

The practice of medicine: a treatise on special pathology and therapeutics (Volume 1).

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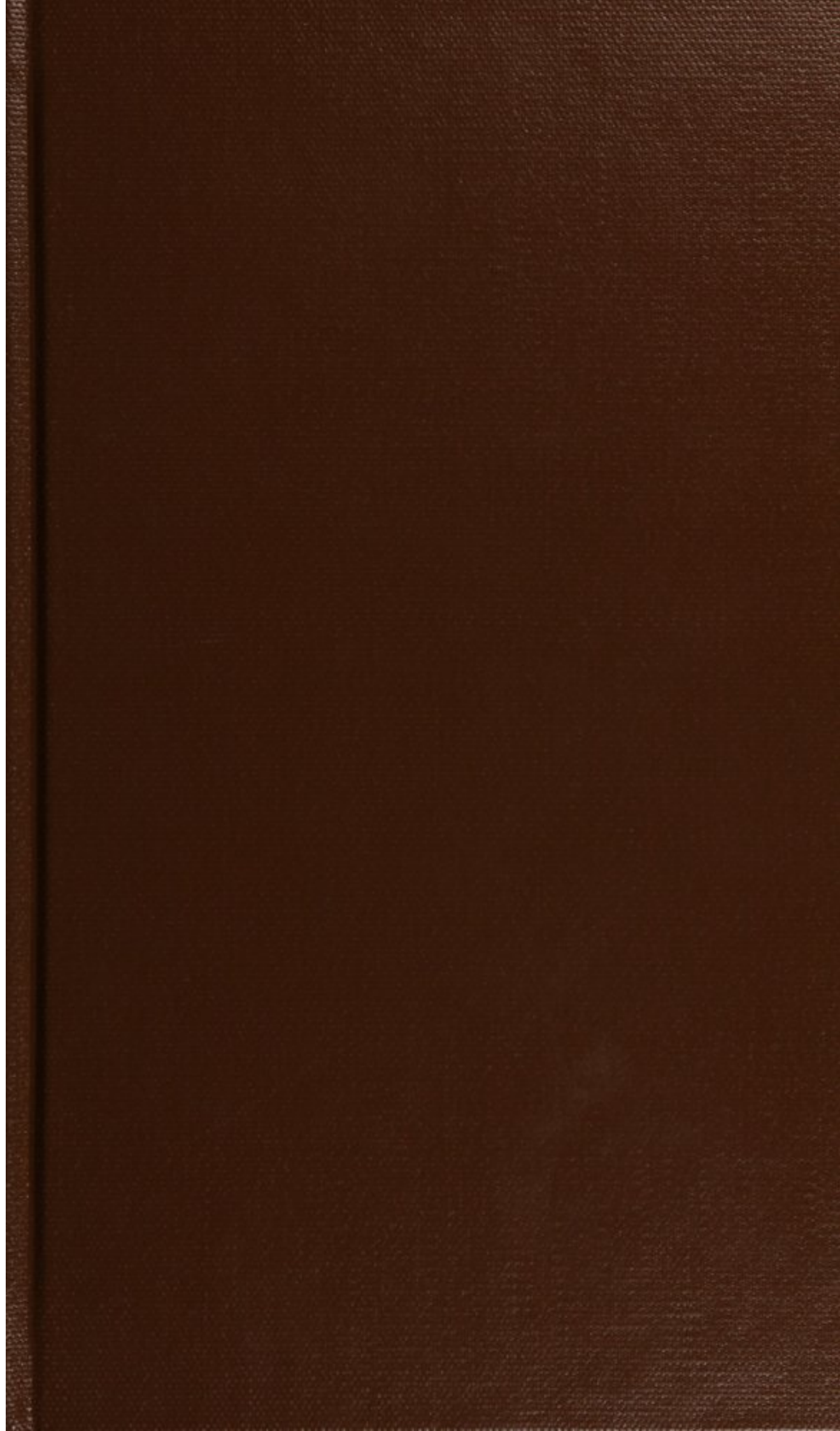
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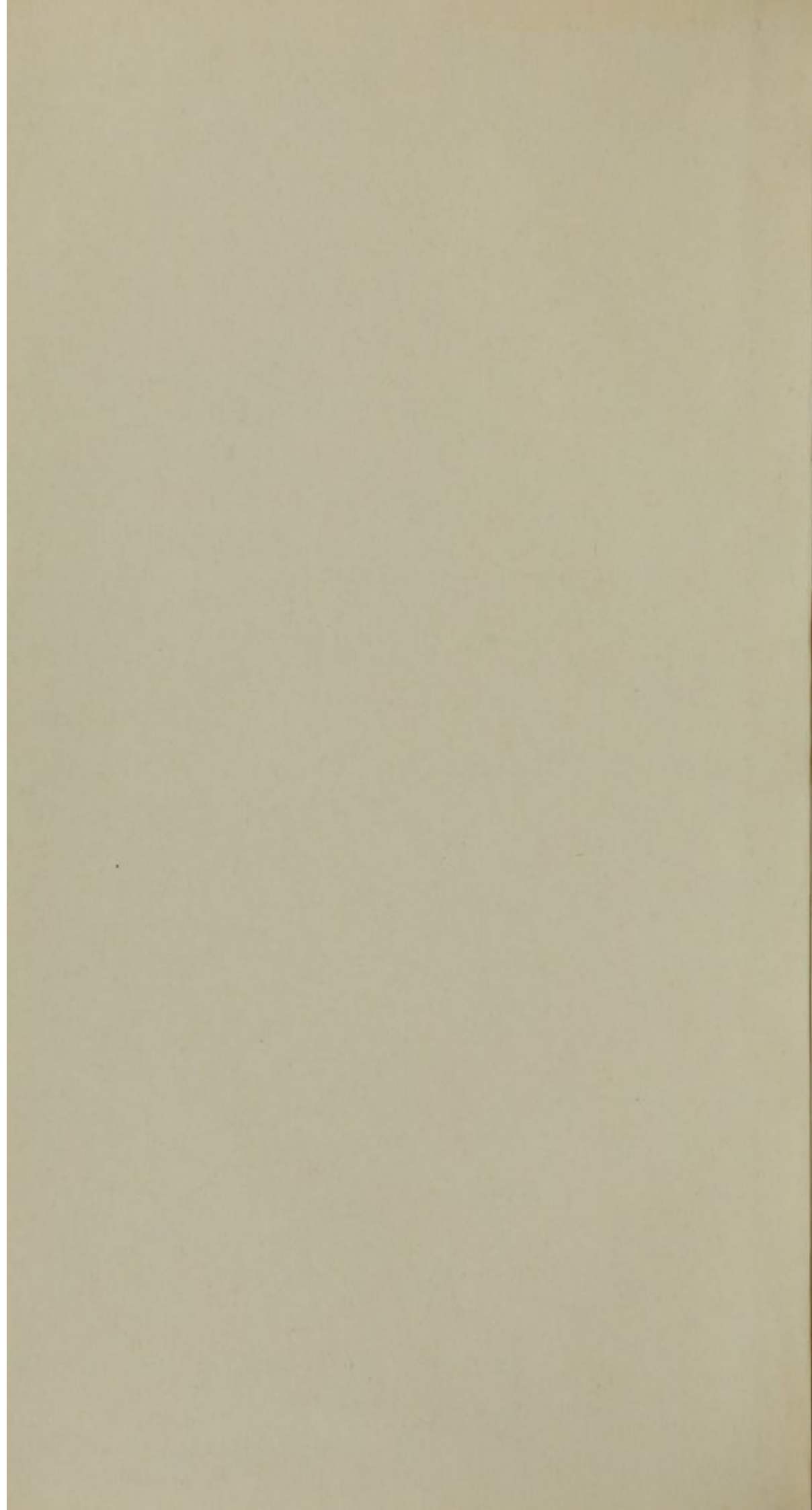
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THE
PRACTICE OF MEDICINE:
A TREATISE
ON
SPECIAL PATHOLOGY AND THERAPEUTICS.

BY
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PHILOSOPHICAL SOCIETY, ETC. ETC.

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IN TWO VOLUMES.

VOL. I.



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C. SHERMAN, PRINTER.

TO THE GENTLEMEN,

WHO HAVE

HONOURED THE AUTHOR BY THEIR ATTENDANCE ON HIS LECTURES

IN THE COURSE

OF

THE LAST EIGHTEEN YEARS,

This Work

IS AFFECTIONATELY INSCRIBED.

is affixed

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TO THE GENTLEMEN

OF THE

HOUSE OF COMMONS

IN PARLIAMENT ASSEMBLED

THE FOLLOVING

Bill

IN RESPECT TO THE

PREFACE TO THE SECOND EDITION.

It is scarcely necessary for the author to say, that the extraordinary sale, which the first edition of this work has met with, is most gratifying to him. It sufficiently satisfies him, that the large amount of labour and reflection, which he bestowed upon it, has been found serviceable to his medical brethren, and more especially so, perhaps, to those who are engaged in the study of their profession.

Grateful for this result, the author has endeavoured to render the present edition still more useful, by adding whatever of importance has transpired in the short period that has elapsed since the first edition was published, and by supplying omissions, which were almost inevitable in the first impression of a work in which so many subjects are treated of.

It has been pleasing to the author to observe the favourable manner in which the work has been noticed by almost all the Journals of Medicine, which have received it—at home and abroad; and where criticisms have been occasionally made, they have generally been rather against the plan than the manner of execution. That plan was adopted from a full and deliberate conviction of its advantages, and it is, therefore, adhered to in the present edition without modification.

The solid testimony, which the Profession have afforded in favour of the work will incite the author to untiring exertion to render every succeeding edition more and more valuable.

ROBLEY DUNGLISON.

109 South Tenth Street,
March, 1844.

PREFACE TO THE FIRST EDITION.

THE improvements and modifications incessantly taking place in the departments of Pathology and Therapeutics, render it advisable, from time to time, to incorporate them, so as to furnish those, to whom the different general treatises, monographs and periodicals are not accessible, with the means of appreciating their existing condition.

Perhaps at no time has it been more necessary than at present to bring together those various elements: certainly, within the last ten or twenty years, greater activity has been exhibited amongst observers than at any former period, and the researches of recent pathologists have greatly altered the face of the science, in regard to certain lesions more especially. Different views are still entertained

on some of these; but they ought all to be familiar to the observer, in order that his own investigations may receive the proper direction, and—what is all important—that he may know when to remain in doubt.

The departments of Special Pathology and Therapeutics have necessarily occupied a large amount of the author's attention; engaged as he has been for upwards of eighteen years as a Medical Professor, and for a much longer period as a practitioner.

His opportunities, too, for witnessing the phenomena presented by disease in both hemispheres, have been varied. During a long service as a medical student in the north of England, in Edinburgh, London, and in Paris; during a practice of six years in London; of eight years whilst he was Professor in the University of Virginia; of three years as Professor in the University of Maryland; and of upwards of five years as Professor in the Jefferson Medical College of Philadelphia, he has carefully noted the modifications that appeared to be produced by climate and locality. Moreover, his service for three years as Physician to the Baltimore Infirmary; and for a longer period as Physician to the Philadelphia Hospital, one of the largest charities in the country, has equally enabled him to appreciate the differences presented by the same malady, according as it may fall under the care of the private practitioner, or of the medical officer of an eleemosynary institution; and to pronounce, as the result of such observation, that the great principles of Pathology and Therapeutics are the same every where, and that one, who has been well grounded in those principles, can exercise his profession with as much satisfaction to himself, and advantage to the sick, in the scorching presidencies of British India, as in the more temperate regions of our own country. As in the case of epidemics, differences are observable; but those differences are readily seized and appreciated by the well-educated physician, and the appropriate treatment suggested accordingly. Hence, the medical officers of our army and navy, and especially the latter, whose duties carry them to every part of the globe, are found to be as successful in the management of the cases that fall under their care in distant regions, as they would be in the treatment of those that prevail in the spot where they received their medical education.

In regard to the execution of the work, the author would merely remark, that he has endeavoured to give a faithful exposition of what he considered to be the existing views in relation to the subjects of which it treats. He is not conscious of possessing any exclusive opinions, and has endeavoured to be essentially eclectic. Neither is he aware of having any undue prejudices. It has been his good fortune to pass, thus far, through life without imbibing unpleasant feelings towards any honourable member of the profession; he has, accordingly, throughout the work felt a pleasure in referring to the labours of observers every where, and it has been no little satisfaction to him that he has been called upon so often to make mention of the investigations of those on this side the Atlantic.

In the preparation of such a work, a large amount of labour and of reflection has been necessary; and the author humbly hopes, that it may not be found to have been bestowed in vain.

Philadelphia, January 4th, 1842.

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BOOK I.

DISEASES OF THE ALIMENTARY CANAL.

THE diseases of the digestive apparatus are among the most common to which the attention of the physician is directed. They are diversified in character; are frequently serious, and always occasion considerable discomfort. They are interesting too in their relations. Derangement of function or of structure cannot go on for any length of time in any other apparatus without sooner or later involving the functions of this. The stomach especially participates, and hence it has been often termed the "centre of sympathies." On the other hand, serious derangement of the digestive tube reacts upon other organs, and especially upon those in the immediate vicinity, which pour their secretions into it.

The whole of the digestive tube, from the mouth to the anus, is lined by a mucous membrane, whose functions are identified with those of the lining membranes of other outlets; namely, to secrete a lubricating fluid, which may facilitate the progress of the matters destined to pass over them. In the supra-diaphragmatic portion of this mucous membrane, there are no crypts or follicles which demand much attention, excepting those of the pharynx, which are at times greatly enlarged, and give rise to suffering in deglutition.

In the stomach and in other portions of the infra-diaphragmatic division of the tube, peculiar secretions take place; in the former, the gastric acids are secreted, which mix with the aliment, and impress the necessary physical changes upon it. In the small intestine, the solitary follicles or glands of Brunner exist; and the aggregate glands of Peyer, which do not seem to differ in their function from the ordinary muciparous crypts, but which have been elevated of late into importance, as being the seat, according to some, of typhoid fever. In the lower portions, too, of the small intestine, and in the large, follicles exist, that secrete a fluid of an offensive odour, which communicates part of the characteristic smell to the fæces: so that evacuations possessed of fæcal odour, may be passed, even when aliment has not been taken to any amount for a considerable period. The exhalation from the mucous membrane and the secretion from the mucous follicles are poured into the canal, and, in addition to these secretions, the fluids from the salivary glands—the parotid, submaxillary, and sublingual—flow into the mouth; and the products of the secretion of

the liver and pancreas into the commencement of the small intestine. These are all the glandular secretions that are poured into the digestive tube.

Throughout the whole of the tube, from the pharynx downwards, the muscular coat is situate to the exterior of the mucous coat; and from the lower part of the œsophagus downwards, a movement of peristole—a gentle, oscillatory contraction, alternating with relaxation, and commonly termed “peristaltic action”—is going on from above to below, by which the alimentary and excrementitious matters, are urged onwards. The muscular coat varies in its arrangement in different parts of the canal. In the œsophagus, it is thick, especially near the cardiac orifice of the stomach; in the stomach, thin; and, in the small intestine, the fibres are both circular and longitudinal, so that, by the contraction of the former, the contained matters can be pressed upon; whilst, by that of the latter, the length of the intestine to be passed over is diminished.

In the first portions of the large intestines—the cæcum and colon—the arrangement is different. The muscular fibres, which proceed longitudinally, are collected into three separate bands or fasciculi; the circular fibres are likewise in fasciculi, and give the colon the sacculated or pouched appearance which it is known to present. The effect of this is, that, in the pouches, there are essentially but two coats, the mucous or inner, and the peritoneal or outer. In the rectum, this arrangement does not hold. Its strong muscular coat exhibits that it is adapted for energetic contraction.

The whole appearance of the alimentary canal sufficiently exhibits, that its different parts are destined for different functions. The shape of the stomach shows that it is a place of sojourn, or a reservoir of detention, in which the food undergoes admixture with the supra-diaphragmatic secretions and those from the stomach itself. The character of the small intestines, as seen externally, shows it to be a mere canal for the passage of food along it. It has none of the aspects of a reservoir; but when we inspect the internal surface of the upper portion more especially—the duodenum and jejunum—we notice folds of the mucous membrane, called *valvulæ conniventes*, whose effect must be to detain the alimentary matter for a longer period than the smooth lower portion of the same intestine—the ileum. These *valvulæ* have likewise the additional effect of affording a larger surface for the chyliferous vessels, which have their origin, in greatest abundance, in the part of the canal where the *valvulæ* exist. Here digestion is completed; for, although it may still take place lower down, and to a certain extent even in the cæcum, as has been believed by many, the main digestive operations are certainly *stomachal*, and perhaps *duodenal*. The whole arrangement of the large intestine exhibits, on the other hand, that it is a reservoir, and intended for the detention of the excrementitious matter, until the desire arises to expel it. It is not true, that the excrement always passes onwards into the rectum, and there accumulates. The rectum is generally empty, or contains but a small amount of *fæces*, even when the colon may be distended; but when the *fæces* are very thin, they descend

into the rectum, and, were it not for the sphincter, would be constantly passing off. The part which usually acts as a sphincter, is the annulus at the top of the rectum, or at the termination of the sigmoid flexure of the colon; and it is important to bear this in mind in certain pathological cases to be referred to hereafter.

When the fæces are detained long in the pouches of the large intestine, and especially in the heat of summer, when the watery portions of the blood are largely thrown off from the cutaneous surface, the liquid parts of the excrement are taken up, and the fæces, when extruded, have the shape of small balls, and are extremely hard. These *scybalæ*, as they are termed, by remaining in the pouched portions of the colon, may readily become the source of disease in the lining membrane. The arrangement and position of the cæcum facilitates this kind of detention, and gives rise to a form of enteritis, to which attention has been directed chiefly of late years.

Lastly—inasmuch as the membrane, that lines the canal, extends along the excretory ducts as far as the glandular organs, which have been described as pouring their secretions into the digestive tube, it can be readily seen, that pathological conditions of the former may implicate the latter; and that many of the diseases of the liver and pancreas, for example, may have their origin in the alimentary canal. Thus, agents, which affect the latter, may exert their remedial agency upon the glands through continuity of membrane, without its being necessary to invoke the more operose process of absorption into the mass of blood, and action on the secretory organ through that fluid. In like manner we can explain how affections of the throat may interfere with audition. Of late years, more especially, the attention of pathologists has been directed to the morbid states of the Eustachian tube, on which many cases of deafness have been found to be dependent. The Eustachian tube opens into the pharynx, and is lined by a prolongation of the pharyngeal mucous membrane. Hence, if inflammation attack the pharynx, it may spread along the tube, and by obstructing it, occasion deafness, either temporary or permanent, according as the obstruction of the tube passes off with the inflammation that caused it, or continues.

CHAPTER I.

DISEASES OF THE MOUTH.

I. INFLAMMATION OF THE MOUTH.

SYNON. Stomatitis; *Fr.* Stomatite, Inflammation de la Bouche; *Ger.* Mundentzündung.

THE mucous membrane of the mouth is liable to various forms of inflammation, which may be simple or erythematous, accompanied by a pseudo-membranous or diphtheritic exudation, or by an eruption; or the follicles of the mouth may become ulcerated, or the stomatitis may end in gangrene. All these pathological conditions it may be well to inquire into separately.

a. *Simple Inflammation of the Mouth.*

SYNON. Simple Stomatitis.

Diagnosis.—The mucous membrane is unusually red, hot, and dry, and extremely sensible to the contact of foreign bodies, even of the tongue. The redness is commonly in patches, and the affection rarely gives rise to general symptoms. It usually passes off in a few days by resolution, but occasionally terminates in ulceration or gangrene. The latter is not, however, to be anticipated; but induration of the submucous tissue is at times left by it. Ptyalism is not an unfrequent concomitant.

Causes.—The most frequent cause is the ingestion of hot or acrid substances; injuries done to the mouth by bruises, by the operations of the dentist, or by the accumulation of tartar around the teeth. During the age of the first dentition, stomatitis may arise from this source, when it may be accompanied by signs of general pyrexia. Occasionally, too, erythematous stomatitis would seem to be induced by disorder of the tube lower down.

Treatment.—This form of stomatitis generally yields readily. If induced by acrid or hot substances, it passes off spontaneously in a short time. Milk diet and mucilaginous gargles, as of flaxseed tea, or infusion of slippery elm, or a lotion of the white of egg mixed with water, are all that can be demanded. If the stomatitis be dependent upon gastric derangement, it disappears as soon as the derangement ceases. Small doses of magnesia, combined or not with charcoal, may generally be prescribed in such cases with marked benefit.

b. *Diphtheritic Inflammation of the Mouth.*

SYNON. Diphtheritic Stomatitis.

This is the stomatitis with altered secretion of some, and ought to include both the thrush or *muguet* of the French writers, and the pseudo-membranous stomatitis, *stomatite couenneuse* ou *diphthérite buccale*. Both are varieties of the same kind of inflammation of the mucous membrane, but it may be convenient to examine them separately.

1. *Pultaceous Inflammation of the Mouth.*

SYNON. Aphthæ of Children, Aphtha seu Aphthæ Infantum, A. Neonatorum seu Lactantium, A. Lactucimen, Lactucimina, Lactumina, White Thrush, Thrush, Milk Thrush; *Fr.* Aphthes des Enfants, Muguet, Stomatite Crèmeuse Pultacée; *Germ.* Aphthen der Säuglinge, Schwämmchen der Säuglinge.

Thrush attacks the new-born infant chiefly, although it is described as occurring in the course of certain diseases, as of phthisis in the adult. This last condition, however, is not stomatitis with altered secretion, but the aphthous stomatitis to be described presently.

Diagnosis.—Thrush is easily recognised. The whole of the surface of the tongue exhibits unusual redness, and here and there small curd-like exudations are perceptible, especially behind the lips and about the tip of the tongue; these gradually increase in number, and coalesce so as to form irregular patches, which are thrown off, and renewed, leaving the mucous membrane, from which they are detached, of a vivid red colour. In slight cases, the exudations are discrete; but in the more severe, they always run together, until occasionally the whole of the mucous membrane of the mouth, as well as of the pharynx, and perhaps œsophagus, is implicated. The skin is commonly hot and dry, and the thirst considerable. The disease is usually of but little consequence, and terminates in a few days in health; but in the foundling hospitals, where numbers of children are crowded together in a small space, and where appropriate ventilation and nourishment cannot readily be obtained, it is a serious malady, the inflammation extending down the digestive tube, and in this way proving at times fatal. In the milder cases that occur in private practice, this extension of the disease,—indicated by diarrhœa, with an irritating character of the alvine discharges, occasioning redness and excoriation around the anus,—is an almost constant concomitant.

Causes.—Early period of infancy, imperfect nutrition, and the atmospheric deterioration occasioned by crowding a number of children together within a restricted space, must be ranked among the predispositions. There is evidently, too, in young infants, a greater predisposition in the mucous membranes, when inflamed, to be covered with diphtheritic exudations or concretions. By many, it has been supposed to be propagable by contagion from the nipple; but others are not of this opinion. Children have often been seen to drink from the cup used by others affected with the disease, without receiving it themselves. The author is unable to speak positively from his own experience as to this point.

Treatment.—Generally little more is needed than in simple stomatitis. The mouth may be wetted several times a day with a linen rag dipped in some emollient liquid, as the infusion of the slippery elm, or simply in milk and water. As, however, the lining membrane of the intestinal canal is generally more or less affected, and the source likewise of altered secretions, an occasional dose of magnesia, alone, or associated with rhubarb, may be advisable.

A common mouth medicine, in these cases, is borate of soda mixed with honey, in such proportion as the practitioner may deem advisable:

R.—Sodæ borat. in pulv. p. i.
Mellis despumat. p. viii.

By some, the mouth is directed to be cleansed by vinegar diluted with water, applied like the emollient liquid directed above.

The diet should be demulcent, and of the character recommended for simple stomatitis.

2. *Pseudomembranous Inflammation of the Mouth.*

SYNON. Pseudomembranous Stomatitis; *Fr.* Stomatite Pseudomembraneuse ou Couenneuse, Diphthérie Buccale.

This can be regarded as only a severe variety of the last, affecting the same parts; the exudation being detached in large flakes, having the ordinary appearance of false membranes. These are soon renewed, but in favourable cases, the inflammation, that gave rise to them, gradually disappears; in other cases, signs of gangrene supervene; this termination, however, and indeed the variety of the disease itself, is rare, except in large foundling establishments, where the mortality from it is at times frightful: of 193 cases, observed by M. Valleix, 153 terminated fatally. In such cases a disagreeable sense of heat is experienced by the little sufferer, with pain augmented by the contact of foreign bodies; the breath is fetid, and the submaxillary glands enlarge and become painful. Later on, the lips and gums are tumid and bloody; a sanious saliva flows copiously from the open mouth; the breath becomes more and more fetid; and the face flushed and swollen. The fever is more or less intense, with headache, restlessness and want of sleep.

Treatment.—Where an impure air is connected with the origin of the disease, it is, of course, important that the patient should be removed from its influence. In the early period, the mucilaginous collutories, recommended in the last variety, may be used, with gentle laxatives of magnesia or castor oil. Afterwards, a mixture of muriatic acid and honey may be employed to touch the pseudo-membranous patches: this may be done by means of lint rolled around, or of sponge attached to, a small stick. Collutories of chlorine water,^a chlorinated lime,^b creasote,^c and vinegar and alcohol,^d have likewise been recommended.

^a R.—Mucilag. acaciæ, gr. xij.

Aquæ chlorin.

Syrup, aa f3ss.

Aquæ, f3iv.—M.

^b R.—Calcis chlorin. gr. xv.

Mucilag. acaciæ, f3j.

Syrup. cort. aurant. f3ss.—M.

^c R.—Creasot. gtt. xv.

Mucil. acac. f3iss.

Aq. camphor, f3xss.—M.

^d R.—Aceti. f3ij.

Alcohol. f3iij.

Aquæ, f3iv.—M.

The application of muriatic acid, as well as of the other collutories, must be made once or twice, or oftener, in the twenty-four hours, as the case may require.

Alum,^a nitrate of silver,^b and sulphate of zinc,^c have all been used as collutories, but they are not possessed of any advantages over the articles already mentioned.

^a R.—Alumin. pulv. gr. xx.

Aquæ, f3iv.—M.

^b R.—Argent. nitrat. gr. ij.—iv.

Aquæ, f3j.—Solve.

^c R.—Zinci sulph. 3ss.—3i.

Aquæ, f3vj.—Fiat solutio.

c. *Follicular Inflammation of the Mouth.*

SYNON.—Apthous Stomatitis, Aphthæ, Emphlysis Aphthæ, Follicular Stomatitis, Aphthæ Adulorum; *Fr.* Stomatite Aphtheuse ou Aphthes; *Ger.* Schwämmchen der Erwachsenen.

Much difference of sentiment has existed as to the precise nature of apthæ; some regarding them as synonymous with stomatitis in general, and especially with the two last varieties; others, that they consist in an inflammation of the follicles of the mucous membrane of the mouth; others, that they are eruptive and divisible into three species—the papular, the vesicular, and the pustular; and others, again, that they are entirely vesicular, and resemble the follicular ulcerations of the œsophagus and intestines.

Apthous stomatitis may be either discrete or confluent. It attacks the parts especially where the epithelium is most apparent. In founding hospitals, however, an ulcerous form of gastritis is occasionally seen, which strikingly resembles apthous ulceration of the mouth. The whole of the internal surface of the stomach is studded with superficial, rounded, or oval-shaped ulcers, a line or two in diameter, having a yellow base, and slightly tumefied edges of a beautiful red colour.

The discrete form is not often met with in infants, but is common in children who have passed the first dentition, and in adults; and is often preceded by some degree of fever and signs of gastric derangement, which pass off in the course of a few days; hence it has been termed *ephemeral apthæ*. The confluent form, which in consequence of its slow progress, has been termed *stationary*, is rarely confined to the mouth like the discrete, but extends to the fauces, and at times even to the infra-diaphragmatic portion of the digestive tube. It is not common in the United States; but is said to be very often met with in moist countries, as in Holland, where it reigns at times epidemically, and is a serious affection, attacking adults and childbed females especially. This form is accompanied by great cephalic, gastric, and general disturbance, and at times the eruption appears to extend to the intestinal canal, giving rise to severe pain in the abdomen, diarrhœa and typhoid symptoms, under which the patient may sink.

Pathological Characters.—When the mucous membrane of the mouth is inspected at an early period of the disease, it presents the appearances of simple stomatitis. Subsequently, when the eruption has occurred, small transparent, grayish or whitish vesicles are perceptible; and, at the base of each vesicle, there is a raised ring, which is resisting, and of a white colour. Still later, the vesicle breaks at the top, so as to allow the fluid to escape from it; after which it becomes transformed into an ulcer, which spreads, and is bounded by a red circle,—the raised border, that occupied or surrounded the base of the vesicle, gradually disappearing. The last stage is that of cicatrization, which occurs at times rapidly; the patient, who has suffered much one day from the soreness of the ulcers, finding himself entirely well on the next. A slight degree of redness may still remain, but it

gradually disappears, and, whilst it exists, occasions little or no inconvenience.

Treatment.—The discrete form requires merely the treatment recommended in mild cases of diphtheritic stomatitis; in the first instance, mucilaginous, and subsequently astringent, collutories. The confluent kind requires the antiphlogistic treatment, regulated according to the symptoms. Blood-letting is rarely needed: quiet in bed, the warm bath, emollient collutories, in the first instance, and subsequently the more astringent, should be directed. At times, the affection is manifestly asthenic, and requires the internal use of tonics, as the cold infusion of cinchona, and of the acidulous and astringent gargles referred to under the head of pseudomembranous stomatitis.

R.—Infus. cinchon. (sine calore præpar.) f3vss.

Syrup. aurant. f3ss.—M. Dose, a fourth part four times a day.

In such cases, and indeed in aphthous sores in general, touching the ulcerations with the nitrate of silver, sulphate of copper, or tincture of iodine, has been found by the author to be the most effectual remedy. The solution of persesquintrate of iron, internally, has been highly extolled in cases of aphthous sores, by Dr. Adam, of Michigan.

R.—Liq. ferri persesquinit. gtt. xl.

Syrup. aurant. f3ss.

Aquæ, f3vss.—M.

Dose, a fourth part four times a day, to a child three or four years old.

At times, these aphthous ulcerations are extremely difficult of management, and very apt to recur after they have been healed. The author has observed some obstinate cases in women who were nursing,—the affection appearing to be induced by the constant drain from the mother interfering with her nutrition. Weaning the child has, in such cases, been indispensable. Attention has been recently directed to the *Stomatitis* or *Sore Mouth of nursing women*, by Drs. Hale, Backus, Shanks, and Taylor. It would appear to prevail more in some parts than in others, owing to causes that have not yet been appreciated. It is not, however, peculiar to this country.

In those who are affected with the obstinate forms, it is indispensable to change all the physical influences to which they are subjected: the thorough revulsion, induced by travelling, air, and exercise, will often effect that beneficial change, which has resisted every remedy that could be thought of, whilst the patient remained under the same influences in which the malady had been engendered. When aphthous ulcerations have persisted for any length of time, they are to be regarded in the same light as other cases of faulty nutritive action of the dermoid tissue, and the same treatment applies to them strictly. The various eutrophics,* as arsenic, iodine, sulphur, &c., are accordingly beneficial, either alone, or associated with the thorough revulsion recommended above.

* For want of a more appropriate term, the author applies this to agents which, through the blood, modify the action of the system of nutrition, without necessarily producing a sensible increase of any secretion. (See his *General Therapeutics and Mat. Med.* vol. ii. p. 278. Philad. 1843.)

The stomatitis induced by mercury—*mercurial stomatitis*—requires a similar treatment, (see MERCURIAL PTYALISM.)

d. *Gangrenous Inflammation of the Mouth.*

SYNON. Gangrenous Stomatitis, Gangræna Oris, Stomatice Gangrænosa Infantum, Cancer Aquaticus, Noma, Cancrum Oris, Cheilocace, Ulocace, Cheilomalacia, Scorbutus Oris, Canker of the Mouth, Sloughing Soremouth of Children, Gangrenous Soremouth, Sloughing Phagedæna of the Mouth, Water Canker; *Fr.* Cancer aquatique, Stomatite Gangréneuse, S. Charbonneuse; *Germ.* Wasserkrebs des Mundes, Mundkrebs, Lippenkinderbrand, Mundkinderbrand, Wangenkinderbrand, Sphacelöse Mundfäule.

Many of the French writers have a division of gangrenous stomatitis; and it may be retained for the purpose of describing a scourge of our establishments for infants, which does not succeed to any well characterized inflammation, and may perhaps be considered gangrenous *ab origine*;—the inflammation that may exist being secondary. It need scarcely be said that all forms of stomatitis, which have been described, may be followed by one form or other of gangrene; the ulcerations may become of a brown colour, and covered by a soft slough, which, when it is detached, leaves the surface beneath highly red and of a granulated appearance. The surrounding parts, in such cases are commonly much tumefied, and of a livid appearance, the breath at the same time having a gangrenous fœtor, and the saliva flowing more or less copiously from the mouth. The sloughing sometimes makes frightful progress, so that the cheeks and gums are occasionally destroyed by it before the little sufferer sinks. These symptoms have frequently been ascribed to mercury; but extensive and spreading ulcerations, with great fœtor oris occur where not a particle of mercury had been taken.

A terrific form of gangrenous stomatitis, which, as remarked above, is one of the scourges of establishments for infants, is that which is most commonly known under the unclassical name of *cancrum oris*.

Diagnosis.—This affection does not always present the same symptoms. At times, on the inside of the lips or cheeks, small vesicles, of a grayish or livid red, or even black colour, appear, without much pain or swelling, but surrounded by a red base; preceded occasionally, or accompanied at their inception, by considerable fœtor oris and augmented secretion from the salivary glands. These speedily pass into a state of gangrene. The swelling, surrounding hardness, heat and pain increase; the vesicle sinks, and in its vicinity livid or black points are observed, which pass into extensive sloughs, surrounded by a glossy tumefaction; and spread so rapidly, that often, even in the course of two days, the lips, cheeks, nose, tongue, palate and tonsils, and even the whole face, become gangrenous, and slough off by piecemeal; the unprotected teeth falling at the same time from their sockets. At other times, the disease commences at the edges of the gums, opposite the incisors of the inferior jawbone; the gums present a white appearance at these points, become spongy and separated from the teeth, and the whole appearance is like that induced by mercury taken so as to affect the system. Ulceration now begins, and extends along the gums until the jaws are implicated; and, as the disease advances, the cheeks and lips begin to swell, and form a tense and indurated

tumefaction; the gums are gradually destroyed by ulceration; the teeth become loose, and fall out; the gums and inside of the cheeks soon assume a gangrenous appearance, and the breath is insupportably fetid. The exterior of the cheek or the part where the tumefaction existed, now becomes of a purple colour, and vesicles often form from one-fourth of an inch to an inch in diameter, filled with a dark-coloured fluid, which soon burst and discharge, and are speedily followed by the formation of sloughs. The discharge from the affected portions is often very acrid, and occasions excoriations of the unaffected parts with which it comes in contact. In the very early stages of the disease there is not much constitutional disturbance,—scarcely any fever or loss of appetite; the desire for food is indeed, at times great; but as the disease proceeds, and involves a greater extent of parts, irritative fever supervenes, the appetite is destroyed, colliquative diarrhœa sets in, and death closes the scene. Yet formidable as the disease always is, the deaths are not always in a very large proportion. In the year 1838, of twenty-three cases treated in the children's asylum of the Philadelphia Hospital, nineteen recovered, and four proved fatal. It would seem to be frequently complicated with pneumonia. M. Baudelocque, indeed, asserts, that the complication is invariably found to exist; and MM. Rilliet and Barthez met with it in every instance that came under their notice.

Causes.—The essential nature of this disease is unknown to us. It is strikingly analogous to that of gangrene of the lungs, hospital gangrene, and the *pustule maligne*. All these affections have been believed by some, indeed, to be identical. Among the predisposing causes must be reckoned the age of childhood; but infants at the breast are rarely affected by it. It is most frequently observed between the age of twenty months and seven years. A great predisposing cause exists in the impure air and imperfect nourishment in large establishments for children. It is hence important, that all such establishments should have their windows constructed so that they can open to the floor; in any other form, perfect ventilation is impracticable; the unchanged and impure air stagnates beneath the window sill, and must necessarily be breathed by the infants, whilst those of larger growth may not inhale it. The cachexia, thus induced, is extremely favourable to the production of the disease. In like manner, the state of the system that follows measles or scarlatina constitutes a predisposition. The most serious epidemics, which the author has observed, have supervened on the former disease.

As the disease often occurs endemically in hospitals, attacking a great number of children about the same time, a question has arisen whether it be not propagable by contagion. Opinions have differed on this subject. It has been affirmed by Dr. Evanson, that, when sloughing or gangrene is present in stomatitis, or a disposition to such is manifested, all agree upon the necessity of separating children not affected from those that are ill. This will be proper, whether we regard the disease to be contagious or not. On the other hand, many of the best observers consider, that there is nothing to prove the contagiousness of the disease, and affirm, that it is usually observed

in one patient at a time, in an hospital, even when surrounded by numbers of other children.

Treatment.—From the nature of the disease, and the individuals that are generally affected by it, the proper treatment of gangrenous stomatitis will be readily appreciable. The great indications are to support the strength of the system, and to modify the condition of the gangrenous parts. The treatment will consequently resolve itself into first, the *internal*, and secondly, the *external*.

1. Tonics and antiseptics are here indicated. Of the former, the best, perhaps, is cinchona, and especially the salts of its active principle, quinia. As the subjects of gangrenous stomatitis are commonly young, these preparations have the advantage of being administrable, owing to their potency, in small quantities; and when they cannot be taken by the mouth, they may be given in enemata, or be sprinkled on the ulcerated surfaces.

R.—Quinæ sulphat. gr. viij.

Syrup, simpl. f 3iv.—M.

Dose, a dessert spoonful every three hours to a child six years old.

Or, R.—Quinæ sulph. gr. viij.

Aq. chlorin, f 3i. vel.

Acid. sulph. dil. gtt. v.

Syrup, limon. f 3iv.—M. Dose, same as the last.

Chlorine water and chlorinated lime, or chlorinated soda, may also be administered with advantage.

R.—Calcis chlorin. gr. x. vel.

Liq. sodæ chlorin. gtt. viij.

Syrup. f 3ij.

Aquæ, f 3iv.—M. Dose, same as the last.

The disease obviously consists in a morbid condition of the function of nutrition, and every thing that modifies it can scarcely fail to be beneficial. Iodide of iron may, in this manner, serve a useful purpose.

R.—Vini Hispan. (sherry) f 3iv.

Ferri iodid. f 3i.—M. Dose, a teaspoonful, four times a day.

Chlorate of potassa has recently been highly extolled by Dr. Henry Hunt, in the quantity of from ʒj. to ʒij., according to the age of the patient, in twelve hours. The beneficial influence of the salt, he says, is generally apparent within forty-eight hours after its being first given; and it seldom fails to arrest the progress of the disease, and to effect a cure, if administered before the patient is very much exhausted. The author has had no experience with it.

All these agents act as eutrophics, by modifying the condition of the blood in the vessels; and as the modified fluid circulates through the tissues that are in a pathological condition, it impresses their sensibilities in a different manner, and breaks in upon the morbid state, especially when aided by the agents that constitute the external treatment.

2. The great object in the external treatment is to arouse the living portions beneath the sloughs to action, and to promote the separation of the latter. When the cheek is observed to be tumid and hard, leeches and blisters have been applied, but without affording essential

relief. The inflammation is, indeed, of the asthenic character, and will not bear depletion, although advantage might be presumed to follow the application of blisters, as in cases of erysipelatous inflammation. The best plan would appear to be to scarify the sloughs down to the diseased parts, and then to apply remedies that are appropriate for exciting a new action in the parts. These remedies belong to the class of excitants, and some of them act as powerful escharotics, and as antiseptics or disinfectants.

By some, it has been recommended, when a slight erosion is perceptible in the interior of the mouth, and a violent ecchymosis internally, to cauterize the central part of the swelling, either with butter of antimony, or with undiluted muriatic acid, introduced to the bottom of a crucial incision made on the outside of the cheek, or with the actual cautery, which is preferred by some. Dr. Baron recommends it as the sole means of restoration, and that it should be employed as early as possible to avoid extensive loss of parts. Others, however, are not favourable to its employment. In the epidemic in the Philadelphia Hospital, before alluded to, the author suggested the use of creasote, applied after incisions had been made through the gangrenous parts.

R.—Creasot.

Alcohol. aa f 3ss.—M.

To be applied by means of a pencil.

Potassa, in the form of the liquor potassæ, nitric acid,^a pyroligneous acid,^b chlorine,^c chlorinated lime,^d chlorinated soda,^e and tincture of muriate of iron,^f with or without incisions, have likewise been advised; but the caustics or excitants, which have met with most favour, have been sulphate of copper, and nitrate of silver used in the solid form, so as to produce an eschar over the whole of the sloughing parts.

^a R.—Acid. muriat. f 3iss. vel.

Acid. nitric. f 3i.

Aquæ, Oj.—f. lotio.

^b R.—Acid. pyrolign. f 3ss.

Syrup. f 3i.

Aquæ f 3iv.—f. lotio.

^c R.—Aq. chlorin.

Syrup. aa f 3ss.

Acaciæ, pulv. gr. xij.

Aquæ, f 3iv.—f. lotio.

^d R.—Calcis chlorin. gr. xx.—xxx.

Mucilag. acaciæ, f 3j.

Syrup. f 3ss.—f. collutorium.

^e R.—Liq. sod. chlorin.

Aquæ, aa p. æ.—f. lotio.

^f R.—Cupri sulph. 3ij.

Cinchon. pulv. 3ss.

Aquæ. f 3iv.—M.

(B. H. Coates, of Philadelphia;) or, the bark may be omitted.

Whatever preparation is employed, it is well to make it come in contact, as far as is practicable, with the diseased tissues.

When sloughs have formed on the cheeks, the yeast cataplasm, or poultices containing powdered bark, or chlorinated lime or chlorinated soda, or pyroligneous acid, may be applied to the part previously washed with any of the lotions already mentioned. Should diarrhœa supervene, it may be treated by a small dose of castor oil and laudanum, in the first instance, and subsequently by starch and laudanum glysters, to which sulphate of quinia may be added, if esteemed advisable.

R.—Ol. ricin. f 3j.

Tinct. opii, gtt. ij.—M.

The diet, throughout the disease, should be nutritious, consisting of beef tea, beef essence, wine whey, the farinaceous vegetable preparations, as arrow-root, sago, and tapioca to which wine has been added, in quantities suitable to the condition of the patient; and it need scarcely be said, that where practicable the child should be removed from the atmosphere in which the disease was generated.

SECTION I.

DISEASES OF THE TONGUE.

The condition of the tongue is an important index in disease. It shows the degree in which the function of secretion elsewhere is modified, is indicative of morbid conditions of the lining membrane of the alimentary canal at a distance from it, and of the extent of general disorder; and in some diseases, as in scarlatina, presents appearances that are peculiar. Its state of moisture or dryness has likewise to be noted in disease. It may, however, become unusually dry under the influence of nervous agitation;—one of the circumstances, which exhibit—that although we may regard the process of secretion to be carried on independently of the nervous influence, such influence is capable of modifying it in some degree. In the case of the secretion from the lachrymal gland, we have an example in which the secretion is augmented under mental emotion. These, however, are symptomatic conditions. The idiopathic affections of the organ alone concern us here.

I. INFLAMMATION OF THE TONGUE.

SYNON. Glossitis, Inflammatio Linguae, Glossonecus Inflammatorius, Angina Linguaria. *Fr.* Glossite, Inflammation de la Langue; *Ger.* Zungenentzündung.

Inflammation of the tongue may be superficial or deep-seated. The former, affecting the mucous membrane, has been considered under stomatitis. The latter is a different affection.

Diagnosis.—The tongue is observed to be painful, hot, red, and swollen; and, when attempts are made to move it, the pain becomes excessive. At first, the affection may be limited to a part, and a small part of the organ; but gradually it extends; the pain becomes acute, lancinating, and burning; and the smallest contact of a resisting body is almost insupportable; deglutition, articulation, and, in short, every muscular motion in which it is implicated, excite the most excruciating torment. At times, the tongue is so enormously swollen as to threaten suffocation, and to hang out of the mouth; and, occasionally, by the pressure of the teeth, indentations are made, and livid or black appearances presented on the protruded part, which threaten mortification. Whilst the tongue is in this condition, and covered frequently with a thick fur, saliva flows copiously from the mouth; and, during the existence of the phlegmasia, the general symptoms are such as are present in all forms of inflammation, and are proportionate to its severity. A tumour is sometimes met with on the upper surface of the tongue, which is at first, hard, and slightly painful on pres-

sure; this suppurates slowly, and afterwards forms a deep ulcer. At other times, the tongue presents a diphtheritic appearance, under which ulcers form, which may even perforate it. The edges of the tongue may be ulcerated, owing to the pressure of sharp spicula of teeth. The sores are tender, and surrounded with a hard base, and may be considered as belonging to stomatitis. They do not, at least, require any separate management.

Causes.—These are usually acrid substances taken into the mouth, or injuries inflicted by the teeth, or by external bodies. It is one of the results of the ptyalism induced by mercury; and the most alarming cases, which the author has ever seen, occurred in this manner. It is met with also in the course of smallpox and scarlet fever, and exists not unfrequently in severe cases of isthmitis and amygdalitis.

Pathological characters.—These may be gathered from the detail of the symptoms. The great tumefaction is owing to the infiltration of serum; but at times coagulable lymph is thrown out, which accounts for the circumscribed hardness.

Treatment.—Superficial glossitis is rarely a disease of any consequence, and yields to the use of the washes recommended under simple, or diphtheritic stomatitis. The deeper-seated form is a cause of some anxiety. Generally, it terminates rapidly by resolution, rarely by supuration, and still more rarely by gangrene and death. In this form, when accompanied by much swelling, general bleeding may be needed; leeches may, likewise, be applied to the under surface of the tongue, and scarification be made on the upper surface. The last measure affords great relief, by discharging not only the blood contained in the hyperæmic vessels, but the serous fluid effused into the cellular membrane. Relief may also be obtained from the application of ice to the surface of the tongue, and of a blister to the throat and neck.

Occasionally, the tongue, on one or more parts, has the appearance of gangrene, constituting the affection termed, by some, *glossanthrax*. In these cases, it has been advised to apply the actual cautery to the mortified portion, and to make use of the collutories of chlorinated lime or soda, or the other excitant and antiseptic washes, described under gangrenous stomatitis.

In all forms of glossitis, revulsion, by means of active cathartics, or cathartic enemata, may be attempted; and, if the swelling be so great, that the tongue is protruded from the mouth, and pressed upon by the teeth, the organ may be enveloped in a cloth, and be pressed firmly for some time, so as to force the effused fluid into the cellular membrane of its posterior part; and, when once the organ has been returned into the interior of the mouth, it may be retained there by means of a piece of gauze fastened firmly over the mouth, which will enable the patient to breathe without difficulty. The author knew a case of excessive infiltration of the tongue accompanying mercurial ptyalism, which was treated successfully by this method. If, owing to the excessive tumefaction of the tongue, suffocation should be threatened, the organ should be scarified deeply in the direction of its length, and, if the imminent symptoms still persist, tracheotomy or

laryngotomy may be needed. In the cases in which a hard tumour forms, that suppurates slowly, and leaves a deep ulceration, the revulsive treatment by emetics and purgatives, aided by the local application of the solid nitrate of silver, may be entirely successful.

Where the surface of the tongue is covered by a dry, white pellicle, and is ulcerated or perforated—a condition which has been described by Dr. Marshall Hall, as psoriasis—it is necessary, as in cutaneous affections in general, to act on the general system. This can be done by agents that modify the system of nutrition, of which arsenic,^a and iodine;^b are among the best, especially, if given in simple syrup, which, of itself, is capable of modifying the chyle, and, through the blood, the nutrition of the tissues. At the same time, nitrate of silver may be applied to the tongue itself.

^a R.—Liq. potass. arsenit. gtt. xxiv. or, R.—Acid. arsenios. gr. ij.
Syrup. simpl. f3ivss.—M. Micæ panis, ʒij. f. massa in pil.
Dose, one-third, three times a day. xij. dividend.

Dose, one, three times a day.

^b R.—Liq. Iodin. comp. (*Lugol*.) gtt. xxx.
Syrup. f3iiss.—M.

Dose, one-third, three times a day.

The ulcerations, that are occasioned by any sharp projection of the teeth, usually heal readily, without any medication, if the irritating body be withdrawn.

Glossitis does not often pass into the chronic state, but cancer of the tongue may supervene in persons of the cancerous diathesis; and hypertrophy of the organ, which requires a surgical operation, has been observed among its consequences. These hypertrophies appear to assume, at times, the characters of the erectile tissues. At others, the fleshy fibres of the tongue are found, on dissection, to have been converted into a substance of a semi-cartilaginous nature, leaving scarcely a trace of the primitive structure.

II. CANCER OF THE TONGUE.

SYNON. Cancer Linguae; *Fr.* Cancer de la Langue; *Ger.* Zungenkrebs.

This is not a common disease. It is generally situate near the tip of the organ, and sometimes at the edge.

Diagnosis.—When inflammation has not preceded it, tumefaction and induration are the first symptoms; after which, painful shootings are experienced, which augment as the disease makes progress. The movements of the tongue become difficult and painful, as well as the associated actions of mastication and deglutition. At length, the indurated tissue passes to a state of ulceration; the ulcers are irregular, red, and hard, and generally with everted edges; and a sanious, bloody matter, of great fætor, flows from the mouth, along with an increased secretion of saliva. The sufferings, as in other cases of cancer, become insupportable, and the unfortunate subject is worn out by the irritative fever that accompanies it in its latter stages.

Causes.—In all cases, there must be a diathesis, which predisposes to cancer; and, when this exists, any injury done to the tongue may act as an exciting cause.

Treatment.—In the early period, attempts may be made to modify the diathesis by agents which induce a new action in the system of nutrition—as by the internal use of the preparations of arsenic, or iodine given in syrup; but if these agents, accompanied by rest of the organ, produce no change, the only remedy is extirpation of the part affected, which, as it is generally seated near the tip of the tongue, can be accomplished without much difficulty.

SECTION II.

DISEASES OF THE TEETH.

I. DENTITION.

SYNON. Dentitio, Odontia Dentitionis, Odontiasis, Odontalgia Dentitionis, Odaxismus, Teething; *Fr.* Dentition; *Ger.* Zahnen.

The process of cutting the teeth, it need scarcely be said, is natural, and not to be classed among pathological conditions; yet, at this period of the infant's life, the system is so impressible, and the irritation induced by the pressure of the teeth on the nerves of the gum so great, that the attention of the physician is frequently called to it.

Certain symptoms are, to a greater or less degree, universal concomitants of dentition. These are—pain, swelling, and heat of the gums, on which the teeth are pressing; constant flow of saliva, with a desire to bite objects—unless the gums are very painful, when they are carefully avoided; or, if introduced into the mouth, are speedily withdrawn. The child is, at the same time, restless and fretful: the sleep is disturbed, and the digestive organs are often more or less deranged. These symptoms are so generally present, that, in moderation, they can hardly be looked upon as constituting disease; but, where the nervous system is unusually impressible, the irritation from the teeth irradiates to the great nervous centres, and convulsions are the occasional consequences.

It is important to attend to the state of the gums, whenever any diseased condition occurs simultaneously with dentition; yet there can be no question, that many affections are ascribed to it, which are mere concomitants.

The local condition will alone fall under consideration here. The affections that are induced by teething will be examined in their appropriate places.

Treatment.—It has been a question, whether, during the irritation of teething, when the child is desirous of conveying every thing to the mouth, hard substances should be permitted to press upon the gums. It is a common custom to allow the child the use of a piece of coral, or of sealing-wax, or, what is preferable—inasmuch as it cannot be forced into the mouth and injure the soft parts of that cavity—an ivory ring. Some of the French writers discard all such substances, but without much propriety. If the gums be very tender, the child will not use them; and, if pressing the gums upon them should afford relief, there appears to be no good reason, why their use should be

forbidden, as the pressure cannot fail to aid the absorption of the gum. It has been suggested, as a good plan, to allow the child the use of a small wax candle, a stick of liquorice root, or a crust of bread. The first of these may be unobjectionable; but the liquorice root may load the stomach with mucilaginous saccharine matter, if allowed too freely; and the crust of bread may excite alarm, by the softened portions getting into the glottis, and producing symptoms of strangling. The physician, however, is not often consulted on these points; the whole matter being generally regulated by the parent or nurse.

Where the gums are swollen, tense, and very tender—and especially if there be, at the same time, a morbid condition, which appears to be connected with the process—it may be necessary to relieve the hyperæmia, either by scarifying the tumefied gum freely, or by dividing it down to the tooth, until we distinctly hear or feel the tooth grating against the instrument. The restraint under which the infant is placed during the operation generally occasions it to cry, and this is often ascribed to the pain of the operation. This is a mistake. It rarely happens, that much pain is experienced, and very frequently the child bites the lancet, as if the sensation were agreeable to it.

The tooth appears, at times, soon after the operation; but, in many cases, it is long before it presents itself. In the latter category, it has been conceived, that mischief may result from the induration of the cicatrix, which, it is imagined, may retard the exit of the tooth. This is not so. It is well known, that, where absorption takes place upon parts on which there are cicatrices, the cicatrices are more readily taken up than the parts surrounding them.

Free division of the gums is an admirable remedy in the cases above referred to, and the operation may be repeated again and again should circumstances arise to indicate it.

II. TOOTHACHE.

SYNON. Odontalgia, Odontia Dolorosa, Dolor Dentium; *Fr.* Odontalgie, Douleur des Dents; *Ger.* Zahnschmerz, Zahnweh.

This disease is characterized essentially by acute pain in the teeth or their involucres, and is dependent upon various pathological conditions, which may require a brief and distinct consideration.

a. *Inflammation of the Alveolo-Dental Membrane.*

SYNON. Periodontitis; *Fr.* Periodontite, Inflammation de la Membrane Alvéolo-dentaire.

The membrane that lines the socket of the tooth is, at times, attacked with inflammation, giving rise to much suffering.

Diagnosis.—An uneasy feeling in the alveolus, or alveoli, of some part of the jaws when the teeth are pressed together; the teeth of the affected periosteum being evidently slightly forced outwards, so that they cannot be accurately brought in contact. This painful sensation, pulsative and constant, may exist for a few days, and then pass off; but, at other times, the inflammation spreads outwards, so as to be perceptible on the gums; the teeth become loose; and, at times, pus is secreted in the alveolus, which makes its way outwards, between the gum and the tooth. In other cases, the parietes of the alveolus

become carious, and a fistulous ulcer is kept up. When the inflammation has recurred frequently, the tooth may become permanently loose, and act as a foreign body in the socket.

Causes.—Periodontitis may be induced by caries of the fang, which is not often, however, the first cause. Cold and hot fluids, taken into the mouth, and partial exposure to cold and moisture, have been looked upon as exciting causes; but, as in every other form of inflammation, the precise etiology is by no means clear.

Treatment.—The affection generally terminates by resolution; but, should the excitement be great, and the pain excessive, it may be necessary to apply leeches externally, to scarify the gums in the vicinity, and to give a full dose of opium, or of some of its preparations. If the tooth be loose, and no chance exist of its becoming fixed, and the maintenance or recurrence of the disease be owing to this circumstance, it will be advisable to extract it.

Periodontitis, followed by secretion of morbid matter, is a very common cause of the loss of teeth. Occasionally, it appears to be connected with some constitutional *vice*, when it has to be met by constitutional remedies. Dr. Graves gives the case of a gentleman, who had been affected by rheumatic periostitis, which was relieved by the internal use of iodide of potassium. Subsequently, he suffered greatly and repeatedly from periodontitis, which resisted every remedy, until the iodide of potassium was used, which completely removed it.

b. *Inflammation of the Dental Membrane.*

SYNON. Endodontitis, Odontitis, Inflammation of the Lining Membrane of the Tooth; *Fr.* Odontite, Inflammation de la Pulpe Dentaire.

The membrane that lines the dental cavity may likewise be inflamed; but it is not easy to distinguish this from toothache dependent upon erethism of the nerve. It may be suspected, if no signs of caries be observed on examination; but it cannot be accurately diagnosticated. The same intermission in the pain—the same absence of inflammation of the gum—occurs in the early stages: but, afterwards, the pain may become more constant.

Treatment.—If endodontitis is believed to exist, the same plan of treatment may be adopted as in periodontitis.

c. *Caries of the Teeth.*

SYNON. Caries Dentium, Odontalgia Cariosa; *Fr.* Carie des Dents; *Ger.* Beinflrass der Zähne.

This is one of the most common diseases of the teeth, and occurs in some countries more than in others. The traveller, in certain parts of the south of France, and of the southern regions of this country, is struck with the ravages of dental caries, whilst, in other districts, the inhabitants are equally characterized by the excellence of their teeth.

Diagnosis.—Pain experienced when hot or cold liquids are received into the mouth, or the supervention of the ordinary signs of toothache, attracts the attention of the patient to the condition of the teeth, and

careful examination exhibits, that there is either a cavity opening externally in some part of the tooth or teeth affected, or that an internal process of decay has been established, which leaves but a shell of bone between the cavity of the tooth and the open air, so that the dental nerves are readily affected through it by external agents. The precise part at which the caries or gangrene takes place varies. It is usually considered to commence immediately beneath the enamel, in the osseous substance of the corona of the tooth. A small, dark spot is observed, which gradually spreads, until there is a free communication between the external air and the dental cavity. In this mode, the whole of the corona may be destroyed—the fangs alone remaining, and often continuing to excite periodontitis, as extraneous bodies, until they are removed by the punch of the dentist. At other times, the gum closes over them, and they no longer excite irritation. The disease is seated in the system of nutrition of the tooth, and has been presumed, by some, to consist originally in inflammation.

Causes.—It is a common belief, that dental gangrene is universally owing to the action of external agents upon the teeth, and the idea has been maintained for various reasons: in the first place, it gives the dentist an opportunity to form “innocuous” dentifrices, which he can recommend to his customers; and, in the second place, it is often convenient to the parent to hold up the idea to her child as a bugbear, when its desire for sweets and other objectionable articles is inordinate.

The facts, already mentioned, that dental caries is more common in some regions than in others—that it is an evil affecting families in many cases—and that the caries is observed, first of all, beneath the enamel—would, of themselves, make us pause in admitting this belief. There is, moreover, a greater liability to the disease in some teeth than in others. The last molar tooth but one, and generally of the upper jaw, is most usually the first affected; and, after it, the corresponding tooth of the opposite side suffers, owing to their being situate anatomically alike; and, consequently, the immediate cause of caries, after having acted upon the one, will be more likely to affect the other. Often, too, the next tooth to the one that is carious becomes so likewise, and on the side nearest to the diseased portion of the first. This has been supposed to be owing to contagion, but there is no good reason for admitting it. Next to the corresponding tooth of the opposite jaw, the one in immediate proximity with the tooth primarily affected, must be most likely to be implicated, seeing that its anatomical elements—blood-vessels and nerves—can vary but little from those of its neighbour.

The upper incisors are often decayed, and, in unhealthy children, caries sometimes attacks almost the whole of the teeth of the first dentition. It is impossible to depict the kind of dyscrasy which predisposes to the affection. Some have imagined, that those of a tuberculous constitution are more subject to it; but we often see the teeth largely decayed in persons who are neither tuberculous nor strumous.

The prevalent belief is, that acids are very destructive to the teeth, and, therefore, a common cause of caries. But destruction of the enamel does not necessarily give occasion to caries. We have seen

many cases in which portions have been broken off the incisors, yet decay has not supervened, unless the individual was predisposed to it; and the dentist is in the daily habit of filing away the enamel, under the conviction, derived from experience, that caries will not necessarily, or be likely to follow. In certain cases, too, the enamel, in the progress of life, scales off by what John Hunter called "the denuding process;" yet decay does not necessarily result. It would seem consequently, to be improbable, that any agent, which acts chemically upon the enamel, could induce caries, when the removal of the enamel, by the file of the dentist or by mechanical injury, does not occasion it. Besides, it is not easy to conceive how any acid substance, having a greater affinity for the lime of the tooth than the phosphoric acid,—and there are not many such,—could remain in contact with the tooth in a state sufficiently concentrated to exert any chemical agency upon it. The presence of acid in the mouth always augments the secretion from the salivary glands, so that it becomes speedily diluted.

If such be the case with acids, how unlikely is it, that the free use of sugar should be directly injurious to the teeth! In sugar there is no acid, yet it has been imagined, that a chemical action may be exerted upon the teeth by indulgence in it. This—as before remarked is a bugbear, which has doubtless been created, in the first instance, with the view of deterring children from the use of a substance of which they are fond, and the indulgence in which is objectionable for sumptuary and other reasons. It has, indeed, been observed, that the negroes in the West India Islands, who drink the juice of the cane very freely, have unusually good teeth, and we know that the nutrition of the frame improves under its use. There cannot be a doubt, therefore, that external agents, of a chemical nature, are not as much concerned in the production of dental gangrene as is generally admitted; but we can easily comprehend, that, in one who is predisposed to the affection, substances that disagreeably impress the nerves of the fifth pair in the mouth—as hot or very cold liquids—may act as exciting causes, by modifying the nutrition of the teeth, and producing the condition in question.

Treatment.—The readiest method of cure, when caries is discovered in a tooth, is to plug up the hole, where this is practicable, with a metallic or other substance. But this is only admissible when the caries communicates externally, and when the cavity in the tooth is greater than the aperture. Where plugging is impracticable, relief may be obtained by destroying the affected nerves either by the actual cautery, or by caustics introduced into the cavity.

The pain may be palliated by substances that deaden the sensibility of the dental nerves, as the different preparations of opium; essential oils, as of cloves; mustard, alcoholic liquors, &c. One or two drops of hydrocyanic acid, put into the hollow tooth, have assuaged the pain; but it need scarcely be said, that so potent a remedy should be employed with caution. Pyroligneous acid has been used, in the same cases, dropped on cotton; and, of late years, its main energetic principle, creasote, has been more extolled, perhaps, than any other remedy.

When creasote is applied in the same manner as the agents above mentioned, or by means of a pencil imbued with it, it causes instantaneously acute pain and a considerable secretion of saliva. The patient is often relieved, but the pain generally recurs, and perhaps the advantage derived from its use is not greater than that from the stronger essential oils. Creasote may be reduced by the addition of an equal quantity of alcohol. It is the opinion, however, of Dr. Cormack and others, that although creasote affords respite from pain, it hastens the destruction of the teeth. Tincture of muriate of iron, and solution of persesquinitrate of iron, have also assuaged the pain.

Revellents, which act on other nervous ramifications than those implicated, often afford relief even in dental caries, although they would seem to be more advantageous in the neuralgic form. Hence, the chewing of tobacco to one unaccustomed to it; of pepper, pyrethrum, ginger, the bark of aralia spinosa, (*angelica tree*, or *toothache tree*, of the United States,) horseradish, calamus, mezereon, or any agent, in short, which belongs to the class of local sialagogues, may yield relief. A union of narcotics and sialagogues has been proposed, and highly extolled by Rust.

R.—Extract belladon.
 ——— hyoscyam.
 Opii, aa, gr. v.
 Pyrethr. pulv. gr. x.
 Ol. caryophyll. gtt. v.—M.

To be made into one-grain pills, sprinkled with powdered pyrethrum, and kept in a stopper bottle. One of these to be put into the carious tooth.

Where the decay is extensive, and the pain cannot be controlled by any of these agents, the tooth will have to be extracted.

d. *Nervous Toothache.*

SYNON. Odontalgia Nervosa, Neuralgia Dentalis; Fr. Odontalgie Nerveuse; Ger. Nervöse Zahnschmerz.

Under this term many writers describe *neuralgia of the teeth*, which may be mistaken for ordinary toothache from caries, but may generally be distinguished from it by the history of the case, as well as by the pain being more periodical, and shooting with the utmost violence along the branches of the fifth pair distributed to the affected jaw.

Treatment.—For the treatment of this form of neuralgia, the general rules, laid down under the head of neuralgia, will be appropriate. The reliance of the practitioner has to be placed upon narcotics in large doses, administered internally, and applied locally—and upon revellents, as blisters behind the ears. In rheumatic odontalgia, which may be regarded as a variety of nervous odontalgia, the insertion of a little cotton, imbued with creasote, in the ear of the same side, has been found serviceable. A tincture of *spilanthus oleraceus* has been much recommended in France and Germany, as a secret remedy, in toothache, and it is only of late that its composition has been known.² Its virtues are probably dependent upon its acting like the sialagogues

² Take of the leaves and blossoms of *Inula bifrons*, one part; blossoms of *Spilanthus oleraceus*, four parts; roots of *Anthemis pyrethrum*, one part; Alcohol, s. g. 863, eight parts. Digest for a fortnight, and filter.

before mentioned; all of which, by the way, are indicated in nervous odontalgia. The tincture of spilanthus is said to relieve toothache instantaneously, when applied to the gums and teeth. By others, it has been esteemed very uncertain.

The various stimulating liniments, the milder counter-irritant lotion of Granville,^a and sinapisms, have been used with advantage, applied over the cheek or behind the ears; and the more rapid the revulsion, the more effective it is in general. It is in such cases, too, that the efforts of the animal magnetizer and the Perkinist, and the employment of the mineral magnet, may be expected to prove beneficial.

^a R.—Liq. ammon. fortior. f3j.
Sp. rosmarin. f3vi.
Tinct. camphor. f3ij.

A piece of thick coarse flannel to be impregnated with the lotion, and pressed on the part for a few minutes.

To this division of toothache belongs that of the pregnant female, which may, likewise, be relieved by the agents just indicated. It cannot often be necessary to extract the tooth, an operation which should always be avoided, where practicable, for fear the shock may induce abortion.

e. *Exostosis of the Teeth.*

SYNON. Exostosis Dentium; Fr. Exostose des Dents.

Like the bony structures elsewhere, the teeth are liable to exostosis. The deposition usually occurs in the fangs, but scarcely admits of detection. Violent, deep-seated pain, not relieved by the ordinary methods, induces the patient to have the tooth extracted, when the affection is, for the first time, apparent.

f. *Tartar of the Teeth.*

SYNON. Odontolithus, Tartarus Dentium, Odontia Incrustans; Fr. Tartre des Dents; Ger. Zahnstien.

From the saliva, a calcareous matter is deposited, which concretes around the base of the coronæ of the teeth, and, at times, where due attention is not paid, accumulates in considerable quantities, causing the gums to inflame, and to be absorbed, so that the support to the teeth afforded by them is lost. The main constituent of these concretions is phosphate of lime, which is cemented by means of animal matter. It has, indeed, been recently affirmed by M. Mandl—as the result of his microscopic observations—that they are formed of calcareous skeletons of infusoria, agglutinated by means of dried mucus.

When first deposited, the *tartar* of the teeth—for so it is termed—is soft, of a yellowish colour, and easily removable; but, as it hardens, the colour becomes of a dark brown or black, and is extremely unsightly. When it accumulates in any quantity, it is impossible to cleanse the mouth properly, so that the secretions are retained there, and, at the temperature of the mouth, 98°, readily undergo decomposition, so as to taint the breath.

Treatment.—Attention to cleanliness, by the daily use of the tooth-brush, will prevent the formation of this concretion. The brush itself may be sufficient, but any of the ordinary dentifrices may be used along with it. There is no better “tooth powder” than a mixture of

powdered charcoal and powdered orris root;^a but there is no end to the dentifrices that have been recommended.

^a R.—Carbon. ligni pulv. part. iij.
Irid. Florent. pulv. part i.—M.

Each dentist,—nay, each druggist,—has his own, which is, of course, extolled by him as the best; and none are, perhaps, positively injurious. It may be well, however, to bear in mind, that the reiterated friction of a hard brush, employed daily and for years, may have some effect, of itself, in injuring the teeth; and, therefore, that the brush should be used no longer at a time, and with no more force, than is necessary for the removal of the secretions. Where the tartar has already formed, and does not yield to simple friction of the kind advised, dilute acids—which, as has been already observed, are objected to by the dentist, but without sufficient reason—may be employed. Weak sulphuric acid will usually remove the concretions without much difficulty; but, should it fail, the services of the dentist are demanded to scale the teeth; after which, the re-formation of the tartar may be prevented by the tooth-brush and dentifrices.

SECTION III.

DISEASES OF THE GUMS.

Under stomatitis, the inflammatory affections of the mucous membrane, investing every part of the mouth, were included. The substance of the gum is, however, liable to affections which require special consideration.

I. INFLAMMATION OF THE GUMS.

SYNON. Ulitis, Inflammatio Gingivæ; Fr. Ulite, Gengivite, Inflammation des Gencives; Ger. Entzündung des Zahnfleisches, Zahnfleischentzündung.

Inflammation of the gum is a common occurrence, and is denoted by pain, heat, throbbing, tumefaction, and redness in some part of the alveolar coverings. In a state of health, the gum is not possessed of much sensibility; but when inflamed, like many other structures, it becomes highly painful. At times, the inflammation terminates by resolution, but very frequently it passes on to suppuration, constituting *Gum Boil*; (*Parulis, Phlegmone Parulis, Apostema Parulis*; Fr. *Parulie*; Ger. *Zahnfleischgeschwulst*.) The formation of pus takes place, indeed, most rapidly in this structure.

Causes.—As in other inflammations, the causes of ulitis are not often apparent. At times, however, the constant formation of abscesses is owing to some morbid condition of the alveolus; a carious tooth inflames the lining membrane of the socket; pus is secreted; ulcerative absorption takes place, and the abscess gradually makes its way to the surface of the gum. In this case, it is sometimes termed *alveolar abscess*. In particular conditions of the general system, when neither the teeth nor the alveoli appear to be in fault, abscesses frequently

form in the gums, which are not attended with any other inconvenience than that which results during their presence. After a time, and under some new evolution of the system, this tendency disappears.

Treatment.—Scarifying the gums, in the early stages, is one of the best remedies. A leech or two applied to the inflamed part also frequently arrest the inflammation. If suppuration be likely to result, it may be encouraged by the application of any substance, which will retain heat, and be, at the same time, moist. A roasted fig answers the purpose. Yet it may be questioned, whether, in the ordinary moist condition of the mouth, and at a temperature of 98°, the parts may not be in as favourable a condition for the production of suppuration, without the use of “suppuratives” as with them.

When pus has unequivocally formed, it is well to open the abscess, provided it exhibits any disposition to spread; but, usually, it is left to itself, breaks, and discharges its contents, without the superintention of any mischief.

If the recurrence of the abscesses be owing to the presence of a carious tooth, or to sources of irritation in the alveolus, they must be removed where practicable.

II. EXCRESCENCE OF THE GUMS.

SYNON. *Excrecentia Gingivæ*, *Epulis*, *Uloncus*, *Odontia Excrecens*, *Sarcoma Epulis*; *Fr.* *Epulie*; *Ger.* *Auswuchs am Zahnfleische*.

The gums occasionally become hypertrophied, and so exuberant as almost to cover some of the molares, passing behind the upper incisors, so as to interfere materially with the closure of the jaws. Frequently, the hypertrophied portions rise into distinct hard projections having the general characters of the gums themselves.

The cure consists in removing them by the knife, ligature, or caustic. Being supplied, however, with blood-vessels of considerable size, their removal by excision often occasions considerable hemorrhage; and, on this account, recourse has been more frequently had to the latter means. The protuberances, when removed, are apt to return. They have been reproduced six times in succession.

Occasionally the gums—especially those at the buccal side of the superior incisors—are attacked with hyperæmia and some degree of inflammation, but no tendency to suppuration, as in the case of ulitis before described. In this condition, they may remain for a few days, preventing the jaws from being closed, and exciting more or less uneasiness. It has been suggested by Dr. Marshall Hall, that the tumidity of the gums, which consists in their growing up in front, between the teeth, and in the posterior part of the mouth, so as to cover some of the molares, is usually induced by a loaded state of the colon; but it is not easy to see the relation between the two morbid conditions.

If the digestive function be deranged, mild aperients and tonics may be prescribed with advantage; and nothing better can be given than a combination of charcoal and magnesia.

R.—*Magnes. gr. v.*

Carbon. ligni pulv.—gr. xv. f. pulvis.

Dose, one, three times a day.

Scarification, early employed, is also of essential benefit; and, if the protuberance become permanent, it will have to be removed by the means already mentioned.

Another form of *ulcerus* is the fungous or spongy condition, which has been commonly termed *scurvy of the gums*. This is a concomitant of scorbutus; but it occurs in conditions of the digestive organs of various kinds, especially in such as are of an atonic character. At other times, it seems to be entirely local, from causes seated in the gums themselves, or in the teeth or alveoli. The gums exhibit a soft, protuberant, or spongy appearance and bleed on the slightest touch.

Treatment.—In simple sponginess of the gums, in which their texture is lax, and their nutrition consequently executed imperfectly, simple division of the gums on many parts of their surface, with the shoulder of a lancet, is one of the best remedies. The hyperæmia of the capillary vessels is in this manner removed, and the new action, thus induced, itself leads to a cure. Where the affection is to a less extent, friction with a hard brush, where the gums will bear it, may be advisable; and, in both cases, the use of excitant collutories, or pastes, especially after scarification, will be advisable.

R.—Tinct. myrrh. f 3ss.
 cinchon. f 3j.—M.
 Or, R.—Ferri iodid. 3j.
 Aque Oss. fiat solutio.
 Or, R.—Creasot. gtt. iv.
 Aque destillat. f 3ij.—M.

Or, R.—Cinchon. rubr. pulv.
 Carbon. lign. pulv.
 Irid. florent. pulv. aa 3ij.
 Mellis, 3ij.—M.

A small portion of a paste to be rubbed upon the gums, night and morning. As dentifrices, the powders may be used alone.

When the gums will readily bear the tooth-brush, gently astringent dentifrices may be used.

It need scarcely be said, that if the nutrition of the gums be deranged by reason of the state of the teeth or their sockets, the cause, where this is practicable, must be removed; and where the washes, and other preparations, already described, prove insufficient, washes of the nitrate of silver, or stronger solutions of creasote, may be had recourse to, applied by means of a camel's hair pencil. When the affection is connected with an asthenic condition of the system, such as prevails in scorbutus, or when there is simple disorder of the system of nutrition of the part, owing to derangement of the digestive apparatus in particular, these conditions must be removed by appropriate remedies.

A more violent form of epulis is occasionally seen, in which the spongy gums throw out polypous excrescences, which bleed on the slightest touch, and are often connected with some *vice* in the system, or disease about the alveolar processes. These must be removed by the knife, and every care be taken that the whole of the disease is extirpated, otherwise they may return. They are accompanied by great pain and irritation: and, sooner or later, the system sympathizes, hectic fever is established, and, unless a stop be put to the disease, a fatal termination ensues.



III. SHRINKING OF THE GUMS.

SYNON. Ulatrophia, Falling away of the Gums.

Under the influence of mercurials, the gums shrink from the teeth, so that they become loose in their sockets; but this condition passes away along with the other effects of the agent that induced it. In other cases, a similar shrinking of the gums occurs independently of such agency; the teeth are left exposed, and at times fall out, without exhibiting any evidence of decay. This is often owing to incrustations of tartar, which—as has been shown—give occasion to ulcerative absorption of the gums. Where such is the case, scaling the teeth is the obvious remedy. In other cases, it is important to scarify the gums, and to endeavour to excite a new action in them by any of the stimulating applications described under Excrescence of the Gums.

SECTION IV.

DISEASES OF THE VELUM PALATI AND UVULA.

The velum pendulum, and the uvula, are liable to inflammation; the latter affection being known under the names *Staphylitis*, *Uvulitis*, *Cionitis*, *Angina Uvularis*, *Inflammatio Uvulæ*, *Falling down of the Palate*; *Fr. Inflammation de la Luette*; *Ger. Zapfenentzündung*, *Entzündung des Zapfens*, *Niedergeschossener Hück*; the former under those of *Hyperoitis*, *Angina Palatina*; *Fr. Inflammation du Palais*; *Ger. Entzündung des hängenden Gaumens*. The symptoms, causes, anatomical characters, and treatment, are essentially those of stomatitis and pharyngitis.

In certain cases, both the velum and the uvula are much swollen and infiltrated, (*staphylædema*), and interfere both with deglutition, and respiration, but especially the former. When very greatly infiltrated and pendulous, they may give rise to threatening of suffocation. Scarification, or excision of the prolapsed membrane, is the best remedy. At times, the inflammation presents an asthenic appearance, having a dusky, red hue, and the capillary vessels are evidently much distended. Scarification is here essential, and afterwards the employment of stimulant gargles. Occasionally, after the inflammation has subsided, the uvula remains permanently relaxed and elongated, so as to excite a very troublesome cough, and to induce the suspicion of serious thoracic mischief. Inspection of the throat will sufficiently indicate the affection. Provided this form of *staphyloncus* does not yield to the excitant and astringent gargles mentioned under the next chapter, it will be advisable to remove a portion of the uvula, which is a simple operation.



CHAPTER II.

DISEASES OF THE PHARYNX AND ŒSOPHAGUS.

To several of the affections of the throat, the terms *Angina* and *Cynanche* have been given by the older writers, and they are still retained by many of the more modern. They have been applied, however, to so many different affections, that they ought to be discarded. For example, simple cynanche or angina means the common sore throat or inflammation of the mucous membrane of the fauces; whilst angina pectoris has been appropriated to an anomalous affection, in which the parts about the fauces are in no wise concerned. In like manner, we have *Cynanche tonsillaris*, *C. parotidæa*, *C. laryngæa*, &c., to designate, respectively, inflammation of the tonsils, parotid gland, larynx, &c.* These we shall consider in their appropriate places.

I. INFLAMMATION OF THE FAUCES.

SYNON. Isthmitis, Angina, Cynanche, Empresma Paristhmitis, Paristhmitis, Paristh-mia, Cauma Paristhmitis, Inflammatio Faucium, Squinancy, Squinsy, Quinsy; Common Sore Throat, Inflammatory Sore Throat; *Fr.* Angine, *A.* Gutturale, Esquinancie; *Ger.* Bräune, Halsgeschwulst, Halsentzündung.

Isthmitis or paristhmitis is an inflammation of the mucous membrane covering the fauces. It is, as has been remarked, the simple angina or common sore throat, and it does not differ in its essential characters from stomatitis, or from simple inflammation of the mucous membranes in general.

Diagnosis.—The symptoms are unequivocal. The patient complains of difficult deglutition; and, on inspecting the mucous membrane covering the fauces, it is observed to be extremely red, dry, and glossy; the secretion, in the first instance, as in other cases of inflammation of the mucous membranes, being diminished; but, subsequently, a ropy mucus being secreted from it, which gives rise to much inconvenience in deglutition. When the inflammation extends to the uvula, and it becomes tumefied, a constant desire for deglutition is experienced; and the elongated uvula and ropy mucus, hanging down into the pharynx, induce violent retching. The inflammation spreads, at times, into the posterior nares, the top of the larynx, and the Eustachian tubes, so that the smell, the passage of air to the lungs, and the hearing may become impaired.

The duration of this affection is commonly brief. It usually passes

* A recent writer, Dr. Symonds, says, the "term *Angina* implies inflammation of the parts bounded anteriorly by the velum pendulum palati and its columns, and posteriorly by the upper part of the pharynx;" but certainly the most common acceptance is more extensive. Like cynanche, it has been usually employed to designate inflammation of some part of the supra-diaphragmatic portion of the alimentary tube, and of the air passages above the lungs.

off in a few days by resolution, but, at times, goes on to suppuration. This stage may be detected by the appearance of the different parts of the throat; the swelling being more decided at some one point than another; and, by passing in the finger, and pressing upon the tumefied portion, the presence of pus may be detected. The character of the pain likewise varies: at first, it is extremely acute on swallowing, but, when suppuration has become established, it is more dull.

Causes.—As in all cases of inflammation, irregular exposure to cold and moisture, by which the harmony of associated actions is broken in upon, is the cause usually assigned. Hence, it is more common in winter and spring, when cold and moisture exist in vicissitudes, than in the height of summer, or the early part of autumn. Some persons are extremely prone to it, on the slightest exposure; and, when it has appeared a few times, it is apt to recur by habit,—a predisposition being, in this manner, induced, which requires but a slight exciting cause to develope it. Like stomatitis, it may be caused by hot or acrid bodies irritating the fauces, but this is uncommon.

In very young infants, the mucous membrane of the fauces is apt to be more or less hyperæmic or congested, so as to resemble the redness of inflammation, and to occasion obscurity in the diagnosis. A recent pathological writer, M. Billard, remarks, that the fauces may be considered to be inflamed;—1st, when the duration of the redness continues beyond the ordinary time of the disappearance of the congestion in young infants—ten or twelve days for example; 2dly, when, instead of being uniformly spread over every part of the throat, it occupies separate points; 3dly, when some of the symptoms of amygdalitis, to be mentioned presently, exist along with the redness. The presence of fever, with difficult deglutition, and alteration of voice, will of themselves be sufficient to diagnosticate, that the redness is owing to isthmitis.

Isthmitis—like amygdalitis and pharyngitis—is one of the symptoms of scarlatina and of syphilis, and it is generally present in hydrophobia.

The attending fever, as in amygdalitis, is frequently very active, but the general prognosis is favourable. It almost always terminates in health.

Treatment.—The pulse is rarely so excited as to indicate the necessity of general blood-letting. Confinement to bed, where practicable, and the employment of saline cathartics,* chiefly as revellents, will relieve the milder cases.

* R.—Magnes. sulphat. 3vj.

———— carbonat. 3j.

Aquæ menthæ pip. f 3iij.—M.

Dose, one half, to be repeated if the first half does not operate.

When more severe,—in addition to this management, leeches may be applied around the throat; and, after they have dropped off, a warm emollient poultice may be placed over the leech bites; and, if the disease still persist, sinapisms, or stimulating liniments, or a blister, may be applied to the throat. Along with these agents, the steam of hot

water may be inhaled. and the throat be gargled with flaxseed tea, or any mucilaginous fluid.

As the vessels are loosely protected by the parts in which they creep,—after the first day or two, it may be advisable to prescribe gargles, which are somewhat stimulating, and may thus cause the contraction of the overdilated capillaries, so that they may force the stagnant blood from them, and be restored to their healthy condition. Gargles of muriatic acid,^a or of ammonia, or of capsicum,^b will accomplish this, taking care that they are not made too powerfully astringent or excitant.

^a R.—Mellis, ℥ijj.
Acid. muriat. vel
Liq. ammon. gtt. xxv.
Aque, f 3vj.—M.

^b R.—Infus. capsic. f 3vj.
Mellis, ℥ijj.—M.

Recently, M. Velpeau, after M. Bretonneau, has strongly urged the use of alum even in the early stage of every form of angina. He employs it either as a gargle or in powder. The tip of the finger, moistened, is to be covered with powdered alum, and then rubbed over the inflamed parts, the tongue being depressed with the handle of a spoon: it may also be applied with a small brush, or a piece of sponge fixed on the end of a small stick, or it may be blown into the throat through a tube; but M. Velpeau prefers the use of the finger, as it can in general, readily reach every point of the inflamed surface; and, moreover, an intelligent patient can apply the powder with his own finger. The application should be made twice or thrice a day, and in the meantime the patient should frequently gargle his throat with a solution of from one to four drachms of alum in four ounces of barley water. In mild cases, the gargle is found to be sufficient.

Perhaps, however, the most effective agent, at all periods of the disease, is scarification with a lancet, which may be superficial, if the inflammation be confined to the mucous membrane; deeper, if the parts beneath be involved. The author has found the advantage of this course in his own case, and has seen it successful when practised on others. Where suppuration has taken place, the pus may be left to itself to make its way outwards; but the best course is to give issue to it, especially if it interfere with deglutition or respiration.

II. INFLAMMATION OF THE TONSILS.

SYNON. Amygdalitis, Cynanche Tonsillaris, Angina Tonsillaris, Inflammatio Tonsillarum, Tonsillitis, Antiaditis, Antiadoneus Inflammatorius, Paristhmitis, Empresma Paristhmitis Tonsillaris, Quinsy, Inflammatory Sore Throat, Sore Throat; *Fr.* Amygdalite, Inflammation des Amygdales, Angine Tonsillaire, A. Gutturale Inflammatoire; *Ger.* Entzündung der Mandeln, Mandelentzündung.

The essential difference between inflammation of the tonsils and isthmitis is, that in the former, along with the ordinary signs of inflammatory fever and the local symptoms accompanying isthmitis, on inspecting the throat the tonsils are found greatly enlarged,—in some cases, so as almost to meet. Along with this, there is extreme difficulty in deglutition, and the sensation of a foreign body in the throat during the effort.

To inspect the throat well, in this as in other diseases, the patient should be directed to open his mouth widely; the tongue must then be depressed with some flat body, as the handle of a spoon; and, if he be directed to draw in a full breath, the tonsils can generally be seen without much difficulty. In the early part of the disease, the membrane covering the inflamed part is dry, and, at times, has white specks upon it of the diphtheritic kind.

Generally, amygdalitis terminates by resolution; but not unfrequently it ends in suppuration, or in permanent enlargement of the tonsils. It is asserted to affect children and females more especially; but this is questionable. Testimony, indeed, is not wanting to show, that males are more frequently attacked with it than females. The left tonsil, in the observation of many, is more frequently affected than the right.

Treatment.—This is much the same as in isthmitis. General blood-letting is rarely needed. The depletion and revulsion, effected by the application of leeches to the throat, followed by a warm cataplasm, are more efficacious. Revellent cathartics and sinapised pediluvia, with the use of excitant liniments or sinapisms to the external throat, and emollient and cooling gargles, with the inhalation of steam, constitute the main treatment in the early stages; and, when suppuration threatens, it must be fostered, and the abscess be treated in the manner recommended under isthmitis.

Recently, the free use of pulvis ipecacuanhæ et opii, aided by warm diluents, has been strongly recommended by Dr. Christison, with the view of cutting short this phlegmasia as well as others.

Cases have occurred, in which the danger of suffocation has been so imminent, that it has been advisable to perform the operation of laryngotomy or tracheotomy.

When an abscess has formed in the tonsils, it generally breaks during some effort of the organs concerned in deglutition, and frequently the discharged pus has a fetid odour: in other cases, the abscess makes its way externally; but this is rare and more frequently occurs in the anginose affections of the throat that form a part of scarlatina.

When the tonsils remain permanently enlarged after amygdalitis, and interfere with deglutition or the voice, (*angina scirrhusa*), they can be readily removed by an appropriate instrument. At times, however the enlargement passes away under the use of powerful stimulants, as of the capsicum in the form of infusion. The application of the solid nitrate of silver freely over the surface of the enlargement has likewise been of service. It must be borne, in mind, too, that, in the evolutions which take place at puberty, a change in the nutrition of the tonsils not unfrequently occurs, under which the enlargement totally disappears.

Dr. Isaac Parrish of Philadelphia, has observed a peculiar change of the voice induced in two cases by the excision of the tonsils. The voice was rendered shrill and whistling,—indicating the influence exerted upon the function by a special modification of the vocal tube.

In rare cases, *calcareous concretions* have been found in the tonsils.

III. INFLAMMATION OF THE PHARYNX.

SYNON. Pharyngitis, Angina Pharyngea, Cynanche Pharyngea, Empresma Paristhmia Pharyngea, Inflammatio Pharyngis; *Fr.* Angine Pharyngée, A. Gutturale; *Ger.* Entzündung des Schlundes, Schlundentzündung.

This affection differs from isthmitis only in its seat: similar tissues are implicated in both; it is induced by the same causes and requires the same treatment. It is detected by inspection of the throat, when the inflammation is observed to be seated in the mucous membrane covering the posterior parietes of the pharynx. At times, it spreads into the nasal fossæ, and, at others, implicates the larynx; but the respiration and voice are often—generally, indeed—unaffected. At other times, the voice is raucous, as in the various forms of angina. It is frequently accompanied by amygdalitis.

The disease generally passes off by resolution; but pus may form, and require to be set free. This may be done by the pointed bistoury, or by an appropriate instrument, termed *pharyngotome*. It has been advised, too, when there was reason to suppose the existence of an abscess, that an emetic should be administered, in order that the rupture of the walls might be favoured by the efforts at vomiting. As the object, in such case, is not to induce any revulsion, one of the direct emetics, or those which operate without inducing any previous nausea, is to be preferred.^a

^a R.—Zinci sulphat. gr. xx.—xxx.
To be taken in sugared water.

Or, R.—Cupri sulphat. gr. ij.—x.
To be taken in the same manner.

Not long ago, the author met with a case of pharyngitis, which appeared to be of the rheumatic kind, and to be seated in the constrictor and stylo-pharyngei muscles. The pain, on pressure being made at the sides of the neck, was very severe; and when fluid was taken, owing to the irregular and spasmodic action of the muscles, it was partly returned by the mouth and nose. Leeching and the general antiphlogistic treatment produced a cure.

Pharyngitis, like stomatitis and isthmitis, may terminate by the formation of false membranes, or by gangrene;—varieties which will require a separate notice.

a. *Follicular Inflammation of the Pharynx.*

SYNON. Follicular Pharyngitis.

This variety of inflammation—so far as the author knows—has not been described in pathological or therapeutical works; yet it is by no means uncommon. He has seen many cases of it; and it is very frequently presumed to be an affection of more dangerous import than it really is. Many of the cases of what has been called *Clergyman's Sore Throat*, which have fallen under his care, have been of this affection. It has been recently described by Dr. Popken, under the name *Tubercles of the Larynx and Fauces*; but he at the same time remarks, that he gives the name at the risk of its being objected to, inasmuch as the disease does not consist of true tubercles, but only of diseased mucous follicles.

Diagnosis.—Follicular pharyngitis is first indicated by huskiness of

the voice, with more or less coughing and hawking, so that the disease appears to involve the respiratory, rather than the digestive, organs—especially as there is often little or no pain on deglutition. Should, however, uneasiness of the throat suggest an inspection, the appearances are such as cannot be mistaken. The follicles of the isthmus of the fauces and the pharynx are observed to be unusually apparent, so that the mucous membrane seems to be studded with granulations, varying, in size, from a pin's head to a pea. The larger bodies frequently have the appearance of a split pea, and of crypts or follicles distended with a semi-fluid substance.

The disease is apt to persist for a long time, even for years, and to give occasion to more or less irritation of the larynx, as indicated by coughing and hawking; but still the general health may remain unaffected, unless the affection should exist also in the larynx, when it may, by irritation, in one of tuberculous predisposition, occasion the formation or developement of tubercles of the lungs. It generally occurs in young subjects, rarely before puberty, or in advanced life, and, it is affirmed by Dr. Popken, chiefly in the male sex. He remarks, that he never could trace any connexion between this form of pharyngitis and any constitutional chronic disease, as syphilis, or scrofula; and that he has so rarely found it coincident with other local affections, and especially with those of the lungs, that, in a doubtful diagnosis, he rather regards the disease in the throat as a sign, that there is not a vomica in the lungs. Certainly, in the cases that have fallen under the author's care, there was no chronic pulmonary disease.

The author has always regarded the affection to consist in an accumulation of mucus in the follicles of the throat, similar to that which takes place in the congenerous sebaceous follicles of the skin in acne; and in a case, which he saw with his friend Professor R. M. Huston, the enlarged follicles presented all the appearances of acne punctata. Occasionally, the follicles break, and discharge small masses of an elastic matter, which is often the source of much anxiety to the patient, causing him to apprehend serious pulmonary mischief. Sometimes, ulceration succeeds, which may be defined or irregular, and is often surrounded by a vivid red inflammation. This may continue for a long time, when the tone of the constitution is impaired, or some scrofulous or other *vice* exists.

Treatment.—The local remedies, to be recommended in follicular inflammation, are the same as those advised in other forms of sluggish phlegmasia of the mucous membrane of the pharynx. A solution of the nitrate of silver, or a creasote lotion, with the application of croton oil to the exterior of the throat, comprise the local means that are most beneficial. Time, however, is an element in the cure, as the disease is essentially chronic in its character. It is advisable, too, to keep the throat warm. This may be done, in the female, by wearing flannel around the throat, and in the male in the same manner, or by permitting the hair to grow around the neck. A nutritious, but not stimulating diet, and the administration of aromatic and tonic medicines, such as ammoniacum and myrrh, or myrrh, extract of bark, and sulphate of iron, has been recommended; but the author has not

observed much effect from such agents. Like acne of the face, it is often, indeed, but little under the influence of medicine; and even change of air and the use of therapeutical agents, that essentially modify the system of nutrition, are of but limited efficacy. The parts, however, gradually become accustomed to the presence of the enlarged follicles, so that little or no irritation is ultimately induced by them. In process of time, too, they may be gradually diminished by absorption; yet, in one case, that was subjected for years to the treatment mentioned above, the follicles remained almost as large and prominent as at first. They had ceased, however, to excite uneasiness.

In cases of ulceration of the pharynx, it may be necessary to employ a solution of nitrate of silver, or creasote water, or a diluted mineral acid, and, if these fail, solid nitrate of silver. If any *vice*, however, exist in the constitution, it is indispensable that it should be removed by the agents that are appropriate to the particular cachexia. Usually, there is a state of defective, along with disordered, action, which demands the use of tonics, and especially of iodide of iron, for a long period.

R.—Ferri iodidi, gr. xxiv.

Aquæ destillat. f 3j.—M.

Dose, an ordinary teaspoonful—which contains about three grains—two or three times a day, in simple syrup. The dose to be gradually increased.

b. *Diphtheritic Inflammation of the Pharynx.*

SYNON. Diphtheritic Pharyngitis, D. Sore Throat, Angina Pseudo-Membranacea, A. Membranacea, A. Pellicularis, A. Plastica, A. Diphtheritica, Pseudo-Membranous Inflammation of the Throat; Fr. Angine Couenneuse, A. Gutturale Couenneuse, A. Pseudo-Membraneuse, A. Plastique, A. Diphthérique.

Under the head of stomatitis, two varieties were described, which, in their essential characters, resemble the same form of inflammation, when it attacks the mucous membrane implicated in isthmitis and pharyngitis. It may be convenient, therefore, to consider here pseudo-membranous inflammation of the throat in general.

Diagnosis.—The disease is often insidious at its onset;—deglutition being less affected than in isthmitis or amygdalitis, and neither fever nor general indisposition being present. At other times, an uncomfortable feeling of heat and dryness is experienced in the throat, with fever, difficult deglutition, and pain on moving the neck, which is observed to be slightly swollen. After this, the cervical and submaxillary glands may become enlarged, and the difficulty of deglutition appears to be rather in a ratio with this enlargement, than with that of the diphtheritis of the pharynx. At times, the parotid glands enlarge, and, in particular epidemics, this enlargement has been observed to precede, or accompany, the formation of false membranes. At this early stage, the pharynx, on inspection may merely exhibit more or less redness and tumefaction of one or both tonsils; but it rarely happens, that the physician sees the case at this early period. Generally, when he first observes the throat, he finds the membrane investing the velum pendulum, uvula, tonsils, and pharynx, exhibiting

small, white or yellowish patches, irregularly circumscribed, and having a lardy or curdy appearance, and in some cases, it is not until these exudations have been thrown out, that the submaxillary glands and cervical ganglions become swollen. The patches are, at first, small and discrete; but they gradually approach until they ultimately coalesce, become confounded, and cover, at times, in a very short period, the whole of the pharynx, extending into the nasal fossæ and the air passages.

Owing to the semi-transparent character of the pellicles, the parts beneath—especially the velum palati and uvula—appear infiltrated. Where the inflammatory tumefaction is most marked, they are thickest, and are bounded by an elevated, red circle, which gives them the appearance of being depressed, and of ulcerations. In a short time however, they project, become partly detached, and a slight oozing of blood, sufficient to colour the saliva, takes place from the parts beneath. The exposed mucous membrane appears red, dotted, injected, or ecchymosed. At times, however, it is of a gray colour, and dry, as if it had been cauterized by an acid; at others, eroded, but without any appreciable loss of substance. The nasal fossæ soon participate in the disease; and from both the mouth and nose there is a copious discharge of a sanious and fetid fluid, and occasionally epistaxis so violent as to require plugging the nasal fossæ. The pellicles or shreds, when thrown off, are reproduced, but their successors are usually thinner, and of a whiter appearance. The quantity of false membrane, disengaged in this manner, is surprising; and it has been conceived, that this circumstance, along with the offensive odour exhaled from the mouth, especially in adults, led the older observers to mistake their nature, and to regard them as sloughs. In place of being thrown off as shreds, the false membrane is at times softened and mixed with the saliva, and in some cases, absorbed.

The general symptoms that usually accompany this condition are—paleness and puffiness of the face, with alteration of the features; tumefaction of the tongue, with redness of the edges, and a thick coat covering its surface,—vomiting most commonly accompanying the efforts to get rid of the membrane. Constipation or diarrhœa may be present, but the latter is more common.

Whilst the diphtheritic inflammation affects the throat, there is a singular tendency to the same kind of exudation from all surfaces from which the cuticle has been removed,—from the lips, *alæ nasi*, behind the ears, around the anus, vulva and nipples, and from the surface of blisters or leech bites. The author saw, some time ago, a fatal case of diphtheritic pharyngitis, which extended into the larynx, and for which a blister was applied to the chest. The blistered surface became wholly covered with a pultaceous exudation; and the case terminated unfavourably owing to the supervention of gastritis. Generally, indeed, when diphtheritic pharyngitis terminates fatally, it is owing to the disease invading either the stomach and intestines, or the air passages, and more frequently the latter, giving rise either to tracheitis, bronchitis, or pneumonia. This result has to be apprehended

in the epidemic form; but usually, when the disease occurs sporadically, and is without complication, it terminates in health. Its mean duration is estimated at from fifteen to twenty days. In ordinary isthmitis or common inflammatory sore throat, grayish patches or specks are at times perceptible, which are the source of uneasiness to the medical attendant; but the circumstance of their not extending, and being of but transient duration, soon satisfies him that he has not to fear the supervention of true diphtheritic pharyngitis.

Causes.—The remarks made as to the etiology of diphtheritic stomatitis are equally applicable to diphtheritic pharyngitis. It appears in all climates and seasons, but chiefly, it is affirmed, in moist countries. It may occur sporadically, as in the fatal case referred to above; endemically, especially where persons are crowded together in restricted spaces; and epidemically,—the last being the most frequent form of all. Children are more liable to the disease than adults, and it is more dangerous in their case, owing to their being more predisposed to serious affections of the air passages. As in cases of diphtheritis in general, opinions have varied as to whether it be capable of being communicated by contagion. Some have believed strongly in the existence of a specific contagion. Yet, when the matter of false membrane has been inserted into the arm, the tonsils, and soft palate, no diphtheritis has ensued. It has been asserted, indeed, that where many persons are crowded together, and where ventilation is imperfect, and cleanliness disregarded, there can be no question as to the generation of a contagious influence, capable of transmitting the disease from one person to another. This, however, is doubtful. That different individuals, exposed to such extraneous influences, have been attacked simultaneously, or in succession, with diphtheritic pharyngitis, cannot admit of question; but this can be explained without supposing the action of any contagious emanation. The observation of the author has not led him to speak positively upon this subject; but the result of personal investigation and of the comparison of evidence leads him rather to favour the doctrine of noncontagion.

Pathological characters.—The diphtheritic form of pharyngitis—like diphtheritis in general—is inflammation, differing from the simple inflammatory affections of mucous membranes. A predisposition to the formation of false membranes exists, we have seen, so that they occur on parts of the external cutaneous surface, from which the epidermis has been removed. The state of the constitution in which they are most frequently observed is one of deterioration, under which the circulating fluid doubtless differs from its healthy state, and impresses the intermediate system of vessels, by which the nutrition of the tissues is accomplished, in a peculiar manner; but of the intimate nature of the morbid action we are in entire ignorance. Without some predisposition, simple pharyngitis neither terminates in pseudo-membranous, nor in gangrenous pharyngitis. These varieties appear to be separate and distinct, and can generally be marked by the observer almost from the very outset of the disease.

Treatment.—This may be divided into the *general* and the *local*.

1. The general treatment must be regulated by the symptoms. Although diphtheritic pharyngitis usually occurs in impaired states of the system, there may be cases in which antiphlogistics may be employed with much advantage. It can rarely happen, however, that general blood-letting is needed; and the application of leeches is often attended with the inconvenience, that the leech-bites become attacked with the diphtheritis. It can only be at the commencement of the disease, and in cases in which the vital powers are active, that they can be used with any prospect of advantage. In light cases, gentle laxatives, cooling drinks, and emollient gargles, of the kind advised under *isthmitis*, with stimulating liniments to the neck, or warm cataplasms, will generally lead to a successful issue. Diluents, in considerable quantity, have been recommended to dilute the mass of blood and diminish its plasticity,—under the view, that diphtheritic pharyngitis is owing to too great plasticity of that fluid, the concrescible portion of which exudes at the surfaces implicated. The temperature of these diluents may be regulated by the degree of activity of the heart and arteries. If this be great, the skin hot, and the thirst considerable, ice and ice-cold drinks may be permitted. If, on the other hand, the activity of the sanguiferous system be less, and the surface cool, tepid or even warm drinks should be recommended. Perhaps, in all such cases, diluents—as they are termed—act chiefly by allaying the local irritation for the time; for, when the mucous membranes are affected with any form of inflammation, absorption does not take place readily from them, so that no great effect can be expected from their diminishing the consistence of the blood.

Emetics have been recommended in all stages of the disease;—in the early period, for the removal of any morbid secretions, which can scarcely fail to be present in the stomach in such a condition of the lining membrane, as well as to produce revulsion; and, in the later periods, with the view of dislodging and expelling the false membrane, which often accumulates in the throat, and gives rise to great irritation.

At the early period, where revulsion is the object, the indirect emetics, tartrate of antimony and potassa, or *ipecacuanha*, or both,* may be prescribed; in the latter period, where simple evacuation is desired, the direct emetics, sulphate of zinc (3ss. in sugared water,) or sulphate of copper (gr. ij.—vj. in sugared water).

* R.—Antim. et potass. tart. gr. ij.

Ipecac. pulv. gr. xx.—M.

To be given in warm water.

Throughout the whole course of the disease the bowels must be kept open, to prevent the accumulation of morbid secretions, which would add to the irritation. The mild laxatives are the best: tea-spoonful doses of castor oil, or rhubarb and magnesia, or gentle salines—as the Rochelle salts (tartrate of potassa and soda), or the common Seidlitz powders; but, in all cases, due attention must be paid to the condition of the lining membrane of the stomach and bowels, which, as has been remarked, is apt to be implicated in the disease under consideration. Where such implication exists, the

canal may be kept clear by laxative enemata. Calomel has been recommended by some therapeutists; but it has not been given so much as a cathartic as to induce the effects of mercury on the system, and by the new action to break in upon the morbid catenation. It has been properly suggested, however, by M. Forget, that caution is demanded in the use of a remedy, whose tendency is to affect the parts about the mouth, and which may thus aggravate the disease.

When the patient is debilitated, and the powers of life begin to fail, recourse must be had to tonics and gentle excitants; but these must be administered with caution, and be gradually discontinued, if the tongue should become dry, and the local or general symptoms appear to be aggravated by them. The cold infusion of cinchona,^a with or without the addition of mineral acids, and wine whey, are as valuable agents as can be selected.

^a R.—Cinchon. contus. 3j.

Aurant. cort. ʒiij.

Aquæ. Oj.—M.

Dose, a wineglassful four times a day.

2. Notwithstanding a diathesis exists, which predisposes to diphtheritis, great reliance has been placed upon the local treatment. Of the local remedies, employed at the present day, nitrate of silver has been preferred. It may be applied in the solid, or in the liquid form. When used in the solid form, the affected parts may be gently touched with it, twice or thrice a day, the patient rinsing the mouth and throat, subsequently, with any tepid fluid. When used in the liquid form, the ordinary strength may be 15 or 20 grains to the ounce of water; but, by some, it is employed much stronger than this—one part of the nitrate to five or six parts of water, and even a saturated solution; with this a piece of sponge, tied to a small piece of stick, may be moistened, and the fauces be touched gently with it two or three times a day. Another plan, which has been advised, is to reduce the nitrate to powder, roll the sponge—previously moistened with mucilage of gum arabic and squeezed—in it, until a sufficient quantity of the powder adheres to the surface, and apply it in the manner recommended above. Muriatic acid has been highly extolled in the same cases;—at times, in an undiluted state; at others, mixed with honey;^a and, in either case, applied once or twice a day, in the same manner as the solution of nitrate of silver.

^a R.—Acid. muriat. p. j.

Mellis, p. ij.—ij.—M.

It is, doubtless, safer to commence with the dilute acid, and, subsequently, if necessary, to have recourse to the pure.

Powdered alum appears to possess the property of dissolving false membranes, whilst, at the same time, it induces a new action in the parts beneath. It may be blown into the throat by means of a quill or glass tube, or be applied in the manner recommended in the case of the powdered nitrate of silver, or of the solution of that salt; that is, by means of the sponge,—one part of the powdered alum to two or three parts of water. Calomel has been administered in the

same manner, but it is deserving of less confidence than the agents just mentioned. The sulphate of copper, too, is much used in some countries. An obvious inconvenience results from the use of all powders thus administered, in their liability to enter the glottis, and excite cough: still, the inconvenience soon passes away. Sulphate of copper has likewise been applied in saturated solution, and, it is said, with satisfactory results. A decoction of soot^a has been used with benefit, and there can be no doubt, that impure pyroligneous acid and creasote would prove as advantageous as in similar affections of the mouth.

^a R.—Fulig., manipul. ij.
Aquæ, Oj.—M.

The offensive character of the secretions from the mouth suggested the use of chlorinated preparations, in the form of gargle.

R.—Calcis chlorin. ℥i.—℥iij.
Aquæ, f 3 viij.—M.

Or, R.—Liq. sodæ chlorin. ℥ij.
Aquæ, f 3 viij.—M.

Advantage might also accrue from their internal administration, as well as from that of chlorine. They may be serviceable, applied externally, not only as disinfectants but as antiseptics.

When the throat cannot be readily reached by the sponge or mop, and gargling is impracticable, the gargles and disinfecting washes may be thrown through the mouth by means of a syringe, and through the nostrils should the posterior nares be affected. It need scarcely be observed, that the strength of the applications, and the number of times they should be employed, must be left to the judgment of the practitioner.

The vapours of ammonia, ether, and chlorine, have been advised; but their efficacy has not been marked, whilst the irritation they have induced has been considerable. They are unmanageable, and ought, perhaps, to be abandoned.

Revellents, applied to the throat, may be employed with advantage along with the topical remedies just described. Caution may be demanded in the use of blisters, as they are apt to excite diphtheritis of the skin; but sinapisms and stimulating liniments^a to the throat and the extremities may be prescribed with benefit.

^a R.—Liq. ammon. part. j.
Ol. oliv. part. iv.—M.

Sinapised pediluvia may be directed throughout the whole course of the disease. The diet must be left to the judgment of the practitioner. Generally, it may consist of farinaceous aliments; but no invariable rules can be laid down: as, in every other disease, it must be appropriate to the various stages.

c. *Gangrenous Inflammation of the Pharynx.*

SYNON. Angina Gangrænosa, A. Maligna, A. Putrida, A. Ulcerosa, Pestilens Faucium Affectio, Cynanche Maligna, Empresma Paristhmitis Maligna, Cynanche Ulcerosa, C. Gangrænosa, Gangræna Tonsillarum; Ulcerous, Ulcerated, Putrid, or Malignant Sore Throat; Fr. Angine Gangréneuse, A. Maligne; Ger. Bösartige Bräune, brandige Bräune.

This variety of pharyngitis has been esteemed by some to be essentially the same as the one just described; but the generality of modern pathologists class them as congenerous yet distinct affections. It cer-

tainly differs essentially from simple pharyngitis, for, although the latter may terminate in gangrene, it is an accidental event; whilst gangrenous pharyngitis is marked from the first by its characteristic symptoms. These are eminently typhous, and the decided difference between gangrenous and diphtheritic pharyngitis, after all, consists in this circumstance. It is not improbable, however, as has been suggested by M. Bretonneau, that many of the cases of *Angina maligna*, *A. putrida*, *Cynanche maligna*, and *Affectio pestilens faucium*, which were described by our ancestors as having occurred epidemically, belonged to diphtheritic pharyngitis.

Gangrenous pharyngitis is well seen in the malignant form of scarlatina, but is not peculiar to it. It occurs at times sporadically; at others, epidemically, and without any eruption; and at others, again, with the eruption of scarlatina. The inflammation rapidly runs on to gangrene, implicating the neighbouring portions of the neck; and generally terminating fatally—at times suddenly—on the second, third or fourth day of the disease.

Diagnosis.—The symptoms are, from the first, of an appalling character, and essentially those of scarlatina maligna. After more or less indisposition—chilliness, headache, vertigo, nausea and faintness—slight pain is experienced in the throat, occasionally with swelling of the neck, which, as in ordinary diphtheritis of the pharynx, impedes its movements. Soon afterwards, the neck, face, chest, and upper extremities, especially, assume a red colour, more or less deep, and become slightly tumefied. The fever is usually intense; the heat being pungent (*calor mordax*), with great restlessness, delirium, and often stupor and coma; the tongue is dry, and covered with a fuliginous crust, as well as the lips, which crack, and appear as if burnt. The parotid glands swell, and diarrhœa, epistaxis, or some other form of hemorrhage supervenes, with petechiæ and every symptom of typhus. On inspecting the throat, the lining membrane is found to be of a deep red or purple hue, upon which patches of a pulpy consistence, and dull ash colour, changing speedily to brown or black, are perceptible. The parts soon begin to slough, and a putrid odour is exhaled. The sloughing proceeds rapidly, involving the soft palate, the substance of the tonsils, and, at times, the cheeks, and the parotids. From the nose an ichorous and offensive sanies is discharged, and the lips and corner of the mouth become implicated in the morbid condition.

Treatment.—This does not vary from that required in gangrenous stomatitis, and in the variety of pharyngitis last described, except that in diphtheritic pharyngitis, the symptoms are not so markedly those of depression. The internal management is that required in typhus: the local, that adapted for diphtheritic pharyngitis and gangrenous stomatitis; the different accidents that arise in the course of the disease, as well as the disease itself, being met on great general principles.

IV. INFLAMMATION OF THE ŒSOPHAGUS.

SYNON. Œsophagitis, Inflammatio Œsophagi, Angina Œsophagea, Cynanche Œsophagea; Fr. Œsophagite, Inflammation de l'Œsophage, Angine Œsophagienne; Ger. Entzündung der Speiseröhre.

Inflammation of the œsophagus is a rare disease, and differs from inflammation of the pharynx only in its seat.

Diagnosis.—The chief symptom is local pain, with difficult deglutition; and, at times, hiccough, after the alimentary bolus has cleared the pharynx, and reached the seat of the inflammation. The pain is referred either anterior to the cervical vertebræ, under the sternum, between the shoulders, towards the cardia, or under the xiphoid cartilage, according to the precise position of the inflamed spot; the local symptoms being accompanied with the general signs denoting the presence of internal inflammation, which vary in degree, according to circumstances. The disease commonly terminates by resolution, so that no opportunity occurs for tracing its pathological characters, which must, however, be the same as those of inflammation of the mucous membranes in general.

Causes.—Injuries of the mucous membrane, produced by swallowing sharp or pointed bodies, as pieces of bone, or hot or acrid substances, must be ranked amongst the most common causes. It may occur, however, from organic changes, the causes of which are as inappreciable as those of other inflammations.

Treatment.—As the disease is rarely severe—restricting the patient to emollient drinks, and allowing these but rarely; to the use of ice or lemonade, with the application of simple or sinapised cataplasms to the neck and of sinapisms to the feet, with laxative and gently excitant enemata, will be sufficient. Should, however, the inflammatory symptoms be more violent, general blood-letting may be needed in addition, with the application of leeches externally along the seat of the pain.

V. STRICTURE OF THE PHARYNX AND ŒSOPHAGUS.

SYNON. Dysphagia Constricta, D. Pharyngea, D. Œsophagea, D. Callosa, Stricture Pharyngis seu Œsophagi vera, S. Œ. Callosa, Stenochoria Œsophagi, Œsophagiæctia; Ger. Verengerung des Speiseröhre.

This affection may be the consequence of œsophagitis, but more frequently it is owing to malignant disease in the parietes of the œsophagus. Most commonly, it occupies the upper portions of the tube. It may take place insidiously; the patient not suspecting a gradual diminution in the calibre of the tube, until he discovers a progressively increasing difficulty in swallowing solids, and until ultimately nothing but liquid aliment can reach the stomach. The hypertrophy usually occurs in the submucous tissue, which forms a kind of ring, gradually encroaching on the tube. Sometimes this is of cartilaginous or osseous hardness, yet without being malignant; and, occasionally it encroaches so completely on the œsophagus, that the patient dies from want of sustenance. Usually, when the tube has become very narrow, the food accumulates above the stricture, so as to form an expanded portion or pouch, (*Pharyngeurysma*), and, at times, the quantity retained there is surprising. Sooner or later, however, an effort of regurgitation ensues, and the food is returned.

Although the stricture commonly goes on progressively increasing, it is arrested at times, so that the individual may pass through a long

life, and die of some other affection. The author is acquainted with a case, in which food more solid than pap does not pass into the stomach, but accumulates in the manner described, and is subsequently regurgitated; yet the gentleman has remained in this condition for many years. Some idea of the seat of the disease may be formed by the quantity of food that may be taken before it is regurgitated; but this is obviously an uncertain criterion. It may be readily detected by the bougie.

Treatment.—The only remedy on which any reliance can be placed is the œsophageal bougie, by which the stricture may occasionally be dilated—if not altogether, to such a degree as will admit of ready deglutition of liquid food, as light boiled eggs and soups, which may form the main sustenance. Hope, too, may be entertained, that the farther progress of the disease may, in this manner, be arrested. Internal remedies that modify nutrition, and are recommended under the next head, may likewise be given; and should the passage become entirely obstructed, alimentary matter may be thrown into the colon, by which a miserable existence may be prolonged for a short time.

VI. CANCER OF THE PHARYNX AND ŒSOPHAGUS.

SYNON. Cancer Pharyngis et Œsophagi; *Fr.* Cancer du Pharynx et de l'Œsophage; *Ger.* Krebs des Schlundes und der Speiseröhre.

As the pharynx and œsophagus constitute but one canal, cancer of both may be considered under the same head, although it may be convenient to specify the symptoms of each.

Diagnosis.—The onset of cancer of the pharynx may be indicated by a slight uneasiness in the throat, which may be nothing more than a sense of tickling; but this gradually becomes painful; and the pain augments, and assumes a lancinating character; deglutition becomes daily more and more difficult; and, if the affection be seated high up in the pharynx, an irregular, fungous tumour may be perceived; the neck is now observed to be swollen and tender on pressure; the breath becomes offensive; and the patient expectorates a glairy, ropy, sanious, or puriform matter, which has a repulsive odour. As the swelling extends to the neighbouring parts, the voice becomes altered and raucous; and the pressure of the tumour upon the larynx and trachea may interfere materially with respiration, so as to threaten suffocation.

The local feelings in cancer of the œsophagus are much the same as in cancer of the pharynx, except that they are referred lower down. The aliment, too, as the disease advances, accumulates above the narrowed portion of the tube, and creates a sense of weight and hic-cough, until it is regurgitated. If the disease be seated in the cervical portion of the œsophagus, a hard, circumscribed, fixed, or movable tumour may be felt between the larynx, trachea, and the vertebral column. In both cases, there is the peculiar sallow tint of the skin, which is observed in the cancerous diathesis.

The progress of cancer of the pharynx and œsophagus is slow, but not the less certain. It is liable to exacerbations, which may be relieved by appropriate remedies; but the disease scarcely admits of cure; and, sooner or later, the patient dies, either from inanition,

owing to the tube becoming entirely obstructed, or worn out by the pain, and by the accompanying irritative fever which never fails to be developed.

Pathological characters.—The parietes of the tube are observed to be thickened, of a lardaceous character, gray, opaline, and semitransparent, creaking under the knife, or softened and encephaloid. In the neighbouring parts, small, red, fungous, and polypous excrescences are often met with, the centre and base of which are firm, and of a whitish appearance. At the seat of the cancer, the calibre of the tube is found diminished, almost obliterated; but immediately above it may be greatly dilated.

Cancer of the œsophagus, as well as of the pharynx, is sometimes observed to follow cancerous engorgement of the lymphatic glands, or of the surrounding cellular tissue, in females, who have undergone amputation of the breast for an affection of the same nature. Where the œsophagus is greatly dilated, and especially if the parietes have become softened by any morbid process, or perforated by ulceration, the contents of the canal may be poured into the posterior mediastinum, and death be the inevitable result. This constitutes the *Dysphagia à Ruptura Œsophagi* of some of the German writers, cases of which are on record.

Treatment.—In addition to the regular use of the bougie, as recommended under stricture of the œsophagus, attempts may be made to break in upon the cancerous dyscrasy by such remedies as are calculated to modify the condition of the circulating fluid, and, through it, that of the whole system of nutrition. Of these, the preparations of iodine are the best, which should be given freely, either in the form of the tincture of iodine, (gtt. x. ter die,) gradually increasing the dose; in that of the solution of iodide of potassium, (gtt. x. ter die,) or of iodide of iron, (gr. iij. vel iv. ter die.) Either of these preparations may be taken in an ounce and a half of simple syrup. By some, mercurials have been advised, especially the corrosive chloride, (gr. $\frac{1}{16}$, ter die,) which may be given in the same vehicle; or a combination of iodine and mercury, in the form of deuto-iodide of mercury, may be prescribed (gr. $\frac{1}{16}$, ter die,) taking care not to push the mercurials so far as to induce their wonted febrile and peculiar effects. Pain must be allayed by full doses of opium or of some of its preparations. Conium, stramonium, belladonna, and other narcotics, which were at one time highly extolled, have fallen into comparative disuse. They have been proved to possess no power over the cancerous cachexia; and, as anodynes, they are far inferior to opium.

When deglutition cannot be readily accomplished by the natural efforts, food and medicine may be conveyed, for a time, into the stomach, by means of an œsophageal tube; and, if this plan should excite too much irritation, life may be prolonged, and ease be afforded, by throwing nutritive solutions, as soups, milk, &c., into the colon. Digestion—limited, it is true—takes place low down; and, there is no doubt, that, in such cases, the absorbents may, for a brief period, convey fresh matter into the blood, which may partly supply its losses; but no chance whatever can exist of any permanent advantage. At

this late period, relief may be afforded by strong doses of opiates thrown up into the colon, or by the endermic use of the salts of morphia.

VII. SPASM OF THE PHARYNX AND ŒSOPHAGUS.

SYNON. Dysphagia, D. Spasmodica, Strictura Œsophagi Spasmodica, Œsophagismus, Œsophagialgia: *Fr.* Spasme du Pharynx et de l'Œsophage; *Ger.* Schlundkrampf.

Without any evidence whatever of inflammation, and under certain conditions of the great nervous centres, the muscles of the pharynx and Œsophagus contract spasmodically, so as to prevent any alimentary matter from reaching the stomach; and, at times, the action is so sudden and forcible, (in rabies, for example,) that the fluid is projected violently from the mouth. The affection, in this case, is seated in the nervous centres, which, as shown under hydrophobia and hysteria, are in an impressible state, so that, when any eccentric impression is made upon the lining membrane of the pharynx, it is conveyed to the nervous centres, whence it is reflected, with the rapidity of lightning, to the muscles, that give rise to the phenomena in question. The *globus* or *nodus hystericus*, the sense of a ball rising up in the throat, threatening suffocation, and impeding deglutition, is an example of this nervous dysphagia.

Treatment.—The plan of treatment recommended under hysteria is the one demanded in this form of spasm. Narcotics and revellents must constitute the reliance of the practitioner. The affection almost always terminates favourably.

VIII. PARALYSIS OF THE PHARYNX AND ŒSOPHAGUS.

SYNON. Dysphagia Paralytica, D. Torpida, D. Atonica, Angina Paralytica, Asthenia Deglutitionis, Pharyngoplegia, Pharyngolysis, Paralysis Œsophagi, Gulæ Imbecillitas; *Fr.* Paralysie du Pharynx et de l'Œsophage; *Ger.* Lähmung des Schlundes und der Speiseröhre.

This affection has been described as a distinct disease of the pharynx and Œsophagus; but it is almost always, if not always, a symptom of general paralysis, or of some disease which is approaching a fatal termination. Its treatment, where treatment can be of any avail, is given elsewhere, under Paralysis. The application of galvanism—the zinc pole to the feet, and the copper pole to the larynx, sides, and base of the tongue, three or four times in the minute, and twice a day—has been found beneficial. It requires, according to Most, to be continued from five to six weeks.

CHAPTER III.

DISEASES OF THE STOMACH.

THE arrangement of the coats of the stomach and of the intestines occasions their diseases to differ materially from those of the supra-diaphragmatic portion of the digestive tube. They are lined, it is true, with a similar membrane, but their muscular coat is much thinner, and, in addition, they have a reflection of the peritoneum, which lines the cavity of the abdomen. All these coats are liable to be implicated in disease, but the prominent affections are chiefly restricted either to the mucous or the peritoneal coat; the function of the muscular coat being generally more or less modified, but the structure itself not being materially implicated unless the organic mischief is considerable.

Exposed, as the stomach is, to the contact of various irritants, it is surprising, that it is not oftener affected with serious disease. With the most regular and temperate, its sensibilities must be variously affected by the different aliments received into it; yet, even in the intemperate, the impunity with which heating substances can be received into the organ, indicates a wonderful resistance to the action of morbid agents. Of late years, the attention of pathologists has been more directed to the condition of its lining membrane; and, although we may not embrace all the views of Broussais, who considered the gastro-enteric mucous membrane to be the *fons et origo* of most diseases, we cannot doubt, that morbid conditions of an inflammatory nature may exist, which may not be indicated by the ordinary signs of inflammation, and yet, by irradiation, may be the cause of much suffering, not only in the digestive apparatus, but elsewhere. If, consequently, we reject the exclusivism of Broussais, we must still retain much that is valuable of the labours of that eminent, but too enthusiastic teacher.

I. INFLAMMATION OF THE STOMACH.

SYNON. Gastritis, Inflammatio Ventriculi, I. Stomachi, Phlegmone Ventriculi, Empresma Gastritis, Cauma Gastritis, Inflammatio Gastritis; *Fr.* Gastrite, Inflammation de l'Estomac; *Ger.* Magenentzündung.

Notwithstanding the constant exposure to various irritants, to which allusion has been made, the stomach is rarely affected with *acute* gastritis, either of the mucous or peritoneal coat; the *chronic* form is much more common. It may be well to consider them separately.

a. *Acute Inflammation of the Stomach.*

SYNON. Gastritis Acuta, G. Phlegmonodes, Acute Gastritis; *Fr.* Gastrite Aiguë ou Plegmoneuse; *Ger.* Hitzige Magenentzündung, acute Magenentzündung.

Under this term, different diseases have been described by different writers; so that much confusion prevails among them.

Gastritis of the peritoneal coat is certainly a very common disease, and its symptoms do not vary materially from those of gastritis of the mucous coat,—*Esogastritis*, as it has been termed. *Endogastritis* is perhaps preferable, as we already have the term *Endocarditis* in common use, to designate inflammation of the lining membrane of the heart. The pathology and treatment of gastritis of the peritoneal coat are identical with those of peritonitis. Many of the German writers place gastritis chiefly in the muscular coat; but this is very different from the observation of most pathologists.

It has been maintained by Broussais, that idiopathic inflammation of the stomach never occurs except in connexion with a similar state of the small intestine; but, although it is true, that they are often co-existent, and that pure gastritis is rare, it nevertheless does occur alone.

Diagnosis.—Acute endogastritis, when violent, is announced by symptoms that cannot be mistaken. After the ordinary evidences of internal inflammation, shivering followed by heat of skin, languor and lassitude, &c., a severe pain is experienced at the epigastrium, which extends to the back, along the duodenum, and ascends, at times, along the œsophagus, so as to be felt between the shoulders. The epigastric pain is increased by the slightest pressure, and by the depression of the diaphragm, so that inspiration becomes painful and distressing, and also on taking liquid or solid aliment, and during the retchings, which are often incessant, and aggravated by ingesta of all kinds. The patient complains of a burning heat in the stomach; and the nausea and retching are tormenting. The matters ejected consist of the fluids taken, mucus, bile, and often blood; but no relief is afforded by their evacuation. The thirst is unquenchable, and the desire for cold drinks unbounded; yet, immediately after fluid reaches the stomach, it is returned. In the intense form of gastritis, the pulse is not developed as in many other internal inflammations; on the contrary, it is small and frequent. The disease generally runs its course with extreme rapidity, especially when it has been induced by any acrid or corrosive poison. It may terminate fatally in a few hours, or not until the lapse of two or three days, according to the intensity of the cause, and the severity of the symptoms.

It is important to bear in mind, that, after unequivocal symptoms of gastritis have existed for some time, they may become masked by the supervention of encephalic or pulmonary mischief, which may attract the attention of the practitioner exclusively, although the primary gastritis may be in full force.

In milder cases of acute endogastritis, the symptoms are, of course, much less marked. A dull pain is felt in the epigastric region, which is not increased by slight pressure, but is augmented when food is taken, or when any sudden shock is impressed upon the body. Sometimes this pain is intermittent; but, more commonly, it is continuous, although liable to occasional exacerbations. An uneasy feeling of pulsation and of tension is also experienced in the region of the stomach. The appetite varies: sometimes it is greater than natural, but most commonly it is impaired. The thirst is considerable, with dryness

of the mouth, and redness of the tongue, which last symptom is present in almost all forms of endogastritis;—at times, the whole surface; at others, the tip and sides, being of a vivid red; the papillæ, at the middle of the tongue, projecting like minute strawberries through the white coat covering it. The appearance of the tongue is indeed regarded, by some, as one of the most marked points of discrimination between endogastritis and gastritis of the peritoneal coat; but extensive observation has shown, that there is no constant ratio between the state of the tongue and that of the stomach: the tongue, as elsewhere remarked, is of more importance as a guide to the condition of the general system. Along with the above symptoms, vomiting of the food is a frequent concomitant.

This milder form of acute gastritis generally terminates by resolution, or it may pass into the chronic state.

Causes.—The most common causes of acute endogastritis are,—mechanical injuries, produced by wounds, or the swallowing of hard and pointed substances, corrosive and acrid poisons, &c. It may also arise like other internal inflammations.

Pathological characters.—Since the attention of observers has been directed more closely to the condition of the mucous membrane of the stomach in disease, its varying characters have been depicted; and there is no doubt, that many appearances have been pointed out as pathological, which had no connexion whatever with the disease to which they were referred. It is important, consequently, to be acquainted with the healthy appearance of the mucous membrane of the stomach;—a point which has engaged the attention of numerous inquirers. From the result of their observations, as well as from those of discriminating and unprejudiced pathologists, it is found that not only hyperæmia may exist in the vessels of the stomach—*gastro hæmia*—without the organ being diseased, but that the coats of the stomach may be found corroded, and even perforated; yet the whole phenomena may have been cadaveric; in the case of hyperæmia, some mechanical impediment having existed to the return of the blood of the veins of the portal system; and in that of corrosion and perforation of the stomach, the gastric acids contained in it, and which are without action on the living tissue, having exerted their chemical agency on the coats, as soon as they were deprived of vitality, in the same manner as they do on other dead animal matter.

In the healthy state, the mucous lining of the stomach has a white, slightly rosy hue, over every part of its surface. It rarely happens, however, that there has not been some mechanical or cadaveric cause of hyperæmia, which has interfered with the circulation along the portal veins, so that the mucous membrane does not often present the same homogeneous appearance; and these appearances may not always be readily appreciable from those of positive inflammation. On the other hand, in the case of hyperæmia of the stomach, as in the same condition elsewhere, there may be no appearance whatever on dissection, even when it has existed to a great extent; but, as inflammation includes modification of structure, careful examination can scarcely fail to detect it.

In the anatomical evidences, left after the taking of poisons, we have an opportunity for noticing the organic changes that result from endogastritis. Redness is always perceptible. This may be partly or wholly caused by arborescent vascularity, to which the term "arborization" has consequently been applied, or by a dotted redness occupying various portions of the mucous membrane. Softening of the mucous coat is likewise met with in different degrees, as well as ulcerations, which, however, are less frequent than redness. Gangrene is likewise observed at times, and alteration of the secretions,—as exhalation of blood, increased quantity of mucus, the formation of false membranes, &c. Many of the poisons coagulate albuminous matters, that may be present in the stomach; and certain of them, as the strong mineral acids, occasion contraction of the viscus. Generally, the mucous membrane alone is affected; but, if the poison has been active, and has remained for some time in the organ, the other membranes may become implicated, injected, softened, ulcerated, and even perforated. Such being the symptoms induced by corrosive and acrid agents, we can understand, that endogastritis, caused in any manner, may have similar necroscopic appearances,—as redness, softening, ulceration, gangrene, perforation, with modification of the secretions. There is reason, too, to believe, that inflammation of the mucous membrane of the stomach may be attended with eruptions in the same manner as the skin. Of this, however, farther mention will be made under Enteritis.

Careful examination of any portion of the inflamed mucous membrane exhibits it to be opaque; and, under the microscope, the opacity is found to result from changes that have occurred in the very system of nutrition. This is well seen, too, when a portion of the membrane is placed in a strong solution of chloride of sodium, which reddens the blood that may be present in the intermediate system of vessels. No ablution will be found to remove the appearances of inflammation.

Irregular, slate-coloured patches are often seen on the examination of persons who have died with broken down constitutions, especially in such as have had hepatic disease, induced by hard drinking. These slate-coloured appearances, on careful examination, have seemed to result, at the time of dissolution, from the impeded return of the venous blood through the liver to the heart, from the softened tissues constituting the parietes of the blood-vessels of the stomach, and from the thin condition of the blood. Under these circumstances, the blood readily transudes through the vessels in the submucous cellular tissue, and gives rise to the arborescent slate colour above mentioned.

Treatment.—In violent endogastritis, an active, sedative treatment must be employed. Blood-letting pushed so as to make a decided impression upon the system, but short of inducing syncope, is the main remedy; and, after the amount of the circulating fluid has been reduced sufficiently in this manner, leeches may be applied over the epigastric region, with the view of exciting a joint sedative and revelent action. When the leeches drop off, warm fomentations may be applied, and, subsequently, a large emollient poultice, if the weight of it be not inconvenient. Should this be the case, a flannel bag, half

filled with chamomile flowers, or with hops, may be applied heated, and renewed at intervals. Cupping is equally efficacious with leeches, where the tenderness on pressure will admit of it.

As the excessive vomiting, which accompanies the disease, is merely a symptom of the inflammation, it must be removed by taking away the cause. Still, it may be allayed, at times, by small quantities of soda water, taken ice-cold, or by small pieces of ice suffered to melt gradually in the mouth. Slices of orange, cooled by ice, are extremely grateful and beneficial in the same cases. Revellents, applied to the lower part of the alimentary canal, as the ordinary domestic enema, or even cold water thrown up into the colon, will occasionally afford relief, when other agents have not succeeded. In milder degrees of the same affection, blood-letting may not be demanded, either generally or locally; cool, emollient drinks, abstinence from all solid aliments, pediluvia—simple or sinapised—with common enemata to keep the tube free, and emollient or sinapised cataplasms to the epigastrium, may be all that is required.

It need scarcely be said, that, where the gastritis is owing to any acrid or corrosive ingesta, they must be removed, if they are still present in the stomach, either by titillating the fauces, or by the stomach tube or pump; and that, in all cases of convalescence from acute gastritis, the greatest caution, as to diet, must be inculcated. Farinaceous food, with milk, where the latter agrees, should be employed, until all risk of recurrence has passed away.

Relapses, in cases of gastritis, and, indeed, of most diseases, are commonly owing to errors in diet.

b. *Chronic Inflammation of the Stomach.*

SYNON. Gastritis Chronica, G. Lenta, G. Erysipelatodes, Chronic Gastritis.

The various forms of dyspepsia have been regarded, by some, as nothing more than chronic endogastritis. It is by no means proved, however, that inflammation of the mucous membrane is always present; and, accordingly, by many, dyspepsia is considered separately as a neuropathic disorder. It is important, indeed, to bear in mind, that many cases of chronic gastritis have been mistaken for atonic dyspepsia, and treated, accordingly, by tonics and excitants, with obvious and marked disadvantage. Careful examination will generally lead to a satisfactory discrimination, or, at least, induce a wise caution.

Chronic gastritis may supervene on the acute; but frequently, from the first, there are no signs of the acute form.

Diagnosis.—In place of acute pain—increased greatly on the slightest pressure, as in acute gastritis—the most prominent symptom may be a sense of weight, or as if some solid body were placed behind the xiphoid cartilage. This feeling is usually constant, and distressing from its endurance rather than from its severity. The appetite is impaired, and a nauseous or bitter taste is experienced; the mouth is clammy; the tongue commonly foul, especially on rising; the digestion morbid; in short, the usual symptoms are those, which are com-

monly referred to dyspepsia;—flatulence, with a sense of distension after a small quantity only of aliment has been taken; nausea, and sometimes vomiting; the bowels generally torpid, unless the lining membrane of the intestines participates in the same diseased condition, when they may be looser than customary. The skin is usually hot, and the pulse frequent. These symptoms may persist for a long while, without injuring the general health; but, sooner or later, unless the inflammation be removed, the whole system of nutrition is affected;—partly owing to defective chylosis, and partly owing to the constant irritation, the individual loses all mental and corporeal energy, and dies in a state of atrophy, frequently with all the symptoms of pulmonary consumption.

Causes.—The most common cause, perhaps, of chronic gastritis, is the intemperate use of fermented, and especially of alcoholic liquors: hence, the disease is very common in our eleemosynary institutions. The habitual use of any excitant substance is calculated to induce it. In like manner, it may be caused by aliments that disagree with the individual, as sour wines, improper food, both as regards quantity and quality, &c.

Pathological characters.—These are necessarily of the same nature as in acute gastritis, but less marked. There may be but little redness; on the contrary, the lining membrane may be unusually pale, and yet this may be unquestionably a pathological state. At times, the membrane presents a slate-coloured appearance; but this, as has been already remarked, may not always be morbid. Thickening and softening of the mucous membrane are often witnessed; and, when it is thickened, the capacity of the stomach is encroached upon. Hypertrophy has, indeed, been considered one of the most striking characters of chronic mucous inflammation. It may be confined to the villi, producing velvety or fungoid elevations, or to the follicles, giving the appearance of warts or patchy excrescences. Ulcerations may be present, but they are not common. Their appearance varies. They are frequently surrounded by a circle of inflammation. When the mucous membrane is softened, it is often easy to scrape it off with the back of a scalpel. Frequently, in these cases, worms—*ascarides lumbricoides*—are met with in the stomach. They have, indeed, been regarded by Broussais as the products of the gastro-enteritis; but it will be seen, hereafter, that there is no sufficient ground for this belief. By others, the gastritis has been ascribed to their presence, but the idea is probably equally unfounded.

Treatment.—In the treatment of gastritis of the chronic form, the main reliance has to be placed on revulsives, accompanied by appropriate diet. Cups or leeches may be applied occasionally to the pit of the stomach. In other cases, a blister to the same region, or the application of the ointment of tartarized antimony, or of a few drops of croton oil, rubbed on the epigastrium—a piece of lint or bladder being interposed between the finger of the rubber and the skin of the patient—affords essential relief. Frequently, however, all treatment fails in removing the disease, until the patient is subjected to that

thorough change in all the physical and moral circumstances surrounding him, which is advised under Dyspepsia.

The diet must be regulated in the same manner as in that disease; all highly stimulating aliments being avoided, and care being taken both as regards quantity and quality. Whenever the lining membrane of the stomach is inflamed, the secretion of the gastric juice is interfered with; and, consequently, if food were taken, inasmuch as none of the gastric solvent is present in the stomach, it could not fail to act as an irritant.

II. GASTRORRHŒA.

SYNON. *Blennorrhœa Ventriculi*; *Fr.* Gastrorrhée, Flux muqueux de l'Estomac; *Ger.* Blennorrhœe des Magens.

It has been presumed, that the mucous lining of the stomach, like the mucous membranes in general, may be affected with *catarrh*, using the term in the extensive signification in which it is employed by the French practitioners; and there can be no doubt that, under inflammatory irritation, the secretion may be greatly augmented; but whether any such distinct affection as the pulmonary or vesical catarrh exists, characterized by symptoms that cannot be mistaken, has been a question with pathologists; some believing, that any increased exhalation is the result of chronic gastritis, of incipient cancer, or of an affection in a remote organ, and that it is very rarely idiopathic; whilst others think, that, although gastrorrhœa has been confounded with gastritis, its separate existence is demonstrated, and that it ought to have a distinct place assigned to it.

The ordinary catarrhs from mucous membranes are inflammatory; but the *Stomachal catarrh*, of the French writers, is looked upon as a disease not dependent upon inflammation. On inspection after death, it is affirmed, the mucous membrane of the stomach is found to be covered by a thick layer of mucus, without there being any signs of inflammation of the membrane. The symptoms, too, are different from those of gastritis, and the treatment diametrically opposed to it. Andral properly remarks, however, that gastrorrhœa may exist along with chronic gastritis, or be a consequence of it, as the ordinary gleet is the result of a previous inflammatory condition. The diagnosis, he admits, is sometimes difficult; but still, he thinks, if an attentive examination be made, the simple flux of the mucous coat cannot be confounded with gastritis; but, if doubts exist, the treatment will remove them: this, indeed, he considers the real touchstone.

It can scarcely be doubted, that, as in the case of the system of nutrition when hypertrophy exists, a nutritive irritation may be present in the secretory system, which may differ materially from inflammation, and give occasion to inordinate secretion; and that such may be the case with the mucous follicles of the stomach. Under this impressibility, particular agents may augment the other secretions, as we know they augment the secretion of the gastric acids. Gastrorrhœa, for example, is stated to be increased by mucilaginous drinks: the secretion of the gastric acids is increased by weak sac-

charine solutions; and many other articles of diet are productive of similar results.

The form of gastrorrhœa with which we are most familiar, is that commonly described by pathological writers under the name of *Pyrosis*; (SYNON. *Limosis cardialgia sputatoria*, *Cardialgia sputatoria*, *Apocenosia vomitus pyrosis*, *Dyspepsia pyrosis*, *Waterbrash*, *Waterqualm*; Ger. *Sodbrennen*;) and which is generally considered as one of the manifestations of dyspepsia. It often accompanies chronic gastritis, and other affections of the stomach, and is characterized by a copious eructation of watery fluid, usually insipid, but at times acrid, with a sense of weight and often of burning pain, extending over the epigastrium. In some persons, the secretion is so copious, that they can eject at pleasure considerable quantities, especially in the morning before taking food, or they possess what has been termed the faculty of *vomiting at pleasure*.

It has been suggested by Dr. Burne, and with much plausibility, that the fluid of pyrosis does not proceed from the stomach, inasmuch as when that organ is full from a preceding meal, some of the food ought to be thrown up with it. He is disposed to refer it to the salivary glands and muciparous follicles of the mouth and throat; and he elucidates the matter by a reference to the fact, that when an emetic is taken, and the person first feels sick, the mouth instantly fills with water, which runs from it in a clear stream: after this vomiting of the contents of the stomach ensues. The clear fluid is doubtless furnished by the salivary glands and muciparous follicles of the mouth and throat, suddenly excited to inordinate secretion by sympathy with the disordered stomach;—phenomena, which, in Dr. Burne's judgment, form an exact parallel to the nausea of pyrosis, and the sudden discharge of the limpid fluid.

It has been affirmed, by Dr. Symonds, that the cause, which, more than all others, induces the affection, is the exclusive use of farinaceous and vegetable food, especially when combined with alcoholic drinks; "hence, its frequency in Scotland and Ireland, where oatmeal and whiskey, or potatoes and the same liquid, are the meat and drink of a large portion of the poorer classes of the population."

Treatment.—Agents, that gently stimulate and induce a new action in the stomach, are found to be most efficacious. Of these, emetics are perhaps the best. Under the influence of an emetic, gastrorrhœa, which has persisted for two or three weeks, has disappeared in the course of twenty-four hours. The ordinary emetic of tartrate of antimony and potassa, and ipecacuanha, is as good as any that could be prescribed. The emetic may be followed by a brisk cathartic of calomel and jalap, or any of the active cathartics, which, by exciting a revellent operation on the intestinal canal, detract from the disorder of the stomach. The cathartics may be repeated twice a week if necessary. Along with this plan, a tonic system must be adopted, similar to that advised under dyspepsia. The subnitrate of bismuth and the nitrate of silver, given as advised under gastrodynia, have been especially extolled. The diet should be dry, and easy of digestion.

Some of the cases of what have been termed "*Alkaline indiges-*

tion," and "*Neutral indigestion*," would appear to have been gastrorrhœa. The fluids, brought up by some of those who have the power of *vomiting at pleasure*, instead of being acid, have been looked upon as alkaline. Whether this be really the case or not, we can readily understand, that there may be a deficiency of acids secreted from the stomach, as we know there frequently is a redundancy. In these cases of "*alkaline indigestion*," acids, as the muriatic, (gtt. vj.—x. ter die ex aquâ,) have been found very beneficial, along with appropriate general management. (See *Dyspepsia* and *Chronic Gastritis*.) Of late years, lactic acid—one of the gastric acids—has been strongly advised by Magendie, in the form of lemonade.

R.—Acid. lact. liquid. f 3j.—3iv.
Aque, Oij.
Syrup. f 3ij.—M.

Recent researches, however, of Liebig, would seem to show, that this acid never exists in the healthy stomach; and he affirms, that the property possessed by many substances, such as starch, and the varieties of sugar, by contact with animal matters in a state of decomposition, of passing into lactic acid, has induced physiologists too hastily to assume the fact of the production of lactic acid during healthy digestion.

III. SOFTENING OF THE STOMACH.

SYNON. *Gastromalacia*, *Dissolutio Ventriculi*, *Emollitio Ventriculi*, *Pseudophlogosis Ventriculi Resolutiva et Colliquativa*, *Metamorphosis Ventriculi Gelatiniformis*; *Fr.* Ramollissement de l'Estomac, *Gastromalacie*; *Ger.* Gallerartige Magengrunderweichung.

Under the head of gastritis, reference was made to softening of the stomach, as one of the consequences of inflammation, but the attention of pathologists had not been largely directed to it prior to the observations of Louis. The disease has been described, by some, as peculiar in its character, and not as a form of chronic gastritis; whilst others have regarded it as a variety of gastritis. It seems to us to belong manifestly to the latter, but it may still demand a separate consideration.

Diagnosis.—The following symptoms have been considered to characterize this inflammation. Long protracted disorder of the functions of the stomach, commencing, in the first instance, with fever, nausea, vomiting, loss of appetite, constant *epigastralgia*, and after persisting, either continuously or with some remissions, terminating in death. When these symptoms supervene in the course of a chronic disease, and especially in phthisis, and when they have continued for twenty days, six weeks, or two months, and at the same time, there is neither a tumour at the epigastrium nor any sign of cancer of the stomach, the diagnosis may be regarded as more positive.

Softening of the mucous membrane of the stomach is a very common appearance in the fatal cases of dropsy and visceral diseases, which occur annually in the Philadelphia Hospital, in persons who have been long addicted to the abuse of spirituous liquors. In many such cases, there may have been no symptoms, which enabled the

observer to pronounce as to the character of the lesion, except the ordinary symptoms of chronic gastritis.

In children, a gelatinous or gelatiniform softening of the mucous lining of the stomach (*Gastromalacia Infantum*; Fr. *Ramollissement Gélatiniforme*), was first pointed out by Cruveilhier. This gelatinous softening is met with in children, and is indicated by the ordinary signs of severe gastritis—as pain and tension in the epigastrium; the contents of the stomach, mixed with bile, discharged by vomiting, either immediately or a long time after food has been taken; countenance always expressive of suffering, with great restlessness. To these symptoms, succeed general prostration and stupor, and the child sinks in the course of from a week to a fortnight.

It is proper to bear in mind, that, although the softening of the stomach is generally produced by an inflammatory process, it may result likewise from the action of the gastric acids after death. This has been unquestionably established by experiments on healthy animals, and by the observation of many eminent pathologists.

Pathological Characters.—The mucous membrane of the stomach is found in some parts so much softened, that it can be removed by scraping it with the back or the handle of a scalpel. It is generally pale, semitransparent, reduced to great tenuity, and occasionally wholly destroyed—the membrane being, at times, rose-coloured, or grayish, and studded with reddish or blackish spots. The softening is most frequently met with at the cardia, the pylorus, and the *bas-fond* of the stomach, but the whole of the mucous membrane may be implicated. The other coats of the stomach are generally healthy. When the mucous membrane is destroyed in places, the denuded spots are not regularly defined, as is often the case in ulcerations of the same membrane.

Treatment.—Although it has been conceived to be practicable not only to diagnosticate the existence of gastromalacia, but likewise to arrest its disorganizing progress, it is a question, whether, if detected, great advantage is to be derived from any plan of treatment. Milk diet, baths continued for a long time, and the properly regulated use of opium, have been regarded as the curative agents by some; antiphlogistics and derivatives, they assert, enfeebling the patient without mitigating the disease. They, on the contrary, who believe the affection to be essentially inflammatory, and who treat all inflammations by the rigid antiphlogistic rule, apply leeches and derivative or emollient cataplasms to the pit of the stomach. The practitioner will have to form his judgment from the nature of the particular case, always taking care not to introduce agents into the stomach, which, by their excitant properties, may add to the mischief already existing. The intestinal canal should be kept clear daily by means of enemata.

IV. PERFORATION OF THE STOMACH.

SYNON. *Gastrobrosis*, *Perforatio Ventriculi* *Gastrorrhæxis*; Fr. *Perforation de l'Estomac*; Ger. *Durchlöcherung des Magens*.

It has already been remarked, that perforation may be the result of the action of the gastric juice on the stomach after death. Under

morbid conditions, also, the organ may be torn or give way, and the alimentary matters be effused into the cavity of the peritoneum, or it may yield in the direction of the cavity of the omenta; and, if adhesions have taken place between the stomach and the diaphragm or intestines, an opening may be formed into the chest or bowels.

Perforation of the stomach is usually—some say always—a sequel of inflammation of the mucous coat of the organ ending in ulceration. This ulceration may either be simple in its character, or malignant.

Diagnosis.—Excruciating pain suddenly occurs at the epigastrium, with a sensation of burning heat, which spreads over the whole abdomen; the patient rolls about in all directions; loses consciousness, and makes perpetual, but ineffectual, efforts to vomit; the features become changed and hippocratic; the pulse small and frequent, and the respiration anxious; meteorism succeeds, and death in the course of a few hours.

Treatment.—This can only be palliative. It is scarcely necessary to say, that, when the diagnosis is accurately established, no expectation of cure can be indulged. The efforts of the physician must be directed to a euthanasia, by the use of anodynes in full doses.

V. CANCER OF THE STOMACH.

SYNON. Induratio seu Scirrhus seu Cancer Ventriculi; *Fr.* Cancer de l'Estomac; *Ger.* Magenkrebs.

Cancer of the stomach occurs most frequently in the pyloric portion. It may, however, attack both the anterior and posterior surfaces of the viscus, the cardia, and the great and little curvature.

Diagnosis.—In the first instance, the symptoms cannot be distinguished from those of chronic gastritis. Generally, a shooting pain is felt, sooner or later, in the epigastric region; although, in other cases, the sensation is merely that of weight. Digestion is always impaired,—the patient experiencing more or less distension after eating even a small quantity of aliment, and being distressed by acid eructations. Vomiting is a common symptom; and, if the carcinomatous affection be seated at the cardia, it supervenes soon after eating. On the other hand, if the malady be at, or near, the pylorus, it may not occur until the lapse of an hour, and then the new food may be apparent amongst the rejected matters along with the food that may have been taken a day or two previously. When the vomiting occurs in the fasting state, it may consist of mere mucus, or blood exhaled from the mucous coat, which has preserved its natural character, or become more or less modified in its appearance whilst present in the stomach. Towards the last periods of the disease, a chocolate-coloured substance is generally discharged by vomiting—often in enormous quantities—and, in all cases, the rejection of the contents of the stomach affords temporary relief.

In many cases, examination of the epigastric region throws no light on the disease; but, in others, a tumour, which is movable according to the position of the stomach, can be felt through the parietes of the abdomen. In a case of scirrhus of the pylorus, under the author's care, which went through all its stages tardily, and, ultimately,

proved fatal, no tumour whatever could be felt in any part of the epigastrium. In certain cases of great diminution of the pyloric orifice, the outlines of the stomach are perceptible behind the extenuated parietes of the abdomen, and can be readily followed by the hand; and by shaking the patient, and applying the ear at the same time on the epigastric region, the sound of gurgling may be heard. The outlines of the stomach were most distinct in the case above referred to.

In the majority of instances, the patient presents the peculiar sallow hue and the general phenomena of cancerous affections; and cancer of the stomach is rarely met with except at periods of life, which are most prone to those affections. It has been doubted, however, by Dr. Stokes, whether there be any validity in the distinction between this and common ulceration in various other parts. In many cases, certainly, a question may arise as to the existence of any true cancerous *vice* in the system; but, undoubtedly, others do occur in which such *vice* exists; and a local transformation is found in the stomach possessing the malignant and incurable character of cancer when seated elsewhere. The diagnosis is obscure; for cancer of the stomach may unquestionably exist without any pathognomonic signs.

Most commonly, the disease is attended with constipation; but there is rarely much disorder in the other functions, until it has laid fatal hold of the system. The termination is often long delayed by intermissions, during which the patient feels so well as to lead to the belief, that he is about to recover; but, sooner or later, the morbid phenomena recur. There are cases, however, on record, in which cancerous tumours have existed in the stomach, in a quiescent state, for years.

Causes.—These are no more known than are those of cancer in general. A cancerous diathesis constitutes the predisposition, which may be developed by various causes—amongst which has been reckoned, by Andral, the habit of drinking ardent spirits when fasting. It would seem to be unquestionable, that the predisposition may be communicated by hereditary organization. The disease is most common between the ages of thirty-five and sixty.

Pathological characters.—When the scirrhus or cancer is seated at or near the pylorus, so as to constitute an obstacle to the passage of the chyme into the duodenum, the stomach is generally enlarged, and usually filled with a dark-coloured fluid, both when the viscus is ulcerated and when it is not. The affected part is thickened and indurated, and, when an incision is made into it, creaks under the scalpel; it is of a white, grayish, pearly, opaline appearance, semitransparent or opaque, or yellowish. The coats of the stomach become so involved, that no appearance of them exists, except the peritoneum, which may remain sound until the last. The consistence of the tumour, which has often a lardaceous character, is less towards its centre, where the softened portion has at times the appearance of encephaloid transformation. The thickness of the morbid part varies from two lines to half an inch or more, and its internal surface is irregular, ulcerated, and covered with a whitish gray, or blackish fungous

matter; in the intervals of which there are numerous depressions. The odour exhaled from it is often repulsive. The interior of the stomach is frequently studded with red, polypous vegetations.

Treatment.—The essential treatment must be that of cancer in general;—iodine, for example, and the other agents that are adapted for modifying the condition of the circulating fluid, and through it that of the system of nutrition: the acid eructations may be palliated by the bicarbonate of soda, or by magnesia; and, if the latter should be insufficient to remove the constipation, which is usually present, emollient enemata may be administered. When the scirrhus is seated at the pylorus, the entrance into the duodenum becomes at times so restricted, that the chyme can pass only in small quantity through it. Nourishing soups or milk may, in these cases, be injected into the colon by means of the rectal tube of Dr. O'Beirne, and life may be prolonged for a short time in this manner.

The severe pain that accompanies the disease must be palliated by opium or its preparations. Some have preferred conium, hyoscyamus, stramonium, or belladonna, partly because they have been presumed to possess eutrophic or alterative powers—which, however, is more than doubtful—and partly because they are not attended with the objection that applies to opium,—of exerting a constipating action; but, after all, the patient is usually compelled to abandon them, and to seek relief from opiates.

Revellents—as blisters, cupping, or leeching—have been applied to the epigastrium, but the relief derived from them has been trifling, whilst certain of them tend to increase the debility. The belladonna or opium plaster to the epigastrium is occasionally beneficial. As a general rule, milk diet is most appropriate; but, should this disagree, the farinaceous preparations—as arrow-root, or sago, or animal broths—may be substituted. Frequently, tender meat will be digested; and, where this is the case, it may be allowed, with boiled rice.

VI. HEMORRHAGE FROM THE STOMACH.

SYNON. *Hæmorrhagia Hæmatemesis, Hæmatemesis, Vomitus Cruentus, Vomitus Sanguinis, Hæmorrhagia Ventriculi, Gasterorrhagia, Gastrorrhagia, Vomiting of Blood; Fr. Hématémèse, Vomissement de Sang; Ger. Blutung des Magens, Blutbrechen.*

Hæmorrhage from the stomach is not an unfrequent occurrence, and, when independent of disease in some other organ, is not a very serious affection: generally, however, it is symptomatic, and the prognosis consequently merges in that of the primary malady.

Diagnosis.—Commonly, before any blood is discharged from the stomach, the patient experiences signs of concentration of action towards some internal organ, with others peculiar to the stomach itself. Often, the uneasy sensations commence with chilliness, and a feeling of heat or distension of the epigastric region: the face is, at the same time, pale, and the extremities cold. Manifest distension now occurs in the epigastrium, with a sense of weight; and a sweetish taste is experienced, followed by nausea and vomiting—usually of a large quantity of blood. As the blood may have been progressively accumulating in the stomach, and become mixed with the gastric acids

and the other contents of the viscus, it is almost always black, and often grumous.

The only affection with which hæmatemesis can be confounded is hæmoptysis; yet, as will be shown hereafter, there is a marked difference between them,—both in the symptoms, which are referred, in one case, to the epigastric, and, in the other, to the thoracic region; and in the appearance of the blood evacuated, which in hæmatemesis has the characters described above, whilst in hæmoptysis it is florid and frothy. Difficulties may, however, arise occasionally, as where pulmonary symptoms have previously existed, and, subsequently, vomiting of blood occurs. A case of this kind fell under the author's care recently. A man was received into the wards of the Philadelphia Hospital, labouring under general dropsy, with signs of cavities in the lungs, and the ordinary functional phenomena announcing their presence. In the absence of the attending and resident physicians, he was suddenly seized with a copious discharge of blood from the mouth, of a dark, grumous character, and expired before the resident physician could reach the ward. At first, it was supposed, that the hemorrhage proceeded from the lungs, but the character of the blood referred the affection to the stomach; and that such was the fact was proved by dissection. It rarely happens, that hæmatemesis is thus rapidly fatal; it may recur, indeed, again and again; and, where it is dependent upon any irregularity of the menstrual function, it may return periodically, and ultimately disappear. Occasionally, the blood accumulates in the stomach, and gradually passes into the bowels, whence it is discharged.

Causes.—Blows received on the epigastric region, or sharp substances passed into the stomach, may occasion the disease; but this is not usual. Hyperæmia may likewise take place in the vessels of the stomach under inappreciable circumstances; and, occasionally, the transudation of blood would appear to depend upon active gastritis—the vomiting of blood being accompanied by epigastric tenderness, heat of skin, and general febrile excitement. At other times, the cohesion of the coats of the stomach may be lessened, so that the vessels are more loosely protected, and, therefore, more readily admit of distension; hence, transudation of blood occurs, especially if the parietes of the vessels participate in the softening. We can thus understand, that hæmatemesis may be a symptom of softening, of perforation, and of cancer of the stomach. In the two last diseases, a vessel may be perforated, and death take place suddenly, in consequence of the copious discharge.

In females, whose catamenia have never appeared, or been arrested, hyperæmia of the vessels of the stomach, with hemorrhage by diapedesis, may occur monthly, without the existence of any pathological condition, either of the parietes of the vessels, or of the mucous membrane of the stomach.

Where the constitution of the blood is modified, and its solid portions are diminished in proportion—as in purpura, typhus, and every form of anæmia or oligæmia—especially as this state is accompanied with impaired nutrition and diminished cohesion of the solid parts of

the body, transudation of blood may take place from the vessels of the stomach as from other vessels; and hence hæmatemesis—like *pétéchiæ*, *vibices*, &c.—becomes a symptom of purpura, typhus, &c.

Where hæmatemesis is caused by softening, perforation, or cancer of the stomach, the history of the previous symptoms will throw sufficient light on the pathology of the disease.

Hæmatemesis is often, also, symptomatic of diseases of other organs. Whatever interferes with the circulation of the blood, especially in those whose blood is more fluid than in health, or whose system of nutrition is impaired by disease, may give occasion to hæmatemesis. Accordingly, we observe it in those who have resided long in malarious regions, and suffered more or less under malarious disease—as enlargement of the liver or spleen. It may, in like manner, be symptomatic of disease of the heart. Whatever impedes the return of blood along the portal system towards the heart, may occasion hyperæmia in the vessels of the stomach, and consequent hemorrhage.

It may be remarked, that blood is occasionally discharged from the stomach, which does not proceed from the vessels of that viscus. In cases of epistaxis, if the person remains upon his back, the blood may not flow out by the anterior nares, but may pass into the throat, and be swallowed, so as to distend the stomach, and give rise to vomiting; and it is affirmed, that after the division of the *frænum linguæ*, in very young children, who are tongue-tied, blood enough may be sucked to occasion death before the mischief is detected.

Pathological characters.—The stomach usually contains a quantity of black fluid, and its lining membrane is of a dark red colour, with black patches, which, when subjected to pressure, yield a black matter by exudation. Occasionally, there are signs of endogastritis, but this is not common. When the membrane does, however, present an inflamed appearance, there are here and there patches, which are produced by the infiltration of blood in the submucous cellular tissue, which retain their colour even when subjected to frequent washings.

Treatment.—Should signs of plethora or vascular excitement exist, with or without evidences of gastritis, it may be advisable to draw blood from the arm, and to adopt the full antiphlogistic treatment; but, most commonly, hæmatemesis occurs in those in whom an opposite condition of the circulatory system is present. Where it arises in consequence of obstruction of the catamenia, bleeding may also be advisable. In the last case, the French therapists advise that leeches should be applied to the vulva, and, if suppressed hemorrhoidal flux be the suspected cause, to the anus.

Cathartics have been recommended by many practitioners, but objected to by others. The Germans generally discard them, but without any well-founded reasons. A saline cathartic, by acting upon the whole canal, develops a succession of sympathies, which derives greatly from the concentration of morbid actions towards the stomach. Certain of the saline preparations;—as supersulphate of magnesia, potassa, or soda, which may be formed extemporaneously,*—by coming in contact with the vessels that pour out the blood by rupture or transudation, arrest the hemorrhage by their astringent action, and

are thus both astringents and revellents;—whilst by their cathartic agency, they at the same time, remove from the intestinal canal any effused blood that may have passed into it from the stomach.

^a R.—Magnes. sulph. ℥iij.
Acid. sulphur, dil. gtt. xxx.
Aqua, f℥vj.—M.
Dose, one-quarter, four times a day.

In the cases, too, of hæmatemesis, that are dependent upon amenorrhœa, the cathartic may act beneficially by contiguous sympathy, on the torpid uterus.

In most cases of hæmatemesis, unless accompanied by marked hemorrhagic diathesis, or organic disease of which the hemorrhage is merely symptomatic, the simple treatment by the solution of super-sulphate of magnesia has been found by the author to be entirely satisfactory. It is probable, indeed, that the hemorrhage would generally yield to very simple measures. Dr. Marshall Hall states, that he has seen so many cases of “dyspeptic hæmatemesis and melæna” cease on giving frequent mild doses of the pilula, and the submurias, hydrargyri, and simple injections of warm water daily, or twice a day, that he recommends this mode of treatment in the strongest terms.

Where the disease occurs in those whose blood is impoverished, and the tissues imperfectly nourished, and consequently of loose coherence, remedies must be administered, which possess the power of adding to the coagulability of the blood,—such as the iodide of iron, (gr. ij. to iv. three or four times a day,) and the remedies advised under the head of SCORBUTIC CACHEXIA.

In hæmatemesis, astringents can be employed with full advantage, as they come in contact with the vessels that exhale the blood; and there may be cases in which the stronger astringents, as dilute sulphuric acid,^a tincture of chloride of iron, (ten drops every three hours,) or pure tannin,^b may be esteemed necessary.

^a R.—Acid. sulphur. dil.
Tinct. opii, aa, f℥ij.—M.
Dose, twelve drops every three hours.

^b R.—Acid. tannic. ℥j.
Opii, pulv. gr. j.—divide in pulv. iij.
Dose, one, three times a day.

In all cases, however, it must be borne in mind, that it is a most important matter to discover the pathological cause on which the hemorrhage is dependent, and to combat it. But unfortunately, as has been shown, this often reposes on morbid conditions of the stomach, and other organs, that do not readily admit of cure. It need scarcely be said, that where the hæmatemesis is active, or dependent upon gastritis, astringents are clearly contra-indicated, until the inflammation is subdued, after which they may be employed with propriety and advantage.

In hemorrhage from the stomach, as in all hemorrhages, it is essential to place the patient upon a dry diet; or at least not to allow fluid too freely. Under the loss of blood, the vessels greedily imbibe fluid, and the quantity of blood in them is soon as great as it was previous to the flow; but it is blood of less consistence, and consequently, more favourable to the recurrence of the hemorrhage. To allay thirst, the patient may take small pieces of ice into his mouth, or small quanti-

ties of iced lemonade—especially of lemonade formed of the sulphuric acid;—or slices of orange kept as cool as ice can make them.

VII. DYSPEPSIA.

SYNON. Apepsia, Digestio Depravata, D. Læsa, Indigestio, Limosis Dyspepsia; *Fr.* Dyspepsie, Gastro-atonie; *Ger.* Schwerverdaulichkeit, erschwerte Verdauung, üble Verdauung, schwache Verdauung.

Dyspepsia literally means *difficult digestion* or *indigestion*. It is a symptom of many diseases; yet it has been the custom with pathologists, for so long a time, to regard it as a distinct affection, that it cannot well be passed over, especially as there is no individual disease under which it can, with entire propriety, be classed. Some have referred it to chronic gastritis, but it unquestionably may exist independently of inflammation, as we often witness in cases of powerful emotions or mental distress—in that variety which has been termed "*nervous dyspepsia*." This protean disease has, indeed, been a great stumbling-block to pathological writers. Dr. M. Hall places it, along with hysteria and chlorosis, among diseases which consist of a general morbid affection, usually combined with some topical symptom or symptoms; and a still more recent writer, of our own country, Dr. Brigham, ranges it among diseases which, especially among students, arise from disease of the brain and nervous system, and which are perpetuated by mental excitement. That many of the cases, referred to dyspepsia, and constituting "*inflammatory indigestion*," belong to chronic gastritis, cannot be doubted. They are known by more or less pain at the epigastrium on pressure; dryness and redness of the tongue; dryness and heat of skin, with, at times, quickness of pulse; yet still, cases occur, which may be properly considered under a distinct head, and which are benefited by agents, that would not seem to be appropriate in an inflamed condition of the lining membrane of the stomach.

Dyspepsia, dependent upon functional derangement of the stomach, may be considered under two heads:—the *first* embracing the transient form, or that to which the French pathologists have given the not very expressive name of *Embarras gastrique*; and the *second*, the more protracted forms of the disease—those generally meant when the term Dyspepsia is used abstractly.

a. *Transient Dyspepsia.*

SYNON. Disordered Stomach; *Fr.* Embarras gastrique.

This affection is so common, that almost all have experienced it at one time or another. When we speak of an aliment having "*disagreed*" with us, or that the "*stomach is out of order*," we mean that transient dyspepsia or indigestion has been induced. It is also the condition in which people are in the habit of describing themselves as "*bilious*," which, in a large mass of cases, means, that, from having taken food in too great quantity or of difficult digestion, the functions of the stomach have become disordered; the food has acted as an irritant—induced a copious secretion from the lining membrane of the organ, and the reflux of bile and other matters from the duodenum.

Diagnosis.—The symptoms, induced by this condition of the stomach, are generally—uneasiness and sense of weight, with distension and feeling of heat in the epigastric region: constant eructations, sometimes acid—at others, inodorous—but at others, again, like the washings of a gun-barrel: the appetite is lost; the very sight of food is, indeed, revolting; the head aches; giddiness is experienced, followed by nausea and retching; and, ultimately, the contents of the stomach are ejected. These are the most prominent symptoms; at the same time, the mouth is clammy, and an acid or bitter taste is constantly present; the face is pale and haggard, and great despondency is experienced; the pulse is small, and there are no signs of inflammation.

Treatment.—This consists in removing the cause. If it have been occasioned by previous excess in eating and drinking—and it is a common result of a debauch—it passes off in a few hours. A Seidlitz powder, taken early in the morning after the excess, will often prevent it; or, if it have occurred, will diminish the morbid effects. In such cases, relief is obtained by spontaneous vomiting, and, in all cases, the cause may be removed by a gentle emetic, (*Pulv. ipecac. gr. xx.*;) after which the tone of the stomach may be restored by any of the bitter infusions, (*Infus. gentian. comp.*, vel *Infus. colom bæ*, vel *Infus. flor. anthemid.* f3iss. quater in die.)

It is not easy to account for the formation of sulphuretted hydrogen—which is not usually met with in the stomach or upper part of the tube—whether, for example, it be formed by the reaction of the elements of the food upon each other, or be secreted from the lining membrane of the stomach. It passes away, however, along with the other symptoms of transient dyspepsia; but may be palliated by the use of any of the chlorinated preparations, (*Calcis chlorin. gr. vj. in pil.*;) or by a combination of charcoal and magnesia, which is well adapted for such cases—the charcoal acting as a tonic, whilst the magnesia unites with any acid that may be present in the stomach, and a laxative salt is formed, which aids the progression of irritating matters, that may be present in the intestinal canal.

R.—Carbon. lign. gr. xv.
Magnesiæ, gr. x.—M. ter die sumend.

b. *Chronic Dyspepsia.*

Under this head may be considered the common dyspepsia of authors, and of the people. It is characterized by the various symptoms, which occur in transient dyspepsia, except that they continue longer and induce more general disorder—of the nervous system especially. Along with distension of the stomach soon after eating, and even when a very small quantity of food has been taken, eructations of gas, sometimes inodorous, and at others of a nidorous or putrid taste; nausea; vomiting; regurgitations of an acid character; and heartburn, or pain at the pit of the stomach,—there is usually headache; clamminess of the mouth; foulness of tongue; great despondency, and commonly concentration of attention towards the affected organs; palpitation; epigastric pulsation; at times, fainting; with constipation, or an irregular state of the bowels. The appetite varies:

—sometimes it is lost or impaired, (*anorexia*;) at others, natural; at others, inordinate, (*bulimia*;) and at others, again, perverted, (*pica*.)

In some cases, the indigestion, instead of being *gastric*, is chiefly *duodenal*. The stomach may be more or less affected with the symptoms described above, or there may be no nausea or vomiting, and but few of the other symptoms. In this case, the prominent symptoms are colic, borborygmi, with the evacuation of aliment that has not undergone perfect digestion; or the fæces may be liquid, and extremely offensive.

Causes.—The main causes are,—inattention to diet and the consequent indulgence in aliments that are indigestible by quality or quantity; sedentary habits; and, it has been asserted, intense mental application. By withdrawing the nervous energy from the stomach, and concentrating it on the brain, the former viscus, it is affirmed, suffers. This, however, may admit of question. The student, who sits closely at his labours, is apt to neglect appropriate exercise, to be irregular in his meals, and in the time allotted for sleep; and, owing to these neglects, he may become dyspeptic, but not because he employs his brain—even for a long period—in the labour for which it is naturally destined. Investigations have been entered into to show, that many distinguished individuals have fallen victims to cerebral diseases, induced by too great intellectual exertion; and it has been affirmed, that an impaired state of health would appear to be requisite for high mental exertion; but, in many of the cases cited, the individuals have suffered from habits which—if persisted in—could not fail to affect the health seriously; whilst the circumstance, that bodily indisposition confines the sufferer to the house, and, therefore, adds to his opportunities for production, has been overlooked in the inquiry. The habitual use of agents, that act upon the nerves of the stomach, and through them on the nervous system generally, is also favourable to the production of dyspepsia. Hence, the disease is met with in the drinker of fermented liquors, and in those who use tobacco in any of its forms, but especially in that of chewing.

Treatment.—The essential treatment is dietetical. Without, indeed, a careful attention to diet and regimen, every attempt at cure will be fruitless, and this is the cause why we meet with so many confirmed dyspeptics.

It will almost always be found, that animal food is more readily managed by the stomach than vegetable: there are exceptions, however, to this, as indeed to every rule that can be laid down,—individual experience suggesting most accurately the appropriate diet in any particular case. Usually, however, where animal food disagrees, it is owing to its affording too much nutriment, rather than to its being more difficult of digestion than vegetable food. Great care, therefore, must be taken that the animal food is not in too great quantity, for this will excite functional derangement, especially if there be the least approximation to gastritis. The common idea is, that the stomach, in cases of dyspepsia, should be kept occupied; but there is no question that intervals of rest are demanded, by which the powers of the organ may be recruited. Hence, it is better to have fixed

periods for eating, and to be careful, that the digestion of one meal is accomplished before another is began. In the majority of cases, weak saccharine solutions disagree in the manner described under Cardialgia, and, therefore, they are inappropriate. On this account, tea and coffee are injurious to most dyspeptics—not by reason of the infusion of the vegetables whence they are made. Chocolate is generally objectionable, owing to the oleaginous matter it contains in addition. As a general rule, it may be said, that the breakfast should consist of boiled milk, where it agrees; and stale or unleavened bread; the dinner of the digestible meats, as chicken or mutton, with the farinaceous potato; and the supper of the same materials as the breakfast. If leavened bread be permitted at all, it must be stale; new bread, especially when hot, is formed by mastication into a tenacious mass, which is not readily managed by the solvent powers of the stomach.

Where irritability of the stomach exists, the patient may have to be restricted to the farinaceous vegetable preparations—as sago, arrow-root, and tapioca, boiled in milk. Soups, consisting—as they do—of gelatin mainly, are not as digestible as is generally supposed. When taken, stale bread should be eaten with them, which gives them the due digestive texture, so that the stomach can readily grapple with them. The same remark applies to mucilages; and if the above rule be not attended to, the gum water, so strongly advised in many cases, will be found to disagree with the stomach. There are many dyspeptics with whom milk disagrees—mainly, perhaps, in consequence of the caseum it contains. These persons can take with advantage a mixture of one part of cream with two parts of water, which may be substituted, in the dietary above recommended, for breakfast and supper, in place of the milk.

Such are the general rules as to diet, to be observed in cases of ordinary or atonic dyspepsia. It is clear, however, that they cannot suit all. Each individual, after a certain term of experience, knows the peculiarities of his own stomach, and it is for this reason that the old proverb has been formed—that every man is a fool or his own physician at forty. The proverb can, indeed, apply only to his dietetic knowledge derived from experience.

As in the cases of dyspepsia, which are now under consideration, there appears to be a want of tone in the stomach generally, and in the muscular coat in particular, it is well, in addition to attention to diet, to administer agents that are capable of impressing the nerves of the stomach, and, through them, those of the general system, in such a manner as to add to their activity. With this view, the various vegetable tonics, which owe their virtues to bitter principle, may be prescribed simply or in combination with excitants. Of these the colomba, (*Infus. colomb.* f 3iss. ter die,) gentian, (*Infus. gentian.* f 3iss. ter die,) or quassia, (*Infus. quassiae*, f 3i. ter die,) are capable of answering all the purposes of the class. The compound infusion of gentian, consisting—as it does—of gentian, orangepeel, coriander seeds, alcohol and water, is a combination which may be prescribed, where more excitation is needed than the simple infusions of the bitter vegetables are capable of accomplishing.

Wherever complications exist, they must be met by proper management. Thus, the head may be so much oppressed, as to require abstraction of blood, by cupping, from the nape of the neck; constipation may require the use of lavements; and diarrhœa may have to be checked by chalk and opium, and other direct or indirect astringents. Perhaps, however, in long protracted cases of dyspepsia, no matter whether dependent upon atony of the coats of the stomach, or on chronic endogastritis—in every form, indeed, of dyspepsia—nothing is so markedly salutary as a thorough change of all the physical and moral influences surrounding the individual. It has been affirmed, by Dr. James Johnson, that the most inveterate dyspepsia, where no organic disease is present, might be cured by a journey of two or three thousand miles over such a country as Switzerland. The more varied the scenery and the atmospheric conditions, the greater, of course, is the revulsion; but in countries, not possessed of the advantages afforded by Switzerland, mere travelling exercise, with due attention to diet, is, perhaps, the most effectual plan of treatment that can be recommended to the dyspeptic.

The use of the flesh-brush, and the shower-bath at such a temperature as not to produce too great a shock; and regular exercise, especially by walking, may be inculcated in all cases. Riding on horseback is next in value to walking; but every form of gestation is attended with benefit.

A question has occasionally arisen as to the proper quantity of drink most favourable to digestion. Where the salivary and other secretions are too sparing to communicate to solid food the due “digestive texture”—which can rarely happen—liquids, in proper quantity, will favour the gastric operations; but, if taken too freely, the aliment is rendered too soft, and the gastric acids are so much diluted, that digestion is more difficult. The dyspeptic must avoid the lemonade, wine, toddy, punch, &c., which are handed round occasionally before dinner: few can take them with impunity. Where the digestive powers are weak, some are in the habit of drinking water as hot as it can be swallowed after a meal; others take a small quantity of some alcoholic liquor. Both plans should be avoided, but the first is less prejudicial. It merely stimulates the lining membrane to an increase of its secretions, and by contiguous sympathy, the muscular coat is excited to greater energy; but the latter coagulates the albuminous matter, and passes through the coats of the stomach into the radicles of the abdominal venous system. As an occasional course this may not be productive of evil; but mischief can scarcely fail to result from its habitual employment. The same remark is applicable to the constant use of bitter tinctures, which act mainly by the excitant influence of the alcohol they contain.

VIII. PAIN IN THE STOMACH.

SYNON. Gastralgia, Epigastralgia; *Fr.* Gastralgie, *Ger.* Magenschmerz.

Gastralgia, which literally means *pain in the stomach*, is symptomatic of many diseases, and is not an uncommon accompaniment of

dyspepsia. Still it may be well to consider it under a distinct head, inasmuch as it may take place without any evidence whatever of previous dyspeptic symptoms. It is met with in two forms chiefly—first, in that of heartburn—the *cardialgia* of most writers; and, secondly, in that of cramp or pain in the stomach—the *gastrodynia* of authors.

a. *Heartburn.*

SYNON. *Cardialgia*, *Limosis Cardialgia* Mordens, *Morsus Ventriculi*, *Soda*, *Cardialgia Spuria*; *Fr.* *Cardialgie*, *Ardeur d'Estomac*, *A. du Cœur*; *Ger.* *Brennen im Magen*, *Magenschmerz*, *Magendrücken*.

Heartburn consists of a gnawing or burning uneasiness, felt chiefly at the cardiac portion of the stomach. It is a common symptom of dyspepsia, as well as of chronic gastritis, and of cancer of the stomach; and gouty individuals are especially obnoxious to it. Occasionally, the uneasiness is experienced over the whole epigastrium, with anxiety, nausea, coldness of the extremities, failure of strength, and great tendency to faintness—constituting the *Limosis cardialgia syncopalis*, or *sinking heartburn*, of Dr. Good. At other times, it is an accompaniment—constitutes, indeed, a symptom—of gastrorrhœa.

It has been already remarked, that two acids are secreted from the healthy stomach—the muriatic, and the acetic—whose agency is required in digestion. Under particular circumstances, for example under febrile irritation—as was witnessed in the case of the Canadian, to which the author has had occasion to refer in other works, (*Elements of Hygiène*, p. 216, Philada., 1835; and *Human Physiology*, 5th edition, Philada., 1843,)—the ordinary secretions are arrested; and, consequently, if food were taken under those circumstances, it could not be digested. On the other hand, in special conditions of the stomach, the gastric acids are secreted in too great quantity, and, by their predominance, give rise to heartburn, and to all the symptoms that characterize *acid indigestion*. There can be no difficulty in diagnosing this form of indigestion—acid eructations, violent heartburn, and marked effervescence, when a carbonated alkali or earth is taken, sufficiently indicate it. The gastric acids lay hold of the base, and the carbonic acid is given off,—at times, in such quantity as to sting the nose, in the same manner as it does when disengaged from champagne, or any brisk fermented liquor.

The predominance of acid, in this form of *cardialgia*, has been the source of speculation with the chemical pathologist, and it has been generally ascribed to the reaction of the elements of the food upon each other. A very slight examination will, however, show that such cannot easily be the fact. Every dyspeptic must have observed, that, when particular articles of diet have been taken, heartburn has been experienced almost on the instant they have reached the stomach, and when it would seem to have been impossible for time to have been afforded for the successive establishment of the vinous and acetous fermentations, when articles have been taken that are susceptible of those changes. Again, the formation of acid is equally evinced, if certain animal substances—as melted or empyreumatic butter—be

taken; and, if the acid were produced by the reaction of the elements of the food upon each other, it ought obviously to differ according to the materials that furnish it. The true explanation of these morbid phenomena would seem to be, that there are certain articles of diet, which, when they come in contact with the lining membrane of the stomach of one liable to heartburn, excite the organs whose office it is to secrete the gastric acids, so that a larger amount of these acids is formed, and, in this way, a predominance occurs—but not owing to the reaction of the elements of the food upon each other. Under this view, the acids ought to be the same, whatever may be the character of the food, and such is probably the case;—the muriatic always predominating, as it does in health, and giving rise to the markedly acid effect occasionally produced on the teeth by the eructations, which almost all persons have experienced in the course of their existence. (See the author's *General Therapeutics*, p. 48: Philada., 1836, and *General Therapeutics and Mat. Med.* Philada., 1843.) It is proper, however, to remark, that there is one article of diet, at least, which, under particular circumstances, becomes so suddenly acid, that the predominance of acidity may be induced by it, without the supposition of undue secretion of the gastric acids. Milk, when the air is thunderous, becomes sour almost instantaneously; and there is reason to believe, that it may rapidly undergo this change, and give rise to the developement of lactic acid in the stomach, especially in children. The predominance of acidity is certainly great in them, and is largely concerned in the causation of disease, especially of the alimentary tube. It is indicated by the acid smell of the breath; the odour and taste of the regurgitated matters; the acid smell of the alvine evacuations, and their green appearance—a mixture of healthy bile and acid producing a green colour. In the adult, a certain degree of acidity may perhaps be present, without being indicated by the ordinary symptom—heartburn; and it may be the cause of the irritability of the stomach, characterized by vomiting, whenever food is received into the organ, as well as of the sleeplessness and headache, which are found to be relieved by full doses of the carbonated alkalies.

The increased secretion of acids, which gives occasion to heartburn, is usually connected with an asthenic condition of the functions of the stomach. It may occur in combination with chronic gastritis, but this is certainly—in the author's experience—the least frequent pathological condition. The means of diagnosis between chronic gastritis and ordinary atonic dyspepsia have been given under other heads. The two morbid states give rise to symptoms, many of which are similar, and demand a patient differential diagnosis.

From what has been observed above, it appears, that in certain morbid conditions of the gastric functions, particular articles of diet give occasion to an augmented secretion of those acids which, in health are essential to the production of the physical changes that take place on the food in the stomach. In other words, the organs that secrete those acids are unusually impressible, and, on the application of particular excitants, become the seat of secretory irritation.

Treatment.—This may be either *palliative* or *entire*. The palliatives

are substances termed "antacids," which neutralize the redundant acid in the stomach, by combining with it as they would do outside the body. Amongst the different alkalies and alkaline earths, the therapist has considerable choice. If a simple antacid be needed, he may administer liquor potassæ, (gtt. x. in milk), liquor calcis, (f 3iv. —Oss.), or carbonates of potassa or soda, (gr. x.—lx.); but if he be desirous, at the same time, to induce some degree of excitation in the mucous coat of the stomach, and through it on the muscular coat, he selects ammonia, (*liq. ammon.* gtt. v.—xx, largely diluted), or its carbonate, (gr. v.—x.) The carbonates—and of these the bicarbonates of soda and potassa—are the mildest preparations. As regards, too, the alkaline earths, the practitioner has a ground of preference, which may be borne in mind. The salts formed by the union of the gastric acids with magnesia, or its carbonate, (gr. x.—3i.), are possessed of laxative properties; those produced by the union of lime with the same acids, when either liquor calcis, or chalk (gr. x.—l.) is given, are of a contrary character. If, therefore, the predominance of acidity be accompanied with constipation, magnesia is selected; if opposite indications exist, lime or its carbonate. Pure argil or alumina has been advised by many in the same cases as the preparations of lime. (See the author's *New Remedies*, 4th edit. p. 71. Philad. 1843.)

The entire or radical cure of heartburn must be obtained by obviating the morbid condition, which gives occasion to the undue secretion of the gastric acids. This, as has been remarked, is most commonly accompanied by an asthenic state of the stomach. The churning process is torpidly executed; and by arousing the muscular coat to augmented action, by the appropriate administration of tonics and excitants, singly or combined, accompanied by the adoption of an appropriate regimen, as advised under Dyspepsia, the symptoms are relieved; and, if the plan be properly persisted in, often entirely removed; but no plan of treatment, which does not combine attention to diet and regimen can prove effectual. Weak saccharine solutions; rich soups, and made dishes of various kinds; alimentary preparations, which contain a large quantity of nutritive matter in a small space; the succulent vegetable, as cabbage, especially when dressed with melted butter, and the various forms of pastry, must be carefully avoided. Experience points out the *lædientia* in the particular case, so that the patient is well aware what he ought to avoid, although he may not be able to select the food that is most appropriate for him. (For the properties of different forms of alimentary matter, see the chapter on the *Materia Alimentaria*, in the author's *Elements of Hygiène*, Philada. 1835.)

b. *Gastrodynia.*

SYNON. Gastralgia, Gastralgia, Epigastralgia, Cardialgia, Spasmus Ventriculi, Dyspepsodynia, Cardiognus Ventriculi, Morbus Cardiacus, Dolor Cardialgicus, Perodynia, Cardiacus Affectus, Cardiodyne, Pain at the Stomach, Colic of the Stomach, Cramp of the Stomach; *Fr.* Gastrodynie, Douleur de l'Estomac, Douleur Névralgique de l'Estomac; *Ger.* Magenkrampf, Herzdrücken, Magendrücken, Magenschmerz, Herzweh, Herzgespann.

Gastrodynia occurs in different degrees, often along with other signs of dyspepsia; and, at times, in an infinitely more severe form,

commonly designated *cramp in the stomach*. Some dyspeptics are extremely liable to a neuralgic pain, resembling colic, which occurs at times before food is received into the stomach; at others, during digestion. It is, occasionally, extremely violent at the epigastrium, and may, or may not, be accompanied by vomiting. * This pain is not augmented by pressure, as in gastritis, but the contrary; and it may exist for years, without the supervention of organic disease of the viscus. It comes on rapidly; soon attains its highest point, and gradually ceases,—to be reproduced under like circumstances. When it is to a slight degree only, the patient can relieve it by taking aliment, as a crust of bread; and one very severe case, the author recollects, was relieved instantaneously by this simple method practised early in the morning, whilst the stomach was empty. Many similar cases of success are upon record. It is also relieved by exciting drinks, as by small quantities of alcohol or ether, or by any of the essential oils, (*ol. menth. pip.* gtt. x, taken occasionally on sugar.) This form is commonly accompanied by other dyspeptic symptoms; and is, at times, an index of organic disease of the stomach. The differential diagnosis must be formed from a due comparison of the symptoms which indicate those diseases, as described in the previous pages of this work. In certain cases, the spasm of the stomach is excessively severe, and is accompanied by anxiety, nausea, coldness of the extremities, failure of strength, and great tendency to faint. It is then generally termed *cramp of the stomach*, and is relieved, as every form of gastrodynia is, by eructation and regurgitation.

Gastrodynia is induced, at times, by cold drinks, taken when in a state of perspiration, as well as by very hot drinks; and there is reason to believe that it may be owing to the transference of gout. It is more obstinate than dangerous. It has been affirmed, indeed, that it is totally devoid of danger in all cases, and after its disappearance, never leaves behind any traces of its existence. Inasmuch, however, as colic may give rise to inflammation, which may prove fatal so, undoubtedly, may gastrodynia.

Treatment.—The treatment of the more severe forms of gastrodynia must be based on a knowledge of the causes. Although it is a pure neuralgia, it may be owing to a predominance of the acid secretion, which may require attention; or to acid or acrid substances received into the stomach. Both heartburn and gastrodynia are common accompaniments of pregnancy, especially of the early stages, when the general functions of the stomach are disordered, and nervous vomiting is an almost universal concomitant. Attention to diet, and the use of bitters and absorbents, recommended under Heartburn, will palliate those symptoms, until the cause inducing them has ceased to act.

In the very severe neuralgic forms, commonly known under the name, *cramp of the stomach*, stimulants and opiates are indispensable. Many of the so called cases, are not seated in the stomach, but are owing to the passage of a gallstone along the ducts towards the duodenum. The mistake is not a matter of moment, inasmuch as opiates are required in both. The quantity demanded is sometimes very great, but the remedy must be continued until relief is obtained.

R.—Tinct. opii, f 3ij.
 Æther. sulphur, f 3iss.
 Aq. camphor, f 3iij.—M.

Half to be taken, and repeated every half hour.

Hot applications, as salt heated and placed in a flannel bag, or a hot trencher, or a bottle filled with hot water and wrapped in flannel, may be applied to the pit of the stomach. The whole treatment, indeed, is similar to that required in common colic.

In various forms of neuropathic disorder of the stomach in which gastrodynia is a leading symptom, hydrocyanic acid^a has been found of marked efficacy, (gtt. j. ter die;—in sugared water.) Creasote has been administered in similar cases,^a and where neither hydrocyanic acid nor creasote has succeeded in affording relief, it has been advised to give them in combination.

^a R.—Tinct. creasot. ℥iv.—x.
 Aq. camphor,
 Infus. gentian. c. aa. f 3vj.—M. et fiat haustus.

In cases of gastrodynia, which have appeared to proceed from morbid irritability of the nerves of the stomach, nux vomica, and strychnia (*ext. nucis. vomic. resinos. gr. i.*—or, *strychn. gr. $\frac{1}{16}$* ; three times a day,) have been strongly recommended. Nitrate of silver^a has also been extolled, as well as subnitrate of bismuth,^b which, in the opinion of some, is the most effectual of the mineral remedies employed in gastralgia. The author, however, has administered it repeatedly, but is not able to say much in its favour.

^a R.—Argent. nitrat. gr. iv.
 Ext. gentian. 3ss.—M. et divide in
 pilulas xij.
 Dose, one, three times a day.

^b R.—Bismuth. subnitrat. gr. xv.
 Acaciæ pulv. 3ss. Divide in pul-
 veres iij.
 Dose, one, three times a day; gradually in-
 creasing the quantity of the subnitrate to ten
 or fifteen grains in each powder.

IX. VOMITING.

SYNON. *Limosis Emesis, Emesis, Vomitus, Ægritudo Ventriculi, Palmus Vomitus, Sickness of the Stomach; Fr. Vomissement; Ger. Erbrechen, Vomiren.*

Vomiting is a symptom, which, as has been already shown, may be an accompaniment of all the affections of the stomach hitherto considered. It is also symptomatic of various lesions of other organs, and especially of serious affections of the head. Indeed, it rarely happens, that severe morbid action goes on for any length of time, in any part of the economy, without the stomach sympathizing more or less, and vomiting being a result. There can be no question, also, that vomiting is, at times, a purely nervous phenomenon, as where it is induced by the sight of a disgusting object; and that it is frequently caused by impressions made, in the first instance, on the brain; of which we have examples in sea-sickness, and in that which is induced by swinging, and by riding in a carriage with the back to the horses. It can admit of as little doubt, that vomiting may arise from unusual impressibility of the nerves of the stomach, so that almost all alimentary matters may be ejected,—at times, soon after they have been received into the organ; at others, after they have undergone more or less digestion. The effect upon the constitution will of course be dif-

ferent under these two circumstances; in the former, the nutrition of the body must fall off materially; in the latter, it may suffer less.

Treatment.—This may be separated into that which is immediately necessary to allay the vomiting, and that which is demanded to prevent its recurrence.

The *first indication* is generally fulfilled successfully, by making a new impression either on the nerves of the stomach, or on others, so as to break in upon the morbid chain. In this way, stimulating glysters often afford relief. These may be made of molasses and water, to which common salt, or sulphate of magnesia, or oil of turpentine has been added. In some cases, however, the gentle stimulation afforded by soda water, or by the soda powders, is serviceable; and, in others, the absorbent earths—magnesia or its carbonate;^a or argill;^b or a few drops of sulphuric ether, dropped on sugar; or ice taken internally; or a few drops of laudanum; or hydrocyanic acid;^c or creasote. This last has been found very efficacious, especially in the vomiting of pregnancy, in that connected with hysteria, and even in Asiatic cholera, and in sea-sickness,—so efficacious, indeed, as to be affirmed by some to excel all known medicines.^d Such is the opinion of Dr. Elliotson, as well as of others; but the author's experience has not been equally favourable. Indeed, in many cases, it has appeared to develope irritability of the stomach, when it did not previously exist. In the sickness and vomiting following a drinking debauch, creasote has proved at times very serviceable: four drops have been found to afford speedily relief. (See the author's *New Remedies*, 4th edit. p. 222, Philad. 1843.)

^a R.—Magnes. gr. xv.
Ol. anisi, gtt. vj.
Aquæ f3iss.—f. haustus.

^c R.—Acid. hydrocyan. gtt. i.
Mucil. acaciæ, f3ij.
Syrup. f3j.
Aquæ f3x.—M. et fiat haustus.

^b R.—Argill. 3ii.
Aq. menthæ, f3iij.—f. Mist.
Dose, one half.

^d R.—Tinct. creasot. ℥iij.
Aq. camphoræ, f3iss.—fiat haustus.

In certain cases of vomiting, as in that which accompanies cholera, great advantage has been found from the internal use of strychnia.

R.—Strychniæ, gr. $\frac{1}{4}$ — $\frac{1}{2}$.
Aquæ f3iij.—M.
Dose, a spoonful every hour.

Camphor, musk and valerian, as well as the whole tribe of reputed antispasmodics, have been advised. They act merely by virtue of the new impression they make; and they may, in this way, succeed from their action as excitants not only on the gustatory and olfactory nerves but upon those of the stomach.

When the vomiting is very severe and obstinate, these agents may not be retained long enough to excite the requisite impression. In such case, many of them may be administered either by the rectum or endermically. Opiates especially may be employed in this way;—as a general rule, three times the quantity that would be administered by the mouth, being added to the enema. When it is desirable to use the opiates, or strychnia endermically, a small blister may be

applied to the epigastric region, and the acetate of morphia, or strychnia be sprinkled over the denuded surface.

Sometimes all internal remedies fail, and the vomiting yields only to the new impressions made by revellents applied to the epigastrium. These may consist of ice or of stimulating liniments,^a or sinapisms, or blisters; and if the latter should not succeed singly, they may be dressed endermically in the method just recommended.

^a R.—Lin. camphor. 3x.
Tinct. canthar. 3ij.—M.

The *second indication* is of the greatest importance. After the vomiting has been checked, endeavours must be made to prevent its recurrence. With this view, the precise cause that gives rise to it must, if practicable, be discovered. Should there be any signs of vascular fulness or polyæmia, blood-letting, general, or local by means of cupping or leeching over the epigastrium, must be advised, with the warm bath, mucilaginous drinks sparingly and cautiously administered; and great attention must be paid to the avoidance of every kind of irritation. After these symptoms have passed away, or if they have not existed, the use of substances, which give tone to the stomach, and induce a new and more energetic action in its functions, as well as in those of the system of nutrition generally, may be prescribed. The vegetable tonics advised in a similar morbid condition (see Dyspepsia), as well as animal diet, will here be appropriate. In similar cases, it is affirmed, remedies—more markedly perturbing—have been found successful, as electricity and magnetism.

The Germans have various divisions of vomiting according to its nature;—as the *Vomitus acidus*, *V. atonicus*, *V. biliosus*, *V. crapulosus*, *V. parturientium*, &c. &c. (*Most*;) but they require no special mention, if we except that induced by sailing at sea, swinging, riding with the back to the horses, (*Vomitus currû vehementium*. Ger. *Erbrechen bei Führenden, Wagenkrankheit*.) &c. Sea-sickness, (*SYNON.* *Morbus nauticus*, *Nausea marina*, *Vomitus navigantium*; Fr. *Mal de mer*; Ger. *Seekrankheit*, &c.) which is caused by the landsmen being unaccustomed to the motion of the vessel, persists until the custom has been acquired. Various means have been resorted to as palliatives,—ether, alcohol, laudanum, &c. With some persons, they have acted as such, but in the generality of cases they have had little, if any, effect. In the mean while, time has passed; the individual has become habituated to the new circumstances around him, and the distressing sickness has diminished—to disappear ultimately altogether. Some, however, are so liable to be morbidly impressed in this way, that they suffer whenever they have been for a time on shore, and return to the element to which their fortune destines them. It is affirmed, that one of the most illustrious of British admirals always suffered under those circumstances.

CHAPTER IV.

DISEASES OF THE INTESTINES.

THE diseases of the small intestine essentially resemble those of the stomach. Similar membranes constitute their parietes; and, with the exception of the gastric acids, like secretions take place from the lining membrane. In addition, however, two large solid viscera pour the materials of their secretion into the upper part of the small intestine, and doubtless influence the mode in which the latter executes its functions; and the varying condition of the small intestine cannot fail to react upon the liver and the pancreas.

The small intestines occupy the greater part of the abdominal cavity, the large intestine occupying the sides, crossing over beneath the stomach, and inclosing, as it were, the small intestines. The duodenum commences at the pylorus, and soon terminates in the jejunum, the rest of the tract of the small intestine being constituted of the ileum. The ileum is the intestine chiefly implicated when violent pain exists in the umbilical region.

In studying the diseases of the large intestine, it is important to bear in mind the position which it occupies in the abdomen. It commences at the right iliac fossa, in which it is bound down, so that it cannot change its position. This portion, which forms a *cul-de-sac*, is the cæcum. It extends from the point at which the small intestine, the ileum, opens, to the blind extremity. At the termination of the ileum is the valve of Bauhin, which is so constituted, that the lips, which form it, separate when the fæcal matters pass from the small towards the large intestine; whilst they approximate, cross, and completely prevent all retrogression, when the fæces tend to proceed from the great intestine to the small. Yet, as will be seen, fæces may pass through it, and be vomited.

At the posterior and left side of the cæcum, is the worm-like process, the *appendix vermiformis cæci*, which is at times affected with disease. The colon commences at the cæcum, ascends along the right flank as far as the under surface of the liver, crosses over the abdomen to gain the left flank, along which it descends into the left iliac region to form the sigmoid flexure, which varies greatly in length in different persons, frequently extending into the hypogastric region, and in some instances across to the cæcum.

The coats of the large intestine are the same in number and structure with those of the small, but they are thinner, and not as separable on dissection. The most characteristic difference is the pouched arrangement of the large intestines, the pouches being reservoirs for the excrement, in which it becomes more indurated by the absorption

of its fluid portions. The longitudinal muscular fibres are concentrated in three fasciculi.

The colon terminates in the rectum, which differs from the rest of the large intestines in its thicker parietes, the muscular coat being very powerful. Immediately within the anus is the widest portion of the rectum, in which accumulations of indurated fæces sometimes take place in old people, owing to the torpor of the powers concerned in their expulsion.

The large intestine is a reservoir for the fæces, which, when extruded, have the shape of the intestine, or of the aperture through which they have been evacuated. If, consequently, the shape of either of these be modified, that of the excrement becomes so likewise; accordingly, in stricture of the colon, especially of the sigmoid flexure, and of the rectum, the fæces are forced through the constricted portions, and are evacuated of very small size, or in the shape of ribands.

The fæces do not pass into the rectum in large quantity, unless they are very fluid, but are generally detained in the colon, until the desire for defecation arises, when they clear the annulus at the termination of the colon and commencement of the rectum, and pass freely into the latter intestine to be evacuated.

Diseases, which implicate one portion of the alimentary canal, are apt to extend to others; hence gastritis and enteritis are more frequently a compound of both, or *gastro-enteritis*; and inflammation of the ileum, or other portion of the small intestine, and the colon, are less ileitis and colitis than cases of *ileo-colitis*, and as such they have, accordingly, been described by many pathologists.

I. INFLAMMATION OF THE INTESTINES.

SYNON. Empresma Enteritis, Enteritis, Intestinorum Inflammatio, Ileo-colitis, Chordapsus, Cauma Enteritis, Colica Inflammatoria, Ileus Inflammatorius; Fr. Entérite, Inflammation des Intestins; Ger. Entzündung der Gedärme, Darmentzündung.

Like gastritis, enteritis may be divided into the *acute* and the *chronic*, and both, again, may be subdivided into enteritis of the peritoneal coat, and enteritis of the mucous coat; the muscular coat being rarely, perhaps, the primary seat of inflammation, but not unfrequently of a severe neuralgic affection, at times of a gouty or rheumatic character, which will be described under Enteralgia.

I. Inflammation of the Small Intestines.

a. Inflammation of the Peritoneal Coat of the Small Intestines.

SYNON. Enteritis, of most British authors, Exo-enteritis, Seroenteritis.

1. *Acute form*.—Acute inflammation of the peritoneal coat may attack any portion of the small intestine, but the essential phenomena and pathological characters are alike in all. When presumed to be seated in the duodenum, it has been termed *Duodenitis* or *Dodecadactylitis*; in the jejunum, *Jejunitis*; and in the ileum, *Ileitis*; but considerable confusion has resulted in consequence of these terms having been often employed indiscriminately for both inflammation of the peritoneal and of the mucous membranes of those portions of the small intestine.

Diagnosis.—The phenomena are generally well marked, with the exception of the state of the pulse, which may lead the superficial into error. The most prominent symptom is—pain over the region of the inflamed intestine, generally very severe, and always increased by pressure, sometimes even by the light pressure of the bed-clothes. If the duodenum be inflamed, the pain is seated high up in the pyloric region, and shoots back towards the kidneys: if the seat of the inflammation be lower down in the jejunum, and especially in the ileum, the pain is generally referred to the region of the umbilicus. In very acute cases, nausea and vomiting are almost always present; the tongue is usually more or less covered with a white fur; the respiration is short and quick, mainly owing to the pain produced by any great depression of the diaphragm, but partly to the general disorder of functions; the pulse is quicker than natural, but instead of being strong—as in many cases of inflammation, which are devoid of danger as in amygdalitis—it is small and contracted, but if careful examination be made, it is found not to be weak. It is a pulse whose characters are owing to rigidity of vessels, induced by the existing inflammatory affection; and accordingly it becomes developed under copious abstraction of blood, and the use of other appropriate sedatives. Along with these symptoms, the skin is hotter than natural; and, in at least nine cases out of ten, there is constipation. On the other hand, when the lining membrane is inflamed, diarrhœa is present in the same ratio. The constipation, in inflammation of the peritoneal coat, is probably owing to the concentration of vital action towards the inflamed membrane, which detracts from the vital activity of the mucous coat, and diminishes the secretion from it.

In inflammation of the small intestine, the system suffers more than in that of the large intestine; and, according to the author's experience, inflammation of the peritoneal coat of the former is much more frequent. Although we meet constantly with cases of inflammation of the mucous membrane of the large intestine, inflammation of the serous coat is, comparatively, of rare occurrence.

In this disease, as well as in other affections of the small intestine, to be mentioned hereafter, it is always well to examine, whether the patient be affected with hernia. A distinguished writer affirms, that he has seen several cases in which female patients, who had positively denied the existence of any swelling in the groin, had been found, after death, to have died of strangulated hernia.

The disease is of the most formidable character, although generally easily overcome, if the physician be called early. Most unexpectedly, at times, the patient sinks; the countenance becomes collapsed; the extremities cold; the body covered with a cold, clammy perspiration; the pulse vanishes, the pains disappear, and the patient dies. The depressing influence on the sanguiferous system, and, indeed, on the whole frame, made by diseases of the intestinal canal, is at times singularly evinced, and must always be borne in mind. The author has elsewhere (*General Therapeutics*, p. 101, Philad., 1836, and *General Therapeutics and Mat. Med.* i. 438, Philad. 1843,) referred to an interesting case of the kind, which he attended with Professor Smith,

of the University of Maryland. A student, after having attended lectures through the day, was attacked with vomiting, which recurred repeatedly, but without any abdominal tenderness, or other uneasiness. On the following morning, there was slight tenderness on pressure, and the vomiting continued. He was cupped over the abdomen, although neither the state of the pulse nor skin, nor the other symptoms, appeared to indicate much inflammatory action. During the day he gradually sank, and expired the same evening. On examining the body, the ileum was found contracted for the space of several inches, but this contraction had evidently been forming gradually, and only amounted to positive obstruction a short time previous to this attack. The coats of the intestines exhibited but slight evidences of inflammation.

Causes.—The chief causes are—derangement of capillary action, induced by exposure to cold and moisture; irregular action of the bowels; and mechanical injuries from wounds and bruises.

Pathological Characters.—As this form of enteritis is really peritonitis, the symptoms of which are modified by the subjacent viscus, the pathological appearances must be essentially those of peritonitis proper, more especially effusions of plastic lymph, which lead to adhesions between the intestines. Gangrene is not as common a termination as is generally supposed.

Treatment.—The sheet-anchor of treatment, as in other cases of inflammation of serous membranes, is blood-letting, pushed so as to produce a decided effect upon the system; but short of inducing syncope, which is always followed by reaction. Immediately after the blood-letting, a full sedative dose of opium should be administered in the form of soft pill, (gr. ijss.—ijj.) This allays any tendency there may be to reaction, and has accordingly, by some, been placed on an equal, if not on a superior rank to blood-letting. In serous enteritis, a distinguished observer, Dr. Armstrong, highly extolled it, and although he esteemed it best to unite it with blood-letting, and to repeat both remedies according to the urgency of the case, he was disposed to think, that if he himself were labouring under peritoneal enteritis, and were told that he must repose his hopes upon the lancet singly, or upon opium singly, he should be disposed to select the latter.

It will be essential for the physician to see his patient in the course of a few hours after the first blood-letting and administration of opium, and should the pain on pressure be as great, and the general signs of inflammation as urgent, the bleeding should be repeated, with a dose of opium (gr. ij), and it will rarely happen that farther active agents will be needed. Some of the German physicians advise, after general blood-letting, that leeches should be applied over the affected part, and that opium in powder should be administered every half hour or hour, until the pain is relieved, and rest supervenes.

R.—Opii pulv. gr. ss.

Acacie pulv.

Sacchar. alb. aa gr. vj.—Divide in dos. vj.

Should it be considered advisable to apply leeches; after they have fallen off, hot fomentations may be used over the leech-bites, and be

frequently renewed; or, if the weight can be borne, a large bread and milk or flaxseed poultice. With a similar view, enemata of warm water may be thrown into the large intestine, by means of a long flexible tube.

As constipation is a prominent symptom of peritoneal enteritis, the obvious remedy with the incautious or uninformed is an active cathartic; but it need scarcely be said, that cathartics should be employed with caution, for fear that the irritation, which they excite, may add to the inflammation. In such cases, as has been well said by Dr. W. Saunders, the best cathartic is the lancet; and if it be followed up by a full sedative dose of opium, as recommended above, the bowels will respond without the aid of a cathartic. The constipation is generally dependent upon the inflammation, and when the cause is removed, the effect will cease.

Revellents may be applied to the abdomen, if the tenderness permit; and when the depletion and opiates have been pushed as far as the physician deems advisable, a blister may be applied over the abdomen, which may be dressed by one of the preparations of morphia, the sulphate, the acetate, or the muriate, made into an ointment;^a or one or two grains of either of the salts of morphia may be sprinkled upon the denuded surface, which may be subsequently dressed with simple cerate.

^a R.—Morphiæ sulphat. seu acetat. seu muriat. gr. iv.
Ung. simpl. 3ss.—M.

Perhaps, however, here, as in all cases of inflammation of the serous membranes, it may be well to endeavour to affect the mouth slightly, by rubbing in unguentum hydrargyri, (3j.—3ij.) night and morning. The new action, thus induced, is often entirely effectual in uprooting the original malady.

As in other inflammations, in which blood-letting is recommended, liquids should not be permitted too freely; but ice may be taken to allay the thirst, which is frequently urgent. The diet must be altogether farinaceous—sago, tapioca or arrow-root; gradually passing to animal food as the inflammation fades away.

2. *Chronic form.*—The chronic form of peritoneal inflammation of the intestines is not a very common disease, yet we meet with it yearly in our public hospitals, and frequently along with tubercles of the serous membranes. Like the acute form, it may be seated in any portion of the small intestines.

Diagnosis.—The symptoms that denote it are often extremely obscure. Pain is usually felt in some part of the abdomen by pressing firmly upon it, by moving the body, or, on coughing and sneezing. The patient is likewise subject to attacks of colic, and to various evidences of indigestion. Commonly, the bowels are constipated, but often the constipation alternates with diarrhœa. The general symptoms may be insignificant; at times, fever exists, but at others, it is nearly or wholly absent. When the disease has continued for some time, the intestines are apt to become glued together by the effusion of plastic lymph from the inflamed surfaces, and occasionally knotty irregularities can be felt by carefully pressing upon the relaxed abdo-

men. These morbid formations occasionally end in suppuration, the pus being discharged either into the bowels or the cavity of the peritoneum; and the patient dies worn out by the consequent hectic. At other times, these peritoneal tumours, by interfering with the due circulation of the blood in the abdomen, destroy the balance between the exhalents of the peritoneum and the absorbents; and dropsy of the abdomen is the consequence.

Causes.—Repeated attacks of colic, or other intestinal disease, may induce it, or it may be the sequel of acute enteritis.

Treatment.—This must consist in the occasional application of leeches or cups; keeping the intestinal canal entirely free, by means of emollient enemata; and allowing only a demulcent diet, like that described under the head of acute enteritis of the peritoneal coat. In this form, the use of mercurials, and of the whole class of revellents, is found to be of great service. Mercury may be administered, by friction with unguentum hydrargyri (3j.—3ij.) over the abdomen, night and morning, until the mouth becomes slightly affected; or mercurials may be administered internally.^a Red iodide or deutioidide of mercury is well adapted for old cases, in which there is reason to believe, that the intestines have been rendered adherent in the manner described above, or that peritoneal tumours have formed.^b

^a R.—Hydrarg. chlorid. mit. gr. xij.

Opii. pulv. gr. iij.

Glycyrrhiz. pulv. 3ss.—M. et divide in pil. xij.

Dose, one night and morning, until the mercurial influence is exerted.

^b R.—Hydrarg. iodid. rubr. gr. x.

Micæ panis,

Sacchari. pulv. aa 3j.

Aquæ, q. s. ut fiant pilulæ lx.

Dose, one morning and evening.

b. *Inflammation of the Mucous Coat of the Small Intestines.*

SYNON. Endo-enteritis, Muco-enteritis, Mucous Enteritis, Eso-enteritis, Phlegmyenitis enterica, Enteritis of most writers of the European continent.

Acute inflammation of the mucous coat of the small intestines is less common than the chronic form, and both are usually less violent in their character, than inflammation of the peritoneal coat.

1. *Acute form.*—Acute inflammation of the mucous coat, like that of the serous coat, may be seated in various portions of the small intestine: the first effect, as in every inflammation of mucous membranes, is to arrest the secretion, which naturally takes place from them. Unless, however, the inflammation be speedily removed, the secretions become subsequently increased in quantity, and morbid in quality. If, too, the inflammation be seated in the mucous membrane of the upper portion of the small intestines, and especially of the duodenum, the inflammatory irritation is extended along the mucous lining of the biliary and pancreatic ducts to the liver and the pancreas; so that their secretions may become first of all arrested, and subsequently of morbid character. The duodenum is, hence, the seat of many of those affections that are termed *bilious*; and on it the cathartics, which are termed *cholagogue* or bile expellers, exert their agency

in the first instance; the impression being thence conveyed, by sympathy of continuity, to the liver. Not many years ago, every form of dyspepsia—transient or chronic, gastric or duodenal—was termed *bilious*; and every article of diet, which disagreed with the stomach or bowels, received the same epithet. An improved acquaintance with pathology has shown the fallacy of these notions; and, accordingly, we now rarely hear the epithet employed in any case. Even *bilious fever* is disappearing from our nomenclature, and we now speak of remittent fever with gastric complications, in the same sense. It was proper, indeed, that the term *bilious*, if retained, should have some definite meaning attached to it; inasmuch as it had been applied not only to affections in which the bile was supposed to predominate, but to those in which it was esteemed to be defective in quantity.

Diagnosis.—The prominent symptoms of mucous enteritis are the following:—pain, which is very manifest, if the inflammation be violent; less so, if it be obscure, but which may be always detected by careful pressure; the pressure being made with the tips of the fingers, whilst the patient takes in a deep inspiration. It is right, however, to remark, that the mucous membrane of the intestines, neither in health nor disease, is as sensible as might be conceived *a priori*. In wounds of the stomach, it may be pressed upon by a solid body, without pain being experienced; and in the well-known case, which fell under the care of Dr. Beaumont, and which was seen by the author, when the elastic gum tube, employed for collecting the gastric juice, was pressed forcibly against the mucous membrane of the stomach, gastric disorder was induced, but not pain. In disease, too, inflammation may be present, and even ulceration, yet neither condition may be indicated by pain. As in gastritis, there is thirst, but still no particular preference for cold drinks; the patient, indeed, often prefers them warm; the tongue is generally red at the sides or tip, and sometimes in the centre; and the bowels are looser than in health. It has been affirmed, indeed, by Dr. Armstrong, that the bowels are scarcely ever lax, if the small intestines alone be inflamed; that they are very easily moved, and a large quantity of mucus is passed; so that the evacuated matter moves in the utensil, like thin, white paint, and is of a mucilaginous or oily consistence; but this is not the result of the author's observation. Whenever the mucous membrane of either the small or the large intestine is inflamed, and continues to be so for some time, diarrhœa, or alternations of constipation and diarrhœa, are inevitable results. The excitation in the mucous coat augments the secretion from it, whilst the muscular coat is aroused to action by contiguous sympathy, and an increase in the liquidity and number of the evacuations is a necessary consequence.

A more fanciful division of enteritis has been made by some writers,—into superficial erythematous enteritis or diarrhœa; a deeper seated variety, which extends to the muscular coat—dysentery; and a phlegmonous variety seated in all the three membranes—the mucous, muscular, and peritoneal; but the division is arbitrary, and not

borne out by pathology, as will be seen under the appropriate heads. At times, blood and pus are observed in the discharges.

It can rarely happen, that serious inflammation can exist in any part of the mucous membrane of the small intestine, without the functions of the stomach suffering more or less; accordingly, nausea and vomiting are common attendants. The pulse is usually—almost invariably—quicker and stronger than natural, but it rarely presents the contracted character, which we witness in peritoneal enteritis.

In inflammation of the mucous membrane of the intestines, the abdomen is said to be almost invariably flat; exceptions being at least very rare, and when they do occur, there is mostly a conjunction of muco-enteritis, and sero-enteritis. This is doubtless owing to the circumstance, that peritoneal enteritis is usually accompanied with constipation, and therefore with flatulence, whilst an opposite condition prevails in mucous enteritis. The disease, when very acute, runs its course to health, or to a fatal termination, in a few days; if not so violent, its course may be slower; and both forms may—and are apt to—terminate in the chronic.

Causes, and Pathological characters.—These are essentially the same as those of gastritis of the mucous membrane. The affections are seated in portions of the same membrane, and consequently, must be affected similarly by deranging influences, and present essentially the same appearances on dissection. The mucous membrane, in simple acute endogastritis, is found injected, discoloured, softened, and at times, ulcerated; and the degree to which these appearances are met with is dependent upon the intensity and duration of the inflammation.

Treatment.—The treatment, also, is based upon the same principles as in gastritis of the mucous membrane. Blood-letting is needed generally or locally. If the accompanying fever be great, it may be from the arm; if less, leeches may be applied over the abdomen, and be repeated again and again, if necessary. The number must be determined by the intensity of the disease. Cupping can here, likewise, be employed in the majority of cases; but where the cups occasion too great uneasiness, leeches must be substituted.

It need scarcely be said, that all drastic cathartics must be carefully avoided; yet, morbid secretions cannot fail to be poured into the intestinal canal which ought to be removed daily, either by small doses of castor oil, (ʒj.—ʒiij.) or by enemata. These may consist simply of warm water, to which castor oil (ʒss.—ʒj.) may occasionally be added, and care must be taken to make them pass into the colon. They act, in this way, both as laxatives and as fomentations. The author is satisfied, that he saw a case of acute endo-enteritis hastened to a fatal termination by an active cathartic, which induced hemorrhage from the bowels; and a similar result has been observed in the same cases by others. A writer of eminence, of the present day, Dr. Marshall Hall, considers, that simple enemata of warm water, “constitute one of our chief remedies” in mucous enteritis. Poultices to the abdomen, and the gentler revellents recommended under Gastritis, may also be employed advantageously.

In this disease, as well as in dysentery, fomentations of the infusion

of tobacco to the abdomen may be found advantageous. They have been highly extolled in the latter affection. They may be made of a quarter of a pound of leaf tobacco to four or five quarts of water. Under their use, the tormina have been found to abate, and the force of the circulation has been reduced, with less expenditure of the general strength than when bleeding only is employed.

The diet too, must be regulated according to the same rules. Arrow-root or sago, prepared with water, acts as a demulcent—when the lining membrane of the stomach is inflamed—by coming immediately in contact with it whilst its nature is unchanged; but even when the seat of the inflammation is lower down the tube, and the demulcent has undergone stomachal or duodenal digestion, or both, it may be advantageous. The soothing influence exerted by it on the lining membrane of the stomach is conveyed by continuous sympathy to the part labouring under inflammation, and the excrementitious portion of the diet is as void of irritating qualities as any fæcal matter can be. Hence, the farinaceous aliments are not only dietetic, but medicinal agents, and a combination of them has been employed, therapeutically, as a demulcent, under the name of *Castillon Powders*, so called after the physician who first proposed them. They are formed by *sago*, in powder; *salep*, in powder; *tragacanth*, in powder, of each, four parts; *prepared oyster shells*, one part; *cochineal*, half a part, mixed together, and divided into powders of one drachm each. One of these is given three or four times a day, in this disease, as well as in diarrhœa and dysentery.

A regulated temperature of the chamber, so as to prevent any irregular action of the capillaries, with confinement to bed, should be likewise inculcated.

2. *Chronic form*.—This may be the sequel of the acute form, but frequently it has no preceding acute stage.

Diagnosis.—The symptoms are of course less intense than those of acute endo-enteritis, but they are somewhat similar in their character. The pain of the abdomen is usually more obscure, more deep-seated apparently; and is but little, if at all, affected by pressure. Uneasy feelings, however, are experienced after stomachal digestion has been completed, and the aliment has been sent on into the small intestine. If the chronic inflammation be seated in the duodenum, constituting *chronic duodenitis*, the pain is felt three or four hours after a meal in the region of the pylorus, shooting to the back, along with the signs of indigestion that accompany chronic gastritis. For the reasons before assigned, duodenal inflammation gives rise to morbid conditions of the liver; in the first instance, perhaps, to diminution of the secretion from that viscus, but subsequently to augmentation of it. It can readily, too, be understood, that the constant irritation, kept up in the liver by chronic duodenitis, may modify its function of nutrition, so as to induce serious and permanent hepatic disease. Many morbid conditions of the liver are doubtless caused in this manner. The constant stimulus, from the habitual use of spirituous liquors, on the lining membrane of the stomach and duodenum, is propagated to the liver by continuous sympathy, and at the same time, the stimulating

fluid passes by imbibition into the veins of the stomach, which convey it, mixed with their blood, to the liver: under this double influence, it must happen that in most hard drinkers, the nutrition of the organ is sooner or later modified.

In chronic endo-enteritis—for pathological reasons before given—the evacuations are generally frequent and liquid; mucous, sometimes bloody, and occasionally purulent. More commonly, however, they give evidence of increased secretion of bile, and of imperfect digestion of the food. Not only stomachal, but duodenal digestion is impaired. Occasionally, the patient is troubled with flatus, and generally with more or less griping. The parietes of the abdomen are flat, as in the acute form, except when accidentally distended with air; the skin is at times hot, and almost always dry and rough; and the complexion sallow. Emaciation takes place slowly, but evidently, and the patient gradually sinks to death. Under more favourable circumstances, he recovers his health, but usually after a long period of suffering.

In children of a scrofulous diathesis, the inflammation of the mucous membrane induces a similar condition of the mesenteric ganglions, and frequently lays the foundation for *tabes mesenterica*.

Causes.—Long protracted diarrhœa or dysentery, or these diseases—which may be regarded as congenerous affections—badly treated by the use of excitants, or of too powerful astringents, may occasion it. Any affection, indeed, which produces organic changes in the bowels, may act as a cause. The German writers, especially, regard the metastasis of herpes, tinea, scabies “rapidly cured,” and the healing up of ulcers and issues, to which the system has become habituated, as causes; but this occurs less frequently than is imagined, and, in the case of some of the cutaneous affections mentioned, perhaps never. Where an irritation has existed for a length of time, and has become an affair of habit, or of accustomed associated actions, and such irritation has been removed, it can be readily understood, that a similar condition may be induced elsewhere, and it is more likely to occur in some part of the same, or of a similar texture. The mucous membrane being a part of the dermoid tissue, if any cutaneous irritation be removed, the next probable seat of irritation may be some part of that tissue; and, accordingly, we witness an extensive consent between the skin and mucous membrane of the bowels, in various eruptive and other diseases; but where the skin has been partially in a morbid condition, and that only for a short period, the danger of metastasis is almost null; and, hence, the practitioner does not hesitate to use all his endeavours for the removal of the cutaneous diseases referred to above, without any apprehension of chronic endo-enteritis, or other affection of the bowels, being the consequence.

Pathological characters.—The appearances of the mucous membrane are like those in chronic gastritis—redness, sometimes vivid; at others, of a brown or violet hue; at times, hypertrophy, but at others atrophy of the parietes of the canal. Where hypertrophy exists, there is usually stricture. Perhaps, however, the most common appearance is ulceration, which is observed most frequently towards the end of the ileum. The edges of these ulcers are vertical, and both the mu-

cous and muscular coats are frequently destroyed, so that the base of the ulcer is formed by the peritoneal coat. The follicles often enlarge, and the general irritation of the membrane appears, at times, to depend upon their condition. In the acute form, the agglomerated follicles are most frequently affected, whilst in the chronic, it is the isolated. The follicles, under such circumstances, may become ulcerated; and around the edges of the ulcers, tubercles are not uncommonly met with. In such cases, they are generally found to exist elsewhere.

Treatment.—This reposes upon the same principles as that of chronic gastritis of the peritoneal coat. It is not often requisite to take blood from the arm, but cups or leeches may be applied over the abdomen, from time to time, should the symptoms indicate the necessity. The French are in the habit of applying them to the anus, and this form of revulsive bleeding is often of eminent service. When the disease, too, has become unquestionably chronic, the various forms of revelents may be used advantageously. If the discharges from the bowels are very copious, it may be advisable to exhibit starch and laudanum enemata,* two or three times a day; and, in all cases, the warm water enemata, advised in cases of acute inflammation of the mucous coat, will be productive of benefit, as warm and soothing fomentations. In like manner, a warm, moist poultice, applied over the abdomen, when its pressure can be borne—and if not, the dry hop poultice, formed by putting hops into a flannel bag and heating them—affords essential relief in many cases.

* R.—Decoct. amyli, Oj.
Tinct. opii, gtt. xxx.—M.

Although in the early stages of inflammation of the mucous membrane of the intestines—as of inflammation of other mucous membranes—antiphlogistics may be the most appropriate agents, there is a condition in which excitants may be administered with advantage; that is, when the violence of the inflammation has subsided, and the remaining inflammation and the discharges are kept up by the asthenic condition of the over-distended extreme vessels. In these cases, however, we generally have recourse to excitants that belong to the class of astringents. When the complaint has persisted for a time, notwithstanding the general antiphlogistic medication and regimen, and the constant use of mild laxatives, as of small doses of castor oil, (ʒj.—ʒij.), or emollient enemata, to remove all offensive secretions from the tube, gentle astringents may be employed with advantage. In very urgent cases, indeed, it may be necessary to have recourse to the more powerful, administered both by the mouth and rectum, and their agency may be increased by the addition of opium, to allay the irritability of the canal, which the erethism of the mucous membrane so largely develops. If these fail, no plan can be adopted with better prospect of success than the revulsion produced by change of air, which is at times successful after every other effort has failed.

Such are the general principles of treatment. The particular agents for carrying them into effect, will be understood by referring to DIARRHŒA and DYSENTERY.

c. *Exanthematous Inflammation of the Mucous Coat of the Small Intestine.*

In treating of the inflammation of the lining membrane of the stomach, it was observed that it—as well as the mucous coat of the intestines—is liable to eruptions in the same manner as the skin, of which we know it to be a prolongation. In measles and scarlatina, the peculiar inflammation is apparent; and an exanthematous affection has been observed in cases of cholera; and, according to some, another implicating the follicles of Peyer and Brunner, and called, by its first describer, Bretonneau, *Dothinenteritis*, is the most constant symptom of typhoid fever. By some, indeed, the follicular lesion has been regarded as its most distinctive character. These lesions will, however, be more properly considered under Cholera and Typhoid fever.

II. *Inflammation of the Large Intestines.*a. *Inflammation of the Cæcum.*

SYNON. Typhlitis, Typhlo-enteritis, Tophlo-enteritis, Inflammatio Cæci, Phlegmonous Tumour of the Cæcum; *Fr.* Inflammation du Cæcum; *Ger.* Entzündung des Blinddarms.

The diseases of the cæcum and of the appendix vermiformis cæci have received great attention from pathologists, of late years more especially. Attention had, however, been directed to them previously—especially to the phlegmonous tumours that form in the right iliac fossa.

Diagnosis.—Simple acute inflammation of the lining membrane of the intestines may be an accompaniment of colitis or dysentery; but it may occur independently of these. The most marked symptoms are violent pain in the right iliac fossa, increased on pressure, by which it is rendered lancinating. The pain is constant, and often proceeds in the direction of the ascending colon. The evacuations are copious and frequent, sometimes from ten to twenty in the day, and are mucous or bloody, or both; and, along with these symptoms, there is generally gastric disturbance and fever, the pulse being accelerated and hard, the skin hot and dry, and the urine high coloured, as in ordinary cases of severe internal inflammation.

Inflammation may likewise attack the peritoneal coat solely, or along with all the coats of the intestine, and these are the cases to which attention has been mainly directed of late years. They are attended with more or less tumefaction in the iliac region, and are owing to some mechanical impediment in the cæcum, constituting *Typhlitis stercoralis*. Where the disease affects the peritoneal coat, it is marked by the ordinary signs of peritonitis, or rather of inflammation of the peritoneal coat, of which constipation is one. The inflammation may extend to the cellular tissue surrounding the cæcum—*Perityphlitis*—and is indicated by an inflammatory pain in the iliac region with distinct hardness, constipation and numbness of the thigh—owing to the tumour pressing upon the nerves as they pass down to the right lower extremity—and occasionally retraction of the testicle. This form of the disease may terminate by resolution, or in any of the results of cellular inflammation. Pus may form and be discharged into the cæcum, or into the cavity of the abdomen; or

perforation may take place through the intestine and the parietes of the abdomen; and where the disease terminates fatally, a large cavity is generally observed in the vicinity of the cæcum, separated from the cavity of the abdomen by the peritoneum. In a case, which fell under the author's care, the pus was discharged into the urinary organs, and the female recovered.

Idiopathic inflammation of the cæcum from ordinary causes, as from exposure to vicissitudes of weather, is certainly rare. Yet the author has observed three or four cases in which no other cause could be assigned than such as might have induced inflammation in any other part of the digestive tube or of any internal organ.

The symptoms, that indicate typhlitis induced by mechanical causes, are—very decided evidences of local inflammation coming on without any very obvious cause, when the patient is in health; and the comparatively slight implication of the general system, as shown by the greater or less freedom from fever. The pain commences in the very seat of the cæcum; gradually augments for from twelve to twenty-four hours, and is constant. Careful examination now shows fulness and tension of this part of the abdomen, with tenderness on pressure, and dulness on percussion; the bowels are constipated, and the functions of the stomach disturbed. The general system now sympathizes, and the ordinary symptoms of internal inflammation declare themselves. Any motion of the body induces pain, so that the patient lies on his back, inclining towards the right side, with the thigh bent on the abdomen so as to relax the abdominal parietes. The symptoms go on in this manner for some days, the affection gradually extending, more or less, over the abdomen, which now becomes full and tense. The pain over the cæcum is lancinating, and the slightest touch with the finger, or the slightest covering, excites excruciating torture. Still, the danger does not seem so imminent as in acute enteritis, although in the sequel it may prove equally fatal.

It is obvious, that a favourable termination of a case of this kind cannot be expected until the mechanical impediment yields; but if this be removed, all the symptoms soon vanish. This, however, can rarely be accomplished in less than a week. About this period, it may happen, that if the bowels have not responded to the means employed, the patient's strength declines and he dies; and it has been conceived by one writer, Dr. Burne, that if much blood has been abstracted, he may sink rather from exhaustion than from the effect of the inflammation: this, however, is scarcely probable; but if life be prolonged, there may be discovered, about the tenth day, a circumscribed emphysematous tumour in the right ilio-inguinal region, or posteriorly in the corresponding ilio-lumbar region, which is a fæcal abscess making its way to the surface. If, in the former case, the peritoneum must be perforated after adhesions have been formed around the part to be perforated; if in the latter, the abscess tends upwards and backwards towards the least resisting part of the lumbar parietes, which is at the outer edge of the quadratus lumborum muscle. In this way, the abscess may be discharged, and recovery take place, or the patient may die worn out by irritation.

Perforative abscess of the cæcum must be esteemed a serious malady. Of seventy-three cases, death occurred in twenty; and in eleven others, the symptoms were so severe as to threaten life. Stercoraceous abscesses appear to be the most fatal, the ratio being five in seven, according to M. Grisolle.

Treatment.—The remedies adapted for this affection are those for local inflammation. General blood-letting may be required, but it cannot be necessary to repeat it often. The great indication is, to temper the inflammation as far as possible, and especially to remove the cause, where the disease is owing to hardened excrement, or to any undigested matter,—as stones of fruit, charcoal, magnesia, &c., which are sometimes known to lodge in the cæcum.

Simple typhlitis of the mucous membrane requires the same treatment as colitis; and perityphlitis the same management as any case of partial inflammation of the cellular or serous membranes.

In cases of inflammation of the cæcum from mechanical causes—*Typhlitis stercoralis*—after general blood-letting has been practised, leeches may be repeatedly applied; the practitioner bearing in mind, however, that if he be unable to prevent the supervention of suppuration, he may do mischief by reducing the powers too much. After the leeches have dropped off, a large warm poultice may be applied, or if this cannot be borne, a hot and dry fomentation of chamomile flowers in a flannel bag. The most important fomentation is warm water sent copiously into the colon, which may be thrown in by means of one of Dr. O'Beirne's rectal tubes. In this manner, the impediment may be removed. If repeated glysters be unable to accomplish this, cathartics—as oleum ricini,^a or infusion of senna with salts^b—may be administered, in addition, by the mouth.

^a R.—Ol. ricini, f3ss.

Tinct. opii, gtt. xl.—M.

^b R.—Infus. sennæ, f3xj.

Tinct. sennæ, f3ss.

Magnes. sulphat. 3ij.—M.
pro haustu.

It can rarely be necessary to have recourse to more powerful remedies than these, repeated every two hours until an evacuation takes place, and aided by the enemata recommended above, or with the addition of castor oil.

R.—Ol. ricini, f3ij.

Enem. domestic. Oij.—M.

The hot bath has been proposed, but it possesses no advantage over hot fomentations, whilst the motion, to which the patient's body is necessarily subjected, renders it objectionable. In the course of a few days, the bowels may begin to be evacuated, and lumps of undigested matter—the cause of the whole mischief—may be perceptible in the discharges.

If signs of suppuration occur, poultices may be applied; and if there be reason to believe, that the parietes of the abscess adhere to the walls of the abdomen, which may be determined by trying whether the latter glide over the tumour, the sooner the abscess is opened the better. Commonly, the tumour gives an emphysematous feel, and if a free incision be made into it, a fetid gas with an offensive fluid will be dis-

charged. This emphysematous condition must be distinguished from the sound rendered on percussion, when the pus has formed on the posterior surface of the cæcum, and pushed the intestine before it. In such case, the intestine may be wounded, as has happened, we are told by Grisolle, in one case. After the abscess has been opened, the discharge of its contents must be favoured by placing the patient on his right side, and the system be supported by wine whey; arrow-root, or sago and wine; beef tea, and the preparations of bark.^a Opiates will likewise be required to produce sleep.

^a R.—Decoct. cinchon. Oss.
Tinct. cinch. f3ij.
Syrup. aurant. f3ss.—M.
Dose, one quarter, four times a day.

Where the perforation takes place into the cavity of the peritoneum, the case must be managed as directed under the head of Perforation of the intestines. Little, however, can be done except to administer full doses of opiates, (*Pulv. opii*, gr. iiss. vel *Tinct. opii*, gtt. lx. vel *Morphiæ acet.* gr. iss.)

Lastly:—Where the abscess is so deeply seated, that an opening into it cannot be made with safety, it has been proposed to endeavour to promote the absorption of the pus by means of repeated blisters, or by moxa applied over the abscess.

b. *Inflammation of the Appendix Vermiformis Cæci.*

SYNON. *Inflammati Appendicis Vermiformis Cæci*; *Fr.* Inflammation de l'Appendice Cæcal ou Vermiforme; *Ger.* Entzündung der Wurmfortsatz des blinden Darms.

The appendix vermiformis, the use of which is so obscure, and its presence even by no means indispensable, communicating, as it does, with the cæcum by means of an open extremity, may have substances impacted in it, which give rise to inflammation and perforative ulceration, attended with fatal consequences; for although adhesion may take place between it and the peritoneum lining the parietes of the abdomen, the more common result is for the abscess to break into the cavity of the peritoneum, and to induce fatal peritonitis.

Diagnosis.—The symptoms, which indicate this affection, are by no means diagnostic. Generally, there is a deep-seated pain in the cæcal region, with more or less fever, vomiting and obstinate constipation. The pain is aggravated by pressure; and careful examination exhibits tumefaction, which may be unhesitatingly referred to the cæcum or to its appendix; at other times, the inflammation spreads over the whole of the peritoneum, so that the diagnosis, when the physician is first called, may be—peritonitis, general or partial.

The position of the appendix is not always the same, a fact, which must be borne in mind. Generally it is curled up beneath the cæcum, concealed by it, and on the outer side of the *psoas magnus* muscle; and, according to its position, different parts in its vicinity may be prominently implicated.

Causes.—It has been already remarked, that the affection may be induced by small substances becoming impacted in the appendix. In one instance, it was an intestinal concretion; in another, a pin, en-

crusted with a calculous deposit; in another, a cherry-stone; in another, a grape-stone; and, in another a tooth, which had been swallowed.

Pathological characters.—The appendix has been found perforated—a portion having sloughed away—with evidences of a high degree of mischief, the result of inflammation; as effusion of coagulable lymph, suppuration, or gangrene, in the neighbouring parts.

Treatment.—This is the same as in perforative inflammation of the cæcum. As in all cases of inflammation, likely to terminate in extensive suppuration, in which the recuperative powers of the system have to be greatly exerted, care must be taken not to reduce too far by general blood-letting, too often, or too largely practised in the early stages. Every practitioner is aware of the difficulty of arresting the suppurative process; and, consequently, if the inflammation be not got under by antiphlogistics, in the first few days of the disease, the farther use of depletives should be had recourse to under a wise caution. It is proper to remark, that the disease, at times, occurs very insidiously.

c. *Inflammation of the Colon.*

SYNON. Colitis, Colonitis, Enteritis Colica; *Fr.* Colite, Inflammation du Colon; *Ger.* Entzündung des Colons.

Inflammation of the colon, like inflammation of the rest of the intestinal canal, may affect either the peritoneal or the mucous coat. When it is seated in the latter, we have the phenomena of dysentery.

1. *Inflammation of the Peritoneal Coat of the Colon.*

SYNON. Serocolitis, Exocolitis.

Diagnosis.—When the peritoneal coat is inflamed, there may be constipation, and the usual signs of exo-enteritis, except, that the mischief is referred to some part of the colon,—the ascending, transverse or descending portion, and the affection of the general system is much less than when the same pathological condition is seated in the small intestine. The nearer, too, the inflammation is to the rectum, the less acute and violent is the disease. When in the transverse colon, it is often extremely obscure. Commonly, there is considerable pain upon pressure, with more or less distension of the colon, meteorism, constipation, vomiting, great restlessness, along with the signs of internal inflammation.

When colitis passes into the *chronic state*, we may have all the results of chronic inflammation of the peritoneal surface of the small intestines,—adhesion of the colon to other viscera, thickening of the parietes of the intestines, with diminution of the caliber,—at times, to such a degree as to occasion obstruction, and death, &c. &c.

Many morbid conditions, that are referred to the stomach or liver, have their seat in the colon. Owing, too, to the attachments of the colon, and its immediate proximity to several important organs, its unequal distension and frequent changes of position, various sympathetic affections are induced, the nature of which is often misunderstood.

Treatment.—This is the same as recommended in acute and chronic inflammation of the peritoneal coat of the small intestines, and in inflammation of the cæcum.

2. Inflammation of the Mucous Coat of the Colon.

SYNON. Dysentery, Fluxus Dysentericus, F. Cruentus cum Tenesmo, Tormina (Celsi), Difficultas Intestinorum, Flumen Dysentericum, Colorectitis, Endocolitis, Esocolitis, Dysentery, Flux, Bloody Flux; *Fr.* Dysentérie, Flux Dysentérique, Flux de Sang; *Ger.* Ruhr.

Dysentery is unquestionably an inflammatory disease of the lining membrane of the colon, and has, therefore, been properly described as a colitis. (*Rostan.*) The inflammation is not, however, generally restricted to the colon, but extends into the small intestines.

1. *Acute form.* **Diagnosis.**—In the milder cases of acute dysentery, the patient complains of tormina, which are not, however, considerable, nor is the pain sensibly increased on pressure. The seat of the pain is commonly towards the rectum, and there is a sense of load in the part, which occasions the patient to make use of frequent and painful efforts—tenesmus—accompanied with very slight discharges, generally, after the first, without any feculent matter, and consisting chiefly of ropy mucus, streaked with blood, and, at other times, of pure blood. These are the essential symptoms; but frequently the irritation is communicated to the urinary organs, and there is a constant desire to evacuate the contents of the bladder. Along with these symptoms, others arise denoting the extension of the irritation to the general system—as pyrexia, with nausea and vomiting: but the general signs of inflammation are not often marked; the patient complains of excessive debility and want of rest; the pulse, although accelerated, is small, and the surface not always hot. On the other hand, the increased heat—if it exist—is partial, and the feet often cold. In some cases of what has been called *Dysentery simplex*, the fever is slight, or unperceived; the evacuations are passed without great pain or tenesmus, are of a tolerably natural quality, and afford relief; but these are the mildest cases of all, and are scarcely worthy of the name of Dysentery. At other times, the febrile symptoms are well pronounced, and the whole phenomena exhibit active inflammatory excitement—*Febris dysenterica*; whilst at others, again, the accompanying fever is typhoid, or even markedly typhous; and the disease runs its course to a fatal termination in a very short time. In a fatal epidemic dysentery, which supervened on measles, whilst the author resided at the University of Virginia, the disease in some instances terminated fatally in the course of forty-eight hours; the evacuations consisting of pure blood, and being extremely numerous, and the sinking state supervening rapidly. In these severe cases, which are not unfrequently seen in armies, in establishments in which numbers of persons are crowded together—as in prisons, ships of war, barracks, besieged towns, &c.—the discharges are frequently excessively fetid, and of a peculiar putrid odour; the face soon becomes pinched—*decomposed*, to use a French expression—and the skin is covered with a cold, clammy moisture; at other times, it is dry, rugous, and covered with a kind of varnish,—circumstances which, according to M. Andral, indicate fatal concentration towards the great intestines.

Sporadic cases of dysentery, occurring in persons of tolerable constitutions, generally terminate in health in the course of a week or ten days; but, as in the case of endo-enteritis of the small intestine, the inflammation may become chronic, and prove excessively obstinate. When it is about to terminate fatally, death is preceded by alteration of the features, hiccough, meteorism, coldness of the extremities, and the ordinary indications of approaching dissolution. In the Philadelphia Hospital, the cases of dysentery are, annually, numerous; yet, although they generally occur in persons of by no means the best constitutions, the proportion of deaths is, in the author's experience, not great. Where the disease occurs epidemically, the danger depends upon the character of the epidemic. At times, it is a scourge; and, in the case of armies and ships of war, has proved extensively fatal. Perhaps no disease has more to be dreaded in such circumstances.

Causes.—As is the case with inflammatory affections of other portions of the digestive tube, climate and season may unquestionably be regarded as predisponents. The disease is, indeed, endemic or endemico-epidemic in torrid regions, and, in the summer and autumnal months, in this country. It is rarely sporadic. By some, it has been supposed, that some form of malaria must be associated with heat, in order that it should be induced; but what the nature of this malaria is they do not attempt to pronounce. The fact of the disease raging so frequently and extensively, where numbers are congregated together, would certainly seem to show, that, as in the case of cholera infantum, atmospheric deterioration along with atmospheric heat may be concerned in the causation. The disease affects all ages, and, where it prevails epidemically, proves serious, more especially to the aged and the young.

When a favourable atmospheric constitution exists, the use of unripe fruit, and of indigestible aliments of all kinds, or of any agents that can irritate the lining membrane of the intestines, may act as exciting causes.

In evidence of the great effect of elevated temperature in the production of dysentery, it may be remarked, that, according to Ozanam, of fifty of the chief epidemics that have occurred at different times in Europe, thirty-six happened in summer, twelve in autumn—making forty-eight in the two seasons; whilst but one occurred in winter and one in spring. In tropical climes, hot and moist seasons are most favourable to it; and, in many of the epidemics that occur in this country, such a union of atmospheric conditions—heat and moisture—has been noticed to prevail. In Bengal, according to Annesley, of 13,900 persons affected with dysentery—from the year 1820 to 1825—2400 were attacked during the cold season, 4500 during the hot and dry season, and 7000 during the hot and moist.

Putrid emanations, hardened fæces, scybala, moral emotions, excessive fatigue, vicissitudes of temperature, especially from warmth to moisture, &c., have been presumed to act as causes of dysentery, and there may be cases in which they have done so. Dr. Copland speaks very decidedly of the effects of water polluted by matter in a state of decomposition; and declares, that he has had repeated proofs

that putrid exhalations may induce the disease. Scybala, were at one time, supposed to be a great cause of dysentery, and without meaning to deny that they may occasionally be so, for evidence is wanting on the subject, it is certain, that, in most cases of epidemic dysentery, they are not to be perceived in the evacuations.

It has been a question amongst pathologists, whether dysentery be communicable by contagion. All admit, that it may be associated with contagious typhus: but some are of opinion, that there is a dysenteric miasm, proceeding from a person labouring under the disease, which is capable of inducing the same disease in another. This opinion has, however, met with much opposition. The question is *sub lite*, but so far as the observations of the author have gone, they are in favour of the negative side of the question.

Pathological characters.—In recent cases, the large intestines are found to be contracted; and, on the other hand, often very much dilated, if the disease have been of longer standing. The mucous membrane is injected and ulcerated, at times, both in the colon and rectum—the muscular coat being implicated in the inflammation, so that the parietes of the intestine are much thickened. The mucous membrane is of a bright red or brown colour in patches. In protracted, or in very malignant cases, deep ulcerations exist, which have been found to run principally in the course of the transverse bands of the colon; and, at times, there is extensive sloughing and mortification of the lining membrane. The follicles of the large intestine are frequently very much enlarged and ulcerated. The parts bounding the valve of Bauhin are often studded with brown or reddish pustules, occasioned by the inflammation of the mucous follicles. The mesenteric glands, corresponding to the seat of inflammation, are occasionally found red and tumefied in the earlier periods of the disease, and black at a later period.

Treatment.—The treatment of dysentery is essentially that advised for inflammation of the lining membrane of the small intestines. In sporadic, and occasionally in endemic cases, it may be advisable to take blood freely from the arm, and to conjoin with it topical bleeding over the region of the colon by means of leeches. In simple cases, the author has found, that by merely keeping the bowels free from the morbid matters that must necessarily be poured into them, by small doses of castor oil, the disease has yielded; but in epidemic cases, the treatment must be regulated by its prevailing characters; and in those cases, that are accompanied by signs of great prostration, and run their course to a fatal termination so rapidly as is sometimes witnessed, the strength may have to be supported, whilst every effort is made to induce a new action in the system by means of mercurials. This is the plan of treatment found most successful in torrid climes. It is a common remark, that if dysentery proves obstinate, it will yield, provided we can only “touch the mouth” with a mercurial. This is not the result of the author’s experience. As a general rule it will apply, but he has seen many cases in which the effect of mercury has been induced on the system, and, nevertheless, the disease has proceeded to a fatal termination. On the other hand, in cases of

great concentration of action towards the seat of the disease, it is not always easy to induce the peculiar effects of mercury. It may have been administered freely without any sensible result; blood-letting may then be practised, which diminishes the intensity of inflammatory excitement, and favours absorption, and immediately afterwards the effects of the mercury are rendered apparent.

Dr. Christison, expresses his belief, that the cure of epidemic dysentery may often be effected by opium alone, begun early and given boldly. In one epidemic, it was prescribed at once in the dose of one, two or three grains every six, four or three hours, according to the urgency of the symptoms, until signs of its narcotic action began to display themselves; and in this way, sometimes twenty or even thirty grains of opium were given in the first twenty-four hours. In several cases, where the treatment was commenced not later than the close of the second day, the force of the disease was at once completely broken, and the only remedies needed afterwards were the continuance of the opium in diminished doses, and restricting the patient to pulpy solids as diet. The author has often seen the excellent effects of opium in this as well as in other inflammations, given in sedative doses; but caution will have to be used that it be not pushed too far.

For the external and internal remedies to be had recourse to in dysentery, we may refer to what has been said under Inflammation of the Mucous coat of the Intestines, acute form, and under Diarrhœa—merely remarking, that as the inflammation is here seated in the large intestine, and at times even in the rectum, enemata—opiate or astringent—can be readily made to come in contact with the parts affected; the impressibility of the canal is, however, so great, that they are generally returned immediately.

The most opposite remedies have been advised, but the only management that can be satisfactory, is one based upon general principles. The disease is really an inflammation; but, as in the case of inflammation of any other part, it may not always demand antiphlogistics. On the contrary, as before observed, inflammatory affections of mucous membranes require, at times, a treatment that is astringent and excitant. This is especially the case with chronic inflammation of those parts. Dr. Marshall Hall affirms, that he has watched a severe epidemic in three successive years, and that all “violent remedies” appeared to him to do harm; but he has not specified those that he considers to be violent.

Of late it has been proposed by M. Mondière to administer albumen in dysentery, under the view of supplying the blood with the albuminous principles that are thrown off in large quantities in the evacuations.

Take of *Water*, two pounds; *Whites of eggs*, six: beat them well together; then strain and add three ounces of *Sugar*, and as much *Orange-flower water* as will flavour it. Three or four bottles of this mixture must be administered in the course of the twenty-four hours. It may also be given in injections.

The plan has been practised by others, and, they affirm, with great success; and there is no question, that in cases of simple dysentery, it may be as effectual as the bland mucilaginous system of management,

generally pursued in such cases; but it can scarcely be found to accomplish more.

2. *Chronic form.*—The chronic form of dysentery is usually a sequel to the acute. In such cases, the tenesmus gradually passes away; the tormina are no longer violent; but the evacuations are numerous, and preceded by obscure pain and flatulency. They still consist of mucus mixed with very little feculent matter, and often with a purulent secretion. The whole system of nutrition, in the majority of cases, becomes affected; emaciation makes slow but sure progress, and death is preceded by signs of loss of balance between the serous exhalents and absorbents,—as indicated by general or local dropsy. The disease is extremely difficult of cure, being dependent upon thickening, softening, or ulceration of the intestines;—organic changes, which do not admit of removal by medicine, and which are generally inconsistent with prolonged existence. It has usually, indeed, a fatal termination.

The *treatment* is essentially that of inflammation of the mucous membrane of the small intestines—chronic form.

II. PERFORATION OF THE INTESTINES.

SYNON. Perforatio Intestinorum, Enterobrosis, Enterorrhesis; Fr. Perforation des Intestins; Ger. Durchlöcherung der Gedärme.

Diagnosis.—If, according to Louis, in the course of an acute disease, and under unexpected circumstances, violent pain of the abdomen suddenly supervene, and this pain is increased by pressure, and is accompanied by speedy decomposition of the features, nausea, and vomiting, there is reason to believe in the existence of intestinal perforation. The pain extends rapidly over the whole of the abdomen, and diminishes, at times, so much as to remove all apprehension on the part of the patient and his attendants; but the physician should not be easy whilst the face remains pinched. The symptoms are commonly deathlike, from the very first. The pulse is not immediately affected, but soon becomes quick, feeble, and irregular in its measure, intermitting, thready, and afterwards no longer to be felt.

The disease generally terminates fatally in from twelve to thirty-six hours; sometimes, more speedily.

Perforation has usually been met with within twelve inches from the termination of the ileum in the colon; the pain, indeed, generally commences in the locality of the cæcum, or near the right iliac fossa.

Causes.—It may be owing to the softening of the mucous membrane; (*Enteromalacia, Enteromalaxia*; Fr. *Ramollissement de l'Intestin*); to ulceration; to gangrene, induced by strangulation; and it has been supposed by some, that it may be caused by worms in the intestines. A distinguished writer, J. P. Frank, however, affirms, that during fifty-four years' practice, although he had opened several thousand bodies, he had never met with one instance, which could be properly attributed to them. Many cases are on record, in which worms have been discharged from abscesses communicating with the intestines, and of worms found in the cavity of the abdomen, with the intestines per-

forated; but it is probable, that the perforation, in all these cases, was owing to ulceration of the intestines—which might or might not have been primarily induced by the presence of worms—and not by any direct perforation by these entozoa. In most of the instances that have been recorded, the morbid appearances have confirmed this view, the openings in the intestines presenting a considerable loss of parts, as if occasioned by some morbid and destructive process. Such is the view of some of the best medical helminthologists. J. Mon-dièrè, affirms, that it is not very rare to see tumours developed on some part of the abdomen, and especially about the inguinal and umbilical regions, which, when opened, give exit to ascarides lumbricoides in greater or less quantity; but with us, certainly, such a pathological condition is extremely uncommon. When perforation takes place in this manner—indeed, in all cases in which abscesses form, that communicate externally, and through which fæcal matter is discharged—a tumour appears, which subsequently breaks through the abdominal parietes, or is opened. An interesting case of the kind, which fell under the author's care at the Philadelphia Hospital, and in which there was also tubercular peritonitis, has been described by an intelligent resident physician, Dr. Vedder, of Schenectady, in the *American Medical Intelligencer* for Nov. 1, 1839, p. 229.

Pathological characters.—Perforation of the intestines is perhaps always—some say always—in the centre of an ulceration. On careful inspection of the mucous membrane, oval patches, more or less prominent, are found, and, in the midst of them, ulcerations, some of which may have perforated the walls of the intestine. The patches are either formed of the mucous membrane, or of agglomerated mucous follicles. They are usually about a line in thickness, and are of a grayish colour, spotted with blue. The submucous tissue of the muscular coat is, at times, in a pathological condition. The margins of the ulcers are defined,—cut, as it were, by a punch. There is never any gangrenous appearance or odour. Besides the evidences of ulceration and perforation, there are those of inflammation of the peritoneum, induced by the extravasation—if it may be so termed—of the contents of the intestines; and the contents themselves are found in the peritoneal cavity. The peritoneum frequently offers considerable resistance to perforation.

Treatment.—This is the same as in cases of Perforation of the stomach; in other words, altogether palliative.

III. DIARRHŒA.

SYNON. Enterorrhœa, Alvi Profluvium, Alvi Fluxus, Ventris Profluvium, Cœliorrhœa, Incontinentia Alvi, Defluxio Alvi, Looseness of the bowels, Lax; *Fr.* Diarrhée, Dévoisement, Catarrhe Intestinal, Flux de Ventre, Courante; *Ger.* Bauchfluss, Diarrhœe, Durchfall.

Diarrhœa is not admitted by all pathologists to be a distinct disease; and there is no question, that it may arise, like gastrorrhœa, from morbid conditions different from inflammation. The mucous membrane, as has been more than once remarked, is a prolongation of the external cutaneous surface, and similar to it in its anatomy and physiology, as it probably also is in its pathology. We can, consequent-

ly, readily comprehend, that the exhalation, which is effected from it in health, may be greatly augmented; or, that under sources of irritation, certainly not always of inflammation, the different secretions, accomplished by the membrane, may be increased in quantity, and that owing to the extension of the irritation to the muscular coat, the peristaltic action may be likewise rendered more active. Diarrhœa may, indeed, be defined—an augmented secretion from the mucous membrane of the intestines, with increased peristaltic action of the canal; these symptoms not being attended, in simple cases, with evidences of positive inflammation. We notice diarrhœa occasionally supervene in persons labouring under anxiety, or some powerful mental emotion, as others perspire freely under the same circumstances. In neither case, can inflammation explain the phenomena.

1. *Acute form.* **Diagnosis.**—Diarrhœa cannot be mistaken. The number of alvine evacuations is greater than usual, and they are of a more fluid consistence. Their character varies considerably; sometimes exhibiting a predominance of acid, especially in children; in others, of bile; and in others again, of both. The remark, previously made, must be borne in mind, however; that when muriatic acid is mixed with healthy bile, a green colour results; and, hence, the therapist may have to correct the too great secretion of acid, rather than the vitiated secretion of bile.

When the evacuations appear to contain much bile, the irritation that gives rise to the diarrhœa is generally seated at or near the portion of the tube into which the ductus communis choledochus opens; and if it should continue for any length of time, the secretion from the liver may be permanently deranged. It is now admitted, that the most certain mode of rendering evacuations bilious is to administer cathartics which act upon the upper part of the small intestines, and which, by their excitation, conveyed by continuous sympathy to the liver, cause an increased and a modified secretion from that viscus. Hence, the common course of treatment, at one time so much advised in dyspepsia, was well calculated to produce the vitiated condition of the secretions which it was prescribed to remove. A blue pill or calomel pill, taken night after night, and followed up by repeated doses of saline cathartics in the morning, is signally liable to this objection. The rule, too, of administering cathartics in cases of diarrhœa, so long as the fæces passed are offensive, has to be received with caution for the same reasons. At the lower part of the ileum and commencement of the colon, peculiar follicles exist, which secrete a fluid possessed of the fæcal smell and characters; and if cathartics be administered sufficiently often to keep up an excitement in those follicles, we may have offensive evacuations induced by the remedial agents themselves.

In simple diarrhœa, mucus may be mixed in considerable quantities with the evacuations, but pain and tenesmus are rarely concomitants; nor are there usually any symptoms which indicate that the irritation extends to the general system. In those cases of diarrhœa that arise from a surfeit—the *Diarrhœa stercoraria*, or *D. crapulosa*; Ger. *Kothiger Durchfall*, (Bartels,) vomiting is at times an attendant: in

such cases, however, the disease is more properly cholera morbus. In some cases, too, more or less febrile irritation prevails, constituting the acute form of *enterorrhœa*, of some.

The duration of an ordinary acute attack of diarrhœa is a few days; generally, perhaps, but a day or two; and the usual termination is in health: it may, however, end in endo-enteritis; and, at times, it passes into the chronic form.

Acute diarrhœa is very common in childhood. Infants, rarely escape attacks of bowel complaints, in which the evacuations are of a green colour and acid smell. The number of evacuations may be very great—from twelve to twenty a day—yet the disease may pass off, without materially affecting the general condition of the child. In this case, the stools may be at first feculent; but they soon cease to be so, and nothing but a greenish fluid may be apparent on the diaper. In other cases, and in somewhat older children, the secretion of mucus is inordinately increased, and after the discharge of feculent stools for a day or two, scarcely any thing but mucus may be passed, which, if it be discharged into a vessel containing water, will be observed at the bottom. In this case, there is usually inflammation of the lining membrane of the tube. In the same pathological condition, frothy evacuations are not uncommon attendants; but no positive deduction can be made from the evacuations alone. In the diagnosis, all the other accompanying symptoms must be attended to. When there is great irritation, the stools are either squirted out forcibly, or they pass away in small quantity with much straining.

One of the most dangerous varieties of diarrhœa is that, to which, in England, the term *watery gripes* has been commonly given. By some, it has been considered to be synonymous with *lientery*; but it is not so; for although the food or drink rapidly passes through the bowels, it generally appears to have undergone some change; and often resembles moss-water. From the commencement of this form of diarrhœa, the secretion from the mucous membrane is excessive, and consists chiefly of watery exhalation, although at times this is mixed with an increased quantity of mucus: the evacuations are accordingly very watery and frequent; the child is extremely restless; the skin dry; the features soon become pinched; the emaciation and prostration are excessive, and if the disease be not speedily arrested, it terminates fatally.

In cases of great irritability of the canal, such as is present in cholera morbus, we notice a true state of *lientery*; food, when taken, being rapidly sent on through the whole of the digestive tube, and appearing, unchanged, in the evacuations.

Causes.—Time of life certainly offers a predisposition to diseases of the lining membrane of the digestive tube. Infancy is extremely liable to the more acute forms of diarrhœa, and old age to the more chronic. Sex, too, appears to act in the same manner, women being more subject to constipation, and this probably owing to their sedentary occupations. Climate and season act, likewise, in the way of predisposition, bowel affections being much more frequent in the torrid regions than in the temperate or frigid; in like manner, diarrhœa is so com-

mon during the heat of summer, as to be called, in this country, *summer complaint*,—a term, however, which is often made to include dysentery and cholera infantum. When any of these predispositions exist, the disease is readily induced by indigestible substances taken as food; and hence our summer and autumnal fruits, unless perfectly ripe, often act as exciting causes, and confirm the truth of the old saying of the school of Salerno:—

“Cave autumnos fructus
Ne sit tibi luctus.”

Exposure to draughts of cold air, or to cold in some form, when the body is heated, has been regarded a great cause of this as of other diseases; but it is not unfrequently induced by the erethism of the dermoid tissue, caused by the rays of the summer or autumnal sun beaming on the body. In the southern parts of this country, every one, who is not acclimated, should, for this reason, avoid too much exposure.

The use of spoonmeat is perhaps the most frequent cause of diarrhœa to the unweaned infant; and hence, also, we can understand, why it should supervene so often soon after weaning, especially in an unfavourable season, as in summer or autumn—when the child has been deprived of a diet congenial to it, and put upon one that is not so readily digestible. It may likewise arise from the nurse's milk not agreeing with the child, or from the irritation of teething. In older children, the causes are, generally, improper diet of some kind, especially of acescent and unripe fruits in their season, or inordinate quantity of food of any kind, or moral emotions. It is not uncommon to see it supervene on a sudden fright, as from a fall. Previous constipation, owing to the retained fæces irritating the lining membrane, or a delicate condition of the bowels natural to the individual, or too active purgation, may likewise give rise to it at any age.

Redundancy and improper quality of the bile have been looked upon by many authors as common causes; but, from the remarks already made, the character and quantity of the hepatic secretion may be modified by the condition of the lining membrane, and may therefore be the effect, rather than the cause, of the diarrhœa. Moreover, secretions rarely irritate the parts over which they naturally pass, when those parts are in health; but if the parts become diseased, they may then be the cause of irritation; hence it is, that *ardor urinæ* is not a sign that the urine is hot—as the term would import—but that the lining membrane of the urethra is inflamed, and, being inflamed, healthy urine occasions a sensation of heat when it passes over the morbid surface.

Pathological characters.—In cases of diarrhœa that have terminated fatally, without inflammation of the lining membrane, the membrane may be found devoid of change both in colour and consistence; or, instead of being red, it may be pale, indicating rather an anæmic condition. In the large mass of cases, however, in which persons have died during an attack of acute diarrhœa, evidences of enteritis have been discoverable.

Treatment.—An ordinary case of acute diarrhœa generally passes

off in a day or two, without demanding much attention on the part of the practitioner or patient. If it have arisen from errors in diet, it may be advisable to administer an emetic,^a which may act beneficially in two ways; first, by removing any undigested or improper aliment that may be in the stomach; and secondly, by its revellent operation, if the source of irritation be seated low down in the digestive tube. It was at one time the custom to administer no therapeutical agents in diarrhœa. The disease was looked upon as an effort of nature, not to be interfered with; and at the present day, there are still some who embrace a similar opinion. Others, again, have adopted an opposite view, and advised, that astringents should be given from the very commencement; of the two, the latter is the more manifestly erroneous, and mischievous in its consequences. The disease is usually one of irritation, and the exciting cause, as has been shown, is often seated in the intestines themselves; accordingly, as an almost universal rule, gentle cathartics must be employed in the first instance, and be repeated if necessary,^b and astringents should not be used, unless the disease should persist.

^a R.—Pulv. ipecac. gr. xx.
Antim. tart. gr. ij.—M.

^b R.—Ol. ricini, fʒi.—fʒiij.
Tinet. opii, gtt. x.—M.

In children, the same course is demanded, perhaps more imperiously, owing to the great predominance of acid in them. To neutralize this, a laxative which absorbs the acid, and forms a cathartic salt, may be advisable; (*magnesia*, or *magnesiae carbonas*,) or any of the milder cathartics may be given, as the oleum ricini, or rhubarb, alone or associated with *magnesia*.^a With the same view, the carbonated alkalies are sometimes administered.

^a R.—Rhei pulv. gr. ii.
Magnes. gr. v.—f. pulvis ter die sumendus.
For a child three or four years old.

By this simple treatment, the ordinary cases of acute diarrhœa, both in the adult and child, are capable of being speedily removed; but in climates and seasons when the disease is endemic or epidemic, still more care is demanded. If the laxative treatment, inculcated above, should not prove effective; and, still more, if the evacuations continue as frequent, whilst they are extremely offensive, and unnatural in their appearance, the laxatives must be repeated; for it must be especially borne in mind, that an increased number of evacuations may take place, owing to the retention of fæcal matter in some portion of the alimentary tube. Diarrhœa may thus be a symptom of constipation, and it is not until the state of fæcal retention has been removed, that a cure can be effected. In such cases occurring in children, the author early in practice observed excellent effects from the use of aloes given in the manner referred to under Constipation. (See the author's *Commentaries on the Diseases of the Stomach and Bowels of Children*, p. 87. London, 1824.)

The cases of acute colliquative diarrhœa, which supervene in phthisis, belong properly to ileitis or endoenteritis of the small intestine, and have to be treated accordingly. The common plan is to

exhibit an opiate, which has the effect of allaying the irritation in some degree; and, occasionally, the *mistura cretæ* of the pharmacopœias is made the constituent of the prescription;* or the infusion of catechu or kino, or of some other vegetable astringent; or the mineral astringents, recommended under the chronic form, may be administered, along with revellents, as blisters or sinapisms to the abdomen, if necessary; but it need scarcely be said, that no permanent benefit to the primary disease, phthisis, can be expected from the administration of these agents. It is only the symptom, the diarrhœa, that we combat by them.

* R.—Mist. cretæ, f 3vj.

Tinct. opii, gtt. xl.—M.

Dose, a tablespoonful, after every liquid evacuation.

In children, where the disease continues violent, notwithstanding the use of the laxatives recommended above, small doses of calomel[†] may be given if the child be under two years of age. Above this age, the infantile constitution is apt to be easily affected by mercury; but, under it, this rarely happens. A distinguished English practitioner, Dr. John Clarke, affirmed, that he never saw but one case of a child, under two years of age, affected by mercury. It certainly is a rare event, as the observation of the author has sufficiently satisfied him.

* R.—Hydrargyr. chlorid. mit. gr. vj.

Sacchar. Zi.—M. et divide in pulv. xij.

Dose, a powder every three hours.

Should the diarrhœa still continue, a mixture of chalk and laudanum, in doses suited to the age of the patient, may be prescribed; or pure argil,^a with opiate frictions^b over the abdomen; or sinapisms; or a *maceratum* of cloves in whiskey, which is a common remedy with the extra-professional. With these means, may be combined injections of starch and laudanum.

* R.—Argil. pur. 3ss.

Acaciæ, Zi.

Sacchar. alb. Zij.

Aquæ anisi, f 3iss.—M.

Dose, for a child two years old, a teaspoonful or two.

^b R.—Lin. saponis. comp. f 3iss.

Tinct. opii. f 3ij.—M. et fiat linimentum.

In all cases, whether occurring in the adult or infant, but especially in the latter, the application of a flannel bandage around the abdomen is to be recommended.

It need scarcely be said, that the diet must be regulated; and this, as before remarked, is often sufficient to remove the disease. Barley-water, or gum-water may be allowed for drink, and Iceland or Irish moss, arrow-root, sago, or tapioca, with or without milk, may constitute the diet. Well boiled rice is one of the most digestible aliments, and is, therefore, very appropriate. It may be mixed with a little gravy, from which the fat has been carefully separated, or with weak chicken soup. The succulent vegetable, and unripe fruits should be proscribed.

As soon as the appetite returns, animal food—as the tender part of the sirloin of beef, or boiled mutton or chicken—will be digested more

readily than strong soups, which are frequently directed in bowel complaints, but are not more appropriate in diarrhœa than they are in dyspepsia.

2. *Chronic form.*—Diarrhœa, after having existed for some days in the acute form, may become chronic, and an increased discharge from the mucous membrane may continue, similar to the gleet, that succeeds to the inflammation of mucous membranes in general. At other times, the symptoms are, from the first, those of chronic diarrhœa, if we may be permitted to term a disease chronic, in which time is no element. In such cases, great impressibility of the digestive tube exists, so that any error of diet reproduces the disease after it appears to have yielded. As in chronic dysentery, the patient frequently becomes greatly emaciated, and the supervention of positive endo-enteritis and consequent ulceration have to be apprehended. It is often, indeed, a matter of extreme difficulty to decide, whether the disease consists in mere irritation of the lining membrane of the tube or in inflammation, or ulceration, or both.

Allusion was before made to the diarrhœa which supervenes on weaning, and which may become chronic, so as to assume all the characters of the *Weaning brash*, of Cheyne, or the *Maladie de Cruveilhier*. The child, in these cases, wastes away perceptibly, becomes peevish, and is desirous of always being at the breast; or, if weaned, is voracious for the drink presented to it. Sooner or later, stupor supervenes, the little patient lies with its eyes half closed, and turned upwards, and gradually sinks, unless the means adopted for its relief be successful.

Attention has been drawn to a chronic form of diarrhœa, dependent upon ulcerations of the rectum, at a short distance from the anus, which may be seen by the aid of the speculum. They occur chiefly in those of broken down constitutions, and in such as have taken a great deal of mercury. The symptoms are irritation of the colon, tenesmus, tormina, frequent evacuations, and generally, during the straining, a little blood is passed. Dr. Stokes advises, that the rectum should always be examined, when diarrhœa has been of long standing; has resisted a great variety of treatment; has been combined with tenesmus, and a desire to remain on the night chair after an evacuation, which shows irritability of the lower part of the tube, and when the health of the patient does not appear to be so much affected as it naturally should be, where there has been long continued disease of a large portion of the great intestine. Since the author's attention has been directed to this pathological cause of chronic diarrhœa, he has met with several cases, which have been treated successfully by the local applications to be mentioned presently.

Pathological characters.—The appearances on dissection, in chronic diarrhœa, are more mixed than those we meet with in the acute form; for the reason, that we have, in addition, the evidences of the pathological conditions that supervene in the progress of the disease. In the epidemic diarrhœa, described by Cruveilhier, a "gelatiniform" disorganization and thickening of the coats of the intestine, both with and without perforation, was perceived, which was sometimes seated

in the small intestine—in other cases, in the large; but almost always the stomach was observed to be affected. In the part where the softening was situate, there was no trace of inflammation, nor any alteration of colour. Cruveilhier, however, subsequently mentions a black hue of the vessels surrounding the diseased portion, which occasionally communicated itself to the disorganized parts.

Treatment.—We may presume, that the laxative and revellent course, and the attention to diet, recommended when treating of the acute form, have been prescribed, and that the use of chalk and opium, and of starch and laudanum clysters, has been tried in vain. The practitioner has now recourse to astringents, or to excitants proper, which are calculated to induce a new action in the morbid parts, or which, by reacting upon other portions of the frame, may prove salutary by virtue of their revellent operation. Astringents and excitants must always, however, be employed with caution, although, in very urgent cases, it may be even necessary to have recourse to the most powerful, administered both by the mouth and rectum, and their agency may be augmented by the addition of opium to allay the irritability of the canal. Of the vegetable astringents, those most frequently employed are catechu and kino; the former, however, possesses all the essential properties of the latter.

R.—Infus. catechu comp. f 3vj.

Tinct. catechu, f 3ij.—M.

Dose, a tablespoonful every three or four hours.—Or,

Pulv. kino comp. gr. v.—xx. four times a day.

Of the mineral astringents, there are several, which are prescribed. The acetate of lead is preferred, by many, in all cases of profluvia from the bowels. Should intestinal pain occur during its administration, similar to that of the painter's colic, it must be discontinued.

R.—Plumb. acetat. gr. viij.

Opii pulv. gr. j.—M. et divide in pil. iv.

Dose, one, four times a day.

The mineral acids have been highly recommended, and especially the nitric, in combination with opium, forming a nitrate of morphia, which is the basis of a mixture, attributed to Dr. Baillie, of London,* and of one, which has been much used in this country under the name of *Hope's mixture*, so called from its proposer.^b

^a R.—Infus. simaroub. f 3iss.

Acid. nitr. dil. gtt. iv—vj.

Syrup. caryoph. f 3ss.

Tinct. opii, gtt. vj.—M.

To be taken three or four times a day, in the case of an adult; two or three teaspoonfuls, in the case of a child.

^b R.—Acid. nitros.* f 3i.

Aquæ camphor. f 3viij.

Tinct. opii, gtt. xl.

Dose, a fourth part every three or four hours.

This last has been highly extolled by some practitioners in dysentery; but it has not succeeded more frequently with the author than other remedies suggested by the nature of the case. In similar cases,

* Hope says *Acidum Nitrosum*, probably of the old Edinburgh Pharmacopœia; but the *Acidum Nitricum* of the Pharmacopœia of the United States was employed in many of the successful cases.

the persesquinitrate of iron has been strongly advised of late years, (*Liq. ferri persesquinit.* gtt. x.—given several times a day in gruel, gradually augmenting the dose.) It is said to have succeeded when other remedies had failed. Alum has likewise been administered,^a as well as nitrate of silver,^b and various other mineral astringents; but those we have mentioned are generally preferred, and are adequate to all purposes. Many of them, indeed, belong to the class of tonics, and seem to act altogether by the new impression which they make upon the mucous lining of the stomach. Amongst the tonics, recommended of late years more especially, may be mentioned the *artemisia vulgaris*, the resinous extract of which has been used successfully in Germany; the *carbo animalis*, and the *ferri ferrocyanuretum*, (gr. ij. gradually increased to gr. vj., three times a day); but there is no reason for believing, that any of these agents are of superior efficacy to other vegetable and mineral tonics.

^a R.—Aluminis pulv. ʒss.

Opii pulv. gr. ij.—M. et fiant pulveres vj.

Dose, one, every three or four hours.

^b R.—Argenti nitrat. gr. ss.—ij.

Micæ panis, gr. iij.—M. et fiat pil.

Dose, one, every four or five hours.

Of the local excitants, employed in diarrhœa, the balsams, and turpentine have long been used. Of these, the copaiba, and the oil of turpentine are almost alone employed at the present day. Great efficacy has been assigned to the copaiba. Its action is probably revelent also. It affects the urinary organs, and in particular constitutions induces great disorder of the mucous membrane of the stomach, and urticaria. The oil of turpentine, which, likewise, acts as a revellent as well as an excitant to the lining membrane of the digestive tube, may be given in the same way. Where the evacuations are offensive, it may be associated with the oleum ricini.^a

^a R.—Copaib. gtt. x.—xxx.

Tinct. gentian. f ʒj.

Aquæ. f ʒj.—M. et fiat haustus.

To be given three or four times a day.

^b R.—Ol. terebinth. f ʒss.

—ricini. f ʒij.

Mucilag. acaciæ, f ʒss.

Aquæ menth. piperit. vel

Aq. cinnam. f ʒvss.—M.

Dose, one quarter, four times a day.

Within the last few years, the peculiar agency on the nervous system, which the nux vomica and its active principle—strychnia—are capable of exerting, has been employed, and especially in those cases that appeared to proceed from morbid irritability of the nerves of the stomach. Either the powdered nux vomica,^a or the alcoholic extract,^b may be given.

^a R.—Acac.

Sacchar. aa gr. xij.

Nucis vomicæ, in pulv. gr. iij. M.

To be repeated according to circumstances.

^b R.—Ext. nucis vomic., alcoholic. gr. ij—vj.

Aquæ cinnam. vel

Aquæ menthæ, f ʒvj.

Mucilag. acaciæ, f ʒss.—M.

Dose, two spoonfuls, six or eight times a day.

The salts of strychnia—the acetate, the nitrate, and the sulphate—are preferable to the pure strychnia, which is nearly insoluble, yet in this country and in Great Britain, it is almost always prescribed.^a It has been highly extolled by many practitioners, and one practitioner,

Ryan, remarks, that he has repeatedly known a few of the pills, the formula for which is given below, check a profuse diarrhœa with rice-coloured evacuations, even when the extremities were blue, in malignant cholera.

^a R.—Strychniæ, gr. i.
Confect. rosar. vel
Micæ panis, 3ss.—M. et divide in pil. xij.
Dose, a pill, three or four times a day.

It will have been observed that, in most cases, opiates are combined with the other remedies, in cases of diarrhœa both acute and chronic. They are, indeed, valuable agents in those affections, and in all the morbid conditions of the mucous membrane that are accompanied with discharges; the practitioner bearing in mind, that the essential agency of a large dose of any preparation of opium is sedative, whilst in smaller doses it is excitant. In many cases, small doses of opium, or of morphia or its salts, are of themselves sufficient, with properly regulated diet.^a The acetate of morphia is often added to glysters, in chronic diarrhœa,^b with the same view as the laudanum is added to the starch glyster.^c The glyster may be repeated twice a day.

^a R.—Pulv. opii, gr. iij.
Ext. gentian. 3ss.—M. et divide in
pil. xij.
Dose, one, four or five times a day.

^b R.—Morphiæ acet. gr. i.—ij.
Decoct. amyli, Oj.—M.
^c R.—Tinct. opii, gtt. lx.
Decoct. amyli, Oj.—M.

In all forms of bowel affections, demulcents are employed, but chiefly as articles of diet. Flaxseed tea, or infusion of the slippery elm,^a or of the benne—*sesamum orientale*—made by stirring one or two fresh leaves in half a pint of cool water, or the dried leaves in hot water, may be allowed for common drink; and the various farinaceous and mucilaginous preparations, advised under the head of Acute Diarrhœa, may be prescribed as diet.

^a R.—Cort. ulmi, 3j.
Aquæ ferventis, Oj.—M.

Where the discharges are kept up by ulceration of the rectum, near the verge of the anus, the ulcers, where practicable, may be touched by lunar caustic, or by a strong solution of the nitrate of silver:—

R.—Argenti nitrat. gr. iv.—xx.
Aquæ destillat. f 3j.—M.

Such are the general remedies to be advised in cases of chronic diarrhœa, which often proves unmanageable; and, at times, after it has resisted the best directed remedies, yields to time, aided by very simple treatment. Chewing rhubarb, or cinchona, by impressing the upper portion of the canal more especially, has appeared, in rare and obstinate cases, to break in upon the morbid catenation lower down, and to effect a cure.

Warm clothing, friction over the abdomen, occasional blisters, and affecting the mouth slightly by mercurials, have exerted a beneficial agency; but where every other remedy fails, the thorough change produced by travelling, air, exercise, society, and scenery, will, at times, succeed in cases that have proved almost hopeless. If the

patient desire to visit the mineral springs, let him be cautioned to avoid those that are cathartic. Simple sulphur waters have been found serviceable, but they must not be taken in quantity sufficient to irritate a lining membrane already too impressible; and in all cases, care must be taken to avoid irregular exposures, and to prevent their effects—if they be inevitable—by the use of flannel next the skin. The Russian belt, by exerting methodical compression, has been found of benefit in such cases. It is the change effected by travelling, and not the water at the springs, on which the physician must generally rest his expectations of cure.

The diarrhœa of infants must be treated upon the same principles. In the *Atrophia ablactatorum* or *Weaning brash*, Dr. Cheyne found the treatment by small doses of calomel, given every night and morning, or every night for a week or ten days, to be most successful. The occasional exhibition of clysters of thin starch and laudanum, or of small doses of opiates combined with the warm bath; the application of a flannel bandage, and a properly regulated diet, will usually be found the most successful method of management. In the *Maladie de Cruveilhier*, the most efficacious plan was found to be the use of opiates and warm bathing, conjoined with properly regulated milk diet. An eighth of a grain of opium administered morning and evening, and, in some cases, every four or five hours, in a glyster of aniseed tea, jelly, or starch, sometimes speedily arrested the diarrhœa, and afforded inexpressible relief.

Adipous Diarrhœa.

SYNON. Diarrhœa adiposa, Fatty discharges from the bowels, Molten Grease; *Fr.* Gras Fondure.

A discharge of fatty matter has been observed from the bowels, sometimes in a fluid state, and at others in the form of fatty concretions. Many cases of the latter are on record; and of late years, the attention of pathologists has been specially directed to the former. In one case, discussed by Sir Everard Home, the cause of the oleaginous discharges seemed to be evident. The lady, before their appearance, had regularly taken olive oil for the purpose of allaying severe pains in the stomach, which were ascribed to the passage of a gallstone. The discharged fatty matter was of a globular form, varying in size from that of a small pea to that of a moderate grape, of a cream colour and slightly translucent, of sufficient consistence to preserve its form, and to bear being cut with a knife like soft wax. A more interesting question of pathology appertains to discharges of fat when no oleaginous substances have been taken;—in other words, to those cases in which the fat must have been formed at the expense of the system.

The annals of medical science contain many examples of fatty discharges from the bowels. Sometimes, the discharge is in the form of oil or semi-concrete matter, floating on the top of the fæces, and possessed of a fetid odour. The quantity evacuated differs of course greatly. In one case, which occurred to Dr. J. B. Jackson, of Boston, it amounted, on an average, in the twenty-four hours, to about eight

ounces during more than four months. Some fatty concretions analyzed by Lassaigne and L. Gmelin, had the following constituents: seventy-four parts of an acid fatty matter, in which stearin predominated, eleain and a peculiar acid; twenty-one parts of a substance analogous to fibrin; four parts of phosphate of lime and one part of chloride of sodium. In another case, there were, in one hundred parts, sixty of matter similar to spermaceti; thirty of phosphate of lime; eight of animal matter, and two of loss.

In many of the cases of fatty discharge, there was concomitant disease of the liver, pancreas or duodenum; so that it was imagined the anomalous secretion might be the product of the pancreas or the liver. On the other hand, in some of the cases on record, the ducts of the liver and pancreas have been so obstructed as to preclude the idea of its being the product of either of these viscera; and moreover it has been seen in cases in which there was no reason to believe in the existence of serious disease of those organs. At the age of three years, a little girl was observed to discharge something from the bowels as she walked across the room; this, when examined, was found to be fat in a liquid state, which concreted when cold. "Ever since that time to the present," (a period of eighteen months,) "she has voided," says Dr. Babington,—the respectable narrator of the case,— "at intervals of ten or fourteen days, the quantity of from one to three ounces, sometimes pure, at others mixed with the *fæces*: when voided, it has an unusually yellow tinge, and is quite fluid, like oil. Her appetite is good, as well as her spirits, and her flesh firm, her belly rather tumid but not hard." In other cases, the disease appears to have occurred during phthisis, hysteria, and other affections; in some instances, oil was discharged from the bladder likewise, and fatty concretions have been taken from the vagina. One of these was examined chemically by Dr. Martius, jr., and found to be composed of fat with some traces of salts.

These facts sufficiently establish, that under certain circumstances, and, doubtless, under the influence of particular diseases of the neighbouring organs, the gastro-enteric and other mucous membranes may secrete fat from the blood, as the *physeter macrocephalus* occasionally secretes an enormous quantity of fat under the form of ambergris:—as much, it is asserted, as one hundred and eighty-two pounds have been found in the body of one of these animals.

Treatment.—In complicated cases of discharge of fatty matter from the bowels, as in some of those that have been reported, in which the liver or the pancreas, or the biliary ducts, or the duodenum were extensively affected with disease, the case may be regarded as unmanageable; but where the secretion is vicarious, and consists simply in the mucous membrane of the intestine secreting a fluid unusual to it, it may admit of remedy. It has been asserted, that our practice cannot be any thing but empirical, until we have more light thrown upon the subject; but it is not probable, that farther investigation will enlighten us any more than in other cases in which we know that organs of secretion separate from the blood matters which they do not ordi-

narily secrete, as where bone is copiously deposited in cases of abnormal ossification.

The philosophical method of management would seem to be, to produce a thorough revulsion in the whole system of nutrition, by changing the diet, and recommending the individual to seek an entire mutation of all the atmospheric and other influences surrounding him. Mercurials and other substances belonging to the class of eutrophics, —iodine, and its various preparations, for example,—may be serviceable in this view; and we can readily understand how new impressions, made on the nerves by the various remedies recommended for hysteria, may put an end to the adipous secretion by removing the irregularity of the nervous and other functions which constitute that Protean disease.

VI. CHOLERA.

Under this head, we shall consider, *first*, the ordinary Cholera Morbus of this country; *secondly*, the Asiatic Cholera; and, *thirdly*, the Cholera Infantum.

a. Cholera Morbus.

SYNON. Sporadic Cholera Morbus, Cholerrhagia, Passio Felliflua, Passio Cholerica, Morbus Fellifluus; *Fr.* Choléra; *Ger.* Gallenruhr, Brechruhr, Brechdurchfall.

This disease has been known from early antiquity, and was originally, as the name imports, (χολη, "bile," whence χολερα,) supposed to be owing to an overflow of bile, which was discharged upwards and downwards.

Diagnosis.—In the generality of cases, perhaps, before the unequivocal symptoms of cholera morbus declare themselves, there is more or less evidence of general, or of gastro-intestinal disorder;—sometimes shivering, headache, pain in the abdomen, nausea, &c.; but, at other times, the disease appears without any premonitions,—violent vomiting and purging occurring almost simultaneously. In the first instance, the ejected matters are the contents of the stomach, mixed with a considerable quantity of the secretion from the mucous membrane; but, when the efforts continue, and the duodenum participates, the liver is called upon, by the excitation, for an increase in its secretion; the secreted bile passes through the pylorus into the stomach, and is observed in the ejected matters. This is the simplest and mildest form of cholera morbus. In the more severe forms of the disease, considerable pain is experienced in the abdomen, and especially in the epigastrium; and violent cramps are felt in the muscles of the limbs. In cases, that are induced by improper articles of diet, there may be more or less frequency of pulse, and heat of skin, with great thirst; but, when the vomiting and purging, and muscular contractions are severe, the surface is pale; the features are pinched; the eyes hollow; and the skin is covered with a cold, clammy perspiration. The anxiety is great, and the depression alarming. In the great revolution of functions, produced during the violence of the disease, the urine is commonly suppressed. The disease does not generally last for any

great length of time in temperate climates. An attack frequently comes on during the night, which passes off, and leaves the patient well, or nearly so, on the following day.

Causes.—Cholera morbus, like diarrhœa, is a disease of warm climates and seasons. With us, it occurs in summer, and more frequently, perhaps, in early autumn, after the system has been subjected to elevated summer heat. The most common exciting cause is diet, improper by quantity or by quality. Particular articles induce it more frequently than others,—nuts and cucumbers for example. Ice and ices are reckoned by Andral among the exciting causes; but, in this climate, they cannot be so regarded. The free use of ice-water is, indeed, well adapted to prevent any form of crethism of the mucous membrane of the digestive tube.

Pathological characters.—Pathological anatomy has thrown no light on the essential nature of cholera morbus. Where the patient has died speedily, the most careful examination has exhibited no change of appearance; but, when the disease has continued for some time, red, brown, black, and even gangrenous, patches have been observed in some part of the canal. The liver, too, has been found tumefied and gorged with blood. None of these appearances can, however, fix the seat of the disease, for the patches alluded to are sometimes met with in the stomach; at others, in the duodenum; and, at others, again, in a lower portion of the intestinal canal. Not many opportunities, however, occur for examining the pathological appearances in common cholera morbus, as it is a disease which rarely proves fatal.

Treatment.—In a common case of cholera morbus, opiates are the best remedies. They may be given in soda water, or in the ordinary draught made of the soda powders. These last may also be given with advantage without the opiate. A full dose of opium, or of its preparations, is advisable.^a This may be repeated in the course of an hour, or even earlier, should there be signs of its having been returned by the vomiting. When there is much epigastric pain, or cramp of the extremities, opiates are still more demanded. Instantaneous relief sometimes follows the administration of fifty or sixty drops of the tincture of opium. Hot fomentations may, at the same time, be made to the epigastrium and to the parts affected with spasm; or sinapisms may be used with the same view; or frictions with stimulating liniments.^b

^a R.—Tinct. opii, gtt. xl.—lx.
Aq. cinnam, f 3j.
Syrup, f 3j.—M.

^b R.—Liq. ammon, f 3ss.
Ol. olivæ, f 3iss.—M.
Or, R.—Linim. camphor, f 3iss.
Tinct. cantharid, f 3ss.—M.

Ipecacuanha, as an emetic, has been believed, by some, to mitigate the violence of the disease, whilst others deprecate all emetics. It is not easy to see in what circumstances they can be useful.

The diet and drinks must be those recommended under Chronic Diarrhœa.

b. *Cholera Asiatica.*

SYNON. Asiatic, Malignant, Indian, Epidemic, Pestilential, Eastern, or Oriental Cholera; Cholera Orientalis, Ch. Indica, Ch. Epidemica, Ganglionitis Peripherica et Medullaris, Trisplanchnia, Morbus Oryzeus, Cholerrhœa Lymphatica, Psorenteria, Typhoid Fever of India; *Fr.* Choléra épidémique, Mort de Chien; *Ger.* Asiatische, indische, epidemische, morgenlandische, orientalische Brechruhr.

Cholera—epidemic cholera—is said to have been known in India from the earliest ages; but it is of the epidemics of modern times alone that we have accurate accounts. Partial epidemics have been seen in Hindusthan, from time to time, ever since it became known to the British. In Upper Hindusthan it destroyed, in 1764, 30,000 natives and 800 Europeans. The disease has long been endemic there; and it is a curious, but, in the existing state of our knowledge, an insolvable problem, to determine the causes which induced it to leave India, and to visit Europe.

On the 19th of August, 1817, it broke out with a new and more excursive character at Jessore, in the Delta of the Ganges, about one hundred miles northeast of Calcutta. It was now noticed to follow the rivers, and in September, 1817, it reached Calcutta, where it raged during nearly the whole of 1818. It then extended over the whole province of Bengal, and beyond it, attacking the grand army stationed at Bundelcund, a portion of the Allahabad province. During the year 1818, it ascended the Ganges and the Juhmna, and reached the northern provinces of Hindusthan, but was there checked for several years by the Nepaulese mountains, and ultimately entirely arrested by the Himālas. It passed, likewise, southward along the coast until it reached Madras. Here, at the onset, twenty medical men were attacked, of whom thirteen died. In December, 1818, it had reached the most northern town of Ceylon. In 1819, Sadras, Pondicherry, and the whole Carnatic were affected. In Bombay, it first showed itself in August 1820, and in that presidency carried off 150,000 persons. From Ceylon, the disease passed to the Mauritius and the Isle of France, where it arrived in October, 1819. Thence it passed to the Isle of Bourbon, and, in 1820, to the eastern coast of Africa at Zanguebar. It never reached the Cape of Good Hope, owing, according to some, to the strictness of the quarantine. Malacca it visited in 1818; the Burmese empire generally, Aracan and Ava, in 1819; Sumatra in 1819; Java in 1821; and the Moluccas in 1823. It visited Borneo and Celebes in 1820, and broke out with great violence at Manilla. In 1819, it appeared in Siam, Bankok, Tonkin, Cochin China, and was very fatal in Cambodia. In 1820, it reached Macao; thence it passed to Canton, and reached Pekin in 1821.

These facts show, that the common notion of the disease travelling from east to west is erroneous; and its farther progress exhibits, that even when it proceeded westward from Hindusthan, its direction was not always from south-east to north-north-west as has been asserted.

In 1821, the disease spread to Muscat, Bender-abassi and Bassorah; and in the last city it destroyed 50,000 persons; from these places it passed along the rivers, and generally along the commercial routes. From Bassorah, it proceeded up the Euphrates and Tigris,

and reached Bagdad in 1821. Proceeding along the Euphrates it reached the ruins of Babylon, and passed across the desert to Aleppo. Thence it extended to different towns in Asia Minor. From Bender-abassi, in Persia, it travelled along the great mercantile road to Shiras in 1821. The various provinces of the Caspian were soon affected. Here it ceased for a time, and reappeared in the middle of 1823, and travelling along the Persian seaports of the Caspian, it reached the river Cur, which it ascended, and in September, 1823, reached Astrachan. In June, 1823, it appeared in the vicinity of Laodicea and Antioch, and spread in two directions along the coast of the Mediterranean. At this period, it ceased its ravages in the west; but continued in India, and extended from Asia Minor, Persia and China, through Tartary and Chinese Tartary. In 1829, it suddenly broke out at Orenburg in Russia with intense violence; and Astrachan became again attacked, with much greater fatality than in 1823, (mortality 8,000.) From Astrachan it ascended the Wolga, and in 1830, reached Saratow, Kasan, Nischnei Nivogrood, Kostroma, Jarislaw, &c. From the Caspian and Black Sea it spread through the Caucasus to the Don, which it ascended; and coasted along the Black Sea to Cherson and Odessa, which it reached in autumn, 1830. In September 1830, it attacked Moscow, and did not cease until the end of the following March. In the autumn of 1831, however, more than 1000 cases occurred in that city. During the winter and spring of 1830-31, it spread far to the west and south, and through the river provinces of the Dneiper, the Bug and the Dniester. In 1831, it reached St. Petersburg, and, in the same year, visited Warsaw, Archangel, Helsingfor, Abo, Aland, Danzig, Elbing, Thorn, Konitz, Memel, Königsburg, Stettin, Berlin, Frankfort on the Oder, and Magdeburg. From Magdeburg, it spread extensively upwards along the Elbè to Hamburg, which it reached in October, 1831. It is curious, however, that Leipzig, Dresden, Hanover, with the exception of Lüneberg, Sachsen-Weimar, Gotha, Anhalt, Hessia and Brunswick, and other small principalities, escaped. Austria suffered very severely—number of deaths, 97,770. In the same year, it visited Pesth and Presburg; proving fatal in Hungary, to 240,000 persons. Vienna and Prague were both afflicted in the autumn of 1831, Moldavia in the spring; and, in the autumn, Egypt was visited for the first time. On the 4th of November, 1831, it was first seen at Sunderland, England; in January, 1832, it was in Edinburgh, and on the 10th of February, in London; but its ravages were comparatively small. Indeed, it has been estimated, that the whole of the victims from the disease in Great Britain and Ireland, did not amount to more than 30,000. It is not the author's intention to trace its course to every town in the Islands. This has been done by Professor Graves, of Dublin, in a communication which is accessible to all. (*Dublin Journal of Medical Science*, Jan. 1840, reprinted in *Dunghlison's American Medical Library*, vol. iii., 1840.) It is singular, however, that it left a number of places entirely untouched, and others were but slightly affected.

Cholera first appeared in Paris in March, 1832, and with great rapidity, various parts of France were attacked. From England the

disease soon passed to Ireland, and appeared in Dublin in March, 1832. On the 8th of June, 1832, it was first seen on this side of the Atlantic in Quebec; and on the 10th it appeared at Montreal. On the 21st of June, it suddenly and unexpectedly appeared in New York, all the intermediate cities on the seaboard of the provinces of New Brunswick and Nova Scotia, and of the states of Maine, Massachusetts, and Rhode Island, remaining wholly exempt. On Thursday, July 5, the first decided case manifested itself in Philadelphia. This city suffered much less than Montreal, Quebec, and New York. The disease spread in various directions, visiting Albany, Troy, New Brunswick, and Rochester, in July; Baltimore, Washington, and Boston, in August. During the same months, it was prevalent in several parts of New Jersey and Delaware. About the 1st of October, it suddenly broke out at Cincinnati, and nearly simultaneously at Madison, Louisville, and St. Louis; and by the latter end of the month, it reached New Orleans. Leaving the Ohio, it visited Tennessee, Illinois, Indiana and Kentucky,—Lexington, Maysville, and some other towns, suffering severely. During the same year, the disease visited Campeche, where it was exceedingly fatal,—1000, out of a population of 20,000, falling victims to it. It also visited the Havana early in 1833, but never reached any other West India island; nor did it extend to Guiana, Demerara, or any of the embouchures of the great South American rivers Amazon, Orinoco, or La Plata. In 1834, it revisited many of the cities of this country, which had previously suffered, and spread to others that had been left untouched; yet singular cases of entire immunity were met with. Two of these may be mentioned as examples. Fredericksburg on the Rappahannock, and on the great road from Washington to the south, may be said to have escaped almost wholly; and whilst the disease was prevailing at Richmond, and the inhabitants of Charlottesville, and of the University of Virginia in its vicinity, were daily expecting a visitation, not a case occurred, although travellers daily arrived from the afflicted city in the public stage. Philadelphia and Baltimore both suffered again, but not severely, in 1834. Charleston also was visited, with most of the southern towns. The disease recurred, indeed, at intervals, for a year or two, but ultimately disappeared, not to return, unless the same endemico-epidemic influences should exist, which favoured its progression previously. In like manner it occurred at Marseilles and Toulon in 1835; at Naples in 1836; and at Bona in 1837. Marseilles was attacked, for the third time, in the same year, and it reappeared in the autumn at Berlin, Prague, and Danzig. The number of persons attacked in the Lombardo-Venetian states, in 1836, was estimated at 100,000, of whom 55,000 died. In the latter part of 1837, the inhabitants of the British metropolis were alarmed by the appearance of cases at Limehouse, which were pronounced by some to be genuine Asiatic cholera; but, by others, to be emanations from “alarmist cholera-hunters.” The disease, if it existed, never certainly became epidemic.

Diagnosis.—In almost all the epidemic visitations of cholera, certain precursory or premonitory symptoms have been observed; some of

which, on other occasions, might have been suffered to pass unheeded; but, in consequence of the prevalent alarm, were the source of much anxiety. The alarm, indeed, in some instances, was so great, as to constitute a real *choleraphobia* or *cholera mania*; the patient being, for the time, in a state of hypochondriacal monomania; at times, believing himself to be afflicted with a disease which had no existence except in his imagination, and at others magnifying symptoms into inordinate importance. This very anxiety and perpetual direction of the attention towards the intestinal canal may have induced more or less derangement of functions, and have added to the tortures of the individual.

The premonitory symptoms, consisting of more or less derangement of the digestive functions, with diarrhœa to a greater or less amount, were generally termed *cholérine*. The appellation has, indeed, been applied both to the premonitions, and to what may be regarded as the first stage of cholera.

At times, great and inexplicable debility is experienced, as if the patient had suffered great loss of blood; vision is impaired, along with giddiness and tinnitus aurium; there is also much thirst, with tumefaction of the abdomen and want of appetite. These symptoms may or may not precede the essential phenomena, which are vomiting and purging; the latter sometimes preceding, for a time, the former. The evacuations are extremely frequent, and, in the first instance, may not exhibit any thing unusual, but soon they are copious, liquid, almost without smell, and resemble in appearance rice-water; hence, they are commonly termed *rice-water evacuations*. As these evacuations go on, the patient becomes extremely restless and indisposed; violent cramps attack the extremities, and even the muscles of the chest and abdomen: those constituting the calves of the legs are, however, most commonly affected, and, next to them, perhaps, the muscles of the fingers and toes. In the mean time, the forces that move the blood are rapidly impaired; the pulse sinks; the extremities first, and, afterwards, the face, and the whole body becomes cold; the features are now astonishingly changed, so much so, that they are scarcely recognisable; the author has, indeed, been unable to recognise the familiar features of an acquaintance a very short time after the onset of the disease; the eyeballs are drawn, as it were, into the very bottoms of the orbits; the patient is excessively restless, and the thirst almost unquenchable. The powers of circulation and calorification become more and more impaired; even the breath feels cold; and the thermometer, placed under the tongue, indicates that the animal heat has fallen many degrees. The patient is now in a state of collapse; the surface is blue, or he is *cyanosed*, if we may employ a French term. He is in the *blue stage* of the disease, or in *cholera asphyxia*. The surface of the hands are wrinkled, as if the fluid had been withdrawn from them, and so shrunken, that rings fall from the fingers and shoes from the feet; the features become pinched, owing to the same cause, and the expression is quite characteristic. The cold expired air has been analyzed, and proved to have undergone little or

no change from respiration. Little or no hæmatorrhœa could, consequently, have been effected. The nose is cold, and is said to have become gangrenous in some cases; the urine is wholly suppressed; the voice is husky; the powers of life gradually fail; the pulse is no longer perceptible; the breath becomes slower and slower; and hic-cough frequently precedes the fatal termination; the senses remaining unimpaired until almost the last; and, in some cases, the patient raises himself from his bed, under the influence of the cramps, or, when called upon, by the desire to vomit or to discharge the fæces, until within a short time of his death.

This is the course of the disease in fatal cases, which, in every epidemic, have been numerous, and, what is singular, the average mortality has been every where pretty nearly in the same ratio. In more fortunate cases, the blueness disappears; the pulse becomes perceptible, the heat returns, and general reaction is evidenced by febrile signs, and, at times, great headache; the secretion of urine, which had been arrested during the preceding stage, is restored; the vomitings diminish in frequency, and the alvine evacuations also; the face resumes its wonted expression, and all the symptoms gradually disappear. Too frequently, however, matters do not progress so favourably. Signs of cerebral hyperæmia often supervene;—intense headache, delirium, stupor, subsultus tendinum, &c.; at other times, the irregularity of circulation, during the period of reaction, attacks other internal organs—as the air passages. The whole system of nutrition, in other cases, becomes implicated, and signs of the typhoid condition, or exanthematous eruptions, appear on various parts of the body. It has been a question, whether any of the symptoms, enumerated above, can be regarded as diagnostic of Asiatic cholera. The most characteristic, according to general belief, are the rice-water discharges. These have been frequently analyzed. When examined two hours before death, by Gérardin and Gaimard, they had the appearance of whey, the specific gravity being 1.0073, with a strongly alkaline reaction. Heat rendered the fluid opaque, and corrosive sublimate very turbid. It, consequently, contained albumen. The alvine evacuations possessed the elements of which the blood was deficient,—serum, alkali and other salts. The vomited matters were also examined. Their character would seem to have differed,—according to some, being alkaline; according to others, acid. Along with this character of the matters evacuated,—the disturbance of the respiratory and circulatory functions, the icy coldness, the cramps, and the peculiar change of features, give to Asiatic cholera a character which cannot readily be mistaken.

The sensation communicated to the hand, on touching a person in the blue stage of cholera is similar to that experienced on touching the nose of a dog, or a cold-blooded animal; yet the real temperature has not been found, by positive observation, to be so much depressed as this circumstance would induce one to believe. This is confirmed by the following table, the results of the labours of a distinguished physiologist, M. Magendie.

| Subjects. | Pulsations of heart per minute. | Respiratory movements. | Temperature, (Fabr.) | |
|----------------------|---------------------------------|------------------------|----------------------|--------|
| | | | Hands. | Mouth. |
| Child, 3 years old, | 20 to 25 No pulse. | 22 | 77 | 86 |
| Youth, 15 years old, | 20 — do. | 12 | 77 | 86 |
| Man, of 66, | 12 to 15 do. | 32 | 70 | 86 |
| Woman, of 36, | None. Pulsations at the ear. | 30 to 36 | 68 | 77 |
| Girl, of 13, | None. No pulse. | 11 | 72 | 84 |
| Man, of 49, | 15 do. | 12 | 74 | 88 |
| Woman, of 60, | 20 do. | 15 | 68 | 83 |
| Man, of 55, | 70 | 32 | 70 | 74 |
| Man, of 70, | | 42 | 70 | 70 |
| Woman, of 47, | 79 | 34 | 72 | 83 |

Professor Czermak, of Vienna, found the maximum of refrigeration in the feet, next in the hands and tongue, face, neck, and scrobiculus cordis; and MM. Gérardin and Gaimard, in their experiments, found the temperature of the tip of the nose lower even than that of the feet, whilst the region of the heart and the axilla always exhibited the greatest degree of heat. It does not appear that recovery took place when the temperature fell below 67° .

The changes, that occur in the blood, are remarkable, and this in proportion to the intensity and duration of the collapse. It becomes dark, and so thick as to bear a strong resemblance to treacle or tar. Dieffenbach, of Berlin, opened the brachial artery without blood flowing. The following were the proportions of the clot to the serum—as the disease advanced—observed by the gentlemen last cited:

| | | | | | |
|--------|-----|-----|-----|-------|------|
| Clot— | 50 | 55 | 60 | 60.3 | 62.5 |
| Serum— | 50 | 45 | 40 | 39.7 | 37.5 |
| | 100 | 100 | 100 | 100.0 | 100 |

The blood of a patient, who had recovered from cholera, and was afterwards attacked with fever, had the following proportions: Clot, 46.25; Serum, 53.75. The ratio of albumen to the serum increased with the intensity of the disease, and attained its maximum a short time before death. If the specific gravity of healthy serum be estimated at 1.027, it will be found, that, after the rice-water evacuations occur, it will rise to 1.028, afterwards to 1.032, and in one case it was found to be 1.036, four hours before dissolution. In other cases, it has been observed to vary from 1.040 to 1.045; and, at times, according to Lecanu, the solid matter is double what it is in health. The result of the analysis of various observers shows, that cholera blood contains less water than healthy blood, and that its salts are in very small quantity, or almost entirely wanting. Owing to this absence of saline matter, the clot is not reddened by the contact of oxygen.

After the prevalence of cholera, Dr. Prout observed an absence of the common lateritious sediments in the urine; and about the time the cholera first made its appearance in England, the same observer noticed a positive increase in the weight of atmospheric air, similar to what might be supposed to be produced by the diffusion of a heavy gaseous principle through the lower regions of the atmosphere.

Hence he concluded, that the cause of cholera and of the urinary peculiarity was a poisonous body analogous to malaria, whose high specific gravity and feeble diffusive powers kept it near the earth's surface, along which it insensibly crept, especially in low and damp situations. He very properly, however, does not lay much stress upon this conclusion. During the prevalence of the above mentioned state of the urine he likewise noticed, in almost every individual, an unusually acid state of the saliva, and of the cutaneous exhalations; and about the time the cholera prevailed, and a little afterwards, he saw more cases of oxalate of lime renal calculi, and of formidable hemorrhage from the kidneys, &c., than he had ever previously seen during the whole of the long period that urinary diseases had occupied his attention. As the cholera disappeared the above state of matters gradually subsided.

Causes.—Of the primary or efficient cause of cholera, we know no more than we do of that of smallpox or measles, or, indeed, of any of the diseases, which are owing to endemic or epidemic influence. It is, therefore, unnecessary to do more than allude to the various speculations as to its sidereal, animalcular, or other origin, which have been adduced from time to time. The analysis of the air has been unsatisfactory. Nothing has been discovered, except the ordinary physical constituents of the atmosphere. And what shall we say of the supposition of certain physicians of India, that the disease was owing to damaged rice, of the harvest of 1817, especially in the territory of Oude—whence the name *Morbus oryzeus* or "Rice disease," applied to it by Tytler? Whatever notion of the kind may have, at one time, existed, it must soon have been dispelled, when the disease continued beyond the year 1817, and extended to countries whose inhabitants eat no rice, as well as to others by whom rice was found to be the best prophylactic aliment.

The primary cause of cholera being unknown, we may pass to the next question. Does it travel by contagion, or is its epidemic visitation owing to general influences, which act for the time being on every one in the same locality, so that the disease may occur independently of all communication with infected persons?

The advocates of contagion must admit, that it in no respect resembles many of the diseases that are unquestionably communicable. It cannot be conveyed by inoculation; nor does it appear to have spread in the same manner as we should expect contagious diseases to do. In many instances, it has declared itself for the first time in various parts of the same locality, where communication between the sick appeared almost impracticable. Such was the case with the epidemic at Baltimore, in 1834, which the author had an opportunity of witnessing; and examples of its passing over places, which were keeping up daily and uninterrupted communication with infected districts, and affecting more remote places, are almost innumerable. In some cases, where rigid quarantine was observed, the cholera did not break out; but this may have been a coincidence; as, in other cases, the disease declared itself under such circumstances in spite of every precaution. Facts, similar to the following, have occurred in all

countries visited by it. At Astrachan, it broke out, notwithstanding all sanitary regulations. A few days afterwards, all such regulations were abolished, yet the disease ceased spontaneously in a few weeks. Whilst it was raging at Astrachan, many families left the city, and dwelt in the neighbouring villages; yet, although a constant communication was kept up with the city, they remained unaffected. After having left Astrachan, it did not return, although vessels were constantly arriving from Saratoff, whilst the disease was raging in this last city. These vessels took not only merchandise to Astrachan, but persons labouring under cholera, several of whom died. Still, the disease did not recur there.

In their zeal for the doctrine of non-contagion, some have gone so far as to assert, that in no case have those, who had the most communication with the sick, been attacked in greater proportion by the epidemic. This is not strictly the fact, nor ought we to expect it to be so. In Moscow, according to Jahnichen, there sickened between thirty and forty per cent. of the persons who had hospital duty to perform, including physicians, nurses, &c., whilst, of the whole population, not more than three per cent. took the disease. In Dublin, too, great numbers of the hospital attendants were affected, and many died. Yet these cases may be explained by the circumstance, that they were all exposed to the same epidemic influence, and were under favourable circumstances, owing to fatigue, want of sleep, &c. for the production of the disease. On the other hand, Dr. Eberle affirms, that in the cholera hospital at Cincinnati, in which, during a period of nearly five weeks, there were constantly from fifteen to twenty cholera patients, *not a single case* of the disease occurred among the physicians, nurses, and other attendants, although some of these remained in the wards day and night during the whole period, and frequently slept on beds where cholera patients had lain and died. It was a common observation, indeed, in this country, that the physicians and the nurses, although under what might be regarded predisposing influences—even admitting the disease to be epidemic, and not contagious—suffered comparatively little.

One more circumstance may be mentioned—the manifest influence pervading all the inhabitants of a locality, and exhibiting itself not only by premonitions (*cholerine*), before the true cholera made its appearance, but likewise when it was present. This is certainly rather in favour of an action of an endemico-epidemic character. There are, however, many inexplicable circumstances in the whole geographical and topographical history of the cholera:—the fact of its generally following the great routes of commerce, and the assertion, that it never traversed the ocean at a rate exceeding that of ships, are points that would incline to the belief of contagion; yet this cannot be considered established. Indeed, a careful consideration of all the phenomena leads to at least a doubt, whether its progression—geographically, or from individual to individual—have ever taken place in that manner.

Whether the disease be propagated by contagion or by epidemic agency, there are many circumstances, which exert considerable in-

fluence on its developement. Most commonly it was observed, that the indigent part of the community was more frequently and fatally attacked than those better off in the world. Accordingly, it prevailed most in the crowded, filthy, and worst ventilated portions of cities; in which, it was presumable, little attention was paid to diet, and but little care taken during the premonitions; yet, on the other hand, in 1834, the epidemic appeared to attack more the better classes of persons. In 1832, few of these died; in 1834, several. Again, it was noticed, that, at Montfaucon, near Paris, where the knacker's operations are carried on, and where the air is filled with putrid odours, the ravages of cholera were less than elsewhere; and it is probable, that, if the workmen had been removed to a purer air, they would have suffered. During the alarm of cholera, the diet was frequently changed; and as they, who habitually indulged in the use of spirituous liquors, were presumed—as in the case of other epidemics—to fall victims more readily to the malady, the accustomed stimulus was often suddenly abandoned. This could not fail to exert a prejudicial effect; and, accordingly, it was generally held as the most salutary rule, that every material change in the habits might contribute to the production of the disease. Errors of diet were doubtless exciting causes; yet, after all, universal experience did not settle down upon any which were especially objectionable. The employment of irritating cathartics was, also, a cause, where the predisposition was strong.

At one period it was presumed, that the approach of winter would entirely arrest its progress, but brief experience showed, that it might rage with virulence through that season. On the 20th of September, 1830, it appeared in Moscow, and did not cease until the end of the following March. A severe frost and snow set in towards the end of November, without in the least diminishing the spread or the intensity of the disease. At St. Petersburg, too, it exerted its ravages in the midst of winter. Perhaps, however, the summer season has generally witnessed its greatest severity.

Intense moral emotions and excesses, and debility of every kind have acted as exciting causes.

During the existence of the cholera atmosphere in France, various animals, according to Messrs. Carère and Mitivié, and Clement Desormes, were affected with epizooties; and the horses and cows in Edinburgh, in 1833, were attacked with symptoms of cholera.

Pathological characters.—It has been remarked, that of those who died in the complete algid period, and in which there was coldness of the whole body, some became warmer after death, and preserved a manifest degree of heat until the commencement of rigidity. This the author never witnessed; nor has he noticed the muscular tremors, and spontaneous movements so generally described. The blue tint diminishes in intensity after death, and is often limited to the extremities, frequently to the pulps of the fingers. It has been affirmed, too, that the body exhales an odour *sui generis*. On examining the digestive tube, the stomach and intestines are found deeply injected; vessels being seen clearly defined, which, in ordinary injections, are not

perceptible. The intestines, when opened, contain the same kind of rice-water secretion, as is discharged by the bowels. Not uncommonly, signs of acute or chronic inflammation are met with, but in numerous instances no such appearances are perceptible. The intestinal follicles are frequently developed; but the appearance is not always the same. At times, there is an eruption of small, miliary, white semi-transparent vesicles, which are distributed over the whole of the mucous membrane of the small intestine. Venous injection and follicular eruption, Andral considers to be the only alterations of the digestive tube, which, in all other respects, preserves its normal characters. The small intestines especially have often been found lined with coagulable lymph, the membranous nature of which Professor Horner proved, by maceration in alcohol, and by the process of drying. By some, this has been considered to be a layer of mucus.

Examination of the blood of a choleric patient by M. Andral showed, that there was no augmentation of the fibrinous element as is found in severe phlegmasiæ of the digestive tube. The proportion of fibrin was 3.3; of globules, 118; and of solid matter of the serum, 88.

The German and French physicians have paid considerable attention to the eruption of isolated, granular pimples chiefly met with in the two lower thirds of the ileum, but seen, also, in different parts of the duodenum, jejunum and colon, and, at times, occupying the whole extent of the mucous membrane of the intestinal canal. The size of these pimples varied from that of a grain of millet to that of a grain of hemp; and, at times, they were solid and papular; but, at others contained a serous or milky fluid. This eruption is said by MM. Serres and A. Nonat, to exist in the vast majority of cases; and, accordingly, the disease has received the name *psorenteria* from these gentlemen. When death had occurred in eight or ten hours, the granulations were scarcely perceptible, and at times could not be detected. When the disease continued from twenty-four to twenty-eight hours, the eruption had attained its full developement. If life were prolonged beyond two days, the eruption gradually diminished; and, by the sixth or eighth day, it was usually completely effaced. The lungs generally did not fill more than half the cavity of the chest; were perfectly healthy in appearance, and contained but little blood,—their capillaries being almost empty. Reddish granulations were several times found on the mucous membrane of the trachea.

On the external surface of the heart, brown spots were often observed, owing to infiltration of blood in the subserous cellular tissue. The left cavities were almost entirely empty, whilst those of the right side were gorged with dark, thick, and viscid blood, resembling currant-jelly too much boiled, or thickened elderberry juice. The parietes of the heart were noticed to be less firm than usual. In the aorta, there was more or less blood; sometimes extremely little; whilst the pulmonary artery and the venæ cavæ were gorged. The arteries of the limbs were commonly empty, and had here and there coagula of blood, and the whole of the venous system contained a vast quantity of thick blood, of a syrupy consistence, similar to that which it contained during life, the characters of which have been described before.

It may be added, that under the microscope, the blood globules appeared unequal and lacerated, and had lost their regular shape. The spleen was sometimes much less than common; but at others, greatly enlarged, and distended with blood. The other organs exhibited nothing of importance.

It will be obvious, from this detail of necroscopic appearances, that they throw but little light on the nature of the disease—great accumulation of blood in the veins, and the appearances met with in the lining membrane of the small intestines, being the most constant pathological conditions.

Various speculations have been entered into as to the nature of cholera. The majority, perhaps, have placed it in the organic nervous system; and it was affirmed by MM. Delpech and Coste, that the semilunar ganglions were observed to be red, injected, and softened; but subsequent observation did not confirm this. Some have regarded it to be a diseased condition of the blood itself; others, a miasmatic disease; others, a pernicious algid fever; others, a gastro-enteritis; and others, again—as we have seen—have considered it an eruptive disease of the mucous membrane of the intestines—an endo-enteritis of a peculiar character. It would certainly seem, that, probably through the nerves distributed to the intestinal blood-vessels, an excited state of the vessels of the mucous membrane is induced, owing to which the watery portions of the blood are exhaled, until ultimately it becomes too thick to circulate in the intermediate or capillary vessels; hence, the whole circulatory system has its functions impaired, and ultimately annihilated. The collapse, consequently, would seem to be owing mainly to the changes effected on the fluid of the circulation by a local irritation in a part of the system, where nutritive absorption is largely effected in health, but wholly suspended in disease,—some of the chief constituents of the blood being at the same time copiously exhaled from the vessels. Such is the case, at least, with the great mass of cholera patients; but, occasionally, the deadly impression appears to affect the nervous system so deeply and suddenly, that the functions cease almost at once, and the patient passes into a state of collapse without discharges either from the stomach or bowels.

It is pretty clear, that, in every case of cholera, the function of innervation must first be morbidly impressed; but, according to the extent of such impression, the capillaries of the intestine may either be capable of inordinate secretory irritation, in the manner suggested above, or their functions may be rapidly and totally annihilated.

Notwithstanding the similarity, in many respects, between cholera morbus and epidemic cholera, in these climes, it is evident, that they are essentially different; and it is probable, that prior to the period we have mentioned,—that is, before the first quarter of the present century,—spasmodic or epidemic cholera was totally unknown in Europe. They, who consider epidemic cholera to be a *psorenteria*, make a wide distinction between the two;—sporadic cholera morbus being, according to them, a greater or less degree of irritation of the stomach and intestines, and epidemic cholera approximating the eruptive dis-

eases, and especially dothinerterea. It has been a common remark, however, that since the recent epidemics of cholera, many of the sporadic cases of cholera morbus have received the impress of certain of the characteristics of the former.

The epidemic of Naples was complicated by a verminous constitution of the most singular kind that has ever been recorded. This verminous epidemic was not, however, confined to those who died of cholera, or who were affected with symptoms of it, but occurred in all the inhabitants of the country; and it is asserted, that the most constant morbid appearances observed in cholera, such as injection of the digestive mucous membrane, developement of the mucous follicles, the presence of an unusual kind of mucus, and of tricocephalous worms, with change in the character of the blood, were equally met with in those who died, during the epidemic, of other diseases than cholera.

Statistics.—From some estimates made in England by Sir David Barry, it would appear, that 38·5 per cent. of the cholera patients died. In 1832, probably 5000 perished in London, and in Great Britain somewhat more than 20,000. In Paris, during the epidemic of 1832, more than 18,000 fatal cases are said to have occurred. In the Russian provinces, the mortality was 58·6 per cent. In Naples, it was estimated at 6 to 10. In Palermo, it was dreadful. Of a population of 150,000, about 30,000 of whom, it was supposed, left the town at the breaking out of the complaint, 25,000 died, or about a fifth part of those who remained. In some of the towns of this country, the mortality was taken as accurately as was practicable. It is thus stated by Professor Jackson, of Philadelphia.

| Places. | Population. | Cases. | Deaths. | Ratio of cases to population. | Ratio of deaths to cases. | Ratio of deaths to population. |
|---------------|-------------|--------|---------|-------------------------------|---------------------------|--------------------------------|
| Quebec, | 32,000 | 5783 | 3292 | 1 in 5·4 | 1 in 2·5 | 1 in 10·5 |
| Montreal, | 28,000 | 4385 | 1853 | 1 in 6·5 | 1 in 2·5 | 1 in 15·4 |
| New York, | 240,000 | 5547 | 2782 | 1 in 25·3 | 1 in 2 | 1 in 15·5 |
| Philadelphia, | 160,000 | 2314 | 935 | 1 in 70 | 1 in 2·5 | 1 in 173·2 |

From the epidemic at Paris, attempts have been made to calculate the probability of death and recovery in Asiatic cholera. From these it would appear, that the daily rate of mortality, in the first 12 hours, was 16 per cent.; in the next 12 hours, (12–24,) 37 per cent.; in the 2d day, 11 per cent.; in the 3d day, 8 per cent. The mortality of cases of cholera, in Paris, was 49 per cent. The force of mortality attained its maximum in cholera by the 21st hour, (18–24 hours;) the maximum intensity of smallpox being attained in days 10–15; of phthisis, in 6–9 months. The danger of cholera decreases as the time advances: the longer a cholera patient lives, the more likely is he to continue to live. Half the deaths happen in 24 hours.

The following table by Mr. W. Farr shows the probability of recovery from the severer attacks of cholera at the end of 12 hours, and of 1, 2, and 3 days.

| Cases. | To recover. | To die. | Probability of recovery. |
|-----------------|-------------|---------|--------------------------|
| 0 hours, 10,000 | 5093 | 4907 | .509 nearly 1 to 1 |
| 12 9185 | 5093 | 4088 | .555 — 1.3 to 1 |
| 1 day, 7616 | 5093 | 2523 | .669 — 2 to 1 |
| 2 6793 | 5093 | 1700 | .750 — 3 to 1 |
| 3 6991 | 5093 | 1198 | .809 — 4 to 1 |

Treatment.—The facts, mentioned in a preceding paragraph, show the importance of having recourse to early treatment. This has varied greatly, according to the difference of pathological views, and in many cases it has been altogether tentative. The author's observation of the epidemic of 1834,—for, of that of 1832 he had no experience,—led him to prefer one, suggested by the view, that the disease essentially consists in an inflammatory, or phlegmonoid condition, of the mucous membrane of the intestines. The treatment may be divided into,—*first*, that which is proper in the first stage of the disease; *secondly*, that which is demanded in the stage of collapse; and *thirdly*, in the period of reaction.

1. On the first appearance of the symptoms of cholera, it is important to send the individual to bed, and to keep up a warm, perspirable state of the surface, by means of ordinary diluent drinks, such as tea or barley water. These simple means, with hot cataplasms to the epigastric region, were sufficient, in many cases, to arrest the disease; but if the evacuations were numerous and liquid, and, especially, if there was heat with pain of the abdomen, it was advisable, in plethoric persons, to bleed from the arm; but generally the joint depletive and revellent action of cups or of leeches was preferable,—the quantity of blood to be taken being judged of by the circumstances of the case.

In the early stage, especially if there be any evidence of the stomach being loaded, emetics have been advised, as chamomile tea, ipecacuanha, (gr. xv.), but more especially mustard.^a If, too, the evacuations contain solid feculent matter, or are offensive, a gentle dose of castor oil, (fʒi.—fʒiij.) or a dose of rhubarb and magnesia^b may be given.

^a R.—Sodii chlorid., cochlear. larg.

Solve in aquæ ferventis, fʒvj.

Adde pulv. semin. sinap., cochlear. larg.

To be taken at once.

^b R.—Rhei. pulv. gr. x.

Magnes. gr. xv.

Ol. anisi, gtt. vj.—M.

A main part of the benefit of emetics results, probably, from their revulsive operation; and it has been suggested, whether advantage might not be derived, in these unfortunate cases, from remedies that would even inflame the lining membrane of the stomach; but such a harsh system of revulsion ought scarcely to be thought of. Some, indeed, object strongly to the use of any thing that can disorder the stomach and bowels, and Dr. Mackintosh affirms, that he has known many individuals destroyed, in the first stage, apparently by taking a laxative—even a small quantity of calcined magnesia, or an emetic. Saline medicines he conceives to be especially prejudicial. There can be no doubt, indeed, that all such local stimulants should be used with the greatest caution.

Should the disease not readily yield to this system of management, attempts must be made to excite a new action, as soon as possible, in the system, by means of mercurials. With this view, calomel and

opium^a may be given repeatedly, until there is a decided alteration for the better, as indicated by a diminution of the vomiting and diarrhœa.

^a R.—Hydrarg. chlorid. mit. gr. ij.
Opii. pulv. gr. ʒ.—M. et f. pil. omni semihorâ sumenda.

It is not, however, easy to affect the system by mercury in this, or, indeed, in any other manner; and when the mercurial action has been excited, it has, perhaps, been owing to the concentration of morbid action having been reduced. The absorbent function is so completely annihilated, or suspended, in the majority of cases, that the mercurials are seen to pass through the bowels unchanged; and they would seem to produce no effect upon the system, until some degree of recuperative energy has been awakened. The same thing is witnessed in long protracted fevers, in which we may, in vain, attempt to affect the system by mercurials. It is a fact, however, that when the new action could be induced, the patients were generally safe. The quantity of calomel that has been exhibited in this disease, exceeds belief. It is a favourite remedy with the practitioners in India, whose example led to its employment elsewhere. In the western part of this continent, fifty or one hundred grains were occasionally given every hour, until as much as a quarter of a pound was taken; and one practitioner, Prof. Cook, of Louisville, administered it in two drachm doses in mild cases, and in ounce doses in the more severe, repeating them several times. It is affirmed, indeed, by Professor Eberle, that as much as a *pound and a half* of calomel has been given in a case of cholera! To aid the operation of the internal mercurial, frictions with the unguentum hydragryri (3i.), were often made, and the ointment was applied to leech-bites, or to wounds made by the scarificator or any other agent.

Opium—like every other remedy, indeed, used in cholera—has met with mixed approbation and reproach. Still, there is no article, perhaps, which has been more employed, alone or in combination, not only in the first stage, but in that of collapse; (*Tinct. opii*, gtt. iij.—v, given every half hour, until signs of narcosis supervene.) The acetate of morphia has been preferred to all other remedies. Of ninety patients, treated by M. Gérard, of Avignon, with it, eighty-one were cured. He administered it at first in the dose of one-fourth of a grain every half hour, until the serious symptoms were removed, and omitted it as soon as the spasms, and the diarrhœa and vomiting had ceased, or as soon as reaction ensued. Opium may likewise be given in enemata; (*Tinct. opii*, gtt. xl. omni horâ.) It has been thought, by M. Louis, to be highly serviceable when administered in this manner.

The intense thirst of cholera must be satisfied by a liberal allowance of cold water; nor need the quantity be limited. There can be no doubt that ice and ice drinks are most grateful. Ice frequently allays the irritability of the stomach, which is, indeed, a symptom demanding attention from the distress it occasions. Various agents have been recommended for this purpose; soda water, put up in ounce bottles, kept in ice, and administered every now and then; and sulphuric ether alone, (gtt. x—xx, omni semihorâ,) or united with opium—

R.—Æther. sulphur. f ʒij.

Tinct. opii, f ʒj.—M.

Dose, eight to ten drops every half hour.

To arrest the diarrhœa, in all stages of the disease, the acetate of lead was much employed in this country, and was brought forward, by Dr. Harlan, with the loftiest pretensions. Since, it has been extolled by Dr. Graves, who used it in much smaller doses than the American practitioners:—

R.—Plumbi acet. ʒj.

Opil, gr. j.—Fiat massa, in pilulas xij. dividenda.

He found, that the premonitory diarrhœa was almost invariably stopped by taking one of the pills; at first, every hour; and, as the evacuations became less frequent, every third, or sixth hour, according to circumstances. When the vomiting, spasms, and state of collapse had begun, a pill was given every quarter of an hour. In the author's own practice, as well as in that of others, this agent was by no means attended with such salutary effects as Dr. Graves has described.

Strychnia was employed endermically with advantage, two or three grains being applied to a blistered surface on the nape of the neck. It has also been given internally by Dr. Ryan, to allay vomiting.^a It is affirmed, that a twelfth of a grain of strychnia, given in pill, and repeated a few times,^b has been repeatedly known to check a profuse diarrhœa, with rice-water evacuations, and even when the extremities were blue, in cholera.

^a R.—Strychniæ, gr. ʒ—ss.

Aquæ, f ʒij.—M.

Dose, a spoonful every hour.

^b R.—Strychniæ, gr. j.

Micæ panis, q. s. ut fiant pil. xij.

When patients recover from this stage, a slight degree of reaction is apt to take place, which requires attention; and relapses must be avoided by attending to the diet, and the state of the stomach and bowels.

2. Even in the period of collapse, it may be advisable to apply cups or leeches to the epigastrium, and to have recourse to the mercurial and other treatment commenced in the first stage. In the algid stage, it is the belief of many, that no remedy will arrest the progress of the disease, and that all the physician can do is to diminish the intensity of the phenomena. Still, we repeatedly see cases recover from this state; and, therefore, the efforts should not be suffered to relax.

Many practitioners have restricted themselves, in this stage, to the employment of external stimulants, with the view of restoring the circulation, almost arrested in the vessels of the surface. Friction—with the hand frequently dipped in flour, to avoid abrasion of the surface, or with any of the ordinary stimulating liniments,^a is certainly preferable to the moxa, actual cantery, boiling water, &c. which have been recommended; and we have seen an occasional case, in which the patient has recovered in a marvellous manner, under this treatment, as under every other—expectant, or energetic. As the desire may be to administer mercurials at the same time with stimulants to the external surface, they may be associated.^b The nux vomica has likewise been used as an embrocation.^c

^a R.—Lin. camphor. f 3iss.

Tinct. cantharid. f 3ss.—M.

^b R.—Ung. hydrarg. 3j.

Capsici pulv. 3j.—M

^c R.—Tinct. nucis vomic. f 3j.

Liq. ammon. 3ij.—M.

Perhaps external warm this capable of accomplishing every thing that rubefacients can do, and with this view, in the cholera hospitals, tin cases were made, into which hot water or steam was passed.

To relieve the urgent cramps, friction was generally used, and the tourniquet. Relief has likewise been derived from the application of a tight bandage round the extremities.

The extensive loss of serum, and consequently of the watery and saline portions of the blood, led to the administration of solutions of common salt and of the carbonate of soda, internally. Several practitioners of British India, recommend them, especially in enemata, administered warm.

R.—Sodii chlorid. 3j.

Sodæ seu potassæ carbonat. 3j.

Aquæ, (120° Fahrenheit.) Oj.—M.

To be repeated every half hour, hour, or two hours, until reaction is excited, and the pulse rises to a satisfactory degree of health.

Owing, however, to the suspension of absorption from the stomach and bowels, these substances rarely or never got into the blood-vessels, and were, consequently, of no advantage. It was then proposed to inject them into the blood-vessels,^a at a temperature above that of the blood, and the effect upon many of the functions was great and immediate, probably by the excitation; for the conversion of venous into arterial blood, demands the action of the nervous system.

^a R.—Sodii chlorid. 3ss.

Sodæ bicarbon. ʒiv.

Aquæ, Ox.—M.

Still, although these injections diluted the blood, and conveyed saline matters into it, they could not remove the important mischief—the pathological cause, that gave occasion to the profuse separation of the watery and saline portions from it. The same remark applies to the dilute solutions of albumen, that were injected; and, accordingly, they were but little employed, except by those who were led away by superficial observations and deductions.

Of the guaco, and other *cholera specifics*, we say no more than that evidence is wanting of their being entitled to any such appellation.

3. Should either the first or the second stage yield, the practitioner must be on the watch for symptoms of reaction. Stimulants, if they have been employed, must be cautiously discontinued. Cupping and leeching may be demanded, if the vomiting of bilious matter be great, and there is reason to believe in the existence of hyperæmia or of inflammation of the stomach or duodenum. They may be equally needed, if signs of cerebral disturbance should supervene. Encephalitis, or cerebral hyperæmia must, indeed, be treated on the principles laid down elsewhere, bearing in mind the cause that induced them. Revellents—as blisters and sinapisms—will be found of great service in this stage. The practitioner will, indeed, have to meet every case as it arises.

Prophylactic treatment.—During the existence of cholera, many preventives were brought forward: one, especially, the tincture of camphor, (gtt. v.—viij., ter quaterve indies,) was extensively used. None of them had, probably, more than this effect—that they removed, in part, the depression under which the person laboured, by fixing his confidence in the reputed prophylactic; but the evil doubtless resulted occasionally, that he became heedless of other more important prophylactics. These were,—for the person to avoid loading his stomach with those substances, which he knew to disagree with him; to take a due amount of exercise, and to keep the intestinal canal clear. An important matter, also, was not to make too sudden a change in accustomed habits, even if these were of an objectionable character.

To prevent the spread of cholera, under the idea that it was contagious, quarantine regulations and *cordons sanitaires* were established in many places. It is *doubtful*, whether they were of any service, whilst they were *unquestionably* most vexatious. Municipal regulations were also made as to the articles of diet that might be allowed, with safety, during the epidemic constitution; and some of these were of the most whimsical nature—dependent, probably, at times, on individual likes or dislikes, caprices or prejudices. Ripe fruits, and the succulent vegetable, were generally proscribed; yet the facts, that, in eleemosynary institutions, where no such articles were permitted, cholera was most fatal;—that the disease prevailed at Moscow, St. Petersburg, and elsewhere, at seasons when ripe fruits and vegetables could not be procured; and that, in the case of San Martin, (see the author's *Elements of Hygiène*, p. 302,) certain ripe fruits were found most digestible; and, again, the no less interesting fact, that where ripe fruits were freely allowed—as in London, at a later period of the epidemic—no inconvenience was found to result from them, may create great doubts, whether the proscription were founded on accurate observation.

Such are the most important circumstances connected with this extraordinary and formidable disease. Fortunately, it has disappeared from amongst us, and, like the epidemics of the middle ages,—the “black death,” for example,—it may hereafter be known in this country only as a matter of medical history. Like all epidemic and contagious diseases, epidemic cholera affords a difficult problem for solution; and we are, perhaps, justified in adopting the following summary of a distinguished pathologist,—Andral. “*Anatomical characters*, insufficient; *Causes*, mysterious; *Nature*, hypothetical; *Symptoms*, characteristic; *Diagnosis*, easy; *Treatment*, doubtful.”

c. *Cholera Infantum*.

SYNON. Cholera of Children, Choleric Fever of Infants.

This disease is one of the most fatal to which children are liable in the large cities of this country. It has, indeed, been considered peculiar to this climate. It strikingly, however, resembles the affection vulgarly called *watery gripes* in England, and the author can say,

from experience, that it is not an uncommon affection in London. It does not appear to be known in Paris.

Symptoms.—In many cases it begins with diarrhœa, but, in others, both vomiting and purging come on at first, without any premonitions; or the child may have suffered for a time under gastric or intestinal derangement. The pulse is usually frequent, and somewhat tense, and there are almost always manifest signs of febrile irritation. The discharges are at first extremely fluid, and often frothy; sometimes tinging the cloths green, and, at others, leaving mucus upon them. In very severe cases, the system becomes rapidly prostrated, and the child may die in the course of 24 hours; but, more commonly, the disease continues for a few days before either the tendency to convalescence or to death is manifest. As in the cholera morbus of the adult, there is often severe intestinal pain, which may be increased by pressure, and, at times, the muscles of the abdomen and extremities contract spasmodically. The thirst is excessive, and the appetite gone, or singularly capricious. If the disease be about to terminate unfavourably, emaciation makes frightful progress, the febrile irritation is constant and manifest, the child becomes restless and comatose, and gradually sinks—the fatal termination being at times preceded by convulsions.

Frequently, the evacuations exhibit the existence of great irritability of the canal, the food passing rapidly through, without undergoing any change. At other times, they have a putrid or cadaverous odour. In the more protracted cases, these appearances are more frequently met with, along with aphthæ of the mouth, meteorism of the abdomen, and other signs of follicular inflammation. At times, before death, a vesicular eruption appears extensively on the chest.

The indication of recovery is the appearance of feculent matter, and of the ordinary secretions in the evacuations.

Causes.—As cholera infantum is a great scourge of our cities during the summer months, not chiefly during the autumnal, as is supposed by many of the European writers, it is obvious, that excessive heat is concerned in its generation; yet, that this is not alone sufficient to induce it is shown by the fact, that in country situations where the heat may be equally great it is comparatively rare. In the nine years, during which the author lived in Virginia, he saw but very few cases; and Dr. Eberle states, that during a practice of twelve years in the country, he met with but two or three. It would seem to be necessary, that there should be a union of atmospheric heat and atmospheric vitiation in order that the disease should exist fatally and extensively; and this combination is met with in the confined and deteriorated air of certain parts of our towns. In the cleanly and well ventilated districts, and in large and well aired apartments—as has been properly remarked by Dr. Emerson, of Philadelphia—deaths from it are very rare. At a time in which the bills of mortality indicate the greatest amount of deaths from the summer complaint, those physicians, who practise extensively in the better portions of the cities, may be but little occupied. The following table will show how largely the deaths

amongst children, during the summer months, predominate in Philadelphia.

| Deaths. | Adults. | Children. |
|---|---------|-----------|
| March, April, May, | 7,229 | 5,264 |
| June, July, August, | 7,606 | 9,462 |
| September, October, November, | 7,545 | 6,369 |
| December, January, February, | 6,909 | 5,153 |

(See the author's *Elements of Hygiène*, p. 141, 167, Philad. 1835.)

Age, too, unquestionably offers a predisposition. The common notion in this country is, that children are more liable to the disease in the second summer than the first, but this does not appear to be confirmed by statistical observations. From the official reports of deaths in Philadelphia and New York, it would appear, that in the former city, of 229 deaths assigned to *summer complaint*, 142 occurred in children under one year of age; 75 in those from one to two years; and 12 in those from two to five years. It rarely occurs in infants under three months. As the disease is evidently connected with the season at which malarious influences are present, although to a decidedly less degree than in the months when cholera infantum has nearly ceased, it has been supposed by Dr. Rush, and by Dr. Condie, that, like the bilious remittent to which it has been assimilated, it may be caused by malaria. There can be no doubt, that vitiated air has a marked agency in its causation, as has been before observed, but it is not probable that it is produced by the malaria that gives rise to fevers. It certainly is uncommon in districts in which intermittent and remittent fevers are annually and extensively endemic.

Under the predisposition engendered by great atmospheric heat and vitiation, it is clear, that improper aliment may be an exciting cause; hence it is, that children, brought up on spoonmeat, suffer in greater numbers than those that are nourished at the breast; and, in like manner, dentition may contribute to its production.

Pathological characters.—The mucous membrane of the bowels generally exhibits evidences of inflammation, and especially the follicles, which have indeed been thought to be the primary seat of the disease. When it has continued for some time, more or less ulceration is met with, and occasionally considerable portions of the intestinal canal are so much contracted as scarcely to admit a small-sized quill. The *Maladie de Cruveilhier*, previously referred to, has been considered identical with cholera infantum, but although analogous affections, they are not the same. The liver is almost always enlarged. This also has been regarded as the primary affection, but it is more probably secondary. We know, that we can enlarge the livers of animals by exposing them artificially to an elevated temperature, but the probability is that the effect is partly induced by a morbid condition primarily seated in the mucous membrane of the intestines. (See the author's *Elements of Hygiène*, p. 50, Philada. 1835.) The encephalon, in nearly all cases, has been found in a state of hyperæmia; and in long protracted cases, serous effusions have been met with in the ventricles, and at the surface of that viscus.

Treatment.—The general principles of treatment do not differ from those laid down under Enteritis of the mucous coat, and Diarrhœa.

The cases that occur in the airy parts of a town are usually managed with facility, and carried to a happy issue; whilst those that occur in the narrow alleys of the worst parts may resist every effort of the practitioner. The author has generally commenced the treatment by a small dose of calomel (gr. j.—iv.), or by rhubarb and magnesia,^a and applied a flannel bandage to the abdomen; and, in very mild cases, by sending the child into the open air, in the manner to be described presently, the disease often yields to this simple treatment. If, however, the febrile irritation be considerable, it will be advisable to apply a few leeches to the epigastrium, or, as recommended by Dr. Eberle, by way of revulsion, behind the ears; covering the abdomen, after the leech-bites have ceased to bleed, with an emollient poultice. In other cases, it may be advisable to apply a stimulating cataplasm;^b and, in protracted cases, a blister, which ought not to be kept on longer than four hours at the farthest, as great local mischief is occasionally produced when blisters are kept on longer.

^a R.—Rhei, pulv. gr. iij.
Magnes. gr. v.—M.

^b R.—Farin. tritic. p. iv.
Sem. sinapis. pulv. p. i.
Aquæ, q. s.—M.

If the disease does not yield readily, small doses of calomel may be given frequently, (*Hydrarg. chlorid. mit.* gr. $\frac{1}{6}$.—j. omni semi-horâ, vel omni horâ,) to produce a new action, if the child be under two years of age, which is generally the case. In older children—as has been remarked elsewhere—great care must be taken not to affect the mouth by the remedy. Should signs of acidity exist, magnesia in the early period, and prepared chalk subsequently, will be indicated. The chalk may be combined either with calomel,^a or be given in the form of the *hydrargyrum cum cretâ* of the Pharmacopœias, (two grains every hour or half hour.)

^a R.—Hydrarg. chlorid. mit. gr. $\frac{1}{6}$.—j.
Cretæ præpar. gr. iij.—M.

Where irritability of the stomach exists, not relieved by revellents applied to the stomach, injections of salt and water may be used in the way of revulsion; or gentle stimulants may be given internally, as a drop or two of the oil of aniseed in sugared water, or five or six drops of the sulphuric ether in the same vehicle.

It need scarcely be said, that, if there be irritation induced by teething, the gums should be freely divided; and, even should the tooth not be set at liberty, the revulsion, thus induced, proves salutary. The warm bath is beneficial at all periods of the disease. In the more protracted cases, but not earlier, as a general rule, it may become necessary to administer astringents. The acetate of lead^a has been highly extolled by many practitioners. The oil of turpentine has been advised when the little sufferer is harassed with flatulent distention of the stomach and bowels (gtt. iv.—viij.), and it has been of service. With the same view, a few drops of any of the essential oils may be administered.

^a R.—Plumbi acet.
Pulv. ipecac. comp. aa gr. ʒ.
— glycyrrhiz, gr. iij.—M. One, every two or three hours.

Great caution, however, must be used in the employment of excipients and astringents. During the convalescence, any of the gentle tonics—as colomba^a—or of the milder astringents, may be used; and there may be cases in which it is necessary to administer injections of the infusion of galls, or of starch and laudanum.

^a R.—Infus. colomb. f3xj.

Syrup. aurant. f3j.—M.

Dose, a teaspoonful, four times a day.

Throughout the disease, care must be taken in regard to the diet, which may consist of boiled milk, with any of the farinaceous preparations—as sago or arrow-root. The appetite is apt to be very capricious, a great desire being shown for salted meat, salt fish, butter, &c.; and it has been esteemed proper to gratify it, occasionally, to a certain extent. There can be no doubt, that in many cases no evil has resulted from such indulgence; but it is manifest, that it should be permitted under the closest circumspection.

To allay the great thirst that prevails, iced water may be allowed, or the child may be permitted to suck ice contained in a piece of gauze.

One of the most important curative agencies is change of air. If the child can bear removal into the country, and circumstances permit, this is the best course that can be pursued. But where this is impracticable, riding, or carrying the patient about in the open air is of essential service. In this city, (Philadelphia,) it is common to take children, affected with the disease, across the Delaware to Camden, daily, or up and down the Delaware in the steamboats, and the effect is often surprising.

As prophylactics, the most important are:—removal during the heat of summer to the country; or, if compelled to remain in town, sleeping on a mattress, with the doors and windows of the chamber open; the daily use of the tepid or cold bath; exercise in the open air, and, if the child be weaned, well regulated diet, especially abstinence from unripe fruits, and the succulent vegetable. The constant use of a flannel bandage, even through the heat of summer, is not one of the least important articles of prevention.

Such are the general principles of management, and the chief methods of carrying them into effect. The plan advisable in each particular case must be left—as in every other disease—to the discretion of the practitioner.

V. CONSTIPATION.

SYNON. Constipatio seu Obstipatio Alvi, Alvus Tarda, A. Dura, A. Adstricta, Tarda Alvi Dejectio, Obstipatio Alvina, Stypsis, Coprostasis, Obstructio Alvi, O. Ductus Alimentarii, O. Intestinalis, Intestinorum Torpor, Costiveness, Fæcal Retention, Alvine Obstruction; *Fr.* Echauffement, Ventre Resserré; *Ger.* Leibesverstopfung, Hartleibigkeit.

Constipation frequently occurs as a symptom of various diseases—as of enteritis, of mechanical obstruction of the bowels from hernia, internal strangulation, invagination, foreign bodies, cancer of the intestines, lesions of the spinal marrow, colic, &c.—but this is not the form to be considered here.

In the same manner as diarrhœa may arise in consequence of secretory irritation in the mucous membrane of the intestines—such irritation being communicated to the muscular coat—so may constipation be owing to those secretions not being formed in due quantity, and to concomitant torpor of the muscular coat. It is this constipation, which has now to be investigated; the character, and mode of treating that which arises from positive obstruction, being described under the next head.

Diagnosis.—We may define constipation to consist in the *fæces* being retained longer in the intestines than is customary with the individual; or to their being inspissated so as to render their evacuation tedious and imperfect. It is necessary to include in the definition, “longer than is customary with the individual,” inasmuch as there are many persons who, in health, evacuate the canal much less frequently than others. Perhaps, as a general rule, the bowels are evacuated, in health, once a day; but some are in the perfect exercise of their functions, who do not have an evacuation oftener than once a week, or even than once a fortnight; and there are cases on record where the interval has been longer; whilst, on the other hand, there are persons who, in health, never have fewer than two or more evacuations in the twenty-four hours.

When the state of constipation passes beyond certain limits, it generally gives rise to more or less uneasiness, gastric and intestinal disorder, sympathetic headache, and often to febrile irritation.

Causes.—Torpor of the intestinal functions may be induced in various ways—as by change of diet or of habits. Long protracted study has been conceived to be a cause—the exercise of the encephalic portion of the nervous system detracting from the energy of the abdominal portion; but the true cause in such cases, probably is, the interference with accustomed regimen. Defect of the biliary secretion has likewise been looked upon as a cause, but this also is doubtful. The agency of the bile as a stimulant to the mucous membrane of the canal, is more than questionable; but if torpor of the intestines exists, the same condition is apt to occur in the liver, and diminished secretion of bile is a consequence of such torpor, as an increased secretion, we have seen, is produced by excitement in the tube. This torpor, or deficient impressibility of the intestinal canal, is well seen in old people, in whom the *fæces* collect at times in the large intestines in such quantity as to create a true obstruction, removable only by mechanical agency.

Treatment.—This may be divided into the employment of such remedies as are needed for removing the constipation for the time being, and such as are calculated to develope permanently the impressibility of the canal. Cathartics, in properly regulated doses, suggest themselves for the fulfilment of both indications. It is obvious that, with the first view, the rapid cathartics and forms of administration must be chosen, as castor oil, (f3ss.—3j.) Epsom salts and magnesia,^a infusion of senna and salts,^b or pills of aloes or colocynth,^c or any of the ordinary cathartics; and if they should not be suffi-

ciently active, croton oil,^d with the addition of domestic or turpentine enemata, may be thrown up into the colon.

^a R.—Magnes. sulph. ʒss.

carb. ʒij.

Tinct. olei menth. gtt. x.—M.

^c R.—Pulv. aloes. seu

Ext. colocynth comp. ʒss.

Hydrarg. chlorid. mit. gr. iij.—M. et

fiant pil. iij.—pro dosi.

^b R.—Infus. sennæ. f ʒxj.

Tinct. sennæ. f ʒj.

Magnes. sulphat. ʒiij.—M.

^d R.—Ol. tigllii, gtt. iv.

Micæ panis, q. s. ut fiant pilulæ viij.

Dose, one, two, or more.

In the constipation of children the same course has to be adopted as with the adult. In such cases the author has frequently derived great advantage from the employment of aloes, which may be administered with impunity to children even in very large doses. It occasionally proves successful after other agents have failed, is rarely rejected by the stomach, acts mildly, and, what is perhaps strange, is rarely objected to by young infants, when given in syrup.

R.—Aloes pulver. ʒj.

Syrupi, f ʒj.—M.

Dose, a teaspoonful from time to time until the bowels are evacuated.

The author has elsewhere detailed cases occurring in his own practice, as well as in that of others, in which two drachms of powdered aloes have been given in this form, in two successive days, without any griping or unpleasant symptom, and with full relief to the constipation. (*Commentaries on the Diseases of the Stomach and Bowels of Children*, p. 92. Lond. 1824; and *General Therapeutics and Mat. Med.* vol. i. p. 170. Philadelphia, 1843.)

In this way, the immediate mischief may be obviated; but although a brisk cathartic removes the contents of the canal, it does not strike at the root of the disease. On the contrary, the constant employment of cathartics in this manner perpetuates the evil; diminished action of the exhalents of the mucous coat and of the muscular coat succeeding to the exaltation of the vital manifestations, produced in these tissues by the operation of the cathartics; hence, if cathartics be repeatedly had recourse to, in a habit disposed to constipation, the person, in time, requires so imperiously the stimulation they excite, that he is unable to have an evacuation without them. This result is, however, more likely to supervene after the action of certain agents than of others. Castor oil and croton oil are more exempt from it than other cathartics, and on the other hand, rhubarb is generally thought to be more obnoxious to the remark than any of the class.

In the torpor of the intestines in which there is a disposition to form scybala, and to retain them in the cavity of the large intestines, the principal remedy, Dr. M. Hall considers to be—a daily aloetic pill and a warm water enema. This plan will certainly succeed generally. The best mode, indeed, of obviating the tendency to constipation, is to avoid—as far as possible—the exhibition of those cathartics that powerfully excite the organs directly and indirectly concerned in defecation, and to trust altogether to the employment of laxatives and an appropriate regimen. The best laxatives, for this purpose, are those that affect the whole intestinal canal, and which possess the

property of developing its impressibility. Such are the saline cathartics.^a By persevering in the use of these for some weeks, the author has succeeded in completely removing the tendency to constipation in some very obstinate cases.

^a R.—Magnes. sulphat. 3j.
Potass. bitartrat. 3ij.
Aquæ bullientis, Oij.

Dose, a wine-glassful night and morning.

In like manner, the combination of a laxative and a tonic is often very beneficial,^a but its use must likewise be persevered in for some time, to break in upon the pathological condition into which time has entered as an element.

^d R.—Carbon. ligni, in pulv. ℥ss.
Magnes. gr. v.—fiat pulvis bis die sumend.

To remove the accumulation of hardened fæces, that owe their origin to the great deficiency of impressibility of the canal in old individuals, injections of warm soap and water may be repeatedly thrown into the rectum; but if they cannot be dislodged in this way, it may be necessary to introduce the finger, or the handle of a spoon, or, what is better, the common marrow spoon.

Recently, ox gall has been strongly advised by Dr. Charles Clay, of Manchester, England, as a direct solvent to accumulated hardened fæces, the consequence of deficiency of quality or quantity of bile in the alimentary canal. The recent gall of the ox is slowly evaporated to the consistence of an extract, and afterwards made into pills, as in the formula given below; but if sufficiently firm, he prefers the simple extract made into pills without any addition. The gall-bladder of a moderate sized ox will afford as much extract as will make one hundred four-grain pills.

R.—Fel. bovis inspissat. 3ij.
Ol. carui, ℥x.
Magnes. carbonat. q. s. ut fiat massa in pilulas xxxvi. dividenda.

Dose, two, three or four times a day.

Dr. Mettauer, of Virginia, employs the inspissated bile of the swine.

A most important assistance to the remedies above mentioned is the proper adaptation of diet and exercise. By simply eating bran bread, or bread made of unbolted flour, or corn bread, ripe fruit, or preserves, figs, stewed prunes, or a free use of saccharine matter, as of molasses, with articles of diet that will admit of the union, the bowels may sometimes be kept entirely soluble in constipated habits, without the use of any cathartic. Regular exercise should also be taken, either on foot, on horseback, or in a carriage, but the first is by far the most advisable. Methodical compression by means of the Russian belt, is often likewise of great service.

Such are the chief agencies for obviating ordinary constipation, in which there is no lesion of the digestive tube, and where the whole disorder appears to consist in an obtunded impressibility of the mucous and muscular coats of the intestines, or rather of the nerves distributed to them.

Torpor of the Colon.

This requires a distinct mention; inasmuch as it is frequently overlooked, and yet is doubtless the source of many anomalous symptoms, which are referred to the gastric and cardiac organs more especially. It is defined by Dr. Copland, as follows:—"General debility, with indigestion; slow or irregular state of the bowels, distension, borborygmi, or stridulous noises in the course of the colon; frequently pain or uneasiness, sometimes with tumours in some part of this viscus."

The torpor appears to be at times owing to defective action of the system generally, and of the colon in particular; but not unfrequently it seems to be dependent upon narrowness of the canal, which occasions a dilatation of the gut above the straitened part, and in which fæces or air may accumulate, and give rise to all the phenomena of ileus; or by pressure interfere with the functions of neighbouring organs. Occasionally, too, hard tumours—painful, when pressure is made over them—are felt along the course of the colon, especially of the ascending portion. When this is the case, vomiting and other signs of ileus are apt to occur, after which, under proper treatment, the symptoms often speedily disappear.

The author has attended several cases in which various evidences of dyspepsia existed, with irregularity in the alvine evacuations; generally, constipation alternating with diarrhœa; great irregularity in the heart's action; giddiness, apparently from the condition of the circulation, and indefinable uneasiness referable to the stomach and bowels;—these symptoms being frequently relieved after food has been received into the stomach, so that the after part of the day may be passed in comparative comfort.

The treatment must of course be regulated by the cause. If the phenomena indicate general or local debility, or both, the preparations of iron, the subcarbonate or the citrate (gr. xv. three times a day,) or the sulphate of zinc, with the employment of methodical compression by the Russian belt, and a diet easy of digestion, will often be attended with the best results.

^a R.—Zinci sulphat. gr. iij.

Ext. gentian. gr. ij.—M. Et fiat pilula.

One of these to be taken four or five times in the 24 hours.

This course must be persevered in for many weeks; and it may be necessary to advise change of air, scenery and society, such as travelling affords. The bowels too must be regulated, less by purgatives than by injections thrown into the colon. Repeated cathartics have not appeared to the author to be advantageous.

When narrowness of the canal exists; and it cannot be readily reached by the bougie, brisk cathartics should be carefully avoided, and every endeavour be made to prevent accumulations from taking place in the bowels.

In almost all cases of torpor of the colon, the author has found decided advantage from a generous diet, restricted, however, in quantity, and from the use of a couple of glasses of wine at dinner.

In the attacks of painful colic that not unfrequently supervene in

such cases, the best course of management is to administer a pill of opium and calomel,* the former of which allays the spasm, whilst the latter exerts a cathartic operation. Violent purgatives have appeared to be positively injurious.

* R.—Opii pulv. gr. iv.
Hydrarg. chlorid. mit. gr. x.
Mucilag. acaciæ. q. s. ut fiant pil. ij.

One to be given for a dose, and the other in a couple of hours, if relief be not obtained.

The cathartic action may be aided by enemata of soap and water thrown into the colon by the rectal tube of O'Beirne, where this can be passed so far. Along with these internal means, the external applications recommended in Enteralgia, (q. v.) may be prescribed.

VI. OBSTRUCTION OF THE INTESTINES.

SYNON. Enteremphraxis, Incarceratio Intestinorum Interna; Fr. Étranglement des Intestins.

Obstruction of the intestinal canal may arise from various causes, which will require a separate consideration. The symptoms, however, are much alike in all—at first, obstinate constipation; and subsequently, more or less abdominal tenderness and meteorism—the combined symptoms of enteritis of the peritoneal coat, and of constipation, twisting pains of the bowels chiefly round the umbilicus, with generally inverted action of the intestines, at times vomiting of stercoreous matter, fæcal odour of the breath, great anxiety, and often rapid sinking. To the aggregate of symptoms just described, the names *Ileus*, *Eileus*, *Colica ileus*, *Passio iliaca*, *Volvulus*, *Chordapsus*, *Miserere mei*; Fr. *Colique de miséricorde*, *C. de Miserere*; Ger. *Miserere*, *Darmgicht*, have been usually appropriated.

The main affections, which may induce obstruction, are the following:

1. *Hernia*.—This is so common a cause of the congeries of symptoms described above, that whenever the practitioner is called to a case of the kind, he should diligently examine, whether there be not evidence of some portion of the intestinal canal being incarcerated and strangulated, either in the shape of inguinal, femoral, or umbilical hernia. Many lives have been sacrificed to mistakes of this kind, and, accordingly, it is well, as has been often recommended, in every case of enteritis, or of disease similar to enteritis, to search diligently for some cause of obstruction, and especially for hernia. Very recently, the author saw a fatal case of strangulated umbilical hernia, which had been mistaken for one of ordinary enteritis.

Even when no external cause of strangulation may be perceptible there may be internal hernia; portions of the intestine may pass through the diaphragm or mesentery; or, owing to inflammation, loops of intestine may have become adherent; and, by the passage of another portion of intestine through the aperture thus made, strangulation may occur. It is impossible to specify all the anomalous cases of the kind that may present themselves; but one or two may be taken. The corpus fimbriatum of the Fallopian tube has been known to contract adhesions with the rectum, after which the mass

of intestines passed between the bond of union and the sacrum, rose on the opposite side towards the pubis, and again fell over into the first space, so as to form a kind of running knot. A similar fact has been noticed in the case of the appendix vermiformis cæci. Very recently, an interesting and fatal case of internal strangulation occurring in the person of a distinguished statesman—the Hon. Hugh S. Legaré—has been published by Professor Bigelow, of Boston. On laying open the cavity of the abdomen, it seemed nearly filled by the sigmoid flexure of the colon, which extended across the abdomen into the right hypochondrium, and was so largely distended, that its external circumference was in one place fifteen inches. The two extremities of the flexure, connected with the colon above, and the rectum below, were felt to be twisted together, about the mesentery as an axis, into a firm cord or neck, about an inch in diameter; and on being carefully untwisted, the whole included portion was found to have made four turns, or two entire revolutions upon itself. The rectum was rather contracted. This very day, (September 21, 1843,) the author has examined a case, which he saw the day before its fatal termination, in consultation with Professor Pancoast, and Dr. Stickney, in which the internal strangulation, that gave rise to obstruction of the bowels of a week's duration, was caused by a fibrous band extending from the left lobe of the liver to the anterior surface of the stomach. Through this the whole of the sigmoid flexure of the colon had passed; the rectum and mesorectum being greatly elongated. The female had been delivered about a week prior to her death; and it is probable, that the band had formed during pregnancy; and that the sigmoid flexure of the colon had passed beneath it at that time. As soon, however, as delivery took place, the incarcerated portion with its contents gravitated towards the pelvis, the constriction becoming greater and greater, and ultimately inducing all the symptoms of ileus.

2. *Diminution of the calibre of the intestines.*—Chronic inflammation of the intestinal parietes may give occasion to adhesions of the intestines; and obstructions may likewise arise from scirrhus, cancerous, and other degenerations, which may be suspected from the presence of the symptoms, that characterize those affections. A case has been lately published by Dr. Holscher, in which ileus was occasioned by hypertrophy of the pancreas. A diminished calibre of the rectum or sigmoid flexure of the colon often gives occasion to torpor of the latter intestine. (See page 155).

3. *Imperforation of the Intestinal Canal.*—(SYNON. *Atresia ani adnata, Anus imperforata, Imperforatio ani*; Fr. *Imperforation de l'an*; Ger. *Natürliche Verwachsung des Afters*.)—This is congenital, and evident on examination.

4. *Intussusception.*—(SYNON. *Convolvulus, Volvulus intestinorum, Chordapsus, Intussusceptio, Invaginatio, Introsusceptio, Indigitatio, Tormentum*; Ger. *Darmeinschiebung, Einschiebung der Gedärme, Innere Zusammenschnüung der Gedärme, Verwicklung der Gedärme*.)

This is caused by one portion of the intestinal canal becoming invaginated in another. Owing to augmented peristaltic or spasmodic

action of the intestines, it can be understood, that an upper portion of the intestines may be forced down into a lower, and that, owing to an action in an opposite direction, a lower portion may be forced into an upper. The former of these lesions is termed the *progressive*—the latter, the *retrograde* form.

Cases of invagination are not uncommonly met with in the dead body; but that these have been accidental, and caused probably during the last acts of life, is shown by the circumstance, that they can be easily reduced; whereas the invagination, that gives rise to symptoms of ileus, is accompanied by an inflammatory action, which causes the adhesion of the peritoneal surfaces to each other, so that the intussusception cannot be reduced after death. Owing to the narrowness of the canal, and the obstruction thus induced, the symptoms of ileus supervene.

The accidental intussusception, alluded to above, may be produced on animals, in the way of experiment; and cases of this nature are, doubtless, meant, when it is affirmed, that of 300 children, who died either from worms or the fever of dentition, at La Salpêtrière, the greater part had two, three, four, and even more, intussusceptions. It may take place in any part of the alimentary canal; but, most commonly, in the ileum, near where it terminates in the colon. This appears to be the result of the cases that have been collected. Sometimes, the invaginated portion sloughs away; and there have been cases in which as much as three feet of intestine have been discharged *per anum*, with more or less of the mesentery attached. In thirty-five cases collected by Dr. Thompson, the average duration of the disease was between four and five weeks. In twenty-two, the evacuated portion appertained to the small intestines; in the other, to the large, or to both.

Where the invagination has proceeded to a great extent, or where the small intestines with the cæcum have passed down into the sigmoid flexure of the colon, as in some cases that have been related, the seat of the disease was manifested by a hard tumour; and, in less marked cases, careful examination has detected the existence of a deep-seated tumour.

5. *Extraneous bodies in the intestines*—as cherry-stones or plum-stones, which have been detained in some part of the intestinal canal; fragments of bones, or calculi from the biliary ducts may, in like manner, be the cause of obstructions, which may or may not be indicated by careful examination of the abdomen. A case of death from extensive intestinal and peritoneal inflammation, resulting from a perforation of the coats of the intestine, occasioned by a calculus lodged in the appendix vermiformis cæci, has been recently published by Dr. J. F. Peebles, of Petersburg, Virginia.

Pathological characters.—The pathological characters vary according to the precise cause of the obstruction, as well as to the length of time it has existed. Generally, signs of inflammation, or of its terminations—as effusion of coagulable lymph, gangrene, &c.—are present; and the intestine, above the seat of obstruction, is usually distended

for a greater or less extent—at times, to three or four times its wonted diameter.

Treatment.—When the aggregate of symptoms, described above as constituting ileus, occurs, and the ordinary remedies for constipation have been tried in vain, it becomes questionable, no matter what the cause of the obstruction may be, whether the disease should be at all treated by cathartics, at least by such as are given by the mouth: if any are administered, they ought to be in the form of enema. The great object must be—if a careful examination should detect hernia—to remove the strangulation; but, as it is not easy to detect the other pathological conditions that may give rise to the disease, it had better be treated upon the principles laid down under Inflammation of the peritoneal coat, of which there is always more or less present.

It can be readily seen, that if the cause of the symptoms be intussusception, cathartics must be doubtful remedies. The only hope we have—when adhesion between the peritoneal surfaces has taken place, and the invaginated portion has become fixed in its position—is, that the protruded part of the intestine may be thrown off, and a cure be thus obtained, of which, as has been remarked, many cases are on record. In the meantime, inflammation must be subdued by blood-letting—general or local, or both; by full doses of opiates, the warm bath, and the other remedies adapted for peritoneal enteritis.

Metallic quicksilver has been recommended by a host of writers in intussusception, and indeed in every case of obstruction of the bowels. Where extraneous substances exist in the canal, it might possibly be of use by driving them onwards; but it is not easy to divine the principle on which it has been advised, both in older and in more modern times, in intussusception. If the invagination be of the progressive kind, the mercury must pass through the invaginated portion; and if retrograde—the least common form—the same thing would happen; or by getting between the intestine and the invaginated portion it might aggravate the disease. In no case, consequently, could it be useful, whilst it might certainly be prejudicial. The quantity administered has been great—from an ounce and a half to six ounces for a dose—until pounds have been swallowed.

In all cases of ileus, the forcible injection of large quantities of warm water, or of air, has been advised; and it is possible, before any adhesion has taken place, that in cases of progressive intussusception, advantage might be derived from this course, and the invaginated portion be made to resume its proper position; where, too, hardened *fæces* or impacted substances of any kind are the source of the obstruction, the injection of warm water might remove the mischief. A long elastic gum tube adapted for such cases, should be passed into the sigmoid flexure of the colon, and the material of the injection be sent through it. When it is air, it may be forced in by means of a common pair of bellows attached to the tube. It has been advised also, in cases of suspected intussusception, to introduce long bougies, and even pieces of whalebone into the rectum, for the purpose of pushing back the in-

tussuscepted portion; but a case can hardly be imagined in which such agents can be appropriate.

Emetics have been suggested in cases of progressive intussusception, yet, although the recommendation proceeds from high authority, it cannot be indulged for a moment. They could only be serviceable before agglutination had occurred; and, besides, one of the evidences of the invagination is the antiperistaltic action already established. Under the same reasoning, cathartics ought to be advised in the retrograde kind.

Lastly—Where the evidence has been very strong as to the presence of intussusception and its seat, the operation of laparotomy has been advised, with the view of disentangling the invaginated portion of the bowel, but it has been properly discountenanced by almost all therapists, and for the best of reasons. The symptoms of invagination are always obscure and doubtful, and may be produced by other states of the digestive tube, that have been mentioned; so that if the abdomen were opened, it might be found that no intussusception existed; or if it did, that owing to the agglutination, no separation could be effected without producing, if possible, a more speedily fatal lesion. These circumstances render the operation wholly inadmissible.

In cases of obstruction from diminution of the calibre of the colon at its lower portion, it may be advisable, as a last resource, to establish an artificial anus in the lumbar region, in that portion of the intestines not covered by the peritoneum. In the older operations in the iliac region, the peritoneum was wounded, and this circumstance was supposed to have been the chief cause of death in numerous cases. Callisen proposed to make a vertical incision, extending from the edge of the false ribs parallel to the anterior border of the quadratus lumborum muscle; and in this way hoped to reach the colon between the layers of its short and imperfect mesentery. The operation appears, however, to have been attended with some difficulties, until it was modified by Amussat, who affirms, that the failure of the operation on the dead subject is owing to the intestine being empty, whilst in the cases that require the formation of an artificial anus, the colon is greatly distended; in which case, the layers of the peritoneum forming its imperfect mesentery are so far separated as to permit the intestine to be reached without opening the peritoneum. Amussat uses the transverse, instead of the vertical incision. He has performed the operation five times, four of the cases being perfectly successful. The subject of the fifth case died on the tenth day, from the progress of the carcinomatous disease, but experienced great relief from the artificial opening.

VII. ENTERALGIA.

SYNON. Colica, C. passio, Colicodynia, Dolores Intestinorum, Dolor Colicus, Tormina, Dysenteronervia, Anenteronervia, Gripes, Mulligrubs, Bellyache; Fr. Enteralgie; Ger. Darmschmerz, Bauchgrimmen, Kolik, Leibschnelden, Bauchweh.

The term *enteralgia* or *colic* is applied to any severe griping pain of the bowels, and the affection, in this sense, is an accompaniment of most of the morbid conditions of the digestive tube. The latter term,

however, has, in common parlance, been extended to pain in the uterus, and we have even heard it occasionally applied to a sharp pain in the shoulder. The French speak of *Colique menstruelle*, and *Colique utérine*, to signify, respectively, the pain that precedes or accompanies the menstrual flux or its suppression, and any pain which has its seat in the uterus,—*hysteralgia*. Etymologically, it doubtless meant pain in the colon. Many varieties of enteralgia have been admitted by different writers: some of the Germans have described not fewer than twenty. The chief forms may, however, be discussed under three heads:—1. *Common colic*; 2. *Bilious colic*; and 3. *Painter's colic*.

a. *Common Colic*.

Diagnosis.—The general characters of common colic are:—Violent pain usually occurring suddenly in some part of the abdomen, with a sense of twisting about the umbilicus, or in the course of the colon. The pain is excessive, and not augmented by pressure, as in enteritis; on the contrary, it is usually alleviated by it: it also remits, and presents all the characters of spasm:—hence, the name *spasmodic colic* given to it by some. It is usually accompanied by borborygmi, constipation, and more or less flatulence, by the discharge of which relief is afforded. The face has generally an expression of great anxiety and suffering, which might be called, by the medical physiognomist, *abdominal*; the pulse is small, and often entirely unaffected. The condition is clearly neuropathic, and ceases in a few hours by the removal of its cause. It must always, however, be borne in mind, that every variety of colic may end in inflammation; and that the remedies, which are adapted for the two pathological conditions, are essentially different. At times, vomiting is associated with the symptoms above described, and the affection may assume all the characters of ileus, which has, indeed, been classed as a form of colic by most writers.

Causes.—The causes of simple colic are, generally, indigestible aliment, or acid substances passing down the intestinal tube. In children, it is a common result of the predominance of acid, and is often owing to the mother's milk disagreeing with the child. The precise pathological condition of the *colica flatulenta* or *flatulent colic*, (Fr. *Colique flatulente* ou *flatueuse*; Ger. *Blähungskolik*;) seems to be over-distension of some portion of the intestinal tract, which, by occasioning pressure or stretching of the nerves, excites the pain. In other instances, it is spasm of the nerves, occasioned by irritating contents of the tube; in which case, it often receives the name *Colica stercoralis*; Ger. *kothiger Durchfall*.

Treatment.—In all cases of simple colic, the first and great object is to relieve the spasm, which, when flatus is the cause, may be done by the internal administration of excitants termed "carminatives." The pain, as we have seen, is owing to the partial over-distension of some part of the intestinal canal; and, if a carminative be administered, the excitement it produces in the mucous membrane, with which it comes in contact, is extended, by contiguous sympathy, to the muscular coat, which is aroused to greater contraction, and, in this way, the flatus is diffused:—a part may escape through the cardiac orifice

of the stomach, or it may descend into the lower intestines. In like manner, in cases of tormina or simple colic, caused by irritating substances in the canal, aromatics are serviceable, by the increased peristaltic action, which they induce, hurrying on the contents of the canal; accordingly aromatics are frequently added to those cathartics which are apt to induce griping.

The aromatics, given in colic, are numerous; and, in the adult, the essential oils of vegetables are generally preferred,—sometimes dropped on sugar—as the oil of caraway, or aniseed, or peppermint, (gtt. v.—x. for a dose;) but, in children, infusions of those seeds, or of some aromatic vegetable, are more frequently chosen. Even in simple cases of griping, however, it is advisable, if the carminatives be not entirely successful, to unite cathartics with them. Castor oil (f3ij.—f3iv.), taken in peppermint water, or in water to which ten drops of an essential oil have been added, generally answers the purpose well; but, should it not, the dose may be repeated, or a cathartic enema be exhibited. To infants a similar union of cathartics and aromatics may be prescribed; the action of which may be aided by a suppository of yellow soap.

^a R.—Rhei, pulv. gr. iv.
Magnesiæ, vel
carbonatis, gr. xij.
Olei anisi, gtt. iv.
Aquæ, f3j.—M.

Dose, a teaspoonful, to be repeated occasionally.

In more severe cases of colic, in which the pain is excessively severe, the object must be to remove—as soon as practicable—the constipation, by cathartics—as castor oil, or the infusion of senna with the sulphate of magnesia^a—and warm water; or the ordinary cathartic enemata may be thrown up.

^a R.—Infus. sennæ, f3iv.
Magnes. sulph. 3j.
Tinct. sennæ, f3ss.—M.

Dose, a third part, every hour, until it operates.

It is advisable, in such cases, to introduce a hollow bougie into the colon; and, if flatus exist there, relief is afforded by the passage of the air through the tube; but, should not this be the case, the materials of the enemata may be thrown up through the tube.

In addition to this treatment, friction over the abdomen with the warm hand, or flannels wrung out of hot water; or caloric applied in any other way, as by heated salt, bottles filled with hot water, &c., may be used with advantage.

In all cases, if any doubt exist, whether there be concomitant inflammation, blood-letting may be practised; and, even should inflammation not exist, the operation of the cathartic is favoured thereby. The union of a nauseant with a cathartic has a similar effect—as by adding to the mixture of salts and senna, prescribed before, two grains of the *tartrate of antimony and potassa*.

Opium has been regarded as a doubtful remedy, until the bowels are evacuated. Such is not the result of our observation or reflection. Any agents, that allay the spasm, will tend to aid the action of the

cathartic; and, as opium is a precious antispasmodic, it may be unhesitatingly prescribed, in conjunction with the other remedies; but it must be administered in a full dose, (gr. iiss. of *solid opium*, or 50 or 60 drops of the *tinctura opii*.) There is, indeed, more doubt, as has been well urged by Dr. Cook, of Buskirk's Bridge, New York, of the propriety of the indiscriminate use of cathartics in all cases of enteralgia. (See the author's *Medical Intelligencer*, January, 1842.)

b. *Bilious colic*.

SYNON. Colica biliosa; Fr. Colique bilieuse; Ger. Gallenkolik.

Bilious colic is generally ascribed to a vitiated condition of the bile; but this is a secondary result in the generality of cases. The disease consists essentially in great impressibility of the nerves of the digestive tube, under which a neuropathic condition is often induced; this extends to the liver, which, under the excitement, increases the secretion of bile; and, in the same manner, an increase and a morbid condition of the different intestinal secretions are occasioned.

Diagnosis.—Prior to the appearance of the symptoms proper to bilious colic, the patient usually suffers under disorder of the stomach and intestines; bitter taste; yellow fur on the tongue, nausea, vomiting, want of appetite, oppression at the epigastrium, &c. When the colic occurs, the pain is excessively severe, cutting, and screwing. It is often experienced, first, in the region of the stomach, and stretches to the back in the course of the duodenum; at other times, it affects the intestines generally, and twists around the umbilicus as in ordinary colic. The thirst is great, and anxiety and restlessness are attendants. After a while,—spontaneously, or through the efforts of art,—bilious vomiting supervenes; and the bowels, which had been previously constipated, or with scanty discharges, are evacuated freely—the fæces being largely mixed with bile. The symptoms then gradually abate, and terminate in entire restoration to health. Very commonly, the disease is attended with fever, and the severest forms are apt to end in inflammation of the intestines, and death.

Bilious colic occurs sporadically in summer and autumn, the seasons in which erethism of the mucous membrane of the intestines, and consequent disorders of the biliary system are frequent. In like manner, it is more common in hot climates, in some of which it is almost endemic. Epidemically, it occurs often.

Treatment.—The great indications of management are—*first*, to remove the spasmodic condition of the canal; *secondly*, to evacuate the morbid secretions; and *thirdly*, to prevent the occurrence of inflammation.

In plethoric and active habits, blood-letting may be advised from the arm; and frictions and stimulating cataplasms to the abdomen. Glysters of turpentine, and in very severe cases, of Epsom salts, or castor oil and opium,² or large quantities of warm water containing laudanum, may be thrown up into the colon; and should these remedies not be successful, full doses of opiates may be administered internally (*pulv. opii*, gr. iiss. pro dosi,) and repeatedly, until relief is obtained.

* R.—Theriac. com.

Aquæ, aa Oss.

Ol. ricini, f3ij. vel

Magnes. sulphat. ʒiss.

Tinct. opii, gtt. lx.—M.

Barley water may be freely allowed, and, when the cramp has been removed, or greatly alleviated, should there be any tendency to inflammation, leeches may be applied over the abdomen, and after they have dropped off, a large, hot, emollient cataplasm, of bread and milk, or of linseed meal, may be spread over the abdomen. To remove any irritating matters, that may be contained in the upper part of the canal, one of the milder cathartics, as castor oil or magnesia, may now be prescribed, and, if necessary, its action may be facilitated by the administration of appropriate enemata.

c. *Painter's Colic.*

SYNON. Colica Saturnina, Colicoplegia, Morbus Metallicus, Colica Pictorum, C. Figulorum, Colica Rachialgia, Palmus Plumbarius, Enteralgia Saturnina, Lead Colic; *Fr.* Enteralgie Saturnine, Dysenteronervie Saturnine, Colique des Peintres, C. de Plomb, C. des Plombiers; *Ger.* Bleikolik, Malerkolik, Huttenkatze.

Under this name is comprised only that variety of colic, which is induced by lead,—not the forms of colic, to be mentioned presently, which, although resembling in their symptoms the lead colic, are dependent upon other causes. The *colica Pictorum* or *colic of Poitiers*, for instance, is confounded, by most of the English and American writers, with the *colica pictorum* or *painter's colic*. The same may be said of the *colic from copper*, and the *colic of Madrid*. Most persons, who deal much in the preparations of lead, experience at one time or other, its injurious effects upon the system.

Diagnosis.—Before the symptoms of painter's colic present themselves, there are evidences of the effects of lead upon the system, to which a recent writer, M. Tanquerel des Planches, has given the name *intoxication saturnine primitive*. The principal marks of this condition, this *lead cachexia*, are said to be—a peculiar bluish or bluish gray tinge of the gums, which sometimes extends over the mucous membrane of the mouth generally, and which has been regarded by Dr. Burton, as an infallible proof of the presence of lead oxide in the system. The teeth, at the same time, become discoloured, and affected with caries; there is a sweetish, styptic astringent taste in the mouth, with a peculiar fætor of the breath; sallowness of the skin, and dull, yellow tinge of the conjunctiva; general emaciation; small, soft, compressible pulse, and, in rare cases, a considerable reduction in the number of its beats. Of these symptoms, the discoloration of the gums and teeth is most frequent and most characteristic; and it is considered to be owing to the deposition of a very minute film of sulphuret of lead on the mucous surface, and on the enamel of the teeth.

The importance of attending to these premonitions is exhibited by the fact, that of 1217 cases of lead colic, which fell under the care of M. Tanquerel des Planches, 1195 were previously affected with one or more of the symptoms above mentioned; and, in many in-

stances, by attending to these premonitions, with temporary cessation from work, the threatened attack of lead colic was prevented.

The pain of the abdomen, which, when the disease is fully formed, is so excruciating as to cause the strongest individuals to writhe about, and to weep like children, sometimes comes on suddenly; but, most commonly, it is immediately preceded by signs of gastric and abdominal derangement, and by scantiness and infrequency of the alvine evacuations. When the disease is fully formed, the pain is agonizing, and exhibits remissions and exacerbations. As in other cases of colic, it may be relieved by pressure, but this is not always the case; and at times it is aggravated by it. The abdomen may exhibit various characters. It may be natural, or fuller than natural, but more frequently it is retracted, and feels hard. The pain, in certain cases, shoots through to the back, so as to give rise to the symptom which has given it the name *rachialgia*, with some. The bowels are almost invariably constipated; such was the case in 1140 out of the 1217 instances, and, when evacuations are procured, they are generally scybalous, and often similar to those of sheep. With these symptoms, there may be conjoined nausea and vomiting—at times, of a bilious character. The pains are not, however, limited to the abdomen; very severe suffering is frequently experienced in the limbs, especially in the upper; followed by debility of the extensor muscles, which may lose all power, become paralytic, shrink, and almost disappear. Occasionally, the organs of sense, as the touch, sight, and hearing, participate in the loss of power. In the midst of all his sufferings, the patient's pulse is slow, and the skin natural; but there is a striking alteration in the expression of the countenance, which indicates extreme anxiety, and intense suffering. The eyes are deeply sunken in the orbits, or sometimes thrust prominently forward from their cavities; they are surrounded by a bluish circle, are muddy and wild, and, with the other parts of the face, in constant motion, vividly expressive of the different degrees of pain experienced by the patient. The nose is somewhat pinched, and the cheeks become hollow. In unfavourable cases, delirium, violent spasms and convulsions supervene, which are the precursors of dissolution.

The duration of the disease is regulated by its intensity. It rarely happens, however, that the patient experiences full relief from a treatment of less than a week's continuance. In the large mass of cases, it terminates favourably. This is shown by the fact, that of 500 cases treated at La Charité, in Paris, only five had a fatal issue; and in 3,569 collected cases, according to M. Bouillaud, there were only 95 deaths, making the mortality but 1 in 30. When the patient recovers from an attack, he is very liable to relapses. Sudden death is an event, which occasionally happens.

The same care is required in this as in the other varieties of colic, to guard against the supervention of enteritis.

Causes.—The occupations, in which lead is most used, are those which give rise most frequently to colica pictorum. The makers and grinders of colours, painters, plumbers, potters, type and other founders who use lead, printers, miners, &c., are those in whom it is

usually witnessed. The workers in white lead appear to be most subject to the disease; and the more volatile the lead is rendered, the more readily does it appear to affect the system. Painting the "dead white," or "statuary white," according to Dr. Stokes, is the most deleterious form of using lead, to the house painter. In this case, white lead is used, combined with a large proportion of oil of turpentine, and the outer air is excluded, as much as possible, so that the air of the apartment becomes strongly impregnated with the lead. It would seem, that the deleterious effects of lead are chiefly produced by the carbonate. The acetate rarely gives rise to lead colic, and when it does, it is presumed to have become converted into the carbonate. To avoid this conversion, it has been advised to add a little acetic acid, in all cases in which the acetate is given.

It has been an interesting question, as to the mode in which the lead enters the economy. Unquestionably, lead colic is occasionally induced by particles of the metal getting upon the fingers, and being swallowed, where due cleanliness has not been adopted. That this is the mode in which it is at times received into the system, is, indeed, sufficiently shown by the fact, that at an extensive smelting establishment, in Cornwall, England, at which cases of lead colic were common, the disease was almost abolished, after an order had been issued, and strictly enforced, that no workman should be permitted to partake of food until he had washed his hands carefully, and had the assistance of a nail brush. Still it occurs, notwithstanding every precaution; and there is great reason to believe, that the channel, by which the lead is most commonly received into the system, is the air passages. It has been affirmed by M. Gendrin, that it is necessary for the metallic particles to be dispersed in the atmosphere, either alone, or by the agency of some volatile vehicle, in order that colic should be induced; but there is no doubt, that it may be produced through the medium of the digestive tube, and even endermically, by simple contact of the lead with abraded surfaces. Lead colic has been induced by the litharge and sugar of lead added to wines and cider, by the use of water kept in leaden cisterns, and by the impregnations of lead communicated to beer, soda water, &c., when suffered to remain in leaden pipes. It would seem, however, that certain individuals are more liable to lead disease than others; and that so great a diversity exists in this respect as to render it impracticable to determine the quantity of lead which the economy can bear in the way of medicine. Daily experience exhibits, that the acetate may be given in large quantities, without the supervention of unpleasant symptoms.

Pathological characters.—Different appearances have presented themselves on dissection, but none have been sufficient to throw light on the nature of the disease. In many cases, it is true, redness, thickness, and ulceration of the mucous membrane of the bowels were perceived, the ulcerations being almost always found towards the termination of the small intestine; but these signs of inflammation must be regarded as complications occurring in the course of the disease, and the tendency to inflammation must, accordingly, be borne in mind by

the therapist. The disease must be regarded as a neurosis of the intestinal tube—or, in other words, as an affection of the nervous system, without any manifest organic change, and this affection seated in parts of the nervous system only—in nerves distributed to the intestines as well as to the extremities; but there is no evidence, so far as dissection has hitherto shown, of disease in the brain or spinal marrow. The membranes and substance of the brain have presented their healthy character; there has been little or no fluid in the ventricles; the spinal cord has been healthy, and of natural consistence, and there has been no effusion between it and its membranes. Notwithstanding, however, the absence of morbid appearances, it has been still presumed, that the seat of the disease is probably the spinal marrow, and that to this organ we must look for the morbid appearances. We have already remarked, that, thus far, the examination of the spinal marrow has afforded no satisfactory results, nor are we likely to obtain any in relation to the essence of the disease. If it be—as we presume it is—a neurosis, the morbid appearances would be altogether secondary. Andral, whilst he combats the idea of the disease being a gastro-enteritis, and esteems it a neurosis, is disposed to refer it to the spinal prolongation, and the abdominal plexuses of the great sympathetic; the constipation being owing—in his opinion—to the destruction of the contractile movements of the intestines, or to the suspension of the secretion from the mucous membrane. In the cachectic condition induced by the influence of lead, he found that the globules of the blood experienced as great a diminution as in spontaneous anæmia; and that, as in the latter, the fibrin and other elements of the blood preserved their healthy proportion.

Treatment.—As the disease is a neurosis or neuralgia of the nerves destined more especially for the intestines, it would seem that opium ought to be a very energetic agent; and, accordingly, it was recommended long ago, and in very large doses. It still holds its ground as a valuable remedy in the disease, and is, by many practitioners, the first prescribed. A full dose of opium, (gr. ij.—ijj.) instead of adding to the constipation, tends to remove it, by allaying the spasm, the real seat of which is in the nerves in question. Nor does it interfere with the administration of other remedies. Mercury, which—it has been advised—should be pushed to salivation, can be readily associated with it.

R.—Hydrarg. chlorid. mit. gr. v.
Opii pulv. gr. ij.—fiat pilula.

This pill may be repeated at short intervals, say every half hour—until a decided impression is made upon the system by the narcotic; and under its action the mercury will probably exert its peculiar agency, or will remove the constipation. To aid this, powerful glysters of turpentine^a may be thrown into the colon. The patient may be placed in the warm bath, and tobacco stupes be applied to the abdomen to induce relaxation of the spasm; but, in violent cases, a tobacco enema^b may be thrown up every four or six hours, until a decided effect has been produced on the system.

^a R.—Ol. tereb. f 3ij.
Vitell. ovi ij.
Theriac. commun.
Aquæ, aa Oss.—f. enema.

^b R.—Tabac. 3ss.
Aquæ bullient. Oss.—M.

Along with this treatment, active cathartics may be given freely, as the sensibility of the canal is so greatly obtunded. Croton oil forms a valuable cathartic, either alone^a or associated with the ol. ricini;^b or the latter may be given alone or combined with the oleum terebinthinæ.^c

^a R.—Olei tiglii, gtt. iv.
Micæ panis, q. s. ut fiant pil. iv.
Dose, a pill every two hours until they operate.

^b R.—Ol. ricini, f 3iss.
Ol. tiglii, gtt. iv.
Pulv. acaciæ, 3ij.
Sacchar. 3j.
Aquæ menth. f 3iv.—M. Dose, a tablespoonful, every two hours.

^c R.—Ol. ricini, f 3iss.
Vitell. ovi.
Syrup. f 3ij.

• Ol. terebinth. rectific. f 3ss.
Aquæ menth. f 3iv.—M. Dose, two tablespoonfuls, every hour or two.

In the hospital of La Charité, Paris, a treatment has been long prescribed, which consists of a combination of emetics and cathartics. It is altogether routine in its character, and most operose; yet it is followed by some of the best pathologists of France—for example, by MM. Louis and Andral—as implicitly as it was by their earlier predecessors.

Opinions have fluctuated as to the utility of blood-letting in this disease. There are doubtless cases in which it might be beneficial in resolving the spasm, and in rendering the system more susceptible of the action of cathartics. The opinion of the French practitioners is not, however, in favour of blood-letting, either general or local. The cures, it is affirmed by M. Andral, have not been so speedy, and the relapses more frequent. In the cases, which have fallen under the author's observation, he has not found occasion to employ general blood-letting; but the application of cups and leeches has afforded great relief, along with full doses of opium, calomel, and the other cathartics before recommended. There may, however, be cases in which general blood-letting may act not only as a potent antispasmodic, but may facilitate, as before remarked, the action of the mercurials and cathartics. Revellents may likewise be serviceable, of which the best is a blister over the abdomen, which may be dressed with a mixture of mercurial ointment and morphia.

R.—Ung. hydrarg. 3j.
Morphiæ acet. gr. x.—M.

Where the stomach rejects medicine, reliance must be reposed on the revellent action of the blister, on the dressing just recommended, friction with the mercurial ointment over the inner surface of the arms and thighs, and powerful cathartic enemata with the addition of opiates. Often, the symptoms, although previously obstinate, yield to the specific effect of mercury on the system. Sometimes, copious enemata of cold water thrown into the colon have induced an increase in the peristole of the intestines, when every thing else had failed.

Alum (gr. xv. to ʒij. every 4th, 5th, or 6th hour) was recommended many years ago by Dr. Percival, and it was affirmed, that the third dose seldom failed to alleviate the pain. Of late years, it has been again extolled, as well as sulphuric acid lemonade. M. Gendrin affirms, that he has cured more than 300 cases, by administering daily from a drachm to a drachm and a half of sulphuric acid diluted in three or four pints of water. The cure was obtained in three or four days. The experience of Gendrin has been corroborated by that of other observers, but the same agent has been found entirely useless by MM. Grisolles, Tanquerel des Planches, and others. It is proper to remark, that the disease, in many cases, terminates in health under very simple management. Of thirty-one cases, in which nothing but the ordinary *tisane* of the French hospitals was given for twelve days, three were cured by the fourth day, two between the fifth and eighth days, ten between the eighth and twelfth days, and one on the thirteenth day: the remaining cases were subjected, after the twelfth day, to the purgative treatment, under which they were quickly cured. Dr. C. J. B. Williams's treatment consists in the exhibition of powerful purgatives, combining them with belladonna in order to relieve the excessive pain; and following this course up with alum, when the bowels have been freely opened.

For the paralysis that succeeds to the poison of lead, should it persist after the use of the remedies before described, it has been recommended to employ stimulant liniments; but as successful a course as any is to place the arm in a splint, which is adapted to the inside of the forearm, and is kept *in situ* by a flannel bandage, the whole being suspended in a sling. In this manner, the flexors are kept at rest, and opportunity is afforded for the recuperative powers to restore the enfeebled action of the extensors. Electricity and galvanism, acupuncture and electropuncture, the cold and the hot douche, have also been advised, with blisters to the nape of the neck. Strychnia, however, offers greater probability of success, in these cases of partial paralysis, than any other remedy. Of forty cases in which it was administered by M. Tanquerel des Planches, all were either completely cured, or their symptoms greatly alleviated,—two months being the mean duration of the treatment. It may be administered in the dose of one-twelfth of a grain, in the first instance, two or three times a day, gradually increasing the dose until tetanic twitchings are experienced in the paralysed muscles, when it must be omitted until the twitchings have disappeared, and be again resumed.

R.—Strychniæ, gr. ij.
Confect. rosæ, ʒj.
Glycyrrhiz. pulv. ʒj. M.—et divide in pilulas xij.

It has been remarked, that the effects of strychnia are cumulative; in other words, that no perceptible effects may be induced for a time, and then they may explode with violence. The author has, however, administered it freely without having noticed these results. If strychnia be not at hand, nux vomica, especially the alcoholic extract, may be employed in its stead.

R.—Extract. nuc. vomic. alcoholic. ℥i.

—glycyrrhiz. ℥vij.—M. et fiant pil. lxxx.

Dose, two to six, two or three times a day.

Brucia has been given in similar cases, but it possesses no advantage over strychnia, except that its action is feebler, and consequently can be better regulated. Its strength compared with that of strychnia, has been variously estimated—as one to ten, one to twelve, and one to twenty-four. (See the author's *New Remedies*, 4th edition, p. 112, Philadelphia, 1843.)

Throughout the whole course of the disease, the diet should be bland, consisting chiefly of mucilaginous or farinaceous substances. After the disease has been removed, care must be taken to keep the bowels open, and gentle tonics may be administered, as the infusion of columbo, or of gentian,^a or sulphate of quinia with sulphuric acid.^b To prevent a recurrence of the disease, cleanliness is all important in every occupation in which lead is handled; and the sulphuric acid lemonade has been esteemed a prophylactic in the laboratories of Paris. It has likewise been employed largely by Mr. Benson, the managing director of the British white lead works at Birmingham, in the form of "sulphuric beer," and with great success. It acts, he conceives, by converting the poisonous carbonate into the innocuous sulphate of lead. His formula for the preparation of the beer is as follows. Take of *molasses*, fifteen pounds; *bruised ginger*, half a pound; *water*, twelve gallons; *yeast*, one quart; *bicarbonate of soda*, one ounce and a half; *sulphuric acid*, an ounce and a half by weight. Boil the ginger in two gallons of water; add the molasses, and the remainder of the water hot. When nearly cold, transfer it to a cask, and add the yeast to cause fermentation. When this has nearly ceased, add sulphuric acid, previously diluted with eight times its quantity of water, and then the bicarbonate of soda, dissolved in a quart of water. Close up the cask, and in three or four days the beer will be fit for use. As acetous fermentation speedily takes place, especially in hot weather, new supplies are prepared as required. The object of adding the bicarbonate of soda is to give the liquor a pleasant briskness. The sulphuric acid, of course, remains greatly in excess.

^a R.—Infus. colomb., seu
—gentian. f3xj.
Tinct. colomb., seu
—gentian. comp. f3j.—
f. haustus ter die sumendus.

^b R.—Quiniæ sulphat. gr. iv.
Acid. sulphur. dilut. gtt. xv.
Aquæ, f3vj.—M.
Dose, one-third, three times a day.

Workers in copper are liable to symptoms to which the name *colic from copper* (*colique de cuivre*) has been given; but the symptoms, both general and local, are those of inflammation of the lining membrane of the stomach and bowels, and the disease requires a treatment adapted for such a pathological condition. Generally, too, the *Colica Pictonum* (*C. Pictoniensis*, *Rachialgia*, of some; Fr. *Colique de Poitou*, *Colique Végétale*; Ger. *Kolik von Poitou*;) as well as the endemic colic, which occurs in the West India Islands, (*Dry belly-ache*); that of Devonshire, (*Colica Damnoniorum*, *Devonshire colic*; Ger. *Cider Kolik*, *Devonshire Kolik*); and that of Madrid, (*Colica*

Madridensis, *C. Hispaniensis*), have been described as varieties of lead colic. They certainly resemble it somewhat in their symptoms, but not so much as they do bilious colic. Evidence is wanting to show that they are induced by the poison of lead:—in some cases, they unquestionably are, as when sugar of lead is added to cider, or the cider is kept in glazed vessels, whence results the Devonshire colic; but at other times, the disease occurs in cider districts, where every precaution is taken to prevent the contact of lead. In like manner, the *dry bellyache* of the West Indies was ascribed to the poison of lead contained in new rum, but closer examination has not proved this to be the fact. It is, indeed, affirmed, that the disease is much more rare now than formerly, under the improvement of morals and clothing.

The treatment is essentially that of bilious colic.

VIII. TYMPANITES.

SYNON. Tympanitis, Tympania, Tympanias, Tympanosis, Tympanita, Emphysema Abdominis, E. Tympanites, E. Tympaniticum, Meteorismus Pneumaticus seu Abdominis, Pneumatosis, Physema, Phyesis, Hydrops Flatulentus seu Siccus, Affectio Tympanitica Abdominis, Cholera Sicca, Aero-enterectasia, Tympany, Meteorism; *Fr.* Tympanite, Ballonnement; *Ger.* Trommelsucht, Luftbauch, Bauchwindsucht.

Gases are always present in the intestinal canal, varying in their character, however, according to the part in which they are met with. Those that have been examined by MM. Magendie and Chevreul may be arranged in a tabular form, as follows;

Parts in the 100.

| | Stomach. | Small Intestine. | Large Intestine. | |
|-----------------------|----------|------------------|------------------|---------|
| | | | Cæcum. | Rectum. |
| Oxygen. | 11 | 0 | 0 | 0 |
| Carbonic Acid. | 14 | 24.39 | 12.50 | 42.86 |
| Hydrogen. | 3.55 | 55.53 | 7.50 | — |
| Azote. | 71.45 | 20.08 | 67.50 | 45.96 |
| Carburetted Hydrogen. | — | — | 12.50 | 11.18 |
| | 100.00 | 100.00 | 100.00 | 100.00 |

Diagnosis.—Allusion has already been made to the painful forms of colic, and gastralgia, which are owing to distension of any portion of the digestive tube by air pent up in it. In the affection, however, to which the name *tympanites* or *meteorism* is usually given, the air is commonly in the colon, in which it is more easy for a considerable accumulation to take place, than in any other portion of the canal, inasmuch as the valve of Bauhin is an obstacle to its ready diffusion upwards through the small intestines, whilst the arrangement of the sigmoid flexure, and the annulus at its termination in the rectum, prevent its escape downwards.

If the anatomical position of the colon be borne in mind, we can easily comprehend the symptoms of tympanites. There is great distension of the abdomen, especially in the course of the colon, which presses upon the diaphragm, and gives rise to dyspnœa. More or less pain is always experienced on taking a full breath, or by pressing

on the abdomen, whether inflammation be coexistent or not; and if the abdomen be percussed, there is the sonorousness as if a drum (*tympanum*) were struck, which has given the disease its name.

Causes.—There can be but little doubt, that the gases of the intestinal canal may occasionally arise from the reaction of the elements of the food upon each other. Bubbles of gas have frequently been seen on dissection escaping from the chymous mass, situate between the mouth of the ductus communis choledochus and the ileum, and it has been found experimentally, that when the mass, obtained from the small intestine, was suffered to ferment for some time in a stove, at the temperature of the body, the same gases were obtained as are met with in the small intestine. Still, this is not probably the general source of the meteorism we meet with. There is great reason to believe, that air may be secreted from the lining membrane of the canal, and in certain conditions of the system, more copiously than in others. Accumulation of gas in the intestines is one of the prominent symptoms of typhoid fever; it is also common in endo-enteritis and in nervous diseases, especially in hysteria and hypochondriasis.

There are certain articles of diet—as dried peas, beans, &c.—which give rise to the generation of much flatus, either by the reaction of their elements upon each other, or by the increased secretion of air which they occasion: the effect of fresh clover upon the herbivora is well known to every agriculturist.

Treatment.—As the disease is connected with various pathological conditions, it is important to bear this in mind in the treatment. If the meteorism be dependent upon endo-enteritis, it must be treated by antiphlogistics; but, if the inflammation have passed away, and the lining membrane be left in an asthenic condition, excitants may be used with much advantage. One of the best of these, if not the very best, is the *oleum terebinthinæ*, which has, indeed, been regarded as a specific by some.^a It may also be given associated with castor oil, (adde misturæ infra præscript. *ol. ricini*. 3ss.), or in the way of enema.^b

^a R.—*Ol. tereb.* f 3ss.
Vitell. ovi,
Aq. menthæ, f 3iij.—Fiat mist.
Dose, one half, to be repeated,
if necessary.

^b R.—*Theriac. commun.*
Aquæ, aa Oss.
Ol. tereb. f 3j.—M.

When the flatus is pent up in the large intestine, as is usually the case, instantaneous relief is often afforded by passing up a hollow bougie through the annulus of the rectum into the colon. The author had the satisfaction of preserving the valuable life of an aged individual, who had been long honourably engaged in the service of his country, by this simple method. Injection after injection had been employed ineffectually. An elastic gum male catheter was then introduced; the flatus was immediately discharged, and the pain and tympanitic distension were at once removed. More recently, a similar case of meteorism has fallen under his charge. The abdomen of the patient—a large woman—was constantly distended, and the abdomen tender,

and markedly gaseous on percussion, especially in the region of the colon. Purgatives and stimulating enemata—of turpentine and assa-fœtida—were given without effect. She was cured by the introduction into the colon of a large flexible catheter, through which an immense quantity of fetid gas was discharged. A tight bandage was immediately afterwards applied round the abdomen, to prevent re-distension of the coats of the intestine, by affording them adequate pressure. The patient had no return of the symptoms.

It is obvious, that, in all cases, the cause of the meteorism must be taken into account, and the disease be treated accordingly. It is only where there is a decided loss, or great irregularity, of nervous power, that stimulants can be advisable. In all cases, however, the dislodgement of the flatus, by means of the catheter, where this is practicable, will prove a palliative. It has been proposed to extract the air from the intestines, by means of an exhausting syringe—*clysma inversum*. A better plan would be to force air into the intestinal canal, and then suddenly withdraw it. The simple introduction of the elastic gum tube, recommended above, will probably answer every purpose.

At times, the air, instead of being pent up in the intestinal canal, escapes, through a perforation in the intestine, into the cavity of the peritoneum, constituting the *æropéritonie* of Piorry. The author has never met with such a case. Its existence has, indeed, been denied by some; and, if it ever occur, it is certainly rare. In such cases, it has been advised to tap the individual at the protruded umbilicus; but the difficulty of diagnosing between tympanites of the intestine and tympanites of the peritoneum has discouraged operators. A great objection to the operation of puncturing through the abdominal parietes is the inconvenience of an artificial anus, which would result from an opening made into the intestine in the usual way. The most feasible course would be to puncture the cæcum in the place recommended under Obstruction of the Intestines (p. 160); and if an instrument no larger than the grooved exploring needle used in empyema, or the minute trocar recommended by Dr. B. Babington in the same affection, were employed, no evil could easily result from an opening made into the intestine behind the peritoneum. Where the stomachs of cattle are distended with air, owing to articles of diet received into them, an opening is sometimes made directly into the organ; and it is said, that many lives have been thus preserved.

IX. CANCER OF THE INTESTINES.

SYNON. Induratio seu Scirrhus seu Cancer Intestinorum, Enterosarcomia, Enteropathia Cancerosa; *Fr.* Cancer des Intestins; *Ger.* Krebs der Gedärme.

Cancer may attack any part of the small intestines. It is more uncommon, however, in the upper portion; and, when seated in the duodenum, the evidences of it are similar to those of cancer of the pylorus. It is most common in the ileum.

a. *Cancer of the Small Intestine.*

Diagnosis.—The symptoms of cancer of the small intestine do not differ materially from those of chronic endo-enteritis. Pain is generally present, which may be dull, but more commonly is lancinating, especially some hours after eating, and when there has been time for the excrementitious portion of the aliment to reach the seat of the mischief. As the disease augments, the pain returns in paroxysms, accompanied by vomiting, and signs of obstruction of the bowels. When the cancer has proceeded to ulceration, the evacuations have a very offensive, and peculiarly repulsive, odour; and, if the abdomen be carefully examined, a hard tumour can, at times, be felt, which is painful on pressure, and whence shooting pains irradiate. If, along with these local signs, we have those of the cancerous diathesis, there cannot be much doubt as to the nature of the disease. Still, the diagnosis, in the absence of certain of these signs, is obscure, especially at the commencement.

The disease may terminate fatally, owing to the obstruction it induces to the passage of the excrement; or it may cause inflammation of the mucous or peritoneal coat, under which the patient may succumb; or lastly, he may die under the protracted irritation, which the disease, like all cancerous diseases, sooner or later developes.

Causes, and Pathological characters.—These do not differ from those of cancer of the stomach.

Treatment.—This must repose upon the same principles as that of cancer of the stomach. It is here still more requisite to avoid agents that may induce constipation. The pain, however, is so severe as to demand the employment of narcotics, and if it cannot be relieved by hyoscyamus, belladonna, stramonium or lactucarium, opium ought to be had recourse to. It may be combined, in such case, with any of the gentle laxatives, as rhubarb.^a Laxatives, as well as laxative enemata, are, indeed, needed throughout the disease. Opium may also be administered by the rectum; or the salts of morphia may be used endermically.

^a R.—Opii pulv. gr. ij.

Rhei. pulv. gr. vj.—M. et divide in pil. ij.

To be taken for a dose.

It has been advised to establish an issue over the stomach, but no permanent good effect can be expected from it. Should it be inserted, the salts of morphia may be made to exert their influence on the system through it.

It is scarcely necessary to say, that the diet should be of such a character as to furnish little excrementitious matter, and that of an unirritating kind; and that care should be taken to avoid excesses in quantity. A small portion of easily digested animal food; or preparations of milk, with the farinaceous articles, arrowroot, sago or tapioca, will suggest themselves; whilst the succulent vegetables that afford but a small quantity of nutritious, and a large proportion of excrementitious, matter, should be carefully avoided.

b. *Cancer of the Large Intestine.*

Diagnosis.—The symptoms of cancer of the colon are essentially those of cancer of the small intestine, except that, in many cases, a circumscribed, hard, fixed, and generally adherent tumour is perceptible in the course of the intestine, the pain of which is lancinating, and increased by pressure: along with these local phenomena, there is the usual straw, or livid colour of the skin.

On dissection, the same appearances are met with as when the disease affects the small intestines.

When cancer attacks the rectum, and has made slight progress only, the differential diagnosis is not easy; the sense of weight in the loins and rectum; the straining and ineffectual efforts at defecation; the discharge of more or less thin and bloody fluid; the pain excited by the evacuations during their passage, especially when they are consistent, may be a part or parts of many diseases of the rectum,—as hemorrhoids, fissures, &c. &c. When the disease is more advanced, however, other signs become added. The calibre of the intestine is so much diminished, that the fæces can be only extruded with great difficulty; and if they have any consistence, they assume the shape of the aperture through which they pass; at times, being not larger than the figured excrements of the infant, and even smaller; and at others, assuming a riband shape, in correspondence with the configuration of the constricted part of the intestine. When an examination is made with the finger, it is found that it cannot be passed into the rectum: either a ring is found to project into the intestine, or the mucous membrane feels indurated, or full of irregular protuberances.

As the disease proceeds in its course, almost insupportable lancinating pain is experienced, which may extend to the sacrum and loins, and to the nates and thighs, and is greatly augmented when the patient is in the erect attitude, or when he walks or rides. When the scirrhus goes into the ulcerated state, the evacuations may be passed with more facility; but the discharge of a sanious, bloody, and extremely fetid fluid sufficiently indicates, that this change is not an amelioration. On the contrary, the pains become, if possible, more insupportable; the digestion is greatly disturbed; gas is secreted in large quantities; and the evacuations are sparing and fetid: vomiting of fecal matters, indicating total obstruction, supervenes, and the individual dies, either from this cause, or worn out by constant irritation.

The termination and the symptoms indicating it belong not to cancer of the rectum only, but to the same disease when affecting the colon or any portion of the digestive tube.

At times, the disease does not commence with scirrhus induration, but with ulceration of the mucous membrane: its progress is then more rapid.

Causes, and Pathological characters.—These are essentially the same as those of cancer of the stomach and small intestines. The disease

may affect any part of the rectum, but it is usually situate an inch or two above the margin of the anus.

Treatment.—The disease is irremediable, except when seated very low down in the intestine, when it may, in certain cases, be extirpated by a surgical operation. Generally, as in other cases of cancer of the digestive tube, the efforts of the practitioner must be limited to palliatives, as opium, or some of its preparations, administered either by the mouth or anus; and where the intestinal obstruction becomes complete, it may be advisable to establish an artificial anus, as recommended under another head.

Occasionally a stricture, which is in no respect malignant, forms in the colon, and about its sigmoid flexure especially, as a consequence of hypertrophy of the submucous cellular tissue, induced by chronic dysentery. The author has met with two or three cases, which supervened on malignant cholera, and existed for years. The symptoms are those of narrowness, as produced by scirrhus or cancer, and the treatment required is much the same. All that can be effected is by the use of the bougie, when it can be made to reach the seat of the stricture.

Spasmodic stricture of the rectum—*Stricture intestini recti spasmodica, Obstructio recti spastica*,—occasionally occurs, and may be readily mistaken for the permanent form. The patient equally suffers from constipation and extreme difficulty in passing the evacuations, and the excrement indicates the form of the constricted portion. The disease occurs in those of the nervous habit, and especially such as are liable to hysteria, hypochondriasis and dyspepsia, and the phenomena may continue for years, without improvement, or with short intervals of amendment, and then subside spontaneously.

The *treatment* of these cases consists in preventing irritation from the feculent matter by keeping the bowels soluble; yet it is important to avoid irritating them by repeated cathartics. The diet should be light, and such as may afford an unirritating excrement; and anodynes may be required, both administered by the mouth and in the form of enemata and suppositories. The cold hip-bath, and cold affusion over the loins, may likewise be serviceable as tonic as well as revellent agents. Under a treatment of this kind, maintained for a length of time, the spasmodic stricture may be gradually resolved; but, in many cases, it terminates in stricture of the permanent form, which may require the appropriate mechanical treatment already referred to.

X. HEMORRHAGE INTO THE INTESTINES.

SYNON. *Hæmorrhagia Intestinorum, Enterorrhagia, Melæna, Hæmatochezia; Fr. Hé-morrhagie des Intestins, Écoulement de sang par l'Intestin; Ger. Blutfluss aus den Dårmen, Blutfluss aus den Gedårmen.*

Hæmorrhage from the intestines occurs under the same circumstances as hæmatemesis. It may arise from diseases, which affect the vessels of the mucous membrane, as cancer, or ordinary ulceration of the follicles; or it may be produced by causes, which determine hyperæmia of the vessels of the intestines, and consequent transudation. When it occurs in long protracted fevers, especially of the

typhoid kind, which are accompanied by follicular ulceration, or in those of the typhus form, in which there is a morbid condition of the blood, as well as diminished cohesion of the solids, it may prove fatal in a short space of time. In other cases, in which the discharge is simply owing to hyperæmia of the intestinal vessels, as is apt to be the case in continued fever, the loss of a moderate quantity of blood, in this way, may afford relief; but, in all cases, the pathological causes in which it originates must be carefully investigated, and, if possible, removed.

The general principles of *treatment* are the same as in hæmatemesis.

XI. HEMORRHOIDS.

SYNON. Hæmorrhoides, Morbus Hæmorrhoidalis, Fluxus Hæmorrhoidalis, Hæmorrhoidis, Hæmorrhoidis, Hæmorrhagia Intestini Recti, Proctica Marisca, Marisca, Proctalgia Hæmorrhoidalis, Piles; *Fr.* Hémorrhoides; *Ger.* Hämorrhoiden, Hämorrhoidalkrankheit, guldene Ader, Goldaderfluss, Goldaderkrankheit.

By the older writers the term hæmorrhoidis (ἡμorrhοΐς), which literally means "flux of blood," was generally employed with that signification, or for menstruation, and especially profuse menstruation, but never, according to Dr. Good, in the sense in which it is now used;—that is, of *hemorrhage from the anus*. It is not, however, confined to such hemorrhage, but has been extended so as to include certain tumours that are seated in, or connected with, the rectum.

Diagnosis.—Most of the writers of continental Europe speak of a special condition of the system, which gives rise to hemorrhoidal discharges. This they term the hemorrhoidal diathesis, or impulse,—*Diathesis hæmorrhoidalis, Motus hæmorrhoidalis, Molimina hæmorrhoidalia*; *Ger.* Hämorrhoidaltriebe, Hämorrhoidalanlage, Hämorrhoidalschwerden. It is frequently announced by signs denoting a concentration of the vital activity inwards,—as chilliness; cold extremities; heat and pain in the rectum or anus, and sense of weight in the loins, often accompanied by symptoms of gastric, cerebral, and, indeed, general disorder. After these premonitions have continued for a time, blood is discharged, sometimes copiously, at others, only at intervals. Occasionally, especially in the first of these cases, it is of a more or less florid colour, and is liquid, seeming to be a true sanguineous exhalation from the mucous membrane; at other times, when discharged at intervals, the blood is retained in the rectum, and is dark-coloured and grumous. The quantity exhaled may be such as to destroy life suddenly; but this is not common; it more frequently continues for a longer or shorter period, so as to gradually exhaust the system. Not unfrequently, the hemorrhage recurs periodically, and becomes the result of associated actions, so that it cannot be arrested with impunity.

This hemorrhage or *hemorrhoidal flux*—*Fluxus hæmorrhoidalis, Hæmorrhagia proctica*—may be, as before remarked, a mere exhalation from the mucous membrane; but, in other cases, it takes place from the rupture of those tumours to which the name *Hæmorrhoids* or *Piles* has been appropriated by the moderns. Their supervention is often indicated by the same symptoms that characterize the *Dia-*

thesis hæmorrhoidalis. These tumours may be *external* or *internal*. The *external* form at the margin of the anus, sometimes in great number; at others, not more than one. They are commonly of the size of a pea, but occasionally attain that of a walnut, and have been met with, in females of advanced age, of the size of the fist. They are generally round; but, occasionally, of irregular shape, smooth, and elastic. Their colour is red, brown, or blue; and they are hot and painful,—the pain being lancinating and pulsatory. Internal hemorrhoids are placed within the verge of the anus, so that they can only be seen when the patient forces down, or be felt by an examination.

When the hemorrhoids are attended with a discharge of blood, they are termed *Open piles*, (SYNON. *Bleeding piles*, *Hæmorrhoids cruenta*, *Proctica marisca cruenta*, *Hæmorrhoides fluentes*.) In the opposite case, they are called *Blind piles*, (SYNON. *Hæmorrhoids cæca*, *Proctica marisca cæca*; Ger. *Blinde Hæmorrhoiden*.)

During the first days of the disease, especially when the patient retains the erect posture, the hemorrhoids are tense, and the pain is severe and pulsatory, exciting great uneasiness, at times,—so much so, as to render the sitting posture impracticable. Gradually, however, in the generality of cases, either spontaneously or through the exertions of art, they subside, become rugous, pale, and disappear. The pain during defecation is especially great, unless care is taken, that the fæces are of such consistence as not to induce irritation. Generally, hemorrhoids terminate by resolution, leaving perhaps a greater tendency to the same morbid condition. Occasionally, however, they remain troublesome, so as to require the attention of the surgeon for their removal. At times, too, if neglected and irritated, the inflammation extends to the surrounding parts, and fistula, or other disease of the rectum, may be the consequence.

Causes.—It has been presumed, that hereditary conformation may predispose to the hemorrhoidal diathesis. Unquestionably, period of life has an influence. The disease is rare in young persons, and is most common between thirty and fifty years of age. It can readily be understood, too, that whatever interferes with the due circulation of the blood through the abdominal venous system,—as liver disease, pregnancy, a sedentary life, or long continued exercise with the body erect,—may predispose to every form of hemorrhoids. The immediate exciting causes are commonly local;—such as obstinate constipation, with indurated fæces, which exert injurious pressure on the rectum in defecation; and the abuse of purgatives, enemata or suppositories.

Pathological characters.—The old opinion was, that hemorrhoidal tumours are merely dilated hemorrhoidal veins (*Varices hæmorrhoidales*);—and sometimes they unquestionably are so. Attentive pathological investigation would seem, however, to show, that they are more commonly constituted of a truly erectile tissue. At other times, again, and in the opinion of many observers, they are, most frequently of all, constituted by an effusion of blood into the submucous cellular tissue of the rectum. These last have been considered the true hemor-

rhoidal tumours—*mariscæ*,—those of a larger size being thus formed, whilst the smaller may be mere varices.

Treatment.—The treatment of the hemorrhoidal flux rests upon the same principles as that of hemorrhage from the intestines in general. The seat of the transudation can, however, in this case, be easily reached, if we are desirous of causing our hæmastatics to come into immediate contact with it. In all cases, inquiry must be made as to the pathological conditions that accompany the hemorrhage; and it is not until this becomes dangerous from its quantity, that topical applications are much needed: in such cases, cold, and the most efficacious of the mineral and vegetable astringents may be prescribed;—care being taken, that they are not used of such strength as to condense and corrugate the parts so much as to endanger the supervention of inflammation. The iodide of iron^a and creasote^b form valuable hæmastic injections.

^a R.—Ferri iodid. ʒi.
Aquæ, Oj.—M.

^b R.—Creasot. f ʒss.
Aquæ, Oss.

When the discharge of blood is very copious, the rectum must be examined carefully, in order, if possible, to ascertain the spot whence the hemorrhage proceeds. In such cases, powdered alum, or tincture of creasote,^a or the tampon, or caustic, or even the actual cautery, may be demanded. The case then becomes one of surgery.

^a R.—Creasot. p. i.
Alcohol. p. viij.—M.

The sudden suppression of the hemorrhoidal discharge, or its non-recurrence at accustomed periods, has been regarded as the cause of many diseases; and there cannot be a question, that the agency may be occasionally morbid, but not so frequently as is generally believed. When the person anticipates its recurrence, he should avoid much exercise or sitting in the erect posture; the diet should be light and laxative,—consisting of stewed prunes and other fruits; and, in every form of hemorrhoids, the seats, which the patient uses, should be stuffed. In the violent inflammatory and painful condition of external hemorrhoids, relief is obtained by the application of leeches immediately over the tumour—if practicable; if not, around the margin of the anus. The patient may, likewise, sit over hot water; apply warm fomentations and emollient cataplasms, and use injections of the same kind. At the same time, the bowels must be kept well regulated by the mildest cathartics—as sulphur, magnesia, or castor oil—or by the use of the mild mucilaginous injections, of which a decoction of flaxseed, or the infusion of the slippery elm, is as good as any. Before the patient is about to have an evacuation, it may be well to throw up one of these injections, or a small quantity of bland oil.

Difficulty is sometimes experienced in returning protruded hemorrhoids. Pressure alone will not accomplish it; but if the patient be directed to make a forcible expulsive effort, and pressure be made simultaneously, the tumour frequently recedes immediately; the sphincter is relaxed; the ligature, which it forms around the tumour, is removed, and the reduction is easy.

At times, the local inflammatory symptoms are so violent as to implicate the whole system, and require general blood-letting, but this is not common. Occasionally, too, a hemorrhoid, whose base is within the anus, passes through during the efforts at defecation, and excites great suffering, which can only be relieved by returning it to its place.

From the first, but especially after the first few days, an ointment of powdered galls and opium, or of nitrate of silver, applied by the end of the finger, where this can be done, affords great relief.^a Fomentations and poultices of *datura stramonium*, and ointments composed of this and other narcotics, have likewise been employed. When the tumours remain torpid, more active astringents than the *unguentum gallæ* are of use.^b

^a R.—Gallar. pulv. ʒj.

Opii. pulv. ʒss.

Adipis, ʒss.—M.

R.—Argent. nitrat. in pulv. ten. gr. v.

—x.

Adipis, ʒj.—M.

^b R.—Alumin. ʒj.

Adipis, ʒij, or,

R.—Ung. plumbi acet. ʒss.

Alumin. ʒij.

Opii, ʒss.—M.

When the hemorrhoids make their exit through the anus and become strangulated, and none of the ordinary methods of management succeed in discussing them, the case becomes surgical, and the hemorrhoid has usually to be removed either by ligature or excision. A dangerous sequel to the latter operation is profuse hemorrhage, under which patients have sunk in spite of every exertion on the part of the practitioner. If pressure should not succeed in arresting the hemorrhage, the only resource is the actual cautery.

In the form of hemorrhoids to which the term *vascular tumour* has been applied, and which Dr. Houston, of Dublin, regards as an affection of the mucous membrane and submucous tissues exclusively, having for its base a knuckle or bunch of varicose veins, or else as being a distinct and independent growth, the result of some other irritation in that region, but giving rise ultimately to the formation of a varicose condition of the diseased part, that gentleman has recently found great benefit from the application of nitric acid, of the specific gravity of 1.500. He directs the patient to strain, as at the night chair, so as to bring the tumours fully into view; and whilst they are down, he lets him either lean over the back of a chair, or lie down, in the bent posture, on the side on which the disease exists, with the nates over the edge of the bed. When the patient is thus placed, a piece of wood, cut into the shape of a dressing-case spatula, is dipped in the acid, and then, with as much of the acid adhering to it as it will carry without dripping, it is rubbed on the tumour to the extent desired,—its effects being exhibited by the colour of the part being changed to a grayish white. One or more applications of the acid are needed, according to the depth of the slough required, after which the whole is smeared with olive oil, which destroys the farther escharotic action. The prolapsed parts are then pushed back within the sphincter, the patient is put to bed, and an opiate administered. The pain is at first sharp and burning, but it goes off in two or three hours, and does not return in the same form. A general uneasiness about the anus, on

motion, together with a slight sense of heat, fulness, and throbbing, are felt for a few days, and there may be some feverishness; but the symptoms following the application are usually so mild as not absolutely to require confinement to bed for more than a few hours, although such confinement may often be desirable. On the third or fourth day, Dr. Houston prescribes a cathartic draught, which is found to act generally without either pain or prolapsus of the rectum. After this the improvement is rapid, and free from any dangerous accompaniments.

XII. PROLAPSUS ANI.

SYNON. Proctoceles, Proctica Exania, Procidencia Ani, Exania, Prolapsus Intestini Recti, Archoptosis, Proctoptosis, Sedes Procidua, Falling down of the Fundament, Prolapsion of the Anus, Coming down of the Body; *Fr.* Prolapsus de l'Anus, Chute du Rectum, C. du Fondement, Renvèrsement du Rectum; *Ger.* Vorfall des Mastdarms, V. des Afters.

Two divisions of prolapsus ani have been made; the one consisting of prolapsus of the rectum, *Prolapsus totius recti*, *Procidencia recti*; the other being a prolapsus of the lining membrane alone,—*Prolapsus membranæ mucosæ recti*, the *Anatrophe recti* of Swediaur. The names sufficiently indicate the character of the two affections. In both, the protruded portions are closely embraced by the sphincter, which interferes with the return of the blood, and excites considerable pain. In cases in which the prolapsus is very considerable—six to ten inches in length, for example,—it is presumable, that there is an invagination of the sigmoid flexure of the colon. Such cases have been recorded by Morgagni and Langstaff.

Diagnosis.—The slightest degree of prolapsus of the mucous membrane of the rectum, is indicated by a sense of bearing down and smarting, especially when the fæces are evacuated, and still more when they are of too great consistence. As soon, however, as the rectum has been emptied, the protruded portion either returns of itself, or with very slight pressure made by the patient or nurse. If the affection be neglected, the protrusion becomes greater and greater, and ultimately is not easily replaced, unless when the patient is in the horizontal posture, and then it remains only momentarily. The intestine being constantly exposed to the air, and to friction from clothes and sitting, becomes inflamed and ulcerated; the epithelium of the mucous membrane is converted into cuticle; and in bad cases, is fungous, indurated, and varicose, exhaling blood and an offensive sanies. It now becomes impossible to replace the gut; the health suffers; digestion is impaired, and the patient may sink, worn out by hectic. This is fortunately a rare termination, and ought never to supervene, if ordinary attention were paid in the earlier periods. In all cases, the pain is increased during defecation, and when the person is in the erect attitude; the mucous membrane is of a dark red, sometimes almost black colour.

Causes.—Age affords a predisposition; the affection being seen most commonly in infancy and advanced life, in consequence of the atony of the muscular and other tissues. The exciting causes are—hard-

ened fæces; great straining; the abuse of emollient and other glysters, suppositories, or purgatives; long protracted diarrhœa, or dysentery; hemorrhoids; worms; laborious parturition; diseases of the urinary organs, &c.

Treatment. In accidental cases of prolapsus, the intestine is generally reduced with facility. The child, if the disease occur in infancy, being placed on the back, gentle pressure must be applied to the protruded intestine, with the thumbs of the nurse previously dipped in oil; or, what is better, it may be laid on its face, the thighs separated, and the nates pressed together. But should these means fail, the forefinger, previously oiled or greased, may be introduced into the gut, in order to remove the stricture from the sphincter. This is certainly a more safe and speedy plan than the application of astringent substances to the protruded parts, which may irritate and inflame them.

Where the procidentia in infants is kept up by worms, diarrhœa, &c., these affections must be removed, and whilst a tendency to protrusion remains, the bowels should be kept open by the mildest laxatives, or by clysters. All irritation of the bowels should be guarded against, and the nates be dipped twice a day or oftener in cold water. As the child grows older, the affection usually passes away; but should it persist for a great length of time, or the portion which escapes be very considerable, astringent injections and fomentations should be had recourse to, such as a decoction of oak bark,^a or alum,^b or the two combined.^c

^a R.—Quercus cort. 3ss.
Aqua, Oij.
Coque ad Oj.

^b R.—Alumin. 3j.
Aqua, f 3vj.—M.

^c R.—Querc. cort. 3j
Aqua, Oiss.
Coque ad Oj. et cola: tum adde
Alumin. 3ss.—M.

If the procidentia have been down for some time, and the swelling and inflammation are considerable, it may be necessary to apply cold lotions, and to surround the prolapsed part with a cloth, making gentle pressure upon it so as to reduce its size, after which it can generally be returned. If much inflammation exist, leeches may be needed. When young children have been for a long time subject to the protrusion, it has been advised that they should be made to sit upon a hard flat stool, or in a chair without arms, and so high, that they cannot touch the ground with their feet. When they are so old, however, as to walk about, the T bandage, supported by a bandage over the shoulders in the form of braces, may be applied, with or without the aid of cold lotions, as may be esteemed advisable.

Should all the usual means fail in curing the prolapsus—which is not a common occurrence—the case has to be transferred to the surgeon, who may consider it advisable to remove some of the projecting folds of the skin, which converge at the margin of the anus.

In the cases of prolapsus that are produced by invagination of the intestine—which may be known by their great length, as well as by the practicability of carrying the index finger very high up in the cylindrical groove situate between the invaginated portion and the

rectum, whilst in procidentia of the mucous membrane, the finger is arrested by a *cul-de-sac* at the part where the relaxed mucous membrane is detached from the muscular coat—but little can be done, and the prognosis ought always to be unfavourable. In rare cases, however, the invaginated portion has been discharged *per anum*.

XIII. CONCRETIONS IN THE INTESTINES.

SYNON. Concretiones alvinæ, Enterolithi; *Fr.* Calculs des Intestins, C. intestinaux, Pierres Stercorales, Concrétions intestinales; *Ger.* Darmsteine.

Concretions of various kinds are met with in the intestinal canal. The scybala, to which reference has been made so often, have indeed been classed amongst them by Dr. Good, under the name *Enterolithus scybalum*. These, as has been shown, must be regarded as essentially constituted of indurated fæces.

Diagnosis.—The signs, that denote the presence of concretions of any kind in the digestive tube, are equivocal, and must, of course, vary according to the situation, size and number of the concretions. These are rarely seen in the stomach, except in the herbivorous animal, where they have been frequently met with. Cases have occurred in which they have been vomited from the human stomach.

When the concretions are seated in the intestinal canal, the symptoms are at times those of obstruction, and at others, of irritation of the lining membrane, as indicated by constant diarrhœa and tormina. Sooner or later, a hard circumscribed tumour may be felt in some part of the intestinal tract, to which pain, especially on pressure, is referred. This tumour is commonly immovable, but may change its position somewhat as the position of the body is varied. Most frequently, it is referable to some part of the colon, and especially to the cæcum, where it may give rise to inflammation of that intestine. At other times, the concretion becomes impacted in the appendix vermiformis cæci, exciting inflammation in that appendage; and, wherever situate, if it be not got rid of, the irritation, induced by its presence, may gradually wear out the patient.

When the seat of the extraneous body—if it may be so termed—is the rectum, a sensation of disagreeable weight is referred to that intestine, with constant efforts to evacuate it, and not uncommonly the patient suffers from hemorrhoids, vesical irritation, and inflammation of the rectum. Defecation is difficult, and but little relieved by cathartics; and enemata cannot be thrown up in any quantity. These symptoms lead to an exploration of the intestine, when the precise nature of the affection is appreciated.

As the concretion is gradually formed, the symptoms, induced by it, generally supervene gradually. The terminations may be various. It may be evacuated by vomiting, by the bowels, or by adhesion of the intestine to the peritoneum and suppuration through the parietes of the abdomen, in all which cases the event may be favourable. It may eventuate also unfavourably, by inducing fatal inflammation or gangrene of the intestine and peritoneum, or rupture of the intestine.

The concretion is generally free in the canal, but in rare cases it

is adherent. The part of the tube, in which it is seated, is usually enlarged, and thickened, and the dilatation forms a kind of sac in which the stone is contained.

Character of the concretions.—The number of concretions met with has varied:—in the stomach, as many as from ten to one hundred and more have been found. The size and weight have been equally various—from a few lines to some inches, and from a grain to some pounds. They are generally roundish, oval, or spherical; at times, however, long, cylindrical, plano-convex, or flat; and, when several of them exist together, their triangular surfaces exhibit that they have been pressed against each other. At times, they have the shape of the colon. The larger the calculus, the more irregular, in general, is its form; and, not unfrequently, it is constituted by the aggregation of several smaller concretions.

Most of the intestinal concretions, both of man and animals, have a nucleus, which may be so intimately associated with the matters deposited upon it, as not to be distinguished. The concretions, that are formed entirely of magnesia, have none. In man, the nucleus has been a cherry or plumstone; a salivary or biliary calculus; a small piece of bone; a needle; an eggshell; sand or gravel; a splinter of wood; a calcareous substance, &c. &c.

In their chemical characters, the intestinal concretions in man may be divided into, 1, those in which the inorganic, and, 2, those in which the organic constituents prevail. In the *former*, phosphate of lime is the main component. The following constituents were found in one: phosphate of lime, 45·34; ammoniaco-magnesian phosphate, 5·16; animal matter, 25·20; vegetable fibres, 20·30; resin, 3·90, and in another, found in the colon, and of which a plumstone was the nucleus, the following were the constituents:—phosphate of lime, 45·34; ammoniaco-magnesian phosphate, 5·16; lime, (carbonate?) 25·20; sulphuric and chlorohydric acids, traces; resin, 3·90; wood fibres, 20·30, and animal matter. Other concretions have been found to consist, chiefly, of magnesia, which had accumulated under long protracted use of the article. In those in which the organic matters predominate, fat and cholesterin are the principal constituents, united with phosphate of lime: the fat is probably a secretion from the mucous membrane, and the cholesterin we know to be the animal principle of biliary calculi.

The great difference between the calculi found in the intestines of man and animals appears to be, that in the former the phosphate of lime is the chief constituent, whilst in the latter it is the ammoniaco-magnesian phosphate. In both, vegetable or animal substances most commonly form the nucleus, and animal mucus is the binding material.

Treatment.—As the diagnosis of the existence of these concretions is extremely difficult, it is not easy to lay down any precise plan of treatment. Frequently, they remain long in the intestines without causing any mischief, but, at other times, they induce enteritis, or cause obstruction of the bowels and its sequelæ. These have already been pointed out, along with the appropriate management.

When the concretion is in the rectum, it may be extracted by the polypus or calculus forceps, or by the handle or mouth of a table-spoon, or by a scoop or marrow spoon: it may be necessary, first of all, to break it down.

It has been advised, that the operation of *laparo-enterotomy*, or of opening the parietes of the abdomen and the intestines, so as to remove the stone, should be practised; but such an operation can scarcely be admissible.

XIV. WORMS IN THE INTESTINES.

SYNON. Helminthia Alvi, Vermes Intestinales, Enthelminthes, Entozoa, Endozoa, Entozozaria, Intestinal Worms; Fr. Vers Intestinaux, Entozoaires du Tube Digestif; Ger. Intestinalwürmer, Eingeweidewürmer.

All animals and vegetables, and every part of them, are liable to be infested by parasites; but those only that are seated in the intestines are the cause of much uneasiness to man. In some animals, their presence elsewhere is the cause of much mischief. They have been found in the lungs, kidneys, and urinary passages; liver and biliary passages; brain, skin, cellular tissue, muscles, blood, the aqueous humour of the eye, the cornea, &c. of animals. Where they are present in great numbers or size, in the intestinal canal, it is owing to a particular condition, which has been termed *Invermination* or *Worm Disease*, *Helminthiasis*, *Scoleciasis*, *Morbus verminosus*, *Status verminosus*, *Saburra verminosa*, *Vermitio*, *Verminatio*, and *Parasitismus intestinalis*; Fr. *Helminthiase*; Ger. *Würmkrankheit*, *Wurmsucht*.

The following table exhibits the entozoa, which have been met with in the human body, and their usual habitat.

| ENTOZOA. | WHERE FOUND. |
|---------------------------|----------------------------|
| Tricocephalus dispar. | Intestines. |
| Oxyuris vermicularis, | |
| Ascaris lumbricoides, | |
| Bothriocephalus latus, | |
| Tænia solium, | |
| Ditrachyrceras rudis. | Urinary Bladder. |
| Diplosoma crenata, | |
| Spiroptera hominis, | |
| Dactylius aculeatus, | |
| Distoma hepaticum, | |
| Strongylus gigas, | Gall Bladder. |
| Filaria oculi, | Kidney. |
| Acephalocystis endogena, | Eye. |
| Echinococcus hominis, | Liver. |
| Polystoma pingucicola, | Liver, Spleen and Omentum. |
| Filaria bronchialis, | Ovary. |
| Trichina spiralis, | Bronchial glands. |
| Cysticercus cellulosæ, | Muscles. |
| Acephalocystis multifida, | Brain. |
| Filaria medinensis, | Cellular texture. |

The worms that infest the intestinal canal are not numerous. They are,

1. *Tricocephalus dispar*, *Trichuris*, or *long threadworm*; Fr. *Tricocéphale*; Ger. *Peitschenwurm*, *Haarkopf*, which is a round, white worm, from an inch and a half to two inches long, and generally inhabits the large intestines, especially the cæcum—being rarely seen

in the small intestines. More than one thousand, according to Rudolphi, have been found in the intestines of a female. Dr. Bellingham affirms, that it is very common in Ireland, or at least in Dublin.

2. *Oxyuris vermicularis*, *Ascaris vermicularis*, *Helminthion*, *Maw* or *Thread worm*; Fr. *Ascaride*, *A. vermiculaire*; Ger. *Pfriemenschwanz*, *Springwurm*, *Madenwurm*, *Askaride*, is commonly found in the rectum, but is migratory. It is usually met with in children, but not unfrequently in adults. *Ascarides*—as they are generally termed—are frequently found gregarious in the intestinal canal, in the form of a ball, and, occasionally, so covered with mucus as not to be easily accessible to the action of anthelmintics. At times, they migrate from the intestines, and lodge in the parts of generation of the female, or in the urethra, exciting irritation and a kind of leucorrhœa. Many of these worms, it is affirmed, have been found in the intestines of a new-born child. Cysts, filled with them, have, likewise, been discovered between the membranes of the stomach and œsophagus.

3. *Ascaris lumbricoides*, *Helmins*, *Lumbricus teres hominis*, *Ascaris gigas hominis*, or *long round worm*; Fr. *Lombricoïde*, *Ascaride lombricoïde*; Ger. *Spulwurm*, is most commonly met with in the intestinal canal, especially in the small intestines. It has been found, however, in the ductus pancreaticus, the ductus communis choledochus, and gall-bladder; and is, at times, voided by the mouth. Sometimes, the intestinal tube is almost filled with them, and they are occasionally congregated in the form of a ball. As many as eighty have been voided in a case of fever. When dead, the worm is quite stiff. It is usually from three to twelve inches in length, and from a line and a half to two lines in diameter. The colour varies according to that of the aliment—being frequently of a milky or brownish-ash—rarely of a blood-red.

A new species of ascaris has lately been found, and called by Dr. Bellingham, *Ascaris alata*. It is about three and a half inches long; the greatest diameter, posteriorly, three quarters of a line; the shortest diameter, anteriorly, half a line. The body is cylindrical, of a dirty-yellowish colour, marked with the four longitudinal lines, and with the transverse very close striæ, that are found in the other species. The ascaris alata is very distinct from the ascaris lumbricoides of the human subject. In general appearance, it is not unlike the *ascaris mystax*, which inhabits the stomach and small intestines of the cat.

4. *Strongylus gigas* is rarely found in the intestines. It is met with five inches, a foot, a foot and a half, and even three feet long, and from two lines to half an inch in diameter. Those that are found alive, especially in the kidneys, are of a blood-red colour; but, when preserved in spirit, they become brown, grayish, or white. The strongylus gigas is commonly met with in the kidneys, rarely in other viscera, and still more rarely in the intestinal tube. It has, doubtless, been confounded with the ascaris lumbricoides.

5. *Distoma hepaticum*, *Fasciola hepatica*, *F. humana*, *Fluke* or *Liver fluke*; Fr. *Fasciole*, *Douve*; Ger. *Leberwurm*, *Egelschnecke*, *Schafegel*, a flat worm, an inch—more or less—in length; from four to six lines in breadth; and of a dirty-yellowish, greenish, or brownish

colour, has been found in the human gall-bladder, although not often. Thence it passes occasionally into the intestinal canal.

6. *Bothriocephalus latus*, *Tenia lata*, *T. vulgaris*, *Lumbricus latus*, or *broad tape-worm*; Fr. *Tenia non armée*, *Ver solitaire*, *T. à anneaux courts*; Ger. *Bandwurm*, *breite oder kurzgegliederte Bandwurm*, *Grubenkopf*, is flat, or nearly flat—as its name imports—generally from ten to twenty feet long, and is, at its broadest part, from a few lines to half an inch broad. It is rarely discharged entire; is of a white colour; but, when macerated in spirit of wine, becomes darker, whence its name *Tenia grisea*. A broken specimen of it has been obtained sixty yards long. It is not common in the United States. As a proof of its general unfrequency, it is asserted, by a distinguished helminthologist, Rudolphi, that, so far as he knows, it has never been met with on dissection.

7. *Tenia solium*, *T. cucurbitina* or *long tape-worm*; Fr. *Tenia armée*, *Ver cucurbitain*; Ger. *Kettenwurm*, *Kürbiswurm*, *Kürbisbandwurm*, *langgegliederte Bandwurm*, is commonly a few feet long, but, at times, attains an enormous length. It inhabits the small intestines, and has been met with after death. It has been found extending from the pylorus to the distance of seven inches from the anus, and is said to have been seen of the enormous length of 600 feet. It may exist in the intestines along with other worms, although this has been denied by Rosen von Rosenstein.

8. The *Ditrachyceras rudis*, *Diceras rude*, (F.) *Bicorne rude*, was first described by Sultzer, of Strasburg, in the year 1808; but it was regarded by Bremser to have been nothing more than a seed, and was consequently neglected, and almost forgotten. Recently, however, specimens of worms were sent from the island of Bornholm to Professor Eschricht, which had been passed in enormous quantities by a young girl after a severe disease. They were found to be the *Ditrachyceras* of Sultzer. These, however, are the only cases of the kind on record.

Diagnosis.—If attention be paid to the mode in which entozoa are probably formed, and the gradual manner in which they must be developed in the stomach and bowels, it would seem, that the parts may be so accustomed to their presence, that they may not, unless when in unusual quantity or of unwonted size, give rise to much irritation, or to symptoms, by which their presence can be diagnosticated. It is, indeed, impossible to pronounce positively as to the existence of worms in the intestines, until we see them in the evacuations. On this point, almost all physicians, at this day, accord: there are still some, however, who place great reliance upon a catenation of symptoms, every one of which may belong to other affections. As the functional disorders, induced by worms, are identical with those induced by irritation of the intestines, it is impossible, independently of the evidence derived from the presence of worms in the evacuations, to decide, whether these disorders be owing to the one or the other. The symptoms are, indeed, so identical with those of gastroenteritis, that the very existence of worms has been ascribed to that affection. "Worms in the bowels," says a well-known systematist,—Broussais,—
"are most frequently, but not always, the product of the alteration of

the mucus and heat, which results from a gastro-enteritis of greater or less intensity: hence, the very various effects of irritating anthelmintics." That they are accompanied with gastro-enteritic symptoms, at times, is unquestionable; but the condition—as we shall see—which favours their developement, is by no means one of inflammation,—in the large majority of cases at least.

As a proof, that they give rise to no pathognomonic signs, even when they may be present in an unusual quantity, it is but necessary to point out some of the symptoms that have been considered to indicate their existence in the alimentary tube. *First.* In the head:—Tumid, pale, or livid face; lower eyelid of a leaden colour; itching or sensation of tension felt in the nose; sense of smell depraved, or lost; epistaxis; discharge of saliva during sleep; fœtid breath; stridor of the teeth; mucous sordes on the tongue; stammering; aphonia; loss of articulation; strabismus; retraction, contortion or fixedness of the eyes; dilatation and immobility of the pupil; objects appearing yellow; sudden amaurosis; moroseness; stubbornness; frightful dreams; cries, and terror, when awake; chorea; risus sardonicus; vertigo; delirium; and stupor,—such are the symptoms, referable to the head alone, which are asserted to have been present, and to have been produced by worms. *Secondly.* In the chest:—Dry, tickling cough; sobbing; interrupted sighs, like those of children; anxiety; pleuritic pains; failure of milk in nurses; hiccup; sensation of a foreign body rising slowly from the stomach along the œsophagus; and one instance is mentioned by Frank, of worms reaching the nasal fossæ, and falling into the larynx, so as to produce suffocation; *and lastly*, in the abdomen:—Irritation in one or more points of the intestinal canal; and sympathetic effects in the whole length; insatiable hunger, with progressive emaciation; appetite variously modified; sometimes nausea, retching, cardialgia, vomiting and expulsion of worms from the mouth; borborygmi; sudden swelling of the abdomen, now and then simulating pregnancy; a sense of coldness, gnawing or tearing in the intestines; inanition; palpitations; sensation of an extraneous body creeping, becoming elongated, or retracted upon itself; partial tumefaction of the abdomen; meteorismus; eructations; intussusception; tormina; spasms; colic; retraction of the abdominal parietes; tenesmus; hemorrhoidal symptoms; discharge of mucus *per anum* or *per vaginam*; mucous diarrhœa containing very fetid, black fæces; the debris of rotten worms; the annuli of the tænia; or worms rolled in the form of a ball; obstinate constipation; derangement of the menstrual secretion; abortion; whitish or thick urine; dysuria; ischuria; obstruction and inflammation of the intestines, &c., &c.

It thus appears, that there is scarcely a symptom, referable to the nervous system, or to the great splanchnic cavities, which has not been ascribed to worms. Almost all agree, however, that, amongst other matters, the patient complains of a sense of pricking or tearing in the intestines; insatiable hunger; distressing itching of the nose; dilated pupils, &c. &c.; yet there is not one of these symptoms, that does not belong to other affections.

Some have asserted, that the intestinal canal is occasionally perforated by them; but if this have ever happened, it is an extremely rare occurrence. More commonly, an ulcerative process has been established in the intestine, through which the worms have passed.

Not many years ago, a *Febris verminosa* or *Worm fever* was presumed to exist, in consequence of its having been observed, that, in the remittent fever of children, worms are occasionally discharged; but—without meaning to deny, that these parasites may be the cause of constitutional disturbance of the kind in question—the opinion, that these fevers are intimately connected with a morbid state of the lining membrane of the intestinal canal, is more consistent with correct observation; and, accordingly, it has been positively denied that there is any such disease as worm fever. It is generally considered sufficient proof, that any disease is occasioned by worms, if they be discharged in its progress. But this is often an erroneous inference. In the disordered condition of the secretions, induced by febrile disease especially, the situation of the entozoa becomes unpleasant to them, owing to the increased heat and modified food; and, accordingly, they migrate; yet they may have had no agency whatever in the causation of the febrile affection. The truth appears to be, that worms may exist in every possible state of the digestive tube, but that they rarely, if ever, accumulate, unless under circumstances to be mentioned hereafter. The cause of their undue accumulation has always, therefore, to be investigated. It is this cause, which must be regarded as the main pathological condition to be combated. Yet there is no doubt, that the worms themselves may, although much less rarely than is imagined, react on the system, by inducing irritation of the intestinal canal, and sympathetic mischief elsewhere. The copious discharge of entozoa should, consequently, attract attention to the state of the system, which gives occasion to their unusual propagation, and to the rectification of this, otherwise the different vermifuges may be administered in vain.

But although the evidences of worms, in general, must be regarded equivocal, we may judge of the presence of one of them,—the *oxyuris vermicularis*,—by the troublesome and almost insupportable itching within the anus, which, in many instances, is experienced more at evening, and during the night, and is caused by the motion of the worms on the sensible extremity of the intestinal mucous membrane. Occasionally, too, as has been remarked, they creep out of the rectum, or induce procidentia ani; and tenesmus is a common concomitant.

Of the presence of the other varieties of entozoa, we have no pathognomonic symptoms. We can only suspect, says Dr. Marshall Hall, the existence of the formidable *tænia*, “from a sense of gnawing pain in the stomach; give a cathartic and examine the evacuations.” Yet no one, from the simple circumstance of a gnawing pain in the stomach, would be led to suspect the presence of this worm particularly; and, on the other hand, a cathartic may afford no positive evidence, even when *tænia* is really there. What shall we say of the diagnostic sign, quoted without comment by Dr. Eberle—generally cautious in his assertions, and withal philosophical in his deductions—

that "it is stated by authors, that persons, affected with *tænia*, become uneasy and ill whenever they hear music; particularly the music of an organ at church!"

Causes.—The origin of intestinal worms, has been an interesting topic with the physiologist, and has given rise to the renewal of the question, whether the maxim, "*omne vivum ex ovo*," be strictly accurate. There are but two ways in which they could originate within the body.—1, by the reception of germs from without, or by regular generation; and 2, by a fresh formation within the body or by *spontaneous* or *equivocal generation*. It has been considered by Dr. Stokes important to settle this point, in order that we may be able "to establish proper principles of treatment;" but as a question of therapeutics, it may be regarded as of little interest. The important inquiry is into the condition of the animal body, which affords a proper nidus for the germs, if received from without, or which causes their development, if formed within the body.

Elsewhere, (*Human Physiology*, 5th edit., vol. ii., Philadelphia, 1844,) the author has entered into this question, and has shown, that whilst many distinguished physiologists and naturalists believe in the doctrine of regular generation as applicable to entozoa, and to certain of the lower classes of animals, the mass unhesitatingly give their assent to the doctrine of spontaneous generation. There is great difficulty on both sides of the question. Worms are found in parts that have no external communication,—as in the cavity of the eye, and the muscular or cellular structure; and they have been met with in the intestines of the foetus in utero. This last fact is one of the strongest difficulties in the way of the germs being received from without; and yet, if we admit of spontaneous generation, it would seem probable, that endless varieties might present themselves. The *Ditrachyceras rudis*—as already stated—has been met with in but two instances,—once in Strasburg in the year 1805; and once in the island of Bornholm in 1841. It has been remarked by Dr. Stokes that there is not much more difficulty in conceiving the formation of a living worm within the body, than there is of conceiving the organization of a portion of lymph thrown out upon the surface of a serous membrane: the difficulty is indeed extreme in both cases.

Of the remote or predisposing causes of worms, one is climate or locality. In Egypt the *tænia solium* is extremely common; and in Holland and Switzerland it is often seen. It has been affirmed, that the *bothriocephalus latus* is met with only in Switzerland, Poland, and Prussia; whilst in England, France, Holland, and Germany, the *tænia solium* alone prevails; and in those parts of France, which border upon Switzerland, the inhabitants are infested by both. Climate affords, therefore, a predisposition to some kinds at least. In this country, *tæniæ* are rarely seen, but the *ascarides lumbricoides* and *oxyures vermiculares* are very common.

Age is another predisposition, childhood being the most prone to invagination; the *oxyures* are very common in the first years of existence, and the *ascarides lumbricoides* at an early age also. At La Salpêtrière, the Parisian hospital for the aged, the *ascarides lum-*

bricoides are scarcely ever found on dissection, whilst in the Hôpital des Enfants Trouvés, which is appropriated to the reception of children, multitudes are met with,—as many as forty-two, according to M. J. Cloquet, in the same individual. The bothriocephalus latus and tænia solium are rare in children.

Sex has been usually esteemed a predisposition; worms being presumed to be more common in the female.

It has been already remarked, that Broussais refers the existence of worms, in most cases, to gastroenteritis;—the increased heat and alteration of mucus giving rise to their spontaneous formation; but he presents no facts, on which the mind can rest; and, on the other hand, in acute gastroenteritis, there does not seem to be time sufficient for their developement. Indirectly, gastroenteritis, like every other irritation, may occasion the developement of entozoa, but only by deranging the functions of secretion and nutrition. They have been met with in all conditions of the intestine,—when it has been red, pale, dry and covered with mucus. Often they are enveloped in a quantity of mucus, and there is some redness in the part of the lining membrane where they are lodged, but this has been regarded as the effect of their presence, rather than the cause.

The belief has been expressed, that persons in excellent health, and with the intestinal canal in a healthy state, may have worms; and it appears to us, that there can be no doubt of such being the fact. The existence of worms can scarcely perhaps be regarded as a pathological state, any more than the presence of parasites in the hair; but it may be laid down as a rule, that entozoa are not present in unusual quantity in the intestines, without the existence of a state of imperfect health, which favours their multiplication. In fact, any disorder or debility of the general system, or of the digestive organs, hereditary or acquired, a scrofulous habit, a sedentary and idle life, a poor diet, a residence in a cold, confined and damp situation,—in short, any thing, that can be the cause of an asthenic condition of the digestive tube, and the surrounding viscera, may be regarded as intimately associated with the undue prevalence of entozoa in the alimentary canal. It is asserted by Annesley, that the Hindoos who live entirely on rice are so infested with worms, that not more than one in ten is free from them; and it has been imagined by a distinguished helminthologist, Bremser, that the use of milk and farinaceous food, has considerable agency in their prevalence in his country. It was in consequence of the belief, that the generation of worms is usually connected with an asthenic condition, that the author placed the class of Anthelmintics,—in which he included not only the agents that destroy worms, but those that prevent their generation,—next to Tonics in the first edition of his "*General Therapeutics*."

It has been already observed, that locality evidently predisposes to worms, of a certain kind especially; or that worms may be endemic. A verminous diathesis may likewise occur epidemically. Such a complication appears to have existed during a visitation of cholera at Naples. (See page 142 of this volume.)

Treatment.—The indications of treatment, in cases of worms, are clear;—*first*, to destroy or expel the parasites; and, *secondly*, to prevent their regeneration.

Worms may be destroyed or expelled in various ways. The number of reputed vermifuges is very great; but many of them are unworthy of notice, and their place may be well supplied by others that are more in vogue at the present day. Of anthelmintics, some are immediately poisonous to worms; others act mechanically upon them, and occasion their expulsion. Of the anthelmintics, that are usually denominated *true*, or which are directly poisonous to worms, there are but few in general use. The seeds of *chenopodium*—the *wormseed* of this country, and those of *santonium*—the *wormseed* of Europe, are sometimes—frequently indeed—given, (gr. xx.—lx. pro dosi;) or the distilled oil, (*Ol. chenopod.* ℥ v.—x.) in molasses, the dose being administered every night for three nights in succession, and followed up on the next morning by a brisk cathartic;^a or *spigelia marilandica*, in the form of powder; (gr. x.—lx.) or the *infus. spigeliæ* (f. 3ss.—f. 3j.); or the *oleum terebinthinæ*, (f. 3ij.—f. 3j.) in molasses; or the following mixture.^b

^a R.—Jalap. pulv. ʒss.
Potass. supertart. ʒj.—M.

^b R.—Ol. tereb. f 3ss.
Vitell. ovi.
Aquæ menthæ, f 3ij. f. haustus.

Dr. Bellingham, of Dublin, does not esteem it necessary to administer the oil of turpentine, in cases of *tænia*, in the large doses which have been usually recommended. He asserts, that it will be equally effectual, if the system be kept for some time under its influence, by giving it in moderate doses, two or three times in the twenty-four hours, occasionally exhibiting a larger dose; and if no cathartic effect follows, combining it, or following it up with castor oil. He usually gives f 3ss. to f 3j. three times a day, and should this occasion strangury, he does not increase the dose. If, however, it be well borne, he gives on the third or fourth day, one ounce, with or without the same quantity of castor oil, and repeats it on the following day. These are the anthelmintics or worm destroyers usually employed. In cases of *tænia*, however, especially, other remedies have been recommended. The Germans extol highly the *Oleum animale Dippelii*, or *Dippel's animal oil*, which is obtained by distilling animal matters—as bones or hartshorn shavings—on the naked fire. The product is excessively nauseous, so that many stomachs cannot tolerate it; (dose, ℥ v.—xx.) The *empyreumatic oil of Chabert*, which is made by adding one part of the animal oil to three parts of the oil of turpentine, leaving them to combine for four days, and then distilling three parts, has been highly extolled. It, likewise, is extremely nauseous. The dose, advised to be taken, is a teaspoonful three times a day. Should these means fail, but little reliance can be placed on the hundred other anthelmintics that are prescribed. A strong decoction of the *helminthocorton*—*Fucus helminthocorton*—has been recommended on the authority of Dr. James Johnson, as the most powerful of all anthelmintics; and, it is affirmed, that when thrown into the rectum, it

"destroys any worms domiciliating there as effectually as choke-damp would destroy the life of a miner."

The *mechanical anthelmintics*,—or those that act upon the worms by rendering their situation unpleasant to them, and thus inducing them to migrate,—are few in number, and but little employed in this country. Granular tin, *Stannum granulatum*, has been recommended. It may be administered in molasses, (3j.—3ss.) and it can be readily understood, that the scraping of the metal over the lining membrane of the stomach and small intestines may augment chylosis, and improve the tone of the digestive functions in general.

The mode, in which the pubes or down of the *mucuna* or *dolichos pruriens* acts is singular. When placed in contact with the cutaneous surface, it excites intolerable itching; yet, when taken internally, mixed with honey and molasses, it excites no irritation of the mucous membrane of the digestive tube, but penetrates the bodies of the worms so as to lead to their expulsion. This strange circumstance has induced many to doubt the facts, that have been put on record in its favour, yet it is impossible to set aside the testimony of so many respectable observers. It is given simply mixed with soft honey, syrup, or molasses, (dose, one teaspoonful to two or three, night and morning,) a cathartic being administered on the third morning. Recently it has been proposed to exhibit in the same cases as the *mucuna*, the short and thick bristles, that are found on the involucre or cupula surrounding the nut of *Corylus rostrata* or Beaked Hazel. They have been found to possess similar virtues with *mucuna*, and to be equal to it in all respects. They may be given in syrup, molasses or other consistent vehicle, and in the same doses as *mucuna*. (See the author's *New Remedies*, 4th edit. p. 200. Philad. 1843.)

For the expulsion of worms, cathartics are valuable agents, but they must not be so often repeated as to induce debility of the digestive organs. For the expulsion of the *ascarides lumbricoides*, the purgative treatment has been esteemed, by some, the most successful of all. Any of the ordinary brisk cathartics^a may be given every other day, or less frequently, as the case may seem to require.

^a R—Jalap. vel rhei pulv. gr. xv.
Hydrarg. chlorid. mit.
Zingib. pulv. aa, gr. v.—M. et. f. pulvis.

Croton oil has been extolled by some, especially in cases of tapeworm. The occasional use of a brisk cathartic may also stimulate the digestive tube to a more healthy action, and at the same time remove the intestinal secretions that favour the reproduction of the entozoa.

Such is the general treatment to be pursued; but where the particular variety of intestinal worms is known, this may admit of a special management. Thus, as the oxyures vermiculares are chiefly in the rectum, they are more readily reached by enemata. Still, it may be advisable to conjoin remedies administered by the mouth, as they have occasionally been rejected by vomiting, and the enemata may induce them to migrate. The enemata may consist of a strong solu-

tion of common salt, or of the sulphate of iron;^a or aloes;^b or turpentine;^c and a dose of aloes, or of aloes and calomel,^d may be given.

^a R.—Ferri. sulphat. ʒij.
Aque. Oss.—M.

^b R.—Decoct. aloes,
Lactis, ʒā, ʒiv.—M.

^c R.—Ol. tereb. ʒss.
Vitell. ovi.
Aque. Oj.—M.

^d R.—Aloes, pulv. gr. x.
Olei succin. gtt. v.—M. et divide
in pil. ij.; or,

R.—Pulv. aloes, gr. viij.
Hydrarg. chlorid. mit. gr. iij.
Ol. succin. gtt. iij.—M. et divide
in pil. ij.

At times, the oxyures are collected in a ball, and so enveloped in mucus, that the enemata cannot reach them. In such case, it has been advised, that the patient's middle finger, smeared with lard, should be introduced as far as possible into the rectum, so as to rub the worms from the surface to which they are applied, and, as it were, to scoop them out from the rectum. This plan, the author has not found necessary.

In cases of ascarides lumbricoides, anthelmintic enemata cannot be needed, as the entozoa are in a higher portion of the tube. They must be treated on the general principles already laid down; and, as regards the bothriocephalus latus and the tænia solium, the most powerful anthelmintics, oil of turpentine, oil of Dippel, and the empyreumatic oil of Chabert are needed.

Several portions of tænia having been discharged after the administration of creasote, it has been prescribed as an anthelmintic, five to eight drops being given to adults combined with oleum ricini, or with half a drop or a drop of croton oil.

The male fern—*Filix mas*—which is the basis of Madam Nouffer's celebrated remedy, (ʒj.—ʒiij. of the powdered root,) as well as the ethereal extract,^a have been much extolled, especially by the physicians of Continental Europe; but, perhaps, the remedy, that has received the most testimony in its favour, is the bark of the root of the pomegranate, which is generally given in decoction.^b The alcoholic extract is also occasionally administered,^c followed by a cathartic.

^a R.—Ext. æther. filicis maris, ʒss.
Mellis, vel.
Theriak. ʒss.

Dose, one half, at night, and the other, next morning.

^b R.—Granat. cort. rad. ʒij.
Aque. Oij.
Coque ad. Oiss.

Dose, ʒij. every hour: three or four doses are usually sufficient to expel the worm.

^c R.—Ext. spirit. cort. rad. granat. ʒvj.
Aque menthæ, f ʒiv.
Succ. limon, f ʒij.—M.

Dose, one quarter, every quarter of an hour.

Of late, *Brayera anthelmintica*, a native of Abyssinia, has been advised in tape-worm. The flowers are the parts administered, and they are given in decoction; but sufficient quantities of the plant have not been exported from Abyssinia to test its efficacy.

When a portion of tænia protrudes from the rectum, it has been advised, with the view of destroying it, to apply the hydrocyanic acid to it.

After all, the most important agents are those that are strictly anthelmintic, or which prevent the development of entozoa. Should there be any evidence of gastro-enteritis, it must, of course, be removed;

but generally, the main predisponent, although it may be gastro-enteric, is not gastro-enteritis. It is a state opposite to inflammation of the lining membrane; and any remedy, that will improve chylosis and the nutrition of the body, is a valuable agent. Charcoal (*Carbon. lign. pulv. gr. x.—3j.*) is in this way anthelmintic, as well as the free use of salt, the want of which gives rise entozoa in both man and animals. (See the author's *Elements of Hygiène*, p. 310.) A nutritious diet, especially of animal food; regular exercise and change of air, as far as is practicable, are to be inculcated; with which may be conjoined the use of the ordinary tonics, as colomba, gentian, &c., prescribed in infusion.

To remove the verminous habit, it has been recommended by Bremser to combine aloes, iron, and the sulphuric acid.

R.—Tinct. aloes. comp. f 3j.
Tinct. ferri pomati, f 3j.
Elixir vitriol, f 3ss.

Dose, 10, 20, or 30 drops, three or four times a day, in a glass of wine and water.

The *tinctura ferri pomati*, is not contained in the British pharmacopœias, and, therefore, a substitute has been recommended by Dr. Stokes.

R.—Tinct. ferri chloridi.
Aloes, aa p. æ.

Dose, 20 drops, three or four times a day.

The aloes acts as a vermifuge and cathartic, whilst the salt of iron exerts its tonic influence.

Lastly, worms, or the larvæ of insects, are occasionally introduced into the intestinal canal by accident, where they occasion more or less intestinal disturbance. The animalcules, which have been most commonly swallowed, are the hair-worm, the leech, the grub of the fly, and of the caddy insect, *phalæna pinguinalis*; the larvæ of the bee, the spider, the *triton palustris*, *lacerta aquatica*, &c. To these, collectively, the terms *Helminthia erratica* and *Ectozoa* have been appropriated. In their new situation, these are often so much changed as not to be recognized. In animals the bots are produced by swallowing the ova of the *æstrus* or gad-fly; and cases are on record of their occurring in the human subject.

When such adventitious parasites are supposed to be present, the true anthelmintics must be first recommended, and afterwards any of the ordinary cathartics.

CHAPTER V.

DISEASES OF THE PERITONEUM.

THE peritoneum lines the abdominal parietes, and gives a coat to most of the viscera. It is a serous membrane, and, like all membranes of the class, is the seat of a secretion of thin albuminous fluid, which keeps it moist. It forms essentially a shut sac, in the cavity of the abdomen, and has, in reality, no viscus within it. If the diaphragm be assumed as the part at which it commences, it will be found extending thence over the abdominal muscles, reflected over the bladder, and, in females, over the uterus; thence over the rectum and kidney, enveloping the intestines, and constituting, by its two laminæ, the mesentery, giving a coat to the liver, and receiving the stomach between its duplicatures. Its use is to fix and support the different viscera, and, by means of its secretion, to enable the intestines to move readily upon each other. When we speak of the cavity of the peritoneum, we mean the inside of the sac: the fluid of ascites is contained within this cavity.

After the peritoneum has covered the stomach and intestines, it forms reflections, which are fatty, and termed *omenta*, or *epiploa*.

The peritoneum generally may be affected with disease; or the mischief may be partial; and the symptoms may be materially modified, according to the particular viscus which it invests. Of peritonitis of the intestines, for example, we have already spoken under the head of Enteritis of the peritoneal coat; and other peritoneal inflammations are treated of under the diseases of the particular viscera which are invested by it. It is convenient, however, to treat here of those affections that appertain to the peritoneum generally.

I. INFLAMMATION OF THE PERITONEUM.

SYNON. Inflammatio Peritonæi, Peritonæitis, Peritonitis, Empresma Peritonitis, Cauma Peritonitis; Fr. Péritonite, Inflammation du Péritoine; Ger. Entzündung des Bauchfells.

Inflammation of the peritoneum may be described under three heads: 1, the *acute* form; 2, the *chronic*; and 3, the *puerperal*.

1. *Acute peritonitis.*

Diagnosis.—The symptoms are essentially the same as those of acute enteritis of the peritoneal coat. A sharp pain is experienced in some part of the abdomen, which may be circumscribed, or extend over the whole lower belly, and is superficial when it affects the peritoneum lining the abdominal parietes, so that the slightest pressure is insupportable: even the weight of the bed-clothes excites intolerable suffering. The parietes of the abdomen are more or less tense and tumid; the countenance has, at times, a peculiar expression—the upper lip being drawn upwards, and bound tightly over the teeth. The patient breathes costally, without depressing the diaphragm more than he can

help, and lies upon his back, with the thighs bent upon the pelvis, and the knees frequently raised, so as to take off the pressure of the bed-clothes. The pulse is generally small, and the skin hot and dry; and a recent writer, Sementini, affirms, as a fact, which he has tested by constant observation for upwards of forty years, that in all cases of peritonitis, in whatever part of the abdominal cavity the inflammation may be seated, there is pain in the pubis, and upon the great trochanters; which, if not felt spontaneously, is always developed by pressure, and of which the severity is directly proportionate to that of the peritonitis. This fact, which, according to Sementini, is confirmed by the clinical observation of others, has not been observed by the author. It is attempted to be explained by the relation of the nerves of the parts, in which pain is felt, to the peritoneum, and by its connexion with the fasciæ and muscles about them. Along with these local signs, the functions of the stomach and bowels are always more or less disordered; but often there is neither vomiting nor constipation; or, if the bowels are confined, they are easily moved by cathartics.

Acute peritonitis may terminate unfavourably in a few days; but when its course is more protracted, there may be evidences of sero-purulent effusion into the cavity of the peritoneum. This is not necessarily fatal, as the fluid may be absorbed, or form a communication between the cavity of the peritoneum and the intestines. The signs, that denote the termination of the inflammation in effusion, are—diminution of the pain and swelling, with a doughy feel of the abdomen, and infiltration of the parietes of the abdomen and the lower extremities. By percussion, the presence of fluid may be detected, and auscultation may afford evidences of peritonitis before and after effusion has taken place. As in other inflammations of serous membranes, the first effect is to arrest the secretion, so that the membranes are dry, and careful auscultation has detected a sound of *frottement* or friction. The effusion of coagulable lymph can likewise be detected in the same manner, as well as by the hand applied over the abdomen. In a case of peritonitis supervening on ovarian dropsy, described by Dr. Beatty, when the hand was applied over the umbilicus and its neighbourhood, the sensation communicated to it, when a full inspiration was taken, was that of a grating or rubbing together of two uneven and rather dry surfaces. By the aid of the stethoscope, a loud and distinct friction sound was audible, over a space about five inches in diameter, with the umbilicus for a centre. Another pathologist, Dr. Bright, states, that he has observed, on several occasions, that when the circumstances of the disease had rendered it probable, that adhesions had taken place between the viscera and the peritoneum of the abdomen, a very peculiar sensation was communicated to the touch, varying between the crepitation produced by emphysema, and the sensation derived from bending new leather in the hand. It has been presumed, by Dr. Corrigan, that for the production of this sign, the effused lymph must be in an unorganized condition, and also by Dr. Beatty, that it is observed only in cases, where one at least of the opposed surfaces is adherent to a solid resisting body, and it would

appear, from Dr. Stokes, that in twelve collected cases, nine presented an organic tumour.

Where the peritonitis is partial, the *local* phenomena are circumscribed, and the *general* less marked.

The tolerance of loss of blood, as in other inflammations of serous membranes, is great, and this circumstance must be regarded as a means of diagnosis, and a guide in the treatment of the disease. It is not unfrequent in the fœtus.

Causes.—Those, usually assigned—as in other cases of internal inflammation—are cold and fatigue. An irregular state of the bowels, as well as contusions and wounds, may also give rise to it. At times, it supervenes on surgical operations, on extensive abscesses, especially when of a specific kind, and on burns. The essential causes are those of internal inflammation in general. It is said by MM. Andral and Most, to have been caused by the metastasis of rheumatism and gout, but enteralgia is a more frequent consequence.

Pathological characters.—When peritonitis has terminated speedily, the peritoneum may be found red, sometimes of a violet hue; and dry, owing to the arrest of the wonted secretion. It has been maintained, that fatal inflammation may have existed, and yet that on dissection there may be no redness,—in other words, that the absence of vascularity is no proof of the previous nonexistence of inflammation, but this has not been the result of the author's observation. It applies to hyperæmia, but not to inflammation, which cannot exist for even a short time, and prove fatal, without organic changes being effected in the part, which leave manifest traces on dissection; and even if we do not agree, that increased redness is always perceptible after death, we have no doubt as to the presence of other appearances, which can scarcely escape the eye of the practised observer. Where the inflammation has seriously implicated the peritoneum proper, as well as that covering the intestines, they are often found glued together by plastic lymph, the omentum adhering to the lower folds of intestine, the adhesions being slight, or firm, according to the length of time that has elapsed between their formation and the fatal event. If the disease has continued for some days, the cavity of the abdomen may be found to contain a turbid whitish, yellowish, or greenish fluid, with flakes of coagulable lymph, the same morbid secretion as the bond of union between the agglutinated intestines. It is at times very fetid. Occasionally, also, pus is secreted in considerable quantity from the thickened membrane; and instances occur in which there are evidences of gangrene. In rare cases, the intestines are perforated, and the contents of the digestive tube found in the cavity of the peritoneum. An exhalation of blood has also been met with, constituting the *Hémopéritonorrhagie* of Piorry.

Treatment.—This is essentially that recommended for enteritis of the peritoneal coat, which is, indeed—as elsewhere remarked—peritonitis, somewhat modified by the subjacent intestine. As in other inflammations of the serous membranes, mercury administered internally or by friction, so as to induce ptyalism promptly and effectually, has been advised, but this revulsive treatment must be subsidiary to

the antiphlogistic. It is not easy, indeed, to produce the effects of mercury upon the system, unless the latter has been energetically premised.

R.—Hydrargyr. chlorid. mit. gr. iij.

Opii, gr. ss.

Confect. rosæ, q. s. ut fiat pilula.

One to be taken every three or four hours.

2. Chronic Peritonitis.

Diagnosis.—Acute peritonitis may terminate in chronic, or it may have, from the first, the characters of the latter, and be very insidious, so as to require great attention in its detection. The symptoms are much less marked, the abdominal pain less acute, sometimes almost null, and only to be detected by careful pressure. It is even affirmed by Dr. Marshall Hall, that there may be no pain, tenderness, or tumour of the abdomen. The abdomen is tense, and doughy, as in the acute form; often, indeed, more manifestly so, and the fluctuation more perceptible, inasmuch as careful percussion can be practised. The pulse is small, more frequent than natural, and especially so towards evening. There is usually neither vomiting nor purging, and the appetite may persist; the emaciation is progressive, and there is evident hectic, under which the patient is gradually worn out.

Pathological characters.—The appearances on dissection resemble those of acute peritonitis. The effusion of fluid is, however, more considerable, and the organic mischief more complicated. The peritoneum itself is generally thickened, has entirely lost its transparency, and is variously discoloured. Often, there are numerous black patches, which have been considered melanic by Andral. They are not gangrenous sloughs, for they are firm, inodorous, and possess none of the characters of gangrene except the colour. The agglutinations of the different viscera are, at times, extensive, and constitute tumours or bands, which may occasionally be felt through the parietes of the abdomen; at other times, the intestines are perforated by ulceration, and death takes place speedily, owing to the effusion of the contents of the digestive tube into the cavity of the peritoneum; whilst, in others, the pus makes its way through the abdominal parietes, owing to the union of the intestines to the peritoneum lining the abdomen, and is discharged externally. In a case of tubercular peritonitis, which fell under the author's care, the external orifice in the parietes of the abdomen was found to communicate with a circumscribed cyst, formed by the agglutination of the omentum to the anterior paries of the abdomen, and by the intestine. It extended into the pelvis, and as deep as the vertebræ, dipping between the folds of the intestines. The walls were ulcerated, and in parts almost gangrenous, containing a greenish, fetid matter. On pressing the intestines, bubbles of air issued from two or three openings, all of which communicated with the cavity of the cyst. On examining it more closely, three perforations were found near each other in the lower part of the ileum, and one in the colon. The intestines were glued in spots to each other and to the anterior paries of the abdomen, partly by old organized adhesions, and partly by new ones. In this case, the surface of the

intestines as well as the omentum, and the peritoneum lining the walls of the abdomen, were thickly studded with tubercles, varying in size from that of a pin's head to that of a small pea, and no lymph or serum was found in the cavity of the peritoneum. It has been remarked by an eminent pathological observer, Louis, that chronic peritonitis, which has been such from the commencement, is always complicated with tubercles; and the fact certainly is, that they are generally coexistent. The mesenteric glands or ganglions are often, also, greatly enlarged.

Tuberculous peritonitis may exist without giving rise to any marked phenomena, and ultimately terminate rapidly. The patient may have suffered under slight abdominal uneasiness, with falling off of the general health and strength, when suddenly he is seized with greater pain than usual; the vital powers fail rapidly, and he may die within thirty hours.

Treatment.—This in no respect differs from that adapted for chronic enteritis of the peritoneal coat.

3. Puerperal Peritonitis.

SYNON. Puerperal Fever, Peritoneal Fever, Child-bed Fever, Febris Puerperalis, Enceia Synochus Puerperarum, Erythematic or Nonplastic Peritonitis, Typhohæmic Peritonitis, Adynamic or Malignant Puerperal Fever, Low Fever of Child-bed; *Fr.* Fièvre Puerpérale; *Ger.* Kindbetterinfieber.

The nature of puerperal fever has been a topic of warm controversy, in recent times more especially, but there can be little hesitation in referring it to inflammation of the peritoneum, modified by the existing condition of the female, or by a prevailing epidemic constitution, and one which has often been favourable to the spread of erysipelas. A *coup d'œil* of the various opinions has been given by Dr. Churchill, in his *Diseases of Pregnancy and Childbed*.

Diagnosis.—It has been affirmed, that when peritonitis follows delivery, the abdomen—the walls of which have undergone considerable distension, and have not yet resumed their wonted resistance—acquires a greater size than in ordinary peritonitis; the lochia are suppressed, the mammæ shrunk, the secretion of milk suspended, &c. On the other hand, it has been equally affirmed by Professor Hamilton, of Edinburgh, that a striking mark of distinction between diseases which resemble each other in the prominent characters of fever and pain in the belly, is, that in the true puerperal fever, the lochial discharge never ceases. The truth would seem to be, that the discharge sometimes flows as in ordinary cases; is sometimes diminished, and, in others, suppressed—the condition described by Professor Hamilton being the least common, inasmuch as the secretion is likely to be interfered with by the concentration of vital action towards the peritoneum. The same effect may be expected upon the secretion of milk, if it have been already established; but if the secretion have not taken place at all, it is apt to be postponed until two or three days after convalescence takes place.

If a patient, soon after delivery, have an unusually frequent pulse, and this is not the result of nervous exhaustion from hemorrhage—

the pulsations being, at the same time, not only frequent but quick and vibratory—serious internal mischief has to be apprehended; and if to this there be superadded—tenderness over the region of the uterus especially, or about the iliac fossæ, with diminished lochial discharge, partial or general peritonitis may be anticipated. The diagnosis, however, of puerperal peritonitis often demands the most careful investigation. The formidable symptoms are exhibited by the pulse, which is generally very rapid; by the countenance, which is remarkably anxious and sunken; and by the nervous system, which is greatly agitated and depressed; low, muttering delirium being a common concomitant; and, after a short time from the inception, the tolerance for blood-letting being extremely small, and the blood dark, and of loose coagulum.

Causes.—In addition to those laid down under ordinary acute peritonitis, there must be a peculiar condition of the frame, in association with the great change in the organs consequent on delivery, to induce puerperal fever, particularly the epidemic form. It has been contended, that the phenomena of puerperal fever originate in a vitiation of the fluids, the causes of which are especially rife after childbirth, and are seated in the uterus, from which the placenta has been separated. The bruised condition of the pelvic cavity; the abraded state of the mucous membrane of the uterus, where the placenta was attached; the gaping orifices of the veins and sinuses; the offensive lochial discharges, and the injurious effects of mechanical injury; retention of coagula, or of portions of placenta, or of dead and putrid children; all, or any of these conditions, have been regarded by Drs. Ferguson and Locock, as ready sources from which vitiated matters can be absorbed into the circulation. A recent writer, M. Voillemier, regards it as essentially a general disease, and that its anatomical character consists in the existence of purulent matter in some part of the body. Where the disease affects numbers in a community at the same time, there must be a favourable constitution of the atmosphere, and, according to some, a contagious miasm, which emanates from the bodies of those labouring under the disease, and which can even be conveyed by the practitioner to other parturient females, and affect them also. In many epidemics of puerperal peritonitis, in the lying-in institutions of large cities, woman after woman became attacked as they were delivered, especially where there had been close communication with the patients labouring under the disease, or they had been attended by accoucheurs, who had previously visited others without making the necessary change in their dress. According to many observers, the miasm, presumed to arise from an individual labouring under puerperal fever, is more virulent than that of almost any disorder reputed to be contagious; and examples have occurred of all the patients of one partner in a medical firm having been successively attacked after delivery, when those of another partner had entirely escaped. Many striking examples of this nature have been recently recorded by Dr. Oliver W. Holmes, of Boston; and at a recent discussion at the College of Physicians of Philadelphia, Dr. Condie stated, that although not a believer in the contagious character of

many of those affections generally supposed to be propagated in that manner, he had become convinced by the facts that had fallen under his notice, that the puerperal fever then prevailing (1842), was capable of being communicated by contagion. "How otherwise," he asked, "could be explained the very curious circumstance of the disease in one district being exclusively confined to the practice of a single physician, a Fellow of the College extensively engaged in obstetrical practice, whilst not an instance of the disease had occurred under the care of any other accoucheur practising within the same district. Scarcely a female that had been delivered by this gentleman for weeks previously, had escaped an attack." Still, there are many, who deny, that the spread of the disease occurs by contagion, and who refer it wholly to epidemic influences.

Pathological characters.—These are essentially such as have been described under acute peritonitis. The fluid effused is usually whey-like, or milky in appearance, and contains pus, with flakes of coagulable lymph. The disease, it has been supposed by Dr. Mackintosh, commences in the peritoneum forming the broad ligaments, whence it spreads to a greater or less extent. The pleura is frequently found inflamed, as indicated by the existence of a similar sero-purulent effusion in the chest: there is sometimes evidence of inflammation of the brain; and, not unfrequently, the tissues of the uterus and ovaries are broken down and pulpy,—that of the uterus being soft, and often approaching to gangrene.

Treatment.—Puerperal peritonitis is more severe and extensive than ordinary peritonitis, and, according to some, is more frequently combined with venous congestion, which suppresses the inflammation, and deceives the practitioner. It consequently requires a very early treatment, and if energetic means be not employed within twelve hours after the attack, and, at times, within six, all the efforts of the practitioner may prove futile. The inflammation must be subdued, and speedily, or the patient will die; and hence blood-letting, practised at as early a period as possible, is one of the sheet anchors of the therapist. Both in the well developed, and in the congestive forms, it must be mainly relied on. Eighteen or twenty ounces of blood should be drawn from the arm, as soon as possible after the inception of the disease, and the operation be repeated in four hours, should the symptoms appear to demand it, and the strength of the system permit.

Leeches have been highly extolled by many practitioners. One hundred, one hundred and fifty, two hundred, and two hundred and fifty have been applied from first to last; but the number, to be advised in any case, must be left to the judgment of the practitioner. In the congestive form, whilst blood is drawn from the arm, or by means of leeches, it may be advisable to combine with it gentle stimulants, as wine-whey, placing the patient at the same time in a bath of 92°—96° Fahrenheit; by these means the blood is solicited towards the surface, and the hyperæmia of the peritoneum consequently diminished. If meteorism exists, warm water thrown into the colon, or the common enema of spirit of turpentine, may afford relief. In all cases, stimulants, administered internally, must be prescribed with caution,

and not unless the ordinary indications for their administration in other diseases should be present. Abstraction of blood and purgatives of calomel have been described as "the arms on which we have chiefly, if not solely to depend;" and both, it is added, should be employed decidedly, and to as great an extent as we dare; but cathartics ought not to be administered too freely; and it is, on the whole, better to keep the alimentary canal clear by laxatives and laxative enemata; and if the disease should not yield speedily to the sedatives recommended above, and to the various local applications advised for the forms of peritonitis already described, to endeavour to affect the system gently, by means of mercurials, administered either internally, or by friction with mercurial ointment, dressing the blisters, if any have been applied, with the same ointment. Large quantities of mercurials have been given, and extolled by some. One patient of Dr. Collins took, in the course of treatment, an ounce of calomel! and twenty grains, every four hours, has not been an uncommon quantity; but large doses of calomel have not proved so successful in the hands of Dr. Locock and others.

As to the topical remedies and the general management, they have already been described under Acute and Chronic Peritonitis. It may be added, however, that injections of warm water have been recommended to be thrown into the vagina and uterus, three or four times a day. A recent writer, Dr. Churchill, says he has frequently syringed the vagina with warm water, with benefit, but he never threw the injections into the uterus.

Such will be the plan of treatment usually, perhaps, found most successful. It is founded upon the best pathology; but great judgment is required on the part of the practitioner. It would appear to be incontestable, that, in certain epidemics, and cases of the same epidemic, which may require the general management detailed above, active treatment cannot be borne. The phenomena are, from the first, of an adynamic character; and the practitioner will soon find, that the same plan of treatment cannot apply to all. As in all cases of the kind, it must be regulated by the character of the prevailing epidemic and the condition of the patient. The disease, in spite of every care, is often most alarmingly fatal, and is always regarded with terror by the obstetrical practitioner. It is affirmed, indeed, to occasion seven-eighths of the total mortality in childbirth.

II. DROPSY OF THE PERITONEUM.

SYNON. Ascites, Hydrops Abdominis, Askites, Hydroperitonia, Dropsy of the Lower Belly; *Fr.* Ascite, Hydropisie du bas-ventre; *Ger.* Bauchwassersucht, Wassersucht des Bauches.

Diagnosis.—Dropsy of the peritoneum is known by enlargement of the abdomen, commencing in the hypogastric region, and gradually ascending upwards, until the abdominal parietes are, at times, so distended as to be extremely thin, and almost transparent, with tortuous veins observable in various parts. Percussion, over the seat of the fluid, yields a sound, which has been regarded as intermediate between

that afforded by percussion of the liver and of the small intestine. When the patient is in the upright posture, the distension of every portion of the umbilical and hypogastric regions is equable; but, if he lie on either side, or on the back, the position of the fluid being varied, the prominent portion of the abdomen is varied likewise. If the hand or extremities of the fingers be placed on one side of the abdomen, below the level of the surface of the fluid, and the opposite side of the abdomen be struck, a feeling of fluctuation is perceptible, which is more or less distinct, according to the greater or less distension of the parietes of the cavity. When it is not very evident, it may be best detected by placing the pulps of one or two fingers on the iliac fossa, and tapping the opposite iliac region slightly, but briskly, with a finger of the other hand. The only inconvenience of which the patient complains is the feeling of weight in the lower part of the abdomen, until the accumulation of fluid becomes so great as to cause the abdominal viscera to press upon the diaphragm, and excite dyspnoea. The secretion of urine is generally scanty, and the cutaneous transpiration diminished likewise.

As ascites—like dropsy in general—is, in most cases, rather the evidence of a pathological condition than a pathological condition itself, the course of the disease is usually dependent greatly upon the visceral mischief, which gives rise to it. At times, the distension is so excessive, and the inconvenience sustained by the presence of the fluid so great, that it is necessary to perform the operation of paracentesis, and this may have to be repeated over and over again; the quantity of fluid, which has been abstracted in this way, is indeed enormous, and scarcely to be credited, did it not rest on unquestionable authority. Twelve gallons and a half have been removed at a single operation, and the operation has been repeated one hundred and forty-three times, and perhaps oftener. Recently (Sept. 2, 1842) a case was reported to the *Académie Royale de Médecine* of Paris, by M. Lecanu, in which paracentesis was performed eight hundred and sixty-six times, and the woman was ultimately cured by methodical compression of the abdomen. In one case, reported by Dr. Beall of Missouri, it was performed ninety-six times within a few years, and the whole amount of fluid evacuated was two hundred and seventy-five gallons and a half; the first fifteen operations yielding an average of twenty quarts.

Ascites may be confounded with encysted dropsy—as of the ovary—but a careful examination, with the history of the case, will exhibit the difference. Instead of the swelling being equable—as in ascites—it will be partial, and more prominent in some part of the abdomen than another—the intestines being pushed to the part opposite the tumour. It is possible, too, to confound it with pregnancy, where the abdominal distension is very great, owing to the quantity of liquor amnii, and the fluctuation is very manifest. A case of this kind occurred to Sir Astley Cooper and Dr. Haighton, of London, in which these gentlemen were so far deceived as to appoint a day for the operation of paracentesis, when fortunately, in the mean while, the lady

was taken in labour, and delivered. The discharge of liquor amnii was enormous.

In rare cases, the ascitic effusion presses upon the recto-vaginal portion of the perineum so as to cause a tumour to form *in perineo* in which fluctuation is manifest, a fact that ought to be borne in mind.

Causes.—Ascites—like other dropsies—arises in consequence of a loss of balance between those vessels whose office it is to secrete the fluid that lubricates the peritoneum, and those that take it up. If the exhalents secrete too much, the absorbents remaining healthy; or if, on the other hand, the exhalents remain healthy, whilst the absorbents take up too little, accumulation of serous fluid takes place, but under opposite circumstances. In the first case, the ascites is *active* or *sthenic*, and may be the result of peritonitis; in the latter, it is *passive* or *asthenic*. The particular pathological condition must be discriminated by the accompanying symptoms. At times, we may have a difficulty in deciding as to its precise character; but if one case be accompanied by more or less febrile excitement, and another by evidences of the scorbutic or hemorrhagic diathesis, no obscurity can exist.

Visceral disease is perhaps the most common of the causes of ascites; and frequently the effusion is owing to a mechanical impediment to the abdominal circulation; as where ascites occurs in one, who has been long habituated to over indulgence in spirituous potations. The liver becomes softened, indurated, hypertrophied, or so diseased, that the blood of the portal system cannot circulate freely through it; engorgement of the abdominal venous system consequently supervenes, and transudation or increased secretion of the more watery parts of the blood takes place into the cavity of the peritoneum. Irregularity of circulation is likewise induced by the enlargement of the spleen, so often observed as a sequel of intermittent fever; by granular disease of the kidney, and by diseases of the great central organ of the circulation. These are, of course, the most difficult of removal. At times, the loss of balance takes place without any adequate cause; sometimes after a debauch.

When the disease is dependent upon serious mischief in other organs, the prognosis of the dropsy merges in that of those affections, and as they often occur in persons of broken down constitutions, the issue will probably be unfavourable; and this is the cause, why the dropsical cases, that present themselves in our almshouses, are generally so unmanageable. The abstraction of the fluid by a surgical operation, can be regarded only as palliative, and the individual gradually sinks, worn out by the excessive secretion at the expense of the system, and the consequent irritative excitement. Commonly, stupor, and signs of cerebral oppression are the precursors of the fatal termination, which may be owing either to hypercrinia of the fluid of the arachnoid, or to the encephalic exhaustion.

Pathological characters.—The fluid of ascites is, as a general rule, transparent and colourless; but occasionally, it is tinged yellow or green. In that drawn by tapping from a woman labouring under ascites combined with symptoms of Bright's disease of the kidney,

Professor Kane, of Dublin, detected urea in large quantity. Where the fluid has long bathed the viscera, they exhibit the same appearance as if they had been immersed in fluid out of the body; and, in some cases, the tissues of the liver, spleen and intestines, seem as if they had been macerated. If the solid viscera be diseased, the evidences thereof will be apparent.

Treatment.—The treatment of ascites rests upon the same principles as that of general dropsy. Great reliance must be placed upon blood-letting, if the disease be active, with brisk cathartics, diuretics, local revulsives, and methodical compression to the abdomen by means of an appropriate bandage. Careful examination must be made to discover the pathological cause, and if this should appear to consist in disease of one of the solid viscera, the treatment must be directed to the removal of the cause, after which the effect may cease. Unless, however, the kidneys themselves be diseased, diuretics will generally, if not always, be proper.

The dropsies, which are such common attendants or sequelæ of intermittent fever, are often effectually removed by the sulphate of quinia, or by the subcarbonate of iron in large doses.

Whenever the distention becomes so great as to interfere materially with the breathing, and to cause excessive abdominal distension and uneasiness, the operation of paracentesis is indicated. As before observed, it can only be regarded as a palliative in any case; but it occasionally affords a chance for the successful employment of appropriate anti-hydropsics afterwards. Such a beneficial result can, however, be anticipated in those cases only, which are of an uncomplicated kind, or which have resulted from peritonitis. When the disease owes its origin to lesions of the heart, liver, spleen or kidney, the relief can only be temporary. Often, indeed, the patient sinks rapidly after the fluid has been withdrawn; generally from systemic irritation, as in cases where large quantities of purulent matter have been evacuated; but, at times, owing to resulting peritonitis. Dr. Prichard, of Bristol, England, uses a needle with a larger groove than the common exploring needle, (see Empyema,) with which he has evacuated the fluid with perfect ease and safety, and with the advantage, that the pain attending the operation is so very trifling, that the patient will call occasionally for a repetition of it, after having once experienced the relief that follows its use. He recommends that both in ascites and hydrothorax it should be used much earlier than the trocar is generally advised, the practice of deferring paracentesis until all other means have been long tried being, in his opinion, a principal cause of the frequent return of the effusion. Dr. Babington employs a very small trocar and canula, which, together, are not thicker than an ordinary grooved needle. The instrument is provided with a probe to pass through the canula.

From a fancied, but loose analogy with hydrocele, the rash practice has been proposed of introducing the vapour of wine into the cavity of the peritoneum. Peritonitis would generally follow; and the patient, who has submitted to the operation of paracentesis for

ascites, which is rarely practised except in advanced cases, is little able to bear irritation of any kind.

After the operation of paracentesis, opportunity is afforded for examining into the condition of the abdominal viscera, and every effort should be made, by appropriate revulsion, to prevent a re-accumulation of the fluid. Great advantage has accrued, in such cases, from change of air, as from one of the crowded cities to a watering place; where the individual can experience a thorough mutation of all the influences surrounding him. The sulphur waters of the Virginia Springs, taken in moderation, have, along with the influences just mentioned, exerted a salutary agency, by exciting the action of the kidneys and the bowels; but caution is necessary that they be not taken too freely.

CHAPTER VI.

MORBID PRODUCTIONS IN THE PERITONEUM AND INTESTINES.

Various morbid productions occur in the peritoneum and intestines, besides those that have been already described.

a. *Tubercles*.—These are met with in the peritoneum,—constituting the *Peritonistruoise*, of Piorry,—sometimes accompanied by inflammation, and at others not. They are in the form of granulations, more or less thickly dispersed over various parts. When they accompany peritonitis, they may be suspected from the tubercular diathesis of the individual. From a comparison of 358 cases, of which 127 were those who had died of phthisis, and 40 from other diseases, it was inferred, by Dr. Louis, that tubercles never occur in any organ in the body, after the age of 15, except in cases in which they also exist in the lungs. Yet, they may be present to a great extent in the peritoneum, without any being found in the lungs. In the case of peritonitis with tubercles, already referred to, the surface of the intestine, as well as the omentum and peritoneum, was thickly studded with tubercles, varying in size from a pin's head, to a small pea, but the tubercles were by no means numerous in either lung. Tubercles are likewise found in the intestinal canal, and most commonly towards the termination of the small intestine. They may exist without giving any evidence of their presence, or they may cause, or be accompanied by, symptoms resembling those of chronic enteritis.

b. *Melanos*.—We have elsewhere spoken of melanosis having been met with in chronic peritonitis. The parts of the peritoneum, in which it is mostly observed, are the greater omentum and the epiploic appendages of the colon. At times, a nodulated variety is seen, the tumours, whether isolated or agglomerated, being generally adherent by small pedicles, and enveloped in cysts of fine cellular tissue, often furnished with delicate vessels.

c. *Fibrous, steatomatous, lipomatous, and encephaloid tumours*.—Extremely large fibrous tumours sometimes form on, or rather under, the peritoneum, and occasionally augment so much as to fill the abdomen. An interesting case of the kind, connected with the peritoneal covering of the uterus, fell under the author's care, and subsequently under that of his then colleague in the Philadelphia Hospital, Dr. Pennock, who has given a description of it accompanied by a drawing. (See the author's *American Medical Intelligencer*, Aug. 1, 1839.) Steatomatous and lipomatous tumours are rarely met with. It has been asserted, indeed, by M. Andral, that it is not very uncommon to see lipomata which have formed in the parietes of the intestines, without occasioning any disorder during life; but this is not the result of the author's observations.

All these tumours, as well as encephalosis, when they are of any size, manifest themselves, by a swelling, which is perceptible on examination; but they are devoid of pain; are little sensible to pressure, and at first not marked by general symptoms; until they interfere with the abdominal circulation, and excite visceral irritation, under which the patient may succumb. The author attended with a respectable physician of Baltimore, Dr. Pue, a case of encephalosis in a child, which almost filled the cavity of the abdomen. Its contents were distinctly encephaloid in some parts; in others, it contained a grumous fluid, of the general consistence of thin jelly; and, in others, a purulent secretion. A similar case is related by Professor Gross, of Louisville.

BOOK II.

DISEASES OF THE RESPIRATORY ORGANS.

THE diseases of the air passages are of great interest to the therapist. The delicate organization of the lungs, their state of constant activity, and their being exposed to the contact of air of different barometrical, thermometrical, and hygrometrical conditions, which contains various extraneous matters suspended in it, render them especially liable to diseases, and those of a most serious character. It has been affirmed, by Dr. C. J. B. Williams, that thoracic diseases constitute, in England, nearly one-half of the fatal cases, and perhaps quite one-half of the slighter disorders; and many other diseases, both local and general, owe their serious or fatal character to secondary thoracic lesions. This, however, is too large a proportion. In the third Report of the Registrar-General, (1841,) it would appear, that in 1839, the deaths from diseases of the respiratory organs, throughout England and Wales, amounted to 90,565 persons, comprising 27 per cent. of the whole number of deaths. This is nearly the proportion in New York. According to Dr. Griscom, City Inspector, the whole number of deaths, in the year 1842, exclusive of premature and still births, was 8475; the number of deaths from the diseases of the respiratory organs, 2242; being about 26½ per cent. of the whole number.

Important as those diseases are, their diagnosis was in an extremely imperfect state prior to the present century. Before this, indeed, attention, as will be seen, was paid to the physical signs afforded by listening to the sounds rendered on percussing the thorax; but still, it is to Laënnec, that we are indebted for the introduction of the main improvements in the detection of thoracic diseases by audible evidences, in which he has been ably supported by many living observers.

To facilitate the understanding of the various diseases, which fall under consideration in this section, it will be requisite, as in other cases, to make a few preliminary observations on the anatomy and

physiology of the apparatus; and likewise on the principles and adaptation of the different plans, which have been devised for accurately appreciating the physical signs of the different lesions.

I. ANATOMICAL AND PHYSIOLOGICAL CONSIDERATIONS.

The respiratory organs consist of the larynx, the trachea, the bronchia, and the lungs; but besides these there are accessory organs, which require mention.

The larynx is bounded anatomically, from above to below, by the epiglottis and the inferior ligaments of the glottis, in which voice is produced; and it is lined internally by a mucous membrane, which is a prolongation of that of the pharynx. On examining the interior of the larynx, two clefts are perceptible, one above the other; these are formed respectively by the superior and the inferior ligaments of the glottis; and, between them, are the ventricles of the larynx. The inferior ligaments of the glottis meet at a point behind the thyroid cartilage, which causes the projection in the neck,—the *pomum Adami*,—so as to form a triangular cleft—the glottis or *rima glottidis*, the posterior extremities of which are attached to the arytenoid cartilages; the cleft being diminished or enlarged by the contraction or relaxation of the arytenoid muscles, which pass from one arytenoid cartilage to the other. The thyro-arytenoidei muscles form, with the ligamentous structure and mucous membrane, the lips of the glottis or inferior ligaments. These muscles have usually been esteemed dilators of the glottis.

The intrinsic muscles of the larynx receive their nervous supply from the pneumogastric nerves. Shortly after the pneumogastric issues from the cranium, it gives off the *superior laryngeal*, which is distributed to the muscles that close the glottis; and after it has entered the thorax, it gives off a second branch, which ascends towards the larynx, and is hence called the *recurrent* or *inferior laryngeal*. It is distributed, in part, to the thyro-arytenoidei muscles,—no ramification, according to some, going to the arytenoidei muscles. Others, however, maintain, that these last muscles receive a filament from each of the inferior laryngeals. This difference of sentiment envelopes the precise functions of these different branches of the same great nerve—the pneumogastric—in obscurity. If the superior laryngeal had been distributed solely to the contractor muscles of the glottis, whilst the inferior laryngeal was distributed to the dilators solely, the anatomical evidence would have been strong, that the former are concerned in the dilatation, and the latter in the contraction of that aperture. Experiments have shown, that if both the recurrences and the superior laryngeal nerves be divided, complete aphonia is the result; and it can be readily understood, that if either of these important branches be injured, the voice may be affected; but much remains to be learned regarding their exact functions.

Whenever any irritating substance reaches the larynx, it is at once closed by means of its contractor muscles. The action, in this case, is clearly *excito-motory*—in other words, the irritation is conveyed

with the rapidity of lightning along a sensitive nerve to the great nervous centres, and, with the like rapidity, the appropriate muscles are excited through a motor nerve. To this we have analogous phenomena in coughing and sneezing. In the case, above mentioned, of closure of the glottis under irritation, it has been believed, that the superior laryngeal is the sensitive, and the inferior laryngeal the motor nerve. (See on the subject of the nerves of the larynx, the author's *Human Physiology*, 5th edit. vol. i. p. 419, Philad. 1844.)

Every part of the larynx, with the exception of the inferior ligaments, may be destroyed, and yet the voice may continue; and when the larynx is exposed in a living animal, the inferior ligaments are distinctly observed to vibrate, whilst the superior appear to be unconcerned. The former, are, consequently, the great organs by which voice is produced, although for its perfection, the superior ligaments and the ventricles may be requisite.

It can be readily understood, that any morbid state, which modifies the condition of the lips of the glottis, as inflammation, ulceration, or œdema; or that interferes with the action of the intrinsic muscles, will modify the character of the voice; and that, if the lesion be considerable, it may induce total loss of voice—complete aphonia. As the intensity of the voice is dependent upon the force with which the air can be sent from the lungs, it will of course vary, according to the condition of those organs, and the general powers of the system.

The trachea is continuous with the larynx, and is lined by a continuation of the same mucous membrane. It divides into two large tubes—the *bronchia*—one of which goes to each lung, and these, after numerous subdivisions, become imperceptible in the lung. They are lined by a continuation of the laryngeal mucous membrane; and it is probable, that what are called the air cells of the lungs are only the blind extremities of myriads of bronchial tubes. Whether the mucous membrane proceeds as far as the ultimate radicles is a point that cannot be determined.

In the trachea and larger bronchial tubes, the cartilages do not form an entire circuit:—in the trachea especially, an obvious muscular structure exists in the posterior third, where the cartilages are wanting. The use of these muscular fibres, doubtless, is to diminish the calibre of the tube by their contraction, so that the air, being driven more rapidly through a narrower space, may more readily sweep away from the mucous membrane the matter of expectoration. These fibres cannot be detected in the smaller bronchial subdivisions, but many of the phenomena of asthma would seem to establish their existence.

The position of the lungs at the sides of the chest and that of the heart must be borne in mind by the investigator of thoracic disease. It has been already remarked, that the air cells—as they are termed—are probably but the minute terminations of the different bronchia. Each of these is associated with a radicle of the pulmonary artery, and of the pulmonary veins; and, in addition to these organic constituents, the lung has arteries—the bronchial—for its nutrition, with

corresponding veins, and lymphatics. The nerves are from the pneumogastric, and the ganglionic. All these elements are bound together by interlobular cellular tissue, so as to constitute the lungs as we observe them when cut into.

Each lung has a proper fibrous capsule, and it is covered by the serous membrane—the pleura—in such manner, that there are two pleuræ, each of which is confined to its own half of the thorax, lining the cavity and covering the lung. Where the two pleuræ approximate each other behind the sternum is the *mediastinum*, in which the heart is situate. As each pleura is reflected over the lung—*pleura pulmonalis*—and lines the parietes of the thorax—*pleura costalis*;—when the lungs are distended with air, the two must be brought into contact. To prevent friction, a serous fluid constantly lubricates them in health; but, if this becomes arrested from any cause, and morbid productions are formed on the pleura, the sound of friction becomes at times distinctly audible.

No air is contained in the cavity of the pleura, as was at one time believed.

In ordinary inspiration, when the ribs are raised by the appropriate muscles, the pleura costalis is, of course, raised at the same time; and, hence, pain is experienced during inspiration when the pleura is inflamed. The pleura costalis and the pleura pulmonalis frequently, too, unite under such circumstances, and this is usually the case in phthisis pulmonalis, so that the affected side does not rise in inspiration like the other; and the same result occurs, if, owing to consolidation, the lung of one side is unable to receive its proper quantity of air. Whilst the ribs are raised in inspiration, the diaphragm is depressed; and, in cases of pleuritis, respiration is almost wholly effected in this manner, to avoid the pain consequent on the elevation of the ribs. For the like reason, relief is obtained by tying a handkerchief firmly round the thorax. On the other hand, in cases of hepatitis, as the depression of the diaphragm cannot fail to add to the suffering, the breathing is almost entirely costal.

During expiration, the muscles, concerned in inspiration, are relaxed; and, in full expiration, various muscles, that draw down the ribs, are thrown into action, which are aided by the active resiliency of the lungs themselves.

The quantity of air, capable of being inspired and expired, must depend upon the capacity of the lungs and the strength of the individual; so that it might seem important to test this at various periods of diseases, which involve the texture of the lungs, to enable us to infer as to the extent of lung impermeable to air; but the practical application of the method is environed with difficulties. It is always extremely distressing to the individual; and, as the powers of the patient simultaneously and progressively fail, there is less capability of full inspiration and expiration, and, indeed, of any effort,—so that the result, even if readily attained, would not be entitled to much consideration.

The number of inspirations is worthy of attention. This varies in

different individuals. Eighteen may be regarded as an average. It varies according to age and sex. The child and the female breathe more rapidly than the adult male, and aged individuals appear to exceed the average. It must be borne in mind, however, that various circumstances, exercise, moral emotions, distension of the stomach from food, &c. &c. increase the number materially.

Thus much as regards the *mechanical phenomena* of respiration.—In diseases of the lungs, the *chemical phenomena* have, likewise, to be regarded. For plenary health, and even for existence, it is necessary that air should be received into the lungs, containing one part of oxygen to four parts of azote. The contact between air thus constituted, and the venous blood sent to the lungs by the pulmonary artery, is essential, in order that hæmatosis—or the conversion of venous into arterial blood—may be accomplished. If such conversion do not occur at all, stasis of the blood—as will be seen under Asphyxia—takes place in the vessels of the lungs, and death. The atmospheric air passes with facility from the ultimate bronchial radicle into the minute pulmonary blood-vessel by imbibition, and the refuse gases are readily exhaled through the coats of the blood-vessel and of the bronchium into the latter tube. The blood, at the same time, loses its venous, and assumes the arterial character.

Lastly;—the various respiratory phenomena—mechanical as well as chemical—are largely under the nervous influence. Experiments show, that the pneumogastric nerves contribute to the change of the venous into arterial blood, and that their division gives occasion to great dyspnœa, and death. When the phrenic nerves are tied, the most determined asthma is produced; breathing goes on by means of the intercostal muscles; the chest is elevated by them to the utmost; and, in expiration, it is as remarkably drawn in. The animals do not live an hour. The lungs in such case have appeared healthy, but the chest contained more than its natural exhalation. When the great sympathetic has been tied, but little effect was induced on the animal; but when the pneumogastric, phrenic, and great sympathetic were tied together, the animal lived little more than a quarter of an hour, and died of dyspnœa.

The pneumogastric and phrenic nerves form part of the *respiratory system of nerves* of Sir Charles Bell. (See the author's *Physiology*, 5th edit. i. 64, Philad., 1844.) This system is considered by Sir Charles to be distributed to the multitude of muscles, that are associated in the respiratory functions, in a voluntary or involuntary manner; and are especially concerned in forced or hurried respiration, coughing, sneezing, &c. As a distinct system this is by no means universally admitted by anatomists and physiologists. Many are of opinion, that there is no special column of the spinal marrow destined for respiration, and that there appears to be nothing so peculiar in the action of the respiratory muscles, as to require a distinct set of nerves.

II. PHYSICAL EXAMINATION OF THE CHEST.

By the *physical signs* of the healthy or diseased condition of the contents of the thorax, we mean the evidences that are afforded to the senses, uninfluenced by the vital properties of those contents; in contradistinction to *symptoms*, which are the evidences afforded by the living contents in action.

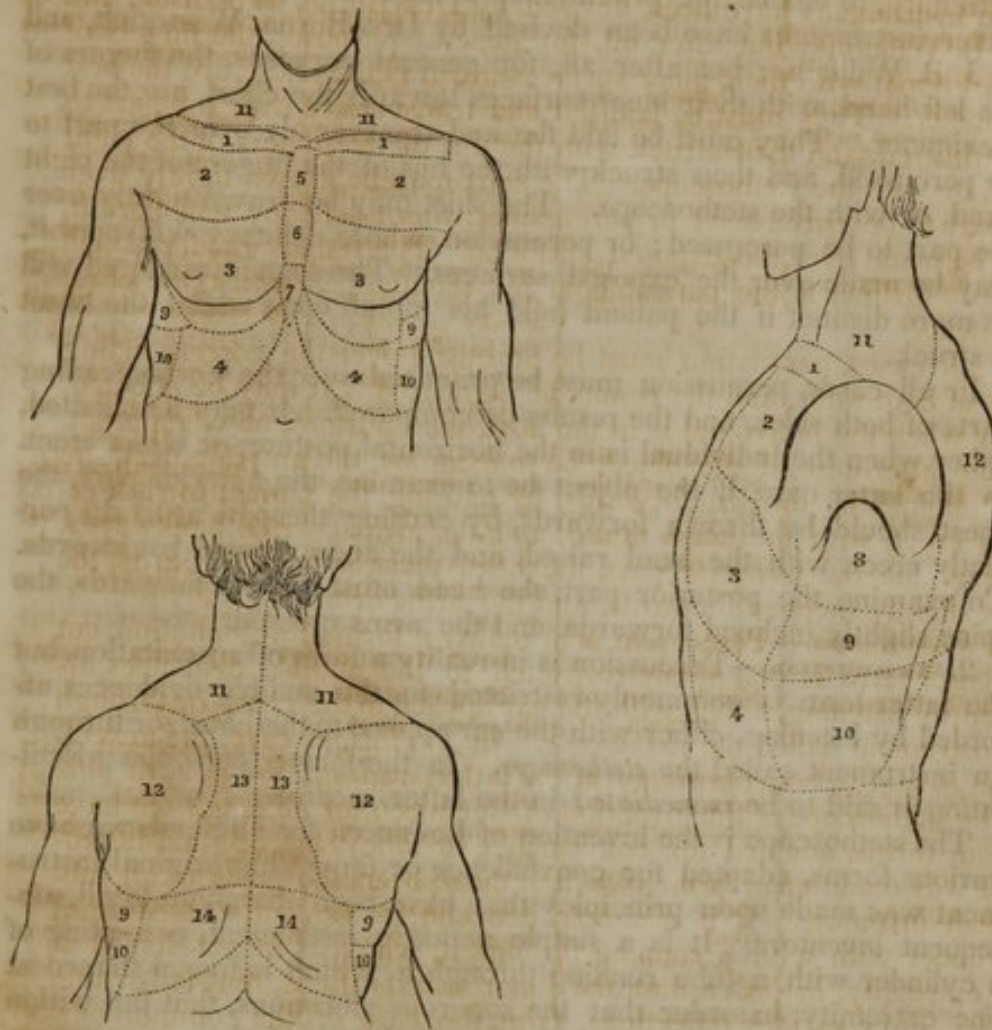
Surrounded, as the different viscera of the thorax are, by a bony framework, which prevents information from being obtained in the case of the deeper seated, by any of the senses, the diseases of those viscera were comparatively obscure, before it occurred to Auenbrugger to employ percussion; and to the distinguished proposer of auscultation, to endeavour to detect their varying conditions by the sense of hearing. It is scarcely an exaggeration, indeed, to remark, with Dr. Marshall Hall, that "the diseases of the respiratory system could scarcely be said to be understood, until the era at which Laënnec's incomparable work appeared. The combination of auscultation and percussion constitutes the basis of the *diagnosis*; and the pathology is scarcely less indebted to that extraordinary man."

1. **Percussion.**—Percussion was introduced by Auenbrugger, of Vienna, in the year 1761; but it remained almost neglected for forty-seven years, when a translation of the work was made by Corvisart, which drew the attention of the profession to it.

The object of percussion, as a means of diagnosis, is to appreciate the sounds rendered by various parts of the chest, when struck, both in the healthy and the diseased condition. As the lungs always contain a large quantity of residuary air, and the parietes are possessed of a certain degree of elastic tension, if they be struck or percussed, a hollow and somewhat tympanitic sound or resonance is elicited, the intensity of which is diminished by whatever interferes with the elasticity of the parietes or by any adipous or other soft deposition, if in considerable quantity in the integuments. It will hence follow, that the resonance of the chest will be greatest over those parts, in which there is nothing but lung, and where the parietes are thinnest, and their tension greatest; and, on the other hand, if any disease have solidified the lung, so that it does not receive the air, or if any effusion have taken place within the chest, the resonance, instead of being hollow, as in health, will become dull; and, again, if the amount of air be augmented, as in pulmonary emphysema, the natural resonance may be largely increased.

The following tables, from Laënnec and Williams, will exhibit the sounds rendered by percussing the various regions in health. Where any solid viscus interferes—as the heart on the left side, or the liver on the right—the sound is, of course, more dull. The numbers correspond with those on the figures.

| REGIONS. | SITUATION. | INTERNAL ORGANS. | SOUND ON PERCUSSION. |
|--|--|--|---|
| 1. Clavicular, (Subclavian, Laënnec.) | { Clavicles. | Apices of lungs. | Very clear towards the sternum; clear in the middle; dull, close to the humerus. |
| 2. Infraclavicular or infraclavian, (anterior superior, Laënnec.) | | Superior lobes of lungs; large bronchia near the sternum. | Very clear. |
| 3. Mammary. | { Between the 4th and 8th ribs. | Middle lobes of lungs; large bronchia in the upper part, near the sternum; the heart generally covered by the lungs in lower part of left region. | Very clear; in women, a clear sound only by mediate percussion. |
| | | The liver on the right, and the stomach on the left side, covered only on the upper part by the thin margin of the anterior inferior lobes of the lungs. | Dull on the right side; irregularly dull on the left, or unnaturally resonant. |
| 4. Inframammary. | { Between the 8th ribs and the margin of the cartilages of the false ribs. | | |
| 5. Superior sternal. | { Upper part of sternum. | Large bronchia. | Very clear. |
| 6. Middle sternal. | { Middle part of sternum. | Margins of middle lobes of lungs. | Very clear. |
| 7. Inferior sternal. | { Lower part of sternum and ensiform cartilage. | Above, margins of the lungs; below, the heart, liver, and sometimes the stomach. | In upper part clear; less so in fat persons; below, at times, more dull; at others, tympanic. |
| 8. Axillary. | { In the axillæ, above the 4th ribs. | Upper part of the lateral lobes of the lungs. | Very clear. |
| 9. Lateral | { Between the 4th and 8th ribs at the sides. | Middle of the lateral lobes of the lungs. | Very clear. |
| 10. Inferior lateral | | Margin of lateral lobes of lungs; the liver on right side, the stomach and spleen on the left. | Same as inframammary. |
| 11. Acromial. | { Between the clavicles and upper margin of the scapulæ. | Superior lobes of the lungs, and large bronchia. | Dull by direct percussion; a somewhat clear sound by mediate percussion, especially near the clavicle. |
| 12. Scapular. | { The scapulæ and muscular ridge below them. | Middle posterior lobes of the lungs. | The pectoral resonance can be elicited only by mediate percussion. |
| 13. Interscapular. | { Between the inner margins of the scapulæ. | The roots and inner parts of posterior lobes of the lungs. | Tolerably clear by mediate percussion, or when the arms are crossed, and the head bowed forwards; the spinous processes of the vertebræ sound well. |
| 14. Infrascapular or inferior dorsal. | { From the inferior angle of the scapula. | Base of the lungs; the liver encroaches on the right, and the stomach on the left side. | Clear in the upper portion, by striking on the angles of the ribs, or by mediate percussion; below, often dull on the right, and unnaturally resonant on the left side. |



An excellent "table exhibiting the physical cause and ordinary seat of the different physical signs, together with the names of the diseases in which they are observed," is given by Dr. Walshe, in his *Physical Diagnosis of Diseases of the Lungs*, Amer. Edit. Philadelphia, 1843.

Percussion may be *mediate* or *immediate*; that is, it may be made through some medium termed a pleximeter or plessimeter; or by the fingers themselves, the tips being placed on a level. Various *plexors* or *plessers* and *pleximeters* have been proposed. M. Piorry uses *first* a hammer as a plexor, the head of which is made of steel, brass, or iron; a capsule is screwed to the end with a projecting disk of caoutchouc; the handle is made of wood, with depressions for the finger and thumb. The head of the handle is not placed exactly at right angles with the handle, but has a slight obliquity upwards, which is esteemed to be necessary, as in using it the handle is almost certain to be somewhat elevated, and this slight obliquity even then allows the practitioner to strike the pleximeter perpendicularly; and *secondly*,

a *pleximeter*, made of ivory, wood or metal, with a handle at each extremity, to enable the practitioner to take hold of it more readily. Other instruments have been devised by Drs. Burne, Winterich, and C. J. B. Williams; but after all, for general purposes, the fingers of the left hand, with their inner surfaces towards the chest, are the best pleximeter. They must be laid flat and transversely over the part to be percussed, and then struck with the tips of the fingers of the right hand, or with the stethoscope. The shirt may be drawn tightly over the part to be percussed; or percussion, where delicacy will permit, may be made over the exposed surfaces. The sounds rendered will be more distinct if the patient hold his mouth open whilst the chest is struck.

In all cases, percussion must be practised over the corresponding parts of both sides, and the results be compared. It may be effected, either when the individual is in the horizontal posture, or when erect. In the latter case, if the object be to examine the anterior part, the chest should be thrown forwards, by causing the patient to sit perfectly erect, with the head raised, and the arms carried backwards. To examine the posterior part, the head must be bent forwards, the spine slightly inclined forwards, and the arms crossed.

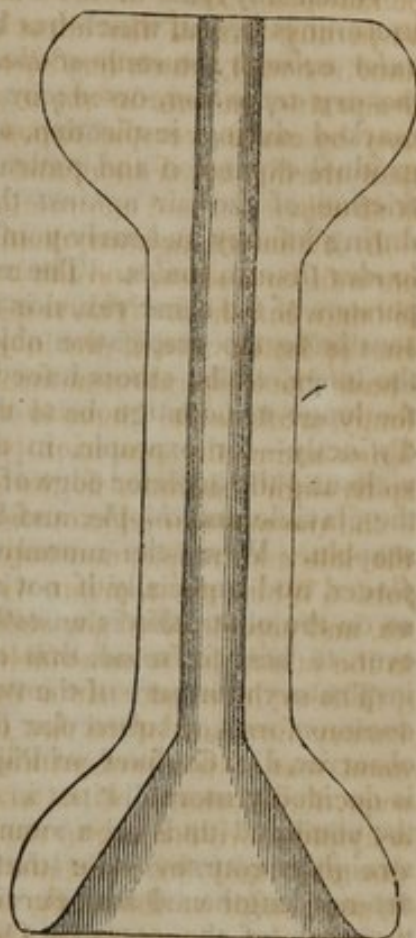
2. *Auscultation*.—Percussion is in reality a form of auscultation, but the latter term is commonly restricted to the audible evidences afforded by listening, either with the ear applied to the chest, or through an instrument called the *stethoscope*. In the former case, the auscultation is said to be *immediate*; in the latter, *mediate*.

The stethoscope is the invention of Laënnec; for although we have various forms, adapted for convenience or fancy, his original instrument was made upon principles that have been the guide to all subsequent inventors. It is a simple acoustic instrument, consisting of a cylinder with a tube running through it, which is funnel-shaped at one extremity, in order that the sonorous vibrations, that fall within it, may, after various reflections, as in the case of the common ear-trumpet, be concentrated and pass into the meatus auditorius. The sounds, produced in the thorax, can therefore be conveyed to the ear in two ways; first, by the solid parietes of the instrument, and secondly, by means of the air in its interior.

Any of the stethoscopes, offered for sale, will answer the purpose of the auscultator, provided the ear part can be easily adapted to his ear, and on this account he ought to select one that is suitable for him. It is proper, however, to observe, that the author has found those, which are wholly conical, or which, in other words, consist of the funnel part only, the least satisfactory, in consequence of the confusion of sounds, resembling, in some measure, those that are heard when a hollow shell is applied to the ear. The instrument should always have, in addition to the funnel-shaped portion, space enough for an inch or two of tube which is perfectly cylindrical, in order that, by the concentration of vibrations, this source of inconvenience may be obviated. The length of the original instrument of Laënnec rendered it inconvenient of application in many cases, and it was by no means easy to place the end of the instrument entirely flat on the

chest, whilst the other was in apposition with the ear. Hence the author has for years employed an instrument almost identical with the one used by Dr. Billing, which is merely, as he remarks, Laënnec's abridged, and is represented in the marginal figure. It may be about four inches long, and "may be obtained from any wood-turner for a few pence."

At the meeting of the British Association at Manchester, 1842, Dr. C. J. B. Williams presented a communication on the construction and application of instruments used in auscultation: in this, he states, that finding the considerable share which the solid walls of stethoscopes have in communicating sounds, and from experiment that their efficacy depends chiefly on the formation of the pectoral end by which they receive the vibrations, he had devised a form of instrument, which qualifies them better, he thinks, for this purpose, than any now in use. This consists in a bugle or trumpet end, the edges of which being made very thin, and applied flat on the walls of the chest, are most readily affected by their vibrations. An instrument, thus constructed, of a light rigid wood, such as sycamore, and tried with a test sound, will be found, according to Dr. Williams, superior for most purposes to the stethoscope hitherto used.



A flexible instrument, like the flexible ear-trumpet, has been devised, by which, without changing from one side of the patient to the other, the sounds of respiration may be heard with the same ear. It is better adapted for auscultating the heart and great vessels than the lungs. The author has frequently employed it, but he greatly prefers the ordinary instrument where the sounds require acuteness of hearing. Dr. Williams affirms, that when tried by a test sound he has found it much inferior in conducting power for all the more delicate sounds of the breath and heart. "Louder sounds," he adds, "such as those of bronchial or cavernous breath, and voice sounds it exaggerates by the addition of a conchal echo, which renders it very difficult to distinguish them from each other." This objection has not, however, impressed the author.

It is scarcely necessary to say, that in order to understand the abnormal or unhealthy evidences afforded by auscultation, we ought to be familiar with the sounds rendered in health, and, hence, the young auscultator should experiment on the healthy subject, and especially on children, in whom some of the sounds are well developed.

With this view, he may practise either *mediate* or *immediate* auscultation. The author is in the habit of employing the latter where circumstances will admit; but there are cases in which either delicacy, or adaptation, or both, render the employment of the stethoscope indispensable.

When any part of the chest opposite the lungs is auscultated, a murmur is heard, which has been called the *respiratory murmur*, *vesicular murmur*, *murmur of the expansion of the lungs*, *murmur of pulmonary expansion*, or *respiration of the cells*. The murmur is more marked during inspiration, and it is presumed to be owing to the gradual expansion and contraction of the vesicles of the lungs, and the friction of the air against them. This vesicular murmur is louder during infancy and early youth—hence termed *puerile*—and in females louder than in males. The respiratory murmur, is not the same in all persons of the same sex, nor in every part of the chest. Many persons have the respiration naturally very feeble, without any lesion of the lungs, whilst others have it very loud, and almost puerile. When the lungs are contiguous to the parietes of the chest, it is heard most distinctly—for example, in the axilla; in the space between the clavicle and the anterior edge of the trapezius muscle; the space between the clavicle and nipple, and between the spine and inner edge of the scapula. When the murmur is not heard distinctly in any of these places, and especially if not audible on one side, whilst it is distinctly so on the other, this is an evidence of disease. It is important, however, to bear in mind, that a difference of sentiment exists as to the inspiratory murmurs of the two sides under the clavicles, which are the common seat of tubercular formations. It has been asserted by one observer, Dr. Gerhard, of Philadelphia, that “the bronchial respiration is decidedly more distinct in the right lung than the left, especially at the summit,” and he accounts for it, by “the greater diameter and straighter course of the tubes, at the summit of the right lung, which are not lengthened and curved, as on the left side, by the presence of the arch of the aorta.” On the other hand, another observer, M. Fournet, has satisfied himself, that in persons presenting all the characteristics of healthy lungs, the sounds of inspiration and expiration are precisely identical in all corresponding points: in the few persons in whom he detected a slightly greater developement of the expiration under the right than the left clavicle, there were some motives for a doubtful opinion respecting the state of the lungs. M. Fournet, indeed, thinks, from the physical condition of the two lungs, that there is no reason, why they should furnish different respiratory sounds. Again, another practised auscultator, Dr. Stokes, particularly dwells on the importance of the discovery made by him, that in many individuals, there is a natural difference between the intensity of the murmur in either lung, and in such cases, “with scarcely an exception, the murmur of the left is distinctly louder than that of the right lung.” It would appear, consequently, and such is the result of the author’s observation, that at times there is no marked difference between the two sides; that at others, the intensity of the inspiratory murmur is greater on the right side; and at others again, on the left.

When we listen over the interscapular region, the respiration is more "blowing" or *soufflante*, as the French term it; this is owing to the bronchia at the root of the lungs being of considerable calibre. Of this *souffle* or "blowing sound," the trachea, in consequence of its size, affords an excellent type. When the sound is heard over the parts mentioned, it is an evidence of the healthy condition; but if it take the place of the respiratory murmur, it is a sign of disease; and denotes that the respiration is *tracheal* or *bronchial*, or, as it is more frequently termed, *tubal*—so called in consequence of the sound of respiration being formed altogether in the tubes.

If a large portion of the lungs be impervious to air, the act of respiration is of course accomplished by the remainder. The air, in such cases, passes in and out of the tubes with great energy and noise, and the respiration has been termed *supplementary*.

When the ear is placed over the chest, at its anterior inferior or posterior inferior part, a gurgling noise (*gargouillement*) is sometimes heard, which must not be mistaken for the gurgling sound occasioned by purulent matter in a cavity. It is produced by the movements of the contents of the stomach or intestines.

Mention has been made, before, of the *friction* of the pleura costalis with the pleura pulmonalis. This friction (*frottement*) does not produce any distinct sound in health, but becomes well marked in certain cases of disease.

If the bronchial tubes be entirely free from disease, the sounds rendered will be of the kind described; but it will be readily understood, that if they be inflamed, or obstructed by mucus, pus, or blood, various sounds—*rhonchi*, *râles* or *rattles*—will be heard, the character of which will be mentioned under the individual diseases.

Thus far, we have considered the auscultation of healthy respiration. The *voice*, likewise, affords physical signs of great moment. At present, we shall speak of those only that are heard in health, and which are the basis of all our diagnosis in disease.

When the voice is produced in the inferior ligaments of the larynx, the sonorous vibrations not only pass out by the vocal tube, but they proceed downwards along the trachea; and the resonance is distinctly heard when the ear or the stethoscope is applied to the chest. When the instrument is placed over the larynx or trachea at the time the individual speaks, the voice appears to pass immediately up to the ear of the auscultator, and is louder than that heard by the other ear. This phenomenon is termed the *laryngeal* or *tracheal voice*, *laryngophony* or *tracheophony*. It is the sound of health; but we meet with a similar physical sign in disease; the voice, when a cavity exists in the lungs, and is at the same time empty, seeming also to pass immediately through the stethoscope to the ear of the observer, and constituting the *cavernous voice* or *pectoriloquy*.

When the stethoscope is applied over the sternum and subjacent trachea; or between the spine and the scapulæ, in the middle of the back, over the subjacent large bronchial tubes, the voice is heard to resound very strongly, but it does not pass up to the ear, in adults,

like the tracheal or laryngeal voice. In children, however, this *bronchial resonance*, *bronchial voice*, or *bronchophony*, cannot be easily, if at all, distinguished from laryngophony.

It can be readily understood, that if any of the bronchial tubes be dilated, these sounds may become greatly developed.

This resonance of the voice can be felt by applying the hand to the chest. An obscure, diffused fremitus is perceptible, which has been called the *vocal* or *pectoral fremitus* or *vibration*. The author has found this manifestly augmented in cases of consolidation of the lungs—the difference between the sound and healthy side being often marked.

In the minute ramifications of the bronchial tubes, the resonance of the voice is not heard; the vesicular texture of the lungs is a bad conductor of sound; and, consequently, it prevents the resonance of the voice in the bronchia from being transmitted to the parietes of the chest, excepting where bronchia of a certain size pass close to the surface. But, if the vesicular structure be consolidated from any cause,—as by the formation of tubercles—then the bronchophony or bronchial resonance becomes very distinct, and aids us materially in our diagnosis. Such is the result of the author's observation, and it is that of almost all observers; yet, M. Fournet thinks, that it is impossible in any case, and that the natural vocal fremitus is diminished in all changes of density, whether of increase or decrease; and M. Skoda affirms, that increased resonance is owing to consonance or reciprocation,—a well-known acoustic phenomenon,—a view, which seems to be corroborated by the fact, that in pneumonia when there is hepatization of the lung, the resonance of the voice is sometimes distinct, and at others very indistinct.

Again, if fluid exist in the chest, so as to modify the transmission of the vocal resonance to the ear of the auscultator, it may become a physical sign of disease,—as is presumed to be the case with *egophony* to be hereafter mentioned.

When consolidation of the lung exists, if the tips of the fingers be placed over the part when the patient speaks, the thrill may be distinctly felt, running at times up the arm; whilst, in the portions of the lung that are free from disease, no such sensation is experienced. It is very different, at least, from the gentle vibration felt in the opposite lung, if the latter be healthy. All these phenomena are better appreciated in thin persons. In those, whose chests are well covered with muscle and fat, and whose voices are deep-bass, the natural resonance of the voice is obscure, and of limited extent.

It has been recently proposed to associate auscultation with percussion;—that is, to listen with the common stethoscope, or with one modified for the purpose, whilst a part is struck in the ordinary method of mediate percussion; and value has been assigned to *auscultatory percussion*—*acouphonia* or *cophonia*, thus practised; but it has not been much used, and is affirmed by M. Fournet to be deceptive—the perceived sound bearing no precise relation to the condensation or rarefaction of the subjacent parts. Hence it has been denounced—

but in too strong language, by Dr. Walshe—as “obviously worse than worthless.”

3. *Inspection, Succussion, Palpation, &c. of the Chest.*

Lastly;—among the physical signs may be reckoned those afforded by *inspection of the chest*—the rising of the ribs, the extent of costal respiration, &c.; by *succussion* and *palpation*—to detect fluctuation; by *mensuration of the chest*—to discover the difference of capacity between the side of the chest which contains a lung more or less deprived of function from disease, and one which, in consequence of the morbid condition of its fellow, is perhaps executing more duty. All these methods will be referred to, where it may be necessary, under the particular diseases. It may be proper, however, to remark here, that the observations of M. Woillez have led him to infer, that a perfectly regular and symmetrical form of the chest even in subjects who have never suffered from any pectoral disease is rare, not existing in more than one of every five persons taken indiscriminately.

Such are the chief means for the physical exploration of the chest. It affords valuable evidence in regard to the nature and amount of organic disease,—more than any assemblage of general symptoms. Still, the physical signs can only be regarded as valuable adjuvants, and not to be trusted to alone. Certain organic affections of the chest afford nearly the same physical signs; but the general and special symptoms indicate the difference. It has been asserted, indeed, that auscultation is of no practical utility; and there are still a few,—dwindled, it is true, to units,—who ridicule the whole doctrine of physical signs as worse than useless. The author has, thus far, known no one who understands and has practised this method, who does not esteem it as a valuable aid in diagnosis. It is troublesome, however, to acquire the knowledge, and, therefore, easier to decry its usefulness; as it is easier to decry productions of the press, which we have never perused, than to read them, and appreciate, by study, their usefulness. The stethoscope enables us to distinguish between diseases, whose general symptoms are alike; to pronounce on the existence of tuberculosis, and whether the tubercles have gone on to softening, when otherwise doubt might exist; and thus to encourage or to discourage—according to the evidence afforded—subjecting the patient to the inconveniences of a migration to another and more genial clime;—in the former case, enabling us to support the drooping spirits with well founded expectations of benefit from the expatriation; and, in the latter, preventing all the unrequited misery and privation, which could not fail to attend upon so hopeless an expedition.

Unquestionably, too exclusive attention has often been directed to the study of the physical signs of thoracic disease. Dependent, moreover, as these signs are upon careful observation, it was to be expected, that unnecessary refinement might be introduced in the detail of the sounds afforded. These, it will be seen, have become extremely numerous; and many of the subdivisions so minute and needless, as to excite ridicule from those even who place great confidence in

auscultation. "To tell the truth," observes a distinguished practitioner, M. Trousseau, "I have much greater pleasure in meeting with a man who will teach me the best mode of making a poultice, than with him who professes to instruct me in the differences between the *râle souflant* and the *râle sonore*, or how to distinguish the *râle sibilant* from the *soufflant râle*, or this latter from the *turturin râle*, or this again from the *roucoulant râle*, or the *caverneux* from the *cavernuleux râle*, and all such petty distinctions." "The greatest error that has been committed in regard to auscultation," says another distinguished auscultator, Raciborski, "is in having attached too exclusive importance to it, and in having esteemed it, as it were, a science of sounds, (*bruits*;) each of which must indicate a different morbid condition. This much is certain,—and we are desirous of insisting upon it particularly,—there is no *râle* which has a very determinate and invariable value; and that any one *râle* being given, it is almost impossible to tell, from it alone, the name of the disease to which it corresponds. I defy any one whatever to distinguish in all cases, with his eyes shut, and without interrogating the patient, the majority of cases of incipient tubercular pneumonia in the first degree, œdema of the lung, hæmoptysis, or even pulmonary emphysema. The sibilant rhonchus, or the bass-string rhonchus, does not indicate the existence of simple bronchitis more than of pulmonary emphysema or of tubercles, for they may both be heard equally in the three diseases. The bronchial *souffle* no more indicates hepatization of the pulmonary parenchyma than it proves the existence of pleuritic effusion. The rhonchi even, which seem to belong more especially to a particular affection, have not such a determinate value as to enable us to pronounce positively the name of the disease when they are present. The gurgling, which is in some measure regarded as a pathognomonic sign of tuberculous cavities, may really be the result of pulmonary abscesses, or the effect of the dilatation of the bronchia; and the metallic tinkling itself may either be the result of pleurisy with effusion, of a pulmono-pleural fistula, or of a simple pulmonary excavation."

It is to be regretted, that many practitioners are accustomed to observe, or to listen, more than to reflect. As has been well remarked, it is the art of reasoning justly upon the physical signs rather than inquiring into the characters of the physical signs themselves, to which attention ought to be directed, and on which most observers fail. "It cannot be too often repeated," adds Dr. Stokes, "that physical signs only reveal mechanical conditions, which may proceed from the most different causes; and that the latter are to be determined by a process of reasoning on their connexion and succession, on their relation to time, and *their association with symptoms*: it is in this that the medical mind is seen. Without this power, I have no hesitation in saying, that it would be safer to wholly neglect the physical signs, and to trust, in practice, to symptoms alone."

CHAPTER I.

DISEASES OF THE LARYNX AND TRACHEA.

I. INFLAMMATION OF THE EPIGLOTTIS.

SYNON. Epiglottitis, Inflammatio Epiglottidis, Angina Epiglottidea; *Fr.* Epiglottite, Inflammation de l'Epiglote; *Ger.* Kehldeckelentzündung, Entzündung des Kehldeckels.

INFLAMMATION of the epiglottis is considered by most to be midway between pharyngitis and laryngitis. The office of the organ is inservient to both deglutition and respiration, and, consequently, both functions participate in the disorder. The epiglottis is not as important an organ as was at one time supposed. It was formerly universally believed to be the sole agent in preventing substances from passing into the larynx. This, however, appears to be the combined effect of the motions of the larynx, by which it is drawn upwards during deglutition, and of the muscles whose office it is to close the glottis; so that, if the laryngeal and recurrent nerves be divided in an animal, and the epiglottis be left in a state of integrity, deglutition is rendered extremely difficult,—the principal cause that prevented the introduction of aliments into the glottis having been removed by the section. Cases have been related, of persons, who were devoid of epiglottis, and yet who swallowed without any difficulty. (See the author's *Human Physiology*, 5th edit. vol. i. Philada. 1844.)

Diagnosis.—It can rarely, if ever, happen, that inflammation of the epiglottis occurs without symptoms denoting that other parts in the vicinity are implicated; and hence it is, that the disease has usually been described under Laryngitis or Pharyngitis. A recent writer, M. Dezeimeris, has collected several examples of this nature. In some of the cases of epiglottis, the epiglottis has been seen of a red colour, enlarged, and, on drawing the tongue forward, erect, as it were, or covered with false membranes, and, to the touch, it has been swollen, hard and prominent. In all cases, there has been great difficulty in deglutition, which appears to be of two kinds—one, which has been termed *pharyngeal*, the other *laryngeal*; the former, at times, altogether mechanical in its character, and owing to the narrowness of the passage for the food into the pharynx; at others, owing to the excessive sensibility of the epiglottis, and to the sort of convulsive effort occasioned by the pain during the contraction of the pharynx;—the latter, or the laryngeal dysphagia, being dependent upon a small portion of liquid passing, during deglutition, into the larynx, and occasioning a convulsive cough for its expulsion. This difficulty, or impracticability of swallowing, when it coincides with the absence of active inflammation and great swelling of the tonsils, is considered by M. Dezeimeris to indicate inflammation of the epiglottis. Taken alone, it may merely announce the existence of inflammation of the upper

part of the larynx, in which, however, the epiglottis is frequently involved.

At times, a sensation, as if an extraneous body were in the fauces, is experienced, with pain at the anterior and superior part of the neck, above the larynx. There is always, too, considerable pain in moving, and especially in protruding, the tongue; and as the root of the epiglottis is studded with glands or follicles, the inflammatory irritation stimulates them to an increased secretion of mucus, which is detached with difficulty, giving rise to constant efforts, that greatly harass the patient, causing paroxysms of dyspnoea, and preventing sleep.

Causes, and Treatment.—These are essentially the same as in pharyngitis, amygdalitis, and laryngitis. In addition to other means, stress has been laid on the application of a solution of nitrate of silver to the inflamed epiglottis.

R.—Argent. nitr. gr. x.
Aque destillat. f ʒi.—M.

It may be readily applied by sewing a dossil of lint to the end of the finger of a glove, and placing it on the forefinger. The tenacious mucus, which collects about the top of the larynx, in this and other diseases, may often be removed by the same agency.

II. INFLAMMATION OF THE LARYNX.

SYNON. Laryngitis, Inflammatio Laryngis, Cynanche Laryngea, Angina Laryngea; Fr. Laryngite, Catarrhe Laryngien, Angine Laryngée; Ger. Entzündung des Kehlkopfs.

Inflammation of the larynx, not many years ago, was scarcely studied as a distinct disease. In the Nosology of Good, the term laryngitis is not to be met with; the disease being comprised under the head of *Empresma Bronchitis*, along with *Cynanche trachealis*, *Cynanche stridula*, *Cynanche laryngea*, *Angina polyposa*, *Expectoratio solida*, *Cauma bronchitis*, *Angina canina* and *Croup*. Yet it will be seen that, although inflammations of the lining membrane of the larynx, of the trachea and the bronchia, may greatly resemble each other, there is room for a well founded distinction. Another division is into,—1. Laryngitis, with simple redness of the mucous membrane, or *Erythematous laryngitis*. 2. Laryngitis, with tumefaction of the mucous membrane. 3. Laryngitis, with copious secretion of mucus. 4. Laryngitis, with copious secretion of pus. 5. Laryngitis, with production of false membranes; and, 6. *Œdematous laryngitis*. There are these objections, however, to this classification—that no great advantage arises from the distinct consideration of the three first varieties; that the fourth is the chronic form of laryngitis, or laryngeal phthisis; and the fifth, laryngo-tracheitis or croup. The last, which is generally designated *œdema of the glottis*, although usually, perhaps, originating in inflammation, may not always have it as a cause. Still, it may be well to consider it under the head of Laryngitis. Another distinguished pathologist, M. Cruveilhier, divides laryngitis into two varieties, according as the diseased action is more conspicuous upon the surface of the mucous membrane of the larynx, or in the sub-

mucous cellular tissue—designating the former *mucous laryngitis*; the latter, *submucous laryngitis*, which is œdema of the glottis.

Perhaps as convenient a division, in all respects, as any, is into the *acute*, the *chronic*, and the *œdematous*,—referring the fifth variety of Andral to a distinct head.

a. *Acute Inflammation of the Larynx.*

SYNON. Acute Laryngitis.

Diagnosis.—The first onset of acute laryngitis rarely differs from that of ordinary sore throat; but, sooner or later, there is a sense of constriction, heat, or pricking in the region of the larynx, which is, at times, very severe when the patient speaks or coughs, or when pressure is made on the larynx. At the same time, and even before the occurrence of these symptoms, there is more or less fever. The voice, as well as the cough, is hoarse, and, at first, dry; but subsequently, an expectoration of mucus takes place, and, at times, the sputa are mixed with blood. The secretion of mucus is of little moment in the case of the adult, but becomes serious in the infant. Deglutition is, at times, difficult, or effected with inconvenience, and the inspirations are long and laborious, but by no means to the same extent as in croup, or in œdema of the glottis. In very severe cases, the dyspnœa recurs at short intervals with spasmodic force, and there is danger of suffocation, with great distress, restlessness, and starting of the eyes, followed up, if the disease be not removed, by evident sinking of the vital powers, and death.

In all cases of disease of the respiratory organs, the symptoms are liable to spasmodic exacerbations, and death would appear to arise occasionally from this cause, before the obstruction from the inflammation could be sufficient to induce fatal results. Owing to these various causes, hæmatisis is imperfectly executed, and this may be the cause of the comatose condition, which generally precedes dissolution.

Where the laryngitis is to a slight extent,—as the author knows from repeated experience in his own person,—the general inconvenience may be slight; but where very severe, as remarked by M. Andral, the “great disorder of innervation may mask the symptoms of local mischief.” On inspecting the throat, there may be no evidence of pharyngeal inflammation; but generally, perhaps, the mucous membrane exhibits more or less injection.

The duration of the disease, where it terminates fatally, varies according to the constitution of the patient, the extent of the lesion, and the effects of remedies. The usual duration is from three to five days, yet it has proved fatal in less than twenty-four hours. It would seem to be the disease of which the illustrious Washington died; as well as two distinguished members of the medical profession, Dr. David Pitcairn and Sir John Macnamara Hays, whose cases have been detailed by Dr. M. Baillie. Before Baillie’s time, this formidable kind

of laryngitis, if known, had not been accurately described; but since that period, many examples have been placed upon record.

Causes.—Exposure to cold, as in every other case of internal inflammation, has been assigned as a cause, and there is no question, that the irregularity, induced by exposure of a part of the body to the action of cold and moisture, may excite acute inflammation of the larynx as it does inflammation of the pharynx, and other parts. It is probable, too, that they who are liable to attacks of amygdalitis, may be more subject to acute laryngitis; but the author is unable to state this as the result of any numerical estimate. It is also said to occur sympathetically in cases of acute gastroenteritis. As a consequence of the major exanthemata, it is met with along with inflammation of the air passages in general, and the complication renders those diseases more formidable.

Acute laryngitis may occur at all ages. It has been observed in the new-born; but it is extremely rare in childhood; on the other hand, inflammation of the larynx and trachea with the production of false membranes is common in childhood, and rare in the adult age. There are very few cases on record, in which acute laryngitis, of the kind now described, has attacked persons under the age of twenty. Of twenty-four cases collected by Dr. Ryland, two only were under the age of 20; four between 20 and 30; six between 30 and 40; five between 40 and 50; three between 50 and 60; and four between 60 and 70. We have no exact data, however, in regard to the influence of age as predisposing to the disease. Of 28 cases, taken indiscriminately from various works, 22 occurred in males, and only 6 in females. This may be owing to the former being more liable to irregular exposure, and to the more powerful exertion of the vocal organs; for this has been assigned as a cause of acute laryngitis as well as of the chronic form.

Pathological characters.—The common appearances presented in acute laryngitis are, an inflamed and thickened state of the epiglottis, which is, at times, observed standing erect, so as to leave the larynx entirely uncovered. This enlargement is owing chiefly to submucous infiltration. The mucous membrane lining the larynx exhibits the ordinary signs of inflammation, with more or less of the same kind of infiltration; and if the disease have not been rapidly fatal, ulceration may be met with; and pus has been observed in the ventricles of the larynx. The condition of the epiglottis would of itself account for the difficulty of deglutition, which is sometimes considerable.

Treatment.—The lighter forms of erythematous laryngitis require but little treatment. Perfect rest in bed, with gentle cathartics, and warm diluents, so as to equalize the circulation over the whole surface, are generally sufficient. The severer forms, however, require the most energetic measures, and even these are too often unsuccessful. In the early period of the disease, when the circulation is active, and the pain and constriction of the larynx are considerable, blood-letting should be employed so as to make a decided impression on the system, and it must be repeated if the symptoms demand it. Leeches should

also be applied freely over the upper and front part of the neck, and a warm poultice, if it can be borne, over the leech bites.

When blood has been copiously drawn, more or less reaction usually succeeds, which must be met by contra-stimulant doses of the tartrate of antimony and potassa;^a pediluvia, simple or sinapized; mucilaginous drinks, as gum-water,^b or the infusion of benne, or of the slippery elm; and cathartics,^c and simple or cathartic enemata.

^a R.—Antim. et potass. tart. gr. iv.—xij.

Mucilag. acac. f 3ij.

Aquæ. f 3vj.—M.

Dose, a tablespoonful, every two or three hours.

^b R.—Acac. 3j.

Aquæ f 0ij.—M.

^c R.—Infus. sennæ f 3ij.

Magnes. sulphat. 3ij.

Ol. menthæ pip. gtt. vj.—M.

Dose, one half, and in two hours the remainder, unless the first should take effect.

The patient should be forbidden to speak, and the recommendation, that the air of the chamber should be preserved at an equable and mild temperature, is judicious.

If these means do not prove efficacious, a revellent treatment should be immediately adopted, which may consist in the free administration of mercurials,^d so as to induce ptialism.

^d R.—Pil. Hydrarg. gr. xx.—in pil. iv.

Dose, two night and morning.

Or, Hydrarg. chlorid. mit. gr. i.

Conserv. rosar. q. s.—ut fiat pilula.

Dose, one night and morning; aided by

rubbing on the inner side of the thigh a drachm of the *unguentum hydrargyri*; and dressing the incisions made by the scarificator with the same ointment, so as to induce ptialism, if practicable.

Should all these means fail, the practitioner must be prepared for the operation of tracheotomy, but it is of no use, unless performed early, and before the patient is evidently sinking. In some cases, in which it has been practised, the exhaustion has been so great, that reaction and recovery could not take place even when the respiration was rendered free by the operation. It gives time for the action of remedies, and all the writers on this subject have urged the importance of employing it early in the disease, and as soon as the attacks of threatening suffocation seize the patient. Where the spasms have supervened, and tracheotomy is not practicable from any cause, full doses of opium, or of its preparations, are indicated, (3 grains of soft *opium* in pill, or the equivalent in the preparations of opium or salts of morphia), which are valuable sedatives, and not only allay the spasms, but diminish the over action of the circulatory system. In six of Mr. Ryland's twenty-eight cases, before referred to, tracheotomy was performed, and in four a cure was effected; in the remaining two, temporary relief only resulted. It has been urged, that the operation frequently fails, owing to the too small size of the canula employed. M. Trousseau uses a middle sized canula at first, and gradually increases the size, until the air almost ceases to make any noise in passing through it during a deep inspiration.

b. Chronic Inflammation of the Larynx.

SYNON. Chronic Laryngitis.

This term has been used synonymously with *Laryngeal phthisis*, *Phthisis laryngea*; Fr. *Laryngite chronique*, *Phthisie laryngée*, *Laryn-*

gée, Laryngite avec sécrétion de Pus; whilst laryngeal phthisis itself (Ger. *Kehlkopfschwindsucht, Halsschwindsucht*;) has been employed by MM. Trousseau and Belloq, so as to comprise "any chronic alteration of the larynx, which may bring on consumption or death in any way." It has been used, indeed, to include all chronic diseases of the larynx. In this work, the epithet "chronic" is employed in regard to laryngitis, in the same manner in which it is applied to other inflammations of mucous membranes:—to signify inflammation of the lining membrane of the larynx, or of the subjacent parts, the duration of which is long, or whose symptoms proceed slowly.

Diagnosis.—The commencement of chronic inflammation of the various structures composing the larynx is often extremely insidious, and its progress so tardy, that much, and often irreparable mischief is accomplished before any alarm is taken by the patient, and he applies for medical assistance. Pain is felt in the larynx, but its precise situation may vary; at times, it extends over the larynx; but, at others, is restricted to a small space, and generally to the region of the thyroid cartilage. Commonly, a kind of tickling sensation exists, which provokes coughing. The pain, too, is exasperated by coughing, speaking, and deglutition, especially when ulcerations exist, and they are situate above the ventricles of the larynx. The breathing of cold air, and pressure upon the larynx likewise augment it. The voice is almost always changed, being hoarse, and, at times, so much enfeebled, as to be inaudible. The aphonia may supervene suddenly or gradually, and ultimately be complete. Cough is a constant concomitant, and when the mucous membrane is much swollen, it becomes hoarse and even croupy. In the first instance it is dry, but subsequently it is accompanied with the expectoration of mucus, mixed occasionally with pus or blood. At other times, a membraniform matter is expectorated for months; and at others a considerable quantity of false membrane is thrown off, after which the patient rapidly recovers. Occasionally, portions of cartilage are mixed with the mucous or bloody sputa, and, in such cases, there is always accompanying hectic. Chronic laryngitis has, indeed, been divided into two heads;—the first comprising that which affects the mucous membrane and the submucous tissue; and the second, that which implicates the cartilages; the latter—it has been conceived—having perhaps the best claim to the name *phthisis laryngea*, from the incurable nature of the affection, and the hectic and emaciation, which invariably accompany its latter stages.

When chronic laryngitis is slight, and there is not much narrowness, the difficulty of breathing may not be great; but if it be attended with much tumefaction of the lining membrane, the dyspnœa is considerable, and the sound on inspiration, sonorous and peculiar. It is evidently, too, augmented by paroxysms. The air of inspiration, likewise gives rise to a snoring (*ronflement*) or whistling, (*sifflement*;) which may be continuous, or recur in paroxysms. These local symptoms may be so slight, that the general health does not suffer to any great degree. Commonly, however, more or less sympathetic febrile disorder is apparent, under which nutrition is impaired, and atrophy supervenes.

The disease now merits the term *Laryngeal Phthisis*, which is, however, in the immense majority of cases, connected with the presence of pulmonary tubercles.

Chronic laryngitis may be primary, or it may succeed to acute laryngitis, and when apparently terminating in health, it is readily reproduced by exposure to cold, errors in diet, &c. &c. Its duration varies from a few months to several years.

When the fauces are inspected, but little evidence of disease may be perceptible; at other times, however, the mucous membrane is injected, and the follicles are so large as to resemble split peas. Whether this enlargement of the follicles be the cause or effect, may admit of a question. The enlarged follicles probably exist lower down, where they cannot be inspected. This form of laryngitis is the one often known under the name "Clergymen's sore throat."

Chronic laryngitis may terminate in health; but it is more likely to end fatally; and this may occur in different modes,—either by the lungs becoming implicated, or by the extent of the laryngeal lesions themselves, which may excite severe irritative fever, or interfere with the entrance of air into the lungs, and thus induce asphyxia. In almost all cases of phthisis laryngea, the disease is complicated with pulmonary tubercle. Dr. Stokes, indeed, asserts, that after ten years of hospital and private practice, he never saw a case presenting the symptoms of laryngeal cough, purulent or muco-purulent expectoration, semi-stridulous breathing, hoarseness, or aphonia, hectic, and emaciation, in which the patient did not die with cavities in his lungs. In some, the laryngeal affection seemed to be primary; but, in the great majority, symptoms of pulmonary disease existed previous to its appearance. Such, also, is the result of the author's observation.

In many cases of pulmonary phthisis,—sore throat, hoarseness, or aphonia, with cough, occur; but the case is different, when the laryngeal symptoms have been primary.

Causes.—The same causes, that give rise to acute laryngitis, may induce the chronic form also. It may be caused, like the acute, by the inspiration of acrid substances, or by extraneous bodies received into the larynx. The habitual and intemperate use of ardent spirits has likewise been esteemed a cause, as well as the effect of mercury. These act either as predisposing or exciting causes. It is often the result of phthisis pulmonalis; whilst, on the other hand, the pulmonary irritation, induced by it, may occasion the developement, and augment the course of tuberculosis of the lungs in those who are predisposed to pulmonary consumption. The co-existence of ulceration of the lungs, and of suppurated pulmonary tubercles, has often been proved. In one-fourth of the cases of phthisis, ulceration of the larynx has been observed; in one-sixth, ulceration of the epiglottis; and ulceration of the trachea was met with by M. Louis, more frequently than either of the other lesions. It is probable, however, that the idiopathic chronic laryngitis rarely produces the symptoms of phthisis; but the two diseases are frequent concomitants.

Amongst the exciting causes are mentioned—prolonged action of the vocal organs; hence the disease is said to be frequent among

actors, singers, lawyers, preachers, &c. It has already been remarked, that it is so common amongst the last, as to have received the name of the *clergymen's sore throat*; yet why it should prevail among them more than among lawyers, professors, &c., who use their vocal organs more, is not clear. It has, indeed, been suggested, by Professor Chapman of Philadelphia, that clergymen, as a class, are of feeblor constitutions, which circumstance may have originally led them to embrace their avocation; and, hence, that they are more liable to such derangements than more healthy individuals; but this does not seem sufficient to account for the difference. Another explanation has been offered by Dr. Stokes—that the clergyman begins to exercise his vocal organs at a much earlier period than the lawyer, for example. The young clergyman, often of a feeble and nervous constitution, and acting under conscientious motives, to the neglect of bodily health, not only reads the service, and preaches once or twice, or even more frequently in the week, but is exposed to night air and the inclemency of the weather. He is compelled to do so, while both the larynx and constitution of the lawyer have generally full time for maturity, before he need employ the one or expend the other in the duties of his profession.

Syphilis would appear to be a frequent cause of chronic laryngitis, and especially of the ulcerative form,—the ulcers extending, at times, from the throat by continuity of surface.

As to age, the disease has certainly been observed most commonly between twenty and forty; but, as to sex, discrepancy of sentiment exists;—some, as Ryland, affirming, that the number of females, attacked by it, is infinitely greater than that of males; others, as Andral, that males are more frequently affected than females.

Pathological characters.—Chronic inflammation induces the same changes in the laryngeal mucous membrane as in other membranes of the class;—for example, redness, increased thickness, and alteration of consistency, over a greater or less extent of surface. Occasionally, too, vegetations of considerable size, and white and hard granulations, are perceptible. Pus, too, is generally found covering its surface. The mucous follicles, both of the lining membrane of the pharynx and larynx, are frequently enlarged, especially in that form of the disease to which clergymen are subject, and they seem filled with a yellowish matter. Ulcerations are likewise very common, so as even to destroy the vocal cords. The submucous cellular tissue is often infiltrated by a thin fluid; and, at times, collections of pus exist in it; at others, it is indurated, and tubercles are found in different stages of development. The intrinsic muscles of the larynx have been found much reduced in size, softened, and occasionally destroyed. At other times, they have been hypertrophied. The epiglottis may be thickened, ulcerated, carious, and even completely destroyed; yet the patient may have been able to swallow to the last. (See p. 225.) Of the cartilages of the larynx, the cricoid and the arytenoid are most frequently diseased—the thyroid least so. Occasionally, they are ossified, or ossific points are deposited on the mucous membrane. In broken down constitutions, in which large quantities of mercury have been

used, it has been remarked, by Drs. Graves and Stokes, that chronic laryngitis is very apt to terminate in ulceration of the cartilages.

Treatment.—In the treatment of chronic laryngitis, at all stages, rest of the vocal organs is indispensable; but it is difficult to have it rigorously enforced. In the early periods, blood-letting from the arm is sometimes demanded, and in almost every case, it will be advisable to apply cups to the nape of the neck, or top of the chest; or, what is better, leeches freely over the seat of the disease. Emollient fomentations and poultices, likewise afford relief, but they have been objected to—probably altogether on hypothetical considerations—under the idea that they solicit an increased flow of blood towards the throat, and thus aggravate the disease. Revellents are, certainly important remedies. A blister may be applied to the top of the sternum, or over the trachea, and as soon as it heals, another should be applied, so as to keep up an intermittent, which is preferable to a permanent irritation. Hence blisters, thus employed, are better than setons; and the ointment of the tartrate of antimony and potassa,^a or the croton oil,^b is, perhaps, preferable to either.

^a R.—Ant. et potass. tart. p. j.

Adipis, p. vij.—M.

A piece, the size of a hazlenut, to be rubbed on the region of the larynx, night and morning.

^b R.—Ol. tigll, p. j.

—oliv. p. ij.—iij.—M.

A few drops to be rubbed in at a time.

With the view of procuring rest, opium and its preparations may be given. They are useful, likewise, in allaying cough.^a The salts of morphia may also be employed endermically,^b and advantage has been derived from frictions over the larynx, with the extract of belladonna.^c

^a R.—Tinct. opii,

—digital. aa gtt. xl.

Mucilag. acacis,

Syrup. aa, f 3ij.

Aque, f 3vj.—M

Dose, two tablespoonfuls, three or four times a day.

^b R.—Morphiæ acet. vel

Morphiæ sulphat. gr. ss.—gr. i.—

sprinkled over a blistered surface.

^c R.—Ext. belladonnæ, 3j.

Cerat. commun. 3xi.—M.

Where the affection of the larynx has lost its inflammatory characters, and any of its terminations remain, topical remedies may be employed. These have, indeed, been regarded by MM. Trousseau and Belloq as the most efficacious of all. They may be made to come into immediate contact with the diseased surface itself. At an early period of the disease, inhalations of the steam of warm water may be employed with advantage, but subsequently more excitant applications are needed, to induce a new action in the diseased surface. Inhalations, however, are liable to the inconvenience, that they cannot be restricted to the larynx; and, consequently, no agents are administered, in this manner, in cases of chronic laryngitis, except such as do not over-excite the mucous membrane of the lungs. The vapour of hot water, to which one of the essential oils has been added, may be used in the way of inhalation, with safety and occasional benefit. Various forms of apparatus have been devised for this purpose; but MM. Trousseau and Belloq frankly confess, that

a simple teapot is as well adapted to the purpose as the most complicated machines. In this way, chlorine, creasote, and iodine, may be inhaled under the circumstances laid down under Phthisis Pulmonalis.

Topical remedies, in solution, are more to be relied on. Of these, nitrate of silver, corrosive sublimate, sulphate of copper, nitrate of mercury, and Lugol's caustic solution of iodine, (see the author's *New Remedies*, 4th edition, Philad. 1843,) have been employed, but the nitrate of silver is to be preferred, on account of its rapidity of action and harmlessness. It may be used in the proportion of ten or fifteen grains to the ounce of water, and it has been prescribed as strong as one part of the nitrate to two parts of water. Various plans have been adopted for applying it. The author uses a mop of rag at the extremity of a piece of whalebone. Others attach a piece of sponge to the end of a quill, dip it in the solution, and having slightly squeezed it to prevent the fluid from dropping, they touch the posterior fauces; raise the outer extremity of the quill so that the sponge may touch the epiglottis and superior part of the larynx, and draw it gently out in this manner. Thus, the solution is made to come into immediate contact with the inflamed surface. By others, it has been advised to take up a drop of the strong solution on the bent extremity of a piece of firmly rolled paper, or whalebone, and to cause this to touch the lining membrane of the larynx. It has been suggested, that the solution may be thrown, in the form of a shower, into the larynx, from a small silver syringe, like Anel's; but the plans, already recommended, have the merit of being more easy of application.

A plan,—before mentioned—proposed by Mr. Cusack, of Dublin, has been regarded by a competent witness, Dr. Stokes, as the best of all. A brush of lint, of the requisite size, is sewed on the end of the finger of a glove, which is then drawn on the index finger of the right hand. The patient is made to gargle with warm water, and the lint being dipped in the solution, can be readily applied to the larynx.

When the disease is dependent upon any syphilitic *vice*, it may be necessary to administer mercury, or some other revulsive agent—iodine, for example. When mercury is pushed so as to affect the mouth, it sometimes breaks in upon the morbid chain where no *vice* is suspected or present. It should be given, under such circumstances, so as to exert its ordinary influence slightly on the mouth. When, however, pulmonary tubercles are coexistent, care must be taken in the administration of this potent remedy, as the dyscrasy, induced by it, is apt to cause their developement. Where the disease is dependent upon the use of mercury, it should, of course, be carefully abstained from, and an appropriate treatment, in which rest and the free use of iodine are combined, should be prescribed.

In many cases, the spasmodic exacerbations are very severe and distressing: they may be assuaged by opiates, or by the application of the *emplastrum belladonnæ* or *emplastrum opii*.

Lastly,—a question may arise as to the necessity for the operation

of tracheotomy. Although frequently demanded in acute laryngitis, and not to be postponed, it is rarely necessary in cases of chronic laryngitis; but should symptoms, similar to those of acute laryngitis, which demand the operation, arise, it must be unhesitatingly performed. It is probable, however, that in such a case, the operation could be of but transient benefit; so much disorganization must have occurred as to render ultimate recovery almost wholly, if not wholly, hopeless.

c. *Œdematous Inflammation of the Larynx.*

SYNON. Œdematous laryngitis, Œdema of the glottis, Œdema glottidis, Hydrops glottidis, Submucous laryngitis, Œdematous angina, Cynanche laryngea; Fr. Laringite œdémateuse, Œdème de la glotte.

The œdematous condition of the larynx has been considered by most pathologists to be dependent upon previous inflammation; yet a similar state has been observed as an accompaniment of the leucophlegmatic habit; so that some have been disposed to admit an œdema of the glottis of an idiopathic character, in which the submucous infiltration is wholly serous; and another—symptomatic or inflammatory—in which the fluid in the submucous tissue is seropurulent. The character of the secreted fluid cannot, however, be regarded as a sufficient ground for difference in pathology.

Diagnosis.—The first symptoms resemble those of ordinary laryngitis. There is pain, or uneasiness, at the upper part of the larynx, which gives occasion to the sensation of a foreign body lodged there. Cases, indeed, it is affirmed, have occurred, in which bronchotomy has been resorted to, for the removal of the suspected foreign body; yet nothing of the kind could be discovered after the most careful examination; and it has been suggested, that such a mistake may occur from the close resemblance between the symptoms of œdematous laryngitis and those caused by the presence of a foreign body. In the latter case, however, both inspiration and expiration are sibilant and difficult; whilst, in œdematous laryngitis, the inspiration alone is sonorous or sibilant, the expiration being free and easy. This is owing to the œdematous mucous membrane being drawn into the aperture of the glottis during inspiration; and to the passage, during expiration, being left entirely clear. The voice is raucous, bass, and discordant; and, occasionally, altogether suppressed.

From the very commencement of the disease, the breathing is extremely difficult, and in paroxysms, which threaten immediate suffocation. These become more and more severe. Sleep cannot be indulged; or, if the patient fall into a nap, he is awoken by violent attacks of suffocation. The severity of the symptoms gradually increases, and death closes the scene, either suddenly, or after the most horrible suffering.

Percussion and auscultation afford only negative signs; but this circumstance, in the absence of other diseases of the larynx and trachea, ought to cause the suspicion of œdema of the glottis. If the finger can be carried along the tongue as far as the glottis, or even

the upper extremity of the larynx, a soft projecting ring or cushion may be felt protruding into the tube, which has been esteemed a pathognomonic sign of the disease. In order to accomplish this, the mouth should be propped open by means of a piece of wood, introduced between the upper and under molar teeth, and the root of the tongue be drawn forwards by means of the handle of a spoon. The finger may then—and especially in females in whom the space between the mouth and the larynx is shorter—be able to attain the lips of the glottis. In males, however, the plan, according to Mr. Ryland, has failed.

The age of the patient is a principal means of diagnosis between œdematous laryngitis and croup. The latter disease is rare in the adult, and on the other hand, œdema of the glottis has only been observed at that age.

It has been elsewhere remarked, that aneurism of the aorta has been mistaken for laryngitis, and it may be confounded with this form of the disease, the pressure of the tumour giving occasion to sibilant inspiration, and paroxysms of suffocation; but careful attention to the signs afforded by auscultation will sufficiently diagnosticate the two affections. Cases, too, are recorded, in which abscess behind the œsophagus has been mistaken for œdema of the glottis, and in which death has taken place from asphyxia.

The progress of œdematous laryngitis is commonly very rapid, and it is almost always fatal. Of seventeen cases recorded by Bayle one only recovered.

Causes.—These are usually not appreciable. It is said to have been owing, in some cases, to rheumatic metastasis.

Pathological characters.—The sides of the larynx, and especially of the glottis, are thickened so as to form a soft ring or cushion, caused by a serous or sero-purulent fluid, which gives it a yellowish or grayish appearance. This generally closes almost entirely the aperture of the glottis.

Treatment.—The treatment to be adopted in this disease, may have to vary according to the accompanying condition of the system. Generally the inflammatory evidences are by no means marked;—the pulse and heat of the skin being perhaps unmodified, so that the disease appears to be wholly local. It cannot often happen, therefore, that general blood-letting is needed. Leeches may be applied over the neck, and, lower down, a blister; every revellent agency must, indeed, be had recourse to, to divert the local mischief from the larynx. Emetics and cathartics should be administered,—the former every few hours so as to cause vomiting, (*ant. et potass. tart. gr. ij.—iij.*;) and, even if vomiting should not be induced, the contra-stimulant agency of the antimonial may be beneficial. Any of the ordinary cathartics may be administered;* stimulant enemata may be thrown into the rectum every few hours, and sinapisms be applied to the legs, feet, or arms.

* R.—Jalap. pulv. vel
Rhei. pulv. gr. xv.
Hydrarg. chlorid. mit.
Zingib. pulv. aa gr. v.—M.

It has been suggested, that large doses of calomel (gr. v.—x. omni horâ) should be administered, which, either by their purgative effect, or by their revellent action on the general system, may tend to check the inflammation of the glottis, and to promote the absorption of the effused fluids.

Should these remedies have been employed, and attacks of impending suffocation be urgent, the operation of bronchotomy must be practised; but, as in cases of ordinary acute laryngitis, it must not be postponed too long, otherwise it also must fail. It has been proposed, that, the moment the nature of the disease is known, the operation should be practised, and that it should be followed up by the revellent treatment just recommended; or that, in its place—and the plan is preferred by some—an elastic gum tube, open at both extremities, and of the proper size, should be introduced into the larynx from the mouth, so as to keep the passage open. It is scarcely possible, however, to conceive, that any benefit could accrue from the presence of an extraneous body in such a condition of the parietes of the larynx. Another plan—scarcely, if at all, more feasible—is to pass the finger into the glottis, and to make pressure on the infiltrated parts, so as to diminish their volume; and, lastly, it has been proposed to scarify the engorged parts, so as to permit the escape of the fluid. Both these plans have been characterized by Mr. Ryland as fantastic, very difficult, if not impossible, of accomplishment, and more likely to increase than diminish the existing evil. The last is undoubtedly extremely difficult of execution; but, if it could be carried satisfactorily into effect, it would offer great probability of benefit. The danger of the disease is, in some measure, proportioned to the extent of the tumefaction; and any method, that would abstract the effused fluid, could not fail to afford essential relief.

II. INFLAMMATION OF THE LARYNX AND TRACHEA.

SYNON. Cynanche Trachealis, Cynanche vel Angina Laryngea of some, A. Membranacea, A. Strepitosa, A. Exsudatoria, A. Polyposa, A. Trachealis, A. Humida, A. Suffocativa, Suffocatio Stridula, Laryngitis et Tracheitis Infantilis, Empresma Bronchlemmitis, Orthopnoea Cynanchica, Pædanchone, Trachitis, Tracheitis, Diphtheritis Trachealis, Laryngo-Tracheitis, Laryngo-Tracheitis with Diphtheritic Exudation, Laryngitis with production of False Membranes, Plastic or Pellicular Inflammation of the Larynx, Croup, Roup, Hives, Choak, Stuffing, Rising of the Lights, &c.; *Fr.* Croup, Angine Laryngée et Trachéale, Laryngite avec production de Fausses Membranes (*Andral*), *L.* Pseudomembraneuse; *Ger.* Croup, Häutige Braune, Entzündung des Luftröhrenkopfes.

Diagnosis.—This disease is a combination of laryngitis and tracheitis; which last does not differ materially from laryngitis, except by its seat, and, therefore, does not require a distinct consideration.

The disease, about to be investigated, is not, however, a simple laryngo-tracheitis, but an inflammation often accompanied with the production of false membranes—differing, consequently, from the inflammatory affections of the larynx that have been thus far considered. Of late years, it has been maintained by Bretonneau to be identical with the diphtheritic inflammation of the supra-diaphragmatic portions of the alimentary canal, which have been described

collectively under the name *Diphtherites*; and a recent writer, M. H. Bell, has observed, that the ideas of Bretonneau on croup are, at the present day, generally admitted, "supported, as they have been, by the anatomo-pathologists, who have made their observations since him, the question turning no longer on the existence of the diphtheritis, but on its nature." It is not accurate, however, to ascribe such sentiments to the generality of pathologists. Almost all admit, that the essential character of croup, in the child, is a violent inflammation, accompanied by an exudation of plastic lymph; but the generality of American and British practitioners regard this idiopathic inflammation of the larynx and trachea, or rather of the latter—for the larynx is generally but little implicated—as very different from the diphtheritic inflammation that occurs in diphtheritic stomatitis and pharyngitis, in which, as has been shown, there is always precedent fever, and the formation of false membranes in the mouth and pharynx, which may extend down the windpipe, and give rise to symptoms of croup in the advanced stage of another and totally different disease. It is extremely doubtful, indeed, whether the mild cases of croup—which are relieved by simple treatment, are unaccompanied by fever, and form, perhaps a large proportion of the cases ordinarily classed as croup,—have any tendency to the formation of false membranes. They have been considered as cases of simple laryngo-tracheitis, and have been classed by M. Berton amongst the false croups—*faux croups*; and by others have been termed *spasmodic croup*.

The inflammatory idiopathic croup, in which the accompanying fever is symptomatic, Dr. Stokes has termed *primary croup*. It is that which we meet with in childhood; whilst *secondary croup* comprises the symptomatic affection just described, and is the croup of the adult—the *Diphthérie* of Bretonneau. Between these two forms of croup, Dr. Stokes has pointed out the following differences, which are so well shown in tabular form, that we borrow his observations.

PRIMARY CROUP.

1. The air passages primarily engaged.
2. The fever symptomatic of the local disease.
3. The fever inflammatory.
4. Necessity for antiphlogistic treatment, and the frequent success of such treatment.
5. The disease sporadic, and, in certain situations, endemic, but never contagious.
6. A disease principally of childhood.
7. The exudation of lymph spreading to the glottis, from below upwards.
8. The pharynx healthy.
9. Dysphagia either absent or very slight.
10. Catarrhal symptoms often precursory to the laryngeal.
11. Complication with acute pulmonary inflammation common.
12. Absence of any characteristic odour of the breath.

SECONDARY CROUP.

1. The laryngeal affection *secondary* to disease of the pharynx and mouth.
2. The local disease arising in the course of another affection, which is generally accompanied by fever.
3. The fever typhoid.
4. Incapability of bearing antiphlogistic treatment; necessity for the tonic, revulsive and stimulating modes.
5. The disease constantly epidemic, and contagious. [?]
6. Adults commonly affected.
7. The exudation spreading to the glottis, from above downwards.
8. The pharynx diseased.
9. Dysphagia common and severe.
10. Laryngeal symptoms supervening without the pre-existence of catarrh.
11. Complication with such changes rare.
12. Breath often characteristically fetid.

The symptoms of the idiopathic croup of childhood are sufficiently distinctive. The onset of the disease is various. At times, with all the signs of health, the child is suddenly attacked with pain in the throat, hoarse cough, of the peculiar kind to be mentioned presently, and difficulty of breathing, soon followed by fever, of greater or less severity: the disease, in such cases, arrives at its greatest intensity in a very short period, at other times precursory symptoms exist for a longer or shorter period, occasionally for days, such as cough and hoarseness, but without any fever; after which the symptoms of croup become declared. Most commonly, the attacks occur in the night, and often after the child has been unusually active during the day. The danger of the disease, when neglected, is so well known, that parents are familiar with the cough of croup, and on the alert, should the child cough as if the sound passed through a brazen trumpet, or resembled the barking of a dog. In such case, the child, when the affection is slight, may awake without much evidence of disease; the cough may persist through the night, but gradually lose the croupy character before morning, and there may be no accompanying fever. In more severe cases, however, on awaking, the voice, also, may be sharp and stridulous; the inspiration distinctly audible and laboured, and, often, of a crowing character, when the narrowness of the air passage is considerable; the child is evidently distressed; the face more or less swollen and suffused; the skin hot, and the pulse frequent and hard. After the disease, if left to itself, or if obstinate, have been thus active, there may be—as in other diseases of the respiratory apparatus—alternations of exacerbation and remission; but the disease makes progress; the hoarseness and dyspnœa augment; the voice is lost, and lividity of countenance indicates the imperfect hæmatisation, under which the child gradually sinks; or, what is more common, dies in a paroxysm of suffocation, even when the appearances, on dissection, may not exhibit sufficient narrowness of the air passages to account for death.

In younger children, the expectoration, where any exists, is swallowed, so that it cannot be regarded in the diagnosis; but in older children, in the latter stages, pus is occasionally expectorated; with portions of a whitish membraniform substance. When this exudation has taken place, the difficulty of breathing is often most distressing; the head being forcibly thrown back, so as to stretch the trachea, and this may be the only posture in which temporary relief is obtained.

The ordinary period of termination, is from the third to the fifth day; but it is asserted by Gölis and Albers, that the disease may become chronic, and continue for two or three weeks. The author has not met with a case of the kind.

The physical signs in croup, although not as important as in diseases of the lungs, cannot be regarded with a distinguished observer, M. Laënnec, as useless. Very commonly, indeed, the case is complicated with pulmonary disease, which cannot be overlooked either in the diagnosis, or prognosis. If the disease be confined to the larynx and trachea, there will be no dulness on percussing the chest; and hence this negative sign is of moment. Where there is any

complication of bronchitis, or pneumonia, they can be detected by the signs afforded by those diseases on auscultation. It is important, however, to bear in mind, that the sounds may be masked by the stridulous breathing. When the false membrane is partially detached, we may have a clapper or valve-like sound on inspiration, when the upper extremity of the membrane is partially detached; and on expiration, when the lower extremity is detached, and moved by the passage of the air through the larynx.

Causes.—Although we are not well informed as to the causes of croup, there are a few points which merit mention.

Age unquestionably has a decided influence. After the first year and up to puberty is the period most liable to it. After puberty it is extremely rare, and the cases that have generally been so regarded belong rather to the division of secondary croup. From the experience of several writers, who have published the results of their observations, it would appear, that it has been observed only once at the age of seven months, and never at any antecedent period; that it has not occurred at a later age than twelve; and that from two to ten was the common age at which it was observed. It certainly is extremely unfrequent in children at the breast, yet it is stated by M. Dugès to have been seen in an infant a few days old. Diphtheritic inflammation of the mouth and throat is very common at this early age, but that affection—as we have seen—is different from primary or idiopathic croup, to which the older child is subject.

Sex also affords a predisposition. Of 543 cases of true and false croup, collected by M. Guersent, 293 were of the male sex, and only 218 of the female. This may be mainly owing to the greater exposure to vicissitudes of the former than the latter. There can be no doubt, indeed, that irregular application of cold and moisture to the frame must be regarded as a cause of croup. It prevails more in cold and damp regions, than in those that are dry and warm. In like manner, it is more common during the spring, autumn, and winter seasons, than during the summer. The author has had an opportunity of observing croup on the banks of the Firth of Forth, on the margins of the English lakes of Cumberland; in London, Paris, the interior of Virginia, Baltimore, and Philadelphia; and the disease certainly has not been equally severe in all these places. The cases were more usually rapid in their course, and destructive in the second of those situations, in which, unless very active measures were taken within the first twelve hours, they were too often beyond the efforts of art. In the other localities, the disease has generally been subdued readily, if it were treated sufficiently early, and appropriate remedies were employed.

In certain families, owing to favouring organization, in which almost all the children have participated, scarcely any have escaped the disease. The subsequent attacks commonly, however, are more and more mild, until ultimately, before or near the age of puberty, they altogether disappear, owing to the fresh evolution at that epoch.

Croup is generally, perhaps always, a sporadic disease. It is said, however, to have prevailed epidemically, and as many as thirty-seven

epidemics have been recorded. It is questionable whether any one of those was the primary or idiopathic croup of children. The same may be said of the croups, that have been esteemed contagious. When it has appeared epidemically, it has generally been complicated with diphtheritic pharyngitis, measles, scarlatina, &c.; and—as has been already remarked—belongs to an essentially different affection, being—in the first of these diseases—altogether secondary, the diphtheritis spreading from the mouth and pharynx into the larynx and trachea. There appears to be no reason for believing, that the primary idiopathic croup is ever communicable by contagion.

Croup is an extremely dangerous disease, but the results of the author's own observation have by no means corresponded with those of many pathologists as to its mortality. It has been already stated, that it is more rapid and fatal in some situations than in others; and there can be no doubt, that extensively fatal diphtheritic affections have been confounded with primary croup, so as to swell up the mortality of the latter. Thus, the mortality has been estimated by MM. Caillau and Double at two-thirds of those attacked; whilst others, as MM. Jurine and Vieusseux have estimated it at one-tenth; another observer, J. Frank, cured 39 cases, and lost 27; and a recent writer, M. H. Bell,—who avowedly regards croup as in all cases a diphtheritis—thinks the estimate of Caillau nearest the truth, if it be not indeed too favourable. No such mortality attends the disease in this country, or indeed in any place where the author has practised, or seen it. On the contrary, when the practitioner is called sufficiently early, it is usually very manageable. Still, it is a disease in which the prognosis must be guarded. Too often, indeed, in consequence of the very slight suffering, the child, although breathing and coughing in the peculiar manner of croup, is able to play about, so that no alarm is taken until too late, and many deaths occur from this cause, which might probably have been prevented.

Pathological characters.—The mucous membrane of the larynx and trachea, but especially of the latter, in a fatal case of croup, is found to exhibit the ordinary signs of inflammation. These may extend down into the larger and even into the smaller divisions of the bronchia. The essential character of the disease, however, is, that the tube, especially below the inferior ligaments of the larynx, is lined by a false membrane, of a pale yellow or grayish colour, the thickness of which is dependent upon the intensity of the inflammation, that gave rise to it. This false membrane extends into the larger bronchial divisions, and may exist in the larynx; but it is more readily expectorated from the larynx, as it forms, whilst the narrowness, formed by the inferior ligaments, prevents the ready escape of that which is thrown out in the trachea. The false membrane may either form an adventitious tube, or be in detached portions, blended with mucus or flocculi of albuminous matter. At times, it is separated from the mucous membrane by a purulent or muco-purulent secretion, whilst at others it is intimately adherent to the mucous membrane. When the disease has been rapid in its course, the pseudo-membrane is usually confined to the trachea, showing that the disease is essen-

tially tracheitis. In many cases, the under surface of the epiglottis is coated by the false membrane, and the rima glottidis is obstructed by it. It is affirmed, that cases have occurred in which the mucous membrane of the air passages was covered only by a viscid secretion or by pus, yet death took place speedily, and with the same symptoms as mark the progress of the disease in those in whom the false membranes existed. Generally, in those who die of croup, more or less evidence exists of bronchitis or pneumonia.

The false membrane has been considered by some to be organized, but it is commonly esteemed to be anorganic. There can be no doubt, however, that, like other plastic productions, it is capable of becoming organized. The chemical composition does not differ from the pseudo-membrane of serous surfaces. It is insoluble in cold and in hot water, hardens by the action of acids, and dissolves in alkalies.

Treatment.—In mild cases of croup, not preceded by bronchitic or pulmonic disease, in which the child is suddenly attacked with croupy cough and breathing at night, but where there is little or no fever, and the disease appears to be rather spasmodic than inflammatory, it is generally readily managed. An emetic should be immediately exhibited, and, for this purpose, one of the indirect emetics, or one whose emetic operation is preceded by nausea, had better be employed.

R.—Antim. et potass. tartrat. gr. iv.

Sacchar. alb. ʒj.

Aquæ. fʒj.

Dose, a teaspoonful every quarter of an hour, until it produces vomiting; or a teaspoonful of the *vinum antimonii* or *vinum ipecacuanhæ*, or five grains of the *pulvis ipecacuanhæ* may be administered in the same manner.

The sedative effect of the nausea, and the equalizing and revellent agency of the emesis, frequently put a stop to the disease at once. The warm bath may be afterwards employed, and the child be placed between blankets; but, often, this inconvenient, though salutary agent, may be dispensed with. Warm diluents may be freely allowed. In this country, the *Hive or Croup Syrup* of Dr. J. R. Coxe has been much used in cases of croup, and is kept by many families as a regular domestic remedy for such cases. It is the *mel scillæ compositum* of the dispensatory of the United States, and is composed of squill, seneka, tartrate of antimony and potassa, clarified honey and water. Dose, as an emetic for children, ten drops to a fluidrachm, repeated every fifteen or twenty minutes, until vomiting is induced. It is, however, a nauseous emetic, and possesses no advantage, perhaps, over the emetic articles above mentioned. It contains one grain of tartar emetic in every ounce of the mixture.

The bowels may, at the same time, be acted upon by calomel, (gr. ij.—vj.) or by any other cathartic. Calomel, however, has been administered not only as a cathartic, but as a revellent, and great reliance has been placed upon it by many practitioners. With this view, it is given in the dose of from one to four grains, every hour or two, until some impression is made upon the system, when it must be gradually discontinued, prescribing it at longer and longer intervals. Usually, after it has been given for a day, and, at times, for a shorter

period, its effect upon the secretions is exhibited by the altered appearance of the alvine discharges, which are of a green colour, and resemble chopped spinach. As soon as this occurs, the revellent effect of the mercury upon the constitution has been obtained, as far perhaps as is practicable, and it may be discontinued altogether, or the intervals between the doses be made progressively longer. The only danger is salivation, which is, at times, uncontrollable, and produces serious local mischief, and occasionally, death. The evils from this cause, in a few instances, induced a distinguished teacher, Prof. J. Hamilton, jun., of Edinburgh, to discountenance the employment of calomel, in the latter periods of his life, although, when the author attended his lectures, he was one of its strongest advocates. If the disease occur in a child under two years of age, much apprehension need not be entertained on this head, as it is extremely difficult to salivate at that age; but if the child be older than this, the effects of mercury on the system are exerted with great facility, especially if the inflammation be not very violent. In this, as in many other cases of inflammatory disease, as soon as the revellent operation of the mercury is apparent, the progress of the disease is generally arrested, and it has been inferred by Mr. Ryland, that could the subject of inflammatory croup be brought under the influence of mercury, before suffocation takes place from œdema of the glottis, or before the rima is plugged up by false membrane, the disease would almost invariably be cured. On the other hand, the mercurial treatment of croup has been characterized by Dr. Stokes as insufficient and unnecessary. It is assuredly uncertain, and liable to the occasional inconveniences that have been pointed out, but its revellent action may be efficacious. Still, it should be employed with caution, and not in the profusion advised by many authors.

Should the symptoms not yield to the emetic and warm bath,—and the difficult and peculiar breathing and cough remain the same, and especially if there be concomitant fever,—blood must be drawn either from the arm or jugular vein, or by means of leeches. There is perhaps no special advantage—as regards the removal of the disease—from bleeding in the jugular. It is the effect on the system to which we have to look; and blood should be drawn, until the pulse exhibits the effect of the agency, but short of inducing syncope. In all inflammatory diseases, this result should be avoided, as the reaction is generally proportionate to the preceding depression; but, in young children, still more caution is needed, as they sometimes do not rally after the operation. After blood has been drawn from the arm, should the case still be urgent, leeches may be applied round the neck, and their application be repeated, according to the nature of the case, and the strength of the individual.

Along with blood-letting may be conjoined the various remedies already recommended. This plan of treatment is, indeed, the one usually adopted, and found to be successful. General and local blood-letting have, however, been looked upon, by Dr. Stokes, as merely assistants to the “principal remedy,” which he considers to be tartarized antimony. This he advises to be given so as to produce free vomiting,

at least once in every three quarters of an hour. Others have advised the same agent to be given so as to keep up a state of nausea, or of sedation, without vomiting. Both plans are unquestionably efficacious;—the equalizing and revellent agency of the emetic appearing to operate as beneficially as the sedative agency of the nauseant.

Blisters are frequently applied to the throat in the early periods of croup; but the practice is not esteemed by all to be judicious. Some, indeed, as Messrs. Stokes and Porter, have considered it to be fraught with danger. Owing to their proximity to the diseased membrane, they may add to the irritation in the larynx, whilst no revellent agency can be expected from them. The application of a soothing cataplasm, where it can be employed, is a more philosophical and successful remedy. It is asserted, however, by Dr. Graves, that sponging the throat and chest, with water as hot as can be borne, has been found, in many instances, capable of arresting at once all the threatening symptoms. It has also been advised to apply pounded ice to the throat; but the author is unable to say any thing respecting its value from his own observation. In the impressible frame of the infant, caution ought to be exerted in the use of cold and moisture, especially where the lining membrane of the respiratory apparatus already labours under more or less inflammation.

A recent writer, C. Wilson, speaks in high terms of the success he has obtained from the use of tartrate of antimony and potassa as a contra-stimulant. He generally commences the treatment with the application of leeches to the larynx, which are followed by warm poultices, frequently renewed; and simultaneously with the leeches, the tartrate is begun with, in doses of one-fourth or one-third of a grain;—at first, generally, every hour, until a decided impression is made, and afterwards every two hours, until the patient is considered in safety. It was usually given in the form of mixture, with a little mucilage; and, occasionally, in older children, half a minim or a minim of the *tinctura opii* was added to each dose, which appeared to have a marked effect in insuring the tolerance of the medicine, without diminishing its usefulness. Along with this remedy, others—as blisters—which are generally employed, were not neglected.

In the croup of children, as in that of the adult, it has been recommended to apply the solid nitrate of silver, by means of a bent port-caustic, so as to cauterize the pharynx freely; but the recommendation has not experienced much favour. M. Hatin found it of no use after the false membrane had formed.

Such are the main agencies to be invoked in the treatment of the first stage of croup. A period too often arrives, when the vigorous employment of antiphlogistics can be productive of no good, and may be prejudicial. Occasionally, too, the practitioner is not consulted till there is reason to believe that the morbid formations within the larynx and trachea have actually taken place. In these cases, although leeches may be occasionally advisable, it must be borne in mind, that the abstraction of blood may enfeeble the patient without arresting the inflammation, so that he may die exhausted by the recuperative action necessary for removing the false membrane or

other termination of the inflammation. The use of mercury, in the manner already pointed out, has been suggested, under the idea, that it has the power of diminishing the plasticity of the blood, and, therefore, of modifying the secretion from the lining membrane of the larynx and trachea. Its whole agency, however, is probably revelent. Liquid ammonia and the alkaline subcarbonates have been administered with the same object;* and it has been proposed to introduce a certain quantity of water into the vessels, with the view of diminishing the plasticity of the fluid. Dr. Caspar Morris, of Philadelphia, states that he has undoubtedly seen the alkaline subcarbonates useful; and that he has long been in the habit of adding them to expectorant mixtures with manifest advantage. It is difficult, however, to assign the precise portion of credit to individual articles in a compound prescription; and, moreover, the alkalies have not been as markedly beneficial in the practice of the author, and of others, as in that of Dr. Morris. These agents, however,—as well as various local applications to the fauces,—have been chiefly advised, in diphtheritic affections, to modify the condition of the fluid of the circulation.

* R.—Liq. ammon. gtt. iv.; in
Aque cyatho ter die sumend.

In this second stage of the disease, occasional emetics are necessary to remove the false membranes from the trachea, and along with mercurials they form the main part of the treatment. In addition, blisters may be applied to the top of the chest; and should the powers fail, it may be necessary to support the system by the ordinary excitants, and especially by those of a more permanent character; of which, wine-whey is perhaps the best. Hot turpentine stupes may likewise be applied to the chest and extremities, “and now and then, according to Dr. Stokes, the reward of the *nil desperandum* practice may be unexpectedly obtained.”

With regard to the operation of laryngotomy or tracheotomy, in cases of primary or idiopathic croup, it is generally disapproved of by authors. The operation, in rare cases, has succeeded, but, in almost all, it has been unsuccessful, and when we bear in mind, that fatal cases never occur without the bronchial tubes lower down being affected with the malady, we can see the reason why it is so rarely attended with success. It is likewise a serious objection to the operation, that the struggles of the patient, the constant motion of the larynx upwards and downwards, and the hemorrhage, apt to take place from the hyperæmic condition of the thyroideal veins, render it extremely difficult. It is now, indeed, rarely thought of. In a discussion, which took place at the Académie Royale de Médecine, the following was given as the ratio of success with the different celebrated operators, whose names are mentioned:

| | Operations. | Cures. | Deaths. |
|--------------|-------------|----------|-----------|
| M. Amussat, | 6 | 0 | 6 |
| Baudelocque, | 15 | 0 | 15 |
| Blandin, | 5 | 0 | 5 |
| Bretonneau, | 18 | 4 | 14 |
| Gerdy, | 6 | 4 | 2 |
| Roux, | 4 | 0 | 4 |
| Trousseau, | 80 | 20 | 60 |
| Velpeau, | 6 | 0 | 6 |
| | <hr/> 140 | <hr/> 28 | <hr/> 112 |

Since then the number of cases in which M. Trousseau has performed the operation of tracheotomy in croup, has been stated to be 109; of which 27 are said to have been successful. M. Petel, of Cateau, has likewise reported six cases in which he practised the operation: three of these recovered, although five days had elapsed in one, and ten in another, from the commencement of the disease, and the patients were almost in *articulo mortis*; and another case recently communicated to the *Académie Royale de Médecine* of Paris, by M. Maslhieurat-Legrand, and reported upon by M. Bérard, would seem to show, that the operation may be properly attempted when life appears to be almost extinct. When it was completed, the infant seemed dead, and was resuscitated by maintaining artificial respiration for upwards of twenty minutes; and in another case, recorded by M. Trousseau, the patient had apparently breathed his last a few moments before the commencement of the operation. "Tracheotomy was, however, performed, apparently, as it were, on the dead subject, and artificial respiration was kept up by means of alternate compression of the thorax; after the lapse of a quarter of an hour, the heart was felt to pulsate, and at the expiration of fifty-seven minutes, the features moved, and a deep inspiration was made. Respiration was gradually re-established, and the patient was restored to life." On the other hand, during the year 1841, according to M. B. A. Becquerel, tracheotomy was performed at the Children's Hospital of Paris nine times; and all the cases terminated unfavourably. In Philadelphia, according to Dr. Caspar Morris, it has been uniformly without success. "In one case, Dr. Rhea Barton, at the earnest solicitation of the physicians and friends, performed the operation when the child was apparently in *articulo mortis*. The first access of air to the lungs produced effects as wonderful as those of galvanism. What had been apparently a corpse looked round on its parents, embraced them, drank, and, I believe, talked. It soon, however, sank again into the stupor of death, and crushed the hopes which had been so highly excited."

A few words are necessary as to the treatment of the *Croup of the Adult*, which, as has been seen, is secondary in its character, and connected with the same diphtheritic habit that gives occasion to diphtheritic stomatitis and diphtheritic gastritis. The remarks as to pathology and therapeutics, made under the latter disease, are equally applicable to diphtheritic laryngo-tracheitis. Mercury, administered so as to affect the system, has been given with the same views as in

primary croup—that is, to diminish the plastic tendency in the blood; and cases are on record, in which very severe diphtheritis of the air passages appeared to have been cured by it. Great reliance has, however, been placed on the topical applications recommended in diphtheritic pharyngitis, and especially on the muriatic acid, nitrate of silver, alum, the sulphuret of potassium, and the muriate of ammonia, applied in the manner directed under Chronic Laryngitis. Tracheotomy has likewise been advised in cases of diphtheritic laryngo-tracheitis, when urgent symptoms arise, which threaten suffocation. Perhaps, in such cases it might be more serviceable than in primary croup, in which there is so frequently a combination of bronchial and pulmonary inflammation. It has been proposed, with another view likewise,—to introduce through the aperture the local applications that have been found so useful in diphtheritic pharyngitis. Fragments of the membraniform exudation are occasionally expelled through the opening, and through it agents, as calomel, have been introduced to act on the morbid surface. Eight grains of calomel, introduced in this way by M. Bretonneau, appear to have afforded marked relief in one case. Powdered sugar and powdered alum have been blown into the larynx through the aperture in the same manner. One of the great advisers of topical applications introduced into the larynx,—M. Trousseau,—seems to have less confidence in them than formerly. They are, indeed, not much employed.

III. SPASM OF THE GLOTTIS.

a. In Children.

SYNON.—Laryngismus stridulus, Asthma spasticum Infantum, A. Infantum spasmodicum, A. Intermittens infantum, A. dentientium, A. periodicum acutum, Spasmus glottidis, Asthma Thymicum Koppii; Cynanche trachealis spasmodica, Asthma acutum Millari, Crouplike inspiration of infants, Child crowing, Crowing respiration, Spasmodic croup, Pseudo-croup, Spurious croup, Millar's Asthma, Cerebral croup, Suffocating nervous catarrh, Thymic asthma, Koppian asthma; *Fr.* Asthme aigu de Millar, Pseudo-croup; *Ger.* Millar's hitziges Krampf asthma.

This disease was known to the older writers, but the first accurate description of it was given by Dr. J. Clarke, under the designation of a *peculiar species of convulsion in infant children*. Of late years, it has attracted more attention, and by many of the German and other writers, has been termed, in consequence of their views of its pathology, *Asthma thymicum*, and *Asthma thymicum Koppii*.

Diagnosis.—Spasm of the glottis is so alarming in its character, that it immediately excites the attention of parents. It consists, essentially, in a diminution of the aperture of the glottis, so that the respiration is occasionally arrested for a moment; and after violent efforts, the child succeeds in drawing in its breath, with a sound approximating to that of croup or whooping-cough, occasioned by the very narrow chink through which the air passes. After a time, the attack ceases, and the child remains in its ordinary health; but sooner or later, the disease returns; at first, the child waking out of sleep in one of them, but, subsequently, the fit occurs whilst it is awake. The intervals between the paroxysms are at first considerable, but they become less

and less, until frequently the child scarcely recovers from one, before it is attacked with another. During the paroxysm, the face often becomes swollen and livid, and the veins filled with black blood. At various intervals, from a few seconds up to a minute, or at times nearly two minutes, air is at length admitted through the glottis, passing through the contracted rima glottidis, and giving occasion to the peculiar crowing sound. "To these symptoms," says Dr. Ley, "not unfrequently succeeds a fit of coughing or crying, which terminates the scene; or, if the glottis be not even thus partially open, the child at the end of from two to three minutes, at the utmost, will die of asphyxia; pallid and exhausted, it falls lifeless upon the nurse's arm, and it is then that the child is generally said to have died in a fit."

Either just before, or for some time after, a paroxysm, the noise of the patient's breathing is that which an increased secretion of mucus in the air passages would produce. This symptom is rarely absent, and communicates to the affection the appearance of catarrh, and especially of the *catarrhus suffocativus*, by which name it has been known by some. Sooner or later in the disease, the hands and feet become slightly swelled, and the fingers and toes rigid, the thumb being frequently drawn forcibly into the palm of the clenched hand. It is not, however, the flexor muscles that are alone affected. The spasm has been observed in the extensors, producing a permanent spreading and extension of the fingers, which has been considered by Dr. Maunsell to denote a less serious lesion of the nervous system than the opposite condition. The presence of these symptoms has given occasion to the names *Carpopedal spasm*, *Cerebral spasmodic croup*, and *a spasmodic affection of the chest and larynx in young children, accompanied by general or partial convulsions*. By the generality of writers, it is conceived, that there is a natural association of the disease with the convulsions, but it may exist without them.

As to the prognosis, great variety of sentiment has existed. Whilst some have esteemed it an affection of the most serious nature, it has been maintained that it is rarely fatal, and others think it will generally yield to proper remedies. It is certainly alarming, and very frequently destroys. The author has known several children in the same family die in succession when they attained the same age.

Causes.—The fact just mentioned shows, that a predisposition to the disease is laid in organization, a circumstance which has been proved by other observers. Age offers another predisposition. Although it has been met with at a later period, the large majority of cases occur before the termination of the first dentition. It would seem, likewise, to be a complaint of damp situations and seasons. In this country, it is very rare. Almost all writers agree, that it occurs generally in those of the strumous habit.

Among the exciting causes, must be ranked powerful mental emotions, and any thing that can over-excite the nervous system or any part of it. In one case, seen by Dr. Marsh, a paroxysm was induced whenever the child was brought back to a newly painted house.

Pathological characters.—We have much still to learn on this interesting subject; and the proof of this is, that, even at the present day,

different opinions exist as to its nature. It has been thought, to be, in the first instance, a spasmodic affection of the muscles of the glottis; and that not until the disease has increased in severity, and general convulsions have arisen, does the brain or its meninges become the seat of disease. The seat of the primary lesion has been presumed to be at the origin of the pneumogastric nerve. By others, it has been supposed to be in the brain. By others, again, the disease has been referred to hypertrophy of the thymus gland, producing pressure upon the heart, lungs, and great vessels; and, lastly, it has been maintained to be owing to the enlargement of the bronchial or deep-seated lymphatic ganglions of the neck, pressing on the recurrent nerves, and inducing paralysis of the muscles supplied by them.

This last view, consequently, differs from those usually embraced, in regarding the affection to be more allied to paralysis than to convulsive movement. Before Dr. Ley's work appeared, it was generally believed to be spasmodic; and, in the opinion of most writers, the spasm of the muscles of the larynx was owing to the existence of cerebral disease, usually of an inflammatory character. As a general rule, however, when the affection of the glottis has occasioned death at an early stage, no pathological appearances have been perceptible in the brain or its meninges; and when such appearances have existed, numerous attacks of spasm have occurred, so that the cerebral lesions have often, certainly, been secondary. Generally, however, judging from the character of the phenomena, the disease is primarily and essentially encephalic; and it has been suggested by Dr. Marshall Hall, that even the enlargement of the thymus gland, which is sometimes met with, may be a "natural effect of the violent convulsive efforts observed in this terrific malady."

Treatment.—This has varied according to the pathological views of the practitioner.

Where the disease seems to be complicated with difficult dentition, derangement of the digestive apparatus, and with marks of a strumous habit; the gums, if a tooth be pressing forward, must be freely divided; the diet regulated; and free exposure to pure air be recommended, with the various agents that are advised, when dentition is accompanied by morbid derangement. Dr. Marshall Hall, indeed, advises, that the gums should be repeatedly and freely divided, without reference to whether teeth are coming through or not. He employs division of the gums during dentition, to correct a state of the blood-vessels and nerves, which, though physiological, borders on a pathological character. "I have prescribed it," he says, "to be used daily. I have been satisfied with nothing short of the subjugation of the excessive action and fulness of the vessels, and of the disappearance of morbid actions, chiefly of a nervous character, in distant parts." The head affection—should it exhibit itself—must be treated by the rules laid down under diseases of the encephalon. The exciting causes, too, must be removed whenever this is practicable.

Such would seem to be an outline of the general principles of management that are applicable to most cases of the disease;—an

outline, which will have to be filled up by the practitioner, according to the indications presented by the individual case.

Should enlargement of the thoracic or cervical lymphatic ganglions exist, which, we are told by Dr. Ley, is the fact in nineteen cases in twenty, the cause of the enlargement must be investigated, and if it be owing to bronchitis, cutaneous affections of the scalp, or scrofulosis, they must be first removed, if practicable. If the glandular enlargement be active, and there be a tendency to suppuration, this must be encouraged, and the abscess be opened as early as possible: on the other hand, if it be indolent, its absorption must be attempted by iodine, or its salts, administered internally or externally, or both. The neck and upper part of the sternum may be rubbed, morning and evening, with an ointment of iodine^a and the solution of iodide of potassium, (gtt. iij. ter die,) or of the iodide of iron, (gtt. iv.—vj.), which is generally preferable, in consequence of the defective nutrition, that always accompanies, or rather forms scrofulosis, may be given, gradually increasing the dose.

^a R.—Potass. iodid. p. j.
Cerat. simpl. p. viij.—M.

The two great remedies, relied upon by Dr. Merriman in this malady, are soda and burnt sponge—the latter of which owes its main efficacy to the iodine which it contains. The soda prevents the predominance of acidity, so fruitful a source of the bowel complaints of children, and the burnt sponge is one of our best agents for inducing a modified condition of the function of nutrition.

The believers in the existence of hypertrophy of the thymus, as a cause of the disease, advise that all undue congestion and nervous excitement in the heart and lungs should be diminished, and prevented by low diet, large and frequent local bleedings every four or eight days, blisters and issues on the chest, constant active cathartics, &c., and that the hypertrophy of the thymus should be diminished by mercury, iodine, &c. The practitioner should, however, be careful in a disease, unquestionably associated, in most cases, with scrofulosis, not to reduce the system so far as is inculcated by this view of its pathology.

Great advantage has arisen from the revulsion afforded by a change of air in chronic cases, especially by a removal from a cold and moist to a warm and dry air. Such, at least, is the general belief; and it is a result which might be anticipated. It has been deprecated, however, by Dr. Mackintosh, who exhibits in his works too many evidences of a desire to be singular in his sentiments. He remarks, that change of air is said to have worked wonders;—that he has seen it beneficial when the child was removed from a cold, bleak situation, to a milder and more sheltered spot, but that he has “more frequently observed change of air hurtful.”

As regards the treatment during the paroxysm, little need be said, as it is commonly ended before the practitioner can be called. Nothing more can be done than to place the child in the erect or sitting posture; to use friction along the spine; to sprinkle cold water on the

face, and apply ammonia to the nose, so as to induce crying, or sneezing, or some strong form of expiration, during which the glottis is opened, and the paroxysm terminates. If the fit do not yield to these remedies, vomiting may be excited, and friction used over the body, or the child may be placed in the warm bath. The case of a child, two years old, has been narrated by Dr. Marsh, in which very frequent attacks, complicated with general convulsions, were stopped, and suspended for a month, after the administration of a tobacco enema, (five grains of the leaves to an ounce of water.) Should none of these agents succeed, the operation of tracheotomy has been suggested; but this ought scarcely to be performed, unless the child is in a state of asphyxia, when every effort should be made to inflate the lungs, and restore the breathing. Among the agencies, in this view, tracheotomy is one of the most important.

The child, that is liable to such attacks, should be warmly clad, and protected, as far as practicable, from vicissitudes. The diet, too, should be the breast milk, whilst it is at the breast; and, if not, cow's milk, diluted with two-thirds of sweetened water, or with weak arrowroot.

b. In Adults.

Spasm of the glottis, occurring in the adult, owing to pressure on the larynx and trachea, or on their nerves, has been separated from spasm of the glottis of children, by Mr. Ryland, although the symptoms, causes, &c. are much the same. In the adult, however, the affection is secondary; whilst in the child, this is doubted by many, although maintained, as has been seen, by some. The disease, in such cases, may arise either from irritation of an inflammatory nature, in the immediate vicinity of the larynx; from foreign bodies in the œsophagus; from bronchocele; from aneurism of the arteria innominata, &c. &c., all of which must be diagnosticated by the appropriate rules. The prognosis is of course, unfavourable, inasmuch as it merges in that of the original affection, which is often irremediable. The great object is, by every care, to prevent the recurrence of the paroxysms of suffocation, by avoiding every source of mental and corporeal agitation. Perfect quiet, an inclination of the body forwards so as to favour the respiratory efforts, the warm bath, with opiates, have been recommended during the continuance of the paroxysm.

In hysterical females, a spasmodic affection of the laryngeal muscles is by no means unfrequent, giving rise to what has been termed "*hysterical croup*." The paroxysms consist of a long protracted, loud and convulsive cough, followed, at times, by the crowing inspiration, and by dyspnœa so great as to threaten suffocation. This state may continue for two or three hours, until the patient faints, or a decided hysterical attack supervenes.

The *treatment* is that recommended for hysteria. During the paroxysm, new impressions must be excited by cold water thrown over the face and neck; or by the *douche* from the spout of an

ordinary teapot. The aromatic spirit, or the carbonate of ammonia, must be held to the nostrils; and when the patient is able to swallow, the various remedies advised for hysteria may be administered. In one case, creasote^a was used with much benefit as an inhalation by Dr. Herndon, of Virginia.

^a R.—Creasot. gtt. xxx.
Aq. fervent. Oij.—M.

IV. MORBID PRODUCTIONS IN THE LARYNX AND TRACHEA.

a. *Hypertrophy of the Cartilages*.—the different cartilages of the larynx and trachea may become hypertrophied, but no inconvenience results from this, provided the mischief does not proceed far; but if it occasion narrowness of the larynx, all the signs of suffocation may ensue. During life, there is a constant sense of constriction in the larynx, and progressively increasing dyspnœa; and, on dissection, the cause of the symptoms is apparent. If the hypertrophy be accompanied by tenderness on pressure, leeches may be applied over the affected part, and an ointment of iodine^a be rubbed in, night and morning.

^a R.—Iodin. gr. v.
Adipis, ʒij.—M.

Quantity for each friction, half a drachm.

b. *Ossification of the Cartilages*.—This is a natural result in the aged, in whom the various cartilages of the larynx are always more or less ossified—a change which does not produce any inconvenience, unless they become hypertrophied, when the phenomena may occur, which have been described above. When entirely ossified, they are said to have caused death by occasioning total dysphagia; but this must be a very rare case. The arytenoid cartilages are seldom ossified, but they have been found so. The cartilages of the trachea are likewise often ossified in the progress of life without any evident symptoms arising.

c. *Tubercles*.—These are sometimes met with in the mucous membrane, but scarcely ever except where the individual is, at the same time, affected with phthisis. When they occur primarily in the larynx, they may undergo softening, and give rise to all the phenomena of chronic laryngitis.

d. *Polypoid and other Tumours, &c. &c.*—The polypoid tumours, which form in the larynx and trachea, are similar to those of other mucous membranes. Their presence is not indicated by any pathognomonic signs, and, therefore, they are not detected until after death. They are generally found above the inferior ligaments of the larynx, and are attached by a pedicle either to the ventricles of the larynx, or to the ligaments.

Tumours of other kinds have likewise been found, on dissection, in the larynx, and *calculous concretions* and *hydatids* in the ventricles.

V. FOREIGN BODIES IN THE LARYNX AND TRACHEA.

When any foreign substance passes into the larynx of an adult,

there is rarely difficulty in the diagnosis, inasmuch as the history of the case is sufficiently known; but in children, there is not the same facility; and cases of foreign bodies, impacted in some part of the air passages, have, doubtless, often been mistaken for spasm of the glottis, and croup.

Diagnosis.—As soon as the extraneous substance has passed into the larynx, it gives rise to a train of symptoms extremely like those of croup, but differing somewhat, according to the size and character of the substance, and the part of the air tubes, in which it may be situate; according, for example, as it is in the larynx, the trachea, or bronchial tubes. In the majority of cases, where it is in the last situation, it is in the right bronchium, either owing to the greater size of that tube, or to the anatomical arrangement of the trachea at its bifurcation directing the substance into it, or to both. The projection or septum, which divides the right and left bronchium, is not in the mesian line, but to the left of it, so that, as remarked by Dr. Stokes, this direction is naturally taken by the extraneous body. As soon as the foreign body has reached the larynx, and especially if it remain there, the symptoms are violent and distressing, this part of the windpipe being possessed of more irritability than lower down. The child is suddenly attacked with violent spasmodic cough, croupy breathing, pain in the region of the larynx, and paroxysms of suffocation, in which the dyspnœa has been observed to be greater during expiration than during inspiration. The case may terminate fatally from mechanical obstruction, or the substance may pass through the rima glottidis into the trachea, after which relief is obtained, which is, however, but temporary, and is generally followed by inflammation of the bronchial tubes, or of the pulmonary tissue, of an acute or chronic character. The most favourable event is the expulsion of the foreign body from the mouth, after which the symptoms speedily yield, except where its presence has given rise to serious bronchial or pulmonary mischief, under which the patient may succumb.

If a child have been previously in perfect health, and been playing with some small article, after which it is attacked with the violent symptoms described above, the presumption will be, that the article has passed into the windpipe. The physical signs, which throw light on the case, are as follows:—If the foreign body be still in the larynx, and no disease have supervened in the lung, the sound rendered on percussion and auscultation of the chest may be as in health; the respiratory or vesicular murmur will be every where clearly distinguishable. When the extraneous substance is movable in the trachea, its motion up and down may be occasionally heard, as well as a valve-like sound, produced by its being violently driven, in expiration, against the rima glottidis. This, however, is not included by all among the physical signs; farther observations being considered necessary to establish it. If the foreign body have passed down into one of the bronchia, the physical signs are more valuable. In such case, it may either have obstructed the bronchium completely, or imperfectly. Hence, the respiratory murmur in the corresponding lung, is either greatly diminished, or altogether gone, whilst the sound on percussion

remains the same; and the opposite lung—into which the whole of the air must now pass—exhibits the puerile respiration. When the foreign body passes up from the bronchium into the trachea, the respiratory murmur will be again heard in the affected lung. In a recent interesting case, in which a half sovereign was lodged in the right bronchium of a distinguished English engineer,—Mr. Brunel,—for a period of thirty days, no particular sounds, according to Sir B. Brodie, were detected by the stethoscope.

Treatment.—Emetics have been advised, with the view of causing the expulsion of the body, and where it is small, they may be of service. As it is the mechanical succussion, which is needed in such cases, the direct emetics are capable of accomplishing all that the others can, whilst they operate much more speedily. The sulphate of zinc may, therefore, be given, (gr. vj. dissolved in water, to a child,) or the throat may be tickled with a feather. Should this fail, recourse must be had to tracheotomy, and it must be borne in mind, that the earlier it is practised, the greater will be the safety of the patient.

The case of Mr. Brunel, referred to above, is so interesting in all its relations, as to deserve farther notice. On the 3d of April, 1843, whilst amusing some children, a half sovereign, which he had in his mouth, accidentally slipped into the windpipe. The symptoms which succeeded were principally occasional severe fits of coughing, and a sense of pain referred to a part of the chest corresponding to the situation of the right bronchium. The patient was able to pursue his ordinary avocations, and made two journeys into the country. On the 19th of April, having placed himself in a prone position, with the stomach resting on a chair, and the head and neck inclined downwards, he had a distinct perception of a loose body slipping forwards along the trachea: a violent convulsive cough ensued; and, on resuming the erect posture, he again had the sensation of a loose body moving in the trachea towards the chest. An apparatus of the following kind was now constructed. A platform, on which the patient could lie prone, was made to move on a hinge in the centre, so that one end of it being elevated, the other was correspondingly depressed. On the 25th of April, Mr. Brunel was placed on this apparatus with his shoulders and body fixed by means of a belt, and his head was lowered to an angle of nearly 90° with the horizon. His back was then struck several times with the hand, but violent fits of choking were brought on each time, and it was not deemed prudent to continue the experiment. On the 27th, it was agreed in consultation to make an opening into the trachea, between the thyroid gland and sternum. In proposing this, the object was two-fold—*first*, that an attempt might be made to extricate the coin with the forceps: *secondly*, that if relief could not be obtained in this manner, the artificial opening might serve the purpose of a safety-valve, and the experiment of inverting the body on the platform be repeated without the risk of inducing suffocation. The operation having been performed, several attempts to remove the coin were made, but unsuccessfully; and on each introduction of the forceps,

paroxysms of convulsive coughing of such a violent character were brought on, that the attempts could not be persevered in without danger to life. On the 2d of May, a renewal of these trials was followed by the same results. On the 13th, the wound in the trachea having been kept from closing by the occasional introduction of a probe, the patient was again placed on the movable platform; his back was then struck by the hand; two or three efforts to cough followed, and presently he felt the coin quit the chest, striking almost immediately afterwards against the incisors of the upper jaw, and dropping out of the mouth. No spasm of the muscles of the glottis took place: a small quantity of blood was ejected at the same time, apparently proceeding from the granulations of the external wound. From this time the recovery of the patient was rapid.

CHAPTER II.

DISEASES OF THE BRONCHIA AND LUNGS.

I. INFLAMMATION OF THE BRONCHIAL TUBES.

SYNON.—Bronchitis, Inflammatio bronchiorum, Angina bronchialis, Catarrhus pulmonum, Pleuritis humida, P. bronchialis, Pulmonary catarrh; *Fr.* Bronchite, Inflammation des Bronches; *Ger.* Entzündung der Luftröhrenäste, Bronchialentzündung.

INFLAMMATION of the bronchial tubes, like other inflammatory affections, admits of two well founded divisions, the *acute* and the *chronic*; and the former may be subdivided into the *ordinary acute*, and the *epidemic form*.

a. *Acute Bronchitis.*

1. *Ordinary Acute Bronchitis.*

Not many years ago, bronchitis and *catarrh*, or *pulmonary catarrh* were generally separated from each other; but by most modern pathologists, they are usually classed together, although the latter may not be confined to the mucous membrane of the bronchial tubes, but may extend along that of the trachea, larynx, and indeed of the pharynx and nose; constituting, in the nose, a *cold in the head*, *coryza* or *nasal catarrh*; which, when confined there, it need scarcely be said, cannot be regarded as bronchitis, by any forced extension of the term. The French, again, and, in certain cases, the British pathologists also, have usually separated *catarrh* from *pulmonary catarrh*, applying the former term, to an increased secretion from any mucous membrane;—thus, a defluxion of mucus from the intestines has been termed *catarrhus intestinorum*—from the bladder, *catarrhus vesicæ*, &c. It is of great moment, however, to abolish terms, which are employed with different significations, and hence there is advantage in considering the pulmonary catarrh, as synonymous with bronchitis.

The milder forms of bronchitis, constituting what is commonly called a *catarrh*, are familiar to all, and no one passes through life without being affected by them. They are generally, however, easily managed, and commonly receive no medical attention whatever.

Diagnosis.—As the inflammatory or other irritation of the lining membrane of the nose is indicated by sneezing, so is that of the bronchial tubes by cough; both being owing to the reflex nervous action, which gives occasion to a convulsive respiratory effort on the part of certain muscles, to drive the air rapidly through the air passages, and thus sweep away from the mucous membrane any source of irritation that may exist there. Cough, consequently, in these affections, is a mere symptom, although of old it was regarded as a distinct morbid condition. In the first instance, the cough is dry, in consequence of the earliest effect of inflammation of mucous membranes, being to diminish or arrest the discharge from them; but this state soon passes away, and the mucous follicles secrete a larger quantity

than in health, and a fluid of an abnormous character; this pathological state resembling, again, the common cold in the head, in which the nasal mucous membrane is first of all devoid of its ordinary secretion, but soon secretes an unusual quantity of a thin mucus. It is this condition, when accompanied by more or less hurry and oppression of breathing, and some degree of febrile movement, we understand by the term *common catarrh*.

When the inflammation of the bronchia is to a greater degree than this, a deep-seated pain is experienced in the thorax, with a sense of heat under the sternum; frequent cough, at first dry; difficulty of breathing, and excitement of the circulatory function in a ratio with the degree of the inflammatory action. More or less headache is generally experienced, especially after the fits of coughing; and if the inflammation be considerable, the face is red and tumid; the appetite gone; there is more or less thirst; the tongue is white; and the mouth clammy. At times, the fits of coughing occasion vomiting, and there is commonly, as in most febrile and inflammatory affections, an increase of the symptoms towards evening. Occasionally, too, the bronchitis is accompanied by phlegmasia of other mucous membranes, and there is a protracted febrile indisposition, to which the name *Catarrhal Fever* has been given, although the term is often used synonymously with acute bronchitis. In severe cases, the cough is violent, and recurs in paroxysms occasioning a severe pain and sense of laceration, which is often referred to the lower portion of the sternum. The pain shoots with violence from the ensiform cartilage to the back; and, owing to the exertion in coughing, the various muscles of the chest and abdomen are painful on pressure. About the second or third day of the disease, the cough, which had been previously dry, becomes more moist, and a thin, frothy secretion is expectorated, with more or less difficulty;—the sputa gradually become more copious and consistent, viscid and ropy; and, at length, are thicker, more opaque, and less in quantity. Towards the termination of the disease in health, they become white, yellow, or, more frequently, of a gosling-green colour; and, if expectorated into water, they are suspended at or near the surface. Occasionally, pus is united with the mucus of bronchitis. The author had a case of measles under his charge, in which the quantity of pus secreted by the bronchial mucous membrane, was surprising: the physical signs showed satisfactorily, that there was no cavity. At times, also, the matter of expectoration is streaked with blood; and cases have occurred in which it has been tinged with bile. In other cases, a pseudomembranous secretion is expectorated, which has the shape of the bronchial tubes, and generally requires violent efforts of coughing to separate and expel it. To this form of the disease the names *Bronchitis membranacea*, *Plastic bronchitis*, and *Bronchial polypus*, have been given.

The physical signs of bronchitis are negative rather than positive. Percussion renders a clear sound over every part of the thorax, unless there is a very considerable accumulation of mucus in the bronchia,—which indicates that there is nothing like morbid deposition or con-

solidation. Auscultation indicates a sibilant or whistling, dry rhonchus or *râle*, exhibiting thickening of the mucous membrane, and consequent narrowness of the tubes; and, at a later period, when the mucous secretion has become increased, the mucous *râle* is heard. The respiratory murmur is commonly heard every where; but, on careful examination, it may be found momentarily absent in certain parts, which is attributable to the bronchial ramifications being obstructed by the secreted mucus, or by a plastic secretion; and, as soon as this is expectorated, the respiratory murmur is observed to return.

The duration of the disease varies; but the average may be reckoned at from one to two weeks.

Mild cases of bronchitis—those commonly classed under the head of *Catarrh*—almost always terminate favourably. The same may be said of the majority of cases of active bronchitis; but, occasionally, owing to the extension of the inflammation to the small bronchial subdivisions, and to its narrowing the tubes and filling them with mucus, death takes place from asphyxia. The disease may likewise pass into the chronic form, or may become complicated with pneumonia; and there would seem to be no doubt, that tubercles may form, and pass through their various stages, so that death may result from phthisis. It is proper to remark, that simple bronchitis almost invariably commences in the lower and posterior portions of the lungs, usually attacking both sides, and advancing from below upwards, whilst the opposite is the case in phthisis.

In severe cases, blood drawn exhibits an increase in the proportion of fibrin, which Andral found 6, 7, and 9 per cent.;—not as high, therefore, as in pneumonia. Chronic cases, unaccompanied by fever, may exhibit no augmentation of the fibrinous element. (See Inflammation.)

Causes.—These are the same as those of the inflammatory affections of the respiratory apparatus in general. It may likewise be induced by the inhalation of irritating gases and extraneous bodies contained in the atmosphere—as in the operations of the miller, the glass-cutter, &c. &c. It forms a part, as it were, of one of the eruptive fevers—measles; and, not unfrequently, supervenes on other diseases—as variola, scarlatina, and hooping-cough.

Pathological characters.—The bronchial mucous membrane is generally red; at times, in patches; at others, universally. Sometimes, the inflammation is confined to one lung, and even to one lobe of a lung. The redness of the mucous membrane is usually deeper in the smaller bronchial ramifications, and gradually becomes less so on ascending towards the larynx. Not uncommonly, the membrane is thickened; and when this is the case in the larger tubes, no great inconvenience may be experienced; but if it exist in the smaller tubes, so as to diminish their calibre materially, dyspnœa, with the sibilant rhonchus, may be the result. At times, the bronchial tubes are found lined with a membraniform or plastic secretion, and there is always in the bronchial subdivisions a greater or less quantity of the fluid that was expectorated during life.

Treatment.—The treatment of a mild case of bronchitis, constituting ordinary catarrh, is extremely simple. It is generally sufficient to recommend rest in bed, the equalizing influence of the temperature proving most salutary. At the same time, the patient must abstain from animal food, and subsist chiefly on gruel or arrowroot, or tea; and, if the cough be severe, seek to allay it by means of jujube paste, simple gum lozenges, or any mucilaginous mixture or oily emulsion.

R.—Mucilag. acaciæ, f3iss.

Syrup. papav. f3j.

Aquæ, f3iiiss.—M.

Dose, a tablespoonful, when the cough is troublesome.

Or, R.—Mistur. amygdal. f3v.

Liq. morphinæ sulphat. f3j.—M.

Dose, a tablespoonful, when the cough is troublesome.

Before the patient goes to bed, the feet may be put into a mixture of warm salt and water, or water in which flour of mustard has been stirred, constituting the *sinapized pediluvium* of the French writers. Warm wine-whey, also, acts favourably as a gentle stimulating diaphoretic; but caution is needed, where there is danger of the supervention of acute inflammation of the bronchial tubes or of other tissues.

Where the febrile irritation is considerable, the sense of heat and pain in the chest great, with much dyspnœa, and violent and frequent cough, blood may be taken, and the operation may have to be repeated more than once or twice, when the patient is young and vigorous. In the very severe forms, indeed, the safety of the patient reposes on the vigorous employment of general bloodletting, followed by the application of cups or leeches to the chest, and, subsequently, of blisters, and the contrastimulant use of the tartrate of antimony and potassa,—on all the means, in short, which are demanded in acute laryngitis. Emetics, by their equalizing and revellent action, are especially advisable.

Expectorants and diaphoretics—so much prescribed—are declared by Dr. Mackintosh, to be more injurious than beneficial, except perhaps in chronic affections; and he deplors the loss of much valuable time by trusting to their action. The remark is just. It is a great error to suppose that there is any agent, which can act either as an expectorant or as a diaphoretic in all states of the system. Where it is necessary to encourage expectoration, or diaphoresis, the pathological cause of the obstruction of the secretion must be inquired into, and, where practicable, removed; but in acute bronchitis, no expectorant or diaphoretic, which is indebted for its properties to its excitant agency, is admissible; whilst in chronic bronchitis these agents may be employed with great advantage. In cases of *plastic bronchitis*, mercury, given so as to affect the mouth, has been regarded as a certain remedy.

It need scarcely be said, that the regimen should be that of other highly inflammatory diseases.

2. *Epidemic Acute Bronchitis.*

SYNON. Influenza, I. Europæa, Catarrhus epidemicus, Febris catarrhalis epidemica, Catarrhus à contagio, Rheuma epidemicum.

The names given to epidemic catarrh, in various countries, and in the same country, have been various. In Germany, it has been called *Spanischer Ziepe*, *Pips*, (epidemic of 1580,) *Schafhusten*, (Sheepcough,) *Modekrankheit*, (fashionable disease,) *Morbus vervecinus*, *M. Arietis*, *Hünerweh*, *Cephalalgia contagiosa*, (epidemics of the 16th and 17th centuries,) and it is now usually called *Influenza*, *Nordische Influenza*, *Russische Katarrh*, *Blitzkatarrh*, *epidemische Schnupfensieber*, &c. In France, it has been termed *Tac*, (a stroke) *Ladendo*, *Quinte*, (used also for whooping-cough,) *Florion*, (a violent stroke,) *Coqueluche*, (until into the 16th century, after which it meant whooping-cough,) *Baraquette*, *Générale*, *Grippe*, (the common name in France at this time,) *Follette*, *Grenade*, *Coquette*, *Petite Poste*, *Petit Courier*, and *Allure*. In Italy, *Il Cortesivo Coculuco*, (until into the 16th century,) *Mal del castrone*, *Moutone*, (so called from the tone of the voice,) *Mazuchi*, and *Morbo Russo*. In Spain, *Catarrho epidemico*. In England and America, *Influenza*, (in the 18th century, *Huxham*;) and *Epidemic Catarrh*. The Italians have employed the word *Influenza* for other epidemics, and this is the reason why, in the chronology of one of their authors, Zeviani, it appears to have recurred more frequently than in that of other historians. The following dates of the recurrence of the influenza, to the commencement of this century, are on the authority of four different chronologists. *Most*. 1712, 1729, 1732, 1743, 1762, 1782, 1800. *Saillant*. 1510, 1557, 1558, 1574, 1580, 1658, 1669, 1676, 1729, 1732, 1733, 1734, 1735, 1736, 1737, 1741, 1742, 1743, 1761, 1775, 1780. *Webster*. 1510, 1557, 1580, 1587, 1591, 1597, 1602, 1610, 1647, 1650, 1655, 1658, 1675, 1679, 1680, 1688, 1693, 1697, 1698, 1708, 1709, 1712, 1729, 1730, 1733, 1737, 1743, 1747, 1755, 1757, 1762, 1767, 1772, 1775, 1781, 1782, 1788, 1789, 1790, 1795, 1797. *Zeviani*. 1239, 1311, 1323, 1327, 1358, 1387, 1400, 1410, 1414, 1438, 1482, 1505, 1510, 1543, 1557, 1562, 1574, 1578, 1580, 1591, 1593, 1597, 1617, 1622, 1658, 1663, 1669, 1675, 1679, 1691, 1709, 1711, 1729, 1733, 1737, 1743, 1762, 1782, 1788.

A modern writer, Kluge, from his investigations, considers, that the following is the chronological order of the return of the true influenza. 14th century—1323, 1326. 15th century—1410, 1411, 1414. 16th century—1510, 1557, 1562, 1574, 1580, 1593. 17th century—1658, 1669, 1675, 1693. 18th century—1708, 1712, 1729, 1732, 1733, 1742, 1743, 1761, 1762, 1775, 1776. 19th century—1800, 1803, 1831, 1833;—and to these may be added the well marked epidemics of 1837 and 1843.

The most remarkable, perhaps, of the influenzas, was that of 1782, although those of the last ten years were sufficiently striking in their general phenomena and peculiarities. The one of 1782 began in Europe in the far north, and in December, 1781, reached St. Peters-

burg, where it attacked, with electrical rapidity, 40,000 people in a single day, whence it got from the French the name of *La Russe*, and from other nations the appellation *Russian*. From St. Petersburg, it spread to Poland, Denmark, and Germany; and in June and July of 1784, had reached France, Spain, England, and Scotland; and in September of the same year was rife in the British American colonies. In the epidemic of 1831, according to Most, 30,000 people, it was asserted, were suffering at the same time in Berlin; and, at a later period, 45,000 in Paris. Of the European epidemics of 1831, 1833, and 1837, the two first were less severe, and attacked fewer individuals than the last.

From a general view of various influenzas, M. Andral has deduced:—*First*. They differ as to the extent of their sphere of action—some appearing only in certain countries, whilst others invade the whole earth. *Secondly*. Almost all have travelled rapidly, commencing in the north, and extending towards the south,—at times, like a vast torrent, spreading from neighbourhood to neighbourhood; at others, bounding from countries to countries, sparing whole regions to rage in others more distant. *Thirdly*. As regards the number attacked;—at times, but few have been affected at first; at others, numbers. *Fourthly*. In regard to severity;—some have been devoid of danger, whilst others have been fatal, and have destroyed especially children and old persons. *Fifthly*. As regards symptoms,—each epidemic has presented some special phenomenon; every form has constituted, as it were, a sort of morbid individuality, which, after its manner, ran through phases of increase and decrease, always commencing in the same way, and being invariably like unto itself. *Sixthly*. As to the parts affected; some have been limited to the bronchia, but most commonly the disease invaded other mucous membranes, when the reaction was generally violent, and the affection assumed the inflammatory form; in one case, the morbid condition of the nervous system predominated, and its influence was exhibited by an ataxic or adynamic form of the disease; in other cases, it was accompanied by hæmoptysis or by an exhalation of blood from other mucous membranes; at times, much sweating attended it; and, occasionally, the fluid of perspiration was extremely fetid. Lastly,—in certain cases, an effusion of serous fluid occurred into the abdomen.

It has been remarked, by Dr. Geo. Gregory, that severe as the disease is, it is not one of danger, the bills of mortality seldom indicating any notable increase in the proportion of deaths during the existence of such an epidemic. This, however, can only apply to certain epidemics: others have proved extremely fatal. The mortality of the epidemic of 1837, in Europe, was greater than that from cholera, although the disease was by no means so severe, or so rapidly fatal. This was owing to its attacking almost every person in society, whilst the ravages of cholera were comparatively limited. It has been estimated, by Dr. Graves, that in Dublin alone, 4,000 persons died of the influenza of 1837. From the returns of a single cemetery—the Prospect Cemetery, Glasnevin, probably the largest in Ireland

—the increase of burials, during months in which the influenza prevailed, was 747.

| | | | |
|----------------------------------|------|--------------------------|------|
| In December, 1835, - - - | 355 | In December, 1836, - - - | 413 |
| January, 1836, - - - | 392 | January, 1837, - - - | 821 |
| February, 1836, - - - | 362 | February, 1837, - - - | 537 |
| March, 1836, - - - | 392 | March, 1837, - - - | 477 |
| Total for four months, - - - | 1501 | | 2248 |
| Increase, during influenza, 747. | | | |

In Hamburg, according to Assing, there died in January, 1836, 466 persons; in December, 1836, 364 persons; and in January, 1837, whilst the influenza was raging, 836 persons. The mortality was extremely great among the aged.

| Ages. | Jan. 1836. | Dec. 1836. | Jan. 1837. |
|---|------------|------------|------------|
| Between 20 and 30 - - - | 35 | 28 | 48 |
| 30 " 40 - - - | 35 | 45 | 68 |
| 40 " 50 - - - | 36 | 29 | 58 |
| 50 " 60 - - - | 36 | 38 | 90 |
| 60 " 70 - - - | 55 | 36 | 128 |
| 70 " 80 - - - | 37 | 36 | 117 |
| 80 " 90 - - - | 12 | 10 | 37 |
| 90 " 100 - - - | 4 | 2 | 3 |
| 102 - - - | - | - | 1 |
| Diseases. | | | |
| Apoplexy, - - - | 33* | 41 | 67 |
| Inflammation of lungs and pleura, - - - | 24 | 8 | 165 |
| Catarrhus suffocativus, - - - | 11 | 9 | 38 |
| Phthisis pulmonalis, - - - | 64 | 57 | 151 |
| Marasmus senilis, - - - | 48 | 44 | 101 |

Causes.—As to the causes of influenza, we know no more than we do of those of other epidemic diseases. It has appeared in all countries, and has raged with equal severity in all seasons, and, so far as can be observed, in all conditions of the atmosphere. Hence it has been conceived that it may depend chiefly on telluric influence, or upon some agency connected with variations in the physical conditions which operate on the external surface of the earth; but the supposition only indicates the little knowledge we have of the subject. The influenza of 1833-4 was by no means so generally fatal as that of 1837. Both were characterized by considerable irritation of the lining membrane of the air passages, but that of 1837 was attended by severe bronchitis and pneumonia, which were not as frequently seen in the epidemic of 1833-4: the accompanying fever of the latter was likewise more acute.

In regard to the nature of the disease, various opinions have been entertained. Essentially, it consists of the catenation of symptoms, to which the term catarrh or bronchitis is appropriated; but along with this, especially in the epidemic of 1837, the nervous system was greatly implicated. By one of the writers on the influenza of 1836, Dr. Blakiston, it has been designated "an affection of the nervous system, with its concomitant derangement in the organs of digestion, circulation, &c., commonly known under the name 'nervous fever,' accompanied *throughout its whole course* by irritation of the pulmonary mucous membrane;" and this view appears to have been embraced essentially by other writers on the subject. Andral, however, con-

cludes that it is a general affection, the nature and cause of which are as unknown as those of the greater part of epidemics, which appear at irregular epochs.

Treatment.—If such be the diversity of phenomena in influenza, and such the uncertainty that hangs over it, it need scarcely be said that no fixed rule of treatment can be laid down. In simple, uncomplicated cases, very little management has been required. Keeping the patient in bed, and treating him as if affected with ordinary catarrh, has usually proved sufficient. By some, blood-letting was always considered to be counter-indicated, and especially if it were not employed within the first twelve or twenty-four hours; but when used very early, it often proved efficacious. Where any doubt, however, exists, ten or twenty leeches may be applied over the sternum, or from five to ten ounces of blood be taken by cupping.

When the mouth is clammy or bitter, and the tongue coated, with inappetency for food, and a sense of weight at the epigastrium, an emetic may be given with advantage.

R.—Ipecac. pulv. gr. xv—xx.—or
Antim. et potass. tart. gr. ij.

The tartrate of antimony and potassa has also been administered as a nauseant, and in large doses as a contra-stimulant, but it has not exhibited the efficacy which it exerts in high inflammatory diseases—as pneumonia and pleurisy, in which, when conjoined with the lancet, it has been regarded by Dr. Cartwright, of Natchez, as almost a specific. [?] The lobelia inflata has been suggested by the same gentleman in influenza, under the notion that “in those diseases affecting the mucous lining of the bronchial tubes, the lobelia inflata comes as near being a specific as tartar emetic and the lancet in pneumonia and pleurisy.” The lobelia is certainly a valuable sedative, but not deserving of the elevated rank that has been assigned to it. The diseases of the bronchial tubes differ, and no one remedy can be applicable to every pathological condition. When there was more than usual inflammation of the bronchia, in the epidemic of 1837, large doses of the ethereal tincture of lobelia, repeated at short intervals, with counter-irritation, “seemed,” according to Dr. Blakiston, to be useful.

Should the cough be dry, and harassing, opiates may be administered, with mucilages or emulsions.

R.—Emuls. amygd. f 3vj.
Liq. morphine sulphat. f 3ij.—M.
Dose, a tablespoonful occasionally.

Or, R.—Mucilag. acacie, f 3j.
Syrup. tolat. f 3ij.
Ol. oliv. f 3ss.
Aque, f 3ivss.—M.
Dose, the same as the last.

As to the particular form of counter-irritation, some difference of sentiment has existed. In the epidemic of 1837, blisters were not found as serviceable in all cases, as had been anticipated:—fomenting the neck and chest with very hot water according to Dr. Graves appeared to be much more serviceable. At the commencement of the attack, it was often found necessary to have recourse to

diffusible excitants, and to administer tonics at an early stage; and, during convalescence, it was generally requisite to prescribe tonics, to restore the languishing functions of the stomach.

b. *Chronic Bronchitis.*

SYNON.—*Tussis senilis*, *Catarrhus senilis*, *Rheuma catarrhale*, *Peripneumonia notha*, *Bronchorrhœa acuta*, *Winter cough*, *Chronic catarrh*.

Chronic bronchitis is one of the most common diseases of the temperate regions of the globe; yet—strange to say—it is only within the present century, that its pathology has been clearly understood. Neither acute nor chronic bronchitis was comprehended in its true relations, until in 1808 an interesting treatise on bronchitis first appeared by Dr. Badham; which was followed, not long after, by another on the chronic forms of the disease by Dr. Hastings. Since then, the inflammatory affections of the lining membrane of the bronchial tubes have received great attention from pathologists.

Diagnosis.—It may be proper to observe, before detailing the symptoms, that the trachea itself may be affected with chronic inflammation—constituting *chronic tracheitis*—independently of any affection of the laryngeal and bronchial mucous membrane: commonly, however, the inflammation extends, so that either the larynx or the bronchia become implicated.

When the trachea is affected alone, the disease is denoted by cough,—slight perhaps at first, but subsequently violent, with mucous expectoration, streaked at times with blood, and occasionally purulent. The pain is sometimes severe, and is felt from the base of the cricoid cartilage to behind the last portion of the sternum. When the mucous membrane is ulcerated, and greatly tumefied, a whistling sound is heard during respiration, which may give rise to the idea, that there is a tumour within the trachea. This state of the mucous membrane is accompanied by dyspnoea. The voice is rough, but not extinguished or veiled, unless the inflammation implicates the inferior ligaments of the larynx. The general symptoms are the same as in chronic laryngitis; and, as in the latter we have phthisis laryngea, so, in the former, we may have phthisis trachealis.

Chronic bronchitis may be the termination of the acute; but, in other cases, it exists where there have been no evidences of the latter. The symptoms vary very materially, but in every case there is cough, differing, however, in its character and intensity, but always more marked, perhaps, than in other diseases of the respiratory organs. The expectoration, too, differs greatly. At times, it is clear and transparent; at others, very frothy; or, on the other hand, viscid, adhesive, and containing small white grains which adhere to the vessel. These particles have been mistaken for portions of pulmonary tubercle, and, therefore, have been supposed to be indicative of phthisis; but if there be any doubt as to their nature and origin, the doubt may be removed by placing some of them on a piece of paper, and exposing them to heat. If they be merely sebaceous matter from the mucous follicles of the fauces and pharynx, they will leave

on the paper a greasy stain, which will not be the case, provided they are tubercular matter from the lungs. In other cases, the sputa consist of a greenish yellow puriform mucus, which may either form a homogeneous mass, or the matter of each expectoration may remain distinct. Commonly, they are devoid of smell, but at times, they are insupportably fetid. Cases of this kind have fallen under the author's care, which have ultimately recovered, and many such are on record, on the authority of Messrs. Bricheteau, Stokes, Cook, (of Buskirk's Bridge, New York,) and others. The quantity of the expectorated matter varies, likewise, materially. At times, it is so great as to exhaust; in other cases, the cough is severe and fatiguing; whilst the expectoration may be so trifling, that the disease has been called *dry catarrh* or *dry bronchitis*,—the *catarrhe sec*, of the French writers. The respiration may not be much affected; but, commonly, it is more or less oppressed, and, at times, seems to be complicated, as it were, with asthma—the difficulty of breathing recurring in paroxysms. Commonly, there is not much pain attendant upon it, unless the paroxysms of coughing are frequent, and severe. Nor are the general symptoms usually marked. At times, there is no accompanying fever; but, in other cases, the febrile movement is considerable; the inflammatory affection passing to the subacute form. When this is the case, the nutrition of the system is affected; emaciation takes place, with evident febrile exacerbations towards evening, and all the signs of hectic, under which the individual is gradually worn away.

These are the severe forms of the affection, which approximate, in their symptoms, to phthisis pulmonalis. In milder cases, individuals may be affected for years with chronic cough and expectoration, without the general health suffering materially, if at all. Generally, the disease disappears, or is decidedly improved during the summer,—returning every winter, so as to give occasion to the name *winter cough*.

It has been already remarked, that the patient may die, worn out by hectic fever: it would seem, likewise, that death may occur, in old people especially, owing to the copious secretion of mucus into the small bronchial ramifications interfering with hæmatisation, so that the nutrition of the frame is, in this way, modified, and asthenia induced; giving rise to the *Bronchitis asthenica* of authors, or to simple gleet or *Bronchorrhœa*, under which—especially on the super-vention of inflammatory or other irritation in some other part of the economy—the patient succumbs.

Occasionally, chronic bronchitis is accompanied by some affection of the lungs or pleura, or some chronic cardiac affection, which must be appreciated, in order to form a sound prognosis, and to establish proper indications of therapeutics.

The physical signs, like those of the acute form, are purely negative. The resonance of the chest may exist throughout. The different rhonchi or râles are heard as in acute bronchitis;—for example, the mucous râle, which never occupies the whole extent of the chest, is not constant, and scarcely ever masks the vesicular murmur; sibilant

râles of different character, which have been compared, in certain cases, to the clacking of a small valve, or to the pronunciation of the word *tic*; gurglings, like those of phthisis, heard in parts where dilatations of the bronchial tubes exist; and cavernous respiration, pectoriloquy, or diffuse bronchophony with humid *râle*, where the bronchial dilatations are considerable, and implicate a great number of the bronchia.

The diagnosis is generally easy; but, at times, marked difficulties exist. Thus, incipient phthisis, when it has not induced much engorgement of the lung, and when the tubercles are not present in sufficient number to yield a dull sound, may be taken for simple chronic bronchitis; and, again, when the latter is accompanied by dilatation of the bronchia, it may present some of the least equivocal physical signs of phthisis. By careful observation, however, the error may most commonly be avoided. Without taking into consideration the general symptoms, the mucous rhonchi or *râles* will be found to occupy different situations in the two diseases. The modification of the respiratory murmur, which precedes the establishment of those *râles*, is heard at the summit of the lung in phthisis; the physical signs are constant over the same part; whilst, in chronic bronchitis, the *râles* are heard generally over the lungs, and vary in their character at different periods.

As regards the dilatation of the bronchia, which may give rise to obscurity in the diagnosis, it is rarely accompanied by induration of the lung sufficiently great to occasion any marked diminution of the sound on percussion, as is the case in phthisis around the tubercular excavations. The dilatation, moreover, does not always exist at the apices of the lungs; more commonly, it occupies the middle portion, and it continues for a long time without inducing any rapid and constantly augmenting effects.

Causes.—Chronic bronchitis is often a sequel of the acute form; but, as has been seen, it occurs as a primary disease. It is very common in advanced life, and especially in those whose constitutions have been injured by excesses. At times, it is observed in children, especially after whooping-cough. Occasionally, too, it is associated with another affection,—as some organic disease of the heart, or tubercles of the lungs. Like acute bronchitis, it may be also occasioned by irritating substances floating about in the atmosphere. It is said by Laënnec to have succeeded to the repercussion of acute or chronic cutaneous eruptions, and the suppression of some habitual flux or hemorrhage.

Pathological characters.—The mucous membrane, which is of a vivid red colour in acute bronchitis, is of various shades of red in the chronic form. When the inflammatory stage has wholly passed away, and the discharge has become a true gleet of the bronchial mucous membrane or a *bronchorrhœa*, the membrane may be found very pale, or of a yellowish hue.

The bronchial ramifications contain mucus and other secretions, similar to those expectorated; and, at times, there is a true fibrinous secretion, which clogs up the tubes, and extends, like the branches of

a tree, into their various subdivisions. This plastic bronchitis is often associated with the presence of tubercles and tubercular cavities in the lungs. In a case, which recently fell under the author's care, the quantity of membraniform arborizations expectorated was very great; and both the general and the physical signs indicated the coexistence of bronchitis and phthisis. On dissection, many of the bronchial tubes of the right lung were found to contain the fibrinous secretion, and others were dilated; whilst, in both lungs, tubercles were found both quiescent and in a state of softening, or already softened. The nutrition of the mucous membrane itself, is generally more or less affected. It may be indurated, or softened, or, here and there, ulcerated; and this is most frequently the case in the *Asthma pulverulentum*, *A. gypseum*, *A. montanum*, or *Staubasthma* of the Germans, which is produced by pulverulent particles passing in with the air of inspiration, and exciting inflammation and its consequences in the bronchial tubes. The mucous membrane is more frequently thickened, occasionally to such an extent as to obliterate the smaller bronchial ramifications, and to diminish the calibre of those of larger size.

One of the most interesting of the lesions is the dilatation of one or more of the bronchial tubes—the *bronchiectasie* of Piorry. Sometimes, this is uniform; at others, it is a sudden dilatation, forming a considerable cavity in one of the tubes; and, at others, again, a bronchium is observed to present several successive strictures and dilatations. The solitary dilatations vary in size, sometimes being no larger than a hempseed; at others, able to contain an almond or a walnut.

Recently, under the name *cirrhosis of the lung*, Dr. Corrigan has described a pathological condition, the general characters of which is a tendency to consolidation or contraction of the pulmonary cellular tissue with dilatation of the bronchial tubes. The diminution of the lung is regarded by him as the first step in the disease, and the dilatation of the bronchia the consequence of this. At a meeting of the Pathological Society of Dublin, Dr. Green exhibited a specimen of pulmonary cirrhosis with dilated bronchial tubes, closely resembling phthisical cavities, taken from a woman who had suffered for a long time from intractable cough and a train of phenomena strongly resembling phthisis. The physical signs were—cavernous respiration and distinct pectoriloquy in the right infra-clavicular space: the latter sign was also found at the inferior angle of the scapula, and in the right axilla: distinct gurgling, with bronchial respiration could be heard in various parts of the chest. The left lung presented the signs of bronchitis. On examination after death, the lung was found diminished in size, and indurated: the cavities formed by the dilatation of the tubes were of considerable size, and did not contain purulent matter: they were largest near the surface of the lung, and towards its upper part their cartilaginous structure could be distinctly traced. There was no sign of tuberculosis in either lung.

The author has, at this time, under his care a female, who presents all the phenomena which lead to the belief of a morbid condition of

this kind. When he first saw her, about three years ago, she was considered to be labouring under phthisis; yet no change has occurred since that time, during the whole of which she has been under his observation. The sounds on inspiration and expiration are of the most anomalous character, comprising all the varieties of sonorous and sibilant rhonchi: the respiration is almost wholly tubal in both lungs: the chest appears to be somewhat enlarged, and is highly resonant on percussion; so that along with the pulmonary condensation there is probably also emphysema. All these functional phenomena are subject to occasional exacerbations. She has no hectic; and, although the appearance of the sputa is often equivocal, it has never been decidedly purulent.

Treatment.—This must be regulated by circumstances. When there is much febrile and inflammatory excitement, the disease must be treated as a case of acute bronchitis, no matter how long it may have persisted; but when the active inflammatory symptoms have passed away, an opposite course may be demanded, and one which combines a gently excitant with a revellent agency; watching carefully, however, and having recourse to antiphlogistics, whenever there is any appearance of fresh inflammation, or of a renewal of the old. Perhaps the best of all remedies, employed in chronic bronchitis, belong to the class of revellents. Intermittent counter-irritation, effected by successive blisters, or by the application of the tartarized antimony ointment, or by croton oil, proves extremely serviceable; and it is by the new action, induced on the surface, that flannel, worn next the skin, is so salutary a remedy in such cases. With the same view, a large portion of the chest may be sponged daily with a liniment, composed of spirit of turpentine and the acetic acid, so as to keep up an erythematous state of the surface.* This is recommended as an easily manageable and efficacious remedy; and it is affirmed to be an imitation of the celebrated liniment of St. John Long, the famous empiric.

* R.—Ol. terebinth. f3iij.
Acid. acetic. fort. f3ss.
Vitell. ovi.
Aque rose. f3iiss.
Ol. limon. f3j.—M.

The beneficial agency of emetics, is, perhaps, chiefly revellent. Almost all therapeutists depose to their value, not only in aiding, mechanically, the expulsion of the secretion from the tubes, but interfering with its too copious reproduction. The ordinary emetics of ipecacuanha and tartarized antimony, or of both combined, are the most advisable, owing to the powerful revulsion effected by them through the state of nausea, and the subsequent emesis. The bronchial tubes being cleared, in this manner, of the great quantity of mucus, hæmatisis is more readily accomplished, and if lividity of the countenance have previously existed, it disappears. They have been esteemed most serviceable at night, taken immediately before the hour of rest, and in the morning, especially after a tolerably long

sleep, when time has been afforded for an accumulation of secretion in the bronchial tubes.

It is in these cases of bronchorrhœa, that the various substances belonging to the class of reputed expectorants have been administered largely, although it is not always easy to understand the precise object which the prescriber has had in view. In asthenic forms of bronchitis, the expectoration is generally too copious, and the powers too slight to expel it with facility; a remedy, consequently, which is possessed of gently excitant properties, by arousing those powers, may favour expectoration; but there is no reason for believing that we are possessed of a medicinal substance, which has the faculty of promoting the expulsion of fluid from the lungs by any specific action, which it is capable of exerting on the parts concerned. (See the author's *Therapeutics*, p. 313, Philad. 1836; and his *General Therapeutics and Mat. Med.* Philad. 1843.) The expectorants, commonly advised, are squill, ammoniacum, myrrh, polygala senega, &c., alone, or in combination; but although the author has prescribed them frequently, and carefully watched their effects, he has never been able to observe any result, except what might be ascribed to their excitant impression on the stomach, and its extension to other parts of the system. Every one, affected with ordinary catarrh, in which the secretion of mucus has been considerable, must have observed the comparative facility with which he has expectorated, even after an ordinary meal, through the impression it has made primarily on the stomach. "Expectorants," says Mackintosh, "*appear to be somewhat serviceable*, and the best is squills. But I have seen expectorants used for a considerable time without any benefit, till after the application of a blister, or the use of the inhaler, when the discharge has become free and easy." Dr. Mackintosh's opinion of the virtues of expectorants does not seem to exceed that of the author. Where the cough, however, is severe, and the bronchial irritation great, relief may be obtained by any of the ordinary saccharine, mucilaginous or oily mixtures, with or without the addition of anodynes, which produce their beneficial effects in the mode elsewhere explained.

Among the various excitant substances, prescribed in chronic bronchitis, the balsams have been ranked highly. Their efficacy in diseases of the mucous membrane of the intestinal canal led to the belief, that they might be serviceable in affections of the pulmonary mucous membrane likewise; and, accordingly, they have been much employed, especially the copaiba, and the terebinthinate preparations; but the testimony in their favour has not been uniform. The author's experience is not more favourable than that of some others; and when benefit has resulted from their employment, it has seemed to be owing to the excitant effects of the remedies, rather than to any special action, which they exerted on the pulmonary mucous membrane. In many cases of chronic bronchitis, the patient is doomed to suffer during the whole of winter, and to improve on the approach of summer; time is, therefore, an important element in any improvement that may take place, and many agents doubtless frequently rob it of the credit to which it is entitled.

By a similar kind of reasoning to that employed in the case of the *copaiba*, the *strychnia* has been suggested in chronic bronchitis. From its efficacy in analogous affections of the digestive mucous membrane, good reason, it was conceived, existed for the hope, that it would prove effective here. The author has never employed it, nor is he aware of any successful results from its administration.

In Germany, the tops of the *galeopsis grandiflora*, a plant which is ranked there as a "bitter resolvent," and which is supposed to be the basis of a nostrum celebrated in pectoral diseases under the name of "Blankenheimer tea," (*Blankenheimer Thee*), or "Lieber's pectoral and phthisical herbs," (*Liebersche Brust oder Auszehrungskrauter*), have enjoyed great repute.

R.—Summitat. *galeops. grandiflor.*

Althææ rad. aa ʒj.

Glycyrrhiz. — ʒij. M.

A fourth part of this to be boiled in a pint and a half of water, and to be taken daily.

Tar water was at one time highly extolled in pulmonary affections, and among the rest in pulmonary catarrh and chronic bronchitis, and since the discovery of creasote, which is its main active ingredient, fresh trials have been instituted with it. The author has administered it freely, and, in cases in which the ordinary excitant expectorants are found to be serviceable, it has afforded relief; but farther than this no advantage has appeared to accrue from its administration. It is easily prepared.

R.—*Picis liquid*, ʒj.

Digere in aquæ Oij. per dies octo et cola.

Dose, from f ʒviiij. to f ʒxij. in the day, mixed with milk.

Creasote itself has been administered in the same cases;^a but it does not appear to possess more virtues than the tar water.

^a R.—*Creasot*, gtt. v.

Mucilag. acaciæ, f ʒij.

Syrup. tolut. f ʒj.—M.

Dose, a tablespoonful every four hours.

Recently, the acetate of lead has been brought forward as a remedy by far the most worthy of reliance in bronchitis attended with profuse secretion. Its administration was limited to the period of the disease, in which the evidences of abundant secretion were apparent. The dose for children was gr. $\frac{1}{4}$, gr. ss. to gr. j. eight or ten times a day; and from one to three grains for the adult, so as not to exceed 12 grains in the day.

The most valuable mode of exhibiting many agents, so as to act effectively on the mucous membrane, is by inhalation. Where the secretion is readily accomplished, and the affection belongs to the form of catarrh denominated *dry*, the inhalations may be of the steam of water; on the other hand, should it be advisable to stimulate the mucous membrane, the vapour from the infusion of chamomile flowers, or of some other excitant, whose properties are dependent upon volatile oil, may be inhaled. Tar vapour, which was at one time so highly extolled in phthisis, appears rather adapted for the disease under consideration, and many of the cases of reputed

phthisis, recorded in the books as cured by it, were doubtless chronic bronchitis. The inhalation of chlorine has been serviceable in like cases. It may be inhaled from a common dish, or inhaling vessel, or from a well-contrived apparatus proposed by Dr. Corrigan, of Dublin, (see the author's *New Remedies*, 4th edit. p. 150. Philad. 1843,) by dropping any of the acids on a mixture of the chloride of lime, so that the acid may be disengaged slowly; and, in the same manner, creasote may be inhaled; five, ten, or fifteen drops, according to the degree of tolerance of the lungs, being dropped into hot water, and the vapour received into them. Iodine has been administered in the same way; at times, alone; at others, associated with conium, in the manner advised under phthisis; but whilst some extol it highly, others have not been able to observe the least benefit from it.

Conium and other narcotics have been used in the same manner, twelve or fifteen grains of the extract being diffused in an inhaling apparatus, and the vapour drawn into the lungs for a quarter of an hour, once or twice a day. There are many cases, in which the internal administration of narcotics, acronarcotics, and sedatives, must be serviceable. If the cough be troublesome, the various preparations of opium, hyoscyamus, hemlock, or belladonna, may be given with much advantage. Colchicum^a has been commended by many, and by others, the hydrocyanic acid.^b

^a R.—Tinct. colchic. f3ss.

Sp. æther. nitric. f3j.—M.

Dose, twenty drops, three times a day on sugar.

^b R.—Acid. hydrocyanic. gtt. xv.

Mucilag. acac.

Syrupi, aa f3ss.

Aquæ, f3v.—M.

Dose, a tablespoonful five or six times a day.

Where persons are liable to attacks of chronic bronchitis, it becomes important that they should be avoided by a change of air, especially from a cold and moist climate to one that is warm and dry. The West India islands, particularly Santa Cruz, offer the best situations for this purpose, all the American and European climates being proverbially liable to great vicissitudes. In cases of phthisis, as will be shown, these vicissitudes, provided they are only within certain limits, are not to be deprecated; but to those who are predisposed to chronic bronchitis they are injurious. Still, a mere change of air to countries, which are themselves exposed to cold and disagreeable winds—for example, to southern France and Italy—is often decidedly serviceable under the new impressions excited; and there are places in the Mediterranean, such as Hières, which are well sheltered, and, therefore, not liable to the objections that may be brought against some of the other localities frequented by invalids. In the United States, Pensacola offers perhaps as many advantages as any other southern situation; possessing, as it does, a comparatively genial climate, and accommodations—the presence or absence of which must always be taken into consideration—for the valetudinarian. In this way, the winter may be escaped, and the habit be occasionally broken in upon. There are but few invalids, who are subject to bronchitis, who can bear with impunity the contact of very

cold air with the pulmonary mucous membrane; hence, they are compelled to breathe through folds of gauze, or to hold a handkerchief to the mouth, whenever they are exposed to it. An instrument has been invented, called a *Respirator*, which consists of several strata of fine wire, through which the air can pass with facility, and, in its passage, has its temperature modified, so that no irritation is produced in the lungs. It is an ingenious and successful invention, but is somewhat expensive, and not much used.

The bronchitic individual should be careful to protect himself against irregular exposure, by casing himself in flannel. He should be especially careful not to expose himself to the night air, or to go abroad in cold damp weather, particularly during the prevalence of one of our northeast winds. By these precautions, with the use of the flesh-brush, and ordinary attention in other respects, the disease may be warded off; but should they fail, change of climate becomes essential.

a. *Summer Bronchitis.*

SYNON. Summer catarrh, Catarrhus æstivus, Hay-asthma, Hay-fever, Rose catarrh; Ger. Sommerkatarrh, Heufieber, Heuasthma.

A singular variety of chronic bronchitis is met with in the summer and autumnal seasons, both in this country and in Europe, which has received various names, indicative of the period of the year at which it occurs, or of the causes which are supposed to give rise to it. It has been well described of late years only, and chiefly by British writers.

Diagnosis.—The most constant symptoms are itching of the eyelids, and, at times, of the inner canthi of the eyes, with irregular attacks of violent sneezing, sense of weight on inspiration, and, at times, considerable dyspnoea, copious discharge from the Schneiderian membrane, redness of the conjunctiva and sense of weight in the forehead, with suspension—partial or entire—of smell and taste, during the continuance of the disease. The exacerbations have commonly been observed to supervene in the morning, a short time after rising; but frequently they appear several times in the course of the day.

The following letters from intelligent individuals, themselves sufferers under the malady, will best exhibit its course and character. The first is from a practitioner of Bristol, England, to Dr. Elliotson. "I knew nothing," he remarks, "about hay-fever as any definite disease; but your description of it is, with little exception, a very accurate description of what I suffered, every June, for several years. Were I not, at the present time, annoyed by this troublesome affection, I should probably not have found leisure to give you the trouble of reading any thing on this subject. The attack generally begins, with me, at the latter end of May, with great itching of the eyelids, particularly at the inner canthi, from which I regularly, during this month, extract some cilia, which grow very near the cornea, and increase the irritation. My most troublesome symptom is sneezing. It is of a violent kind, and often continues eight or ten

times. The defluxion from the nostrils is most copious at these periods of the day, while, in the intervals, I have no catarrhal symptoms. Expectoration of clear mucus is also considerable. My sneezing attacks are sure to come on while I am visiting my patients, to my great annoyance. This comfortless state generally continues five or six weeks, but is never sufficient to interrupt any of my employments, or render any confinement *necessary*, though I am always free from it when in the house. How far grass or hay has any thing to do with this affection, I cannot satisfactorily determine. There certainly are several hay-fields within a quarter of a mile of my house. The *air* seems to make me worse, and an open window is my abhorrence, while I am thus indisposed. Last week I spent an hour or two in a friend's hay-field, with a party of ladies, but the syllabub, the ladies, and the pastoral sports, had no amusement for me; and I was glad to get to a corner of the park, where my streaming eyes and nostrils, and noisy sternutations might escape both remark and commiseration. Certainly, during that afternoon, in the hay-field, was the worst attack I have had; but whether it was the *air* which was cooler than usual, or the *hay*, I could not tell. I must however confess that my *fancy* on the subject has always leaned more to the effect of some subtile particles of an irritating nature, than to the ordinary causes of catarrhal affections. My lungs are rather asthmatic; formerly I had a good deal of asthma. I have never found time to *try* any remedies."

The subjoined letter is from a patient of the author, who has been long a sufferer under this disagreeable affection, and who kindly furnished the particulars of his case, but whose modesty shrinks from the publicity of having his name attached to it. Had it pleased him so to do, it would have been found to be that of a gentleman whose intelligence and sterling worth are known and appreciated far from the locality in which he resides.

Baltimore, June 30th, 1840.

"MY DEAR SIR,

"I will very cheerfully endeavour to give you, in terms as few, and at the same time as full, as circumstances allow, my recollections of the catarrh with which I am periodically visited, establishing one only condition most explicitly, that *my name* is in no wise to be referred to. Of this I should have great horror. My impression is, that the first attack was late in the summer of 1823, which followed the summer (1822) in which I had undergone an operation for the removal of hemorrhoidal tumours. These I had suffered from since my boyhood, and they were wont to *bleed freely*. I had made a voyage during the same season. The operation arrested the discharge. The attack, which has generally occurred after the middle of July, (but not always *on the same day of the month*, as was the case with Mr. —, Mr. —, Dr. —, I believe, and others,) was always sudden, and without any apparent predisposing cause. It is sensibly aggravated by fruits generally, and by peaches in particular, and it never was as bad, or lasting, as during the season in which I

resolved to persevere in a cooling diet, eating fruit freely—for which there is an inordinate demand—and drinking ice water. It is accompanied by two or three paroxysms in a day of violent sneezing, and most copious flow, from the nostrils, of a limpid secretion like tears; and, with *me*, the sympathy between the eyes and throat does not appear until some weeks, and is not violent. The affection is mainly of the head. I can arrest it by inhaling laudanum through the nostrils, but suffer much from the experiment, and am glad, by means of snuff to bring it on again. It gradually wears out,—in general in the course of October,—and in the latter stages the secretion assumes the appearance of the effects of a common cold. It leaves me liable to chills in the night, which awake me from a sound sleep, and it also leaves a liability to a nervous sensation, which creeps over me like an approaching faintness. This is apt to come on almost at the moment after taking coffee in the morning, and at other times. I have tried countless remedies, *regular* and *irregular*, and nothing cures: some things aggravate; few mitigate. The Prussic acid with black drop, three times a day in small doses, has generally been useful. Rowand's tonic mixture is a good preparation, and, I think, palliates the symptoms in their course. Fatigue, exposure, excitement, all aggravate. Moderation, quiet, *comfortable diet*, the sofa, not the bed, riding rather than walking, suit me in the season. The effect on the nerves is terrible, but on the constitution eventually slight. I am convinced it *ought not to be cured*, and Dr. Physick of Philadelphia told me, that he had utterly failed in the several cases that had come under his care. I have been told more than once that it is gouty, and there was gout in my family. It has been commencing earlier for some few years than formerly, but is not continual until the stated season, and then the *dripping* from the nostrils is *almost ceaseless*. Tepid bathing, I think, aggravates the symptoms. When badly managed, it has lingered on, with intermissions, until mid-winter. It is a mighty trial of faith, patience, and good nature, &c.; and if I were on a jury before whom one was tried for murder, who could prove that at the alleged season he was afflicted with this catarrh, I should suspect him the more grievously, but deal with him much more leniently.

“Among the symptoms I failed to remark, that it causes a writer to be very clumsy and confused. From this, and the history, which you have above, you will immediately infer the fact, that I am suffering from it already. Add to this the hour—12 P. M.—and you will not be surprised at the style of the drawing.”

It is obvious from these ample details, that the disease does not belong to asthma—as we now define it—that is, to nervous or spasmodic asthma, but that it consists essentially of inflammatory irritation of the mucous membrane of the eyes, nose, and the whole of the respiratory apparatus,—the dyspnoea originating in this cause. It is rather a form of chronic bronchitis, and can scarcely be regarded as a combination of catarrh and asthma, as it has been by some.

Causes.—The prevalent idea is, that it arises from vegetable matter

diffused in the atmosphere, that it is derived from the flowers of some plants, and that in a great number of instances it comes from grass. Dr. Elliotson asserts, that a lady, who had suffered from the disease for many years, told him, that being once away from home at an inn, where she conceived there was no danger whatever of being affected by the flowers of grass, she was suddenly seized with violent dyspnoea, and great irritation, and on looking out of a window, she saw that a cart-load of hay had just been brought into the inn-yard. She told him, also, as another proof, that the affection arose from this source, that her children once came into the room after having been playing with hay, and instantly her breathing became affected. It is, however, against the idea of the effluvia from hay being a common exciting cause, that the haymakers themselves are said to be entirely free from it, and that it is often met with in towns, where such effluvia, if they exist at all, cannot be in any quantity.

The rarity with which the disease is seen sufficiently proves, that the predisposition lies in some idiosyncrasy, which is, at times, derived from progenitors. In a letter from Mr. Poyser, of Wirksworth, England, to Dr. Elliotson, he speaks of the mother of a large family, who had been afflicted with this malady for many years. "This lady decidedly considers the cause of her complaint to be an emanation from the flowers of grass. It begins when grass comes into flower. There is a perceptible increase or paroxysm, when she is exposed to these effluvia, and when the flowering time is over, she can go into a hay-field with impunity, which she could not previously do. "The father of this lady is immediately seized with violent and continual sneezing, and inflammation of the nose and eyes, when he goes into, or approaches, a hay-field; but the symptoms go off when he is removed from the smell of hay. He, therefore, carefully avoids the exciting cause, and escapes the disease. Three of the sons of Mrs. A. are also subject to this disease, and their symptoms are similar to her's though less severe. One of these young gentlemen is now at Geneva, and had the complaint there this summer." When a predisposition is laid in idiosyncrasy, the smell of hay may act as an excitant cause; but in other instances it may be an emanation of a different kind. The odour of ipecacuanha is one of the most frequent excitants. The author knew a young gentleman who could not touch powdered ipecacuanha without the immediate supervention of every symptom of "hay asthma." With others, the same effect is induced by the smell of the rose, the bean-flower, &c. &c. In one of the sons of the lady, whose case is described by Mr. Poyser, all the symptoms of the disease are produced by the smell of the Guinea pig; and an English nobleman is affected with sneezing and asthmatic symptoms, if he comes in contact with a hare, or rather with the fur of a hare, and remains ill for several days afterwards. He experiences great suffering, whether the hare be dead or alive.

Moreover, cases of bronchitis of a periodical character and analogous in their phenomena to the affection under consideration, are occasionally met with, in which hay can by no means be invoked as a cause. An interesting example of this kind is contained in the

following extract from a letter from a respectable physician of Virginia to the author's friend and pupil, Dr. John B. Grayson, of Virginia, who consulted the author in regard to the case.

"In June 1822, I was visited with an attack of the influenza, then prevailing epidemically; though it confined me to my bed several days, I took, as well as I can recollect, very little, if any medicine. This neglect perhaps I have cause to regret; in due time, I recovered; that is all the symptoms left me, except the affection under which I still suffer, and to an intolerable degree. This chronic form of influenza is periodical in its character,—its attack almost always commencing early in the morning, and continuing till after meridian, extending sometimes till the evening. I first feel a burning sensation high up the nostrils, which becomes exceedingly violent, so much so that I could tear my nose from my face, if it were possible. Excessive sneezing, with a copious discharge of serous fluid seems to be nature's relief of the present paroxysm. A heaviness of feeling succeeds like that experienced in a common cold. For several years after the original disease, the paroxysms, (I mean the severe ones) would occur about once in four or five days; seldom a day passing without a slight one. The disease I take to be one of irritation seated in the frontal sinus. I have discovered that counter-irritants relieve, as long as they act, but no longer. I am free from it in bilious fever, but it returns with convalescence. I infer that an issue or seton would afford relief, but then it must be perpetual. I have used nothing for it of consequence except quinine; and from its periodical type, I have had a notion of trying the virtues of arsenic and quinine: from its irritative character, I have had thoughts of using the belladonna. I have for several weeks past enjoyed a mitigation of the symptoms, but I daily expect a recurrence of them in all their violence. For the last two or three years, the disease has been much more severe and frequent in its attacks than formerly. The swelling and inflammation of the membrane of the nose will sometimes extend to the fauces, and even affect the glottis, threatening suffocation. The nasal passage for a considerable time is effectually closed, so that respiration is performed through the mouth alone. Sometimes, for the whole day I am totally unfit for the ordinary duties of life, and unfit also to be in company. It is remarkable, that frequently a horizontal position will suspend the paroxysm in the midst of its violence, but its return is sure on rising. Has the disease any affinity with *tic douloureux*?"

Treatment.—From the cases that have been detailed, it would not seem that any great advantage is to be derived from medicine. It has been affirmed, that the best prophylactic, before the period of expected recurrence, is the cold shower bath, accompanied by the internal use of the sulphate of quinia and the sulphate of iron, which although not entirely compatible in a chemical point of view form a compound, which has been productive of advantage.

R.—Quiniæ sulphat. gr. ij.—iij.

Ferri sulphat. gr. j.—f. pil.

Dose, one, three times a day.

This plan has been found so effective, that two persons, who had previously been most severely afflicted "were able to walk through a rich meadow without suffering in the slightest degree; although formerly, if they had ventured out into such a situation, they would have brought upon themselves all the agonies of spasmodic asthma." It has been advised, likewise, that the person should visit the seacoast during the period at which he is usually attacked, and the change, as might be presumed, whatever may be the cause, has often proved very beneficial. It is proper to remark, however, that the only instance said to be on record, in which the disease attacked a patient before the usual period, was when he was residing for a few days, in an airy house, situate on a cliff overhanging the ocean. In one case, the patient almost entirely escaped the disease, by merely commencing, some time previous to the expected period of attack, to anoint the eyelids at bed-time with the *unguentum hydrargyri nitratis* properly reduced,^a and by bathing the eyes occasionally during the day with a collyrium composed of rose-water and acetate of zinc;^b and after this had dried, smearing them with simple spermaceti ointment to remove the stiffness left by the collyrium.

^a R.—Ung. hydrarg. nitrat. p. i.
Adipis. p. ix.—M.

^b R.—Plumbi acet.
Zinci sulphat. aa gr. vi.
Aque rosæ, f 3iv.—M.

When the disease has fairly set in, its course is not much modified by remedies. Being chronic in its character, it does not well bear depletion.

A recent writer has recommended the tincture of lobelia in the dose of f 3j. three times a day, which, he affirms, generally affords relief; and Mr. Worthington, of the Lowestoff Infirmary, has found the administration of a cup of strong coffee without sugar or cream, repeated every two hours, to be the most successful remedy. The sulphate of quinia failed in the hands of both these gentlemen.

Almost all the sufferers have experienced inconvenience from too rigid a diet, and from too free exposure to air. These facts must be borne in mind, as well as the circumstance, that the affection wears itself out in the progress of time, and without materially affecting the constitution. The practitioner should, therefore, avoid being too officious. Under the idea, that the cause was the effluvia from grasses—the pollen in all probability—and that such effluvia might be destroyed by the chlorides, Dr. Elliotson requested a gentleman, who had the disease, to sprinkle chloride of soda around the chamber, and he did so with perfect success. In another case, saucers of a solution of one of the chlorides were placed about the bedroom; rags were dipped in the solution, and hung upon the backs of chairs; the hands and face were washed with it, night and morning; and the patient was directed to carry a small bottle of it about with him, and to smell it repeatedly in the course of the day. The result, in this case, was likewise satisfactory. In other cases, however, the plan has been by no means as beneficial; and even if it had been, the result would not be a sufficient proof, that the cause was the one assigned by Dr.

Elliotson. No matter what might be the effluvium in the air, the chlorine could not fail to modify the condition of the latter, and thus to obviate, more or less, the morbid influence. It is clear, therefore, from the whole history of the affection, that the efforts of the practitioner can lead only to the palliation of the more urgent symptoms, and that, even in this respect, his powers are extremely limited, and his attempts to afford relief too frequently either altogether nugatory, or productive of unexpected aggravation of the symptoms.

II. HOOPING-COUGH.

SYNON. Bex convulsiva, B. theriodes, Tussis convulsiva, T. asinina, T. canina, T. clamosa, T. clangosa, T. ferina, T. spasmodica, T. pueros strangulans, T. quinta, T. stomachalis, Pertussis, Pnœsis pertussis, Amphimerina, Orthopnœa tussiculosa, Bechorthopnœa, Morbus cucullaris, M. cuculus, Chincough, Kinkcough, Kincough, Kindeough; *Fr.* Coqueluche, Catarrhe ou Bronchite convulsive; *Ger.* Keuchhusten, Keichhusten, Krampfhusten, Stickhusten, Eselshusten, Schlafhusten, Brechhusten, Kielhusten, Blaue Husten, Consulsivische Katarrh, Epidemische Kinderhusten.

A variety of *nervous cough* is at times met with in nervous and hysterical persons, which is dry, sonorous, returns in paroxysms, and requires to be treated by revellents and narcotics, so as to excite a new impression on the nervous system. It is different, however, from the neurosis,—if we may so term it,—of the respiratory organs, which we have now to consider, and which has something special and specific in its character.

By the ancients, hooping-cough was confounded with other affections, unless we presume that it was unknown to them, and made its appearance, like some other diseases, at an after period. It seems to have been first satisfactorily described by Dr. Willis, in 1682, although it was a disease apparently well known.

Diagnosis.—Hooping-cough may be conveniently divided, as it has been by many writers, into three stages, although, it need scarcely be said, every such division must be artificial and arbitrary. The *first*—the *catarrhal stage* of some—essentially resembles ordinary bronchitis or catarrh. There is more or less indisposition, chilliness, depression, suffusion of the face and eyes, increased secretion of tears, sneezing, and discharge from the nose, along with a dry fatiguing cough, which returns by fits or *quintes*. During this stage, there is more or less febrile indisposition, with exacerbations during the night. This stage is very variable in its duration; at times, lasting for a few days; but, at others, for weeks. It does not often, however, exceed a fortnight. The *second*—the *nervous and spasmodic or convulsive stage*, of some—is known by the occurrence of the characteristic symptoms of the disease. The cough is now excessively violent and convulsive, and so distressing, that the patient, feeling its approach, runs to lay hold of, and support himself by some object, until the paroxysm is ended. These come on more frequently during the night, and consist of a series of forced, quick, and unequal expirations, which follow each other so rapidly, that inspiration is impracticable. The return of blood is accordingly interfered with, and the face becomes swollen and livid; the tears are discharged copiously; the

veins of the neck are prominent; a copious perspiration breaks out, and suffocation appears imminent. In a short time, however, small imperfect inspirations are effected, and then a slow, long, and distressing inspiration, accompanied by a peculiar noise, which has been compared to a *whoop*,—hence the name *whooping-cough* or *hooping-cough*; and, by others, to the braying of an ass, or the crowing of a cock; to which, however, it bears but little resemblance, although names, descriptive of the notion, have been assigned to it, especially by the Germans. The cough sometimes ceases after this peculiar inspiration, but a second or a third may succeed, and the paroxysm may not wholly terminate until a viscid, ropy, colourless secretion is expelled with difficulty by expectoration, and often accompanied by vomiting. The sonorous inspiration is owing to the entrance of the air into the trachea through the glottis, the opening of which is spasmodically contracted.

It is not uncommon for a tensive pain to be felt in the forehead; and it is a symptom which requires attention. Some, indeed, impressed by this encephalic affection, have placed the site of the pathological condition, which characterizes the disease, in the brain.

The duration of the paroxysms is from one to four or five minutes, and their occurrence is equally various,—at times, every five or ten minutes, but, at others, not oftener than six or eight times in the 24 hours. When they are not very long, or frequently repeated, the child resumes his play immediately afterwards; but when they return with great violence and frequency, dyspnœa, pain in the chest, and general indisposition remain. Their recurrence is immediately excited by mental emotion—as fright, crying—or by rapid running. They are commonly, also, more frequent after excitants of any kind have been taken; and where more than one in a family suffer, the occurrence of a paroxysm in one is very apt to excite it in another. It is not an uncommon occurrence for blood to flow from the nose, and occasionally from the mouth and ears, during the paroxysm; and for infiltrations to take place under the conjunctiva. In excessively severe fits of coughing, the urine and fæces are discharged involuntarily; and where there is a liability to prolapsus of the rectum, or to hernia, these protrusions may occur under like circumstances.

Between the fits, there is little or no general indisposition, unless some complication exists. The duration of this period is very variable. On an average, it may be estimated at from a fortnight to a month, but it may continue for months.

The *third stage* or the *stage of decrement* or *decline*, is indicated by the diminution of the spasmodic phenomena; the paroxysms of coughing becoming shorter and shorter, and less violent and frequent; the peculiar inspiratory noise, by which they terminate, diminishes, and ultimately disappears. The liquid expectorated becomes opaque, thicker, of a greenish hue, generally—and sometimes puriform. The cough at length does not differ from that of ordinary catarrh, and gradually ceases, especially if the disease have existed during the spring; if during the autumn, it may remain severe the whole of the subsequent winter.

The duration of hooping-cough is uncertain; on the average, it may be estimated at from six weeks to three months; but it may continue much longer.

If the ear be applied to the chest during a fit of coughing, no respiratory murmur is heard, because the air does not enter the chest; but the moment the pathognomonic inspiration takes place, the air is heard rushing into the ultimate bronchial ramifications, and the respiration becomes louder than natural. As there is no consolidation, percussion renders a clear sound, both during the paroxysms and in the intervals between them.

Hooping-cough is often complicated with other affections, as with bronchitis and pneumonia. Of 38 cases of complications, reported by M. Blache, 12 were of pneumonia; and of 28 cases, observed in 1836 by M. Constant, in the *Hôpital des Enfants* of Paris, ten were of the same affection. As a sequel of hooping-cough, tubercles are at times formed or developed, and, not unfrequently, serious encephalic affections ensue,—encephalitis, hyperæmia, and convulsions, which accompany every paroxysm of coughing, and are difficult of removal owing to the persistence of their cause. In the winter season, epidemics of hooping-cough are apt to be accompanied with inflammatory affections of the air passages; in summer, with affections of the alimentary canal, especially inflammation of the lining membrane.

Causes.—But little is known of the causes of hooping-cough. It is one of the diseases that reign epidemically; and, as has been more than once observed, we know but little of any of the diseases that occur under epidemic influences. It is rarely sporadic; and, as a general rule, attacks individuals but once; but to this rule there are many exceptions. A recent writer, W. England, states, that he had, at the time of writing, (May, 1840,) under his care, a boy, five years of age, labouring under hooping-cough, who had the same disease when about a year old. It is farther stated, that a maternal aunt and uncle of this child were twice affected with the disease—first when infants but a few months old; the aunt a second time, when seven years of age; and the uncle a second time when forty-five years of age. It prevails at all seasons and in all climates, and attacks every age and condition; but children are more liable to it than adults; and children, under the age of the second dentition, are affected in greater numbers than the older. Of 130 cases, recorded by M. Blache, 106 were under 7 years of age; 24 between 8 and 14.

When hooping-cough prevails extensively, the mortality from it is occasionally considerable. In Glasgow, the deaths have been pretty nearly $5\frac{1}{2}$ per cent. of the whole number; and in one year, according to Dr. Watt, they amounted to $11\frac{1}{4}$ per cent.

The disease differs from some other epidemics—as the influenza—in not affecting any great belt of country. It is commonly, indeed, restricted to a small sphere, and this is one reason why it has been conceived by some to spread rather by contagious than by strictly epidemic influence. Whether it be ever produced by contagion has, however, given rise to discussion. Many, amongst whom may be mentioned Stoll, Sprengel, Laënnec, and Professor Dewees, of Phi-

ladelphia, deny it altogether, but the large mass of observers do not hesitate to admit it. With those who believe in its being a contagious disease, a question frequently arises as to the precise period at which it becomes, and ceases to be so. The author, who is rather disposed to be a contagionist, has had no reason for believing that it has been communicated until the disease has been fully formed, or after the cessation of the whoop. Since the first edition of this work was published, his youngest child has had the disease severely,—the whoop continuing during the winter and spring for at least three months; yet none of the other children—not one of whom had passed through the disease—took it from her. Cases of similar exemption are by no means unfrequent.

Pathological characters.—It is difficult to affirm positively what are the anatomical characters of this disease. It never terminates fatally, without inducing some other affection, whose traces are perceptible on dissection. This circumstance, with the phenomena during life, has caused it to be classed by distinguished pathological writers, amongst the *lesions of innervation of the bronchia*. In the great majority of cases, however, more or less redness is observable in the mucous lining of the bronchial tubes. This is at times general, but at others restricted in extent; and although by some it has been said to have been wanting, it has been maintained by others to be an invariable appearance. The small bronchial ramifications have been found filled with a mucous or muco-purulent matter; and where the inflammation has extended to the lungs or pleura, or complications of disease of other parts have existed, their characteristic lesions have been seen on dissection.

A very common necroscopic appearance is dilatation of the bronchia, and, along with this, pulmonary emphysema is not uncommonly found, especially where the disease has existed for a long time. The bronchial ganglions or glands would seem to have been as often diseased as the bronchial mucous membrane. They have been found red, swollen, or tubercular.

Some have affirmed, that the pneumogastric nerves have exhibited evidences of inflammation, whilst by others no appearance of the kind has been met with.

With regard to the precise nature of the disease, much difference of opinion has existed, and still exists; but it is not advisable to dwell on points, which, in the existing state of science, appear inappreciable. The view, most in accordance, we think, with all the phenomena, is, that the disease consists in erethism of the nerves distributed to the bronchial mucous membrane, accompanied generally, if not always, by bronchitis. It has been found, that when the pneumogastric nerves were bruised and pinched in a living animal, so as to break down their structure, convulsive cough was excited like that of whooping-cough; and, again, it is well known, that if extraneous bodies be received into the air passages, a spasmodic contraction of the glottis may occur with a whooping sound on inspiration.

Treatment.—This is generally palliative; for it rarely happens, that we are able to cut short the disease or to modify its course. The

number of remedies, which have been brought forward, is immense, but the true plan is to treat the disease according to general principles; for neither in this, nor in any other disease, has a specific been discovered. The treatment may be divided into that which is applicable in the *first* or forming stage, according to the division of the symptoms laid down;—in the *second*, or convulsive stage, or stage in which the disease is fully formed; and in the *third*, or stage of decrement or decline.

The *first stage* requires the treatment that is demanded in subacute bronchitis. It is rarely necessary to take away blood from the general system, but should the symptoms seem to demand depletion, the application of leeches to the chest may be of service.

In the *second stage*, a great variety of medicines has been prescribed; and perhaps the most efficacious of these are emetics. They may be given every three or four days, and even oftener, unless their administration should seem to be productive of bad effects. By some, they are given every day or two, for the first two weeks. Either the tartrate of antimony and potassa, or ipecacuanha, may be administered; the nausea dislodges the mucus from the bronchial tubes; and the immediately succeeding efforts at vomiting expel it. It has long, indeed, been observed, that those children, who vomit readily during the paroxysm, suffer the least; and this has been a great incentive to the administration of emetics. Purgatives are of no essential use, and are only prescribed under the general principles, which point out the necessity for their use in other cases. Narcotics have been greatly extolled, and certain of them more so than others. Belladonna has been preferred by many; so much so, indeed, that certain writers have regarded it as a specific in the disease. This is not the fact; but when pushed to the extent of affecting the brain—as indicated by vertigo, dimness of sight, dilatation of the pupils, &c.—it has arrested the violence of the paroxysms. Some, however, administer it in smaller doses, and are not desirous of producing narcosis.

R.—Ext. Belladon. gr. ss.

Sacchar. alb. 3j.—M. et divide in part. viij. æquales.

Dose, one, night and morning, for a child from two to four years old.

The effect of belladonna is, however, somewhat uncertain; in a very small dose, it occasions symptoms of narcosis, and it is apt to lose its effect speedily, so that the disease continues stationary.

Various other narcotics, as opium, and its preparations, hyoscyamus, conium, lactucarium, tobacco, &c., have been administered with advantage in particular cases; but all—and especially the last—require care in their administration. Hydrocyanic acid, in the opinion of some, is almost entitled to the rank of a specific. By Professor Thomson, it is regarded as the sheet-anchor of the practitioner. After emptying the stomach with an emetic, and purging the patient briskly, he commences with the use of the acid, and never alters the prescription except to increase the dose; and Dr. Roe found its employment attended with such striking effects, that he could not entertain a doubt of its possessing “a specific power over hooping-cough.” The result of all his trials convinced him, “that in

warm weather it will cure almost any case of simple hooping-cough in a short time; that in all seasons it will abridge its duration; and in almost every instance, where it does not cure, that it will, at least, materially relieve the severity of the cough." It is proper to remark, however, that Dr. Roe always combined it with other agents, that have been recommended in the disease.

R.—Acid. hydrocyanic. (Scheele's), ℥xij.

Liquor. antim. tartaris. f3j.

Tinct. opii. camphorat. f3ijss.

Aq. camphor. f3vijss.—M.

Dose, a tablespoonful, every four hours in some warm drink: "the child to remain in a warm room, and to live upon light pudding and broth." This prescription was for a delicate boy, four years old. For a healthy-looking female child, five years of age, Dr. Roe ordered the following mixture:

R.—Acid. hydrocyanic. (Scheele's), ℥xx.

Liq. antim. tartaris. f3iss.

Vini. ipecac. f3iss.

Aquæ, f3xij.—M.

Dose, a teaspoonful, every two hours.

It need scarcely be said, that it is not easy to deduce satisfactory inferences, as to the action of any one ingredient of a compound formula, every article of which, it is presumable, has been added to effect some definite object.

Narcotics have likewise been administered endermically with advantage; but unpleasant accidents have resulted from them, so that, even in this form, they must be employed with caution.

Various reputed antispasmodics—assafœtida, musk, valerian, castor—have been prescribed by some practitioners—and lauded—but the author has seen no effect from them, except what could be ascribed to their excitant agency,—or in other words, to the new impression made by them upon the nerves of the organs of taste, and of the stomach. By recent observers, the subcarbonate of iron has been regarded as the best antispasmodic. Dr. Lombard gave it in the quantity of 24, and even 36 grains to young children, either in water or syrup, or mixed with a cough mixture. He never found it produce any inconvenience; on the contrary, he observed that all the children, treated after this method, recovered faster than with other remedies, and he considers himself justified in affirming, that it enjoys the property of making the paroxysms less violent, diminishing their number, and after a certain time of entirely curing the disease. The good effects of the iron are ascribed to its antiperiodic and antineuralgic properties; and these effects are considered to favour the idea, that hooping-cough resembles a true neuralgic, or at all events nervous disease.

Of late, iodide of silver has been recommended by Dr. Charles Patterson, Physician to the Rathkeale Infirmary and Fever Hospital. He gave it in several instances in the dose of from one-eighth of a grain to one-fourth, three times a day, with what he considered decided relief. *Lobelia inflata*—which is an acro-narcotic—has also been much recommended in spasmodic diseases of the air passages, and, therefore, in hooping-cough.

R.—Tinct. lobeliæ, gtt. xxx—xl.

Mucilag. acac.

Syrup. papav. aa f 3j.

Aquæ. f 3vj.—M.

Dose, a teaspoonful, every two or three hours.

It has been regarded as infallible as the hydrocyanic acid has been by its supporters.

Revellents have been greatly employed; but the more severe have generally been laid aside,—partly, because they are not more serviceable than the milder; and partly, also, because in young children, blisters and issues are apt to be followed by unpleasant consequences. In their stead, the ointment of tartarized antimony may be rubbed on the chest or epigastrium, but care must be taken that the pustulation is not too extensive, as troublesome ulcerations have resulted from it. Croton oil has, likewise, been used in the way of friction.

R.—Ol. tiglii.

—oliv. aa partes æquales.—M.

A few drops to be rubbed on the chest night and morning.

Various embrocations have been advised, to be rubbed on the chest, epigastrium, and along the spine. They all act on the same principle. *Roche's embrocation* for hooping-cough has been much used.

R.—Ol. oliv. f 3xvi.

—succini, f 3viij.

—caryoph. q. s.—M.

The oil of cloves is added merely as a scent, but it is not better than any of the ordinary excitant liniments, as the *Linimentum ammoniæ*, or the *Linimentum camphoræ compositum* of the Pharmacopœias. An asafœtida plaster to the chest, or between the scapula, has been highly thought of by many, and has, doubtless, at times been productive of advantage as a cutaneous revellent, not in consequence of any antispasmodic virtue possessed by the asafœtida, inasmuch as other gently excitant plasters, similarly applied, have been followed by like good effects.

At the meeting of the Medical Section of the British Association, in 1840, it was stated, that rubbing the chest with cold water, repeated two or three times a day, with so much activity as to produce a rubefacient effect, was frequently of great use.

The warm bath is occasionally found serviceable in allaying the violence of the paroxysms.

Remedies have likewise been administered in the way of inhalation. Sulphuric ether, thrown upon the bed or on the clothes of the patient, speedily vaporizes, and has been conceived to diminish the violence and duration of the cough. The smoke of tobacco; the inhalation of the vapour from a hot decoction of belladonna, of the cherry laurel water, and of different aromatic substances, of the vapour of tar, and of nitrous acid, have likewise been advised, but their efficacy is so little marked, that they are scarcely ever employed.

When tensive pain exists in the forehead, a few leeches may be applied with marked advantage. It has been presumed, indeed, that the severity of the whoop may be, in this way, diminished; and that

the fact is in accordance with the acknowledged influence of certain states of the brain upon the respiratory organs.

Lastly,—vaccination has been proposed as a method for curing whooping-cough; and there are many cases on record, which would seem to show the marked influence exerted by this new affection, artificially excited, on that which had possession of the economy. At the same time, it must be remarked, that it has often failed altogether. It may be well, however, to seize the opportunity for vaccinating, provided it have not been previously practised.

In the *third stage* or the period of decrement, advantage may be derived from the use of gentle tonics, as the cold infusion of cinchona, the infusion of gentian or colomba; and at this period, the excitant remedies—external and internal, advised in chronic bronchitis—may be employed with as much prospect of success as in that disease. Change of air is, at this period, most important, and it is not essential, that the change should be from a worse air to a better. The inhabitants of Edinburgh frequently send their children from the airy parts of the town into the Cowgate,—a filthy street, which runs at right angles under one of the largest thoroughfares in the old town, and in which, at a certain hour of the night, the inhabitants eject all the offensive accumulations from their houses, to be washed away by the water of the reservoirs let on for the purpose; yet the change is often most salutary. Even the change from one room of the house to another, has been found of benefit. (See the author's *Elements of Hygiène*, p. 151, and the article, "*Atmosphere*," by the author, in the *American Cyclopædia of Medicine and Surgery*, p. x.) The patient should be warmly clad, if the season require it, and wear flannel next the skin, whatever may be the season; and should take moderate exercise, and food easy of digestion, but not in too great quantity. Should the convalescence be tedious, and the cough and other signs of pulmonary disorder persist, change of air, society, and scenery; and, where practicable, if the winter be approaching, removal to a more genial climate, should be strongly recommended. In the summer season, the climate of the United States is amply adequate to all useful purposes, and several of its mineral springs afford localities that are very favourable for the complete restoration of the valetudinarian. The springs at Warrenton, in Virginia, afford an excellent sanitarium for such cases.

It need scarcely be said, that the different complications, which present themselves in the course of the disease, must be met by the modes of treatment recommended under their respective heads,—the circumstance being always borne in mind, that after the complication has been removed, strength is necessary for the support of the patient through a long and tedious malady, and that, therefore, all copious abstractions of blood, should be made with a wise caution.

III. HEMORRHAGE INTO THE BRONCHIA AND LUNGS.

a. *Hemorrhage into the Bronchia.*

SYNON.—Hæmoptysis, Hæmorrhagia Pulmonum, Bronchorrhagia, Pneumorrhagia, Hæmoptismus, Hemoptoë, Emptoë, Emptoys, Sputum cruentum, Hæmorrhagia hæmoptysis, Spitting of blood; *Fr.* Hæmoptysie, Crachement de Sang; *Ger.* Blutung aus den Lungen, Bluthusten, Blutspeien, Blutausfluss, Lungenblutfluss.

Hemorrhage from the bronchial tubes is by no means of common occurrence; and although always an alarming disease, inasmuch as it is so often the announcement of the existence of pulmonary tubercles; yet, when it is a simple exhalation of blood from the bronchial mucous membrane, it is of comparatively little danger.

Spitting of blood is always an alarming symptom to the patient, no matter, whether it proceed from the bronchial arteries, or from some of the vessels in or near the pharynx; although, in the latter case, the exhalation is of no greater consequence than in epistaxis in the same individual; hence the number of cases of *spitting of blood*,—meaning by that term, hæmoptysis,—which are of no serious consequence. It is not generally difficult to diagnosticate these cases, and, consequently, to separate an affection, which is of little or no consequence, from one that merits the greatest consideration. A practitioner boasted to the author of the great success, which attended his practice in hæmoptysis; but on inquiring closely into the cases, they were all examples of venous hemorrhage—and to a small extent only—from the pharynx.

Diagnosis.—An attack of hæmoptysis is commonly preceded by more or less indisposition, and especially by a sense of weight, or heat, or an indescribable feeling of uneasiness about the chest, with oppression in the breathing and cough—signs indicating hyperæmia or congestion of the lungs—and a sweetish taste, or the taste of blood in the mouth. With these local, are commonly associated general, symptoms; the extremities and surface of the body are cool; irregular chills are experienced, especially in the back; the face is alternately pale and flushed, and there is palpitation, with an accelerated, and at times vibratory, full, and hard pulse. A distressing sense of ebullition is also experienced in the chest, which has been esteemed a certain sign of blood being effused into the bronchial divisions. The constraint in respiration augments, and a sense of tickling and pricking is referred to the bifurcation of the bronchia. The expectoration of mucus, streaked with blood, or of pure blood in greater or less quantity, now commences; and when the blood is examined, it is found to be of a florid vermilion colour, and frothy; unless it has remained some time in the bronchia, when it may be black. Such is the case, when the exudation of blood is ceasing; the portions which transude, instead of being thrown off immediately, may remain there for hours, and be ultimately expectorated of a very dark colour. Cases have been seen, where extraordinary quantities of blood have been discharged, and the patient has sunk immediately;—but they are rare.

The expectoration resembles red currant jelly; but, at times, it is not

so much tinged: the quantity of blood evacuated varies; it is sometimes so great, that it almost amounts to vomiting—mouthful after mouthful being expectorated; the feelings of indisposition then gradually cease, but they may recur, and be followed by a similar hemorrhage. The quantity lost is, at times, astonishing, especially when it is vicarious, as in cases of suppression of the catamenia; in these cases it may return monthly. After a copious discharge, cough usually continues with the expectoration of a slight quantity of dark liquid, or coagulated blood, which ceases gradually.

When the chest is percussed, it emits its natural sound, because the blood is expectorated as fast as it transudes: for the same reason, on auscultation, no sound may be heard except the mucous *râle* with large bubbles, (*râle muqueux à grosses bulles*.)

Difficulty may occasionally arise in discriminating the blood of hæmoptysis, from that of hæmatemesis and epistaxis. In the last disease, the blood may flow by the posterior nares into the pharynx, and be expectorated along with the mucus of those parts. The colour of the blood is strikingly different, however, from that of active hæmoptysis; it is never florid and frothy, as in the latter disease. The blood of hæmoptysis may be distinguished from that of hæmatemesis by the same signs, as well as by the accompanying symptoms. In the former disease, as we have seen, there is cough and dyspnœa; in the latter, nausea, weight at the epigastrium, and vomiting: on inspection, too, the blood evacuated may be found mixed with the contents of the stomach or small intestine.

The blood in hæmoptysis may proceed from the rupture of an aneurism of the aorta; but, in such case, there is not much time for doubt, as the case speedily terminates fatally.

As it very rarely happens, that hæmoptysis is a primary disease, and as it is almost always symptomatic of some internal lesion, it becomes important to determine the nature of such lesion, and especially, whether it consist in deposition of tubercles. In the latter case, the prognosis merges in that of phthisis pulmonalis, and the existence of tuberculosis must be determined by the signs and symptoms to be described hereafter. Even where tubercles are not present, it may lay the foundation for them in one predisposed to them. It has been affirmed by a distinguished pathologist, M. Andral, that he has found less than one fifth of those, who have laboured under hæmoptysis, exhibit tubercles on dissection. There are many, again, who have been hæmoptoic in their youth, who have attained a good old age, remaining delicate for a longer or shorter period, or entirely recovering. It is unquestionable, however, that in the majority of cases, hæmoptysis is either preceded or followed by phthisis pulmonalis.

Causes.—The predisposing causes of hæmoptysis are numerous; the phthisical habit—to be described hereafter—and any organization, in which the vessels are loosely protected by the parts in which they creep, offer a predisposition. This is apt to be the case in that organization, which has been esteemed markedly strumous, in which the hair is fair, the eyes blue, and the pulse rapid. Age is, likewise,

a predisposition. In infancy and advanced life, the disease is rare; but soon after puberty, when, owing to the different evolution of organs, the disposition to epistaxis has ceased, the tendency is much greater; and again, after the age of 35, when the evolution takes place that favours cerebral hemorrhage, the liability to hæmoptysis is greatly lessened. Between the ages of 15 and 40, may be regarded as the period most subject to the disease.

Women, it is affirmed, are more liable to the affection than men. Any sudden changes of atmospheric pressure may, likewise have some influence; that is, a change from a denser to a rarer condition, provided it be considerable. We might suppose, therefore, that persons, who live in elevated regions, as on the mountains of South America and Thibet, would be subject to hæmoptysis. The system soon, however, becomes accustomed to the altered circumstances, and we have no reason for believing, that, ultimately, such persons are more liable to hæmoptysis and other affections of the pulmonary apparatus, than those who reside on the level of the ocean.

It has been asserted, that attacks of spitting of blood are more frequent in spring and autumn, when the days are warm, and the mornings and evenings cool, than at other seasons, but the author is not able to say, that he has observed any influence exerted by seasons. The same may be said of the hour of the day. His observations has not led him to infer, that most of the attacks occur in the night or morning.

The exciting causes are very numerous. Violent corporeal exertion, either of the lungs or of the body generally, may induce it, especially if any of the predisponent influences, already described, be in action; or if there be either vascular fulness, or mechanical impediment to the circulation, owing to the presence of tubercles in the lungs. One of the most severe cases of hæmoptysis, which the author has attended, occurred in the act of sexual intercourse.

In the advanced stages of pulmonary consumption, hæmoptysis may be a symptom of the existence of abscess in the lungs.

† The inhalation of fine mechanical particles, borne about in the air, in certain occupations, or of acrid vapours, may also be an exciting cause.

Pneumonia is attended with some exhalation of blood, but this is generally to a slight extent. Inflammation, therefore, of the pulmonary parenchyma may be regarded as a cause of hæmoptysis, and any induration, or hypertrophy, or dilatation, or protracted palpitation of the heart, or organic disease of any of the viscera by interfering with the due circulation of the blood, may give rise to hyperæmia in the lungs, which may terminate in the exhalation of blood into the bronchial tubes. In like manner, pregnancy, or the improper pressure exerted on the female by corsets too tightly applied, may induce it. It succeeds, at times, to the suppression of accustomed evacuations, as of the hæmorrhoidal or menstrual flux, and recurs periodically at the times when these fluxes have been expected. The condition of the blood has likewise its effect in favouring hemorrhage, and this, we shall see, has to be borne in mind in the treatment. If

the blood be thin,—that is, if it contain a larger proportion of serum than of red globules or fibrin,—it will more readily transude through the parietes of the vessels; hence, hæmoptysis is occasionally seen in scorbutus, and in chlorosis.

Some singular cases are recorded, in which unusual agencies have acted in the way of causes. Thus, music, it is affirmed, has induced it in many persons affected with phthisis. In other cases, it has supervened on the application of leeches, or of a blister or sinapism, and, on the other hand, these means will frequently arrest it. The author had a case recently under his charge, in which the patient felt the sensation as if the blood were drawn internally towards the part of the chest to which any form of counter-irritant was applied, and spitting of blood invariably followed. We are told, again, of persons who could not partake of particular articles of diet, or inhale particular odours, without this affection supervening. Such, however, are rare cases—exceptions to the general rule.

It has been asserted, that hæmoptysis may be caused by a prolonged mercurial treatment, or after a long use of the preparations of iodine; but although the author has had ample opportunities for seeing both these therapeutical agents used to a great extent, he has never witnessed this result.

Pathological characters.—In a case of simple exhalation from the lining membrane of the bronchial tubes, the membrane may or may not present signs of a morbid condition. It has been found more or less red, livid, and tumefied, and, at other times, pale, and exanguious. Commonly, it is covered with blood, and, on its surface, a number of red points may be observed on careful examination; but there is usually no trace of ulceration or of any rupture. The flow of blood takes place by transudation or diapedesis; not by rhexis or rupture of vessels, as was at one time universally believed: we still, indeed, constantly hear of a hæmoptoic individual having *broken a blood-vessel* in his lungs. The mucous membrane is usually a little softened, and impregnated or tinged with blood throughout its substance. This softened condition is the main cause, perhaps, of the sanguineous exhalation.

Treatment.—When hæmoptysis is slight, occurs in one enjoying good health, and is merely limited to sputa tinged more or less with blood, the simplest means are sufficient for its removal. It is but necessary to inculcate mental and corporeal quietude, silence, a restricted diet, the occasional use of a brisk cathartic,* and, if much plethora, or sense of tightness about the chest exist, general or local blood-letting.

* R.—Jalap. p. gr. xv.
Hydrarg. chlorid. mit.
Zingib. pulv. ãã gr. v—M.

It was at one time the belief with the profession, and still is with the vulgar, that in all cases of hæmoptysis, as of other hemorrhages, astringents should be employed; but the case is not so simple. The pathological cause of the hemorrhage must be appreciated, and the disease be treated accordingly. If the hæmoptysis be

attended with symptoms of vascular fulness or activity, blood-letting, and the agents belonging to the classes of sedatives and refrigerants, are chiefly indicated. Usually, when a person is attacked with hemorrhage from the lungs, the greatest alarm is felt, and, in all cases, it is expected, that the practitioner should have recourse to blood-letting to arrest the flow. The fact, however, is, that the loss of blood may be arrested at a less expense of fluid, when due attention is paid to ventilation, posture, &c. than when the lancet is used. A coagulum soon forms around the transuding vessel, and the hemorrhage ceases. Whether blood-letting have to be practised must depend upon other grounds—upon the results of an inquiry into the state of the circulation, general and capillary, connected with the hemorrhage. Should there be evidences of plethora, or of hyperæmia, the quantity of the circulating fluid must be diminished, otherwise, the hemorrhage may recur—care being had, as in every case of hemorrhage, not to allow too much fluid, but rather advising, that a small piece of ice should be taken into the mouth occasionally, for the purpose of allaying thirst and undue excitement. Blood-letting is one of the most powerful sorbefacients we possess; and if, immediately after it have been practised, fluid be freely allowed, it will pass at once into the blood-vessels, so that the quantity of blood circulating in the vessels may be as great, soon after the operation, as it was before; but it will be blood containing a larger proportion of watery contents, and, therefore, better adapted for transuding through the parietes of the vessels. If such be the case after a single bleeding, it can be readily seen that repeated bleedings, under similar circumstances, cannot fail to increase the evil, by laying the foundation for repeated returns of the hemorrhage. The symptoms, that precede, accompany, or follow the hemorrhage, must be the guides to the abstraction, and should it be accompanied by a sense of heat or pain in the chest, constant or frequent cough, dyspnœa, and the pulse be, at the same time, full and hard, blood-letting may be practised, and repeated at the discretion of the practitioner.

In this country, during the flow, it is very common for the patient to be directed to take common salt into the mouth, under the idea that it possesses hæmastatic virtues. The author has never had the slightest reason for believing, that it has been productive of any advantage, nor can he see under what principle it has been recommended. It has been already remarked, that, after a time, the hemorrhage ceases, whether salt have been employed or not; and hence it has probably happened, that the result has been ascribed to the salt, when it may have exerted no agency. By some of the European writers, as by Andral, it is referred to as a remedy employed in Philadelphia!

In cases of active hemorrhage, where the loss of blood, and the use of ice, with the other means above recommended, are insufficient to reduce the vascular action, tartarized antimony and ipecacuanha have been used, with the view of inducing the sedation that accompanies nausea. Digitalis has, likewise, been recommended for the same purpose. It may be given alone,^a or in combination with hydrocyanic acid.^b

^a R.—Digit. pulv. gr. j. vel
Tinct. digit. gtt. x. ter die.

^b R.—Tinct. digit. gtt. xl.
Acid. hydrocyanic. gtt. vj.
Mucilag. acaciæ, f 3iij.
Aquæ, f 3iiss.—M.

Dose, a fourth part every four or five hours.

The objection to digitalis is, that its effects are not immediate; still, there are many cases in which ample time is allowed for them to be elicited.

Amongst the most valuable of the remedial agents in hæmoptysis are revellents, of which there are various kinds. Dry frictions may be made over the surface; and, as the recession of the vital activity from the extremities is one of the common precursors of an attack of hæmorrhage, it is important to solicit the blood towards them, by sinapised pediluvia, or by sinapisms to the feet, calves of the legs, arms, &c. Dry cupping over the surface of the body has, likewise, been recommended; and when the hæmorrhage has taken place, some have advised, that ligatures should be put around the limbs, with the view of modifying the circulation. The plan is not, however, much employed, although we are satisfied it has occasionally been of advantage. Flying blisters, applied here and there, have been advised, but they have been thought contra-indicated, where bleeding had been pushed to a great extent, in consequence of the irritability thereby engendered. There can be no question, indeed,—as the author has elsewhere pointed out,—(*General Therapeutics*, Philada. 1836, and *General Therapeutics and Mat. Med.* Philada. 1843,) that excessive loss of blood develops the nervous irritability, and that mischief is apt to be induced from this cause. When blood-letting from the arm is practised, whilst the hæmorrhage is taking place from the lungs, it belongs to what were formerly termed “revulsive bleedings,”—the flow of blood being solicited towards the open vein, and, therefore, deriving from the “determination” towards the bronchial mucous membrane. On the principle of revulsion, the application of leeches to the anus has been strongly advised, and, for the same reason, it has been recommended not to apply them, or the scarificator, or blisters, over the chest.

Although the equalizing and revulsive operation of emetics might be of service in hæmoptysis, it has been conceived, that the activity they occasion in the vascular movements might do more harm than their other operations could do good. Yet it has not been found, that hæmoptysis, symptomatic of phthisis, has been increased at sea, during the retching of sea sickness. (See the author's *Elements of Hygiène*, p. 183.)

The revulsion, excited by cathartics, may be used beneficially, after the hæmorrhage has ceased. During the attack, their operation might be injurious, in consequence of the corporeal disquiet they induce. Saline cathartics, which operate on the different tracts of the intestinal canal, and augment the secretion from the mucous membrane, ought perhaps to be chosen.

R.—Magnes. sulphat. 3vj.
Acid. sulphur. dilut. gtt. xij.
Aquæ menthæ, f 3iij.—M.

Dose, one half, to be repeated in three or four hours, if necessary.

Where blood is flowing copiously from a vessel, the idea would at once present itself, that astringents should be employed; and, before philosophical views of pathology were entertained, these were the agents universally had recourse to. Whenever hæmoptysis is attended with symptoms of vascular fulness or activity, the agents, already described, act as indirect astringents, and but little reliance is placed upon any of the articles of the *materia medica*, which are regarded as direct astringents, as none of them can be made to come in contact—except in a very dilute state—with the vessel whence the blood proceeds. Most astringents are, however, tonics, and, in cases of asthenic hæmorrhage, may be serviceable in this way, from the improvement they produce in the general system; whilst others have the power, at the same time, of modifying the condition of the blood, and rendering it less fitted for ready transudation through the parietes of the vessels.

Almost all the agents that belong to the class of astringents have been given in hæmoptysis. Sulphuric acid, in a dilute state, or in the form of the elixir of vitriol, (gtt. viij.—x. in a glass of water,) is a common remedy; or a lemonade, made of dilute sulphuric acid, lemon peel, sugar, and water; but, if the experiments of Magendie can be relied on, sulphuric acid does not favour the coagulation of the blood, but the contrary. Alum, kino, extract of *krameria*, &c. &c. have likewise been favourites with some. In regard to the acetate of lead, much difference of opinion has existed. Some have regarded it as the most potent of all remedies, (gr. ij. iij. iv. in pill, every three or four hours,) after plethora has been reduced. Tannin, also, has been highly extolled.^a It occasions constipation, which may be removed by enemata.

^a R.—Acid. tannic. gr. iv.
Acaciæ pulv. gr. xvj.
Syrup. simpl. q. s. ut fiant pilulæ viij.
Dose, one, every three hours.

From the powers of creasote as a hæmastatic, it was certain to be employed in hæmoptysis; and testimony of its efficacy has been adduced. In the hands of some, however, it has proved of little avail. The author has used it on one or two occasions, and he thinks with advantage.^a

^a R.—Creasot. gtt. v.
Mucilag. acac. f 3iij.
Syrup. f 3j.—M.
Dose, a spoonful, every three hours.

From the effect which it exerts on the coagulability of the blood, it seems well adapted for cases in which there is too great tenuity of that fluid. The same may be said of the iodide of iron, which the author has prescribed with the best effects, (gr. ij. or iij. in solution in water, three or four times a day.) Its property of coagulating the blood, and, therefore, of inspissating it, renders it especially valuable in hæmorrhage, occurring in pathological conditions of the system, in which there is paucity of red globules, and too great a proportion of liquor sanguinis.

By Dr. Copland, the oil of turpentine, to whose action on the system he has long paid attention, is regarded as one of the most valuable remedies in internal hemorrhages, and adapted to both the active and passive forms. In large doses, after the temporary excitement of the nervous system passes away, it is considered to act as a sedative, and therefore to be adapted to the more active cases; and in smaller doses to the passive. A recent writer, Dr. Willshire, regards it as "one of the most able weapons in the hands of the practitioner." It is absorbed into the circulation, and acts immediately on the affected capillaries. Dr. Willshire affirms, that it acts more quickly than any other astringent; and he has seen hæmoptyses which had continued in spite of other remedies yield at once to it.

Hæmoptysis has occasionally recurred in an intermittent manner, and has been arrested by the sulphate of quinia. Both this, and the iodide of iron, as well as other tonics, may be administered, whenever the hemorrhage is of an asthenic character, and when the catenation of symptoms resembles those of scurvy.

During the whole course of active hæmoptysis, the diet should be that of any febrile affection, except that fluid should be less freely allowed. The diet ought, indeed, to be as dry as possible; and, to allay thirst, small pieces of ice may be taken into the mouth, or iced lemonade may be sucked through a rag. When the fever has abated or disappeared, more nourishing aliment may be allowed; but every thing must be taken cold. Farinaceous vegetables with milk—as arrowroot, sago, rice, &c.—should form the main diet, and every care be taken to avoid mental or corporeal agitation. All unusual exertion of voice or of body must be avoided; and the effects of vicissitudes of temperature and of consequent irregularity of circulation be obviated by flannel worn next the skin, and if this should fail, removal to a milder climate may be advisable.

b. Hemorrhage into the Lungs.

SYNON. Apoplexia Pulmonalis, A. Pulmonum, Pneumorrhagia, Pulmonary Apoplexy; Fr. Apoplexie Pulmonaire; Ger. Lungenschlagfluss.

By many, pulmonary apoplexy is reckoned as a form of hæmoptysis, and is considered under that head. There is, however, pathologically, a well marked difference; in the latter case, the blood is exhaled from the bronchial mucous surface, whilst, in the former, it is effused essentially into the pulmonary parenchyma itself. The affections are, however, so congenerous, that it may be advisable to consider hemorrhage into the lungs immediately after hemorrhage from the bronchial tubes.

Hemorrhage into the lungs is not uncommon. It has been affirmed, indeed, by M. Rostan, to be very common, but he remarks, in another place, that it is somewhat rare! In some cases, it has destroyed instantaneously by asphyxia, but generally, it is announced by a train of symptoms, which may indicate its existence.

Diagnosis.—The attack is commonly very sudden, and is marked by great dyspnœa, amounting, at times, to a threatening of suffocation. The movements of the thorax are hurried and unequal, ex-

hibiting, indeed, the greatest possible irregularity; and the accompanying anxiety is intense.

The characteristic physical signs have been considered to be:—absence of the respiratory murmur over a portion of the lung of no great extent, and a crepitant rhonchus around the part. But these signs would not appear to be constant, and, in many cases, it would seem, percussion and auscultation have afforded no information. The expectoration of a black fluid, devoid of fœtor, and resembling a solution of liquorice juice, has been esteemed a more positive sign, as indicating a collection of blood, which has undergone some change prior to its expulsion.

Where the blood is, at the same time, poured into the air cells, the quantity expectorated may be enormous. As much as ten pounds, according to Laënnec, have been lost in forty-eight hours.

Causes.—In the generality of observed cases, the hemorrhage has occurred in persons labouring under heart disease, or pulmonary consumption. One of the most rapid cases which the author has seen was that of a young gentleman who was travelling for his health, and was, at the time, affected with manifest tuberculosis of the lungs, which had gone on to softening.

Pathological characters.—Portions of the lung, usually restricted to a few inches in extent, are found of a deep red colour, having a density similar to that of the lung when hepatized by inflammation—appearances which are not modified by ablution. When these portions are divided by the knife, coagulated blood is generally found in the centre, which is, of course, entirely devoid of organization. The parts of the lung, surrounding the seat of the apoplexy, are crepitant, and separated from the apoplectic portions by a well marked line of demarcation. Careful examination often exhibits laceration in the pulmonary tissue. The hardness of the affected portions is owing to the absorption of the more liquid portions of the blood.

Treatment.—The plan of treatment, laid down by almost all, is to bleed copiously, and not to be prevented from this course by apparent debility, or feebleness of pulse. It has been properly remarked, however, by Dr. Mackintosh, that the plan of bleeding, in every case of bloody discharge from the lungs, is very objectionable; because it is bleeding for a name, without pathological considerations. The objects with which bleeding should be practised may be—to diminish the quantity of the circulating fluid; or, by inducing syncope, to arrest the flow; or to change the direction of the blood towards the artificial outlet. A more remote object may be—to favour the absorption of the blood already effused. In plethoric individuals, there can be no doubt of the propriety of this course, pushed as far as the symptoms, in the individual case, may indicate; but where the disease occurs in oligæmic individuals, the caution which was advised under Hæmoptysis, and the various revellents and other agents, recommended under the same head, are equally appropriate here.

IV. INFLAMMATION OF THE LUNGS.

SYNON. *Inflammatio pulmonum, Pneumonia, Empresma pneumonitis, Peripneumonia, Pneumonia peripneumonia, Pneumonitis, Peripneumony; Fr. Pneumonie, Peripneumonie, Fluxion de poitrine, Inflammation du parenchyme pulmonaire; Ger. Lungenentzündung, Entzündung der Lunge.*

The definition of pneumonia, given of late years, by some of the best observers, is—inflammation of the parietes of the pulmonary vesicles or air cells, or of the intervesicular cellular tissue, or of both combined. If, however, we regard the vesicles or air cells to consist of the terminal extremities of the bronchial tubes, it is difficult to separate pneumonia from bronchitis, which, as we have seen, is an inflammation of the mucous membrane of the bronchia. It is presumed, however, that the small tubes are not lined by a mucous membrane, and hence it may be supposed, that pneumonia is an inflammation of the cells and minute tubes; and a recent writer, just cited, believes, that “it differs from bronchitis in the ordinary acceptance of the term, merely in the occurrence of a parenchymatous inflammation, such as solidification, suppuration, and abscess, phenomena not proceeding from any inherent difference in the diseases, but a result of anatomical structure.” Dr. Stokes, elsewhere remarks, that, “he who would call pneumonia a bronchitis of the terminal tubes, would be hardly guilty of a misnomer.”

It has been a belief with some, that the extension of inflammation from the small bronchial ramifications to the intervening cellular tissue is very rare, and hence that pneumonia is a very uncommon result of bronchitis. The author is satisfied that it is a frequent occurrence. The two affections are often seen together, and in many cases the bronchitic symptoms have decidedly preceded those of pneumonia.

Inflammation of the lungs may admit of three divisions for convenience of description; *a. the acute; b. the chronic; and c. the typhoid.*

a. Acute Inflammation of the Lungs.

Inflammation of the lungs has received various epithets, according to the part of the lungs implicated. When the air vesicles are presumed to be affected alone, or chiefly, it has been termed *vesicular pneumonia*. When the inflammation implicates all the vesicles of a lobule, it is termed *lobular pneumonia*; and when the whole of a lobe or all the lobes of a lung are concerned, it is termed *lobar pneumonia*. *Double pneumonia* is when both lungs participate in the inflammation, as is commonly the case in children; and *pleuropneumonia* is the term applied to the disease, when the inflammation affects at the same time both the lungs and pleura.

Lobar pneumonia occurs more frequently in the inferior, than in the superior lobes. Of 88 cases referred to, by M. Andral, the inferior lobe was inflamed in 47; the superior in 30; and in 11 cases the whole lung was implicated. From the combined observations of several distinguished pathologists, it would appear, that in 1430 cases,

the right lung was concerned in 742; the left in 426; and in 262 the disease was double. It is probable, however, as has been suggested by Dr. Stokes, that the proportion of cases of double pneumonia is underrated in the estimate. It is very much more common in young children and old persons than in adults. Of 128 cases observed in infancy, according to Valleix and Vernois, the disease occurred in the right lung in 17 cases; in the left lung in no case; and the pneumonia was double in 111 cases. Of these 111 cases, the disease predominated on the right side, 59 times; on the left 10 times; and it was equal on both sides, 42 times.

Of 264 cases observed by M. Grisolle, the upper lobe appeared to be the first to suffer in 101; the inferior in 133; and the middle third of the organ in 30. Like other observers, however, he found that the tendency to disease of the upper lobe varies in different cases, and has sometimes been observed to become almost epidemic. From M. Grisolle's cases it would seem, that pneumonia of the apex is about two and a half times as frequent on the right side as on the left.

Pneumonia is often associated with bronchitis, so that the former may be masked by the latter. This is especially the case in children, in whom no information from the sputa is attainable: at the same time, the sounds afforded by percussion may be alike on both sides, as the affection is rarely confined to one lung. Previous to six years of age, the symptoms and progress of the disease differ somewhat from those of a later period; it would seem then, according to Messrs. Gerhard, of Philadelphia, Ruz, and Rilliet and Barthez, to occur mostly as a secondary lesion, and it has been conceived to be owing to a stagnation of blood in the lungs, which acts, as it were, as a foreign body, and concurs in producing an alteration in the pulmonary tissue, with which it combines, and becomes identified, so as to form what is called *hepatization of the lungs*. Although, however, in very young children, the disease is generally secondary, in other cases it attacks those in perfect health and runs its course in a brief space of time, sometimes in forty-eight hours. Howsoever this may be, it is certain, that in children, the diagnosis between pneumonia and bronchitis is not easy.

Diagnosis.—The essential symptoms of pneumonia are—febrile excitement, cough, viscid, bloody or purulent expectoration, and shortness and difficulty of breathing; yet these are not pathognomonic; and it is only by associating them with the physical signs, and carefully observing the latter, that we are enabled to pronounce positively; for although, as has been well remarked by Dr. Stokes, any of the physical signs taken singly may occur in other affections, in pneumonia their mode of succession is characteristic; still, the diagnosis is not as easy as some have imagined: this is exhibited by the fact, that the respectable pathologists, just cited, consider pungent heat of the surface as the most invariable and conclusive diagnostic, and that where inflammation is confined to the chest, howsoever various may be the tissues implicated, the presence of this symptom may be esteemed a certain indication of pneumonia in nineteen cases out of twenty.

As regards the symptoms that are referable to the lungs themselves,—one of the most important is the expectoration. At the commencement of the inflammation, the cough is dry, and by no means in a ratio with the extent of the inflammation. If some degree of bronchitis have preceded the attack of pneumonia, the sputa may be mucous; about the second or third day of the disease, however, the matter of expectoration becomes characteristic, consisting of mucus intimately mixed with blood; yet this appearance is by no means constant. The disease may, indeed, occur without any characteristic, or indeed without any expectoration; and as has been observed by Messrs Andral and Stokes, where the bloody and viscid sputa are present, their appearance may vary from yellow, or rusty, to florid red in the course of the same day. As the disease proceeds, the density of the sputa augments, and they become viscid, transparent, and so tenacious as to adhere to the sides of the vessel. In this state, they may remain until the disease is about to terminate, when they vary according to the nature of such termination. If it be about to end by resolution, they lose their red colour and great viscosity, but resume them on the occasion of any exacerbation; on the other hand, if it grow very serious, they become small in quantity, are expectorated with difficulty, and, at times, wholly suppressed. This suppression may be real, or the sputa, owing to their viscosity and the feebleness of the patient, may accumulate in the bronchial tubes, and induce death by asphyxia.

Although the rusty sputa—*crachats rouillés*, of the French pathologists—are found in the more active cases in persons of robust habit, yet in a large proportion of hospital cases, in which the disease occurs in feeble constitutions, in the child, and as a sequel to fever, the appearance of the sputa has been esteemed of little value. It is certain, that there are many cases, which run their course both to a happy and fatal termination, in which the matter of expectoration is similar to that of simple bronchitis. In *intercurrent pneumonia*, or such as occurs in the course of another disease, the absence of the characteristic expectoration, according to Andral, is noticed. When the pneumonia has terminated in suppuration, the expectoration presents itself in two forms:—either in that of pus, or of a purplish-red muco-puriform fluid, having the consistence of gum water, and the appearance of liquorice or prune juice—the latter form of expectoration, occurring generally when the pneumonia is of a lower grade, and in broken-down constitutions; whilst the former is a consequence of active pneumonia in a healthy individual.

Dyspnœa is a symptom, which is present to a greater or less degree in pneumonia, but to a less extent than in bronchitis or pleurisy: the extent of obstruction cannot certainly be estimated by the amount of difficulty of breathing. Occasionally, however, great oppression is experienced at the chest, with anxiety, lividity of face, and sense of suffocation. These cases not uncommonly terminate fatally. On the other hand, especially after antiphlogistic remedies have been used, the breathing is singularly easy, even although a large portion of the lung may be solidified.

Pain—it has been supposed—does not exist in pneumonia, unless the pleura is involved, which, however, as already remarked, is generally the case. The pain may be felt in various parts of the chest, and is most severe at the commencement. According to the numerical estimate of M. Grisolles, of 175 cases, it was seated at the nipple in 89 cases; at the base of the chest, about the 6th or 7th rib, in 39 cases, and in about one fifth of the cases, the seat of the pain corresponded precisely with that of the pulmonic inflammation. It is usually augmented by coughing, inspiration, change of posture, percussion, and by lying on the affected side.

It is maintained by some pathologists, as by M. Valleix and Dr. Gerhard, that inflammation of the pleura rarely complicates the pneumonia of children. By others, however, the complication has been found to be common, the pleura having been unaffected, in the observations of MM. Rilliet and Barthez, in ten cases only. Evidences of acute pleurisy existed in one-third of the children from two to five years of age.

When the pleura is unaffected, a feeling of constraint, a kind of weight and sensation of heat, is experienced in the chest.

It has been often said, that the patients constantly lie on the side affected, but such is certainly not the fact; the decubitus is generally indeed on the back.

Three stages of pneumonia have usually been pointed out. (*Laënnec*.) In the *first*, the lung is engorged with blood, and a crepitating rhonchus is heard; in the *second*, solidification takes place, with its physical signs; and in the *third*, interstitial suppuration of the lung, or the condition, which precedes the formation of abscess, supervenes. It has been suggested, however, that a stage prior to the first of *Laënnec*, exists, and, consequently, that *Laënnec's* first is really the second stage of the disease; and there can be no doubt, we think, that a stage of irritation, if not of inflammation, exists, previous to the secretion or effusion, which causes the crepitant rhonchus. Dr. Stokes affirms, that he has repeatedly seen a condition of the lung, which seems to be the first stage, and in which the pulmonary tissue is drier than usual, not at all engorged as in *Laënnec's* first stage, and of a bright vermilion colour, from intense arterial injection. This condition was found in the upper portions of lungs, in the middle and lower parts of which *Laënnec's* first and second stages existed. Dr. Stokes, consequently, enumerates the stages of pneumonia as follows:—*First*. The lung drier than natural, with intense arterial injection, no effusion of blood into the cells. *Second*, (*Laënnec's* first.) The cells engorged with blood; no change of structure. *Third*, (*Laënnec's* second.) Solidity and softening,—(*Ramollissement rouge*, of Andral.) *Fourth*. Interstitial suppuration. And *Fifth*. Abscess.

In the *first* of these stages, the principal phenomenon is local puerility of respiration, which, according to Dr. Stokes, may be esteemed diagnostic, if it occur along with fever and excitement of the respiratory system, especially if there be clearness of sound on percussion, indicating that no extensive organic modifications has yet

occurred. Nor does the sound on percussion become obscured, until about the second or third day, and sometimes later.

In the *second stage* of Stokes—the first of Laënnec—the crepitating rhonchus is heard along with a gradually diminishing respiratory murmur. This crepitating rhonchus has been compared to the sound produced by rubbing a lock of hair close to the ear. As a physical sign, it points out a secretion or effusion into the vesicles, but to determine that it is pneumonitic, the increasing dulness and gradual obliteration of the respiratory murmur must be combined with comparative dulness of sound on percussion.

It may be proper to remark, that in some cases the crepitant is united with the mucous rhonchus. In other cases, the crepitant rhonchus is heard, where there is simple bronchitis without any inflammation, perhaps, of the pulmonary parenchyma; and hence it has been inferred, that, like other rhonchi, the crepitant rhonchus results from a mixture of air and liquid, and that the differences, which the rhonchi present, are owing to the difference in the size of the cavities in which they are produced. In cases, for example, of extensive excavations in the lungs, *gargouillement* or gurgling is heard; in the larger bronchia, the mucous rhonchus; in the bronchia of medium size, a mixture of the mucous and crepitant rhonchi; and in the smallest bronchia and pulmonary vesicles, the pure crepitant rhonchus. These different rhonchi Andral designates respectively—the *cavernous*, the *bronchial*, and the *vesicular*.

In the third stage—the second of Laënnec—there is solidity with softening; the cells are obliterated, whilst the large tubes remain pervious: there is, therefore, dulness of sound, with bronchial or tubal respiration, a loud resonance of the voice—*bronchophony*, and an increase of the vocal fremitus,—signs which sufficiently indicate solidification.

Occasionally, rapid solidification occurs without being preceeded by the usual signs—the lung passing, in the course of a few hours, from apparent health, according to every physical sign, to solidification. Signs of sudden solidification, without preceding crepitating rhonchus, have been regarded pathognomonic of pleurisy with effusion, yet they are equally indicative of the condition just described. The principal physical diagnosis between this '*typhoid solidity*' and a pleural effusion, as remarked by Dr. Stokes, is, that with the dulness and absence of respiration of a considerable effusion, the signs of ex-centric displacement are wanting; the heart is not displaced; the epigastrium and hypochondria are concave, and the intercostal muscles unaffected.

When pneumonia is about to end by resolution, and to pass from the third stage to the second, the crepitating rhonchus returns. This has been called the *returning crepitating râle*—*Rhonchus crepitans redux*, *Râle crépitant de retour*; the tubal respiration diminishes; the bronchophony gradually disappears; the crepitating rhonchus fades away, by little and little, until, ultimately, only the normal sound of respiration can be heard. In many parts of the lungs, however, different physical signs may be elicited, indicating that

these parts are in different stages of inflammation; and, at times, after the other signs have ceased, a crepitant rhonchus may remain. This circumstance should keep the physician on his guard against a relapse, or some disorganization of the lung, which may result insidiously from the existing phlegmasia. It was the opinion of Laënnec, that as solidification of the lung disappears, the fact is invariably announced by a return of the crepitating rhonchus; but this would not appear to be an absolute rule: the change, indeed, from complete dulness of sound, and tubal respiration, to clearness and return of respiratory murmur, has been often observed by Dr. Stokes, without any *crepitus of resolution*.

The signs of the *fourth* and *fifth* stages of Stokes are the following:—If there be tubal respiration, along with a sharp and peculiar muco-purulent rhonchus, these signs, taken along with the previous history of the disease, and the existing symptoms, will lead to the inference that there is interstitial suppuration.

The signs of pneumonic abscess do not differ from those of tuberculous cavities; the former are generally, however, at the inferior portion, or about the root of the lung, and are not so slow in their formation as the latter.

If pneumonia be deeply seated towards the base, the centre, or the root of the lung, percussion may yield but little information, and the same remark applies to auscultation. In like manner, when an isolated lobule is inflamed, the physical signs may yield no information as to the existing lesion. When inflammation affects both the lungs and pleura—*pleuro-pneumonia*—the signs of pneumonia may be modified by those of solid, fluid, or aeriform secretions into the pleura: notwithstanding, however, the frequency of adhesions, the friction sound—*bruit de frottement*—is rarely observed in pneumonia. The secretion of air into the pleura is indicated by the sudden appearance of tympanitic resonance over the affected portion of the lungs, which may be distinguished from the *cracked vessel sound*—*bruit de pot fêlé*—of caverns, and, as remarked by Dr. Stokes, differs, also, from the clear sound rendered by percussing the lower portions of the lungs over the stomach distended with air. Lastly, during pneumonia, a bellows sound—*bruit de soufflet*—of the heart has been observed; and also, during the earlier stage of the disease, a throbbing over a large portion of the chest, synchronous with the systole of the heart. The bellows sound has been supposed by Messrs. Graves and Stokes to be owing to inflammation, either of the pericardium or endocardium, accompanying the pneumonia; and the throbbing has been presumed to be owing to the semi-fluid condition of the lungs, the pulsations of the heart being propagated through these organs, and occasioning phenomena analogous to those of aneurism.

The average duration of pneumonia is from twelve to twenty-four days. At times, it continues only two or three days; at others it may go on for thirty or forty. It is always a serious disease. Of seventy-eight cases, observed at La Charité between the years 1821 and 1827, twenty-eight, according to M. Louis, proved fatal. Acute

pneumonia may, likewise, pass into the chronic form, or it may give occasion to the formation or development of pulmonary tubercles.

Many varieties are observed in the disease. For example,—intense pneumonia may exist, without giving rise to dyspnœa, cough, or the characteristic sputa; and it would appear, that auscultation may afford no sign of it. In this form, the disease has been termed *latent pneumonia*. It is rarely primary, and commonly supervenes in the course of other diseases. Of the differences presented by pneumonia, when it occurs in children, we have already spoken. In them, the disease frequently terminates fatally, before it reaches the third stage; the appearances on dissection being principally those of engorgement of the lungs.

In old persons, a more rapid prostration is induced than in adults, and hence the term *Peripneumonia notha*, which has been applied to pneumonia in them, as well as to chronic bronchitis; which latter affection is indeed very apt to be complicated with pneumonia, giving occasion to intense dyspnœa.

It has been properly remarked by M. Andral, that great practical difficulty exists in diagnosing the symptoms of pneumonia, when it occurs in the course of serious fevers, pleurisies, pericarditis, arachnitis, gastro-enteritis, pulmonary tubercles, aneurism of the heart, &c.

Of the catenation of symptoms, which constitute the bilious and typhoid forms of pneumonia, special mention will be made hereafter.

Pneumonia and acute rheumatism are diseases in which the increase in the proportion of the fibrin of the blood has been the greatest. In 84 bleedings, practised by M. Andral, in the course of well-marked pneumonia, there were only 7 in which the proportion oscillated between 4 and 5 in the 1000; in the 77 others, it exceeded this; maintaining itself in eleven cases between 5 and 6; in nineteen, between 6 and 7; in fifteen, between 7 and 8; in seventeen, between 8 and 9; in nine, between 9 and 10; and in six it rose as high as 10, and even exceeded this a little.

Causes.—Pneumonia is a disease of all climates, although, like other inflammatory diseases, less frequent perhaps in Australia. It would seem to be not so common where the climate is warm and equable; and, in temperate regions, some countries are more affected by it than others. In the United States, it is a very common disease; and, according to the statistics that have been taken, it is here, also, more frequent in some places than in others. The following table, prepared by an accurate medical statistician, Dr. Emerson, of Philadelphia, exhibits this fact as regards some of the principal cities of the United States. It gives the average mortality from consumption, and acute diseases of the lungs in those places.

| | New York. | Boston. | Philada. | Baltimore. |
|---|-----------|---------|----------|------------|
| Average annual proportion of the general mortality to the population, one in | 39·36 | 44·93 | 47·86 | 39·17 |
| Average of the mortality from consumption alone, to the general mortality, one in | 5·23 | 5·54 | 6·38 | 6·21 |
| Average of consumption and acute diseases of the lungs, one in | 4·07 | 4·47 | 4·90 | 5·33 |

It would appear, that situations in cold and variable climates, in

which the hygrometric state of the atmosphere varies considerably, and which are open to cold winds from the ocean, are less fitted for those who are liable to affections of the pulmonary organs. (See the author's *Elements of Hygiène*, p. 201.) In like manner, pneumonia is more likely to occur in cold and moist seasons.

Recently, the attention of the army medical officers of the United States has been drawn to this subject; and the following table, published by Dr. Forry, presents, in a condensed shape, so far as regards the catarrhal form of pulmonary lesions, the result of the quarterly sick reports of 45 permanent posts, arranged in classes, and comprising a period of ten years, and of 31 temporary posts in Florida. It is based on an aggregate mean strength of 47,220 men, and the period of observation extended from 1829 to 1838 inclusive. It exhibits the condensation of about 1500 quarterly reports of sick, and the mean strength of each post, computed from monthly returns in the adjutant general's office.

Ratio of Catarrhal Diseases.

| Divisions. | SYSTEMS OF CLIMATE. | Latitude. | Difference between the mean temperature of winter and summer. | Ratio treated per 1000 mean strength. | | | | |
|------------|---|-----------|---|---------------------------------------|-----------------|----------------|-----------------|----------------|
| | | | | First quarter. | Second quarter. | Third quarter. | Fourth quarter. | Annual result. |
| Northern. | 1st class. Posts on the coast of New England. | 43° 18' | 38° 61 | 63 | 49 | 36 | 85 | 233 |
| | 2d class. Posts on northern chain of Lakes. | 46° 27' | 43° 00 | 90 | 62 | 50 | 96 | 300 |
| | 3d class. Posts north of lat. 39°, and remote from the ocean and inland seas. | 44° 53' | 55° 84 | 175 | 120 | 86 | 169 | 552 |
| Middle. | 1st class. From Delaware Bay to Savannah. | 37° 02' | 32° 99 | 102 | 45 | 23 | 97 | 271 |
| | 2d class. Southwestern stations. | 35° 47' | 36° 83 | 122 | 61 | 33 | 78 | 290 |
| Southern. | 1st class. Posts on lower Mississippi. | 30° 10' | 24° 39 | 92 | 34 | 26 | 60 | 218 |
| | 2d class. Posts in Peninsula of East Florida. | 24° 33' | 11° 34 | 45 | 24 | 40 | 33 | 143 |
| Total, | | | | 689 | 395 | 294 | 618 | |

In the French hospitals, three times as many cases of pneumonia have been observed in the first six months of the year as in the last, and such was nearly the proportion in the Philadelphia Hospital, during the years 1840, 1841, and 1842; 39 cases being received in the first six months, 12 in the last.

According to the report of the Registrar-General of England, for 1841, it appears that the deaths from pneumonia were to the deaths from all causes, in persons under fifteen, in the following ratio:—in the first three months of the year, 15·3 per cent.; in the second, 11·4; in the third, 8·9; and in the fourth, 18·7. This ratio, applicable to cases of pneumonia in general, appears to correspond with that observed by Dr. Charles West, of London, in children. Of 2450 cases of disease occurring at the Infirmary for Children, in 1841 and 1842, taking the mean of the two years, the ratio of cases of pneumonia in

the first three months was 5·1 per cent.; in the second three months, 2·5; in the third, 3·8; and in the fourth, 5·8.

Often pneumonia is ascribed to the influence of sudden chill whilst in a heated state; but on an accurate scrutiny of 205 cases, M. Grisolle found, that only 49 were preceded by sudden chill; and if we take the average of these observations, along with those of MM. Chomel and Barth, it would show, that of 409 observed cases, 91 only were preceded by sudden chill. This would not, however, seem to be the case every where.

It has been already remarked, that pneumonia often occurs in the course of other diseases: it would seem, indeed, that chronic inflammation in any organ has a tendency to predispose to it; so that, after a chronic disease has persisted for a long time, the patient may be carried off by an attack of acute pneumonia. In children from the age of two to sixteen there would appear to be six diseases, in the course of which pneumonia is apt to occur in very large proportion. Thus, according to M. Grisolle, secondary pneumonia occurs in $\frac{7}{8}$ of all cases of croup: in $\frac{5}{8}$ of all cases of cancrum oris: in $\frac{1}{3}$ of all cases of enteritis, measles, and whooping-cough; and in $\frac{1}{4}$ of all cases of smallpox. According to the same observer, intercurrent pneumonia was seen in $\frac{1}{7}$ of all cases of continued fever; $\frac{1}{6}$ of cases of acute affection of the brain; $\frac{1}{4}$ of cases of pulmonary tubercles; $\frac{1}{4}$ of cases of disease of the heart; and in about $\frac{1}{6}$ or $\frac{1}{7}$ of all cases of cancerous disease of the viscera; organic diseases of the liver,—especially cirrhosis, Bright's disease, &c. It is likewise a frequent complication of glanders, and phlebitis, and hence it is apt to occur in connexion with, or as a consequence of, surgical operations and injuries. From a table of forty-one deaths, following various injuries and diseases in the surgical wards of University College Hospital, London, in which an account of the state of the lungs was kept, these viscera, according to Mr. J. E. Erichsen, were found in twenty-three cases to be in the first or second stages of pneumonia. On this account, it has been suggested to defer operations during very severe weather, or during the prevalence of an epidemic pneumonia.

The great dyspnœa, which precedes dissolution in most cases, has been regarded as pneumonia, and has received the epithets *Pneumonie des agonisants*, and *Hypostatic pneumonia*, but there is little reason for the opinion, that the condition is inflammation. It appears rather to be a state of hyperæmia, dependent upon the difficult transmission of blood through the lungs.

Pneumonia occurs at all ages. It has been found even in the still-born, and is, consequently, an intra-uterine disease also. The report of the Registrar-General already referred to, shows, that of 1553 deaths from pneumonia, occurring in three large towns of England, 1348, or 86·7 per cent., were in persons under 15; of these 1348, 1093, or 81 per cent., were children under 10 years of age; and 1231, or 91·3 per cent., under three. Similar results were obtained in regard to pneumonia in childhood by Dr. Charles West.

Statistical investigation has shown, that pneumonia proves fatal in an increasing proportion after the 20th year, infancy being excepted.

Chomel found the mortality of persons before twenty, 1 in 30; but between twenty and forty, it rose to 1 in 8; and between forty and sixty to 1 in 5. Grisolle likewise found the mortality between fifty and sixty to be 1 in 5. It attacks both sexes, but men more frequently than women. This is doubtless owing to their greater exposure to its exciting causes, for, according to M. Grisolle, when field and other open air labour is shared equally by both sexes, the proportion is the same. In infancy, too, females suffer as much as males. Of 108 cases, observed by M. Hache, 50 occurred in boys; 58 in girls. Of 129 cases recorded by MM. Valleix and Vernois, 67 were boys, 62 girls. It would seem, however, that females are much less favourable subjects for pneumonia than males; the mortality of the former being, in M. Grisolle's experience, from one-third to one-half greater. At times, it appears epidemically, when its characters may be so far modified as to demand a very different treatment at one time from that which is required at another.

Pathological characters.—In accordance with the different stages, of engorgement of the lung, solidification, and interstitial absorption, laid down by Laënnec, he adopts three degrees in which the pulmonary parenchyma may be found affected on dissection. 1. *Simple engorgement*. 2. *Red hepatization*; and 3. *Gray hepatization*. The word *hepatization* has, however, been objected to, as not expressive of the changes that are induced either in the second or third stages of Laënnec. It has been observed, that an inflamed lung differs from liver in consistence especially,—being most commonly softened and friable; but, at the same time, in certain, and much more rare, cases it is harder than natural. On these accounts, Andral proposed, that the terms *red* and *gray ramollissement* should be substituted for the *red* and *gray hepatization*, of Laënnec. Andral's own observations, however, show, that the term *ramollissement*, which signifies *mollescence* or *softening*, can only apply to a portion of the cases, and, accordingly, the word *solidification* is usually given by pathologists to any condition of the lungs, in which their vesicular structure becomes filled with a secretion, that prevents the reception of air into them.

If a patient die in the early stages of pneumonia, when the lung is simply engorged, the crepitation of the lung may still exist, but it will be more feeble than in the natural state, and pressure will show, that the pulmonary vesicles contain fluid as well as air. The parts, which are affected with inflammation, are of a brown or vermilion colour, which contrast with the appearance of the healthy lung. When the affected part is cut into, a frothy and bloody fluid exudes, and if the engorged parts be well washed, their colour is restored as well as their crepitation, and they float high in water. If the inflammation be more intense than this, the consistence of the parenchyma of the lungs is diminished; it becomes friable, and breaks down readily when pressed between the fingers. In this state, it resembles the tissue of the spleen, and the condition of the lung has accordingly been termed, by some, *splenization*. When cut into, the fluid that exudes is less copious and frothy; and this condition has been esteemed the transition from engorgement to solidification.

In the second stage of Laënnec—the third of Stokes—the pulmonary vesicles become impervious to air; the lung is greatly engorged with blood, uniformly red, and resembles the liver in appearance: it is no longer crepitant, and when the solidified portion is thrown into water it sinks. A recent pathological writer, indeed, Professor Gross, of Cincinnati, affirms, that although he has frequently tried the experiment, he has never witnessed this last circumstance, and he feels inclined, therefore, to regard it rather as an exception, than as a general event. The observation of the author does not accord with his; and the difference may have originated in the circumstance, that the portions of lungs, with which Dr. Gross experimented, may not have been wholly solidified, but may have contained sufficient air to render them buoyant. It is clear, indeed, that the substance of the lungs themselves, and the fluids that give rise to the solidification, must be heavier than water, and, therefore, unless buoyed up by air, that they must inevitably sink in water.

The weight of the healthy lung is about 235 grammes, or nearly $7\frac{1}{2}$ ounces. M. Grisolle has found the organ in the state of red hepatization to weigh 2500 grammes,—considerably more than ten times the natural amount.

If the lung be cut into, a red, but not frothy, fluid exudes, less in quantity than in the preceding stages, and the pulmonary tissue appears to be composed of a multitude of red granulations of very small size, which are pressed against each other; white spots are likewise observed, which are caused by the pulmonary vessels and bronchial tubes that remain unaltered. In this stage, the pulmonary tissue is so much softened, that it can be crushed readily under the finger, and reduced into a reddish pulp; hence, the name *Ramollissement rouge*, which was given to it. The weight and size of the lung are manifestly augmented; accordingly, it presses against the ribs, which cause indentations in it; but this cannot happen, unless the increase of size is considerable.

If the inflammation of the lung have proceeded still farther, interstitial suppuration is established, constituting the *Hepatisation grise*, or *Ramollissement grise*. The colour of the affected portion of the pulmonary tissue is now grayish; and, on making an incision into it, a grayish purulent fluid exudes, which may exist in the lung either in the state of infiltration or of abscess: in the former case, the granular appearance of the lung may be very marked; and the pus may be readily pressed out, if the parenchyma has been cut or torn. The substance of the lung is, in such case, so friable, that if the finger be pressed lightly on any point, small cavities filled with pus may be made, which may be readily taken for recently formed abscesses. Occasionally, the pus may be traced into the small divisions of the pulmonary artery. The formation of pus commonly takes place from the twelfth to the fifteenth day, but cases have occurred in which it has been found as early as the fourth day. The formation of abscesses in the lungs is uncommon. On this point all observers agree. Of several hundred examinations, made of persons who had died of pneumonitis, in not more than five or six, according

to Laënnec, was the pus collected into an abscess. On the other hand, tubercular cavities are very common, and, doubtless, have often been enumerated amongst abscesses following inflammation of the pulmonary parenchyma. Dr. Graves has recently, however, expressed the opinion, that "real circumscribed abscess occurs more frequently in the pulmonary tissue than Laënnec allowed, or his followers seem to believe." He has published six cases of pulmonary abscess, which occurred in his own practice and in that of his friends, in which complete recovery took place, to show, that patients may recover contrary to the usual interpretation of the most significant and decisive stethoscopic symptoms, and, therefore, to warn practitioners from relying too exclusively upon physical phenomena, and from concluding too hastily, that pulmonary lesions, however extensive, thus indicated, must necessarily prove fatal.

Of abscesses, perforating the lung from without, and of gangrene of the lungs, mention will be made under separate heads.

In children, lobular pneumonia is very common; and instead of its being confined to a single lobule, it often extends over many, constituting what has been termed, *lobular pneumonia generalized*. As in the pneumonia of the adult, the morbid appearances may be divided into three stages. In the *first*, according to MM. Rilliet and Barthez, the cut surface of the lung is marbled with spots of a grayish rose and red colour; these spots are more or less circumscribed, and are more readily torn than the healthy tissue; but they float in water, yield liquid mixed with air, when pressed; and still crepitate. The *second* stage is the one most commonly met with, and resembles the hepatization of the adult: the *third*, or that of suppuration, requires careful examination to detect it—the substance of the lung having regained the grayish colour, which belongs to its healthy state; but, by careful attention, some lobules are observed more prominent than the rest; they are not flaccid like those around them, and, on pressure, they discharge a purulent fluid.

The appearances left by vesicular pneumonia may readily be confounded with the effects of phthisis. They have been accurately described by MM. Rilliet and Barthez. The lung is soft and flaccid, and is more or less collapsed according to the extent of the lesion. Its section presents a great number of granulations of a yellowish-gray colour, and of about the size of millet seed. These granulations differ in physical properties as well as in nature from crude miliary tubercles;—the former containing a liquid; the latter forming solid masses. If the former be divided, they collapse immediately, giving exit to a drop of puriform fluid. MM. Rilliet and Barthez propose the term *vesicular bronchitis*, which, they think, expresses the nature of the affection better than its usual name *vesicular pneumonia*. They consider the disease to be seated exclusively in the extreme bronchia—a certain number of pulmonary vesicles becoming inflamed, filled with pus, and dilated without the surrounding cellular tissue becoming implicated. It is not easy, however, to see how those minute tubes could be inflamed to suppuration without the inter-

vesicular cellular tissue being more or less concerned. This, indeed, is probably the mode in which lobular pneumonia is produced.

Treatment.—The importance of early and active treatment in pneumonia has been generally, if not universally, admitted. In such case, it can usually be controlled. It has, indeed, been esteemed the most manageable of all parenchymatous inflammations, when judicious treatment is adopted at an early period. Of the advantage of general blood-letting at an early stage, but little difference of opinion has existed. It is chiefly when the lung has passed to a state of solidification, that a question has arisen as to its advantage or appropriateness. The extent, to which the abstraction of blood should be carried, has, however, given rise to much diversity of opinion. Of late years, one observer—M. Bouillaud—has advised bleeding *coup sur coup*, and fixed the medium quantity necessary to be taken, at from 16 to 20 cups (*palettes*,) of six ounces each, in three days; and he affirms, that of one hundred and two cases, ninety were cured, and only twelve died. The results of M. Bouillaud's plan of treatment were laid before the *Académie Royale de Médecine*, of Paris, by Professor Pelletan. Seventy-five cases were treated by repeated bleedings, the amount of blood taken varying from ten to seventeen *palettes*, which was drawn in the first three or four days after the patient's reception into the hospital. In pneumonia of one lung, only two cases in fifty-five terminated fatally. In double pneumonia, eleven cases of sixteen recovered. The average duration of the disease under this system was only from nine to thirteen days; whilst in fifty cases, treated by M. Louis less actively, the average duration was fifteen days. Almost all practitioners, however, agree, that this copious and repeated abstraction of blood is generally neither necessary nor advisable. The author has not found it often requisite to bleed more than twice or thrice at the farthest; and a recent and excellent pathological writer, Dr. Stokes, has affirmed, that of many hundred cases, he has had only one in which it was necessary to bleed oftener than twice, and in this instance, there was a complication with hypertrophy of the heart. The true principle seems—in his opinion—to be, that general bleeding is to be considered only as a preparative for other treatment, and not the chief means of removing the disease.

On the other hand, it has been maintained by M. Louis, from the results of numerical observations, that the influence of bleeding, when performed even within the two first days of pneumonia, is less than has been supposed, and that, in general, its power is very limited; that its effect, however, on the progress of the disease is found to be happy, and that patients, who were bled during the first four days, recovered—other things being equal—four or five days sooner than those bled at a later period. The researches of M. Louis gave occasion to numerical investigations, as to the effect of blood-letting in pneumonia, on this side of the Atlantic. Of thirty-one cases, treated at the Massachusetts general hospital,—in three, blood-letting was practised on the first day of the disease. The average duration was $13\frac{1}{3}$ days. The number of bleedings, in each case, was four; and the average quantity of blood, abstracted in each, $61\frac{1}{3}$ ounces. In

fifteen cases, which were bled, for the first time, on the first, second or third day, the average duration was $12\frac{1}{3}$ days. The same thing was true, with a slight difference, of twenty-one cases in which bleeding was practised on or before the fourth day. In five cases, bled for the first time after the fourth day, the average period of convalescence was $13\frac{1}{3}$ days. In these 26 cases, the average duration of the disease was $12\frac{1}{2}$ days. In five cases, blood-letting was not employed, except in one, in which six leeches were applied. The mean duration of the disease was $14\frac{2}{3}$ days. So far, consequently, as these cases go, it would seem, that the effect of bleeding, on or before the fourth day of pneumonia, is to shorten its course by nearly one day, when compared with the cases in which it was not employed till after that period:—compared with those who were not bled, it was shortened a little more than $2\frac{1}{4}$ days. These results, obtained by an accurate and careful observer—Professor James Jackson, of Boston—are confirmatory of those of Louis, which led him to infer, that bleeding does not exert so powerful an effect on pneumonia as is generally believed; but they are not sufficient to induce us to discard this important remedy, or to place as little reliance upon it as has been done by some. It is doubtful, whether it ever succeed in cutting the disease short: the remarks of Louis, indeed, on this point, are very explicit. His conclusion is,—“that we cannot cut short pneumonia by blood-letting, at least during the first days of the disease; and if the contrary has been believed to occur, it is, doubtless, owing to the disease having been confounded with others; or because, in some rare cases, the general symptoms rapidly diminish after the first bleeding; still, the local phenomena, crepitation, &c. for the most part, continue to advance with no less certainty.” It must be admitted, however, from the testimony of most observers, that in strong and vigorous subjects, general bleeding is an important remedy; yet, it must be equally admitted, from the same testimony, that it ought not to be practised at all periods; and that after the stage of engorgement has passed into that of solidification, and *a fortiori*, when it has entered that of interstitial suppuration, it may be a very questionable agent. When the practitioner is called during the first stage of Stokes, or even during the second, a copious bleeding, which will exhibit its effects upon the system, or upon the morbid manifestations, but short of inducing syncope, may be sufficient. One single venesection of this kind, carried to the extent of relieving the pain in the chest, of permitting the patient to take in a deep inspiration, and of converting the small, rapid and oppressed pulse, into one that is large and full—has been found more efficacious than four, practised at a later period. Of 180 cases, according to Most, it was found necessary in two only to repeat the blood-letting on the same day, or at the next exacerbation.

It is scarcely necessary to say, that circumspection should be used in regard to blood-letting, when, along with smallness and feebleness of pulse, a state of depression or exhaustion exists; or when the disease—as previously remarked—has passed beyond the first stage of solidification. In cases where doubt exists as to the repetition of

blood-letting, the local abstraction of blood may still be very advisable. It has, indeed, been considered, on the high authority of Dr. Stokes, as the principal remedy. The application of cups with the scarificator is preferable to leeches, but if the latter be employed, cups may be applied over them; and the abstraction of blood, in this way, may be repeated as the case may require.

Where bleeding alone has not proved successful, tartrate of antimony and potassa, given in large doses, has exerted a favourable action, and appeared to diminish the mortality. It is now, indeed, usually combined with general and local bleeding, and is commonly considered secondary to them, not as a chief remedy, as it has been regarded by some. In order that the tartrate of antimony and potassa may produce its full effects on pneumonia, it is not necessary, or even desirable, that it shall induce vomiting or purging. Its contra-stimulant powers are, indeed, best exhibited, when it produces no evacuation; or, in other words, when a tolerance is established. Where blood-letting cannot be practised, either owing to individual, or epidemic, influence, this remedy is, at times, extremely beneficial; or, if the patient be exhausted by age or other causes, or appear too weak to bear the loss of blood, or obstinately refuse to submit to it. It may, likewise, be a valuable agent, and of convenient employment in the country, where the physician can seldom make closely repeated visits. The signs, which promise success, are the tolerance or absence of evacuations, observable after the second or third dose,* with diminished frequency of pulse, and a feeling of improvement.

* R.—Antim. et potass. tartr. gr. vj.

Aquæ cinnam. f3vj.

Acet. opii, gtt. xij.—M.

Dose, half an ounce, every two hours.

It would seem, that as there are medical constitutions, which do not admit of blood-letting, so there are some, so eminently phlogistic, that they interdict the use of tartarized antimony. For instance, after M. Bricheteau had employed it successfully in 1831, in the Hospital Necker, it could not be used advantageously at the end of 1832, and even at the commencement of 1833. If the dose of the tartarized antimony, as in the formula given above, be six grains the first day, the quantity may be increased by one or two grains daily, until ten, twelve, or fifteen grains are given in the twenty-four hours; but it is rarely necessary to exceed this quantity. Should the first doses produce vomiting, or purging, or both, these effects do not continue, but generally subside after the first twenty-four hours. As the disease yields, the remedy must not be suddenly discontinued. It is advisable to diminish the dose at the rate of a grain or two daily, until it is ultimately left off; but it should not be abandoned as long as the crepitant rhonchus is heard. It has been conceived by MM. Laënnec and Trousseau, that good effects have resulted from its use, even where a great part of the lung had been infiltrated with pus.

As tartarized antimony probably acts partly as a revellent, by the derivative influence which it exerts upon the lining membrane of the first passages, it will necessarily be contra-indicated where gastritis is

present. Where, however, it is inadmissible, another revellent may be had recourse to with advantage, after blood-letting has been used as freely as has been deemed advisable:—mercury, for example, employed both internally and externally. The object is to induce a new action as speedily as possible. With this view, it is well, that the intervals between the doses should be considerable, as the system sooner feels the impression under such circumstances, than when it is given at short intervals.

R.—Hydrarg. chlorid. mit. gr. iv.

Confect. ros. gr. xij.—f. massa in pil. iv. dividenda.

Dose, one pill, every six hours.

Along with these pills, blistered surfaces, if such there be, may be dressed with the strong mercurial ointment; and, as soon as evidences of the peculiar action of mercury on the system appear, the mercurials must be discontinued. It must be borne in mind, however, as has been more than once observed—that it is not easy to affect the system by mercurials, when the organic actions are greatly excited. It is necessary, therefore, to reduce these to the appropriate point first; and frequently, when mercury has been given freely, and without any sensible effects, a slight abstraction of blood will speedily develope them. The previous exhibition of tartarized antimony has been found to facilitate the mercurial action; and, moreover, both plans of treatment are by no means incompatible. Recently, the author has had under his care a severe case of typhoid pneumonia, which remained stationary for days, but ultimately yielded to a grain of calomel, given night and morning, and to a blister dressed with mercurial ointment, although none of the signs of mercurial action were induced.

Where solidification exists, after the ordinary signs of pneumonia have passed away, the cautious use of mercurials, with repeated local bleedings and revellents to the surface, afford the best prospect of success. The seton has often been employed, in such cases, with benefit, but it does not possess the advantage of counter-irritation effected in an intermittent manner, as by successive blisters. Attention, it has been maintained, ought, in all cases, to be paid to position; the patient being directed to lie on the sound side to avoid hypostatic engorgement; or, where the posterior part of the lung is engorged, to lie on the face for a certain time every day. In children, it has been esteemed important to place them in a semi-recumbent position in the arms, or to prop them up in bed. In this manner, respiration is facilitated, as the diaphragm is not pressed upon by the viscera of the abdomen, and hypostatic engorgement in the posterior portions of the lung is less likely to occur.

With regard to blisters, much difference of sentiment has existed as to whether they are advisable during the early stages, especially of acute pneumonia. Sinapisms to the inferior extremities are said to have been serviceable in some cases; but many advise, that blisters to the chest should be employed with caution,—affirming, that they are rather a torment than a relief. It is only after the febrile symptoms have been reduced, that much advantage can be expected from them. It has been affirmed, indeed, by M. Louis, that blisters

have no evident action on the progress of pneumonia; and that without any loss, they may be banished from the treatment of those cases of pleurisy and pericarditis, which occur in healthy subjects. The remark appears to be too sweeping; but there can be little doubt, that their employment is unadvisable in the acute stage of the disease; and as little, that at a subsequent period, as well as in typhoid pneumonia, they are most efficacious agents.

Weak sinapisms, and emollient and narcotic cataplasms to the chest, have been useful, especially in children. The bowels, too, must be attended to, and, occasionally, the engorgement of the lungs has been found to disappear under the revellent action of a brisk cathartic.

Throughout the whole period of the disease, mucilaginous or gummy drinks may be allowed,—as gum-water, barley-water, &c. &c.; and if the cough be troublesome, it may be alleviated by any of the expectorants advised in bronchitis. It must be recollected, however, that the cough is but a symptom, and will yield with the pathological condition, which induced it. The air of the chamber should be kept at a comfortable temperature, and especially during the night; and mental and corporeal quietude be strictly enjoined. When the inflammation has been removed, milk, with the farinaceous preparations, as arrowroot, sago, &c. may be allowed, but great circumspection must be used to avoid errors in diet, which may be of extremely injurious tendency.

b. *Chronic Inflammation of the Lungs.*

Simple chronic pneumonia, regarded as an original affection, is undoubtedly a rare disease. This is the opinion of most pathologists. Some, however, are disposed to think, that it occurs more frequently, others more rarely than is generally believed. We have stated, that simple chronic pneumonia is uncommon; but the scrofulous or tuberculous inflammation, which is chronic in its character, and accompanies the softening of tubercles—if it can be regarded as chronic pneumonia—is extremely frequent.

This form of the disease may be primarily chronic in its character; or it may be a sequel of the acute form; it may, also, occur in the course of chronic bronchitis, or—as remarked above—be a complication of tuberculosis of the lungs.

Diagnosis.—The symptoms resemble those of chronic bronchitis, except that the dyspnœa is more considerable. Percussion yields a dull sound, but if the indurations be small, the evidence it affords may not lead to any positive knowledge. By auscultation, the crepitant rhonchus is heard disseminated; and, at times, there is bronchial respiration; at others, complete absence of respiration. Both the symptoms and physical signs resemble, therefore, those of the acute form of the disease; and the general symptoms have a great similarity to those of phthisis pulmonalis—emaciation, fever, and sometimes night sweats.

Pathological characters.—The lung is commonly found to present

more or less of the red and gray indurations, with atrophy. The colour, however, varies; at times, it is pale yellow, iron gray, or even black; and different portions of the inflamed lung may present different tints, so as to exhibit a mottled appearance. It is singular, that the upper lobes of the lungs, according to Andral, are more frequently affected with chronic pneumonia than the lower, which is the opposite to what holds in acute pneumonia.

When the disease is limited to the state of red induration, it may terminate favourably; but if it should extend beyond this, the issue will be unfavourable, either owing to the disorganization occasioned by the primary affection, or to its giving rise to tubercles.

The carnification of the lung, met with in children, in which the lung bears considerable resemblance to the fœtal lung, so as to lead to the belief, that the pulmonary cells have been obliterated by disease, has been considered the result of chronic pneumonia.

Treatment.—It is essentially that of chronic inflammation;—revellents—as cupping, blistering, the tartarized antimony ointment, and mercurials,—given so as to affect the system slightly.

c. Typhoid Inflammation of the Lungs.

SYNON. Pneumonia Typhoides seu Typhodes, Putrid, Typhoid or Erysipelatous Pneumonia; Ger. Bösertige Lungenentzündung.

Under this denomination, nosologists generally include inflammation of the lungs, often more or less latent, and accompanied by great prostration, and this, perhaps, dependent either upon the low state of the constitution, the complication with other diseases, or owing to the pulmonary affection being secondary to a general morbid condition. This form of pneumonia is met with everywhere. It is said to be, at times, so frequent in Dublin, as to be almost epidemic; and it is very common in this country. A recent writer,—Dr. R. W. Gibbes of Columbia, South Carolina,—states, that it prevails there extensively during the winter months in the river swamp plantations, and that it destroys more negroes than all the diseases combined to which they are ordinarily liable. South of the Potomac, it is affirmed by Professor Potter to be seldom so inflammatory as along the shores of New Jersey, Delaware and Maryland; and the farther south, the more it is said to assume a middle typhoid complexion; but there is no regularity in its history in this respect. In all these situations, and elsewhere in the United States, unless the symptoms of prostration are very great, it bears the name of *bilious pneumonia* or *bilious pleurisy*. This term has been given, however, to different affections. The bilious pneumonia of Stoll is considered to have been pulmonary catarrh with disorder of the stomach or intestines; and, in other cases, the name has been assigned to inflammation of the lungs, presenting some symptoms of *embarras gastrique*, and accompanied by a yellowish expectoration, which has been supposed to be bile, but was really, according to M. Andral, produced by a mixture of blood and mucus. The disease, according to Dr. Gibbes, is known by various names, according to the predominance of particular symptoms.

The more violent cases being suddenly taken with a chill and cold skin, and often dying without any reaction, are sometimes termed *cold plague*: and as the head is almost always affected before the pneumonic symptoms are developed, it is sometimes called *head pleurisy*.

Typhoid pneumonia has been seen as a complication of gastro-enteritis, of true typhus, of malignant erysipelas, of diffuse cellular inflammation, of delirium tremens, of phlebitis; and, occasionally, it is apparently the sole disease. It is not uncommon in the insane, and is liable, in those, to be overlooked.

Diagnosis.—Typhoid pneumonia is often masked by the disease with which it may be complicated. Thus, the main evidences of the morbid condition may be those of common gastric or bilious fever; but if attention be paid, more or less dyspnœa and cough may generally be observed. The disease is often, however, extremely insidious in its progress, and is not suspected; the dyspnœa may suddenly become aggravated, the motions of the chest irregular, and death may take place in a very brief space of time from engorgement of the lungs. At times, the symptoms are wholly absent, but the physical signs may reveal the true nature of the case. A trifling cough, with or without expectoration, slight dyspnœa, and hurry of breathing may occur; yet the patient may not complain of his chest, although extensive and fatal mischief may be present. It has, indeed, been affirmed by Dr. Stokes, that, in this disease, the stethoscopist will over and over again detect inflammation of the lung, when there has been no preceding cough, pain, dyspnœa or expectoration.

In this form of pneumonia, extensive engorgement of the lung and solidification often take place rapidly; but, although this is the fact, the progress towards resolution is generally exceedingly slow; chronic hepatizations, with or without hectic fever, or a lurking congestion, may continue for weeks; and although, under appropriate management, the disease may be ultimately removed, atrophy of the lung, with or without ulcerative disease, is often established. In certain cases, months may elapse before the respiratory murmur is heard, and, in many instances it is never re-established. On the other hand, it has been known to cease in a single day, on the supervention of an attack of gastritis or enteritis.

Typhoid pneumonia may terminate in rapid and fatal hepatization, in gangrenous abscess, or it may induce chronic solidification or induration of the lung, which may end in the tubercular condition.

Treatment.—As the disease partakes of the characters of typhus and pneumonia, the mode of treatment must vary, according to circumstances. In all cases, however, general blood-letting will have to be used with caution. It certainly can only be practised—if practised at all—at the very commencement of the attack. In robust individuals, where the bilious or gastric symptoms are more marked than the typhoid, it may be necessary; or, if it seem to be contra-indicated, the joint depletory and revellent action of cupping may be employed with advantage. Revellents may be used here at an earlier stage, and with decidedly more advantage than in acute pneumonia. Mercury—with this view—may be given, as elsewhere

directed, until the system is brought slightly under its influence; blisters may likewise be used much earlier, and with decided benefit; the patient should be clothed in flannel next the skin, and the warmth of his extremities be supported by adventitious aid, if necessary.

In cases in which the gastric or bilious complication is considerable, and especially if there be marked signs of gastro-enteritis, leeches may be applied over the region of the stomach, and a warm bread and milk, or flaxseed, poultice over the leech-bites. Emollient or anodyne enemata may also be prescribed, and caution should be employed in the use of cathartic remedies. In the debility, that attends the lowest forms and stages of this disease, it may become necessary to support the system; but, as in all similar instances, agents, belonging to the class of tonics or of gentle excitants, are preferable to the more powerful. Wine whey, and the cold infusion of bark with acids, or any of the vegetable tonics, may be administered with good effects. The decoction of senega, with carbonate of ammonia, has, likewise, been extolled, when the patient becomes hectic, with copious expectoration.

The mild farinaceous articles of diet—as arrow-root, sago, or tapioca—may be given throughout the whole period of the disease; and, in the latter stages, wine may be added. Should the disease linger, and convalescence be tedious, change of air may be advisable.

V. GANGRENE OF THE LUNG.

SYNON. *Gangræna Pulmonum*, *Necropneumonia*; *Fr.* *Gangrène du Poumon*; *Ger.* *Lungenbrand*.

Gangrene of the lung, would seem to be rarely the result of active inflammation. This is acknowledged by the majority of observers. Of 305 cases of pneumonia, analyzed by M. Grisolle, not one ended in gangrene; and of 75 cases of pulmonary gangrene, described in the Medical Journals, not more than 5, at the most, according to the same observer, could be fairly pointed out as the sequence of pneumonia. The disease is not so unfrequent as is usually imagined. It does not often occur in private practice, but in eleemosynary institutions, into which those of broken-down constitutions are freely admitted, it is often seen. In the Philadelphia Hospital, a few cases are annually observed; in the nine months prior to August, 1838, four cases were admitted, all of which terminated fatally. It is a disease, observes Dr. Craigie, "the presence of which it is difficult to distinguish in the early stages from that of other diseases of the lungs; its determining causes are totally unknown; and it is not known that, in any genuine instance of it, the patient has made a recovery." The two following cases, which fell under the author's care, and were reported by intelligent resident physicians, Drs. Vedder and J. B. Cottman, will illustrate the affection better than any general description.

Case 1.—A woman, aged thirty-three years,—who had been a patient in the Lunatic Asylum for about one year, and whose health was good until two months before her admission into the medical ward, since which period she was affected with severe cough,—complained at her entrance, of considerable fever and dyspnoea, with

paroxysms of coughing so violent as to threaten suffocation. She was bled to six ounces, which relieved the dyspnœa, and suspended the paroxysms of coughing.

R.—Syrup. ipecac.

Tinct. opii camphor. aa f ʒss.

Mucilag. lini, f 3v.—M.

Dose, a tablespoonful, every two hours.

On the 6th of July, the expectoration and breath became fetid. On the 8th, she presented the following condition:—Emaciation evident, but moderate; lies with her head elevated; expression of anxiety; nostrils dilate during inspiration; face slightly flushed; tongue red at the centre, white at the edges; respiration 60 per minute; breath extremely fetid; cough loose, and frequent; sputa dark-coloured and of a gangrenoid odour; pulse 138, small, and quick; œdema of both feet. *Physical signs.*—Chest, *anteriorly* on the left side;—respiration cavernous under the clavicle at its internal margin; bronchial externally; inferiorly, abundant sibilant and sonorous rhonchi, with sounds of bubbles of mucus; vesicular murmur feeble; pectoriloquy in the infra-clavicular space. *Anteriorly*, right side.—Respiration cavernous, with gurgling under the clavicle; pectoriloquy marked; inferiorly, sibilant and sonorous rhonchi. Percussion, on the left side anteriorly, yielded a flat sound below the clavicle to the second rib, rather dull below; on the right side, a flat sound to the third rib, dull below. *Posteriorly*—the respiration on the left side, at the summit, bronchial, with resonance of the voice; throughout the remainder of this side feeble. On the right side, respiration cavernous, with gurgling,—on coughing, the air seeming to pass through a constricted orifice; the splashing of the fluid can be heard against the walls of the cavity. This character of respiration extends to the middle of the chest; it is rude below this. In the corresponding part, there is intense pectoriloquy. On percussion, the sound is flat in the superior half of the right side, clear below. On the left side, it is dull at the summit, and nearly natural below. (Addatur misturæ liquoris sodæ chlorin. ʒss.—Nutritious diet, with six ounces of wine to be made into whey.) On the 10th of July, there was more oppression; the strength had diminished; the skin was above the natural temperature; pulse 150, and feeble; respiration 56 in the minute, laboured, and interrupted by coughing; sputa of the same fetid character. On the morning of the 11th, at the visit of the author, she was evidently moribund; breathing extremely difficult, and abdominal; skin covered with a cold clammy sweat; extremities cold; pulse scarcely perceptible at the wrist; countenance anxious; yet her mind was active, and the amount of intellectual manifestations as usual. She died about one o'clock, P. M. Unfortunately, permission could not be obtained to examine the body.

Case 2.—The last case was one of gangrene of the lungs supervening on phthisis. The following is one of pleuropneumonia followed by the same results. A man, aged 38, had always enjoyed good health until about seven years ago; his parents were healthy, and there was no hereditary disease in the family. About the period mentioned, he

had an attack of intermittent fever, of which he recovered in about nine months, and remained healthy until the first of August, 1839, when he was attacked with cough; had no pain in the chest; became very weak in a short time, and was compelled to give up labour; had been at work for six or eight months in a tunnel; was often wet all day, and frequently, during the winter, his shirt would freeze to his back. He gradually grew worse, until the 11th of June, when he was admitted into the hospital affected with bronchitis. He remained there until the 2d of July, when he was discharged cured of his affection; there still, however, remained some cough, with slight dulness on percussion under the right clavicle, and a difference in the respiration of the two sides of the chest. He went on the farm to work, and caught cold, when he was again admitted into the hospital, and fell under the care of the author. He was emaciated; face flushed; general appearance very much attenuated since he left the hospital; respiration laboured; cough troublesome; complains of no pain; skin hot and dry; pulse 100, weak and feeble. On the chest there was an elevation as large as a goose's egg, where the fifth and sixth cartilages on the right side join the ribs, for which he could give no satisfactory reason. Percussion anteriorly, on the right side, gave a flat sound in the upper portion; a clear sound in the middle, and a dull one in the lower. Anteriorly, on the left side, the sound is flat throughout. Respiration, anteriorly on the right side, bronchial in the upper portion; vesicular in the middle; feebly vesicular in the lower. Anteriorly, on the left side, rude at the summit; feebly vesicular throughout the remainder. Posteriorly, the physical signs correspond to those anteriorly, except that the respiration at the summit of the left lung is heard more distinctly than anteriorly. Impulse of heart greater than natural. (*Four cups* were directed to be applied to the chest, with a *mucilaginous mixture* for the cough; *farinaceous diet* and *ice*.) On the 12th the fever still continued, the skin being hot and dry, and the thirst very great; respiration much oppressed. (*The cupping* was repeated.) On the 14th the respiration was easier; face flushed; skin hot and dry; pulse 120, quick and feeble. On the 18th, the emaciation had advanced; cough troublesome; expectoration very abundant, and excessively fetid, consisting mostly, however, of mucus; face pale; skin cold and moist; respiration oppressed; complains much of weakness; (*Calcis. chlorin.* gr. iv. every three hours; *dry cupping* to the chest; continue the *pectoral mixture*, and let the patient have *four ounces of wine* in the twenty-four hours.) On the 19th, he was very much emaciated. He had vomited frequently; was unable, indeed, to retain any thing on his stomach; expectoration about two pints in the twenty-four hours; breath of a gangrenous odour, and so unpleasant, that it was loathsome to examine the chest. On the 21st the patient was evidently sinking fast, and the odour, exhaled by him, was so disagreeable, that no one would go near him. He died on the morning of the 22d of August.

On opening the chest, no particular lesion was found corresponding to the prominence on the right side. The pleura costalis was adherent throughout to the pleura pulmonalis. On the left side, the adhe-

sions could not be separated, until the lung was removed from the chest. On the right side, the pleuræ were adherent about half-way up from the base of the lung; the remainder of their surfaces was bound together by bands of lymph. One-third of the upper lobe of the right lung was slightly emphysematous; a few miliary tubercles were scattered through it; the remainder was of a purple or greenish tint externally; when cut into, the tissue was softened, engorged with bloody serum, and presented numerous cavities of different sizes, some as large as a ten cent piece, filled with a purulent matter, and very fetid. Some of the cavities were lined by a distinct false membrane; others were proceeding to ulceration; many of the smaller cavities did not appear distinct, but merely distended vesicles, filled, however, with a matter similar to that contained in the larger; the middle and lower lobes exhibited the same appearance; the bronchial tubes on the right side were very much enlarged, of twice the natural size; the larger of a pale pink colour; the smaller of a deep red, terminating in a distinct *cul-de-sac*. The bronchial glands were enlarged; colour natural; consistence soft. The summit of the upper lobe of the left lung was emphysematous, the remainder healthy, except in a few spots at the lower portion, where gangrene had commenced, and the lung presented the same appearance as already described. The middle and lower lobes were in the same state as on the right side; the bronchial tubes were enlarged; their lining membrane slightly roughened, and of a rose colour. Such were the chief pathological appearances. (*American Medical Intelligencer*, August 1, 1838, and October 15, 1839.)

Gangrene of the lungs may be *diffused* or *circumscribed*, and where recovery takes place, it is of the latter class. In all the cases, that have fallen under the author's observation, the subjects were addicted to spirituous liquors. The only pathognomonic symptom, as has been correctly observed by Dr. Stokes, is the extraordinary and disgusting odour of the breath and expectoration, which is generally constant; but, in some cases, it may not be readily appreciated, unless the patient be made to cough.

The *treatment* consists in the employment of the chlorinated preparations internally, or of chlorine by inhalation; in allaying irritation by opium, and supporting the patient by wine whey and nourishing diet.

VI. ŒDEMA OF THE LUNGS.

SYNON. Hydrops Pulmonum, Hydropneumonia, Anasarca Pulmonum; *Fr.* Œdème du Poumon; *Ger.* Lungenwassersucht.

This affection is said by MM. Laënnec and Andral to be somewhat common, but it certainly is not readily diagnosticated.

Diagnosis.—It is described as occurring under three different forms.

1. The *super-acute*. In this, the patient, at the time in perfect health, or in the course of an acute disease, is suddenly seized with symptoms of suffocation, which end in death by asphyxia. This may be the result in two or three hours, or not for as many days. 2. The *acute*,

likewise characterized by considerable dyspnœa, which augments for from four to twelve days, and ends in complete prostration, during which the fatal termination occurs. 3. The *chronic*. In this form, the dyspnœa may be slight or null for months, whilst the patient is in a state of rest, but it may appear with more or less intensity during exercise, coughing and expectoration. In all these forms, percussion affords a more or less obscure sound, according to the degree of the disease. Auscultation, too, exhibits, that the vesicular murmur is much more feeble than in the natural state, and that it is accompanied by a subcrepitant rhonchus, less than that of pneumonia in the first degree, and with moister and more bulky bubbles. "It must, however, be acknowledged," says the best describer of this disease, Laënnec, "that it is sometimes difficult to distinguish these two diseases from each other, by the signs alone, that are furnished by the cylinder, and that it is requisite to associate with them the comparison of the general symptoms. When the œdema is very extensive, and very intense, the sonorousness of the chest diminishes in a sufficiently marked manner; and a slight bronchophony is manifested in such cases, especially at the root of the lung; but the long persistence of the crepitant rhonchus, and the absence of the general signs of inflammation almost always permit œdema of the lungs to be distinguished from pneumonia in the first degree, even in cases where these affections are united."

œdema of the lungs may be a primary affection, or it may develop itself in the course of different diseases—as acute bronchitis, acute pneumonia, diseases of the heart; and those of the brain, such as cerebral hemorrhage, softening of the eighth pair of nerves, or pressure upon them by serum. It is said to supervene, also, under the influence of general dropsy, and according to M. Andral, in the course of all chronic maladies, which require decubitus on the back.

Pathological characters.—The tissue of the lung, which is of a pale grayish or yellowish colour, is more dense and heavy than in its natural state; it crepitates, and if, by compression, it be freed from the liquid it contains, it preserves the impression of the finger. The lung is gorged with a colourless, transparent, frothy fluid, but the air-cells retain their natural texture.

Treatment.—As the disease is induced by such different conditions of the system, it is difficult to lay down any precise plan of treatment. The practitioner must be guided by the particular indications that present themselves.

VII. EMPHYSEMA OF THE LUNGS.

SYNON. Pulmonary Emphysema, Asthma aëreum ab Emphysemate Pulmonum, Pneumocœtasie, Dilatation of the air-cells; *Fr.* Emphysème du Poumon; *Ger.* Lungenemphysema.

Emphysema of the lungs was first described by Laënnec, but it was not much regarded until the attention of pathologists was re-directed to it by the investigations of M. Louis. Yet it is by no means an uncommon disease. The writer, last cited, describes it, indeed, as "one of the most frequent and remarkable affections to be

found in the whole catalogue of nosology." Two forms have been described; one in which the disease is confined to the vesicles or air-cells—hence called *Vesicular emphysema*; and the other in which infiltration of air has taken place into the cellular tissue, connecting and separating the lobules of the lungs;—hence termed *Interlobular emphysema*. To this last form of the disease, the term *Emphysema of the lungs*, appears more appropriate; inasmuch as in the opinion of many excellent observers, the other concerns the terminal extremities of the bronchial tubes; a recent writer, however,—M. Lombard—who divides emphysema of the lungs into three forms—the *vesicular*, *lobular*, and *lobar*, discards the interlobular, because it is external to the pulmonary tissue, and therefore not "a lesion of the organs of respiration!" The term "Emphysema" has, indeed, been regarded as altogether improper, inasmuch as it is not the principal characteristic of the disease, and although a frequent, by no means a constant, complication.

a. *Vesicular Emphysema.*

This affection consists essentially in dilatation of the air-cells: the lung, consequently, becomes increased in size, and the quantity of air within the chest, as well as the capacity of the chest itself, is augmented.

Diagnosis.—One of the best descriptions of the disease, is that by Louis, translated by Dr. Stewardson, of Philadelphia. It is unattended by fever, and of long duration, commencing frequently in early youth, and very rarely after fifty years of age. The first symptom is slight dyspnœa, which generally continues, without aggravation, for a number of years, when it dates from infancy; and afterwards becomes more and more marked, occurring in paroxysms, during which the patient appears at times to be threatened with suffocation. The dyspnœa is often preceded by cough, and is almost always accompanied, at some period or other of its course, by bronchitis, which, when aggravated, would seem to be one of the most common causes of the paroxysms of dyspnœa. The disease is, indeed, considered by some, as by Messrs Laënnec and Stokes, to be the result of bronchitis,—the mucous secretion of which cannot be readily expectorated, and therefore dilates the vesicles; but this is denied by M. Louis, because, in the cases which he has observed, the emphysema was rarely preceded by bronchitis, and the bronchial tubes, in the vicinity of the dilated vesicles, were found empty, containing neither mucus nor false membrane.

Connected with the symptoms above described is an alteration of the form of the chest, generally of limited extent, implicating both the ribs and intercostal spaces, and the common seat of which is the anterior part of the thorax, and the supra-clavicular regions. The shoulders are elevated and brought forward, and the patient stoops habitually, owing to the relief, which he has found from bending the body forwards. To such an extent does the habit of stooping alter the configuration of the chest, that the acromial, interscapular, supra-spinous and sub-spinous surfaces may become nearly horizontal.

In some cases, the heart is displaced by the dilated lung, which pushes it downwards, so that its impulses become manifest in the epigastric region.

The chief physical signs, are the greater sonorousness of the elevated portions of the chest on percussion, and the diminution of the sound of respiration on auscultation. A sibilant or subcrepitant *râle* is often mixed with the respiratory murmur; and, in some patients, at a more or less advanced stage of the disease, there is palpitation, with œdema of the lower extremities.

The dyspnœa is regarded as almost pathognomonic of emphysema, if we take into consideration its commencement at an early age; its duration; its being continuous, although paroxysmal; and unattended by, or separable from, the other symptoms of diseases of the heart. It cannot easily be mistaken for chronic bronchitis, as the latter does not give rise to paroxysms of dyspnœa, to prominence of the chest, and to constant diminution of the respiratory murmur. From dilatation of the bronchia, it is known by the respiration in the latter, instead of being weaker, being stronger, throughout a certain extent, than in the natural condition, and the voice being more resonant. From the tuberculosis of the lungs, it is known by the circumstance, that in the latter there is flatness on percussion in some part, whilst in emphysema the sound is clearer than common, and there is, in general, neither emaciation nor fever. From aneurism of the aorta, or any tumour, which might compress the trachea, or a large bronchial tube, it is distinguished by the dyspnœa, in these cases, being more severe and more constant, and generally accompanied by a whizzing sound, which does not occur in emphysema.

The physiognomy of an individual labouring under this disease has been esteemed almost characteristic; the complexion being of a dusky hue, and the countenance, although with an anxious and melancholy expression, having, in several cases, a degree of fulness, which contrasts greatly with the condition of the rest of the body. This has been supposed to result from hypertrophy of the cellular membrane, and of the respiratory muscles of the face; the first produced by repetitions of venous obstruction, and the second by the violent exertion of the whole system of respiratory muscles. The nostrils are dilated, thickened, and vascular; the lower lip is enlarged, and its mucous membrane everted and livid, so as to give a peculiar expression of anxiety, melancholy and disease to the countenance.

The following modes have been pointed out for distinguishing emphysema of the upper and lower lobes—conditions which, however, are seldom absolutely distinct.

Emphysema without displacement of the diaphragm.

1. The shoulders greatly elevated, and the upper part of the chest convex.
2. The sound on percussion of the upper portions morbidly clear; of the lower, little altered.

Emphysema with displacement of the diaphragm.

1. The shoulders not affected; the upper part of the chest flat, and the convexity only evident inferiorly.
2. The reverse.

Emphysema without displacement of the diaphragm. *Emphysema with displacement of the diaphragm.*

3. The stethoscopic signs of the diseases manifest in the upper portions.

4. The epigastrium collapsed, and the heart and liver in their natural situations.

5. The distress in breathing much less except during an exacerbation of bronchitis.

3. These signs predominating in the lower lobes, and audible below the usual level of the diaphragm.

4. The epigastrium full and resisting; the right hypochondrium dull on percussion, and the heart displaced downwards.

5. The dyspnoea much more permanent, and less affected by treatment calculated to relieve bronchitis.

The course of the disease is chronic, yet it is subject to variations. In many cases, it continues for years in a mild form, with but little change. In other cases, it has come on with some degree of violence, yet the subjects have attained advanced age. In rare cases, its progress has been more rapid.

Causes.—With regard to the causes of vesicular emphysema, it has been already remarked, that it probably is not always dependent upon bronchitis, as is believed by some; the same may be said of pneumonia, as a cause, notwithstanding it is accompanied by dilatation of the vesicles. The immediate cause of the dilatation we are unable to appreciate; nor is it explained by the assertion of M. Louis, that both in this form of dilatation, and in that of the larger bronchial tubes, "we must admit, at least in a great number of cases, a force analogous to that, which presides over the extension of hollow organs, and in virtue of which these latter enlarge, without our being able to account for it by means of any obstacle or mechanical cause." Rokitansky believes that it is commonly the result of forced inspirations, such as occur in croup, whooping-cough, &c. A recent writer, Dr. G. Budd, ascribes it to a want of elasticity in the lung, or, in other words, to absence of its natural tendency to collapse. The powerful muscles of inspiration are continually acting to dilate the chest, and thence, by virtue of atmospheric pressure, the air-cells. This agency is not counteracted as it should be by the natural elasticity of the lung, and the air-cells as well as the cavity of the chest, are, in consequence, permanently dilated.

The disease has been observed to supervene after a powerful moral emotion.

The question as to its hereditary character was closely and ably investigated by a young American physician, too soon lost to science, Dr. J. Jackson, Jr., of Boston, who was a worthy pupil of a distinguished master, M. Louis, and the following are the results at which he arrived:

1. Of twenty-eight patients, affected with pulmonary emphysema, eighteen were the offspring of parents, one of whom had been attacked with the same affection, and several of whom had died in the course of it. In some cases, the same was true of the brothers and sisters.
2. Of fifty individuals not affected with emphysema, three only were descended of parents, who laboured under the disease; whence it would follow that emphysema is frequently an hereditary affection. It would appear, too, that hereditary influence is much more marked,

where the emphysema dates from early infancy, than in those in whom it commences immediately before, or subsequent to the age of twenty. It was found, for instance, that of fourteen individuals, whose dyspnœa was traced to early youth, fourteen had asthmatic parents, whilst of fourteen attacked later in life, two only were the offspring of parents who had died of the same disease.

Pathological characters.—On opening the thorax, the lungs do not collapse, and are more bulky than in health; the vesicles are dilated, and this dilatation is always more marked at the free border than in other parts of the lung; and, along the free border, peculiar appendices are met with, which result from the laceration of the pulmonary vesicles, and the form, size, and structure of which are very variable. The dilatation, according to MM. Andral and Louis, rarely implicates the bronchial tubes.

The extent of the emphysema differs in different cases, but it seems to affect both lungs nearly alike. Of 43 cases referred to by M. Louis, it was found on the left side in 23; on the right, in 20. It would appear to affect the upper lobe more frequently than the lower. In most of the cases, the heart was larger than natural; and this circumstance has given rise to the idea, with some, that emphysema is a secondary disease in all cases; and hence, that it is important to seek out the primary lesion. It is probable, that this may be the case in many instances; and yet it is equally, if not more probable, that the emphysema itself may have reacted on the heart, and given rise to morbid conditions of that viscus. In many of the patients, observed by M. Louis, adhesions were found between the lungs and the pleura, and tubercles were, likewise, met with not unfrequently in the lungs, but there was no reason for believing, that they were in any respect concerned in the causation of the emphysema.

Treatment.—When the disease has existed from an early age, it is not probable, that any remedial agency can do more than palliate the symptoms. It has, indeed, been affirmed by Drs. Stokes and Osborne, that, under treatment calculated to remove bronchial irritation, the vesicular murmur may return, and the volume of the lung be diminished. The disease is certainly susceptible of alleviation; but, except in very recent cases, it can scarcely be cured. All mental and corporeal agitation—as well as every thing that can irritate the lungs in particular—must be carefully avoided; and if the patient experience relief in one place rather than in another, or by change of air, it may be recommended to him, where his circumstances will admit of it. The various means, that have been advised under bronchitis, for allaying bronchial irritation and cough, may be used here, and great advantage is said, by some, to have resulted from their employment. On the other hand, their use has not been found productive of much benefit in the hands of others. Opium is the therapeutical agent, which has exerted the greatest effect on the dyspnœa. Almost all those to whom M. Louis gave it were remarkably improved, and the symptoms resumed their former violence as soon as its use was suspended, unless they had been relieved for a certain length of time.

When the affection is accompanied by disease of the heart, the

treatment will have to vary according to its nature, and to the rules laid down elsewhere. Hypertrophy with dilatation of the cavities of the heart is the most frequent complication; but, as remarked by M. Louis, it must be borne in mind, that the dyspnœa, which the patient experiences, is owing, in a great measure, to the emphysema, and that it is not sensibly influenced by blood-letting, in the majority of cases certainly; and, hence, this remedy should be used with caution.

The diet and regimen must be so regulated as to keep down any acceleration of the circulation, which could not fail to augment the dyspnœa.

b. *Interlobular Emphysema.*

This variety of emphysema—as before remarked—is owing to the infiltration of air into the interlobular cellular tissue. It is said, by Professor Gross, to be an exceedingly common affection in the Western States, which is singular, if correct.

Diagnosis.—Dyspnœa is here also the main symptom, and it is proportionate to the extent of the mischief. If it be slight, neither percussion nor auscultation may throw any light upon it; but if to a greater extent, the resonance may be louder on percussion over the seat of the lesion, and the dry, crepitant rhonchus with large bubbles may be more especially manifest during inspiration. Along with these signs, a sound of friction during both inspiration and expiration has been described, but it has been properly remarked, that this point of diagnosis requires farther investigation. When healthy serous membranes rub against each other, they give rise to no friction sound; but if, owing to inflammation, they become dry, or the seat of morbid exudations and changes, such a sound may be elicited as in pericarditis, pleurisy, and peritonitis. It is, therefore, probable that, when the friction sound is heard in interlobular emphysema, it is owing rather to slight pleurisy than to the existence of the subpleural vesicles of Laënnec.

Another diagnostic sign of pulmonary emphysema—in both the vesicular and interlobular form—is the difficulty of breathing out, which has been attributed by some to obstruction of the minute bronchial tubes; by others—and more properly perhaps—to diminished elasticity of the lung itself.

Causes.—It has been affirmed, that the disease may occur spontaneously, owing to a simple exhalation of air into the interlobular cellular tissue, but this is probably not often the case. Generally, the air vesicles give way, and infiltration takes place, under some mechanical injury or violent effort. Of nineteen cases of the disease, of which a record was kept, six, according to Professor Gross, occurred in association with bilious and typhoid fever, four with dysentery, three with hooping-cough, one with acute inflammation of the lungs, four with tubercular phthisis, and one with cholera infantum. In twelve of these cases, the emphysema affected both lungs, though not to the same extent. In five, it was confined exclusively to the right lung; in two, to the left.

Pathological characters.—The cellular tissue between the lobules of the lungs is infiltrated with air, and the surface of those organs presents small vesicles or ampullæ, arranged in transparent strips or bands, which penetrate more or less deeply into the pulmonary tissue. These bubbles of air have likewise been observed frequently in the course of the vessels, which traverse the lungs, and along those that run on its surface.

Emphysema does not occur frequently at the base of the lung. When it does so, it is apt to pass to the mediastinum, and thence to the cellular tissue of other parts of the body, so as to cause general emphysema. In such cases, if the ordinary symptoms and signs of pulmonary emphysema be present, there can be no difficulty in the diagnosis. The following is a case of this kind:—It is given by Mr. Lilburn.

A child four years old, labouring under hooping-cough, was found lying in a state of coma consequent on convulsions, with emphysema above the left clavicle, which, in a few days, extended through the cellular texture of the whole body, and was so extensive over the abdomen and ribs as to raise the skin at least one inch. From the puffed appearance of the child's face, his friends could not recognise him. The main treatment consisted in keeping the child as quiet as possible, giving a solution of tartarized antimony with tincture of digitalis, in frequently repeated doses, to reduce the circulation and respiration to the lowest possible amount, and regulating the bowels daily by a gentle cathartic. The diet was restricted to a pint and a half of asses' milk *per diem*. After about a fortnight, the crepitus began to subside, and ultimately disappeared.

Treatment.—This does not differ from that of vesicular emphysema. It can rarely be necessary to treat any case so actively as the one just described. The cares, recommended under the head of vesicular emphysema, are equally demanded in the interlobular form. The disease, although tedious, is not of grave prognosis. The air in the cellular membrane is gradually absorbed, and the dyspnœa becomes greatly diminished, and more frequently wholly removed, than in the vesicular form, in which the dilatation of the vesicles remains generally, if not always, permanent. By M. Prus, however, emphysema of the lung has been regarded as a cause of sudden death; but, in the discussion which followed the reading of a *mémoire* by him before the *Académie Royale de Médecine* in Feb. 1843, great difference of opinion existed on this point.

VIII. ASTHMA.

SYNON. Asthma convulsivum, A. spasticum adutorum, A. seniorum, A. spasticum intermittens, Dyspnœa et Orthopnœa convulsiva, Brokenwindedness, Nervous asthma, Convulsive asthma; *Fr.* Asthme, A. nerveux; *Ger.* Engbrüstigkeit, krampfhafte Engbrüstigkeit, Convulsivisches Asthma, Brustkrampf.

The terms dyspnœa, asthma, and orthopnœa, were formerly employed to designate different degrees of difficulty of breathing; but their signification is now more precise;—*dyspnœa* being appropriated to difficulty of breathing in general; *asthma* to the disease now to be

described; and *orthopnœa* to that great difficulty of breathing, in which the patient is incapable of respiring, except in the erect posture.

It has not been unusual to divide asthma into two varieties; the one constituting the *essential* or *idiopathic* disease; and the other the *secondary* or *consecutive*; the former not being depending, so far as can be detected, upon disease of any other organ, whilst the latter may be clearly associated with, and is perhaps dependent upon appreciable affections of the lungs, heart, great vessels, &c. The former of these will alone engage us here. It has been a question, however, whether any essential nervous asthma exist, or whether there be not always some organic lesion. Many of the best observers have had their attention directed to this point, but they have been totally unable to discover any morbid appearances sufficient to account for the disease. Hence it is, that Andral always uses the term *nervous asthma* for the affection under consideration, and he adduces, in support of his view, arguments drawn from physiology, which have great force; the effects, for example, of compressing, tying, or dividing the pneumogastric nerves, and of disease at the encephalic origin of those nerves, or of the nerves themselves; the fact, that the attack is often brought on by nervous agitation; that the patient is in perfect health between the paroxysms, &c. &c.; but to this point of pathology reference will be made hereafter.

Diagnosis.—The paroxysms of asthma come on, at times, without any premonition, and instantaneously; at other times, there is a sensation of oppression or of fulness at the pit of the stomach—which is commonly owing to the presence of flatus in that organ—with a feeling of irritation in the air passages. These premonitory symptoms are, however, extremely uncertain. The paroxysms themselves usually commence at night, and between the hours of ten and two; they rarely occur during the day. If the patient be lying down, he immediately rises, and remains sitting up, experiencing a sense of violent constriction over the whole chest; the arms are thrown back to facilitate inspiration; the shoulders are raised, and the head is often violently straightened on the neck; the patient lays hold of any object that may afford him support; all the inspiratory muscles are in full action; the inspirations are quick, suddenly interrupted, and repeated at short intervals; the patient demands that more cool air should be admitted into the apartment, and feels as if he were about to be suffocated: the respiration is sibilant, and sometimes sonorous. Along with these symptoms, there is, usually, a small, frequent, broken and dry cough; the face is pale, sometimes livid; the eyes anxious and projecting; and the surface of the body covered with a cold and copious perspiration. The stomach is frequently more or less disordered, and vomiting is not an uncommon attendant; the condition of the pulse, as to force, frequency and fulness, varies; it is commonly, perhaps, frequent, small, and contracted.

During a paroxysm, the chest does not sound well on percussion, and the respiratory murmur is indistinct, even on the most full inspiration. But if the patient, after holding his breath a little, be re-

quested to breathe again quietly, the spasm will be overcome, "as it were by surprise,"—to use the language of Dr. C. J. B. Williams, and the entry of the air into the cells will be heard in a clear, and, at times, puerile manner. This may be done by desiring the patient to read aloud, or speak as many words as he conveniently can without taking breath, and then to breathe at his ease. But after one or two inspirations, the spasm returns, and the respiration is as dull as ever.

The usual duration of a paroxysm of nervous or spasmodic asthma is three or four hours; after this the symptoms generally become mitigated. When it has attained its height, the cough usually becomes more free, and the expectoration more easy and copious; the sputa are transparent, colourless, and viscid; and, occasionally, of a sweetish, but oftener of a salt taste; and towards the termination they are ropy and similar to a solution of gum tragacanth. At times, they have been observed as if moulded to the bronchia, but in such cases, there is doubtless inflammation of the lining membrane of the tubes, of which this plastic secretion is one of the evidences. Whilst the respiration and expectoration are becoming more free, eructations of gas generally take place from the stomach; the pulse becomes more full and free; the countenance resumes its natural expression; the urine, which was at first perhaps pale, watery, limpid and copious, becomes of a darker colour, less copious, and at times altogether suppressed, and at length the patient, exhausted, sinks to sleep. On awaking, he may find himself entirely restored, but, almost always, there is more or less pain in the region of the diaphragm, with dyspnoea, which—if the paroxysm be about to return on the following night—may continue through the whole day. Towards midnight, there may be a return of the paroxysm, and this may be the case for three or four nights, after which the individual may be restored to his accustomed health. This succession of paroxysms constitutes an attack of asthma.

Asthma is very rarely fatal. The most violent attacks, which seem to threaten instant suffocation, almost always terminate favourably. The author has never seen a fatal case during the paroxysm; but should such an event occur, we are told it will be immediately preceded by a most distressing anhelation, frothing of the mouth, livid countenance, weak, tremulous, or total failure of, pulse; great depression of general strength, and, sometimes, more or less paralysis of the upper extremities; yet, most of these symptoms are often present, and the patient recovers. The great danger consists in the repeated recurrence of the paroxysms, which may give rise to other affections, and especially of the heart and great vessels. It may happen, also, that death may occur during a paroxysm, owing to cerebral hemorrhage, or to the rupture of some important vessel or viscus; but these are collateral dangers. The recurrence of the attacks is extremely irregular. Cases are on record, in which it would seem to have observed regular periods, but this is not common.

The varieties of asthma, usually described—by the German writers especially—are numerous. Under the name *Asthma with puerile respiration*, has been understood dyspnoea, which is dependent upon an

increase of the desire to respire, the respiration being, in other respects, perfect. The respiratory murmur is found to have resumed all the intensity, which it possessed in early infancy, and yet the patient is oppressed, especially on taking the least exercise. This form of dyspnœa, is chiefly observed in the course of chronic bronchitis; and its precise nature is not readily appreciable. Nervous asthma itself has been usually divided into two forms; in the one, commonly regarded as *Nervous asthma*, properly so called, there is no expectoration after the paroxysm. It has been termed *Asthma siccum*, *Asthma spasticum siccum*. This variety is, however, of rare occurrence; in the other, the *Catarrhal asthma*, *Asthma humidum*, *A. aquosum*, *A. pituitosum*; *Fr.* Asthme humide; *Ger.* feuchtes Asthma, Schleimasthma, the paroxysm is usually followed by a copious expectoration of mucus. When accompanied by pain in the epigastrium, flatus, eructations, vomiting, &c., it has been termed by some, *Gastric asthma*, (*A. abdominale*, *A. flatulentum*, *A. ab acrimoniâ*, &c.)

Causes.—It is not easy to state in what the predisposition to asthma consists. It is generally believed, that a peculiar conformation, derived from progenitors, predisposes to it, but this probably applies rather to emphysema of the lungs, than to asthma: and many of the cases, that are recorded of asthma in young children, belong unquestionably to emphysema.

Among the causes, that give rise to the paroxysms, atmospheric variations have been enumerated. In general, a cold and dry air suits the asthmatic, but there are singular differences in this respect. With some, closing the door of a room will bring on a paroxysm; with others, darkness greatly increases the violence of the attacks. A recent writer of eminence, Dr. Graves, has given the following example in elucidation of this singular feature of the disease. In December, 1839, he attended two gentlemen residing in the same street, and each about forty-five years old. Neither was liable to any other disease, and they were both short and stout. On a very cold morning, Dr. Graves found one of them very ill. He had not slept at all during the night, and had every moment been on the point of smothering from asthmatic dyspnœa. The extreme violence of the paroxysm he attributed to the fact, that his bedroom chimney had smoked occasionally during the night, and the weather was so cold, that he was afraid to open the windows to let out the smoke. Dr. Graves ordered him to change his room, and then proceeded to visit his neighbour, and found him sitting in a room full of smoke. The patient apologized to the doctor for introducing him into so disagreeable an atmosphere, and explained, that when the fit of asthma became very bad, the only sure means for obtaining relief, which he knew of, was to get a good coal fire lighted in the grate, which being done he made his servant occasionally obstruct the progress of the smoke up the chimney, and thus maintain a certain density of smoke in the room. This never failed to afford him relief. This gentleman was of very active habits; was agent to several large properties, and, consequently, obliged to travel much about the country; experience had proved to him, that he could derive no benefit from turf smoke,

and, therefore, he never stopped at any inn, where they had no other fuel but turf, as he felt himself insecure, unless he could procure coal smoke, in case of an asthmatic attack.

Various odours—agreeable or disagreeable—smoke; dust; irritating gases; metallic and other particles floating in the air, unquestionably act as exciting causes: and to these has been added—air surcharged with electricity, as well as different lunar phases, but the author has not had the slightest reason for believing in the influence of the latter. Some asthmatics are so sensible of atmospheric changes, that, according to Broussais, they are aware of the presence of a cloud in the sky, and can predict storms from the increase of their dyspnoea. In like manner, it can be understood, that irregularities of diet, especially when food in too great quantity, or improper in quality, has been taken: the abuse of alcoholic liquors; the suppression of any accustomed discharge, and the transference of irritation thereby engendered; too great exertion of any kind, and mental emotions;—in short, undue moral or physical excitement of any kind, may induce the return of the paroxysms.

There is something extremely inexplicable in the fact, that the air of contiguous localities, and even of different parts of the same house, may affect the asthmatic very differently. As a general rule, perhaps, the air of the crowded city is more congenial, than that of rural and elevated situations. Dr. Watson refers to the case of a college acquaintance of his, who can sleep in one inn in Cambridge, and not in another; and who assured Dr. Watson, that when in Paris, he never escapes a fit of asthma if he attempt to sleep in the back part of Meurice's Hotel, and yet never suffers if he sleep in a front room. A friend of the author—one of the most respectable inhabitants of Baltimore—is unable to sleep at his country-house, which is not more than a mile and a half from the centre of the town. He has tried the experiment frequently, and the result has always been identical. The author knows another gentleman, who cannot sleep with impunity in the town: others, again, prefer a dry, whilst many breathe more freely in a moist, atmosphere; and the same thing applies to medicinal agents, that are administered in the way of inhalation. An interesting case has been related by Professor Chapman of Philadelphia, in which the air of different parts of the same house produced very different effects. Called to visit a young lady from the south of the United States, who was labouring under a violent paroxysm of the disease, Dr. Chapman was told that she had derived immunity from it during a previous and recent residence in Paris, by selecting the middle story of an hotel in a particular portion of that city; and that, whenever she quitted the apartment, a paroxysm soon came on, from which she was as speedily relieved on returning to it. Curious to make the experiment, Dr. Chapman was seconded by the patient's own desire, owing to her anxiety to change her lodgings, where she had suffered severely, and in a very short time she went to another house in the vicinity, in which she entirely escaped the disease for several months. Being compelled, however, to leave it, she took up her residence at the distance of a few hundred yards, in a street no less thickly built;

and here she had scarcely any exemption for weeks. On moving to a different quarter of the city, Dr. Chapman witnessed a complete verification of the statement she had made. As long as she occupied the chamber on the second floor, she was harassed almost nightly by renewals of attacks, which were prevented by sleeping in the room above. Even by dining below, her respiration was, on several occasions, seriously affected.

Pathological characters.—It has been already remarked, that the researches of the most eminent pathologists have failed in detecting any morbid appearances, that throw light on the essence of asthma; and that all the phenomena indicate it to be a neurosis of the chest. The spasmodic nature of the disease is now admitted by almost all; the spasm being seated—as it always is—in the nerves, that are distributed to muscular fibres,—in this case, in those surrounding the small bronchial ramifications: that such fibres exist, has been demonstrated by the observation of distinguished anatomists, and even had they not, the phenomena of asthma would have been sufficient proof thereof. It has been supposed, that the bronchial spasm is consecutive on irritation or inflammation of the pulmonary mucous membrane, but this can scarcely be the case in those asthmatics who are affected by slight changes of air, in the manner already described. Others, again, in the apparent obscurity of the subject, have supposed either that the disease is owing to a spasmodic condition of the heart, which prevents the blood from being distributed to the lungs, or that it is always a symptomatic affection of some lesion of the heart or great vessels, whilst others, again, are of opinion that the cause of the phenomena ought to be sought for in the brain and spinal marrow, and not in the heart or lungs. There can be no doubt, that amongst the organic conditions connected with asthma, may be reckoned diseases of the heart; and hence there may be foundation for a *cardiac asthma*. Dr. Billing, expresses his total disbelief in the existence of spasmodic asthma as a disease of the muscular structure of the bronchia; and states that he has never seen a case which, sooner or later, could not be traced to organic disease of some viscus, as the heart, liver, spinal cord, or lungs, such as emphysema, Laënnec's chronic dry catarrh, &c.

All the phenomena of asthma establish, that the disease is dependent upon some special condition of the nerves, which are distributed to the bronchial mucous membrane, and that through them the different nerves connected with the respiratory function become implicated. The attacks generally perhaps result from some internal irritation, either in the lungs, the heart, or the digestive system, producing a reflex action upon the muscular fibres of the bronchial tubes. Under the spasm of the muscular fibres of the bronchia, thus induced, the functions of the membrane itself become disturbed; and, after repeated paroxysms, modifications in the texture of the membrane may be perceptible. The good effects of the narcotic or anti-spasmodic treatment of asthma, are strongly in favour of its neuropathic character. Moreover, according to Dr. Watson, Dr. Williams has demonstrated experimentally, that the lungs and air tubes are actually

contractile to a very considerable degree under electrical, chemical, and mechanical stimuli. The contractions take place steadily and deliberately, and are followed, as soon as the stimulus is withdrawn, by an equally gradual relaxation. M. Valentin, too, found that the rings of the trachea could be made to contract visibly and distinctly, by irritating the pneumogastric nerves.

Treatment.—The treatment of asthma—as of every other paroxysmal disease—resolves itself into that which is proper during the paroxysm, and that which is advisable afterwards.

a. *During the paroxysm.*—The patient should be propped up in bed, and every ligature or article of clothing, that could interfere with the circulation, be removed. Air, too, should be freely admitted into the chamber. The great difficulty of breathing, and the apparent urgency of the symptoms, would naturally suggest the use of blood-letting; and when the patient is vigorous and plethoric, it may be practised with advantage. It can only be advised, however, as an antispasmodic. There is no inflammation, it must be recollected, to be subdued; and, therefore, should the practitioner determine upon employing it, he will not consider it advisable to repeat it, but will rather have recourse to other agents, which are found to be effectual, as far as any remedies are so, in removing the paroxysm. Therapeutical agents, which act by inducing a new impression on the nervous system, or by allaying nervous erethism, are those which prove most beneficial. To the first class belong emetics, which have been advised by most therapeutists. As the object is revulsion, those emetics are preferable, which induce nausea, followed by full vomiting; and there is no one more advisable than the tartarized antimony,^a singly, or in combination with ipecacuanha.^b

^a R.—Antim. et potass. tart. gr. iv.
Aquæ, f ʒiij.—M.

^b R.—Antim. et potass. tart. gr. ij.
Ipecac. pulv. gr. xv.—M.

Dose, one half, to be repeated in twenty minutes, should the other not operate.

The various articles belonging to the class of emetics, have been advised, but none of them possess virtues beyond those of the articles first mentioned. The sulphate of zinc was largely prescribed by Prof. Kuhn, of Philadelphia, who believed it to be possessed of superior “antispasmodic” properties in this, as well as every other affection, of the air passages, of a spasmodic nature; but his view has not been embraced by others. It is obviously, indeed, less adapted for such cases, in consequence of its revellent action being less energetic, by reason of its action as a direct emetic, or one that does not induce much preceding nausea.

The revulsion, effected by stimulating manuluvia and pediluvia, or by sinapisms applied to the wrists, lower extremities, and to the anterior or posterior part of the thorax, has, likewise, yielded relief. A recent writer, M. Ducros, of Marseilles, in a paper laid before the Académie Royale des Sciences, of Paris, states that in nine cases he had found the application of ammonia at 25° (s. g. 905), over that part of the cervical vertebræ, which corresponds to the pharyngeal plexus, to almost instantly arrest the paroxysm; and Dr. Graves has

found the application of a liniment which is an imitation of that of St. John Long of much service.

R.—Acid. acet. fort. f ʒss.

Ol. Terebinth. f ʒiij.

Aquæ rosæ, f ʒiss.

Ol. limon. ℥x.

Vitell. ovi. q. s. ut fiat mistura.

To be applied by means of a sponge to the nape and sides of the neck, and the forepart of the chest.

It generally induces an eruption of small pimples after a few applications. Benefit has likewise resulted from dry cups applied over the chest; and, as the modification in the circulation, produced by a ligature round the lower limbs, and the new condition thereby engendered, has prevented an attack of epilepsy, the same course has been advised in asthma: cold affusions and aspersions have been used with a similar view by some, and are said to have been of benefit.

Galvanism is a remedy, which has been much extolled, and whose operation must be esteemed essentially revellent. Resting on his views of the absolute identity between the nervous and the galvanic fluids, Dr. Wilson Philip employed galvanism in asthma. In a communication, read by him before the Royal Society of London, in January, 1816, he details some experiments which he made on rabbits. The eighth pair or pneumogastric nerves were divided by incisions made in the neck. After the operation, the parsley, which the animals had eaten, remained unchanged in their stomachs, and, after evincing much difficulty of breathing, they seemed to die of suffocation. But when on other animals, whose nerves had been divided, the galvanic agency was transmitted along the nerve, below its section, to a disc of silver, placed closely in contact with the skin of the animal, opposite its stomach, no difficulty of breathing occurred. The galvanic action being kept up for twenty-six hours, the rabbits were then killed, and the parsley was found digested. The removal of dyspnœa, in these cases, led Dr. Philip to employ galvanism as a remedy for asthma; and by transmitting its influence from the nape of the neck to the pit of the stomach, he gave decided relief in every one of twenty-two cases, of which four were in private practice, and eighteen in the Worcester Infirmary. The power employed varied from ten to twenty-five pairs of plates. Since that time, galvanism has been repeatedly used in such cases, but commonly Mansford's plates are employed for this purpose. (See the author's *New Remedies*, 4th edit. p. 326, Philad. 1843.) The disease is unquestionably, in the majority of instances, dependent upon erethism of the pneumogastric nerves: all the phenomena exhibit that there is a spastic constriction of the small bronchial tubes, from causes seated at the extremities, or in the course of the nerves. The new impression, made by the galvanic agency, breaks in upon the concentration of nervous action, by exciting other portions of the nervous system, in the same manner as we observe spasms or ordinary cramps relieved, or paroxysmal diseases warded off by agents that are capable of suddenly impressing some part of the nervous system.

The magnet has been used in similar cases. It was employed in

the manner recommended by Hallé;—that is, by establishing a magnetic current through the diseased parts, by means of several magnetised plates; and Laënnec affirms, that he frequently found it diminish the oppression.

Of the substances that act by allaying nervous erethism, narcotics hold the first rank; and of these, opiates would naturally first suggest themselves to relieve the paroxysm. Yet there has been much difference of opinion in regard to them;—some extolling them highly, whilst others have recommended caution in their employment, and others again have thought them decidedly prejudicial. The truth is, that the efforts of the practitioner are not attended with very marked success during a paroxysm of asthma; but still, much may be done to relieve; and, in this respect, the author has found opiates to hold an elevated rank, when given in full doses, and especially in combination with an agent, which, in appropriate doses, is a nauseant, and, therefore, a relaxant. The *pulvis ipecacuanhæ et opii* is hence an excellent form; or the opiate may be administered along with a diffusible stimulant, and be repeated, unless its effects are perceptible.

R.—Tinct. opii, f3j.

Ætheris sulphuric. f3ij.—M.

Dose, sixty drops, every half hour, until relief is obtained.

Belladonna, hyoscyamus, stramonium, conium, and other narcotics, have been substituted for opium; but, as in every other spasmodic disease, none of them can be so much relied upon. The hydrocyanic acid, even when the pulse was small, irregular, and often not readily distinguishable, is said to have acted in asthma almost like a charm, removing the oppressed breathing, and restoring the free play of the respiratory organs; but such has not been the result of the author's trials with it. It is certainly less efficacious than narcotics.

Both nux vomica and its active principle, strychnia, have been administered in asthma, and, like other excitants of the nervous system, they may have rendered service, but they are not to be depended upon. The same may be said of the reputed antispasmodics—asafoetida, castor, musk, valerian, &c.,—which are mainly dependent for their virtues on the essential oil they contain, and therefore on the impression which they make on the gustatory nerves, as well as on those of the stomach. Next to narcotics, they are the remedies most frequently employed during a paroxysm, either alone, combined together, or associated with opium.

R.—Mist. assafœtid. f3v.

Tinct. opii camphorat. f3ss.

Sp. ætheris sulphuric. comp. f3iij.—M.

Dose, a tablespoonful, every half hour.

Towards the end of the paroxysm, it has been advised to administer some of the reputed expectorants—as gum ammoniac, myrrh, polygala senega, &c. Of the reality of any such class of medicinal agents, great doubts may be entertained; but there can be no question, that the demulcent agency of any of the ordinary syrups, combined with the slightly excitant properties, which some of them—as

the *syrupus* or *oxymel scillæ*, or the *syrupus senegæ*—possess, may be employed beneficially. No great reliance, however, can be placed on them. The efforts of the practitioner must be directed to the removal of the morbid condition, and as that yields the secretion from the bronchial mucous membrane will be restored.

There is a mode of administering narcotic, and other substances, so as to cause them to come in contact with the seat of the disease, and to afford marked relief in many cases—that is, by *inhalation*. In this way, aqueous vapours, impregnated with narcotic or gently excitant substances, have been received into the air passages. The leaves of belladonna, hyoscyamus, stramonium, &c., have been boiled in water, and the vapour inhaled into the lungs; but the probability is, that the effects did not differ from those of the vapour of simple water, as the narcotic properties of the plants are not volatile.

Chlorine, iodine, iodide of sulphur, tar, and various excipients, have likewise been inhaled in the form of vapour, but there can be few cases in which their employment could be suggested, and more especially as experience has shown, that more striking benefits result from certain of the narcotics employed in the way of fumigation. The most important of these is stramonium, which was at one time esteemed almost, if not wholly, a specific. It is not entitled to any such reputation, yet it affords eminent relief in many cases. The smoke of tobacco relieves some asthmatics, and aggravates the symptoms of others; but that of stramonium agrees with a large majority of persons, and occasionally affords marked relief. A friend, who suffers excessively under the disease, frequently makes manifest to his medical attendant the relief he derives from its inhalation. For this purpose, he employs the dried stalk. Others use the root; and others, again, the leaves only. A veteran asthmatic, in a letter to a distinguished physician, Dr. Forbes, thus expresses the results of his own experience:—"Smoking, I am able to say, after fifteen years' practice, and suffering as much as mortal can suffer and not die, is the best remedy for asthma, if it can be relieved by expectoration. I have been in the hands of all the doctors of ——— for fifteen years, and still I say, SMOKE."

Recently, it has been proposed to immerse paper in a saturated solution of nitrate of potassa, and to dry it. A portion of this is set fire to, and allowed to burn in the vicinity of the patient. The author has frequently observed good effects from this inhalation, both in asthma, and chronic bronchitis.

At the period when the inhalation of *factitious airs* was supposed to hold out a probable plan of cure for many serious diseases, oxygen was highly extolled in asthma, but no one thinks, at the present day, of employing it, and the same may be said of the proposition to force air into the lungs of the asthmatic through a common bellows. Upon the principle of revulsion, it might be advantageous; but we cannot see how it could act upon any other.

Such are the chief therapeutical agencies to be employed during an attack of asthma.

b. *Between the paroxysms.*—In the intervals between the fits, care

is demanded to prevent their recurrence. The therapeutical agents, that are advisable, will depend upon the accompanying symptoms. As a general rule, the remedies needed during the paroxysms will be indicated, under various modifications, in the intervals. Attention must be paid to the due maintenance of the functions of the skin, the kidneys, and the alimentary canal; to restore, where practicable, any cutaneous or other irritation, or any accustomed evacuation, provided such have been unduly or suddenly arrested; and where the attacks observe any thing like a regular intermission, to employ the various antiperiodics recommended in intermittents, especially the sulphate of quinia, and arsenic. The main reliance, however, must be placed in hygienic precautions. The patient should breathe the air, which experience has shown to be most congenial to him. Long journeys have often removed the disease; and sea voyages have been especially recommended. So beneficial is the result of travelling air and exercise, that even the exposure and hardships of military life have proved beneficial. During the late war, when the volunteers of Philadelphia were called out, and encamped for several months—part of the time in winter,—individuals, according to Professor Chapman, who had been previously harassed dreadfully by the disease, escaped entirely, whilst thus employed, and have since been nearly exempt from it. The diet should be properly regulated, so that excess in eating and drinking is avoided; regular and moderate exercise must be taken daily; vicissitudes of temperature be guarded against by appropriate clothing, and flannel be always worn next the skin. Frictions with the flesh-brush should be frequently employed, with cold, tepid or warm bathing, where it is not contra-indicated. Frictions with various substances, as cold vinegar and water; liquor ammoniæ acetatis, &c., have been recommended by Dr. Copland, and others, but it is not easily seen on what principle. No advantage can assuredly be induced by these agents beyond what simple friction is capable of affording. No less attention should be paid to preserve perfect tranquillity of mind. By a strict observance of these rules, the paroxysms of asthma may be warded off, and comparative comfort be enjoyed, even when the predisponent cause is powerful.

IX. MORBID PRODUCTIONS OF THE LUNGS.

The morbid productions met with in the lungs may be, as elsewhere, either *analogous*,—that is, similar to those met with in the healthy condition of the body,—or *heterologous*,—having no analogy in the economy. Notwithstanding the advanced state of diagnosis in modern times, it is not easy,—indeed, often not practicable,—to distinguish them from each other.

When morbid productions are of trifling size, they may give rise to no sign that can reveal their existence; and when more developed, although their presence may be detected, it is frequently impossible to discriminate as to the precise mode of production. For example, tubercles in the lungs, when disseminated, may give rise to no local phenomena; but if agglomerated, the signs, afforded by percussion and auscultation, may sufficiently diagnosticate their presence. The

same remark is applicable to other morbid formations, yet it may be extremely difficult to detect the precise morbid production which gives rise to the phenomena.

a. *Cancer of the Lung.*

SYNON. Cancerous phthisis, (*Bayle*,) Medullary or Encephaloid Tumour of the Lung; *Fr.* Cancer du Poumon; *Ger.* Lungenkrebs.

This disease is by no means common, yet it is occasionally met with; and, difficult as the task is, has been diagnosticated during life.

Diagnosis.—If the patient present signs of chronic disease of the lungs, with the general evidences of the cancerous diathesis, and especially if there be concomitant cancer of some other portion of the body, there may be but little doubt of the existence of cancer of the lung. It may be divided, with Dr. Stokes, into cases in which simple degeneration occurs without change of volume, and into those in which tumours exist, that cause compression and displacement. In the first class, the physical diagnosis is difficult; in the second, the signs may be those only of some internal tumour. It has been properly remarked, however, that as intra-thoracic tumours are in general either aneurismal or cancerous, the diagnosis will be between these forms of disease. There are no physical signs peculiar to this affection, but the evidences of gradual diminution, and ultimate subsidence of vesicular murmur, with the tracheal respiration, resonance of the voice, and complete dulness on percussion, without the precursory signs of pneumonia, pleurisy, or tubercle, will justify a suspicion of the existence of the cancerous degeneration without change of volume. On the other hand, where cancerous tumours exist, that cause compression and displacement, there may be, as in aneurism, localized dulness, double pulsation, with bellows' sound, difference of the radial pulses, tracheal breathing, dysphagia, palpitation and pain in the shoulder; but the feebleness of pulsation, connected with the extent of dulness, may assist in distinguishing the disease from aneurism.

Such are the main diagnostic evidences laid down by one, who has paid much attention to the subject. The author has not met with any case, and, therefore, cannot speak from experience. Dr. Stokes adds, that though the existence of external cancer may often aid in diagnosis, yet the disease may be altogether internal; or the visceral may precede the external cancer. Andral affirms, that he has never found cancer of the lung without its existing elsewhere at the same time.

When the cancer has attained the stage of softening, it gives occasion to hectic fever and emaciation; and the straw—and, at times, livid—colour is an index, so far as it goes, of the nature of the affection. Lancinating pains in the chest have been enumerated amongst the signs of the disease; but, according to some, although such pains are regular concomitants of cancerous affections of certain parts, they have never been observed in cancer of the lung. In one case, mentioned by Bayle, a pain was experienced, similar to that induced by compressing the testicle.

Causes.—They are those of cancer in general. The lesion is gra-

dually formed, and often without any evidences of bronchitis or pneumonia; and, frequently, the lung remains entirely healthy around the cancerous masses. The first symptoms appear, at times, after the removal of a cancerous tumour. Time of life seems, as in cancer of other parts, to exert an influence. It has been generally observed between the ages of 25 and 70. Of nine cases, in which the ages were noted, it was found, according to M. Andral, to have occurred at the following ages:—25, 35, 37, 48, 49, 55, 57, 58, and 72.

Pathological characters.—Two forms of cancer are found on dissection. In the *first*, one or more cancerous masses, of different size and shape, and enveloped or not in a cyst, are found in the substance of the lungs. These masses can be readily removed, when the pulmonary parenchyma surrounding them may be found unaffected. They are generally encephaloid in their character. In the *second*, a portion of the lung is transformed into a scirrhus production. This may implicate one lobe of the lung only, or a whole lung.

Treatment.—It is obvious, that if the disease be diagnosticated, no treatment can eradicate it. The efforts of the practitioner must be limited to palliation.

b. *Melanosis of the Lung.*

SYNON. Nigritudo seu Carcinoma melanoticum seu Melansis pulmonum; Fr. Mélanose pulmonaire.

This black matter, which is not unfrequently met with in the lungs at an advanced period of life, either in the interlobular tissue, or in the parietes of the vesicles, has received more attention from the morbid anatomist than from the therapist; or, to employ the language of M. Rostan, its anatomical characters have attracted the attention of pathologists much more than its functional expression.

Diagnosis.—There are no symptoms that can diagnosticate this from other morbid conditions of the lung, of a chronic character. They are affirmed, indeed, on good authority,—that of M. Andral,—to be identical with those of chronic pneumonia; and a form of phthisis has been described, and termed *melanic* by Bayle.

Causes.—They are very obscure. It has been said, that it may be produced by breathing the vapour of oil and coal in combustion, constituting, when it implicates the whole lung, what has been called the *black lung of coal miners*, and, recently, *anthracosis*. Melanosis of the lung is observed, however, in all conditions and in every way of life, and in the country as well as in the city. It is often seen in the lungs of horses,—and in white horses, it is affirmed by M. Dupuy, oftener than in others.

Pathological characters.—Melanosis of the lung cannot be mistaken. At an early period, it is liquid, and may infiltrate the parenchyma of the lung, which may be healthy, or indurated. The melanotic formation may be isolated or encysted; and it generally exists, at the same time, in other organs,—as the liver, the spleen, the brain, &c. It is commonly found in irregular masses, in small nodules, in thin, irregular plates, or in minute points. The tuberiform variety,—

Melanomyces [?], *Melanospongus*—occurs in globular, oval, or pyriform tumours, from the size of a currant to that of an egg or even a large apple. The surface of the tumours is either smooth, irregular, lobulated or studded with small tubercles, like a mulberry. Of this variety, two or three examples only have been seen by Dr. Gross. The author has met with several of the amorphous kind. A case is related by M. Andral, of a man, fifty-nine years of age, in whom the left lung was wholly converted into a black, homogeneous substance, of such density, that the scalpel could scarcely penetrate it. The whole appeared like a mass of extravasated black injection after it has cooled.

Some writers have divided the different kinds of true melanosis—*melanosis vera*—into four classes;—*Melanosis punctiformis*, *M. tuberculiformis*, *M. stratiformis*, and *M. liquiformis*, but all divisions, founded on form only, are of course arbitrary.

Melanosis—M. Andral affirms—may be confounded with the bronchial glands or ganglions. The latter are, however, small and close to the bronchia; their outer surface is very smooth, and their interior rarely presents a very uniform black colour. The fluid which oozes out from them, scarcely colours the finger, whilst melanosis always gives the skin the tint of Indian ink.

Treatment.—As we have no means of diagnosing this affection, it is of course impracticable to lay down any precise rules of treatment.

c. *Serous Cysts and Hydatids in the Lung.*

SYNON. *Fr.* Kystes séreux, et Hydatides du Poumon.

A question may occasionally arise as to whether the cystiform productions found at times, although rarely, in the lungs, are of the acephalocystic kind, or mere serous cysts. The author has elsewhere, indeed, stated, that the evidences of the animalcular nature of the former—wherever met with—are by no means overwhelming; and that, on the other hand, there is great reason for believing in their being nothing more than cysts containing a limpid fluid.

Diagnosis.—If the cysts or hydatids be in small number, and occupy a limited space, or if they be accompanied by acute pneumonia, or any other pulmonary disease, the symptoms may be very obscure. The only pathognomonic evidence of the presence of acephalocysts in the lungs is their appearance in the expectoration; yet, in such cases, it is not easy to believe, that they were formed in the pulmonary parenchyma. It has been affirmed, indeed, that hydatids, originating in the liver, have been discharged by the lungs, and been tinged with bile.

The physical signs are like those of other morbid growths. If the cysts be few in number, the sounds afforded by percussion and auscultation may be those of health; if more numerous, and therefore occupying a larger surface of the lung, the sounds may indicate some extraneous deposition, but they can afford no information as to its precise character. In one case, in which a dull sound was rendered

on percussing the inferior part of the chest, a large pouch, according to M. Andral, was found in each inferior lobe of the lung, which was filled with hydatids.

Pathological characters.—The seat of hydatids is generally in the parenchyma of one or both lungs. They have, however, been found in the pulmonary blood-vessels, as well as in pouches communicating with the bronchia, or with the cavity of the pleura. Their size varies. Generally, they are small, but, at times, as large as the fist, and occupying a whole lobe. They have been attributed to inflammation, but, as M. Andral has properly remarked, this is altogether hypothetical, and explains nothing. Their cause is, indeed, wholly unknown. They have been supposed, by Dr. Baron, to be the source of all tubercular affections of the lungs, but this is liable to the same observations as the last hypothesis. Certain it is, that they are very rarely met with in the human subject. Of nearly 6000 patients, admitted into the wards of M. Lerminier in six years, hydatids were seen in the lungs only five times. In one of these instances, they were found in the pulmonary veins; but in all the others they were developed in the pulmonary parenchyma.

Treatment.—As we have rarely any pathognomonic evidence of the presence of serous cysts or hydatids in the lungs, we can seldom be called upon to treat the affection; were we, indeed, aware of their presence, it would not be easy to offer any thing satisfactory. In one case, the expectoration of the hydatids appeared to be promoted by the inhalation of the vapour of ether.

The practitioner will have to inquire into the condition of the general and local symptoms, and to lay down his indications accordingly.

d. *Calcareous Concretions in the Lung.*

SYNON. *Fr.* Calculs Pulmonaires; *Ger.* Steine in den Lungen.

These are by no means uncommon. Every pathologist must have frequently met with them, and often on the dissection of those who have died of other diseases. A recent writer, M. C. Rogée, affirms, that in the lungs of 100 old women, whom he examined, he found cretaceous or calcareous tubercles in 51. The author has frequently seen the lungs studded with them, yet there may not have been any signs, that indicated their presence during life, at least immediately preceding dissolution. Perhaps, in all cases, they are degenerated tubercles, and certainly a degeneration the very opposite to that of softening. When analyzed, they have been found, according to Dr. Marshall Hall, to consist of 3 parts of animal, 97 parts of saline, matter; the saline matter consisting almost entirely of phosphate of lime, with some carbonate of lime, and carbonate of magnesia. They are of different degrees of consistence, sometimes hard, at others soft, like particles of plaster softened in water. Their colour, size and number likewise vary. When accompanied by the ordinary signs of pulmonary consumption, they constitute the *calculous phthisis* of Bayle.

These concretions are almost always found at the top of the lung. Of fifty-one cases, noted by M. C. Rogée, in thirty-nine they were

either at the apex exclusively—or in much greater number than in the rest of the organ; in six, they were equally distributed over the whole lung; and in six, they were found in several parts, without any being at the top. Twenty-four times, they were found in both lungs simultaneously; seventeen times in the right lung, and ten times in the left.

Diagnosis.—The only certain evidence of the existence of pulmonary calculi, in any case, is their presence in the expectorated matters; yet, it has been properly remarked, that this circumstance is not sufficient to discriminate, whether they proceed from the lungs, the bronchia, or the bronchial ganglions.

Treatment.—The remarks made on the treatment of serous cysts and hydatids are equally applicable here. We have no pathognomonic signs of their presence in the lungs, and if we had, it is not easy to lay down any plan of management that would lead to their removal.

e. *Tubercles in the Lung.*

SYNON. Tubercula Pulmonum; Fr. Tubercules Pulmonaires; Ger. Lungentuberkeln.

The presence of tubercles in the lungs gives rise to pulmonary consumption; yet tubercles of the lung and pulmonary consumption cannot be regarded as synonymous, inasmuch as tubercles may unquestionably exist there, and remain quiescent, so that no symptoms of pulmonary consumption may present themselves. Still, these latter cases must be regarded as exceptions, and therefore it may be convenient, with the generality of writers, to inquire, under this head, into the phenomena of pulmonary consumption.

The word phthisis, (from φθίω, "I dry up," "I fade,") like consumption, means emaciation and decline from any cause. Hence, in the older writers, and, indeed, in the more modern, we meet with *laryngeal, pulmonary, gastric, hepatic, intestinal, splenic* and *renal* phthisis, to designate, respectively, the marasmus, which is produced by disease of the larynx, stomach, liver, spleen and kidney. In more modern periods, the term *phthisis* has been applied to diseases of the lungs only, and by one writer on this subject, Bayle, as many species of phthisis were laid down, as there were organic lesions, which, in his opinion, could, by their developement, lead to wasting and death. Hence, he had the *tubercular*, the *granular*, the *cancerous*, the *melanotic* or *melanic*, the *calculous*, and the *ulcerous*. Since the period, however, of the distinguished introducer of stethoscopy, Laënnec, pathologists have generally admitted but one species of phthisis, the *tubercular*, and have considered that the existence of tubercles of the lungs constitutes the proper character of phthisis. Perhaps it may be well to include under the term all those forms of disease of the lungs, which arise from the formation of tuberculous matter, or of depositions and indurations, which are allied to it, in the substance of the lung.

To give a correct view of this important morbid condition, it will be advisable to inquire, first of all, into the pathology of tubercle.

1. TUBERCLE.

It has been properly remarked by Dr. Marshall Hall, that, after inflammation, tubercle is the most important of the subjects comprised in the theory of medicine or pathology. It is important, therefore, to inquire into the pathological characters it presents in the lungs, which constitute, essentially, the pathological anatomy of pulmonary consumption.

Pulmonary tubercles—as remarked by M. Andral—present three distinct periods in their existence—one of developement or crudity; one of elimination or softening; and one of excavation or cavern.

1. *Period of developement or crudity.*—Tubercle, in the simplest and most common form, is a small, yellowish-white body, of a round shape, firm consistence, and sufficiently hard to be crushed in many cases; in others, of the consistence of viscid pus, or cheese. It varies in size from that of a millet-seed, to that of a pea or nut. It is without any trace of organization or texture; is sometimes isolated; at others agglomerated in masses of greater or less dimension; sometimes infiltrated into the parenchyma of the lungs, and occupying one or more lobules,—at others, a lobe, or even the whole lung. Tubercles are very rarely single or solitary; and their number varies greatly. They are commonly situate at the top of the lung, and when they are met with in the inferior lobes, they are always in a less advanced stage of existence than those of the superior lobes.

Various opinions have been entertained in regard to the primitive state of tubercle. It has been presumed to commence by small, transparent, shining grains or granulations, of variable size, from that of a millet-seed to that of a grain of hemp, which have been called *miliary granulations*. Such is the opinion of different distinguished pathologists. It has, however, been combated, on the ground that if the granulations be the first stage of tubercle, they ought to be met with wherever tubercles exist, which is not the case. They are seen only in the pulmonary tissue. Andral regards them to be formed of the pulmonary vesicles, indurated and hypertrophied, and constituting one of the anatomical forms of pneumonia—the *vesicular*. Others have considered the tubercle, at its commencement, to be nothing more than a particle of fibrine resulting from a trifling oozing of blood; whilst others, again, have assigned them a hydatid origin; but this opinion has been embraced by few, although, in animals, hydatids and tubercles have been found in the same organs by Cruveilhier, and even depôts of tubercular matter are affirmed by MM. Dupuy and Andral to have been found in animals in hydatid cysts. Rokitansky, however—according to two of his pupils—maintains, that tuberculosis and serous cysts are never met with simultaneously in the same organ, or even in the same individual; but where one process has entirely ceased, the other may develop itself. Sebastian corroborates Rokitansky's views, by observing, that hydatids are never found in the same organ as tubercles. Rokitansky considers that tubercles occur in the lungs originally in two forms,—the one named by him the interstitial tubercular granulation, and the other

the tuberculous infiltration. The *former* is the most common form of tuberculous deposition. It consists of the well known round, grayish bodies, found discrete, or agglomerated and scattered through the parenchyma of the lungs. Their seat is in the interstitial tissue, between the smaller lobuli and the cells of the lungs, and on the walls of the cells themselves. The *latter* form of tubercles is the result of a process identical with common pneumonia, except that the lymph, which is deposited in the cells, instead of being absorbed or running into pus, becomes, from the influence of the tuberculous diathesis, yellow tuberculous matter—thus constituting hepatisation by means of a tuberculous product. This form is considered by Rokitansky to be always the result of a very high degree of tubercular diathesis,—occurring most generally in young persons, being usually attended with tuberculosis of the bronchial glands, and often with bronchial tubercles; appearing seldom as primitive tuberculosis, and coming on usually in the far advanced stages of interstitial tubercles.

Whenever tubercle is met with, it is in the solid state. Yet it cannot be presumed to have been separated from the blood-vessels in this form. It is probably more fluid when first deposited, and afterwards the fluid portions are taken up by absorption; but how this is effected we know not. The researches of recent histologists appear to show—in the language of Gerber—that albuminous or unorganized tubercles can only be produced from exudations abounding in albumen and poor in fibrin; and such exudations, it need scarcely be said, are more likely to occur from blood which possesses less of the plastic or fibrinous material. Hence, the important practical indication—to modify the condition of the circulating fluid by improving its plastic or vitalizing power.

Ordinary tubercles, according to M. Thénard, consist of about 98 parts of animal, and 2 parts of saline, matter, comprising chloride of sodium, and phosphate, and carbonate of lime. Of the calcareous tubercles mention has already been made, (p. 338.)

The precise location of tubercle has been a great question among pathologists, and one on which difference of sentiment yet exists. Whilst some have believed them to be seated in the lymphatic system of the respiratory apparatus; others have referred them to the pulmonary vesicles, and minute bronchial tubes. Some, again, have presumed them to be secreted from the bronchial mucous membrane; whilst others have referred them principally to the cellular membrane of organs. The author has frequently investigated this point, and has satisfied himself, that the submucous seat of the tubercle was manifest in several cases. It is obvious, however, that other textures, besides the cellular membrane, may secrete tuberculous matter, for we find it deposited at the surface of the mucous lining of the air passages, in the bronchia; in the vesicles; in the cellular texture, which unites the different parts of the lungs; and in the lymphatic vessels of the lungs. When deposited, and as we ordinarily see it, it would appear to be, like the cuticle, completely anorganic, having at times, although very rarely, a cyst. Appearances of blood-vessels are sometimes seen; but these, it is affirmed, are owing to a portion of the pulmonary

parenchyma having become incarcerated, when the tubercles, which were at first isolated, joined and became agglomerated, as no trace of a vessel has been met with in a simple tubercle. It has likewise been a question with pathologists, as to the mode in which the tubercles become developed. Some have presumed, that the matter of tubercle is endowed with plastic properties, so that it increases from within, in the manner of organized and living bodies—that is, by intussusception; but the tubercles—whatever size they may attain—never exhibit any traces of organization. The fresh deposition doubtless occurs in the same manner as that of the primary tubercle, and increase of size takes place by accretion. The tubercles gradually become agglomerated, so that the intervening tissues are incarcerated and compressed, and as vessels were distributed through these tissues, evidences of them appear on dissection. At times, however, they become confounded into one mass, in which nothing but tubercular matter is perceptible.

The minute texture of tubercle has been lately examined with care by numerous observers, and, amongst others, by Mr. Gulliver, who considers it to be composed of granular matter, corpuscles, and cells. The granular matter is seldom or never absent, and is composed of infinitely minute particles, and of minute spherules remarkably variable in magnitude, and generally from the $\frac{1}{8000}$ th to the $\frac{1}{800}$ th of an inch in diameter. This is the most prevalent ingredient of tubercle. It is almost always mixed with the other constituents, and frequently forms the entire mass of caseous tubercle. The corpuscles are generally more or less globular or oval, but are often either very irregular in form, or shapeless. They generally vary from the $\frac{1}{8000}$ th to the $\frac{1}{3000}$ th of an inch in diameter, and are thought by Mr. Gulliver to be probably imperfect, degenerating, or blighted cells, and nuclei. The most common size of the cells is from the $\frac{1}{2000}$ th to the $\frac{1}{1140}$ th of an inch in diameter. They may be frequently recognised in grayish miliary tubercles; but as the tubercles increase in size, the well-marked, and complete cells disappear,—probably, according to Mr. Gulliver, degenerating into the corpuscles and granular matter. From all his histological observations, Mr. Gulliver thinks it highly probable, that tubercle, like the most highly organized tissues, has its origin in cells, generally mixed at a very early period with granular matter. It seems, however, to differ essentially from the matter of plastic exudations, inasmuch as the cells of the latter not only grow into a higher organization, but increase also in number towards the centre: in other words, plastic matter has an inherent power of multiplying and evolving organic germs; but tubercle has no such power; for it would appear, that its primitive cells can only retrograde and degenerate, since they are wholly destitute of the plastic force from the beginning.

It must be admitted, however, that the histology of tubercle is by no means settled.

2. *Period of elimination or softening.*—After the tubercles have remained crude for a longer or shorter period, they undergo important changes, and ultimately become softened. The mode, in which the

softening is effected, has been a matter of dispute; some believing, that they possess, within themselves, the power of softening, as they do of development; others attributing it to an inflammatory process; but the most probable view is, that the tubercles act as foreign bodies, irritating the surrounding tissues, and occasioning a secretion of pus, which softens the tuberculous matter mechanically. When the mollescence of the tubercles has taken place, the tuberculous matter seeks to escape; this gives rise to the

3. *Period of excavation or cavern*;—the stage, in other words, of ulceration. The pus makes its way into the bronchial tubes in the same manner, as that of an ordinary abscess makes its way to the surface. The pulmonary parenchyma, surrounding the tuberculous matter, as well as the bronchial tubes themselves, becomes destroyed; and a ready exit is thus afforded to the matter, which is thrown out by expectoration.

The excavations or caverns are owing to the simultaneous softening of several tubercles agglomerated together, or of one large tubercle; as well as to the destruction of the pulmonary parenchyma by ulceration, and the expectoration of the softened tuberculous matter. The number of cavities in the lung is extremely various. At times, there are several; at others, but one or two: these are always surrounded, in greater or less number, by tubercles in different stages of their progress, which, by becoming successively softened, add to the size of the cavities already existing, or form new ones.

On the dissection of lungs that are largely tuberculated, sufficient evidence is afforded, that the cavities are formed in the manner described. They are usually found divided into compartments by extensions of the pulmonary parenchyma, forming bands or cords, which pass from one side of the cavity to the other, and which break at times, so that the divided extremities hang loose in the cavity. In other cases, as in one which the author has just examined, large vessels are seen crossing the cavities, which do not appear, however, to be capable of conveying blood, but to have become obliterated; sometimes, before they are rendered impervious by disease, the vessels give way, and death takes place by hæmoptysis, and at times—although rarely—almost instantaneously, the hemorrhage being so excessive.

The seat of the excavations is generally in the superior lobe, where the tubercles are commonly most numerous. At times, they so completely destroy the pulmonary parenchyma, that the exterior paries may be formed by the pleura pulmonalis only. The contents of the cavities are various. They commonly consist of a mixture of pus, mucus, and tuberculous matter, and, at times, blood; and, occasionally, portions of the pulmonary parenchyma are observed in the sputa. In a case, which the author had under his care recently, this was manifestly the fact. In the case, before alluded to, the fluid was thin and sanious, and of an offensive character. At times, indeed, gangrenous sloughs form in the parietes of the caverns, so as to complicate the phthisis with gangrene of the lungs. Occasionally, the caverns are found quite empty, but this is uncommon. It is important,

also, to bear in mind, that the cavern may contain a greater quantity of pus at one time than another; and, at times, may be so completely filled, that, as regards the physical signs afforded by the voice alone, no positive deduction can be made; whilst, at other periods, and of the same day, especially in the morning, the caverns may be so far emptied by expectoration, that the vocal signs of a cavern may be very unequivocal.

The interior of the cavern may consist of the pulmonary parenchyma indurated, red, and infiltrated with tubercular matter, the surface being irregular, and projections and prolongations existing, which are formed either of condensed cellular substance, or of the remains of vessels, as before described. In their shape,—as has been correctly remarked by Professor Gross,—these small fasciculi or bundles bear a very close resemblance to the fleshy columns of the heart, and they are often encrusted with yellowish tuberculous matter. It rarely happens, that any remains of bronchial tubes exist in them. It would seem, that the slight pressure, made by these heterologous formations on the tubes, is sufficient to cause their absorption. Generally, however, bronchial tubes are seen to terminate in them, through which the tubercular matter, pus, &c., are expectorated, and the presence of which affords signs of moment to the auscultator. Occasionally, a communication exists between the cavern and the cavity of the pleura, giving rise to pleuritis, or pneumothorax; or a fistulous opening may exist, by which the matter may make its exit by the parietes of the thorax. Frequently, the excavations, especially if old, are lined by a whitish false membrane, thin, soft, and friable, or adherent, and formed of various layers.

The following particulars of the necroscopy of a case of tubercular phthisis, which fell under the author's care in the Philadelphia Hospital, and was reported in the *American Medical Intelligencer*, 1838-39, p. 201, by an intelligent resident physician, Dr. Vedder, now of Schenectady, exhibit the characters frequently presented by tubercular caverns on the dissection of those who have died of phthisis. The left lung was adherent throughout, and was removed with the greatest difficulty; on separating it, a large cavity was opened, which discharged about a pint of dark fluid blood. The pleura pulmonalis anteriorly was three-eighths of an inch in thickness, hard, and almost cartilaginous. On cutting into it, the scalpel passed immediately into a large anfractuous cavity, occupying the whole of the superior, and about one-half of the lower, lobe: numerous firm bands traversed it in all directions, (obliterated blood-vessels;) two or three were of a light red colour, and—as it were—dissected out; they were still permeable; a probe could be passed into them. An imperfect, almost cartilaginous, septum existed, which could, with difficulty, be cut by the scissors: it was constituted apparently by the pleura, which dipped between the lobes. Numerous small cavities communicated with the large cavern: these varied in size from that of an almond to that of a pullet's egg. The large, and nearly all the small, cavities were lined by an old and polished membrane. Numerous bronchial tubes terminated abruptly in the cavity; these appeared as if cut off, and

varied in size from that of a pipe-stem to double the size. One was about half an inch in diameter. On the anterior surface of the lung was an opening, which communicated with the cavity. It was evidently old, from the character of its margins, which were smooth, rounded, firm, and shining. The lung was, however, so firmly bound down in this place, as to have prevented the passage of air into the cavity of the pleura. One mass of tubercles was met with in the lung, of about the size of an egg. A small portion of the base of the lung still preserved its vesicular texture, crepitated, and was engorged with blood. This was the only portion of the lung in which the vesicular structure was not destroyed. In the right lung, there were a few scattering nuclei of tubercles; and in the posterior part of the upper lobe there was a small cavity lined with a smooth membrane. The bronchial glands were tuberculous.

It has been a prevalent opinion, that when once a cavern has formed in the lungs, it is incapable of cicatrization; and one of the most distinguished of modern pathologists, M. Louis, has affirmed, that, in the numerous dissections which he has made, he has never met with a single example. His negative experience has, however, been controverted by the positive observation of others. The author has met with several instances, in which this change was unequivocally accomplished; and the details of the case of an eminent medical practitioner in this city, Dr. Parrish, have been published, in whose lungs there were marked evidences of cicatrization. This probably occurred after he had long suffered under symptoms of phthisis, and exposed himself to a regimen, which will be mentioned hereafter.

M. Boudet has recently affirmed before the *Académie Royale des Sciences*, of Paris, that in 197 cases taken indiscriminately, he found 10 examples of cavern completely cicatrized, without any trace of recent tubercle; and 8 examples of complete, or partial cure of cavern, coinciding with recent tubercles; and he concludes, that recovery is possible at any period of pulmonary consumption; and that nature generally works the cure.

The mode, in which this cicatrization is accomplished, appears to be as follows:—At times, the cavern exists, but it becomes lined with a membrane of a cellulo-vascular character, approaching the serous membranes in its nature and functions. This may be regarded as the completion of the process of reparation; for no more tuberculous matter or pus is poured into the cavern. By degrees, this cavern diminishes in size, and, in process of time, may form a mere line with cellulo-fibrous parietes, in which large bronchia suddenly terminate. The contraction of the parietes of the cavern gives occasion to a puckering of the lung, which is often most strongly marked on the apex, where the contraction of the cellular parietes of the cavern have drawn it strongly downwards, and the pleura pulmonalis along with it. In the depressions, pseudo-membranous flakes are thrown out, which subsequently become converted into fibrous, or fibro-cartilaginous, tissue. M. Louis considers “the sort of cartilaginous cap covering the apex of the lung when excavated” to be a pleuritic lesion peculiar to phthisis.

A recent writer, M. Fournet, whilst he admits that pulmonary phthisis is, in extremely rare cases, susceptible of cure in the stage of excavation, considers it to be by no means demonstrated, that the cure depends upon complete cicatrization of the excavations; nor is the mode—he maintains—in which the cure is effected, yet understood, although he thinks it more likely to be by conversion of the excavations into fistulæ, than by their closure.

That tubercles are capable of what may be esteemed a cure, in their period of crudity, is shown by the results of all observation. They may, under appropriate treatment, remain quiescent, or they may become converted into those calcareous concretions, which, as has been elsewhere shown, are met with in the lungs, on the dissection of persons who have died of disease in other organs.

It has been properly remarked by M. Andral, that the cicatrization of the lungs must not be confounded with the phenomena that result from dilatation of the bronchia, or with the puckering and sinking down of the lungs, observed in old people, in whom these organs tend to become atrophied.

Whilst the tubercles are in the crude state, the pulmonary parenchyma, surrounding them, commonly appears unchanged; but when the stage of softening is in progress, and especially when caverns have formed, it is subjected to material modifications. Generally, evidences of inflammatory action are perceptible around the tubercular masses, which may be acute, but more commonly it is chronic. At times, pneumonia exists along with tubercles, so as to give rise to the interesting question, whether the pneumonia gave origin to the tubercles, or conversely? The author's view—as will be seen hereafter—is, that whilst the formation of tubercles may be excited by inflammation, they are not necessarily dependent upon it; and, consequently, as a general rule, if pneumonia be found, it must be esteemed either an accidental complication, or the result of the presence of tubercles.

It had been long observed, that tubercles are often developed in many organs at the same time, and that, in the consumptive especially, they are met with in other parts than the lungs. Numerical results have been obtained, however, in recent times only. Of 358 necroscopies of persons who had died of phthisis, the presence of tubercles, or of tuberculous matter, according to M. Louis, was observed in

The lungs, in *all the cases* except one.

Small intestine, in nearly one-third.

Large intestine, in one-ninth.

Mesenteric gland, in one-fourth.

Cervical glands, in one-tenth.

Lumbar glands, in one-twelfth.

Prostate, in one-thirteenth.

Spleen, in one-twentieth.

Ovaries, do. do.

Kidneys, in one-fortieth.

Uterus,

Brain,

Cerebellum,

Medulla oblongata,

Ureters,

} In one only.

It is, therefore, in the lungs only, that tubercles exist alone; and in not one of the 338 subjects were there tubercles in any organ without their being at the same time in the lungs. In the report, made to the Académie Royale de Médecine, of Paris, on M. Louis's Researches on Phthisis, M. Chomel, the reporter, asks whether these numerical results will apply to infants? To establish this, investigations have been instituted, which have led to the following observations. In 100 *adult* subjects, noted by M. Lombard, who had died of phthisis, tubercles were found;—in the intestines, 26 times; in the mesenteric glands, 19 times; bronchial glands, 9 times; cervical glands, 7; spleen, 6; lumbar glands, and the subperitoneal cellular tissue, 4; axillary glands, and anterior mediastinum, 3; subarachnoid cellular tissue, spinal marrow, false membranes of the pleura and peritoneum, intercostal muscles, and ovaries, 2 each; gall-bladder, liver, posterior mediastinum, pleura, vertebræ, omentum, uterus, prostate, bladder, cerebrum and cerebellum, medulla oblongata, kidneys and vesiculæ seminales, 1 each. On the other hand, in 100 cases of phthisis in *infants*, recorded by the same observer, tubercles were found;—in the bronchial glands, 87 times; in the lungs 73, (30 times in one lung only,—13 times in the left, 17 in the right); in the mesenteric glands, 31; spleen, 25; kidneys, 11; intestines, 9; brain, 9; cervical glands, 7; meninges of the encephalon, 6; pancreas, gastro-hepatic glands, [?] cellular tissue lining the peritoneum, 5; inguinal glands, 3; cellular tissue lining the pleuræ, 2; lumbar glands, bladder, omentum, gall-bladder and false membranes covering the pleura, 1 each.

From these observations, which are wanting, however, in precision, it is evident, that the distribution of tubercles differs greatly in children and in adults; that they exist in children in a greater number of organs at once, and are not so invariably present in the lungs. In infants, it will be observed, they occur more frequently in the bronchial glands than in the lungs, a fact which has been observed, although rarely, in the adult. They preponderate, also, strikingly in the brain and meninges.

The researches of M. Louis have led him to the inference, that after the age of 15, tuberculous matter is never met with in any tissue or organ, unless it exists also in the lungs; at least he has known only two exceptions.

The common opinion is, that the left lung is more frequently and extensively affected with tubercles than the right, but such has not been the result of the author's observation, nor does it accord with that of many other individuals. High authority, that of M. Louis, has been brought forward in favour of the left lung being most frequently and extensively affected, and it is supported by some observers on this side the Atlantic, but a recent writer (*British and Foreign Medical Review*, April, 1840, p. 334), has shown, that, curiously enough, the cases of M. Louis do not, on analysis, warrant his inference, the following being the result in his 50 tuberculous subjects.

| | | | | |
|----------------------------|---|---------------------------------|---|----|
| Cavities in both lungs | } | Most extensive in right lung in | - | 13 |
| in 33 cases. | | " left " | - | 12 |
| | } | Doubtful in this respect, | - | 8 |
| Cavity in left lung only, | | - | - | 7 |
| " right " | } | - | - | 6 |
| | | Right side, | - | 1 |
| Tubercles (without ulcera- | } | Left, | - | 1 |
| tion predominating | | Doubtful on which, | - | 2 |
| on the | | - | - | |
| | | | | 50 |

Both of the lungs seem, therefore, to have suffered as closely as possible to the same amount.

Of 170 cases, observed by another pathologist, M. Fournet, 109 presented the greatest share of disease on the right side; 46 on the left; and in 15 cases both sides were equally implicated. If any doubt, however, exists as to which of the lungs is more frequently and extensively affected with tubercles, it must be admitted to be unusual to find the disease equally developed on both sides.

The observations of Rokitansky, of Vienna, have led him to infer, that tuberculosis and cholera are incompatible. In the cholera epidemics in Vienna, it was remarked, that in the very numerous dissections which were made, no case of cholera was found combined with tuberculosis, yet although this incompatibility existed between tuberculosis and cholera, his observations afforded no ground for the belief, that diseases of the lungs in general give any such immunity. Rokitansky observed, also, that the coincidence between tuberculosis and typhus, and between the former and dysentery, carcinoma, serous cysts, aneurism, hypertrophy of the heart, dilated bronchia, and almost all chronic diseases of the stomach, was extremely rare. Several years ago, the attention of Dr. J. B. S. Jackson, of Boston, was directed to the subject of the infrequency of tubercular deposition in patients dying from malignant disease, without his being aware, for sometime, that the same remark had been made by others. Of 33 cases of malignant disease, in nearly all of which a careful examination was made for tubercles, in 24 none were found; six times they were observed in the lungs alone, and three times in the bronchial glands alone.

2. TUBERCULAR CONSUMPTION.

Synon. Phthisis pulmonalis, Ph. pulmonaris, Ph. pulmonalis vera seu tuberculo-ulcerata seu tuberculosa seu scrophulosa, Ph. pulmonalis purulenta exulcerata, Marasmus Phthisis, Hæmoptysis Phthisis, Tuberculosis Pulmonum, Pneumopathia tuberculosa, Tuberculous Disease of the Lung, Pulmonary consumption, Consumption of the lungs, Consumption, Decline; *Fr.* Phthisie pulmonaire, Crachement de Pus; *Ger.* Lungen-schwindsucht.

The preceding remarks on tubercles—as occurring in the lungs more especially—will render the symptoms of tubercular pulmonary consumption readily intelligible. There is no disease which is more deeply interesting to the pathologist—affecting, as it does, the young and the promising, and being so fatal—so alarmingly fatal—when once it has become fully developed.

It is an old estimate, that perhaps one-ninth part of the whole number of deaths is from pulmonary consumption. In Great Britain, the proportion has been conceived to be one-fifth, and according to Sir James Clark, it has even been rated as high as one-third of the whole number, but the latter estimate, according to Dr. Forbes, is too high for England, as it is for any part of the United States. The third report of the Registrar-General, enables us to judge with some degree of accuracy of the ratio of deaths from consumption in England and Wales, in the year 1839. Of 90·565 deaths referred to diseases of the respiratory organs, 59·559, or 18 per cent. of the whole number of deaths, were by consumption. An estimate, as already remarked, has been attempted by Dr. Emerson, of the average mortality from consumption and acute diseases of the lungs, in the four largest cities of this Union—New York, Philadelphia, Baltimore and Boston, from which it would appear, that the average annual proportion of the general mortality to the population, was, in New York, 1 in 39·36; in Boston, 1 in 44·93; in Philadelphia, 1 in 47·86; and in Baltimore, 1 in 39·17; and that the average of the mortality from consumption alone, to the general mortality, was, in New York, 1 in 5·23; in Boston, 1 in 5·54; in Philadelphia, 1 in 6·38; and in Baltimore, 1 in 6·21. The subject has been recently investigated by Professor Hayward of Boston, who has found, that whilst Philadelphia has suffered less from consumption than New York or Boston during the last 30 years,—the average of deaths from that disease being 1 in 7·003 of the whole number; whilst in Boston, it was as 1 in 6·185; and in New York, as 1 in 5·547: during the last 10 years Boston has enjoyed the greatest exemption. From 1831 to 1840 inclusive, the deaths in Boston from consumption, were 1 in 7·587; in Philadelphia, 1 in 7·482; and in New York, 1 in 5·952. The report of the City Inspector of New York, Dr. Griscom, for 1842 is, however, more favourable to that city. It makes the proportions of deaths from phthisis to the whole number, omitting still-births and casualties, to be 1 in 6·114.

The mean proportion of deaths from phthisis at Carlisle, London, Plymouth, and the Landsend, is stated by Dr. Forbes, to be one in 5·6. In New York, during 1839, the ratio was one in 5·2, excluding casualties and the still-born; and one in 6 including those. In Philadelphia, during the same year, according to the Report of the Board of Health, the ratio was one to 7·2, of the whole number of deaths. These estimates must be regarded as approximations merely, inasmuch as the same method of obtaining the statistics was not adopted in the different cities.

Diagnosis.—The symptoms of tubercular consumption admit of a division—in accordance with the progress of the tubercles—into three stages;—the *first* being that of tubercular developement; the *second*, that of softening; and the *third*, that of the formation of large caverns in the lung. Between the different stages—as has been well remarked by Dr. Stokes—there is no exact line of demarcation, but when completely established, each has its characteristic symptoms, and physical signs.

First stage.—It is proper to state, that although a certain group of symptoms may accompany tuberculous disease of the lungs, the order in which these present themselves, and the degree of their severity, vary remarkably in different individuals,—in some cases, the symptoms being so pronounced as to excite the attention of the most careless observer, whilst in others they are so trivial as scarcely to be noticed by any but the medical attendant, and occasionally not even by him. In this first stage, the symptoms are mainly those of catarrh,—as cough, some dyspnœa, languor, debility, with at times, in addition, hectic fever, followed by unaccountable emaciation. The cough exhibits great variety, but it is commonly slight, frequent and irritating, and is referred to a tickling sensation in the trachea. The expectoration, when there is any, consists of a nearly transparent mucus,—at times, containing small dots of blood. Along with these symptoms, pain in some part of the thorax is often experienced, sometimes constant, but at others intermittent, and occasionally so regularly intermittent, that, as it has occurred with the paroxysms of hectic, it has been mistaken for intermittent fever, and treated accordingly. This pain often occupies the scapulo-humeral articulation, and is accompanied with tenderness of the subclavicular region, and often with irritation of the muscular fibres, which causes their contraction on percussion. The combination of this pain of the shoulder with quickness of pulse, it has been affirmed by Dr. Stokes, should always excite alarm. The pathological condition of the lungs consists in the presence of a greater or less quantity of tuberculous matter,—the whole, or a large proportion of which, is in a state of crudity,—that is, more or less firm, of a grayish colour and somewhat transparent; or partly of a pale yellowish colour and opaque. The pulmonary tissue, and bronchial membranes, in the immediate vicinity of the tuberculous deposits, may have undergone no perceptible alteration, or may present a degree of redness and vascularity.

At this period of the disease, the physical signs are not as valuable as they are afterwards, unless the tubercles are numerous, and seated—as they generally are—near the summit of one of the lungs. Inspection of the chest may convey little or no information, but, according to Dr. Walshe, Dr. Chambers has observed an enlargement in the antero-posterior diameter of the summit of the chest, doubtless owing to the increase in the size of the lung, owing to the tuberculous formations. Under such circumstances, the sound, rendered on the percussion of the affected side, will be more dull under the clavicle; the respiratory murmur, on auscultation, will be less full and free; inspiration may be bronchial; expiration more audible, and the resonance of the voice and the vocal fremitus greater; but unless these indications are unequivocally different on the two sides, they cannot, as a general rule, be much relied upon at this early period, as a means of diagnosis. All these signs are evidences of deposition at the upper portion of the lung. The sound of the voice, transmitted by the induration in an unusual degree, is sometimes only a diffused resonance. The subjacent arteries are also heard unusually clear below the clavicles; and in cases of tuberculous deposition in the upper portion of the right lung, the sounds of the heart are often heard

more loudly in this situation than under the left clavicle. When the subclavian arteries are heard with unusual distinctness, it is owing to a partial obstruction of the arteries, by the pressure of indurations at the apex of the lung. This has been esteemed a sign of incipient phthisis, but it cannot be diagnostic, as the same sounds are produced in some healthy persons under slight excitement, probably, as suggested by Dr. C. J. B. Williams, owing to the artery pressing on the clavicle or upper rib.

Second stage.—In this stage the diagnosis becomes more marked. The hectic glow and fever are more evident; the symptoms of irritation continue; the emaciation and loss of strength make decided progress; the hectic chill in the evening, succeeded by fever, is followed by sweats, more or less profuse; the colourless, frothy expectoration, which had previously attended the cough, is observed to contain small specks of opaque matter, of a pale yellowish or white colour, and resembling curds or cheese. The proportion of this matter gradually increases so as to form patches, surrounded by the transparent portion in which they seem to float, or they fall to the bottom of water, if the sputa have been expectorated into it. Specks or streaks of blood are also perceptible in them, and, at times, hæmoptysis occurs to a considerable amount. There is occasionally, in this stage, less oppression or pain in the chest than before; but the shortness of breath, on exertion, is undiminished, if not increased, and the pains which existed in the chest, in the first stage, are continued. Anomalous pains are apt to occur both in this and the next stage, in different parts of the body, which add greatly to the distress. In a case, which the author attended some time ago, the most severe neuralgic pains were frequently experienced over the chest, abdomen, and extremities, even at the tips of the fingers, which nothing but opiates would allay; and in one unfortunate case, the pain experienced in the occipital portion of the scalp was almost beyond endurance. This is the period of the softening of the tubercles. They have become *broken-down*, or are rendered soft by a secretion from the surrounding pulmonary tissue; and the matter, of which they are constituted, passes into the bronchial tubes. About this period, adhesive inflammation generally unites the pleura costalis to the pleura pulmonalis, and the pains experienced in the corresponding parts of the chest are often evidences of the slight pleuritic affection, which precedes, and is the cause of the union. At other times, the pains are of the neuralgic character just referred to. The dulness on percussion persists, and generally extends over a greater surface downwards. Auscultation now becomes a valuable diagnostic agency; vesicular respiration is no longer audible in certain portions of the lung, whilst the respiration along the larger bronchia may be unusually loud; the mucous, the crepitant or sub-crepitant rhonchi or *râles* are heard—the latter, when the patient coughs, more especially. The resonance of the voice is great over the affected parts, and distinct pectoriloquy may be detected, particularly in some portion of the clavicular or scapular regions; but this is not generally audible, unless the cavities are large and empty. The cavernous respiration

and voice are indistinct, when the ulcerations are small. These signs will be heard more markedly on one side than on the other, and this difference is an important element in the diagnosis.

It is proper to remark, that the tubercular deposition and development may have proceeded to the extent of rendering the greater portion of the upper lobes impervious to air, and of solidifying those lobes considerably; yet, as Dr. Graves has remarked, the solidified portions may be so divided from each other by laminæ of healthy lung, and may be so covered by a stratum of vesicular tissue, that the general result of percussion is to elicit a clear sound over the whole of the parietes of the chest corresponding to the affected lobes.

The duration of this stage is extremely various; at times, a few weeks; at others, months, and even years. In a very small number of cases, a curative process is established, by which the effects of the disease are, in a greater or less degree, obliterated; and, if the patient's general health be maintained in a good state, there may be no return of tuberculous disease.

Third stage.—This is the stage in which large caverns exist in the lungs, and which has been termed the *colliquative*, in consequence of the wasting induced by the profuse perspirations, which are often attended by diarrhœa. The expectoration is usually very copious. It is not always easy, however, to diagnosticate, in all cases, the purulent sputa from the mucous,—nor is it so important, since the mode of exploration, proposed by Laënnec, has led us to a more accurate diagnosis without it. It is proper, also, to bear in mind, that the lining membrane of the bronchia can, and frequently does, secrete a purulent or muco-purulent fluid, without there being any tubercular condition of the pulmonary substance. In a case of measles, which fell under the author's care some time ago, and which was accompanied by severe bronchitis, with evident narrowness of the bronchial tubes, a copious expectoration of a fluid possessing all the properties assigned to the matter of vomica, was discharged, which would doubtless have led to the belief, that an abscess had formed in the lungs, had it not been that the secretion was established too soon after the commencement of the bronchitis, and that there was an absence of all the physical signs that indicate the existence of a cavity in these organs. The case terminated fatally, and dissection proved that the whole secretion was bronchial. Before tubercles are softened, and their contents discharged into the bronchia, the whole of the matter of expectoration must be supplied by the bronchial mucous membrane. At this time, the sputa—as already remarked—are generally transparent, frothy and tenacious—of the character which is considered *mucous*, but the appearance of the expectorated matter varies materially, and, as in cases of chronic bronchitis, it may become thicker, less frothy, and possess a more equivocal character. Still, the mucous portion will generally predominate so much, that if the sputa be thrown into water, they will swim, buoyed up, more or less, by the imprisoned air.

When the tubercles become softened, and the tuberculous matter passes into the bronchial tubes, the sputa may still consist largely of

the bronchial secretion. The bronchial mucous membrane would seem, indeed, to produce the greater part of the sputa in tubercular diseases of the lungs. If they be now examined, they will present the white curdy appearances described as belonging to the second stage of tuberculous consumption. Some of these will be observed at the bottom of the vessel, whilst others are connected with, and suspended by, the more mucous portion.

In the stage, now under consideration, when the purulent discharge is very great, it may have the appearance of globular masses, often of an ash colour: these masses predominate greatly over the bronchial secretion, and being usually of greater specific gravity, and less penetrated by the air, they sink in water to the bottom of the vessel. In making these examinations of the matter of expectoration, it is important not to permit too long a time to elapse, after it has been discharged, as the water in the vessel is apt to commingle with it, and thus to create confusion; and likewise to examine more particularly that which is expectorated on first waking, as, in this way, we obtain the secretion, which has accumulated in the cavity during the night. After all, however, when we reflect on the varying characters of the expectoration, the uncertainty of its changes according to the progress of the disease, and its occasional absence altogether, we ought not to place too much reliance upon it as a diagnostic symptom, especially in the early stages. In conjunction with other symptoms, as suggested by Sir James Clark, it may enable us to ascertain the presence of tubercular disease in complicated cases, and the changes that occur in the ordinary progress of phthisis.

Along with the generally copious expectoration in the third stage, the dyspnœa often becomes urgent, so as occasionally to threaten suffocation, and the feet and ankles are at times œdematous. Inspection of the chest indicates, that great changes have taken place in that cavity. The shoulders are raised, and brought forward; the clavicles are unusually prominent, leaving a deep hollow—more or less perceptible in the first and second stages—between them and the upper ribs; and the chest, instead of being round, is flat. The shoulders are raised at each inspiration, and the chest is dragged upwards, as it were, in place of being expanded as in health. Percussion gives a dull sound, wherever there is solidification, but if it be practised over a cavity, the sound may not be as dull as in the second stage. Auscultation indicates, that there is no respiration in different parts of the lung—none that is vesicular; but the bronchial or tubal respiration may be uncommonly loud, so as even to be *tracheal* or *cavernous*. Coughing gives rise to a gurgling—*gargouillement*—and sometimes this gurgling is heard on inspiration; and pectoriloquy may be more or less distinct—especially in the morning early, after the pus, which has collected during the night in the caverns, has been evacuated. In this state—hopeless as it is—the patient may linger for weeks or months, or he may be cut off with very slight warning. In a case, which fell under the author's care not long ago, the symptoms in the morning indicated but little augmentation of mischief, yet, in the evening, the dyspnœa increased, and in a few hours the sufferings of

the patient were terminated. Such cases are not uncommon. Often, the disease destroys, by gradually wearing out the sufferer by a hidden, and not distressing irritation; but, at other times, the sufferings are considerable, and, not uncommonly, death occurs suddenly, owing to the breaking of a vomica in the lungs, the matter of which cannot be evacuated with sufficient rapidity in the enfeebled state of the patient, and death occurs by asphyxia. Such are the main functional phenomena and physical signs of phthisis. It must be borne in mind, however, that valuable as are the latter, when taken along with the former, none of them are pathognomonic; and that all of them, as remarked by Dr. H. M. Hughes, derive their diagnostic importance from a comparison instituted between one part of a lung with another part of the same, or a corresponding part of the opposite lung. It occasionally, but rarely, happens, that tubercles are simultaneously deposited throughout both lungs, or in corresponding parts of both; and under such circumstances no other signs may be presented than those of bronchitis.

Although tubercular consumption must be esteemed essentially the same disease, as regards its anatomical characters and constitutional origin, it has been thought proper to make different varieties of it. Laënnec, for example, recognises five:—1. Regular manifest phthisis. 2. Irregular manifest phthisis. 3. Latent phthisis. 4. Acute phthisis. And 5. Chronic phthisis. Sir James Clark, also, notices five; whilst Dr. Stokes admits six, besides those that are diversified by complications. 1. Acute non-suppurative. 2. Acute suppurative. 3. Chronic progressive. 4. Chronic ulceration following pneumonia. 5. Tubercle consequent on chronic bronchitis. 6. Tubercle consequent on the cure of empyema. It is doubtful, however, whether, as a general rule, more harm than good do not result from such subdivisions. It is not easy, indeed, for any agreement to exist among pathologists in the number of varieties to be admitted. Accordingly, a recent writer, Dr. C. J. B. Williams, considers it to be sufficient for his purpose to distinguish two kinds of consumption, the *acute* and the *chronic*, without, however, professing, that the line between them is always well marked; and admitting, that each may present considerable variety in its predominant symptoms. In addition to these two varieties admitted by Dr. Williams, Sir James Clark has—the *phthisis of infancy* and *childhood*; the *febrile phthisis*, differing from the others in being usually ushered in, and attended, during its whole progress, by a considerable degree of fever,—and the *latent*. The last—the latent variety—may present itself in two different forms. In one, the constitutional symptoms exist,—as fever, night sweats, emaciation, diarrhoea, &c., without any local indications of the pulmonary disease, or if they be present they are of so slight a character as to pass unnoticed. The other form is more insidious, and, therefore, more important; being attended with neither constitutional nor local symptoms until the tuberculosis has made extensive progress. The greater number of cases may, however, be esteemed, latent in the commencement. This opinion Laënnec was led to entertain, in consequence of finding, that nothing was more common than to meet with nume-

rous miliary tubercles in lungs otherwise healthy, and in persons who had never exhibited any signs of pulmonary consumption; and it has been already remarked, that the lungs may be studded with calcareous tubercles without any existing evidences of phthisis. After Laënnec was first led to adopt this opinion, on anatomical grounds, it frequently appeared to him quite clear, from a careful comparison of the history of the case with the appearances on dissection, that the greater number of the first attacks had been mistaken for slight colds; whilst others were altogether latent, being unaccompanied by either cough or expectoration, or indeed by any symptom of sufficient weight to impress the memory of the patient. The facts, which are confirmed by the results of the author's observation, lead to the important therapeutical deduction, that where there is reason to suspect the existence of a tuberculous diathesis, the greatest attention should be paid to those indications, in order to preserve the pulmonary tissue from more serious inroads.

After phthisis has undergone some degree of developement, the symptoms may almost wholly disappear, or become latent under new conditions of the system. Pregnancy is one of these; but it occasionally happens, that symptoms of phthisis make their appearance, for the first time, during utero-gestation, and that difficulty arises in determining, whether the pulmonic symptoms be induced by the developement of sympathies irradiating from, or connected with, the uterine condition, or whether they be truly phthisical in their character. The physical evidences of auscultation are evident in such a case. An attack of mania will often also suspend the symptoms of phthisis; the new state of excitation of the nervous system concentrating the morbid action on it, and thus diverting from the organic mischief in the lungs. In the course of the disease, the sexual appetite is often greatly augmented; yet, according to M. Rayer, the sperm contained in the several vesicles has been found to contain few or no spermatie animalcules.

Of the particular symptoms of phthisis—the cough, dyspnœa, expectoration, hæmoptysis, pain of the chest, pulse, hectic fever, perspirations, thirst, diarrhœa, emaciation, œdema, aphthæ, &c., not much need be said; yet a few remarks may be advisable on some that have not received, thus far, much notice.

Hæmoptysis is a very common occurrence, having been observed fifty-seven times in eighty-seven cases:—that is, in two-thirds:—in twelve cases only, it preceded the cough and expectoration, and in four cases only it took place in the last days of existence. Of hæmoptysis, mention has been made already. It was then stated to be an affection of but little consequence, except when accompanied by the presence of tubercles, or of tuberculous excavations in the lungs; but, in such cases, it is a symptom of serious import.

The *pulse* varies, of course, materially throughout the disease, being rapid during the hectic paroxysms; but often natural in the intervals. Frequently, however,—especially in the more acute forms of the disease,—it is permanently rapid, and almost always so in the advanced periods. Sometimes, even in the third stage, it remains slow. Re-

cently, great attention has been paid to the pulse in phthisis, by Dr. Guy, and he has maintained:—1. That the frequency of the pulse varies within wide limits,—the difference between the extremes amounting to 90 beats. 2. In the same individual, the frequency of the pulse undergoes remarkable fluctuations, passing, in a few days, through a range of upwards of 60 beats. 3. In five out of six cases, the frequency of the pulse in phthisis, exceeds the highest frequency observed in health. 4. The difference between standing and sitting in phthisis, is nearly the same for all frequencies of the pulse. 5. The maximum difference between standing and sitting in all cases of phthisis, falls short of the mean difference in health. 6. From the average results of a considerable number of cases, it appears, that the mean difference in health is six times as great as the mean, and three times as great as the maximum difference in phthisis. 7. On the supposition, that the slight effect produced by change of posture is peculiar to phthisis, it forms one of the most constant and certain of its symptoms. These results, however, require farther observation. There may be other diseases, which exhibit the same, so that they may not be diagnostic of phthisis.

The *heat* of phthisis, according to Sir Charles Scudamore, reaches from 99° to 104° ; and in some instances of acute phthisis, hectic fever being extremely urgent, he has marked it as high as 105° .

Along with phthisis of the lungs, the larynx is often the seat of disease, as already remarked under another head. *Hoarseness* or *loss of voice* is frequently, indeed, an early symptom of phthisis. The digestive system also suffers sooner or later, and at the latter periods, more or less endo-enteritis frequently prevails, which passes on to the state of ulceration, often complicated with tuberculous deposition under the mucous membrane of the intestines. In some instances, however, phthisis runs through all its stages to a fatal termination, without the supervention of any intestinal disorder. Of 112 cases observed by M. Louis, 5 escaped diarrhœa. Tubercles, likewise, may form in the brain or spinal marrow, or in the meninges, and give rise to encephalic symptoms. In the female, the catamenia, according to Laënnec, are generally defective, or absent, at an early stage, and their suppression has been regarded, according to Dr. Williams, as an unfavourable sign; but the author has not been impressed with this circumstance.

Pulmonary consumption is essentially a chronic disease. Its mean duration, according to the observation of pathologists, is, in hospital practice, twenty-three months. This includes the extreme cases; but more than one-half, in 314 recorded cases, terminated in nine months, and the greater proportion of these between the fourth and ninth months. By excluding the cases, that ended within four months—which amounted to 24—as well as those that exceeded four years—amounting to 19—the average duration of the remaining cases is eighteen months. It is manifest, however, that various circumstances must modify the duration of the disease. Amidst the comforts and advantages of private life, we should expect it to be more

protracted: and much must depend upon age, sex, constitution, &c., as well as on climate, season, and other influences.

Causes.—These may be divided into the *extrinsic* and the *intrinsic*.

a. *Extrinsic causes.* 1. *Climate.*—Pulmonary consumption has been seen in all or almost all climates, but by no means in an equal degree of frequency; yet our information as to the precise *modus agendi* of climate, in causing phthisis, is sufficiently imprecise. It is much less common in Russia than in this country, and this is attempted to be explained by Sir Geo. Lefevre, by the fact, that the Russians protect themselves much more against the cold; but it remains to be seen, whether this explanation be applicable to the natives of hyperborean regions in general, who are less capable of protecting themselves than the Russians. A cold, damp, and variable climate—like that of Great Britain—is conceived not only to give the predisposition, but to become an exciting cause of the disease; yet it prevails to a like extent in many of the more dry, less cold, but scarcely less variable situations of southern France and Italy; and it is fearfully rife in many parts of the torrid zone, where none of these conditions of climate are met with. As a general rule, it would seem, that the deaths diminish in a direct ratio with the mildness of the climate; but great heat appears also to have a powerful effect in predisposing to tuberculous disease. The table—cited in an early part of this article from Dr. Emerson—of the average mortality of phthisis in the four largest cities of the Union—is signally elucidative of the difficulties that environ us, in accounting for either the general, or particular, mortality of any place as compared with that of others.

Within the limits of the United States, the range of the thermometer is considerable—much more so than in Great Britain. This applies even to St. Augustine, Pensacola, and other places in Florida, which have been regarded as eminently favourable winter retreats for the phthisical valetudinarian. The medium heat is, however, higher in those southern situations; and this, along with other atmospheric advantages, may, in part, counterbalance the evil. Yet, although the climate of the United States is proverbially one of great vicissitudes, the number of deaths by consumption is probably not as great as in England, or in many of the situations of southern France and Italy, which have been selected as winter retreats for the consumptive. A respectable physician of the navy, Dr. Hulse, has asserted, that he has never known, or heard of, a case of consumption that originated in Pensacola. The West Indies, and Peru, would seem to be unusually exempt from phthisis, as a disease of the inhabitants, but the mortality from it among the British troops and others stationed in the West Indies, is by no means small; and hence it has not been regarded by some as a favourable residence for the phthisical of other countries. It would appear, indeed, from the statistical report on the sickness, mortality, and invaliding among the British troops in the West Indies, by Major Tulloch, that in Jamaica, with a high temperature, consumption is there as frequent among the British troops as in Britain. The results, too, obtained statistically in the West Indies, by no means favour an opinion, hereafter referred to,

that there is an antagonism between diseases, which are the product of marshy emanations and phthisis. They prevail together, without seeming to exert any influence upon each other.

M. Ruzé states, that in Martinique, this disease is the most frequent of all chronic maladies.

One interesting fact, by the way, has been established by recent statistical observations—that consumption is much less frequent amongst sailors than amongst soldiers. The benefits of a sea voyage to the phthisical valetudinarian have been long known, and there can be no doubt, that in those who are predisposed to pulmonary disease, the revulsion thereby effected in the system may prove most salutary. According to the statistical reports laid before the House of Commons, it appears, that in the West Indies and North America, the mortality from consumption in the navy was at the rate of 1.9 per 1000, whilst amongst the soldiers in the same region, the returns were as follows. In the Windward and Leeward command, 12 per 1000 were attacked annually with consumption; in Barbadoes 15.8 per 1000 die of it; in Jamaica 7.5 per 1000; and in the more northern portions of the same command, the deaths from diseases of the lungs among the troops were, in Nova Scotia and New Brunswick, 7.1 per 1000, and in Canada 6.7 per 1000. In Bermuda, there were attacked annually with consumption, 8.8 per 1000.

When a tuberculous individual passes from a warm and dry country, to one that is cold and damp, the tubercles undergo development. It was observed, that the French regiments suffered more from phthisis in Holland, than in Spain and Italy; and it would appear, that almost all the animals, too, which are brought from the torrid regions to our menageries, die of tuberculosis of the lungs.

2. *Season.*—In the temperate regions of the globe, winter and spring appear to be most favourable to the development of phthisis, because, in those seasons, there is the greatest union of cold and moisture. The remark has been made, that near the sea there are but few consumptive cases; but this must depend greatly upon the exposure. If, for example, as on the seaboard of the United States, the place be exposed to the constant N. E. storms and winds from the ocean, that prevail during the winter, the effect cannot fail to be seen on the tuberculous.

Where tubercles already exist, a warm dry air will have the same influence in favouring their development as the heat of the torrid regions of the globe; and the absence of solar light has been thought to produce the same effects as humidity. It is well known, that privation of light occasions, or favours, imperfect development of the frame, and hence any situation, from which light is excluded, may lay the foundation for tuberculosis, which must be regarded as a disease dependent upon defective and vitiated action of the tissues in which the tubercles are formed; and this, we shall see, is dependent, again, upon an unhealthy condition of the system, which favours their deposition.

According to the annual report of the interments in the city and county of New York, for the year 1839, the number of deaths in the

different months from consumption was as follows: September, 134; April, 126; March, 125; December, 124; August, 118; February, 114; January, 101; October, 100; May and November, each 99; June, 88; July, 87;—total, 1315. So far as this table goes, no satisfactory inferences can be deduced as to the effect of season.

3. *Atmospheric vitiation.*—Atmospheric impurity has, unquestionably, much to do with the causation of tuberculosis; accordingly, it is found that they who live in restricted habitations, where ventilation is imperfect, and especially where numbers are crowded together in a small space, suffer much from tubercular disease. All living bodies, when crowded together, deteriorate the air so much as to render it unfit for the maintenance of the healthy function. If animals be kept crowded in ill-ventilated and badly lighted apartments, they speedily sicken. The horse is attacked with glanders; fowls with pep; and sheep with a disease peculiar to them, if they be too closely folded.

It would appear, that the young, especially of the animal creation, and particularly of the human species, require the respiration of pure air, otherwise they perish. The experiments of Jenner and Baron, have shown, that if young animals be deprived of their open range, and especially if the character of their nourishment be modified, a foundation is laid for disorganization and death. A family of young rabbits was placed in a confined situation, and fed with coarse green food—such as cabbage and grass. They were perfectly healthy when put up. In about a month, one of them died; the primary step of disorganization was evinced by a number of transparent vesicles, studded over the external surface of the liver. In another, which died nine days after, the disease had advanced to the formation of tubercles in the liver. The liver of a third, which died four days later, had nearly lost its true structure, so universally was it pervaded by tubercles. Two days subsequently, a fourth died; a considerable number of hydatids was attached to the lower surface of the liver. At this time, three young rabbits were removed from the place, where their companions had died, to another situation, dry and clean, and to their proper and accustomed food. The lives of these three were obviously saved by the change. Similar results were obtained from experiments of the same nature performed on other animals. It can hence be understood, that where an individual has tubercles already present in the lungs, confinement to a chamber, with a regulated temperature during the winter season, may be obnoxious to weighty objections, owing to the greater or less degree of vitiation of the air of the apartment; and, accordingly,—as will be shown hereafter,—it has been recommended to send the consumptive invalid abroad, in the winter season, when the air is dry, although it may be cold, rather than to adopt this questionable procedure. It can be further understood, that such occupations as those of the needle-pointer, dry grinder, stone mason, miner, collier, feather dresser, cotton manufacturer, &c., may act, at least, as exciting agencies, and probably lay the foundation of phthisis; for, although it has been questioned, whether the consolidation of the lung, which is found in such cases, be really tuberculous, the difference, as remarked by Dr. C. J. B. Williams, is

so slight, that they can scarcely be separated. Very recently, Dr. G. Calvert Howard, of Sheffield, England, has stated, that the influence of gritty and metallic particles on the respiratory organs is rather to induce two important structural changes—an enlargement of the bronchial tubes, and an expansion of the pulmonary tissue. These are not invariable effects, but they are produced in an immense number of instances. Dr. Alison affirms, that there is hardly an instance of a mason, regularly employed in hewing stones, in Edinburgh, who lives free from phthisical symptoms to the age of fifty. Under such circumstances, extraneous particles have often been found in the indurated lung. In workers in coal mines, the texture of the lungs has been completely blackened by coal dust, so as to constitute *anthracosis*. In the case of the steel workers at Sheffield, we are told by Mr. Knight, that the fork grinders, who grind dry, so that the particles are readily received into the air, do not reach the age of thirty-two; whilst the knife grinders, who work on wet stones, generally live to forty or fifty.

The results of the inquiries of different observers, as to the influence of trades and professions on the production of phthisis, have not been very accordant, and the difference has arisen partly, perhaps, from the circumstance of exposure to vicissitudes, to imperfect light and ventilation, and insufficient nutriment not having been always taken into sufficient consideration. For example, in Berri, in France, there is a village, in which almost all the inhabitants follow but one profession—that of makers of gun-flints, whence they have been called *Caillouteux*. Almost all these persons, according to M. Benoiston de Chateauneuf, die of phthisis, or at least few pass the age of 40 without affording evidences of tuberculosis. This has been attributed to particles of siliceous dust in the air passing into the lungs; but M. Andral, who visited the place, affirms that the dust of the flints can never reach the mouth, and cannot, therefore, be respired. He attributes the phthisis to the workmen being compelled to have their feet in constant contact with very cold stones. It has been presumed, that the inhalation of the fine particles, in the occupations above mentioned, can only act as an exciting cause, by developing predispositions that may have previously existed: it is certain, however, that the mortality from phthisis, in some of those employments, is much greater than in others in which the collateral circumstances would appear to be quite as unfavourable to the general health.

4. *Faulty alimentation* is doubtless, also, one of the important extrinsic causes of phthisis, and of the tuberculous condition. Exclusive vegetable diet, or a defective supply of animal food, has been regarded specially obnoxious; but much depends upon habit. If a person have been accustomed to a mixed diet of animal and vegetable food, and be subsequently restricted to either one or the other, his nutrition is apt to become impaired, and cachexia to be induced; but habitual diet has probably not much influence; and, that a free allowance of animal food does not alone prevent phthisis is shown by the circumstance, that in England, where the diet is perhaps more largely animal than in other countries of Europe, phthisis is probably

more frequent. It would not seem, however, that intemperance develops tubercles. Of 35 persons dying of various diseases, all of whom were decidedly intemperate, and most of them grossly so, in 26, according to Dr. J. B. S. Jackson, of Boston, no tubercles were found; in five there were tubercles in the lungs; in one in the bronchial glands; and only two died of phthisis. In several of the most striking, the organs were as free from tubercular disease as those of a newborn infant. These results have led Dr. Jackson to suggest, whether intemperance may not have some effect as a prophylactic. "The remedy," he adds, "to be sure, would be worse than the disease; but has it any such effect?" The author's experience would certainly lead him to similar conclusions.

5. *Influence of articles of dress.*—Where a female is predisposed to phthisis, irregularities of exposure to cold and moisture, of the body generally, but especially of parts that are habitually covered, may act as exciting causes. It has been generally, too, believed, that tight corsets may prove injurious, by preventing the due expansion of the chest, and in this manner favour the disease. When worn at an early age, and before the chest has undergone its full developement, they may prevent this, and thus act injuriously. Yet it has been affirmed on the high authority of M. Louis, that "the influence of clothing, and especially of corsets, on phthisis, is perhaps a mere assertion without proof."

b. *Intrinsic causes.* 1. *Constitution.*—It has been presumed, that the formation of tubercles in the lungs, as elsewhere, originates in a *tuberculous constitution or diathesis, Phthisiosis*;—and in *tuberculous cachexia, Tuberculosis, Morbus tuberculosus, Dyscrasia tuberculosa*; Fr. *Cachexie ou Dyscrasie tuberculeuse*; Ger. *Tuberkelkrankheit, Knotensucht*. The characteristics of this tuberculous constitution are chiefly those of the strumous or scrofulous;—fair skin, light hair, blue eyes, and thick upper lip. Along with these signs, there are often, also, long neck, narrow chest and projecting shoulders. So far, however, as the observation of the author goes, the large mass of the phthisical do not present these characters. In the published experience of one observer, Professor Morton of Philadelphia, almost two-thirds of the consumptive patients, who have fallen under his notice, have had dark hair, dark or sallow complexions, and dark eyes; and such has been the result of the author's observation. In the negro, both the scrofulous and the tuberculous constitution are often met with, and some of the most decided, and most rapid, cases of phthisis occur in them. In the United States, scrophula—at least in its ordinary glandular forms—cannot be considered as by any means common among the white inhabitants,—that is, if Great Britain be taken as the standard of comparison; but it is one of the diseases to which the black population are especially subject.

The tuberculous and the scrofulous constitution appear to be distinct, although congenerous;—an individual may have tubercles existing to a considerable extent in the lungs and other organs, without the usual indications of scrophula in the lymphatic glands or gan-

glions; and on the other hand, disease may be prominently developed in the latter, without any evidence of the presence of tubercles in any of the internal organs. Of *seventeen cases*, according to Mr. Phillips, of scrofulosis, where life had been destroyed by the exhaustion consequent upon profuse discharges from ulcerated surfaces and scrofulous caries, only *one* presented considerable tubercular deposition in the lungs, and only *nine* any traces of it. Of *eighty-six* cases of tubercular phthisis, only *one* exhibited any cicatrix or other evidence in the neck, the axilla or the groin, of having suffered from disease of the lymphatic ganglia of those regions. Of *three hundred and fifty-eight* cases of tuberculosis of the lung, that fell under the care of M. Louis, *thirty* were found to present more or less trace of the deposition of similar matter in the lymphatic ganglia.

Narrowness of the chest has been generally considered to afford a predisposition; but, according to M. Woillez, such is not the case, unless it is coupled with an incomplete developement of the transverse diameter; and therefore, it is incorrect to say, that subjects of small thoracic capacity are more liable than others to pulmonary tubercles.

According to some pathologists, a tuberculous constitution—natural or acquired—must always be present before any exciting cause can induce phthisis; according to others, the disease is a chronic inflammation of the pulmonary tissue, and may be developed in the absence of any such constitution. The former of these opinions appears to be most in accordance with observation and reflection.

2. *Age*.—It was at one time believed, that tubercles in the lungs and elsewhere prevail only in the adult age, and chiefly between 18 and 35; but it is now sufficiently established, that they may occur at all ages, and even in the fœtus in utero. From observations made in this country, as well as in Europe, it would appear, that the greatest number of deaths occurs between the ages of 20 and 30; the next in proportion between 30 and 40; the next between 40 and 50; the succeeding grade of mortality is sometimes placed between 15 and 20; at others between 50 and 60, or even above 60. This remarkable agreement of observers in different parts of the globe warrants the deduction, that after the fifteenth year, fully one-half of the deaths from phthisis occurs between the twentieth and fortieth years of age; and that the mortality from the disease is about its maximum at 30, and from that time gradually diminishes. M. Andral thinks, from his researches, that males, after puberty, are particularly liable to tubercles between the ages of 21 and 28, whilst females seem to be more exposed to them before 20; and M. Lombard is of opinion, that after the age of puberty females are most liable to tubercles between 18 and 20 years of age; and males between 20 and 25. From the New York report of interments for the year 1839, it appears, that, of 1315 registered cases of consumption, 31 occurred under the age of one year; 39, between 1 and 2 years; 58 between 2 and 5; 44 between 5 and 10; 67 between 10 and 20; 335 between 20 and 30; 318 between 30 and 40; 197 between 40 and 50; 127 between 50 and 60; 68 between 60 and 70; 25 between 70 and 80; and 6 between 80 and 90. The report of the Board of Health of Philadelphia, for the

same year, gives 708 deaths from pulmonary consumption; of which 24 occurred under one year; 15 from 1 to 2; 29 from 2 to 5; 13 from 5 to 10; 5 from 10 to 15; 36 from 15 to 20; 206 from 20 to 30; 164 from 30 to 40; 102 from 40 to 50; 55 from 50 to 60; 38 from 60 to 70; 17 from 70 to 80; 3 from 80 to 90; and 1 from 90 to 100.

3. *Sex.*—The influence of sex is not settled. The common opinion is, that females are more subject to phthisis, and such is the view of some excellent authorities. Of 9549 recorded cases of phthisis, according to M. Lombard, 5589 occurred in females, and 3960 in males. In Paris, according to a report of the *Conseil de Salubrité* and Chabrol's *Statistique de la ville de Paris*, the proportion of phthisical males to phthisical females was as 10 to 13·8. In certain other cities, however, of this country and Europe, the ratio was 10 males to from 8·7 to 8·9 females. At the adult age, when consumption chiefly prevails, the numbers of men and women living are nearly equal; yet in 1839, in England and Wales, 31·453 females, and 28·106 males died of this disease. The annual rate of mortality by it was—*males*, ·003722; *females*, ·004015: in 1838, it was—*males*, ·003783; *females*, ·004077. In New York, during the year 1839, the number of males was 704, and of females 611; or in the proportion of 10 males to 8·7 females nearly. In Philadelphia, on the other hand, during the same year, the number of deaths from phthisis was—of males 335, and of females 373,—or in the proportion of 10 males to about 11 females.

4. *Hereditary conformation.*—This is one of the most important of the causes of tuberculosis, and especially of tubercular phthisis. A patient, affected with tuberculous cachexia, entails on his offspring, not tubercles, but a predisposition to them, which may be warded off, by avoiding the exciting causes, but may be developed by causes, which would be entirely inoperative in one not so predisposed. It is important, therefore, in the history of any case, to discover, whether the parents or any member of the family have died of the same disease. It would not appear to be tuberculous cachexia alone in the parent which lays the foundation for this fatal malady in the offspring. There are several diseases, which have been supposed to produce the result, and the most frequent and important of these are disordered states of the digestive organs and their consequences;—indeed, any state of deteriorated health in the parent from any cause may give rise to this cachexia in the progeny.

5. *Inflammation of the respiratory organs, and other diseases.*—Mention has already been made of the supposed inflammatory origin of tubercles; and those remarks may be transferred to pulmonary consumption. The opinion of M. Broussais, that “the term phthisis pulmonalis, as it expresses only the disorganization, which is the product of inflammation of the pulmonary parenchyma, ought not to be applied to this phlegmasia,” and that “it would be better to call it *chronic pneumonia*, thus specifying the tissue of the organ in which the disease commenced,” expired almost with its promulgator; yet, there are still many, who consider that irritation or hyperæmia is, in

most cases, connected with tubercular formation and development. It is questionable, however, whether any greater irritation or hyperæmia exist in such cases, than in any other case of heterologous secretion.

It seems clear, that in order for inflammation of the air passages to be followed by the production of pulmonary tubercles, there must be a predisposition; and, if this be admitted, it can be readily conceived, that in one individual very slight bronchitis may be sufficient to produce tubercles, whilst others may not become phthisical from the most severe and long continued catarrh. At the same time, we can understand, that inflammatory affections of the air passages may, by persistence, induce the tuberculous constitution or cachexy, and, in this way, be not only the predisponent, but exciting, cause of phthisis.

Some light is thrown on the subject by recent researches of M. Andral into the condition of the blood in various diseases. He found, when tubercles were under the form of hard masses, without any sign of inflammation around them, the blood constantly exhibited, on analysis, its normal quantity of fibrin, but in proportion as they experienced softening, a process of elimination, similar in its character to the inflammatory process, was established around them; the blood became charged with a larger and larger quantity of fibrin; so that, he properly infers, the formation, in excess, of this principle is not dependent upon the development of the accidental product, but rather on the inflammation, which becomes associated with it at a certain period of its existence:—an additional fact—he adds—to many others, that the process which creates different accidental products is not of the same nature as that which constitutes inflammation. In all the cases of incipient tuberculosis the individual was, to a certain degree, anæmic, or the blood possessed a modification of composition like that which belongs to feeble constitutions, or those in which, owing to some cause, the vital forces have lost their energy. The quantity of globules was diminished. In proportion, too, as the tubercles progressed, the diminution of the globules became greater and greater; and when the lungs were filled with caverns, it attained its minimum: yet this diminution was never as great as in chlorosis. M. Andral has only seen a single case in which the proportion of globules was below 80 in 1000. In every other case it oscillated between 80 and 100. “Is it not singular to see,” he adds, “without any other appreciable alteration of the lung or of any other solid, the globules spontaneously descend in chlorosis to below 30; whilst their minimum remains at 72 in a disease, in which it might seem that the state of the lung could scarcely permit blood to be formed. And yet, not only the globules do not diminish as much as might be supposed; but when the lung is already in a great measure destroyed, the fibrin augments in quantity, and the temperature of the body may be elevated as in typhoid fever or acute pneumonia. I have seen it rise as high as 39° and 40° (cent.) in the hectic fever, which commonly attends the last stage of phthisis.”

Of thirty phthisical cases, whose blood was examined by M. Andral,

he heard in one only a *bruit de souffle* in the carotid arteries. This was in the case of an individual whose blood contained only 72 parts in the 1000 of globules.

Dr. Stokes separates phthisis into two classes—the *constitutional* and the *accidental*. In the first, tubercle supervenes either with or without precursory irritation, in persons strongly predisposed to it by hereditary disposition, or original conformation. In these, the disease is generally rapid, invades both lungs, and is complicated with lesions elsewhere. The disease is constitutional, and the affection of the lung, although the first perceived, seems only a link in the chain of morbid actions. In the second, the disease is met with in persons, not—he considers—of the strumous diathesis, and who have no hereditary predisposition to tubercle. In this case, it results from a distinct local pulmonary irritation, advances slowly, and the digestive and other systems show a great immunity from disease. In the accidental phthisis, the lesser tendency to abdominal and other complication allows time for the vital powers to act; whilst, in the constitutional variety, tubercle is commonly deposited throughout the body, and the patient dies rapidly in consequence of the extent of the disease.

Amongst the predisposing causes of tubercular phthisis have been reckoned syphilis, scurvy, rickets, &c., and hence the various epithets, *syphilitic*, *scorbutic*, &c. applied to it by some writers. It is questionable, however, whether these affections predispose to the disease in any other manner than by modifying the nutrition of the frame, and evidence is wanting to show, that they can have any agency in the causation of phthisis, unless the tubercular diathesis is present. In many cases, there is unquestionably mere correlation of existence.

Lastly, in regard to the causation of phthisis, a brief allusion is necessary to the notion, that it is capable of being communicated from one person to another. The author has had no adequate evidence, that it can be extended in this manner; yet, singular instances of the kind have been related by different writers, and if they prove nothing more, they exhibit strange coincidences. In Italy, the contagious nature of phthisis appears to be admitted by almost all. When an individual dies at Naples of the disease, in a private house, not only are his effects, and the furniture which he has used, destroyed, but the walls are scraped and whitewashed, and the ceilings, floors, and partitions removed. Similar views appear to be entertained at Rome, where phthisis is even more frequent than at Naples. Where such a sentiment prevails so extensively amongst the profession, it would appear arrogant to presume, that observation has been altogether erroneous. Certain it is, that the cases are rare, in this country, in which the communication of the disease from one person to another by contagion could even be suspected. It can be understood, however, that if a person be constantly breathing the generally deteriorated atmosphere of the rooms, which the consumptive occupy, by sleeping perhaps in the same bed, the health may ultimately suffer, tuberculous cachexy be induced, and ultimately confirmed phthisis.

Pathological characters.—The anatomical characters of pulmonary

tubercle have been so fully described in an early part of this section, that it is but necessary to refer to it. But, along with the morbid appearances presented in the lungs themselves, by those who have died of phthisis, there are others frequently met with in other parts of the body, which require mention. In the larynx and trachea, ulcerations, of different dimensions, frequently exist, with more or less redness of the mucous membrane. At times—as in a case recently under the author's care—the vocal cords are entirely destroyed, as well as the superior ligaments of the larynx. Ulcerations of the epiglottis are by no means uncommon, even when none exist in the larynx and trachea. They are generally on its laryngeal surface. From the statistical information contained in the last edition of the work of M. Louis on phthisis, (Paris, 1843,) it appears that in 190 cases, there were ulcerations in the trachea, in 76 cases; in 193 cases, ulcerations of the larynx in 63; in 134 cases, ulcerations of the epiglottis, 35; and in 49 cases, ulcerations of the bronchia, 22; these lesions were found much more frequently in males than in females:—why, it is impossible to say.

Adhesion between the lungs and the pleura is almost always observed to a greater or less extent. Where they are old, the bond of union is firm, and not readily lacerable; but where the inflammation has occurred a short time prior to dissolution, the false membrane may be soft, readily torn, and present the characters described under Pleurisy.

Phthisis has been ranked as one of the causes of aneurism of the heart, but it is not common to find any increase in the size of that organ. Atrophy of the heart is, indeed, more frequently met with than hypertrophy. The author has, in one or two instances, observed fibrinous concretions in the heart, dependent upon the difficult transmission of blood through the lungs, the presence of which was suspected, by auscultation, during life.

The spleen was found—in 90 observed cases—augmented in size, 16 times; diminished, 15 times; healthy, 59 times. Often, tubercles have been observed in it, especially in children.

In four-fifths of those who die of phthisis, the digestive organs, according to M. Louis, are found to exhibit more or less evidence of disease. Tubercles, in every degree of development, may be met with in nearly the whole extent of the small intestine below the duodenum; but they are more numerous near the cæcum than elsewhere. Ulcerations of the small intestine are still more common, and they, also, are more numerous, and more extensive and deep, the nearer we approach the cæcum. In 95 cases, tubercles were met with 36 times; ulcerations, 78 times. After the cicatrization of these ulcers, it has occasionally happened, that narrowness of the bowel has been induced, which has eventuated in death. In some cases, the intestine has been found perforated. The same morbid appearances are met with in the large intestine. The opinion has long been entertained, that fistula in ano is, in some measure, connected with the tuberculous cachexy or diathesis. The notion is, however, discarded by excellent observers, as by MM. Louis and Andral; the latter of whom

ascertained its existence only once in 800 tuberculous subjects; nor has the author had any reason to believe in the connexion. Professor Morton states, that he has met with four cases, in three of which fistula supervened so directly on the pulmonary symptoms, and so kept pace with them, that he "could scarcely consider its presence as an accidental coincidence."

The different lesions of the alimentary tube may occur simultaneously with those of the lung; but more commonly, the symptoms of intestinal inflammation and ulceration take place after the pulmonary mischief has made considerable progress.

The mesenteric glands, according to M. Louis, were found tuberculous 23 times, in 102 observed cases, and the glands most affected were those nearest the cæcum. The coexistence of tuberculosis of the lung and mesenteric glands is more frequent, however, in the child than in the adult. The cervical glands were found tubercular, and increased in size 8 times in 80 cases. The bronchial glands—as before remarked—may also be the seat of tubercles: under such circumstances, they are, usually, of greater size, and of a gray or blackish colour. The peritoneum, in many cases, is found to be affected with tubercular inflammation; or gray semitransparent granulations are met with in the membrane, or in layers of false membrane on its surface, both of which have been considered to be confined to phthisis, but the author has met with one case, in which the lungs were very slightly affected, although tubercles were numerous under the peritoneum. The most common morbid appearance, presented by the liver in phthisis, is the fatty transformation. In 120 cases, it was observed 40 times. The liver, in this condition, is pale, almost always of a light brownish yellow colour, and spotted with red externally and internally. Its volume is nearly always augmented, and, at times, to double its usual dimensions. The increase is almost always at the expense of the right lobe. The liver has been observed to overlap a large portion of the anterior surface of the stomach, to occupy the epigastrium, extend the breadth of two or three fingers below the false ribs, and reach the iliac crest and the spleen, which is occasionally covered. Its consistence is usually, in these cases, greatly diminished; and, in very advanced cases, the scalpel and the hands are greased, as by ordinary fatty substances.

The fatty transformation of the liver is almost confined to phthisis pulmonalis. Of 120 cases, observed by M. Louis, 40 were cases of phthisis. The change is much more common in the female than in the male; as, of the 49 cases above mentioned, ten only occurred in the latter. Tubercles and hydatid cysts have likewise been found in the livers of the phthisical. Generally, in those who are affected with the fatty transformation, the bile in the gall-bladder has a blackish colour and pitchy consistence, intermediate between that of a solid and a liquid body. In one case, tubercles were observed in the parietes of the gall-bladder, and in the biliary ducts. Very rarely, too, a small quantity of tuberculous matter, unsoftened, has been met with in the suprarenal capsules, and likewise in the kidneys.

Of 40 subjects, in whom the genital organs were examined, 3

exhibited tuberculous matter in the prostate; and it was found, at the same time, in the vesiculæ seminales and the vasa deferentia. In the female, tuberculous matter has, at times, been seen in the substance of the uterus, and in the ovaries.

Lastly. The arachnoid coat of the brain is often partially thickened, presenting more or less numerous granulations in its upper portion, especially near the falx. In three-fourths of the cases observed by Louis, the tissue, uniting the arachnoid to the pia mater, was infiltrated, and the ventricles distended by an appreciable quantity of serum. Hydatids and tubercles are, likewise, found in the encephalon, —rarely in the adult, but more frequently in the child.

Treatment.—Although cases of confirmed phthisis may be regarded as almost universally beyond the resources of art, much may be done in the way of palliation; and it is important to bear in mind, that solitary and circumscribed excavations have unquestionably cicatrized, or ceased to exert any influence. The chief indications, in the treatment of tuberculosis, are, 1, to diminish any local irritations, or hyperæmiæ that accompany and develope, if they do not lead to, the formation of tubercles; 2, to correct the condition of the system of nutrition, that constitutes the tuberculous cachexy; 3, to promote the removal of tubercles already deposited; and, lastly, to treat troublesome symptoms and accidental complications. Bearing these indications in mind in the subsequent remarks, the treatment may, for convenience, be divided into the *hygienic* and the *therapeutical*.

a. *Hygienic treatment.*—It has been stated, that the tuberculous constitution is often communicated by the parent to the progeny. In the way of hygiene, it is, therefore, important, that precautions should be taken by parents themselves, and every step be avoided, that can deteriorate their own general health. If more consideration were bestowed on matrimonial alliances, and a more healthy and natural mode of living were adopted, by persons in that station of life, which gives them the power of regulating their mode of living according to their own choice, the predisposition which is so often entailed upon their offspring might be checked, and even extinguished in their family, in the course of a few generations. "The children of dyspeptic persons," observes Sir James Clark, "generally become the subjects of dyspepsia in a greater degree, and at an earlier period than their parents; and if they marry into families of a delicate constitution, their offspring become highly tuberculous, and die of phthisis in early youth and even in childhood." These remarks are unquestionably just; but how impossible is it to regulate the feelings of individuals, so that any prudential restraints shall be regarded! Every practitioner who has been consulted respecting the propriety of marriage, where one or both of the parties have laboured under a disease, or a predisposition unquestionably hereditary in its nature, and who has given advice befitting the occasion, must, at times, have had the mortification to find his advice wholly disregarded, and that he has, at the same time, for ever lost the good opinion of both parties. On the part of the mother, care is, doubtless, demanded, for the plenary health of the offspring, during the period of gestation. But the pre-

vention of hereditary transmission regards rather the condition of both parents at the time of a fecundating union; for the predisposition is as often given by the male as by the female parent. If the tuberculous diathesis be induced during intra-uterine existence, it belongs to the class of acquired predispositions.

As respects children, born with a predisposition to tubercle, or who may have acquired the predisposition, although we are unacquainted with any direct remedies for it, we can frequently correct it indirectly,—by placing the child under circumstances most favourable to health; giving it proper nourishment with free exposure to air, under precautions that will always suggest themselves, and by proper exercise, warm clothing, and due attention to the removal of every source of irritation that may arise. After the period of puberty, when the danger of tuberculous development is shown to be greatest, the same system must be pursued; with frequent friction of the surface; warm bathing; exercise in the open air, especially on horseback, or on the water, and appropriate exercise of the respiratory organs, so as to expand the chest, and ensure the full play of the lungs;—as by taking deep and frequent inspirations; gymnastic exercises, which employ the muscles of the arms and chest; reading aloud, and public recitation under prudential restraints. Some, who have been predisposed to phthisis in early life,—amongst whom may be named Cicero and Cuvier,—have ascribed their exemption from pulmonary disease, to the increased strength which their lungs acquired in public speaking. (See the author's *Elements of Hygiène*, p. 436.)

It need hardly be added, that great caution is needed in the adaptation of both general and local exercise to the particular case; and always the use of instruments, which interfere with the healthy play of the respiratory function, must be sedulously avoided.

As regards therapeutical agents, to be employed for the prevention of phthisis, so much must depend upon the particular condition of the individual, that it is impossible to lay down any rule of universal, or even of general application. The practitioner must be guided by general principles of prevention, and there are numerous articles of the *Materia Medica*, possessed of the most different properties, which may occasionally be demanded.

The prophylactics, most to be prized, are such as improve the general health, and of these, change of air and of climate, appropriately applied, is, perhaps, the most effective; but as change of climate is to be recommended as a therapeutical measure also, it will be considered under the next subdivision.

Some experiments on the influence of different agents in preventing the development of tubercles have been recently made by M. Coster, and the details thereof laid before the Académie Royale de Médecine of Paris. He experimented upon dogs, rabbits, guinea pigs, and fowls, which he subjected to the most injurious hygienic influences; and to combat these administered iron, baryta, iodine, bromine, mercury, and tannin. The agent which always succeeded with him in the prevention of tubercles was a ferruginous bread, composed of half a

drachm of the subcarbonate of iron to a pound of bread. A quarter of a pound of the bread was taken in the day.

b. *Therapeutical Treatment.*—This is, unfortunately, difficult and unsatisfactory. When the disease is once fully formed, it is generally beyond the efforts of art; still, it must be borne in mind, that cicatrization of cavities is sometimes effected.

In the earlier periods of the disease, the practice, with many, has been to employ small and repeated bleedings; and the same course has even been pursued in the confirmed stage. Dovar was in the habit of bleeding to the amount of six or eight ounces every day, for the first fortnight, and of increasing the interval between each repetition of the operation, by employing it at the respective periods of every second, third, and fifth day, for the three successive fortnights; and the employment of small bleedings, although by no means to the same extent, has been advocated by others. That symptoms and complications may arise, which may demand general blood-letting, cannot be doubted; but to expect to remove tuberculosis by it is a great error. We feel satisfied, indeed, that much mischief is done by its indiscriminate employment, and that nothing is more likely, in many cases, to confirm the tubercular cachexia. At the same time, when the symptoms indicate the employment of the lancet—when inflammatory action or hyperæmia of the pulmonary tissues, is associated with the disease, it cannot be pretermitted.

Throughout the whole course of phthisis, local blood-letting by cupping or by leeches, practised with the view of removing accidental inflammatory or hyperæmic complications, may be had recourse to with marked benefit. Moderate local blood-letting by leeches below the clavicles has been recommended, whenever increase of pain, or cough, with a bloody tinge of the sputa, &c. indicate an hyperæmic or congested state of the lung, around the suspected indurations. In such cases, it is probable, that the local blood-letting acts rather as a revellent than as a depletive. It is, indeed, on revellents, that the hopes of the practitioner—slight as they may be—must mainly repose for the cure of phthisis.

Revulsion on the chest may be used in all stages of the disease—more care being demanded during the earlier periods, that too much irritation be not induced. Intermittent revulsion is preferable to the constant, in which latter class may be ranked the perpetual blisters, issues, setons, &c., which do not act by the discharge they induce, but by the counter-irritation. The author is in the habit of employing tartrate of antimony and potassa, in the form of ointment, or of saturated solution, which may be rubbed in below the clavicles, twice a day, until the peculiar eruption is induced. The friction is then to be discontinued, but it must be renewed as the crop of pustules disappears; or a fresh place may be selected, so that a new crop may be presenting itself as the former is fading. In rare cases—one of which is at present under the author's care,—the tartarized antimony induces much gastric uneasiness. The croton oil may be substituted, either rubbed on pure, or mixed with olive oil.

R.—Ol. tigllii, p. i.
Ol. oliv. p. ij.—M.

The iodide of potassium has been added to the saturated solution of the tartarized antimony, with the effect of rendering it more irritating, and, perhaps, according to Dr. Williams, of acting favourably on the constitution, by being partially absorbed. Issues and setons are considered to cause too much irritation of the system to be useful in the early stage; and in our view, their place may be supplied beneficially, in all stages, by the more efficacious and more cleanly applications.

Some practitioners prefer one revellent and some another;—blisters, applied from time to time; ammoniated liniments, of various degrees of strength; moxas; sponging the whole chest, once or twice a day, with salt and brandy, or strong vinegar, or with the *linimentum cantharides* of the U. S. Pharmacopœia—which consists of oil of turpentine and cantharides—or with a liniment of oil of turpentine and acetic acid, as recommended in bronchitis.

R.—Ol. tereb. f 3ij.
Acid. acetic. f 3ss.
Vitell. ovi.
Aq. rosar. f 3iiss.
Ol. limon. f 3j.—M.

One objection to the use of many of these agents is, that they interfere with the physical diagnosis; but they may be so managed, in all cases, by the selection of proper parts of the chest, as to obviate this in a great measure.

Purgatives and emetics have been highly extolled by many writers. Their beneficial agency, also, is probably altogether revellent. An objection—urged against the former—is, that the intestines are disposed to inflammation, purgatives may hasten or exasperate it; but a more important objection is, that their imprudent use—by deteriorating the general health—may add to the tubercular mischief. They are now rarely employed, except under circumstances in which they would be had recourse to in most diseases—viz. as simple evacuants.

Emetics were, at one time, regarded as specifics in phthisis; and a great majority of the reputed cures of consumption, related by different authors, have either been ascribed to emetics, or to decidedly nauseating remedies. The practice has been sanctioned by many therapeutists. Sir James Clark, who is an advocate for the use of emetics, supposes their action to be, in a great measure, mechanical, by destroying the tuberculous matter, which, according to Dr. Carswell, is first deposited on the free surface of mucous membranes. Emetics, Sir James conceives—may remove this deposit, by the succussion they give to the lungs; and thus may “prevent the *localization* of the disease, and give time for the correction of the constitutional disorder.” The examinations of the author, however,—as elsewhere stated,—have by no means led him to agree with Dr. Carswell as to the primary seat of tubercle; and, besides, this explanation of the *modus operandi* of emetics must be regarded as entirely too mechanical. The main salutary agency has appeared to the

author to be ascribable to the revulsion, which they operate; and hence the advantages of sea sickness, united—as it usually is—with the revulsion, which a thorough change of the physical and moral influences around the individual is capable of effecting.

Different emetics have been recommended. Some give half a grain of the tartrate of antimony and potassa, and repeat it in fifteen minutes, if necessary. Others use ipecacuanha, or the more direct emetics,—sulphate of zinc or sulphate of copper. The repetition of the emetic,—according to the author last cited,—must be regulated by the nature of the case. When it is given with the view of preventing the deposition of tuberculous matter, it may, perhaps, be sufficient to repeat it once or twice in the week. When the case is more urgent, and the patient threatened immediately with the deposition of tuberculous matter in the lungs, or when the presence of such matter is already suspected, emetics, he remarks, may be much more frequently repeated; but, in all cases, it will be necessary to watch their effects on the gastric system, and to suspend their use, should they appear to excite irritation there. It will be readily understood, that their indiscriminate employment may tend rather to develop the mischief they are intended to prevent. Owing to this cause, and to their unmanageable character, they are not much employed, notwithstanding the high authority adduced in their favour.

The tubercular depositions themselves, as well as the morbid consolidations, could not fail to suggest the use of some agent, which might be regarded as possessed of properties to modify the condition of the system of nutrition. The efficacy of iodine in the removal of bronchocele, and in certain strumous affections, naturally gave rise to the belief, that it might be serviceable in tuberculosis. In mesenteric tubercles, it is affirmed to have been given with success. It has also been much used in pulmonary tubercles by many practitioners, and, according to some, with the effect of removing the tubercular depositions. The experience of most practitioners has, however, shown, that it is of no marked advantage, even in the incipient stage of the disease,—the stage in which, alone, much good is to be expected from any remedy. The author has used it to a considerable extent, especially in public practice,—in the form of the ioduretted iodide of potassium,—which, by the way, is as valuable a form as any,*—in that of the iodide of potassium,—of the tincture of iodine; of the iodo-hydrargyrate of potassium, the iodides of mercury, &c.; but the most careful and unprejudiced examination has not enabled him to say, that any beneficial effect was induced, which could be unhesitatingly referred to these preparations. In the Baltimore Infirmary, and the Philadelphia Hospital, it was a question of interest with both physician and student to determine this point; and such, unfortunately, was the negative opinion formed.

* R.—Iodin. ℞j.

Potassii iodid. ℞ij.

Aq. destillat. f ʒvij.—M.

Dose, 10 drops, three times a day, in sugared water.

Codliver oil—*Oleum jecoris aselli*—which contains, it is affirmed, a

minute quantity of iodine, and which has been highly extolled in scrofula, has been given in tuberculosis, and, it is asserted, with advantage. The dose to an adult is from half a spoonful to three spoonfuls, two or three times a day, in coffee or with lemon juice, or in the form of emulsion. Of its effects, the author has had no experience. It is an extremely nauseous article.

Alkalies have frequently been recommended in tuberculosis of the lungs; and they have been brought forward with high encomiums by a recent writer, Dr. J. S. Campbell. He recommends the liquor potass., in the dose of f 3ss. to f 3j., three or four times a day in milk or water; care being taken, that no medicine which might convert it into a salt is prescribed simultaneously, and that it be persevered in for a long time. Very recently, Dr. John Hastings has urged upon the profession the use of naphtha in these cases. He was led to adopt it from chemical considerations. From the greasy nature of tubercle, in its crude state, he concluded, that carbon entered largely into its formation, and that its composition had a striking resemblance to fatty matter. Among the changes in the earlier stages of pulmonary consumption, the disappearance of the fat is one of the most remarkable. In consequence of this loss of fat, Dr. Hastings determined to employ those compound agents, rich in carbon and hydrogen, which had not been previously used in medicine; not with the idea that they would make up the deficiency, which the system had sustained in the progress of the disease, but that such a change would by that means be introduced into the constitution as would act upon the forces of the organism at the point of departure from health, whether that took place in the stomach, blood, or elsewhere; that change tending to such an affinity in the elements within the body, that the carbon, hydrogen, oxygen and nitrogen, instead of assisting in the formation of products which threaten life, would tend to develop those materials only which are required for the perpetuation of health, and the prolongation of existence." Under these views, Dr. Hastings was led to employ naphtha,—the kind termed *pyro-acetic spirit*, obtained by the destructive distillation of an acetate, and in its outward form scarcely distinguishable from *pyroxylic spirit*, being that which he considers best suited for this purpose. He prescribes it three times a day, in doses of fifteen drops for an adult, mixed with a tablespoonful of water, which is proportionably decreased according as the patient approaches youth. After the second or third day, the dose is augmented by about one fourth,—regulating its increase or decrease according to the increase or decrease of nausea, vomiting, or any other outward symptom referable to its use. As the disease advances, the dose is increased to forty and even fifty drops, and it is administered four times a day instead of three. The naphtha was also used in the form of inhalation.

The author has had, as yet, no opportunity of testing the value of the naphtha. As a revellent, it will probably rank with codliver oil, and some of the other articles that have been mentioned. He can scarcely indulge the hope, that it will be found capable of accomplishing more.

Contrary to the sentiments of most members of the profession,

mercury, pushed to salivation, has of late been advised, on the authority of Dr. Graves, for the cure of incipient phthisis, and several cases, it is affirmed by Dr. Stokes and Dr. Munk, were thus treated successfully, which would in all probability, have ended in confirmed phthisis. Dr. Stokes properly remarks, however, that he is any thing but sanguine regarding the general employment of mercury in incipient phthisis; and that "the remedy is a two-edged sword, and its exhibition must not be lightly attempted." It is, indeed, "*anceps remedium*." In confirmed phthisis, nothing can be expected from it: generally, in this stage, the powers of the system require support under the extensive suppuration and irritation. This can be best afforded by appropriate diet; but it may be aided by any of the vegetable tonics, of which the *prunus Virginiana*, (*Infus pruni Virginian.* 3iss. ter die,) is one of the best. It is presumed to possess sedative as well as tonic properties, and it certainly enjoys the latter. The iodide of iron,—either alone, or taken at periods distinct from the *prunus virginiana*,—is also a useful preparation; (*liq. ferri iodidi*, gtt. xx. ter die.) It is obvious, however, that these agents can only act as palliatives.

As substances can be readily made to come in contact with the whole of the air tubes along with the air of inspiration, inhalations naturally suggested themselves in the treatment of phthisis. Of dry fumigations, with resinous and balsamic substances, and with tar, the author can say little from experience. It is not easy to conceive, however, that they can be of much use. The vapour of tar was at one time highly recommended. It is diffused through the patient's chamber, by heating the tar to gentle ebullition, with a little carbonate of potassa, to retain the irritating pyroligneous acid. In chronic bronchitis, the application of a gentle excitant to the vessels themselves, which are concerned in the secretion, may be, and often is, beneficial; but in that disease, there is no adventitious product to be softened and broken down as in incipient phthisis. Under Chronic Bronchitis, allusion has already been made to the effect produced by the internal use of both tar water and creasote, and to their agency in phthisis also. The results of trials with both these agents in the latter disease have been discordant. The inhalation of aqueous and medicated vapours is not more advantageous, and they by no means compensate for the labour necessary in the process. It has been properly suggested, however, that when the air of the chamber is too dry, advantage may be derived from placing a basin of warm water near the patient. Chlorine has been much used in the way of inhalation, and, according to the testimony of some, with advantage. The experiments with it, instituted at La Charité and the Hôtel Dieu, of Paris, as well as the testimony of different observers, are not encouraging. It produced increase of bronchial irritation, and arrested the pulmonary secretion. Chlorine, like iodine, may be inhaled from a common dish or inhaling apparatus, by dropping any of the acids on a mixture of chloride of lime, so that the chlorine may be disengaged slowly; but the best method is by the apparatus devised by Dr. Corrigan. (See the author's *New Remedies*, 4th edit. p. 150, Philada. 1843.) The inhalation may be repeated twice a day or

oftener. Iodine has been also recommended in the form of vapour. The addition of a little tincture of conium was found by Sir Charles Scudamore to be beneficial in subduing the irritating qualities of the gas. His formula is the following :—

R.—Iodin. gr. viij.
Potass. iodid. gr. iij.
Alcohol. f 3ss.
Aq. destillat. f 3vss.—M.

Of this solution, from one drachm to six, and from 20 to 35 minims of a saturated tincture of conium are used in each inhalation, which is continued from 30 to 40 minutes. Sir Charles considers it better to add the conium at the time of employing the inhalation. At the temperature of 90°, the volatile properties of iodine are given off very sensibly, but the conium requires more heat, and the temperature of 120° is not too much for the iodine.

The author's experience is not favourable to the iodine in this form, and such has been the case with that of others. It has been suggested by Mr. A. Leigh, to apply a sufficient quantity of iodine ointment on the ribs, and under both axillæ, and to cover the head with the bed-clothes, in order that the iodine, volatilized by the heat of the axillæ, may be breathed. This method is stated to have arrested the progress of the disease.

None of these agents can be expected to afford much benefit. If they modify the local symptoms, it can only be to a slight extent, whilst they leave the tuberculous constitution unchanged. Too often, indeed, all that can be done is to palliate the distressing symptoms.

One of the most judicious therapeutists of the day, M. Trousseau, has advised the employment of the arsenious acid in phthisis, in the way of inhalation. The remedy is not new,—the sulphuret of arsenic having been administered, in fumigation, centuries ago. M. Trousseau recommends that the arsenious acid should be used in the form of *Cigarettes arsénicales*, which are made in the following manner:—a sheet of white paper is dipped in a solution of one part of arseniate of soda, and thirty parts of water. The paper is then made into small cigars of the length of a finger, and the patient is directed to smoke one or even two daily, so that the fumes may pass into the lungs. The cigars burn readily, the arseniate facilitating the combustion; and, in this manner, “the empyreumatic oil of the paper is inhaled, united with the metallic arsenic, reduced by the contact of the charcoal formed by the burning of the cigar.” M. Trousseau does not pretend to cure pulmonary tubercles by this agent, but he thinks the general symptoms may be so far modified by it, as to produce decided improvement in the condition of the patient; which, however, is questionable.

The cough, when very troublesome, must be met by the remedies laid down under Bronchitis. When there is much accompanying irritation in the early stages, simple mucilaginous or oily mixtures are to be preferred; in after periods, narcotic mixtures become indispensable.

R.—Mucilag. acaciæ.
 Syrup. simpl. aa f3ss.
 Morphicæ sulphat. seu acetat. gr. j.
 Aquæ, f3iv.—M.

Dose, a tablespoonful, when the cough is troublesome.

Where opiates disagree, hyoscyamus, conium or belladonna may be substituted. By many, the hydrocyanic acid has been highly recommended, alone, or united with opiates.

R.—Acid. hydrocyan. medicin. ℞xij.
 Morphicæ sulphat. seu acetat. gr. j.
 Syrup. f3ss.
 Aquæ, f3v.—M.

Dose, a tablespoonful, three or four times a day.

When these agents fail, two or three leeches, applied over the larynx or trachea, will, at times, prove successful; and in some chronic cases, Dr. Stokes asserts, that he has found the common antispasmodic mixture of camphor, valerian, opium, ammonia, and ether give the greatest relief,—doubtless, by the new impressions which these agents occasion in the manner of all reputed antispasmodics and expectorants, that are possessed of excitant properties. He cautions the practitioner, however, to be careful in the employment of remedies, that may check expectoration, “as it is the natural relief of the lung;”—a pathological view, which may be questioned; although all may be disposed to admit, that the new irritation, induced by improper excitant agencies, may be prejudicial. As to the *modus operandi* of reputed expectorants, the author's views have been expressed elsewhere. They are all relative agents, and must be adapted to the precise morbid condition, which, in one case, diminishes, and, in another, augments, beyond the due bounds, the secretion of the materials that constitute the sputa.

The pain, frequently experienced in some part of the thorax, may be met by a small bleeding from the arm, or by leeching, or cupping—with or without the scarificator, according to the case: or simple revellents, as sinapisms, or a burgundy pitch plaster, or one to which cantharides or tartarized antimony has been added may be applied over the seat of pain.

The dyspnœa, which appears in exacerbations, is, in part, a nervous phenomenon, and must be treated either by narcotics, which overpower the nervous erethism, or by excitants, which induce a new impression, and thus act as antispasmodics;—for example, by sinapisms to the chest; and the preparations of ether and camphor internally.

R.—Sp. æther. sulphuric. comp. f3iij.
 Morphicæ sulphat. seu acetat. gr. j.
 Mist. camphor. f3v.—M.

Dose, a tablespoonful, when the dyspnœa is urgent.

In cases of acute phthisis, where the skin is constantly warm, and the pulse exhibits permanent excitement,—in addition to general antiphlogistic treatment, and ablution of the arms with tepid water, digitalis has been proposed; and, at one time, its efficacy was thought to be undoubted in phthisis in general. It is difficult, however, to pro-

nounce a decided opinion upon its agency in this disease, but the very difficulty shows, that it has been probably greatly overrated—in many instances at least. The author has employed it extensively in public and private practice; but although the pulmonic symptoms have appeared to be suspended, whilst the system was under its peculiar influence, he is not aware of a single case in which it seemed to produce permanent benefit; and the same may be said of the tinctures of lobelia and colchicum. They seem to be indicated, where there is unusual excitement, which they are well adapted, with other agents, to reduce.

Where the hectic fever returns, with distinct chills every evening, an inducement is given to attempt to arrest them by the preparations of cinchona. The author has seen this practice followed; but his experience has been the same as that of M. Andral; the chill has been removed, and perhaps the violence of the exacerbation diminished, but the heat and sweats have nevertheless persisted.

When hæmoptysis is present, the treatment will of course vary according to circumstances. The general mode of management has been given elsewhere, and need not be repeated.

For the colliquative sweats, many remedies have been proposed; chiefly belonging to the class of astringents,—mineral and vegetable. As the extent of the sweating is dependent upon that of the previous febrile exacerbation, attention must be paid to moderate the latter—by the cooling regimen; sleeping in a cool, airy apartment; changing the body and bed linen; avoiding diet of too stimulating character and, wherever it is practicable, permitting the patient to have the advantage of the open air during the day. Dr. Stokes strongly “denounces the attempt to moderate the hectic sweating by medicines merely, without attention to other circumstances.” The sweating, like the other symptoms of hectic, is but a symptom—an effect—which cannot be combated directly; and hence none of the remedies proposed, could be expected to afford much benefit. The author has employed the acetate of lead—the dilute sulphuric acid, alone, or combined with laudanum, and the various astringents, recommended in such cases; but the results have not been more satisfactory than those obtained by others. In recent times, the *boletus laricis* has been administered in these cases, and has received the favourable testimony of many therapeutists. It may be given in the form of pill,—three grains, three times a day. Andral was at one time disposed to speak favourably of it; but more recently he has affirmed, that no great advantage has appeared to him to have resulted from it.

Colliquative diarrhœa generally supervenes at so late a period of the disease, as to render all active treatment unadvisable. It is truly an inflammatory condition of the lining membrane of the intestines, which soon terminates in ulceration. It may be controlled by attention to diet; allowing only mucilaginous and farinaceous aliments; and, in the early stage, by the ordinary cretaceous and opiate medicines advised in diarrhœa. Should these fail, the mineral astringents—acetate of lead, or nitrate of silver—with or without

opium,* may be administered, and injections of starch and laudanum, or of infusion of catechu and laudanum, may be given twice a day, or, if necessary, after every liquid evacuation. The infusions of catechu and kino may, likewise, be administered internally, in the same cases.

* R.—Plumbi acetat. gr. ij. seu
Argenti. nitrat. gr. j.
Opii, gr. ʒ.
Ext. gentian. gr. ij. fiat pilula.
Dose, one, three or four times a day.

When these agents have failed, the most marked advantage has been derived from the application of a sinapism or a blister to the abdomen. The blistered surface may be sprinkled with the sulphate or the acetate of morphia.

It remains to speak of a mode of revulsion, which is one of the most important that can be advised in phthisis—the new impressions made on the system by change of air and of climate. If the circumstances of the patient do not permit him, in the early period of the disease, or even before it manifests itself—except by his known tuberculous constitution—to leave the situation, which he inhabits, for another, he should endeavour to take, daily, such exercise as he is able, short of inducing fatigue. If he be the resident of a town, let him seek the air of the country during the day, and return, if compelled, to the city at night; but if he be capable of changing the whole of the circumstances surrounding him, he ought not to hesitate to migrate—especially during the winter—from the temperate regions of the globe to a more genial clime. Even in the confirmed stage of phthisis, where the excavations are small, and the disease probably limited, and not progressive, benefit may accrue from this course; but in the generality of cases of confirmed consumption, it is the height of cruelty to expatriate the sufferer, and to send him away to die far from his friends, his comforts and his home. Even in the slighter cases, little or no benefit is to be derived from a brief expatriation; and it is of importance to impress upon the mind of the patient and his friends, that if the measure is to be attended with favourable effects, it ought to be continued for several successive years, in order to produce a full and permanent influence upon the constitution. “In a case,” says Dr. Stokes, “with a cavity, yet in which the symptoms and signs are not progressive, the patient’s best chance, I believe to be, the use of the seton and travelling. If he does not recover, his life will probably be prolonged. He should take as little medicine as possible; he should adopt all strengthening means, and use such a regimen as experience points out as the best. Heated rooms, cough mixtures, acid draughts, inhalations, narcotics, ‘repeated counter-irritation,’ and all the varied and harassing treatment, which ignorance supposes to be curative—these are not the means of recovery. So long as a drain from the chest does not weaken, it is clearly useful, and all the other means should be calculated to give enjoyment to the mind, and to strengthen the body. The patient’s winter residence should be, if possible, in a temperate climate; but his occu-

pation, in summer and autumn months, should be travelling. The temperate, and even colder countries, may be visited with advantage." There is no doubt of the general truth of these observations, but the intelligent writer will find, if he employs the "repeated counter-irritation," to which he objects, that it is infinitely less harassing, and more effectual, than the seton, which is at all times a most uncleanly and inconvenient accompaniment.

So satisfied is the author, that the good effects of change of climate are altogether dependent upon the revulsion produced on the *physique* as well as the *moral*, that instead of selecting a situation for the brumal retreat of the invalid, which has equability of temperature as its sole recommendation, he would rather choose one, the temperature of which may be less equable, provided it be not too elevated, as in the torrid regions, or provided the air be not damp. The great object is to select one, in which the phthisical valetudinarian can take exercise with safety in the open air, every day during the winter; and the nearer the climate approaches this desideratum, the better it is for the consumptive. In such an atmosphere, the patient ought to be as much in the open air as possible, and take exercise, both by walking and riding, short of inducing much fatigue.

Of the places abroad, which are esteemed eminently adapted as sanatoria for the consumptive, Madeira has the favourable testimony of most persons. In Italy, Rome, Pisa and Nice are preferred; but no part of Italy is considered to be appropriate during summer. The islands of Hyères, being sheltered from the north wind, are much frequented. "The south of France," says a competent observer, M. Andral, "ought only to be recommended as winter residences; for the summer there is fatal to the consumptive. Avoid Marseilles, the whole shore of the Mediterranean; avoid Montpellier, Pau and Bayonne." In England, Penzance, Torquay, Undercliff (in the Isle of Wight), Clifton, Hastings, St. Leonards, and Brighton, have been recommended, and, within the last few years, Cove, in Ireland, has attained great celebrity. In equability of temperature, the Cove of Cork would, indeed, seem to be surpassed by but few places. Observations, according to Dr. Stokes, have shown, that the mean difference of days and nights rarely exceeds four or five degrees, and often, in the winter months, does not exceed one degree. The town is completely sheltered from the north wind, and owing to its southern exposures receives the full influence of the sun and the southern breeze.

Recent observations show that the climate of Algeria is exceedingly favourable to the phthisical valetudinarian. According to M. Moreau, who was at the time physician to the French army of Africa, among 6245 patients, 12 only figured as attacked with consumption; and in 250 deaths there were but 6 from that disease. His experience, indeed, warrants him in deducing,—*first*, that consumption is extremely rare amongst the inhabitants; *secondly*, that Europeans are rarely affected by it; and, *thirdly*, that the progress of the disease is retarded in consumptive Europeans who reside in Africa. M. Boudin, also, affirms, that of 12,853 patients whom he has treated, either in

the army of Africa, or at the Lazaretto of Marseilles (after their return from Africa,) he has met with only 31 cases of consumption, of whom 25 had incontestably been previously affected with tuberculosis. Still more recently, M. Casimir Broussais has stated to the *Académie Royale de Médecine*, of Paris, that the mortality amongst the civil population of Algeria is 1 in 15, whilst in Paris it is 1 in 5; amongst the Jews, the mortality is 1 in 56; and amongst the Arabs and Turks, 1 in 20, as far as could be ascertained. In combating the objection, that individuals dying by fever and dysentery might, had they lived, been subsequently carried off by phthisis, M. Broussais added, "that tubercles, even in a crude state, are never found in Algiers in patients dying of any other disease than consumption."

It has long been remarked, that marshy countries, which are favourable to the production of intermittents, are unfavourable to the production of phthisis; and hence, amongst the prophylactic remedies against the latter disease, it has been advised to send patients to localities where intermittents prevail,—for example, to the isles of Hyères; the neighbourhood of Pisa and Rome; the Ionian isles; the shores of the Morea; the neighbourhood of Cadiz; South Holland; the aguish districts of England, &c. &c. It has been remarked, also, by M. Boudin, that the comparative immunity from tubercular phthisis in Algeria prevails only on the sea-coast, where it is marshy. The doctrine of the antagonism between intermittent and phthisical localities has not, however, been universally admitted; and, indeed, has been combated recently by MM. Bonnefont and Levy. The former asserts that at Rome the ratio of persons who die of phthisis is nearly equal to that of Paris. M. Levy also stated to the *Académie*, that at Strasbourg, surrounded by marshes, phthisis and intermittents prevail; and that he had met with various instances of phthisis in the marshy lands of both Corsica and Greece. In regard to the prevalence of the two diseases at Strasbourg, it was asserted, at a subsequent meeting of the *Académie*, by M. Boudin, that whilst he acknowledged the prevalence of both phthisis and intermittents at Strasbourg, the precise localities of their origin appeared to be different,—one being endemic only in the marshy districts without the walls, and the other in the citadel alone.

In the present state of our knowledge, it is therefore impracticable to pronounce positively on this interesting subject. Sufficient testimony has been afforded, however, to show, that some marshy situations where intermittents prevail are much more exempt from phthisis than other situations in which intermittents are unknown.

In point of climate, the Bermudas and the Canary Islands would appear to approach nearest to that of Madeira. To the climate of the West Indies, Dr. Stokes has strong objections. That of Santa Cruz especially, has, however, been recommended by many. Perhaps, in the territory of Florida, situations may be met with, which possess every advantage, so far as regards atmospheric influences, which the valetudinarian could desire; and if it be granted, that there are objections to St. Augustine on the score of the north-

east storms to which it is liable, these objections do not equally apply to Pensacola and to places in the interior.

The remarks, thus far made, have relation to the course to be pursued by the valetudinarian during the winter. It is often, however, an important subject of inquiry to decide as to the course to be pursued by him during the summer season. Where the mischief is incipient, there is nothing perhaps comparable to the revulsion, which the change of physical and moral influences, during a sea voyage, is capable of effecting; and even in the more advanced stages, life has appeared to be prolonged by it. The facilities are so great for crossing the Atlantic, that a sea voyage to Europe is easily undertaken, with every comfort provided that is practicable; and from the commencement of May, no countries perhaps could afford greater advantages for a summer journey, and a temporary residence, than Great Britain or France. The invalid can remain some weeks in either, and return to his own country before the autumnal vicissitudes are experienced to any extent, so that he may be ready to make any arrangements that may be advisable for the winter. So salutary has been the influence of sea voyages in consumptive diseases, that it has not been esteemed an idle or foolish proposal to have a ship fitted out for the express purpose of taking phthisical invalids to sea, and keeping there for months or even years.

Next to a sea voyage during the summer, travelling by land, through different parts of this country, may be recommended; and now that the distance between different places has been so much reduced by railroads and steam navigation, a thorough change of atmospheric influences—barometric, hygrometric, thermometric, &c.—can be speedily obtained, with all the other advantages of change of society and scenery, attendant upon travelling exercise. The physician must, however, use his best judgment in adapting his advice to the particular case, employing special caution where the excavations exist to any great extent. Pamphlets have appeared strongly recommending the Red Sulphur Springs of Virginia to the invalid during the summer season; and in many pulmonary affections, in which change of air, scenery, and appropriate mineral waters are indicated, few situations appear to offer more advantage. Possessing a delightful climate, and with accommodations well adapted for the comfort of the valetudinarian, it is an excellent retreat for all those for whom travelling air and exercise are deemed advisable, no matter whether or not its waters may possess the power of diminishing the frequency of the pulse, as is affirmed by some, but denied by other observers. Were they, indeed, possessed of this virtue, they would not be applicable to all cases of phthisis; but where the waters failed, the admirable climate, with all the attendant advantages, would not the less exert its beneficial agency.

Attention has been recently directed by Professor Drake, of Louisville, to the northern lakes of this country as a summer residence for invalids of the south. A tour to these is said to offer advantages of novelty, great variety, magnificent scenery, a pure cool air, and many interesting historical associations.

In judging of the sanitarium best adapted for the phthisical, it need scarcely be said, that the capability of affording the requisite accommodations must always be considered. It matters not what may be the advantages of climate, unless they can be properly enjoyed.

As a succedaneum for change of climate during the winter season, a regulated temperature has been advised in the apartments of the sick. The best course, perhaps,—where this plan is adopted,—is, to accommodate the temperature to the feelings of the patient. As a general rule, a temperature of 70° to 76° will answer every purpose. The air of the chamber becomes, however, so vitiated, and proper ventilation so difficult in the depth of winter, and there is, withal, so much monotony in every thing surrounding the invalid, that more of detriment would appear to arise from these circumstances than of good from the equability of temperature. This has, in part, led to the recommendation of vigorous exercise, and exposure to the air, as the most efficient remedies in tubercular consumption,—the exercise to be pushed so as to amount even to labour, and the patient not to allow the dread of taking cold to confine him on every occasion, when the temperature may be low, or the skies overcast. The general rule should be, to take exercise in the open air, whenever it is dry, and the temperature—even if cool—tolerably equable. The late Dr. Parrish always ascribed his recovery from phthisis at an early period of his life to the adoption of this course; and his impressions were probably just, as, on dissection, evidences of cicatrization of the lung were perceptible. On several occasions, the author has advised this plan, and has never witnessed any disadvantage to accrue from it. On the contrary, the invalid has always appeared to be benefited by the revulsion. At every exacerbation of his complaint,—as Dr. Billing has remarked—he says he has “caught fresh cold,” but the same thing happens when he is kept in rooms the temperature of which is regulated by the thermometer.

On the subjects of climate and change of air, the author has entered at length in his *Elements of Hygiène*, and in the article *Atmosphere*, of the *American Cyclopædia of Medicine and Surgery*, to which the reader is referred for further information.

It yet remains to mention the diet adapted for the consumptive. In the first stage, it ought to be mild and unirritating, consisting chiefly of milk and the various farinaceous aliments; and, if the patient has been accustomed to indulge freely in animal food, it may be allowed in moderation. Always let it be borne in mind, that the pathological state of tuberculosis, as of scrophulosis, when uncomplicated by inflammation or hyperæmia, is simply, perhaps, one of defective and depraved nutrition. As the disease advances, the same kind of diet may be persevered in, subject to modifications to suit the particular case. It has been advised by some, that from the very inception of the disease, the diet should consist of beef-steaks and porter, freely allowed. The author's experience would warrant him in saying, that, as a general rule, a liberal and nutritive diet answers best; but great care must be taken in passing to extremes, and in converting a *general* into a *universal* rule. The jellies of the Iceland moss—*Cetraria Islandica*,

and of the Carrageen or Irish moss—*Chondrus crispus*—are bland and nutritious.

R.—Chondr. crispi, ℥ss.

Lactis recent. f℥ix.

Coque ad 3v. et adde

Sacchar. alb. ℥ss.—℥j.

To be taken in the course of the day.

To these, any dietetic or remedial agent may be added, which is considered to be indicated.

Preference has been given to asses' and to goats' milk over that of the cow, and in Europe much expense is often incurred to procure them. There is, however, no sufficient reason for the belief, that they are possessed of any advantages, which cannot be obtained from cow's milk. A notion existed, that the goat should be first of all fed on aromatic plants, but this is now exploded, and properly so. It was also believed at one time, that the white snail, swallowed raw and in quantities, was not only a hygienic but a therapeutical agent in phthisis, and it was brought forward with high pretensions in the 17th century. Except by the unprofessional, it had, however, been almost universally abandoned, when its use was revived recently by a respectable French practitioner, M. Sue. It need scarcely be said, that the only effects snails can induce are those of any gelatinous and mucous aliment; and on this side of the Atlantic, they are considered to possess no advantages that could suggest their employment over less revolting articles of diet.

The free use of chloride of sodium or common salt has been recently recommended very highly in both phthisis pulmonalis and scrophulous affections. Half a drachm to a drachm is directed to be administered daily, either in a glass of beef-tea, or in some pectoral infusion. There can be no question, that the use of salt as a condiment will exert a favourable tonic influence, but nothing farther can be expected from it.

X. DISEASES OF THE BRONCHIAL GLANDS.

The bronchial glands or ganglions are seated around the bronchia, near where they dip into the tissue of the lung. Their colour is almost always black, and with them the few lymphatics, that arise from the superficial and deep-seated parts of the lungs, communicate. The efferent vessels of the glands have been traced into the thoracic duct. It is not uncommon to find these larger than usual, without there being any evidence of their morbid condition during life; and hence it has been concluded, that when hypertrophied, or otherwise diseased, they seldom produce any striking symptoms. It need scarcely be said, that if they are so large as to compress the bronchial tubes, they must interfere with breathing; still, the compression may be made so gradually, as to account for the very slight effect they induced on the breathing, in certain recorded cases. In children, they are frequently greatly enlarged by the deposition of tuberculous matter, and may give occasion to dyspnoea, and evidences of obstructed circulation. A writer on this subject, affirms, that he has never met with any

instance of stridulous breathing, or even bronchial compression, produced by their diseased condition; but Dr. Golding Bird, has recorded a case in which death appeared to him to have resulted by the constriction of the left bronchium by two enlarged bronchial glands, which prevented the entrance and exit of air as regarded the left lung:—the right, however, was so full of tubercles as to be incompetent to the task of arterializing the blood. Dr. Bird also states, that he has seen three other cases in which death occurred in the course of phthisis, where the existing disorganization was not sufficient to account for the fatal termination, and where pressure on the left bronchium existed:—in two, the constriction was produced by enlarged bronchial glands, and in one by an aneurismal tumour.

Tumours of the bronchial glands—it is affirmed—generally grow forwards; and Dr. C. J. B. Williams states, that he has often seen them pushing out the sternum or the ribs on one side, and causing dulness at those parts, and symptoms of displacement of the lung farther down; and that he has known them compress the great bronchia to a fatal extent. This must, however, be an extremely rare occurrence. The author has often known the glands largely hypertrophied in children of scrophulous habits, but there were no signs, that could lead to more than a suspicion, that this morbid state existed. The scrophulous diathesis may be accompanied with tuberculosis of the lungs, and no signs can enable us to pronounce positively, if evidences of compression of the bronchia exist, that such compression is owing to the enlargement of the bronchial glands. These scrophulous enlargements sometimes soften, and are evacuated by ulceration into the bronchia. The bronchial glands are sometimes, also, affected with encephalosis, and it has been suspected, that encephaloid disease of the lungs generally originates in this way, and spreads afterwards along the vessels into the pulmonary tissues.

If scrophulous disease of the bronchial glands be suspected, it may be treated as recommended under Scrophulous Cachexia.

CHAPTER III.

DISEASES OF THE PLEURA.

I. INFLAMMATION OF THE PLEURA.

SYNON. Pleuritis, Pleuresis, Pleuresia, Inflammatio pleuræ, Empresma pleuritis, Pleuris, Pleuritica febris, Passio pleuritica, Pleurisy; *Fr.* Pleurésie, Inflammation de la Plèvre, Fièvre pleurétique; *Ger.* Brustfellentzündung, Entzündung des Brustfells.

As the pleura is a serous membrane, the general phenomena, and anatomical characters of its inflammation, are similar to those of the peritoneum, and of serous membranes in general. The membrane, it will be borne in mind, lines the thorax—*Pleura costalis*,—and is reflected over the lungs—*Pleura pulmonalis*. Some difference, consequently, exists, in the phenomena presented by inflammation of the two portions; and when the disease is seated in the pleura pulmonalis—as in the case of the peritoneum—the phenomena are modified by the viscus over which the membrane is reflected.

a. *Acute Form.*—**Diagnosis.**—The main characters of this disease are,—acute pain in the side, or in some part of the thorax; cough; difficulty of breathing; fever; more or less dulness on percussion, with egophony, followed by enlargement of the affected side, and abolition of all sound of respiration and voice. Great variety, however, exists in the phenomena, which renders a farther inquiry into the character of the symptoms and signs necessary. Pain is one of the most constant symptoms, and, at one time, it would have been considered idle to suppose, that inflammation of the pleura could exist without it; yet there are cases of what is termed *latent pleurisy*, occurring chiefly in the weak and in those debilitated by disease, in which neither the pain nor general symptoms may excite more than suspicion; and, notwithstanding, the pleura may have been inflamed for a long time; and the inflammation may be accompanied by copious effusion into the cavity of the pleura;—cases which can only be elucidated by auscultation and percussion. Most commonly, the pain is felt in the region of the nipple, on one side or the other, and it is generally of an extremely lancinating character, aggravated by the slightest attempt at inspiration. It may, however, be referred to the axilla, under the sternum or clavicles, or to the region of the scapula, the margins of the false ribs, &c. &c. When the inflammation is seated wholly, or in part, in the pleura costalis, it is increased by pressure on the intercostal spaces; and wherever seated, it is commonly aggravated by percussion, inspiration, coughing, lying on the affected side, and by the motions of the trunk; so that the patient makes short and repeated inspirations, and dreads the slightest mechanical change induced by the movements referred to. Usually, in acute pleurisy, pain exists from the outset; but it is not always fixed at the first, which may give occasion to its being confounded with pleurodyne, or rheumatism of the parietes of the thorax. At the end

of a few days, however,—sooner or later,—it becomes fixed, and constant, and after being for some time excessively severe, it diminishes in violence, becomes obtuse, or may cease entirely before the termination of the disease.

The dyspnœa, which is an accompaniment of the pain, appears to be wholly owing to it; the slightest movement of the ribs, as already remarked, exciting the greatest torture. After the pain on inspiration has abated, or wholly ceased, and the difficulty of breathing continues, this is owing to effusion into the cavity of the pleura, and its degree is, of course, dependent upon the amount of effused fluid. Its character differs, too, somewhat, according to the part of the pleura implicated. If it be the pleura costalis, or both that and the pleura pulmonalis, the breathing is chiefly *diaphragmatic* or *abdominal*; if, on the other hand, it be the pleura investing the diaphragm, the diaphragm is kept as free as possible from motion, and the respiration is performed almost wholly by the ribs, or is *costal*. The pain, too, is usually referred to the margin of the ribs, and causes unusual distress and dyspnœa.

The cough is a very uncertain symptom, being, at times, extremely distressing; at others, entirely wanting. It is commonly short and dry, and never takes place in fits or paroxysms.

The decubitus or position of the patient in bed, on the affected side, was mentioned as occasioning an augmentation of the pain; hence, it has been looked to as affording information in regard to the disease. Not much reliance can, however, be placed upon it, either where the pleurisy is dry, or accompanied by effusion. In the great majority of cases, indeed, the position is on the back. The rule generally is, that, in the first stage, the position is on the healthy side; but in after periods, when effusion has taken place, it will—for obvious reasons—be on the diseased side. But the exceptions are numerous. After the pain, for example, has ceased, and copious effusion has occurred, the decubitus, as stated by Dr. Stokes, is often on the healthy side.

Such are the *local* symptoms, that usually accompany and indicate inflammation of the pleura. The *general* symptoms consist of fever, which is usually present, and, at times, to a great degree; the pulse being hard and frequent; the skin hot and dry; and the blood, when drawn, exhibiting so markedly the inflammatory crust or buff, that this has been termed *crusta pleuritica*.

These symptoms, taken collectively, would seem to indicate with unerring certainty the existence of acute pleuritis. They are not all, however, well developed in every case, and, as already remarked, they may be so nearly wanting as scarcely to excite a suspicion as to the existence of the disease. In such cases, we have a valuable resource in the physical signs. These, in the majority of cases, leave but little doubt as to the existence of pleurisy, and they are highly satisfactory in determining the effusion of fluid, which is its accompaniment. When the pleura is merely in a state of active hyperæmia, percussion may afford no positive evidence; but when this state has continued for a time, more or less thickening or density is produced

in the parts affected, which is indicated by dulness on percussion, more or less considerable, according to their density. The presence of effusion, however slight, is indicated by dulness on percussing the side in which it is. The fluid naturally assembles at the lowest part of the chest, so that if the patient be erect, it descends behind the pillars of the diaphragm, near the spine; and it must be borne in mind, that on account of the restricted dimensions of the cavity of the pleura, in this region, a very small quantity of fluid may rise to a considerable height. At the commencement, therefore, the dulness on percussion will be at the lower part of the chest, whence it is observed higher and higher, as the effusion proceeds, until, ultimately, it may be evidenced over the whole of the affected side, below the fossa supra-spinoza, and the clavicles. The fact of the dulness supervening much more rapidly than in ordinary pneumonia, and of its being unaccompanied or unpreceded by the crepitant rhonchus, generally points out pleuritic effusion.

Prior to the occurrence of adhesions between the pleura pulmonalis and the pleura costalis, the lung floats, as it were, on the fluid; and the sound, on percussion, is varied according to the position of the patient. When erect, the dulness is at the inferior part of the chest—the clearness above: if the patient turns on his face, the postero-inferior portion of the chest may give a clear sound; and when he changes his position from side to side, similar phenomena are at times observable. These signs are, however, frequently absent, and, probably—as has been supposed by Dr. Stokes—in many cases, owing to agglutination of the pleuræ, which prevents the fluid from changing place. In cases of effusion into both sides of the chest, or of *double pleurisy*, the dulness is, of course, perceptible on both sides.

The signs afforded by auscultation are more varied and more precise than those from percussion. When the inflammation is attended with very severe pain, as is generally the case, the patient restrains, as much as possible, the motions of the affected side; the air, consequently, enters the corresponding lung in less quantity, and the respiratory murmur becomes less audible than on the unaffected side. This has been noticed as an early sign of pleurisy, but it must be equivocal—being dependent upon the presence of pain, which does not always exist, and which, indeed, may exist independently of inflammation of the pleura.

Early in the disease, a rubbing, creaking, or friction sound is heard, which may indicate, that the secretion from the pleura has been arrested by the inflammation; or, what is more general, it indicates, that plastic lymph has been thrown out, the consequence of which is, the friction—*frottement*—which, however, may be so slight as scarcely to merit the name of *frolement* or *slight grazing touch*, but, at other times, is so loud as to resemble the *leather creak*, or *bruit de cuir neuf*, of the French. These signs, when combined with the general symptoms, are valuable in the diagnosis, but they are not of long duration, and, therefore, may not be heard. Friction sounds,—as already remarked—occur likewise, in interlobular emphysema, and as this pathological condition does not speedily change, they persist longer.

Recent researches, as remarked by Dr. Williams, would seem to show, that, as in the case of peritonitis, the sounds are not often produced in pleurisy, unless the lung be at the same time pressed against the chest by a tumour or by effusion, or partially distended by emphysema or by tuberculous or other deposits. When the pleura costalis is raised in this manner, it is readily comprehensible how the friction sounds may be induced, as well as in cases of what are termed "dry pleurisy," or such as are accompanied only by the effusion of lymph. They are generally most audible in the central parts of the chest, owing to the motion of the pleuræ upon each other being most marked in that situation; and, in order to be heard, the patient should be on the abdomen.

When effusion of any kind takes place to a great amount into the cavity of the pleura, the extent of the respiratory movements must be diminished in a direct ratio with the quantity of fluid effused. The sound of respiration will, likewise, be diminished in the affected side, whilst, in the other, it is more extensive than in the natural state. If the effusion is very considerable, the respiratory murmur can no longer be heard; at times, at the lower and posterior part; and, at others, over the whole of the chest. The lung, compressed by the fluid, is forced, in the majority of cases, on the vertebral column; and the respiratory murmur—if heard at all in any part of the thorax—is so very indistinctly. Occasionally, in such cases, the respiratory or vesicular murmur is replaced by bronchial or tubal respiration, which is heard along the vertebral column on which the lungs are crowded. When effusion exists, and the patient is made to talk, the physician's hand being at the same time applied to the parietes corresponding to the seat of the effusion, very slight, or no vibrations may be felt; whereas these vibrations are very manifest in health. In this way, by placing a hand under each scapula, a pleuritic effusion may be detected by the absence of vibration over the dull portion. Dr. Stokes regards it as of far greater value than the egophony to be described presently. It is a physical sign, however, which does not exist in many cases of females, and boys previous to the change of voice;—the vocal vibrations in them, although audible, being not sufficiently powerful to be felt by the hand. The layer of liquid between the lung and the chest modifies or destroys the vibrations, a very different effect from that produced by solidification of the lung, by which the resonance of the voice is powerfully augmented.

When a moderate effusion has taken place, so that there is dulness on percussion, and diminution of the respiratory murmur in the lower part of the chest, a singular resonance of the voice is observed, posteriorly, which appears to be superficial, and separate from the true voice. It is a peculiar tremulous, broken voice, somewhat resembling the voice of the goat, and hence termed *egophony* or *goat's voice*. This peculiarity appears to be a kind of bronchial voice modified by its transmission through a stratum of liquid. This has been considered one of the characteristic signs of pleuritic effusion; but the observation of most persons has shown, that it is not so certain as was at one time supposed; usually, when the effusion becomes considerable, the

egophony is no longer heard; but there are cases on record in which the whole of one side of the chest was filled with fluid, and egophony still present, whilst in others, where the effusion was slight, it was absent. Dr. Stokes places but slight value on egophonic sounds in pleurisy. "In many instances," he remarks, "we never find them, and even when present they are extremely inconstant, and, taken alone, have but little value in diagnosis." Between them and those from hepatization of the lung, there is often the closest resemblance. Dr. J. Wolff, indeed, affirms, that they are heard in the second stage of pneumonia, accompanied by the bronchial or tubal respiration; Dr. Stokes, that almost perfect egophony has been heard in the stage of resolution of a few cases of pneumonia; and M. Reynaud, that egophony is only audible in cases in which the inflammation of the pleura is accompanied by inflammation of the lungs.

The pectoriloquism of phthisis, and the egophony of pleurisy, are regarded as the least valuable of the physical signs of these diseases, still, the presence of egophony, with dulness on percussion, enfeebled respiratory murmur on the affected side, with absence of the crepitant rhonchus, would be a strong combination of evidences in favour of the existence of pleurisy. The true character of egophony has been described, by Dr. Williams, as a certain tremulousness of the voice when it is superficial, and an echo-like slenderness when it is deep seated.

When the accumulation of fluid is to a great extent in one of the pleuræ, it gives rise to an increase of the size of the side, which is evident to the eye, and, if not, is discoverable by mensuration with a graduated tape, or with callipers, similar to those used by many of the French obstetricians for appreciating the distance between the posterior surface of the sacrum and the anterior surface of the pubis, by means of a graduated arc, which is attached to one leg of the callipers, and passes through an eye in the other. The increased size is affirmed, on excellent authority, that of MM. Laënnec and Andral, to be observable early; Laënnec says after two days' duration of the disease; Andral, on the fourth or fifth day. The author's observation would lead him to fix the appearance of this phenomena at a later period. It has been usually considered, that protrusion of the intercostal spaces is always coexistent. But this, as remarked by Dr. Stokes, may be wanting. Moreover, dilatation of the side may not be present, where even copious effusion exists, owing to the displacement of the diaphragm. The observer, in making these comparisons, must bear in mind, that the right side, in health, is often larger than the left. The average result of the most accurate measurements of 20 chests of persons not labouring under disease of the lungs gave, according to Dr. Stokes, for the right side, 17·86 inches, and for the left, 17·23,—or more than half an inch in favour of the right lung. Of these, the most capacious chest measured 22 inches for the right, and 21·50 for the left. In one case only, the left side was larger than the right, and in three, the sides were symmetrical. In the case in which the left side was more developed, the man was left-handed, and the left biceps measured half an inch in circumference more than the

right. The following admeasurements of ten males and ten females were taken partly by the author, but chiefly by the late Dr. Moore Robinson, at the time one of the resident physicians to the Philadelphia Hospital. None of the individuals were labouring under disease of the lungs.

MALES.

| Ages. | Occupations. | Left side. | Right side. |
|-------|-----------------------|--------------------------|--------------------------|
| 67 | Carrier, | 18 $\frac{1}{4}$ inches. | 18 $\frac{3}{4}$ inches. |
| 25 | Shoemaker and Pedlar, | 16 | 16 $\frac{1}{2}$ |
| 56 | House Carpenter, | 16 $\frac{1}{2}$ | 18 |
| 49 | Do. | 18 | 18 $\frac{1}{4}$ |
| 41 | Carriage Painter, | 16 $\frac{3}{4}$ | 17 $\frac{3}{4}$ |
| 32 | Apothecary, | 18 | 17 $\frac{1}{2}$ |
| 32 | House Painter, | 14 $\frac{3}{4}$ | 15 $\frac{1}{2}$ |
| 30 | Labourer, | 17 | 17 $\frac{3}{4}$ |
| 30 | Do. | 17 | 17 |
| 42 | Do. | 17 | 17 $\frac{3}{4}$ |

The average of these observations gives 16.92 inches for the left side, and 17.47 inches for the right; or a difference of about half an inch.

FEMALES.

| Ages. | Occupations. | Left. | Right. | Hand most used. |
|-------|---------------|------------------|------------------|------------------|
| 20 | Servant maid, | 13 | 13 | Uses both alike. |
| 24 | House maid, | 16 $\frac{1}{4}$ | 16 $\frac{1}{4}$ | Do. |
| 25 | Do. | 15 | 15 | Do. |
| 23 | Do. | 15 $\frac{1}{2}$ | 16 | Right. |
| 20 | Do. | 14 | 15 $\frac{1}{2}$ | Do. |
| 19 | Seamstress, | 15 $\frac{1}{2}$ | 16 | Do. |
| 22 | House maid, | 16 | 16 $\frac{1}{2}$ | Do. |
| 21 | Do. | 16 $\frac{1}{2}$ | 16 | Left. |
| 24 | Shoebinder, | 13 $\frac{3}{4}$ | 13 | Do. |
| 26 | House maid, | 15 $\frac{1}{2}$ | 16 $\frac{1}{2}$ | Right chiefly. |

The average gives 15.1 inches for the left side, and 15.2 for the right, or a difference in the female of not more than one-tenth of an inch. In instituting the comparative admeasurement, the tape may be passed horizontally around the chest, under the nipple, and be made to meet at the centre of the lower end of the sternum.

Sooner or later, careful examination may exhibit, that the intercostal spaces do not present the usual depressions on the affected side, and ultimately they appear entirely smooth, so that, in thin persons, the contrast is perceptible on careless inspection. It is important, however, to bear in mind, that an effusion, sufficient to dilate the side and displace the heart, may exist for weeks without inducing it. Smoothness of the side is not met with in the earlier periods of the disease, and appears to be peculiar to pleurisy in its advanced stages, as it is not observed in emphysema of the lungs, pneumonia, simple hydro-

thorax, or enlargement of the liver. Hence, it is esteemed one of the most important of the physical signs of advanced pleurisy. In looking for this sign, the patient may be placed obliquely with regard to the light, and it may be more readily seen by regarding the chest from a little distance. The diaphragm, too, may be displaced by the effused fluid, and the displacement may be recognised by examining the upper part of the abdomen, which is found full and resisting. If the fluid be on the right side, the liver is pushed downwards, forwards, and across the abdomen; if on the left, the spleen may be displaced; but the latter displacement is more rare. When the liver is displaced, a distinct sulcus or furrow may be often felt immediately below the ribs and above the upper boundary of the tumour, resulting from the space left by the touching of two convex bodies—the upper portion of the liver and the protruded diaphragm. On the absorption of the fluid the liver ascends, and the sulcus disappears. This physical sign was first observed by Dr. Stokes, in 1832: farther observation has, however, shown, that the disappearance of the sulcus does not necessarily imply the ascent of the liver to its natural position; for the liver may yield to the pressure of the diaphragm, and become deeply indented, or concave on its upper surface; so that the disappearance of the sulcus is only favourable when accompanied by the ascent of the hepatic tumour. More than one case of latent pleurisy has been noticed, in which the tumour, formed by the liver, was long supposed to be the chief disease—the patient not complaining at all of the chest.

The displacement of the liver and heart, from pleuritic effusion, was scarcely noticed by Laënnec. It is chiefly to Drs. Stokes and Townsend, of Dublin, that we are indebted for our information regarding it. The displacement of the heart is an important sign, which exists from the earliest periods, long before any protrusion of the intercostals or diaphragm. When effusion has occurred into the left pleura, the pulsations of the heart may be observed, most distinctly, immediately under, or to the right of the sternum, instead of in its usual position; and, again, if the effusion have taken place into the right pleura, the heart is pushed towards the left axilla. In a case of hydro-pneumothorax of the right side, Dr. Townsend saw and felt the heart pulsating between the fourth and fifth ribs, near the left axilla, whence it gradually returned to its proper position as the compression was removed by drawing off the fluid from the opposite side; and a similar case occurred to the author very recently. In this, the impediment to the circulation was so great, that the individual was in a state of cyanosis. The relief afforded by withdrawing the fluid was signal; but it was only temporary;—the empyema being accompanied by tuberculosis. When the fluid accumulates in either pleura, to the extent of producing displacement of organs contained in the other, the mediastinum, which lies immediately behind the sternum, must be pressed from its situation, so that fluid is immediately behind it; hence it renders a dull instead of a clear sound, when the sternum is percussed. Sometimes this dullness extends half an inch or an inch beyond it. It need scarcely be added, that all

these displacements may be produced by pneumothorax, or by an accumulation of air in the cavity of the pleura; but the tympanitic sound on percussion, in the latter case, will distinguish it.

Such are the main general symptoms and physical signs of acute pleurisy. If the disease be unaccompanied by effusion, the morbid phenomena generally disappear in a few days, and health is restored; but if effusion have occurred, the restoration to health, if it take place at all, may be at an uncertain period. The acute condition may pass away, or it may terminate in the chronic. When effusion has been to such an extent as to give rise to the evidences already described, the absorption of the fluid is indicated by changes in the respiration, which—if it have been absent—may be heard feebly, and gradually augmenting in the upper portions of the affected side, both anteriorly and posteriorly: the signs, too, of the different displacements gradually disappear, but the thorax may remain more or less contracted, owing to causes described under Chronic Pleurisy.

As in other cases of serious inflammation of internal organs, death may take place in a few days; yet this does not happen frequently.

In the bills of mortality of New York, for 1842, 21 persons are said to have died of pleurisy; and of 26 cases that occurred in one year, in the Philadelphia Hospital, only one died, facts which show, that it is not a fatal affection, under appropriate management. Not unfrequently, tubercles form in the inflamed pleura. Where this is the case, the patient dies of marasmus and hectic fever, and the case is probably reported as one of consumption.

Causes.—The general causes of pleurisy are like those of pneumonia, and other internal inflammations. In addition, however, it may be produced by external violence, as by wounds and contusions of the chest, fracture of the ribs, &c. Organic diseases of the lung, likewise, occasion it. Thus, it has been already remarked, that pneumonia is usually accompanied by some degree of inflammation of the pleura,—hence the term *pleuro-pneumonia*, applied to pneumonia, by many, from the supposed constant association of the inflammations; and also, that the pleura is almost always involved, sooner or later, in tubercular phthisis. The latent character of pleurisy, in many cases, has likewise been referred to. Persons, indeed, often pass through life without being aware of the existence of adhesions between the pleura costalis and the pleura pulmonalis, which dissection alone reveals.

Pleurisy occurs at all ages, and is a disease of intra-uterine existence. Many cases are on record, in which manifest signs of pleuritis and of its concomitant—sero-purulent or purulent effusion—have been observed on the dissection of the still-born, or of those who have died almost immediately after birth. It is probable, too, that pleurisy is more common among young infants, than is generally believed. In the annual report of the interments of the city of New York, for 1839, 21 deaths from pleurisy are recorded, whereof 6 were under the age of 5 years, and 3 of these under the age of 1.

Pathological characters.—The appearances, observed on the dissection of those who have died of acute pleurisy, may be partly antici-

pated from the history of the symptoms and signs already given. Simple inflammation of the pleura does not differ, in its morbid appearances, from inflammation of the peritoneum. If death have occurred early, we meet with more or less redness and injection of the sub-serous cellular tissue; the serous coat, in slight cases, being dry perhaps, but not seeming to be much, if at all, affected otherwise, and preserving its transparency; but in more severe cases, it exhibits great vascularity, either in points, streaks or patches, or a uniform redness is observed over a greater or less extent of surface, but this last appearance is rare. The membrane is not often thickened, softened, or ulcerated. Very early, however, if the disease have persisted, various alterations take place in the secretions from the membrane, which are modified both in quantity and quality. The quantity of fluid may vary from an ounce to several quarts, so as, indeed, to fill the whole of one side of the pleura, compressing the lung, pushing the diaphragm downwards, and with it the liver and the spleen; enlarging the intercostal spaces, and causing them to project outwards, and displacing the mediastinum, heart, &c., in the manner already described.

The character of the effused fluid varies greatly. Sometimes it is colourless; at others, yellow, limpid and transparent; sometimes containing albuminous flakes swimming in it, but, at others, dissolved in the fluid and disturbing its transparency. Frequently, the fluid is more or less coloured and turbid, and occasionally very thick, and of a dirty or muddy appearance. In other cases, pus is found in the pleura, or a peculiar fluid resembling half melted meat jelly, or even blood: in the last case, it constitutes the "*hemorrhagic pleurisy*" of Laënnec, *Hæmathorax* or *Hæmatothorax*; Ger. *Blutbrust*. The plastic lymph, which is the product of pleuritis, and is sometimes thrown out without the effusion of fluid, forms the bond of union in the cases of adhesion, which are so frequently met with on dissection, that they have been properly regarded as the most common of all morbid appearances, and are found to a greater or less extent in nearly all the bodies, that are subjected to inspection. Strange to say, these adhesions were at one time considered to be produced by laughing. The plastic lymph appears to be capable of self-organization, like the fluid which is thrown out in ulcers, and the materials of which the new being is formed after a fecundating copulation; and sooner or later the membranes become firmly united. The albuminous exudation assumes different forms. At times, miliary granulations are alone perceptible, separated from each other; at others, large concretions cover the pleura and increase its thickness, leaving it at times smooth and polished; at others, rugous; and at others, with nipple-like projections. These "concretions" frequently extend like bands, (*brides*) from one pleura to the other, forming bonds of union, which, by intercrossing through the fluid, form cells, of greater or less number and regularity of form. When these adhesions are recent, they are soft, readily lacerable, and have an albuminous appearance; but sooner or later they become transformed into a cellular tissue, which unites the pleuræ, in the mode so often seen in those who ex-

hibit, on dissection, the signs of a former pleurisy. The adhesions are generally colourless, but, at times, they acquire a yellow, gray or reddish hue from the fluid with which they are in contact. At times, they pass to the fibrous, cartilaginous, and even osseous state. Often, too, tubercles are found in them, which, at times, become developed with great rapidity. These appearances may be found in one or both pleuræ, according as the pleurisy is *single* or *double*, or they may be confined to a portion of one pleura.

The condition of the lung is more or less modified, according to the extent and nature of the effusion. If the quantity of fluid be very great, the lung may be so much compressed as to form a mere thin strip, occupying a very short space along the spine. In an interesting case, which fell under the author's care, and which he has described in its other relations elsewhere (*General Therapeutics*, p. 305, note), the right lung was found reduced to scarcely more than a bulb. The inflammation had passed to the chronic state, and the right pleura was completely filled with fluid. In another case of double chronic pleurisy, both lungs were reduced to mere knobs by the pressure of the fluid, and the consequent condensation and atrophy. In cases like these, for some days before dissolution, hæmatisis is executed most imperfectly, and—it must be presumed—by the bronchial tubes themselves. The lung, that is thus compressed, does not crepitate, but is dense, and sinks to the bottom of the water. These appearances are, however, more marked in chronic pleurisy than in the acute.

Treatment.—The management of pleuritis is much the same as that of pneumonitis. Blood-letting is generally demanded, and it must be repeated according to the severity of the disease, and the habit of the patient. When the system has been lowered by two or three bleedings, it is better to trust to local blood-letting, especially by cups, which exert both a depletive and revellent agency; after which a large emollient poultice may be applied over the pained part.

The more powerful revellents, as blisters, are more efficacious after blood-letting. One of the most valuable is mercury pushed so as to affect the mouth. It is esteemed, by some, to occupy the important place as a remedy for inflammation of a serous membrane, which the tartrate of antimony and potassa does for that of the lung itself. The ptyalism—it has been advised by Dr. Marshall Hall—should be kept up until the effusion is absorbed.

The cough should be alleviated by all the means that are recommended under Bronchitis; and, if necessary, full doses of opiates should be given with this view.

After the violent symptoms have passed away, and the effusion alone remains—which it does, at times, for a long period—blisters may be applied so as to induce an intermittent counter-irritation, or the seton may be used,—but the former are to be preferred; or, the ointment of tartarized antimony may be applied. Diuretics may likewise be administered, as in other cases of accumulation of the fluid of serous membranes. Cathartics may also be given, but care must be taken not to reduce the powers of the system too low.

In the early period, the diet should be as dry as possible, and the thirst may be allayed by small pieces of ice taken into the mouth; and afterwards the diet may be farinaceous, with or without milk.

b. *Chronic form*.—Chronic pleurisy occurs generally in feeble individuals, and may possess its chronic form from the beginning, or, it may be the termination of acute pleurisy. Some, indeed, as Laënnec, admit three kinds of chronic pleurisy; 1st, That which is chronic from the beginning. 2dly, That which was acute and has become chronic; and 3dly, That which is complicated with certain organic productions on the surface of the pleura. Others, as Dr. Mackintosh, have described *first*, the chronic pleurisy, which terminates in empyema; and afterwards that which ends in permanent contraction of the chest.

Diagnosis.—The symptoms and signs of chronic pleurisy are chiefly those that denote copious effusion into the pleura of the affected side, and they are the same if the pleurisy be any of the kinds described by Laënnec;—generally, difficulty of breathing, at times amounting to orthopnœa; dry, tickling cough; hectic fever; enlargement of the affected side of the chest, and of the intercostal spaces; impracticability of lying on the sound side; and, at times, fluctuation; percussion dull; respiration inaudible, except in the region of the vertebral column, and puerile on the opposite side, unless the case is one of “double pleurisy,” which is not common. These—it will be observed—are essentially the symptoms and signs of acute pleurisy, terminating in effusion; and it has been properly remarked by Dr. C. J. B. Williams, that there is less reason for distinguishing formally between acute and chronic inflammation of the pleura, because the transition of one into the other is, in reality, undefined, and the symptoms of the recent disease have sometimes so little of an acute character, whilst one of a long duration occasionally manifests such an intensity of irritation, that the terms “acute” and “chronic” are less applicable to pleuritic affections than to inflammation of most other organs.

To the effusion of fluid, whether supervening on an acute or chronic attack, the name *empyema* has been given, which literally means an effusion of pus, (from *ev*, “in,” and *πυον*, “pus;”) yet the term has been extended, conventionally, to the effusion of other fluids—bloody, or serous—into the cavity of the chest. Empyema—in the sense of effusion of pus into the cavity of the pleura—has also received various synonymes—as *Empyema verum*, *Pyothorax*, *Pleurorrhœa purulenta*, *Diapryema*, *Ecpyema*, *Ecpyesis*, *Empyesis pectoris*, *Pyosis pectoris*, *Hydrothorax purulentus*, *Dyspnœa pyothoracica*; Fr. *Empyème*, *Pyopleurite*, of Piorry; Ger. *Empyem*, *Eiterbrust*, *Brustgeschwür*. The effused fluid may be absorbed in process of time, and the chest may return to its natural position, without any resulting contraction; and this is, at times, effected so rapidly, that a dilated side of the thorax has been known to lose as much as an inch and a half in eight days. Commonly, however,—and this is usually the most favourable termination,—the fluid is more gradually absorbed, and the affected side, from being preternaturally distended, becomes greatly contracted. This change has been regarded as not simply the result of the parietes

passively following the absorbed fluid, but to be attributable to the new structures, formed, undergoing contraction. It is easy, however, to comprehend, that if the lung has become so far compressed and condensed, by the lymph and effused fluid, as to be incapable of expansion when the fluid is absorbed, flatness and contraction of the chest would be a natural result of atmospheric pressure, if from no other cause. The difference between the two sides is found to be great; the intercostal spaces of the affected side are contracted; the shoulder is lower; the scapula approaches the vertebral column, and the muscles of inspiration, especially the pectoralis major, lose their volume. In some cases, the lung of the affected side gradually resumes a part of its functions; the respiratory murmur becomes audible, but imperfectly so; and although the deformity of the chest has been manifest, the state of the individual has permitted active exercise of the lung, and public exertion of the voice. Such—it is presumable—was the fact with one of the individuals, whose chest was examined by the author, and the admeasurements of which are given elsewhere, (p. 390.) The difference between the two sides was an inch and a half, and the deformity, of course, obvious on the slightest inspection; the respiratory sounds were distinct on the right side, but by no means so on the left: yet, the individual was an active labourer, and had no recollection whatever of having suffered from pleuritis. Such cases as these strikingly show the inadequacy of physical signs, taken alone, to establish the diagnosis in all cases.

Instances have occurred, in which, after the absorption of an effusion on the right side, the heart was drawn over to that side, so that its pulsations were felt to the right and not to the left of the sternum: at times, too, after the removal of pleuritic effusion on the left side, the heart is drawn upwards to the left.

It need scarcely be said, that although in some cases after the cure by contraction of the chest, the persons preserve excellent health, and exhibit no signs of pulmonary disorder, this is not to be expected. Usually, indeed, there is more or less liability to affections of the respiratory organs, and a cachectic condition, which ends, at times, in tuberculosis. In other cases of chronic pleurisy, the termination by contraction of the chest does not ensue; the fluid continues accumulated, and it becomes necessary to have recourse to some direct means for its removal.

Treatment.—Where the symptoms and physical signs, described above indicate that the state of chronic inflammation of the pleura exists, and there is reason to believe that it has been of some standing, the patient should be confined to the horizontal posture—in bed, for example; and there remain, perhaps, for weeks. The diet should consist of milk and the farinacea; and leeches, or cups, with the scarificator, be applied every two or three days, for the first week or ten days—for a longer or shorter period, as the nature of the case may suggest. About the expiration of this time, revellents, as small blisters, or the tartarized antimony ointment, may be applied to the chest, so as to induce an intermittent irritation; and mercurials may be administered so as to affect the mouth slightly. These may be given

from the first, and should their effects not be perceptible when the blisters are begun with, the blistered surfaces may be dressed with mercurial ointment. Under the employment of these means, the physical signs, in the course of two or three weeks, may be found to indicate a diminution in the extent of dulness; and, if the heart have been displaced, its return to, or towards, its proper situation.

If the febrile symptoms have passed away, after this treatment has been pursued for a time, the diet may be made somewhat more nutritious, by adding light boiled eggs, and perhaps a small quantity of any of the lighter meats,—care being taken not to induce undue excitation.

When the inflammatory action has been removed, the absorption of the fluid may be promoted by any of the diuretics, that are employed in cases of hydrothorax, or of other hydropic accumulations:—it is well, however, to notice whether albuminuria be coexistent, as in such case stimulating diuretics must be used with caution. Cathartics may be substituted, which may be repeated twice a week. Iodine has in this stage been highly extolled—employed both internally and externally. Dr. Stokes advises, that a pint of Lugol's solution, or mineral water should be taken during the day,^a and from a quarter, to half of an ounce of the compound iodine ointment^b be rubbed daily over the side.

^a R.—Iodin. gr. $\frac{1}{2}$.
Sodii chlorid. gr. xii.
Aque destillat. Oj.

Lugol makes the solution of three strengths, gr. $\frac{1}{2}$, gr. $\frac{3}{4}$, and gr. j. of iodine to the pint of water.

^b R.—Iodin. 3ss.
Potassii iodid. 3j.
Alcohol. f 3ij.
Adipis, 3ij.—M.

By others, the internal use of the iodide of potassium is preferred, (gr. ij. vel iij., ter quaterve indies,) and in more asthenic cases, the iodide of iron. These remedies may be associated with blisters, and their effect in promoting absorption has been, sometimes, singularly rapid. The iodine generally acts as a diuretic, and must be continued until all liquid is presumed to be removed from the pleura.

When the patient is free from fever, and *a fortiori* when convalescent, change of air, with gentle travelling exercise, is advisable; a voyage to the West Indies has, indeed, been esteemed *the* remedy *par excellence*, as in so many other diseases of the chest. Should deformity supervene, it may improve somewhat by time, but as the morbid change in the lung is generally permanent, not much improvement can be expected. Carefully regulated gymnastic exercises, and, "perhaps, electricity," have been suggested to restore the tone of the intercostal muscles, but, for the reasons already given, it is not easy to see what advantage could accrue from them. Were they, in any degree, to expand the chest, the morbid condition of the lung would still remain.

By many, all remedies in empyema have been esteemed inoperative, but many cases unquestionably recover with the contraction of the kind mentioned. Twenty cases of complete and permanent recovery from empyema, by absorption, have been recorded by one

author—Dr. Stokes—so that—as he properly remarks—the probability of a cure, and the efficacy of remedies, is much greater than has been supposed.

When all remedies have failed, and the patient is threatened with suffocation, or suffers much distress from the mechanical pressure of the fluid on important organs, the operation of paracentesis or puncture of the thorax is the last resource; but the results of many cases, which show, that absorption may ultimately be effected even in unpromising cases, would indicate, that it may not have been always necessary where it has been performed.

Different instruments have been used for the evacuation of the fluid. Dr. Prichard, of Bristol, England, employs a needle with a larger groove than in the common instrument. In this mode, he says, he is able to evacuate any fluid with perfect ease and safety, and with the advantage, that the pain attendant upon the operation is so trifling, that the patient will at times call for a repetition of it, after having experienced the relief, which follows its use. Dr. Babington has proposed an instrument, which he considers to be superior in some instances to the grooved needle, through which fluid at times flows with difficulty. It consists of a very small trocar and canula, which, together, are not thicker than an ordinary grooved needle, and a probe, which would pass through the canula. The grooved needle may mislead the physician in his diagnosis of empyema. By separating the serum from the small concretions of albumen, it may occasion an empyema to be considered a simple serous effusion, whilst the small canula would, Dr. G. Bird considers, be more likely to exhibit the true nature of the affection. Dr. Bird, in presenting the instrument before the Westminster Medical Society, related a case in which there was every physical sign that could lead to the conclusion, that there was effusion into one side of the thorax. The small trocar was introduced, but no fluid escaped, and on passing the probe through the canula the lung could be distinctly felt. No ill effect followed the trial, and the case proved to be one of rapid softening of the lung after tubercular deposit. Dr. Babington had employed the instrument to diagnose an obscure tumour, which filled the right hypochondrium and iliac regions. A thick, dirty fluid escaped, and the probe could be passed to any extent without meeting with resistance, showing that the tumour contained a viscid fluid. No bad effects followed the exploration, and when the patient died, the tumour was found to be an enormously distended gall-bladder.

The operation is not demanded solely in chronic pleuritis. If, in the acute form, the effusion take place so quickly, and copiously, as to endanger the very existence of the patient, owing to compression of the lungs, and other important organs within the chest, it may be necessary. When the operation is performed in the latter case, the fluid is usually serous, with more or less lymph, and it commonly deposits a further clot of gelatinous fibrin after it has been drawn from the chest; whilst in chronic pleurisies, it presents the appearances described under the head of "pathological characters" of acute pleurisy, and, occasionally, of purulent matter, which is not readily

absorbed. These are cases of true empyema, in the sense in which it is usually employed, and in which paracentesis is considered the more necessary; yet it does not appear, that the operation has been equally successful where the fluid has been purulent as where it has not.

Although the operation may be indicated in cases of chronic pleuritis, there are many obstacles to its success. If the lung be bound down, or so condensed that it is incapable of expansion, the removal of pus, or other fluid, merely gives occasion to the entrance of air, or, in other words, the pyothorax is converted into pneumothorax. Not unfrequently, too, tuberculosis has occurred, and the operation has been performed, when the patient was labouring under phthisis also. In other cases, when fluctuation has been evident,—a circumstance which commonly proves, that air is in the chest; and this, in the large mass of cases, owing to a fistulous communication between a bronchium and the cavity of the pleura; and, as the existence of fistula implies disease, and, almost always, tubercular disease of the lung; success cannot be expected from the operation. It has, however, succeeded, notwithstanding these impediments. Should any doubt exist as to the presence of fluid, a grooved or exploring needle as advised by Dr. Davies, may be passed into the chest, by which not only the presence, but the character of the effused fluid may be detected. Where there is no pointing of the fluid, the middle portions of the chest are considered the most eligible places for the operation—between the third and the seventh rib, in the opinion of Dr. C. J. B. Williams: the fifth intercostal space is recommended by Drs. Townsend and Stokes. Lower down, there is danger, at times, of wounding the diaphragm; and this has actually happened.

It has been a question, whether the whole, or only a part, of the fluid should be withdrawn at once; but opinions have appeared to settle upon the ancient mode of evacuating the fluid gradually, at successive times, closing the orifice in the intervals. In this manner, less irritation is induced in the morbid surfaces, and time is afforded for the gradual restoration of the lung from the effects of compression, and of the parietes of the thorax from their state of atony. In all such cases—and especially, perhaps, where an extensive surface has been secreting purulent matter—a recuperative action is set up, under which the system sympathizes, and the patient frequently sinks. It has been of late years a question, whether the admission of air into the cavities of serous membranes be productive of as much mischief as was at one time presumed. When the membrane is healthy, the negative of the question is undoubtedly accurate: it has been remarked, however, by Dr. Williams, that there is a vast difference between the result in a healthy and in a diseased serous cavity. In the former case, the air may be absorbed; but, in the latter, the membrane is covered by products highly disposed to decomposition, which—it has been conceived—must augment the irritative fever, and greatly interfere with the absorbing power of the membrane. A recent observer, Dr. Heyfelder, has, however, held, that but little apprehension need be entertained, in morbid cases, from the

admission of air into the pleural cavity; and he is favourable to discharging the fluid at once. When the fluid is purulent, it may be advisable to inject warm water into the chest, with the view of displacing it; and if, after repeated evacuations, there be no apparent disposition to the expansion of the lung, or the contraction of the chest, and matter continues to be secreted, it has been suggested to inject a very weak solution of nitrate of silver or chlorinated soda; and if the discharge be fetid, to correct it by injections of chlorinated solutions, mixtures of creasote, &c.; but it need scarcely be said, that all such applications must be used with the greatest caution, for fear, that inflammatory excitement may be lit up, which may not be easily subdued.

In the last stages of the disease, where the operation has not been performed for any reason, the accompanying dyspnœa is, at times, excessive. This may often be relieved by a slight stimulant, (*Sp. ætheris sulphuric. comp.* f 3j. in a little water,) which gives occasion to the expulsion of flatus from the stomach; and both in this case, and in hydrothorax, great relief is at times afforded by a stimulating glyster—as of turpentine, or assafœtida—which prevents the accumulation of flatus, and thus obviates any pressure that might otherwise have been made on the diaphragm.

c. *Typhoid Inflammation of the Pleura.*

SYNON. Bilious Pleuritis, Typhoid Pleuritis, Pleuritis Typhoides seu Typhodes, Pleuritis Biliosa, Typhoid Pleurisy, Bilious Pleurisy.

The remarks, that were made on typhoid inflammation of the lungs, are strikingly applicable to typhoid pleurisy, both as regards the diagnosis and method of treatment. It is apt to occur in the enfeebled and broken-down constitution, and may be secondary to some other morbid condition. The affection, too, is insidious, and the signs often latent,—being indicated rather by sinking of the powers of life than by any new suffering. Like typhoid pneumonia, again, although it forms suddenly, it is slow of removal; is frequently combined with gastro-enteric disease;—hence, the epithet *bilious*, given to it at times;—and does not admit of active antiphlogistic treatment. It is observed as a secondary disease in the course of typhus or spotted fever, and of the exanthemata, in puerperal fever, in typhoid arthritis, and diffuse inflammation; in bad forms of erysipelas; in phlebitis, and it has been conceived to be a consequence of purulent absorption. It would not appear, however, to occur frequently as a complication of typhus; as, of fifty-seven observed cases, according to M. Louis, it was noticed but once. Two such cases have been detailed by Dr. Stokes. In one, on the fourteenth day of a severe maculated fever, a sudden sinking was observed, with the friction sound or *frottement* over the left side. On the next day, the patient, a young female, had the appearance of an individual in cholera. She had perspired copiously, and was covered with a miliary eruption; there was severe orthopnœa, and she speedily sank. A double effusion had existed. The left pleura contained a large quantity of whey-coloured fluid; whilst, in the

right, the effusion was more sanguinolent and serous. In both, lymph was found in a reticulated form over the whole serous membrane, and also in the pericardium. In many of these cases, the cavity of the pleura may be found to contain sero-purulent or purulent collections, although during life symptoms of pleurisy have been either absent or very slightly marked. At other times, however, the invasion of the disease is accompanied by severe pain. In all these cases, the physical signs, that denote effusion, will sufficiently indicate the nature of the affection.

Treatment.—The same cares and cautions are necessary in the treatment of typhoid pleuritis as in that of Typhoid Pneumonia, to which the reader is, therefore, referred.

II. PLEURODYNE.

SYNON. Pleurodynia, Pleuralgia, Pleuritis Spuria, Pneumonia Externa, Pseudopleuritis, Dolor Pectoris Externus, Thoracodyne, Pain in the Side, Stitch in the Side, Bastard or False Pleurisy; *Fr.* Point de Côté, Douleur de Côté; *Ger.* Seitenstechen, Seitenschmerz, Falsche Seitenstich.

Pain, at times, attacks the side suddenly, so as to give rise to a *stitch*, which continues for a time and then passes off; but, at other times, is of longer duration. It is of a neuralgic character, and appears to be seated rather in the muscles, or their aponeuroses, than in the pleura.

The various forms of pleurodyne may be distinguished from pleuritis by the absence, in the former, of the febrile symptoms, of dulness on percussion, of the friction sound, and the other signs and symptoms, that indicate pleurisy. There is generally, also, more or less soreness on pressing the muscles of the chest.

Pleurodyne is not unfrequently met with in nervous, hysterical persons, and, at times, occasions great suffering,—occasionally, indeed, as much as pleuritis itself. It is, also, an accompaniment of chlorosis; and, Dr. Hall remarks, is in such cases so like chronic pleuritis, that he has known patients to be bled and blistered for the twentieth time, under this erroneous impression. Yet the slightest attention to, and acquaintance with, the physical signs, would have shown the difference.

Treatment.—The treatment of this neuralgia must consist chiefly in revellents applied to the part affected—as cups, with or without the scarificator; sinapisms; hot applications—as salt heated, or a hot flannel; blisters, ammoniated lotions, &c.; and if the pain recur frequently, the emplastrum belladonnæ, or emplastrum opii, or a *warm plaster*, containing a small quantity of cantharides or of the tartarized antimony, may be kept upon the part. Narcotics may, also, be required internally, when the pain is violent. They should be given in full doses;—for example, two grains and a half of soft opium in the form of pill, or a corresponding quantity of any of its preparations.

Should the disease be connected with hysteria, or with the anæmic condition that constitutes chlorosis, the remedies which are adapted

for such morbid conditions, and are mentioned under those diseases, must be prescribed.

A recent writer, Dr. Max. Simon, has recommended the use of emetics in pleurodyne. Their good effects are, doubtless, owing to revulsion.

III. DROPSY OF THE PLEURA.

SYNON. Hydrops pectoris, Hydrops thoracis, Hydrothorax, Dyspnœa et Orthopnœa hydrothoracica, Dropsy of the chest; *Fr.* Hydropisie de poitrine, H. des plèvres, Hydropleurie, of Piorry; *Ger.* Brustwassersucht, Wasserbrust.

Prior to the time of Laënnec, idiopathic hydrothorax was esteemed an extremely common disease. It is now, however, as generally admitted to be rare. Dr. Stokes, indeed, remarks, that he has never seen a case of it; the accumulation being, in all cases, owing to disease of the heart, or lungs, or some of the solid viscera of the abdomen. As in the case of the effusion of pleurisy, the fluid is contained in the cavity of the pleura, and is essentially an accumulation of the secretion, which takes place from the pleura, and which, in health, is intended for its lubrication; and, like other hydropic accumulations, it may occur under three circumstances mainly:—in the *first*, the exhalent vessels may secrete more copiously than in health, or the hydrothorax may be “active:” in the *second*, the exhalents may pour out their proper quantity, but the vessels, whose office it is to absorb, may take up too sparingly; and in the *third*, there may be some obstacle in the heart, or elsewhere, to the proper return of blood to the centre of the circulation. In the two last cases, the resulting hydrothorax may be considered *passive*.

Diagnosis.—The symptoms and physical signs, which denote the existence of hydrothorax, are extremely like those of the effusion that takes place in pleurisy; so that it is not an easy matter to distinguish between a slight attack of acute pleuritis, and one of active hydrothorax. Generally, however, along with dyspnœa, which is proportionate to the amount of the fluid effused,—with difficulty of lying on the affected side; and in cases of double hydrothorax, panting respiration, and difficulty of breathing, except when in the sitting posture, energetic action of all the respiratory muscles and extreme anxiety of countenance,—there is absence of the inflammatory and local symptoms of pleurisy, with more or less effusion into the cellular membrane, as evinced by œdema of the lower extremities, and the ordinary evidences of dropsy. The physical signs are—dulness of the affected side, egophony, if the fluid be small in quantity,—(although egophony often exists when there is no fluid in the thorax,)—and absence of respiratory murmur in the part corresponding to the effusion, with the substitution of tubal respiration. The affected side is also larger than the other, and, according to general testimony, there is an enlargement of the intercostal spaces; and, at times, fluctuation has been distinguished; yet one eminent observer, Dr. Stokes, affirms, that he has never observed dilatation of the intercostal spaces or protrusion of the diaphragm in hydrothorax, and this fact he adduces, amongst others, as an argument in favour of his view of

the cause of muscular displacement in empyema,—that in the latter the innervation of the muscles is implicated so that they become paralyzed.

Causes.—These are the same as those of dropsies in general. The disease occurs at all ages, but is more common after the age of 40. It has been observed in the fœtus. As already remarked, however, it is commonly symptomatic of disease of some thoracic or abdominal viscus.

Pathological characters.—The fluid of hydrothorax is like that of ascites. It is thin and limpid, and generally occupies but one pleura. Its quantity is very variable: sometimes, it amounts to many pints. Twelve pounds have been seen in one side of the thorax. The pleura is found to be healthy, but blanched by the fluid that bathes it; and the lung of the affected side is, of course, found compressed towards the vertebral column or the apex of the thorax, as in cases of pleuritic effusion.

Treatment.—As hydrothorax is commonly a symptomatic affection, it can only be met by remedies that are adapted for the removal of the primary mischief. To promote the absorption of the fluid, the general antihydrotic treatment is desirable. As a part of this, revalents, especially such as act on the kidneys, are found highly serviceable, and great faith has been reposed in the digitalis, especially when combined with opium.

R.—Tinct. digital. gtt. xl.

— opii, gtt. v.

Mucilag. acac. f3ij.

Aquæ, f3v.—M.

Dose, a fourth part, every 5 or 6 hours.

It has been considered especially advisable in the asthenic diathesis, with debility, pallor and feeble pulse. All the diuretics elsewhere recommended, (see *Hydrotic Cachexia*.) may be administered in this form of dropsy; and advantage is derived from occasional cupping and blistering the chest. Where all remedies have failed, and the patient suffers great inconvenience from mechanical pressure by the fluid, the operation of paracentesis has been recommended, and performed; but it can only be had recourse to with the view of affording temporary relief, inasmuch as it does not modify the pathological condition on which the dropsical accumulation is dependent. There may be truth, however, in the suggestion of Dr. Prichard, of Bristol, England, that the practice of deferring paracentesis till all other means have been long tried, may be a powerful cause of the recurrence of the effusion. Dr. Prichard employs a grooved needle to evacuate the fluid, (see page 398.)

IV. AIR IN THE PLEURA.

SYNON. Pneumothorax, Pneumathorax, Pneumatothorax, Physothorax, Asthma aëreum a physothorace, Emphysema pectoris; Ger. Luftbrust, Brustwindsucht.

The phenomena presented by air effused into the cavity of the pleura are, in many respects, analogous to those produced by liquid effusions; and where they differ, the causes of the difference are

readily understood. The disease may be either simple, or the air may be mixed with liquid (*hydropneumothorax*, *hydroaëropleurie* of Piorry).

Diagnosis.—The patient complains of great dyspnœa, which is in a ratio with the quantity of air effused, and the rapidity with which the effusion occurs. The affected side is rendered prominent, but this is not always the case; and there is, over the whole, unusual clearness on percussion; or, if the patient be sitting up, the resonance may be marked at the upper portion of the chest, whilst it may be dull beneath, denoting the presence of a liquid. This unusual sonorousness is accompanied with absence of the sound of respiration, except near the root of the lung, where it is tubal.

When, along with pneumothorax, the pleura contains fluid, and there is a fistulous communication with the bronchia, the respiration may be markedly cavernous, and there may be more or less gurgling, with a peculiar sound, called *tintement métallique*, “metallic tinkling” or “ringing noise of metal.” This sound is peculiar, but not constant, and although it is regarded, by M. Andral, as unexplained, it has nevertheless received many attempts at explanation. The view of Spittal, Beau, Puchelt, junr., and others,—that it is caused by a bubble of air from the open bronchium, which passes through the liquid, and bursts upon its surface, hence termed by the last of these observers, “bullar metallic tinkling,” seems to be the most correct. It has been suggested, however, by Professor Bigelow, of Boston, that there must be a cavity, whose walls are preternaturally susceptible of vibration, as is the case when the pleura is preternaturally distended, so as to overcome the obtuse or muffling effect of the contiguous soft organs,—as the lung, diaphragm and intercostal muscles; and such may be the case. Dr. Bigelow considers the immediate or exciting cause of the metallic tinkling to be a forcible or sudden disturbance of the liquid in a vibrating cavity like that described,—the explosion of bubbles of air from beneath the surface of the liquid appearing to be the most common cause of such disturbance; and this explanation seems to be as satisfactory as any that has been offered.

It not uncommonly happens, that when the patient changes his posture—as from the horizontal to the upright—drops of liquid adhere to the pleura, or are retained by false membranes, and subsequently fall upon the surface of the liquid, causing a noise similar to that which is produced by the falling of a drop of water into a decanter containing a portion of liquid. This is regarded as a variety of the *tintement métallique*, which may accompany the inspiration, the voice or the cough. Whenever, too, hydropneumothorax exists, if the thorax be shaken, the fluctuation of the liquid will be heard. This method of detecting the existence of fluid is as old as Hippocrates, and has been called “*Hippocratic succussion*.”

When the effusion of air, or of air and fluid, is considerable, there may be the same signs of displacement, or what has been termed *eccentric displacement*, as in the effusion of pleurisy.

The disease may terminate favourably by absorption, but this is a rare occurrence. As it is generally connected, however, with tuber-

culosis of the lung, the prognosis must be unfavourable; yet it does not necessarily terminate speedily. Andral remarks, that it may continue for some days, and even for more than a month. It has been known, according to Laënnec, to exist for six years, and in some cases, under the new morbid condition of the pleura, the tuberculosis of the lung appears to be arrested. In a case of phthisis with perforation, detailed by Dr. Houghton, the patient, a bricklayer, made several extraordinary rallies, during each of which he returned to his occupation. He lived upwards of a year. In another case, described by Dr. Stokes, a gentleman, after recovering from the first violence of the affection, gradually regained flesh, strength and appearance; the hectic totally subsided; the pulse became quiet, and he took exercise every day. He could trot or canter his horse, were it not for the "splashing in his chest," which annoyed him. Similar cases are noticed by others.

Causes.—Pneumothorax may arise spontaneously, by the exhalation of air from the pleura, in the same manner as from the peritoneum; but this is probably a rare occurrence. It may, likewise, arise from a wound of the chest; but, most commonly, it is occasioned by some communication being formed from without—as from the lung—with the cavity of the pleura. This may consist in a tuberculous excavation, with a fistulous opening into the pleura; or it may result from pneumonia terminating in an abscess, which has broken into the pleura; from gangrene of the lung implicating that membrane; from laceration of the lung or pleura by pulmonary apoplexy; from cancer of the lung; or, it is affirmed by M. Andral, from the simultaneous rupture of some of the pulmonary vesicles and pleura: any cause, in short, which opens a communication between the bronchia and the cavity of the pleura, may occasion it.

Pathological characters.—Air is, at times, found alone in the chest; but more commonly—as before remarked—it is mixed with fluid, usually of a sero-purulent character. The gas may be inodorous, or fetid, and may consist of oxygen, or azote, or pure hydrogen, or sulphuretted, or phosphuretted hydrogen. In 70 cases, according to M. Andral, the affection was double, or on both sides, twice; 41 times on the left side, and 27 times on the right.

Treatment.—It would not seem, that the mere communication of a bronchial tube with the cavity of the pleura ought to be necessarily fatal; but this simple case rarely presents itself. Usually, it is pneumothorax with tuberculosis of the lungs that we have to treat; and inasmuch as the latter is almost incurable, it cannot be rendered less so by combination with the former. It has been affirmed, indeed, by Dr. Stokes, that where pneumothorax has proceeded from the opening of a gangrenous or tuberculous abscess into the pleura, the chances of recovery are infinitely small; and that there is no instance recorded of such an event. Irritation may be allayed by opium and its preparations, and counter-irritants may be applied to the chest, from time to time. The efforts of the practitioner will, indeed, be mainly restricted to palliation.

When air accumulates in the chest, owing to the smallness of the

opening of communication between the bronchial tube and the cavity of the pleura, so that oppressive dyspnœa is experienced,—a question arises as to whether it may not be advisable to puncture the chest, and let out the air. This has been done in several instances, and, it is said, with great temporary relief. There is much difference of opinion, however, on this point: whilst one writer, Dr. C. J. B. Williams, affirms, that the risk of the operation is not great; another, Dr. Stokes, asserts, that in cases of great accumulation and distress, the relief is much less than might have been expected, and there is great liability to gangrene of the pleura—a fact which he asserts he has repeatedly verified; and noticed that the “rapidity of the destruction of the serous membrane is truly singular.” Where the disease has been produced by any of the forms of pulmonary mischief, referred to under the head of causes, and especially from tuberculosis, but little advantage can be expected from the operation. The disease will proceed on its course. As a means of permanent cure—like paracentesis for the removal of effused fluid simply—no benefit can be expected from it; and from what has been said, the physician will have recourse to it only after careful deliberation. It will be always well to choose a place for the operation, beneath the surface of the liquid, if any be present, so that both the air and the liquid may be evacuated. It might seem, that little or no precaution is necessary to prevent air from being admitted, as the disease itself consists in the admission of air to the cavity of the pleura. It is air, however, that has undergone a change in its temperature before it has reached the cavity, and, therefore, is less likely to produce irritation. It is, consequently, advisable to prevent, as far as practicable, the entrance of air through the opening made by paracentesis.

V. PERFORATING ABSCESS OF THE LUNG.

A few remarks may be made here upon those cases, in which purulent collections form exterior to the lung, and afterwards perforate its tissue, so that they are evacuated through the bronchial tubes. They are cases of what has been called by Dr. Stokes “*Perforating abscess of the lung*.” These abscesses may be formed by purulent collections in the parietes of the thorax or abdomen, which may reach the lung owing to adhesion between the pleura costalis, and the pleura pulmonalis,—so as to form a fistulous communication with the lung; or, purulent collections in the pleura may open in this way; or abscess of the liver may make its way through the diaphragm, and be discharged in the same manner. Of this last form, the author has met with two marked cases, both of which were fatal. Recovery, however, not unfrequently takes place.

VI. MORBID PRODUCTIONS IN THE PLEURA.

The pleura, like serous membranes in general, is liable to various other lesions of nutrition.

a. *Cartilaginous and osseous depositions*.—These are occasionally, but not frequently, met with. Commonly, the bony matter is de-

posited in thin plates, and cartilaginous deposits are usually met with, also. At times, calcareous concretions are observed in the fluid effused during chronic pleuritis. They are probably formed at the surface of the pleura, and become detached.

b. *Serous cysts*.—These are very unusual, but they have been observed; and, when numerous or large, they may give rise to all the signs of liquid effusion into the pleura. Not uncommonly, indeed, after—or in the course of—chronic pleurisy, the fluid is collected in cysts, owing to pseudo-membranous *brides* or prolongations, which divide the cavity of the pleura into several compartments.

c. *Ulceration*.—This is an unusual occurrence in serous membranes, and when it does exist, it is probably dependent upon the breaking down of tubercles. In one case, described by Professor Gross, of Louisville, in which there were five large ulcers in the left costal pleura, the lung contained hundreds of tubercles, in every stage of development; and in the upper lobe, there was a large excavation, the margins of which firmly adhered around the principal ulcer of the pleura.

d. *Tubercles*.—These occasionally form in the pleura, and are generally associated with tubercles of the lungs. At times, they are so large as to compress the lung, but commonly they are of small size, varying from that of millet to that of hemp-seed. The author has frequently met with them, under both the above mentioned circumstances. In cases of pleuritis, they occasionally form with great rapidity in the false membranes thrown out. Examples are on record, in which the false membranes have been found studded with tubercles, in persons who died of pleurisy of not more than a fortnight's duration.

e. *Cancer*.—Scirrhus and encephaloid masses are met with, at times, in the pleura; occasionally, in numerous small formations; but, at others, so large as to fill one side of the chest, compressing the lungs, and giving occasion to dulness on percussion, absence of respiratory sound, except along the great bronchial tubes, and great dyspnoea. These morbid productions form, also, in the mediastinum, so as to constitute "cancer of the mediastinum," which is denoted by pain under the sternum, sometimes excessively lancinating and shooting, with progressive emaciation, and the general symptoms of the cancerous diathesis. In other cases, pulsations have been felt, owing to the pressure of the tumour on the aorta, so as to lead to the belief in aneurism of the aorta; and, along with these, the sternum has become absorbed by the pressure, and an outward projection has been visible. The cases are, however, to be distinguished by the symptoms above mentioned, and the absence of those physical signs, which are shown, elsewhere, to indicate the existence of aneurism of the aorta.

In three out of five observed cases, according to M. Andral, cancer existed in other parts of the body.

CHAPTER IV.

ASPHYXIA.

SYNON. Apnæsphixia, Apnæa, Apneustia, Anhæmatosis, Mors Apparens, M. Putativa, Asphyxy, Suspended Animation; *Fr.* Asphyxie, Anhématisie; *Ger.* Scheintod.

The term Asphyxia, in its original acceptation, means "want of pulse," (α privative, and $\sigma\phi\upsilon\gamma\iota\varsigma$, "pulse.") In this sense, it was used by the old writers, and is still employed, occasionally, by the moderns. It is not many years since suddenly fatal cases of heart affection were described by Mr. Chevalier under the name *Asphyxia idiopathica*, and we find the term, even at the present day, extended so as to include every variety of suspended animation; but, in its usual acceptation with the best writers, like *apnæsphixia*, it is restricted to cases of apparent death, which result primarily, and principally from the suspension of respiration; whilst *syncope* is commonly applied to death commencing in the heart, and *apoplexy* to the variety which is primarily dependent upon a suspension of the action of the brain. Of late, too, the epithet *Asphyxia* has been applied to the conditions of malignant cholera, marked by pulselessness and other symptoms of collapse,—an extension of application, which the term would scarcely seem to admit, although many of the phenomena are present, which characterize asphyxia from suspension of the respiratory function.

In describing the phenomena and treatment of asphyxia, it will be convenient to refer, first of all, to them as they regard asphyxia in general, and afterwards to describe the different varieties.

I. ASPHYXIA IN GENERAL.

Causes.—Asphyxia, in the sense in which we employ the term, may be produced by any agency, that interferes with the due aeration of the blood. Of the necessity of a due supply of arterial blood, or of blood that has undergone such aeration, no one doubts; but its absence has not always been regarded as the main cause of asphyxia: on the contrary, the common belief has been, that the presence of unconverted, or, in other words, of black or venous blood in the tissues is positively deleterious, and that asphyxia is caused rather by its presence in the vessels, than by the absence of blood possessing arterial qualities. Assuming, for the present, that the former of the opinions is the more correct, it will be obvious, that mechanical or other impediments, which interfere with the necessary contact between the blood in the pulmonary vessels and atmospheric air, or air necessary for producing the conversion of venous into arterial blood in these organs, will be the cause of asphyxia.

Accordingly, any agency, which prevents the due expansion of the chest, by pressing upon its parietes,—as in the punishment occasionally inflicted by the Turks on their prisoners, which consists in burying them up to the neck in earth or sand, and pressing the earth firmly

around them,—or, as in that which has been directed by the tribunals of more civilized countries, by placing weights on the chests of the wilfully mute,—will prevent the due quantity of air from entering the lungs, and induce a most painful form of asphyxia. In the latter case, breathing might, for a time, be accomplished by the diaphragm; but, in the former, even this imperfect respiration is prevented by the firm pressure of the earth on the abdominal parietes, which necessarily prevents any descent of the diaphragm. It is obvious, too, that any disease, which mechanically interferes with the due elevation of the ribs, must produce more or less of this effect; as where water, or air, or other fluid, is effused into the cavity of the thorax, constituting the affections respectively known by the names *hydrothorax*, *pneumothorax*, and *pyothorax*; or where the lining membrane of the chest—the pleura—is inflamed, so that elevation of the ribs, or any attempt at elevation, excites intense pain. In the last case, however, the obstructed aëration is not as strongly manifested, owing to respiration being still carried on, although imperfectly, by the diaphragm.

Another cause of asphyxia is the insufficient supply or total absence, of oxygen in the inspired air. Hence, extremely rarefied air, and various gases, which are not of themselves positively deleterious, may become negatively so. Unless the air contains a due quantity of oxygen, and that properly diluted by nitrogen, the change of the venous blood into arterial cannot be effected. In atmospheric air alone we find the admixture of these gases, in the requisite proportion. Unless this air be supplied in proper quantity, the beneficial conversion cannot be sufficiently effected, and asphyxia may equally ensue. The *negatively* injurious gases are,—hydrogen and azote, to which carbonic acid has been added by some, but its lethiferous influence is exerted in a somewhat different manner. The hydrogen and azote are capable of being respired for a short time, and they destroy, simply because they do not contain oxygen; but carbonic acid, as well as various other gases, in a concentrated state, cannot be breathed at all, producing, the very instant any attempt is made to inhale them, a spasmodic closure of the glottis. They belong, therefore, to a third set of causes, comprising those that produce asphyxia in consequence of their forming media that are incapable of being inhaled.

The *irrespirable* gases are,—carbonic acid, ammoniacal gas, muriatic acid gas, deutoxide of azote, nitrous acid gas, and chlorine. Different writers have classed under the same head, oxygen, carbonic oxide, protoxide of azote, carburetted hydrogen, sulphuretted hydrogen, and arsenuretted hydrogen; but these gases give rise to no symptoms resembling asphyxia. They are *positively* deleterious, and the only difference between their action and that of other poisons is, the part of the economy through which they make their impression. They are properly, therefore, poisons: they are capable of being breathed: they produce a train of morbid phenomena, which, in the case of some of the gases, rapidly succeeds, even if the gas be only allowed to come in contact with the skin, and they are no more the cause of asphyxia, than would be the vapours of arsenic, or hydrocyanic acid, if inhaled.

A last set of causes are those, which mechanically prevent the entrance of air into the pulmonary organs, whether such obstacle be seated externally or internally. To this set belong—hanging, strangulation, and every variety of smothering; obstruction of the air passages by the entrance of extraneous bodies, by the pressure of tumours, or by any morbid thickening of the lining membrane of the tubes. Any disease, too, which gives occasion to the effusion of blood or other fluids into the minute bronchial ramifications, and thus prevents the air from exerting its necessary action on the blood, produces death in this manner. Direct or indirect irritation, or paralysis of the pneumogastric nerves, causes asphyxia, and death, partly in this way, and partly by impairing the powers of the respiratory muscles. From the phenomena that follow the section of these nerves on both sides, it would seem, that the first effect is exerted on the tissues of the lungs, which being deprived of the nervous influence they receive from the brain, are no longer capable of exerting their ordinary elasticity—or muscularity—whichsoever it may be. Respiration, consequently, becomes difficult; the blood, owing to defective oxygenation, no longer circulates freely through the capillaries of the lungs; the consequence of this is, that transudation of its more watery portions takes place, and occasionally effusion of blood, owing to rupture of the small vessels, or to transudation through their parietes; so that ultimately all communication is prevented between the inspired air and the blood in the pulmonary vessels. The conversion of venous into the arterial blood is completely prevented; the animal becomes *asphyxied*, and death is the inevitable consequence, because the mischief done to the nerves by the section cannot be repaired.

Diagnosis.—The general phenomena of asphyxia necessarily vary according as the supply of oxygen is diminished, or totally withheld; and according to the degree in which the supply is diminished. There are some slight differences, also, according to the precise mode in which the supply is cut off; but still, certain symptoms and appearances are met with in all.

When the access of oxygen is in any manner prevented, a few seconds elapse before any uneasiness is experienced; but, after this, a marked feeling of distress indicates the necessity for satisfying one of the most imperious wants—that of respiring—the *besoin de respirer*. This feeling soon becomes insupportable; the animal gasps and yawns repeatedly, and makes use of every effort to obtain a supply of the indispensable fluid. The whole body is agitated. The limbs quiver, and are convulsed, or thrown into tetanic spasms. Almost instantaneously, especially if respiration have been slightly practicable, and the supervention of asphyxia therefore gradual, the feeling of distress is attended by vertigo and stupor: the face becomes livid, especially the lips, and the orifices of the mucous membranes; and, at times, the whole surface assumes the same hue. The sensorial functions are suspended in a few moments; and, almost simultaneously, the muscles lose the power of contraction, so that the individual falls. In this state of apparent death, an obscure circulation alone exists in the great vessels, whilst the functions of the capillary system continue. The præcordial region presents, at times, a dulness on percussion,

which extends as far as two inches to the right of the sternum, and three inches above the space usually occupied by the right heart. This dulness, according to M. Piorry, is owing to the engorgement of the right cavities. Soon the circulation ceases, first of all in the larger vessels, and afterwards in the capillaries; and, with this cessation, the functions of secretion, nutrition, and calorification are arrested. The asphyxia has now become positive death.

Pathological characters.—Examination of the body after death exhibits general lividity of the surface, and of the face more especially. The parenchyma of the different organs, especially of the liver, spleen, kidneys, and lungs, is filled with fluid, which is sometimes quite purple. The whole capillary system, indeed, is surcharged with blood of a dark colour, which is described by some writers as always fluid; but to this there are many exceptions. The blood appears to be wholly collected in the pulmonary artery, the right side of the heart, and the venous system generally, whilst the pulmonary veins, the left cavities of the heart and the arteries are empty, or contain but a small quantity of fluid. The appearances, however, differ somewhat, according as the respiration is at once obstructed, or has been accomplished, although imperfectly, for a time. In the former case, death ensues more promptly, and there is less suffering; and, on examination, the cutaneous capillaries and the various organs are less charged with blood, and the fluid is less exclusively collected in the venous system.

The appearance of the countenance has been looked upon as a means of discrimination in death from asphyxia, where there has been much previous struggling; but it is extremely fallacious. The mechanical obstacles to the return of blood from the head, in some forms of asphyxia, and the convulsive efforts in all, give rise to protrusion of the eyeballs, and to more or less distortion of the features, while life exists; but these signs usually disappear, so that when death has unequivocally taken possession of the frame, no indications of suffering may be perceptible in the countenance. It has been remarked by Dr. Copland, that where no obstacle exists to the action of the inspiratory muscles,—the obstruction to respiration being in the air passages,—the efforts to renew the air in the lungs are much more convulsive and laborious; the anxiety is extreme, but of short duration, and is rapidly followed by abolition of consciousness, voluntary motion, and of the function of circulation. In this case, the writer quoted considers Shakspeare's description of the frightful physiognomy of Duke Humphrey, after death from suffocation, physiologically accurate:—

"But see! his face is black and full of blood;
His eyeballs farther out than when he lived,
Staring full ghastly like a strangled man;
His hair uprear'd; his nostrils stretch'd with struggling;
His hands abroad display'd, as one that grasp'd
And tugg'd for life, and was by strength subdued."

Many of these signs may, or may not exist, and this will be greatly dependent upon the length of time the mechanical violence may have

been applied. If the rope, for example, were removed prior to the coagulation of blood in the vessels, they might be entirely absent; but if kept on until all circulation—general and capillary—had ceased, the congestion of blood in the vessels, and the protrusion of eyeballs, might be present as in Duke Humphrey's case. Usually, however, whatever distortion or mark of suffering may have existed prior to dissolution, there is little or no evidence of it after the spirit has passed, when the features usually exhibit a placidity of expression—a “rapture of repose”—singularly contrasting with their previously excited condition. (See the author's *Human Physiology*, 5th edit. vol. ii. Philadelphia, 1844.) The author has had different opportunities for examining the countenances of those who have been judicially hanged,—where the rope has consequently been removed prior to the total abolition of the vital properties,—and in none of the cases were there, in the features, the evidences of suffering, that have been so often described—by poets more especially.

There is another symptom of asphyxia from mechanical obstruction to respiration, to which the author's attention was first directed by Dr. H. H. Hayden, of Baltimore,—viz. redness of the teeth, which cannot be removed by maceration, so as to have the whiteness restored. This is probably owing to the same venous congestion that is observable in the mucous membrane of the larynx and pharynx, and in the brain. The flow of blood in the veins of the teeth is arrested by the causes inducing the asphyxia, so that engorgement of the dental veins supervenes, with consequent transudation. (See the article *Asphyxia*, by the author, in the *American Cyclopaedia of Practical Medicine and Surgery*, ii. 465. Philad. 1836.)

With regard to the duration of life in cases of asphyxia, or rather to the capability of resuscitation, it is impossible to say any thing definite. When once the heart has ceased to beat, it is extremely difficult to restore it. We know nothing whatever of the cause of its action; but distension by an appropriate fluid appears to be indispensable: unless, therefore, we can succeed in causing the blood to be propelled from the lungs to the left side of the heart, so as to excite there the requisite stimulation, our efforts at resuscitation will be vain. But, although we may lay it down as a general rule, that where the action of the heart has ceased, in asphyxia, for a few minutes, we shall too often fail in saving the individual, much may depend upon a difference of resistance referable to age, constitution, corporeal condition, &c. It is probable, too, that the more slowly the state of suspended animation has been induced, the greater will be the chance of restoration, the organs retaining longer the power of being reanimated. In some of the varieties, too, of asphyxia, lesions are apt to be produced, which inevitably destroy.

It is important to bear in mind the cases on record, in which resuscitation has been effected, as in drowning, after an immersion much longer than that, which we have laid down as usually sufficient to render asphyxia irretrievable; but, at the same time, we must unhesitatingly reject many of the marvellous stories that have been handed down to us on this subject, and which, strange to say, find believers

even at the present day. Notwithstanding these traditionary histories, and the philanthropic recommendation, that our attempts at resuscitation should be continued for several hours in cases of asphyxia, it is but too true, that our efforts will generally be fruitless, after a perfect asphyxia of a few minutes' duration. On the occasion of a melancholy catastrophe at Albany, in the state of New York, (August, 1840,) when many persons were submerged, although some of the sufferers were removed from the water in less than five minutes, and, in two or three cases respiration was imperfectly performed, in no single instance did the medical gentlemen succeed in their efforts at resuscitation. The public journals of Great Britain, in giving the particulars of a casualty on the river Lea, (September, 1840,) also mention, that although seven persons were taken from the water within three minutes, not one was resuscitated. At the coroner's inquest, a witness deposed, that he had been acquainted with the Lea for the last thirty years, and had seen many persons drowned in it, but that he had never known any one that had been submerged in its waters even for a minute recover from the effects of such submersion. (?) At Navarino, ample opportunity occurred for putting the powers of the best divers to the test. Dr. Lefèvre witnessed the performances of those who were employed to fish up the relics of the Turkish fleet sunk in Navarino harbour. The depth to which they had to plunge was 100 feet; but though the Greek divers are, and have always been, famous for their powers, none of them could sustain submersion for two whole minutes together. Seventy-six seconds was the average period in fourteen instances accurately noted; and frequently, after reaching the surface, blood issued from the mouth, eyes, and ears of the swimmer. In general, these people can repeat their task three or four times an hour.

The pathology or theory of asphyxia has excited the inquiries of the physiological pathologist. Before attention was directed to the chemical phenomena of respiration, or to the changes produced on the blood in the lungs, it was generally supposed, that when respiration is suspended, the circulation ceases, owing to some mechanical obstacle existing in the lungs, or to their collapse; and this view was maintained even at a late period. It was soon, however, established, that no such mechanical impediment exists to the passage of the blood through the lungs, even after the most forced expiration, and that it continues to circulate freely through them. Accordingly, Goodwyn rejected this hypothesis, and having properly appreciated the importance of the conversion of venous into arterial blood, and the necessity of a due supply of the latter for the maintenance of the circulation and of life, he supposed, that in cases of asphyxia, the blood, being no longer exposed to the influence of the air, and therefore retaining its venous character, is unable to stimulate the left auricle and ventricle to contraction; the heart, consequently, in his view, becomes, as it were, paralyzed, and dies first.

In Goodwyn's theory, no obstacle is conceived to exist to the circulation of the blood through the lungs; the cause of the asphyxia is the non-conversion of venous into arterial blood, and, as a consequence

thereof, the arrival, at the left side of the heart, of blood not possessing those qualities that are requisite for exciting its cavities to contraction. This view of the phenomena of asphyxia met with considerable favour from physiologists, and was generally adopted, until the appearance of the *Researches on Life and Death*, of Bichat. That distinguished individual, equally with Goodwyn, ascribed the first link in the chain of morbid phenomena to the non-conversion of venous into arterial blood; but he rejected the idea of Goodwyn, that any paralyzing influence is exerted upon the left side of the heart, and attributed the whole of the phenomena to the *poisonous* effects of the venous blood on the different tissues of the body.

The theory of Bichat commanded universal assent for a long period, and M. Devergie considers, that it "alone merited the suffrages of all physicians." Of late years, however, it has been subjected to a fresh examination, the results of which have shown, that many of the views of Bichat have been too implicitly received, and that some of them must be unhesitatingly rejected. It is evident, that he attached too much importance to the presence of black blood in the different tissues, and that the mischief is rather to be ascribed to the absence of blood in the arteries. Were, indeed, the experiments and observations of Edwards, Kay, and others considered insufficient to establish this, the singular phenomena, exhibited by malignant cholera, would complete the demonstration. They are calculated, indeed, to give the *dernier coup* to the theory of Bichat, and to shake all our ideas regarding the connexion of the sensitive and locomotive functions with the circulation and hæmatisation. Every one who has witnessed that strange malady, must have observed the nervous and muscular actions preserved until within a few moments of dissolution, when the whole of the vascular system has been so filled with black blood, as to render the surface blue, and when arterial pulsations, even in the larger vessels, have been imperceptible. These striking phenomena have led M. Magendie to affirm, that the contact of arterial blood is neither indispensable to cerebral action nor to muscular contraction; and Dr. Madden has gone so far as to assert, that the brightening up of the mind prior to dissolution, which is occasionally witnessed, but far less frequently than is imagined, is probably produced by the "stimulus" of the dark venous blood circulating through the arterial vessels of the brain; but this idea is opposed to all received notions on the subject.

In opposition to the views of Bichat, it has been maintained by Drs. D. Williams and Kay, that the earliest effect of the interruption of respiration is to impede and arrest the circulation of the blood in the capillary system of the lungs. All the organs of the body, in Dr. Kay's view, consist of a congeries of small blood-vessels, denominated, from their minuteness, "capillaries." These vessels are possessed of peculiar powers, by which, in a healthy state, they admit only fluids of a certain quality, excluding those that are incompatible with the functions of the part. They even resist the forcible introduction of other fluids, when injected with a syringe. In the lungs, minute blood-vessels exist in an exquisitely delicate network. In these vessels, the venous blood is exposed to the influence of the atmospheric air; its

qualities are changed; it loses its dark hue, and acquires a bright red colour; and hence, it is probable, Dr. Kay thinks, that the vessels in which the arterial blood circulates, must differ in their peculiar sensibilities, from those which propel the venous blood. The laws, generally observed to regulate the action of the small vessels in other structures, would, he conceives, be violated, if the vessels which usually convey arterial blood, were able to convey, with equal facility, venous blood in every state of its changes, until it acquires its darkest colour. When air is no longer inspired, a considerable quantity of this fluid remains in the ultimate bronchial subdivisions, and so long as this air contains a certain portion of oxygen, the blood undergoes its proper change in the pulmonary vessels, and the circulation proceeds with its ordinary activity; but as the proportion of oxygen diminishes, the conversion is more and more imperfectly accomplished; the circulation becomes progressively feebler, and slower, "until," as remarked by Dr. Kay, "when venous blood enters those vessels which formerly conveyed arterial blood only, this degenerated fluid is no longer able to excite their action, and the circulation stagnates in the structure of the lungs. The pulmonary veins then discharge their last meagre supply through the left auricle into the left ventricle, which propels its last and feeblest tide into the arteries, in which the circulation has, every moment, become more scanty, until the pulsation has gradually been extinguished." In this way, Dr. Kay accounts for the congestion of the venous system, and especially of the right side of the heart, and of the pulmonary artery, whilst his theory equally explains the emptiness of the pulmonary veins, and the left side of the heart. The general conclusions which he deduces from all his investigations, are: *First*. That the circulation is arrested after respiration ceases, because, owing to the exclusion of oxygen, and the consequent non-arterialization of the blood, the minute pulmonary vessels, which usually convey arterial blood, are incapable of transmitting venous blood, which therefore stagnates in the lungs. *Secondly*. That the arrestation of the circulation is sudden when the lungs are entirely deprived of air, and that blood ceases to flow from them into the left cavities of the heart, even in the smallest quantity, in about three minutes and a half. *Thirdly*. That even supposing a great quantity of venous blood were transmitted through the lungs, it would not impair their contractility; but, on the contrary, it is even capable of supporting this power for a certain period: that venous blood does not possess any noxious quality, by which the organic functions of these tissues can be destroyed, but is simply a less nutritious and less stimulating fluid than arterial blood: and, *lastly*,—that the functions of the muscular fibres cease in asphyxia, because the circulation, and, consequently, the supply of the fluid which is necessary to life, is arrested in the lungs.

Recently, fresh experiments have been instituted by Dr. J. Reid, which do not accord, in all respects, with those of Dr. Kay. Dr. Reid concludes, that the suspension of the functions of the encephalon are chiefly, if not entirely, dependent upon the circulation of venous blood in the arteries. He does not, however, maintain, that venous blood exerts any noxious influence upon the functions of the nervous

texture; but believes, that the effects are solely attributable to the want of the proper excitation of the organ; for when the circulation of arterial blood is renewed, its functions rapidly manifest themselves, provided this be done within a given time. He believes, that the order of succession in which the vital processes are arrested in asphyxia is as follows:—The venous blood is at first transmitted freely through the lungs, and reaches the left side of the heart, by which it is driven through all the textures of the body. As the blood becomes more venous, its circulation through the vessels of the brain deranges the sensorial functions, and rapidly suspends them, so that the individual becomes unconscious of all external impressions. The functions of the medulla oblongata are enfeebled about the same period that the sensorial functions are arrested, but are not fairly suspended for some time longer. Immediately after the sensorial functions are suspended, and the blood has become still more venous, it is transmitted with difficulty through the capillaries of the lungs, and, consequently, begins to collect in the right side of the heart. A smaller quantity of blood must now necessarily reach the left side of the heart; and this diminution of the quantity of blood sent along the arteries, conjoined with its venous character and the ultimate arrest of the circulation, being circumstances incompatible with the manifestation of vitality in the other tissues of the body, general death is sooner or later induced. This view, consequently, ascribes the phenomena of asphyxia chiefly to the circulation of blood that has not been oxygenated in the lungs, or, in other words, of blood devoid of the proper excitant agency, and subsequently, to arrest of the blood in the capillaries of the lungs, which occasions the flow of arterial blood towards the left heart to be arrested. As a consequence of the want of the stimulus of distension, the left cavities lose their contractility; the right auricle, which continues for a time to receive blood by the *venæ cavæ*, being the *ultimum moriens*. The nervous, muscular, parenchymatous, and other tissues, no longer receiving a supply of arterial blood, cease also to act: but those organic functions, which are affected in the capillaries of the general system—as nutrition, secretion, and calorification—yield last; circulation continuing in the capillaries for some time after it has ceased in the larger vessels.

These are probably the chief agencies concerned in the phenomena of asphyxia. Were the view of Bichat adopted, we might vainly attempt resuscitation by inflation of the lungs, seeing that every tissue, even that of the heart, has been poisoned to the total destruction of its irritability; and this has generally been regarded as a powerful objection to the view of that distinguished physiologist.

Treatment.—An attentive consideration of the different phenomena of asphyxia, presented during life as well as after death, and a comparison of these phenomena with the theory they seem so naturally to suggest, will leave but little doubt in the mind of the practitioner, as to the general resuscitative measures he ought to adopt. Still, there are many particulars on which doubt might be indulged, and on which, indeed, a diversity of opinion exists among therapeutists. The general

indications will consist, *first*, in removing the individual from the causes that have produced the asphyxia; and, *secondly*, in endeavouring to restore respiration, circulation, and innervation—the great vital functions, which mutually re-act on each other, and therefore require the simultaneous application of remedies adapted to each.

The consideration of the mode of fulfilling the first indication will necessarily fall under the examination of the particular varieties of asphyxia, as it must differ in each variety.

The chief means for fulfilling the second are,—to expose the body to that degree of heat which experience has shown to be best adapted for the support of the vital powers, and simultaneously to attempt to restore the suppressed respiration. From certain experiments, instituted on different classes of animals, by Dr. W. F. Edwards, it would seem to result, that an elevated temperature of the body exhausts the nervous action, unless the animal is able, at the same time, to have a due supply of air, and that there is a temperature, remote from the extremes of too great heat, and too great cold, which is best adapted for the recovery of those in whom respiration has been from any cause arrested. When the management of the different varieties of asphyxia falls under consideration, this subject will have to be again referred to, in its relation to each; and its bearings on the asphyxia of the new-born infant, or of one thrown into a state of suspended animation in the first few days of its existence, will be strikingly apparent. In all varieties of asphyxia, a temperature at all approaching that of the body,—and a higher than this was at one time recommended by the Royal Humane Society of London, whose directions are the rule of conduct over every part of Great Britain at least,—must, for the reasons assigned, be positively injurious, and *a fortiori* if such elevated temperature be applied through a medium, that shuts off from the skin the vivifying influence, which the contact of air is capable of exerting. In but few cases can it be safe to have the air of the apartment higher than 75° or 80°. *Radiant* caloric, where caloric is demanded, is manifestly to be preferred to the *conducted*,—unless its application, in the latter way, be partial, so as not to interfere greatly with the free exposure of the surface to the contact of air. The body may be placed before the fire, or in the sunshine; and warm flannels, or bags of warm grains, or of salt or sand; or bottles of warm water, or warm bricks, may be placed on small extents of the cutaneous surface. A proper temperature might be applied to the back by the tin mattresses, filled with warm water, used during the prevalence of cholera in several of the cholera hospitals. In this partial mode of applying warmth, sufficient surface is allowed for the action of the air, as well as for the employment of friction, which, with some other agencies, and especially that of artificial respiration, are the grand means for restoring suspended animation.

It was remarked that the application of warmth must be made simultaneously with another operation—insufflation—the most essential, indeed, of the appliances and means that have been recommended for the removal of asphyxia. It must be recollected, that in this condition, respiration and circulation are suspended, and that

innervation, which is under the dependence of these two functions, is almost annihilated. Irritability, however, still exists, and the blood-vessels, and the cavities of the heart, contain venous, and usually liquid, blood. Unless, indeed, this were the case, and if fibrinous concretions had formed in the cavities and in the great vessels, all attempts at resuscitation would manifestly be fruitless. In all these cases, death supervenes on the arrestation of a single vital function intimately catenated with the rest; but views have differed regarding the first seat of death; fortunately, under every view that has been entertained in modern times, the same plan of management has been inculcated. At one period, it was universally supposed, that death, in drowning, is owing to the oppression of the water swallowed; but as soon as the labours of observers, showed that this was an error, and that death results from the privation of air, pulmonary insufflation was recommended. The theory of Goodwyn, as before shown, maintained, that the contractile power of the left heart is destroyed, owing to venous blood being sent into it. Accordingly, insufflation was proposed, to change the quality of the blood—in the pulmonary veins, sinus venosus and auricle—to blood capable of arousing the left heart to contraction. Goodwyn's erroneous views of the nature of the affection led him, however, to the injurious recommendation, to introduce a large quantity of air at each inflation—upwards of 100 cubic inches, for example, in the case of the adult;—a recommendation which, if universally embraced, could not have failed to be followed by the unhappy consequences that are found to result from an injudicious employment of artificial respiration. Bichat, Kay,—and indeed every author on the subject, whatever may be the theory he adopts,—equally recommend its employment. Under the view embraced by Kay, it is clearly the most philosophical plan of treatment that could be devised. Asphyxia, according to him, essentially results from the privation of air preventing the due conversion of venous into arterial blood; and, as a result of this, stagnation takes place in the pulmonary capillaries. To remove such stagnation, and re-establish the flow, this conversion must be effected; after which, arterial blood makes its way through the vessels adapted for it, but which did not allow the passage of venous blood; and in this way, the circulation, when it has not been too long suspended, may be restored.

The most simple mode of employing artificial respiration is that proposed by Leroy, which has since been described, at length, in the reports of the Royal Humane Society of London. It has a signal advantage of being available in cases where no professional individual is at hand, and can always be employed without the slightest apprehension of evil. A piece of strong flannel, an old blanket, sheet, or other cloth, most easily attainable at the moment, is to be cut of the following size, and in the following manner. It should be six feet in length, and in breadth eighteen inches. Six strips are then to be cut or torn lengthwise on each side. Each strip is to be three inches broad, and two feet long. The untorn portion (two feet in length, and eighteen inches broad) is to be placed under the back of the patient, from the armpits to the upper part of the thigh bones. The

strips are then to be brought together over the chest and abdomen, interlacing each other from the opposite sides, as the fingers are interlaced in clasping the hands. The strips, thus arranged, are to be gathered into a bundle on each side; and if they be then drawn in opposite directions by two assistants, the edges of the bandage will be made to approach, and firm and equal pressure will be produced on the chest and abdomen. The assistants—having thus compressed the body of the patient by drawing the bandage in opposite directions—should then relax it, permitting the chest to re-expand, and perform this process at the rate of about twenty times in the minute. If the head and shoulders be elevated, the contents of the abdomen, on the relaxation of the pressure, will cause the diaphragm to descend by their gravity, and will thus enlarge the chest. By applying the flame of a candle, or the fine down of a feather, to the mouth and nostrils, it will be seen, that on each firm pressure by the bandage, air is expelled from the lungs; and on the relaxation of this pressure, the chest regains its original size, and air rushes in.

Such is the plan, which may be had recourse to almost from the first moment that the body is discovered, and whilst any other means are in preparation from which more beneficial effects are anticipated; but, as soon as it can be accomplished, a more effective method of re-exciting the respiratory movements should be adopted. The pipe of a pair of bellows may be inserted into one nostril, whilst the mouth and opposite nostril are closed by an assistant, and the windpipe, in the superior prominent part, commonly called *Pomum Adami*, is gently pressed back. Then, by forcing air into the lungs, and alternately expelling it by pressing the chest, respiration may be imitated. In this way, air may be sent into the lungs about twenty times in the minute, so as to imitate natural respiration as nearly as possible.

Another, and a more satisfactory method of insufflation, is, to pass into the larynx a bent silver canula, the larger extremity of which can be attached to the end of a flexible tube, so as to admit of a ready execution of the process. The finger must be passed towards the root of the tongue, on which it must press; in this way, the epiglottis is raised, and, by carrying the canula along the finger, it readily slides into the larynx. Where none of the apparatus described is at hand,—but this can rarely happen, for in almost all situations, a bandage, of the kind recommended for establishing artificial respiration, can be met with,—it has been advised, that air should be forcibly blown into the lungs, by applying the mouth of the operator to that of the patient, closing his nostrils with one hand, and gently expelling the air again, by pressing the chest with the other, or by the aid of an assistant; and if any difficulty be experienced in this method, air may be blown in at one nostril, keeping the other closed, and pressing the larynx back upon the œsophagus, in the mode already described, so as to prevent the introduced air from passing down into the stomach; or one of the curved canulas may be introduced, and air sent through it. But this method has not met with the approbation of every observer, and for obvious reasons. When the air issues from the lungs of an individual, it has experienced such a change in

its composition as to be no longer adapted for continued respiration. It has ceased to be the appropriate fluid—atmospheric air—for the maintenance of the respiratory function, as experiments on animals sufficiently demonstrate. On the other hand, the introduced air has its temperature elevated, so that the advantage of the higher temperature, it has been conceived, may nearly counterbalance the disadvantage of less purity; but this may be advantageous or disadvantageous according to the case. It is more than doubtful, indeed, whether in any case of asphyxia, in the adult, the application of a temperature of upwards of 90° to the body can be useful. It has been considered, that the danger or dread is slightly exaggerated, as the air is so little changed; and moreover, in spite of every precaution, where a tube is not used, the air must pass, more or less, into the pharynx and even into the œsophagus, so that it cannot enter in quantity into the lungs. The advantages, however, attending the insufflation of the pure air of the atmosphere, are so overwhelming, that it ought always to be adopted, when practicable. There is, indeed, one variety of asphyxia where such deteriorated air can hardly be looked upon as so objectionable—the asphyxia of the new-born child, or of one that has respired but for a short period. The presence of a full portion of oxygen is not here so indispensable as it is afterwards; but this variety will have to be considered hereafter.

At one period, pulmonary insufflation was universally practised, and without the slightest caution. It was even recommended, as has been observed, that the air should be *forced* into the lungs so as penetrate the minute air-cells. Experiments have, however, shown, that although a moderate inspiration favours the passage of the blood through the lungs, great distension by air checks almost entirely the circulation through them, by the mechanical compression of the vessels. In recent times, too, it has been shown, that the apparently simple operation of inflating the lungs is not as devoid of danger as was for a long time imagined; and it has been attempted to prove, that many cases may have resulted fatally from the violence of the insufflation, and consequent lesion of the pulmonary structure. Some of the statistical evidences on which this opinion is founded will be given under the head of *Asphyxia from submersion*. Bichat had remarked, that where air is forced violently into the lungs of an animal, infiltration of air may be produced owing to rupture of some of the pulmonary vesicles, and, within the last few years, a series of experiments has been instituted by Leroy d'Etiolles, which have confirmed the observations of Bichat. He found, that if air was blown into the lungs, and with no greater strength than that of an expiration from the human lungs, it proved fatal to rabbits, foxes, goats, sheep, and other animals. The experiment was performed by briskly inflating the lungs from the mouth of the operator. All animals were not, however, equally affected by the operation. The tissue of the lungs of the dog, for example, is denser than in the animals mentioned, and, therefore, resists the insufflation better; and the same remark applies to the lungs of infants, which were not lacerated, even when the inflation was practised with considerable force,—a fact which was

confirmed by the experiments of others. Similar experiments, made on the dead bodies of adults, exhibited that a like rupture of the air-cells could be effected by simple oral insufflation. Where the pulmonary vesicles are ruptured in this manner, the air passes into the cavity of the pleura, and presses upon the lungs, so that they cannot be inflated, unless the effused air be removed by a puncture made into the chest, and re-inflating the lungs by the trachea. A *post mortem* examination of many of the cases, that proved fatal after insufflation, sufficiently exhibited their true pathology; the diaphragm being found pressed into the abdomen, so as to form a prominent elastic tumour in that cavity, and the lung contracted into a small space in the chest. In experiments on animals, relief was afforded by making a puncture through the parietes of the chest, immediately after brisk insufflation had been practised, and thus permitting the effused air to issue from the cavity of the pleura. The animals, treated in this manner, recovered, although they exhibited much embarrassment in breathing for some hours. To remedy these inconveniences, Leroy recommends a modification of the resuscitative apparatus. He employs the double-valved bellows of Hunter, to the handles of which he adapts the graduated arc of a circle. One end of this arc is attached to one handle of the bellows, whilst the other passes through a mortise-hole in the other handle. The extent to which the handles are separated is measured by the graduated arc, and thus the quantity of air sent into the lungs may be determined. With this bellows, Leroy measured the quantity of air expired, without effort, into a bladder, by persons of different ages, and marked upon the arc of the circle the point to which the handle of the bellows was raised in each. He moreover had the curved tubes, to be introduced into the glottis, made of a different calibre, according to the age, so as to render it impossible to introduce the proper quantity of air, as indicated on the arc of the bellows, more rapidly than it would be inspired at that age. The apparatus is simple, and its adoption has been properly and strongly advised, on the ground, that verbal directions often fail to impress the mind with a due sense of the dangers attending insufflation, especially when it must be performed in such excitement, and confusion, as cannot fail occasionally to diminish the caution even of experienced persons. In most of the cases of asphyxia, however, that occur, no such apparatus can be at hand, and the operator is consequently constrained to make use of the agents which present themselves. These should of course be employed with the greatest precaution, to prevent the evils that have been depicted by Leroy.

In adopting any form of insufflation, it is important to imitate, as far as possible, the natural movements of inspiration and expiration; not to go on incessantly forcing air into the lungs, but, by means of the pressure before mentioned, to force the air from the chest before a fresh quantity is sent in. This is one of the strong objections that may be urged against the plan, which has been recommended, where difficulty is experienced in introducing a curved tube into the glottis,—of making an incision into the windpipe, and inserting the nozzle of

the bellows into it, so as to maintain artificial respiration. In order that expiration shall be accomplished, the nozzle must necessarily be alternately withdrawn and inserted, so that great violence must be done to the parts. A fatal case of this kind has been recorded by Franks.

Lastly, it has been recommended to substitute oxygen gas for atmospheric air, and that the resuscitative apparatus should contain a quantity in a well-stopped bottle. But, although it might seem probable, that the substitution of oxygen would be advantageous, so few cases of its employment are on record, that a respectable surgeon, Mr. Armiger, when about to prepare a work on suspended animation—which has not yet seen the light—solicited from the profession accounts of cases successfully or unsuccessfully treated, but his call was not responded to. Goodwyn employed this gas in several instances in asphyxia of the smaller animals, and he thought, that recovery was commonly more expeditious than when atmospheric air was used; but at the same time he admits, that he had never been able to resuscitate an animal by oxygen gas, after atmospheric air had been vainly employed. We can readily appreciate the principle on which inflation with oxygen gas should be recommended; but it is not so easy to comprehend that on which a mixture of 80 parts of atmospheric air and 20 of chlorine should have been advised, by Ackermann, unless it were upon the same principle that Hunter advised the inhalation of stimulating vapours. The recommendation appears, however, to have fallen still-born from its originator. Agents of this kind were sure to have early suggested themselves. The vital powers being suspended, or, as it was conceived, in a state of torpor, excitants would naturally seem to be demanded in every case of asphyxia. *Friction* has been advised by all, although its importance, even as an auxiliary means of restoring life, has been much overrated. It can, of course, be of no use where the circulation has entirely ceased in the capillary vessels; but, in such a case, all applications would probably be equally unsuccessful; when, however, even an obscure circulation goes on in them,—and we have seen that this may be the case for some time after the action of the heart has ceased,—the remedy is certainly philosophical, if used with the more important means already considered.

The effect of frictions, like that of local excitants in general, is to produce rubefaction, or, in other words, to solicit the blood into the extreme vessels, so that an impulse is thus communicated to the greater and more important parts of the vascular system; whilst the excitation of the subcutaneous nerves is communicated to the brain, and thence to every part of the organism. In such cases, therefore, as admit of any hope of relief, the employment of friction may be strongly inculcated. It may be applied with the naked warm hand, previously dipped in flour, to prevent abrasion; or by the flesh-brush. The part of the body that may be selected with this object is not material, but generally the extremities are recommended.

Various other excitants have been advised, such as tickling the nostrils or the fauces with a feather; applying spirits of hartshorn or

aromatic vinegar to the Schneiderian membrane by the same instrument; burning sulphur under the nose of the patient, as well as other volatile irritants; but they can be of little or no benefit until the sensibility is restored by other means,—and then they are probably unnecessary. With similar views, brandy and water, or hartshorn and water, or negus, have been thrown into the stomach by means of the stomach tube; and irritating turpentine or spirituous enemata, or salt, or vinegar, or chlorate of potassa in solution, have been administered in the same form. Their use can only be productive of benefit under like circumstances, and they had better be cautiously employed in all.

The effect of electricity, in the different forms in which it is adopted in medicine, on the functions of sensibility, and muscular contraction, could not fail to suggest it early to observers as a means for restoring suspended animation. It is doubtless a most valuable agent, but it is rarely available, for reasons that are obvious. It has been strongly recommended by the latter gentleman on the strength of numerous experiments on animals. As the object, in these cases, is to arouse the respiratory muscles to action, the electric shock may be passed through the shoulders, or through the chest in any direction. Neither common nor galvanic electricity is possessed of any power in restoring the action of the involuntary muscles. The author has frequently attempted to re-excite the action of the heart, intestines, fibres of the uterus, &c., soon after the cessation of respiration and circulation, by means of the galvanic stimulus, but without the slightest success, although the voluntary muscles responded to it most energetically. Besides, were the action of the heart to be re-excited by it, this could be but momentary. An appropriate stimulating agency is distension, and unless the respiratory movements were restored, and conversion of venous into arterial blood effected, so that the latter could reach the left heart, the action of that organ could not be maintained. Every attempt, therefore, is properly made to restore the action of the respiratory muscles, so that hæmatosis may be accomplished. It has been advised, that the great nerves should be exposed in the neck; and that whilst the wire, connected with one pole of the galvanic battery, is applied to the pneumogastric nerve, for example, the other wire should be placed on the epigastrium. It is unnecessary, however, to expose the nerves, for experiments have sufficiently shown, that the galvanic influence is more strongly exhibited when the integuments are left entire. As the intestinal tube retains its excitability for a long time, it has been recommended to pass the galvanic current through the tube, by placing one of the poles in the pharynx and the other in the rectum.

A new method of application has been suggested by M. Leroy d'Etiolles, which, at the first aspect, appears to be most formidable, but is really less so than it seems, in consequence of the impunity with which fine needles can be made to penetrate even the most important organs. He introduced an acupuncture needle on each side, between the eighth and ninth ribs, until the needles reached the fibres of the diaphragm. He then established a galvanic current between

these, by means of a pile of twenty-five or thirty pairs of plates, an inch in diameter. The diaphragm immediately contracted, and an inspiration was made. He now interrupted the circle, when the diaphragm, urged by the weight of the abdominal viscera, and aided by gentle pressure made on the abdomen by the hand, returned to its former position, and an expiration was accomplished. In this way, the two respiratory acts were made to succeed each other, and regular respiration was reinduced. A continuous current was, likewise, applied in some cases, but the respiratory movements were irregular, and nothing like natural respiration resulted. Leroy tried his method on animals asphyxiated by submersion, and when they had not been under water more than five minutes, they were often resuscitated. The experiments were witnessed by Magendie. On different occasions, Leroy asphyxiated animals of the same species, and apparently of like strength, and whilst those that were left to themselves perished, those that were treated by galvanism recovered. Recently, a case has been published, in which the galvanic influence, from a battery of fifty plates, was applied immediately to the diaphragm, through an incision made below the seventh rib. The muscles of the chest and abdomen were instantly thrown into spasmodic action, which subsided, in a few minutes, into the regular movements of respiration. The man had been six or seven minutes under water.

As an aid, therefore, to pulmonary insufflation, and an important one, galvanism might be advantageously employed in asphyxia; but, as has been already remarked, it can rarely be advisable. Certainly no time should be lost in adopting the other energetic and indispensable measures that have been already advised. It has been recommended, that as only a very small apparatus is necessary, batteries, consisting of a few plates, might be kept wherever there are station-houses for the reception of persons in a state of asphyxia. The suggestion is good; and they might with propriety also form a part of the cabinet of apparatus of the private practitioner; but whilst an assistant is preparing it for action, the practitioner should be energetically engaged in using his other means of resuscitation. The employment of galvanism has likewise another advantage, in cases of asphyxia,—in being a test of the presence of excitability or irritability. Where none is evidenced, death is absolute.

The operation of blood-letting requires much caution, when practised to any thing like the ordinary extent; but there are, perhaps, few cases of asphyxia, in which blood can be abstracted, where the loss of a few ounces would not be beneficial, along with other resuscitative measures. The venous system is always surcharged with blood, and the removal of this quantity could scarcely fail to aid in the re-establishment of the circulation, without the danger that has been apprehended, of its extinguishing vitality. It is a measure, however, regarding the propriety of which, much difference of opinion has existed. Mr. Hunter strongly reprobated it, and the Royal Humane Society, of London, recommend the "utmost caution" in its employment. On the other hand, a modern writer, M. Wagner, regards the removal of the oppression of the encephalon, owing to the

accumulation of blood in its vessels, as the *second* indication to be fulfilled in many kinds of asphyxia, the *first* being the restoration of the circulatory and respiratory movements. It has already been remarked, that the abstraction of some ounces of blood must usually be beneficial in aiding the restoration of the circulation; but the grand evil, after all, is the deficiency of fluid sent by the arteries, which bleeding can only rectify indirectly, by aiding in the re-establishment of the circulation. A recent writer, M. Devergie, affirms, that when the individual has only just lost all consciousness, a "large bleeding" may produce the most satisfactory results, and that if it cannot always be employed at the first, it often facilitates the restoration of the circulation, when attempts at respiration are made. The general reprobation of blood-letting, in asphyxia, seems scarcely warranted; and, indeed, as we have already said, there are, perhaps, few cases in which a moderate abstraction of blood would not be beneficial. By some it has been advised, that blood should be drawn by cupping from the dorsal, epigastric and hypochondriac regions.

Such are the chief remedial agents employed in asphyxia. Nothing has been said of stomach brushes, and stomach mops, for stimulating that organ; of the internal use of phosphorus; of the instillation of hot water on the head, scrobiculus cordis, genitals, spine, &c.; the dropping of hot sealing-wax on the head; sticking needles under the nails; the application of the actual cautery, &c.,—because these are forms of excitants, from which but little good could, in any case, be expected, whilst there are others that are more appropriate in all.

With regard to the length of time that the resuscitative measures should be continued, it is difficult to lay down any precise rule. We shall find, when the particular forms of asphyxia are considered, that, in some, restoration appears to have been effected after a greater lapse of time than in others, so as to have given rise to the idea, that the impression made on the nervous system by the cause producing the asphyxia, may have occasioned syncope rather than true asphyxia. Under the possibility, that restoration may still be accomplished in very unpromising cases, it has been advised, that the means should be persevered in for several hours, and, indeed, until cadaveric rigidity begins to appear. A good deal must necessarily depend upon the length of time the individual has been exposed to the agency that has occasioned the asphyxia; and the practitioner, in every case, will have to be guided by his own judgment as to the probability of success from the application of any restorative measures; bearing in mind the cases on record of recovery after a long suspension of the vital manifestations, but, at the same time, recollecting that such fortunate examples are extremely rare. Occasion, however, will present itself for a recurrence to this subject.

When the resuscitative measures are beginning to be successful, slight convulsive snatchings of the respiratory muscles take place at longer or shorter intervals; with gaspings, sighing, slight fluttering at the heart, palpitations; and afterwards regular respiration and circulation. The patient should not be abandoned by the practitioner immediately after resuscitation has occurred, as, in consequence of

the condition in which the encephalon has been placed, during the existence of asphyxia, and the irregular movements occurring during the recovery, delirium or convulsions may supervene. A case is given in a respectable French periodical, in which the most furious delirium came on immediately after resuscitation from drowning, and where blood-letting appeared to be clearly indicated. The propriety of bleeding will have to be judged of by the presence of the usual signs, that denote increased action of the encephalic vessels.

The case of a corporal of the guards is given, who was seized with cramp as he was bathing, and remained for several minutes under water. By judicious assistance he recovered, and appeared to those about him to be free from danger, when he was attacked with convulsions and expired. It has been suggested, by Dr. Roget, that if the respiration had been artificially supported at this period, so as to have maintained the action of the heart until the black blood had returned from the brain, the life of the soldier might, probably, have been preserved; but it is more likely, that some lesion had taken place in the encephalon, consequent on the modified circulation in that viscus, rather than on the presence of black blood in the vessels, which must have been sent back towards the heart from the first re-establishment of the circulation,—and this view is confirmed by the fact, that convulsions sometimes occur a considerable time after recovery has, to all appearance, been effected.

Various inflammatory symptoms are apt to supervene, owing to the same irregularity,—which must be met as they arise, until the functions are restored to the healthy condition.

II. VARIETIES OF ASPHYXIA.

The remarks made in the history of asphyxia in general will render it unnecessary to dwell, at any great length, on the different varieties. Respecting the number of these, the greatest discrepancy has existed, in consequence of the difference of latitude given to the acceptation of the term. The causes, previously referred to, will guide us in establishing a few varieties:—*first*, those that arise from any mechanical obstacle to the due expansion of the chest;—*secondly*, such as are dependent upon an insufficient supply, or upon total absence, of oxygen in the inspired air;—*thirdly*, those that are produced by irrespirable gases;—and *fourthly*, such as are owing to any mechanical cause, which prevents the entrance of air into the lungs.

a. *Asphyxia from mechanical obstacle to the expansion of the chest.*

The brief mention that has been made of the first of these, will be sufficient. It can rarely happen, that asphyxia is induced by any extrinsic cause, that can prevent the due expansion of the chest in inspiration, and therefore, as a question of therapeutics or of legal medicine, it is possessed of but little interest, whilst its pathology does not differ from that of asphyxia in general. As, however, death takes place in consequence of imperfect hæmatisation, and supervenes gradually instead of suddenly, as in many of the other forms of asphyxia, the evidences on dissection may be more equivocal: there

may not be the same extent of fulness in the right heart, or of vacuity in the left; nor ought we to expect those extravasations into the lungs or encephalon, which are so common whenever the circulation from the right side of the heart to the left has been suddenly arrested.

Allusion has been already made to the cases in which this variety of asphyxia has presented itself,—namely as a punishment in Turkey, and as a means of judicial compulsion, where a witness has persisted in remaining wilfully mute. Occasionally, too, it has happened, that this mode of taking away life has been adopted criminally with the infirm, as in some of those infamous examples of turpitude, which excited so much horror and alarm, in the British metropolis, a few years ago. In these cases of refinement of cruelty, after the victim had been “hocused,”—as it was termed in the slang vocabulary,—by stupifying him with opium in some form, the hand was pressed upon the mouth so as to prevent the entrance of air, whilst the expansion of the chest was prevented by sitting upon the body. In this way, death was as speedy as if a ligature had been passed around the neck, or the individual had been thrown into an irrespirable medium. A case is described, in which asphyxia was nearly induced in a pugilist, by taking a cast of his body, in one piece. As soon as the plaster began to set, he felt deprived of the power of respiration; and to add to his misfortune, was cut off from the means of expressing his distress. His situation was, however, perceived in time to save his life. A similar accident happened to an illustrious individual in this country, (President Jefferson,) when the artist Browere was taking a cast of him. Mr. Jefferson informed the author, that he was in imminent danger of suffocation, and the family were so seriously alarmed that the plaster had to be broken off.

b. *Asphyxia from insufficient supply or total absence of oxygen.*

Of this variety there are many examples. It has been before remarked, that extremely rarefied air, and various gases, which are not of themselves *positively* deleterious, may become *negatively* so;—or, in other words, they may destroy, not in consequence of their being possessed of any noxious property, but because they do not furnish the oxygen, which is indispensable to hæmatisation. Hydrogen and azote are in this category. If an animal be placed in either of these gases, it breathes for a minute perhaps; but the conversion from venous to arterial blood in the lungs being prevented, arrest of the circulation, in the radicles of the pulmonary veins, occurs, in the same manner as in other cases of complete asphyxia. We can hardly, however, imagine the case, in which asphyxia from exposure to these gases could happen to man. The same may be said of an extremely rarefied atmosphere. For the purpose of experiment we occasionally place one of the lower animals under the receiver of the air-pump; and rapidly exhaust the air: the effect is here speedy, if the vacuum be suddenly formed, and the pathology of asphyxia, thus induced, is like that of the forms just considered; but if the rarefaction be made more gradually, asphyxia is longer in being produced, and the phenomena are much more equivocal.

In the respiration of animals, the oxygenous portion of the air is more or less consumed, and carbonic acid, of a nearly equal volume, takes its place. In other words, the vital portion of the air is abstracted, and an equal volume of air, which is altogether irrespirable, is added to the azote—which, as we have seen, is itself negatively injurious. Now, if an animal be confined in a restricted quantity of atmospheric air, it can exist so long as there is oxygen enough for due hæmatisation, and so long as the deadly agencies of the carbonic acid and the azote are not powerful enough to destroy. The bad effects of confined air might, therefore, be mainly, if not wholly, ascribed to the presence of an undue quantity of carbonic acid, and to the uncombined azote, left after the disappearance of the oxygen. This, at least, is one view of the matter; but those physiologists, who believe that the air is taken into the pulmonary vessels without decomposition; that its oxygen disappears in the course of the circulation, and that carbonic acid is formed in the system, and merely given off at the lungs,—a view which appears to be most in accordance with observed facts,—would ascribe the phenomena to the deleterious agency of the carbonic acid. Instances have occasionally occurred, where death has been caused in this way,—as in a diving-bell, where the air could not be renewed; but the most melancholy example on record was in the—since celebrated—“Black Hole” at Calcutta, a place of confinement 18 feet by 18, or containing 324 square feet, in which one hundred and forty-six persons were shut up, when Fort William was taken, in 1756, by Surajah Dowla, Nabob of Bengal. The room allowed to each person a space of $26\frac{1}{2}$ inches by 12 inches, which was just sufficient to hold them without pressing violently on each other. To this dungeon there was but one small grated window, and the weather being very sultry, the air within could neither circulate nor be changed. In less than hour, many of the prisoners were attacked with extreme difficulty of breathing; several were delirious, and the place was filled with incoherent ravings, in which the cry for water was predominant. This was handed to them by the sentinels, without the effect of allaying their thirst. In less than four hours, many were suffocated, or died in violent delirium. In an hour more, the survivors, except those at the grate, were frantic and outrageous. At length, most of them became insensible; and, eleven hours from the time they were imprisoned, of the *one hundred and forty-six* that entered, *twenty-three* only came out alive, and these were in a highly putrid fever,—from which, however, by fresh air, and proper attention, they gradually recovered. A similar instance happened in London, in 1742. Twenty persons were forced into a part of St. Martin's round-house, called “the Hole,” during the night, and several died.

In these, and in all similar cases, the lethiferous influence is doubtless of a compound character; being dependent both upon diminution of oxygen, and the presence of uncombined azote, and of an unusual quantity of carbonic acid. This acid, given off in respiration, is heavier than atmospheric air, and consequently accumulates near the ground, where ventilation is impracticable or neglected, and it can thus be readily understood, that where the only aperture into the cham-

ber is by the roof, or by a window high above the ground, the lower strata of air may become irrespirable for some time before the upper.

c. Asphyxia by irrespirable gases.

The gases which produce death by occasioning a spasmodic closure of the glottis, or which are *irrespirable*, are not many. They are chiefly carbonic acid, ammoniacal gas, muriatic acid gas, deutoxide of azote, nitrous acid gas, and chlorine. It has been before observed, that different writers have classed under this head, oxygen, protoxide of azote, carburetted hydrogen, carbonic oxide, sulphuretted hydrogen, and arsenuretted hydrogen; but these gases give rise to no symptoms resembling asphyxia. They are positively deleterious, and act upon the frame as *poisons*, under which head they are considered. A similar remark might, indeed, be extended to the gases enumerated as producing asphyxia by spasmodic closure of the glottis, when their strength is reduced below a certain point. Above this, contraction of the muscles that close the glottis is produced, as soon as the gases come in contact with them; but if sufficiently diluted, they may pass into the lungs, and exert upon those organs, and through them on the organism, the peculiar effects which they are capable of inducing. Thus, carbonic acid may cause symptoms of narcotism, whilst ammoniacal gas, muriatic acid gas, the deutoxide of azote, nitrous acid gas, and chlorine, may produce violent irritation, and inflammation of the air passages. It is, however, in their relations to asphyxia, that they have to be considered at present.

Carbonic acid gas is by no means an uncommon cause of asphyxia, and it has not unfrequently proved fatal more slowly by the poisonous narcosis which it induces. It has been found, that air was still irrespirable, when it contained three-fifths of its volume of this gas. Carbonic acid accumulates wherever combustion is going on; but it is the accumulation from brasiers of charcoal, where ventilation is impeded, that has been most lethiferous. The public journals contain accounts of many persons who have perished during the night, from this cause; and it was the method adopted by the younger Berthollet to rid himself of a disagreeable existence, in which he succeeded. In crowded apartments, artificially heated and well lighted, inconvenience—such as hurried respiration and circulation, giddiness, &c.,—are not unfrequently experienced from the presence of this gas, and allusion has already been made to its being concerned in the fatal affair of the Black Hole. It is the fixed air given off during the vinous fermentation; and, in the large vats of extensive ale and porter breweries, sufficient of the gas is often contained at the bottom to destroy those who may venture down. It is usual to pass a lighted candle to the bottom, and if it continue to burn, the descent may be made with safety,—carbonic acid not supporting combustion. In like manner, it is met with in deep wells, and the same plan is adopted to discover, whether the air will allow of combustion and respiration; but many a labourer has fallen a victim to his want of attention to this precautionary measure. This air likewise constitutes the *choke-*

damp of the coal mines, in contradistinction to the *fire-damp*, which consists of carburetted hydrogen. It issues in some volcanic regions in great quantities, from fissures in the rocks, and is found in caverns, as at Pyrmont in Westphalia, and at the celebrated Grotto del Cane at Naples—so called in consequence of the number of dogs that are asphyxiated in it. Carbonic acid is also extricated in considerable quantity in limekilns, by the agency of heat, which drives it off from the limestone or carbonate of lime,—and the public prints have detailed many cases in which life has been lost, owing to the wayworn traveller having lain down to rest in the warm but destructive atmosphere around one of these furnaces. Lastly.—Plants evolve carbonic acid in the night, which renders the air of confined apartments unwholesome, and, in some cases, induces asphyxia. An instance of this kind was related in the public prints. A gentleman, having frequently had his pinery robbed, the gardener determined to sit up and watch. He accordingly posted himself with a loaded fowling-piece in the green-house, where, it is presumed, he fell asleep, and in the morning was found dead upon the ground, with every appearance of suffocation, supposed to have been occasioned by the disengagement of *mephitic gas* from the plants during the night.

Carbonic acid cannot be breathed in a pure state, or even, as we have seen, when diluted with two-fifths of its bulk of atmospheric air. It occasions an immediate spasmodic closure of the glottis, which cannot be overcome by the strongest efforts,—preceded by painful irritation of the glottis and the upper parts of the throat. When, therefore, a person descends into a brewer's vat, a foul well, &c., in which the gas is in a concentrated state, he dies as speedily from suffocation, as when a ligature is tied round the neck so as to completely shut off the entrance of air into the lungs. Air, however, which contains a much smaller quantity of this gas, is unfit for prolonged existence. Experiments have shown, that animals perished in about three minutes, when plunged into an atmosphere containing about one-fifth of its volume of carbonic acid. But in order that asphyxia may ensue, it is not necessary that the air of a room, in which charcoal is burning, should be as strongly impregnated as this. There is an obvious difference between a mixture of free carbonic acid and air, and a mixture containing carbonic acid actually produced at the expense of the oxygen of the air. If only one-fourth of the oxygen be removed by combustion, it will contaminate the air with one-twentieth of carbonic acid, and, according to MM. Varin and Devergie, will render it asphyxiating.

With regard to the discrimination of asphyxia produced by the inhalation of carbonic acid, nothing can guide us except the history of the event, which may be deduced from the circumstances surrounding the air,—not from any intrinsic evidences. Pathological anatomy, independently of circumstantial evidence, does not indicate any phenomena, which distinctly show, that death has resulted from this variety of asphyxia rather than from any other.

Treatment.—In the treatment of asphyxia from the respiration of carbonic acid, the first important procedure is to withdraw the patient

from the deleterious atmosphere, and strip him of his clothes, in order that the air may come freely in contact with his skin. He must then be exposed to cool air, and cold water be thrown upon his face, until the respiratory movements re-appear. The reasons for this plan of management have been given previously. Friction over the chest must also be employed, and ammonia may be held to the nostrils, so as to stimulate the oppressed energies. These are the most important steps, but, in addition, insufflation has been advised to remove the noxious gas from the lungs, and to re-excite respiration; and galvanopuncture, in the mode recommended by Leroy d'Etiolles, for stimulating the diaphragm to contraction. It has been conceived, too, that the insufflation of oxygen might be serviceable; and, by some, blood-letting has been employed; but it is not easy to discover the rationale of the action of these agents. The judgment of the practitioner must suggest to him, whether these or other means, adapted to particular emergencies, may be indicated.

Ammoniacal gas, as well as *muriatic acid gas*, *deutoxide of azote*, *nitrous acid gas*, and *chlorine*—when in a state of concentration—are so acrid, that, when inhaled, the most violent irritation of the air passages is induced. It has generally been conceived, that they prove fatal by occasioning spasmodic closure of the glottis; but, from some experiments, it would seem, that certain of them pass the rima glottidis in sufficient quantity to produce phenomena, which are apparent on dissection. In experiments, which Mr. Broughton made on the effects of chlorine on mice, he found, that they fell dead in less than thirty seconds, and, on opening them, the lungs were tinged with the yellow colour of the gas, and the peculiar odour of chlorine was perceptible throughout their structure. Still, it is probable, that death arises from asphyxia,—not from the poisonous influence of the gas, the effects of which could scarcely be exhibited in so short a space as thirty seconds.

The smell of these agents will enable us to judge—in the absence of any history of the case—as to the cause of the asphyxia.

The *treatment* is similar to that for asphyxia by carbonic acid gas; and, in addition, insufflation with sulphuretted hydrogen gas—largely diluted with common air—may be had recourse to advantageously.

As these gases are extremely irritating, there may be a greater necessity for the employment of blood-letting in asphyxia induced by them.

d. *Asphyxia from mechanical obstacles to the entrance of air into the lungs.*

The most interesting varieties of asphyxia are those that are owing to some mechanical cause preventing the entrance of air into the lungs. Some of these we shall consider in detail.

1. *Asphyxia by submersion or drowning*.—This is perhaps the most common, and one of the most interesting in the phenomena which it presents. It differs according as the submersion is complete from the first, or the person has risen again and again to the surface. In the former case, we should expect the *post mortem* appearances to be

unequivocal. When a person falls into water, and remains beneath the surface, an effort is made to inspire; but this is impracticable, in consequence of the medium being irrespirable. Water is, however, drawn in, but as soon as the fluid reaches the glottis, the muscles which close it contract spasmodically; little or no water can enter, and death takes place with the same phenomena as present themselves in strangulation. These, as has been before shown, are,—accumulation of blood in the pulmonary artery and right side of the heart, owing to the non-conversion of venous into arterial blood, and more or less vacuity in the pulmonary veins, and left side of the heart.

It is an important question of forensic medicine,—whether there be any intrinsic appearances about *the found drowned*, which can enable us—in the absence of all history of the case—to pronounce definitively, that death has taken place by drowning. It has often been affirmed, that the presence of water, or, at all events, of frothy mucus, in the bronchial tubes, is characteristic of this variety of asphyxia. But dissidence has existed on this point amongst observers. At one time, the entrance of water into the bronchia was considered to be the essential cause of death, but it is now sufficiently established, both by experiments on animals, and by observation of the bodies of the drowned, that but little water is to be looked for;—generally, indeed, there is none; but there may be a small quantity of frothy mucus, totally insufficient, however, to account for death. By many, water has never been met with in the air tubes; and several observers assert, that, in their examination of drowned persons, they have neither found water nor froth, although in other cases, some of these observers have met with both one and the other. Louis instituted several experiments with the view of testing this matter. On immersing animals in coloured liquids, he discovered the liquids in the trachea, and sometimes even in the last bronchial ramifications. His experiments were repeated by Goodwyn, both for the purpose of proving that water positively enters the trachea, and of dispelling an idea, which had been entertained, that the frothy mucus is nothing more than a secretion from the bronchial tubes, owing to extreme engorgement of the pulmonary artery, during the last struggles of the individual. Three animals were immersed in mercury, and after death an appreciable quantity of the metal was found in the air passages. Experiments by others, have led to similar results.

Admitting, then, that a small quantity of water may enter the bronchial tubes, it can be readily understood, that if the individual were to rise to the surface and attempt to breathe, the inspired air, becoming mixed with the water and mucus of the bronchial tubes, might communicate the characters assigned to this frothy mucus; but it is not quite so easy to understand that any frothy mucus or liquid should be met with in the drowned unless under these conditions. If the individual, after immersion, took in any fluid and remained beneath the surface, or, in other words, did not inspire afterwards, it could scarcely be frothy. This would appear to be the view embraced by many. Orfila is of opinion, that a greater or less

quantity of water is generally drawn in during the agony of drowning, and that the existence of froth in the bronchia depends, in a great measure, on the circumstance of the animal's having risen to the surface, and respired air once or twice previous to its final submersion. It need scarcely be added, that whenever froth is met with in the air passages, it is a proof, that the individual was immersed alive,—respiration being indispensable to mix the air with the liquid. The fact, however, of water being met with in the tubes is not a sufficient proof that the person came to his death by drowning. It has been affirmed by Drs. E. J. Coxe and Evers, that if cats be first strangled, and then thrown into water, and suffered to remain there for 12 or 14 minutes, no water will be found in the lungs, except when the abdomen is compressed. In the latter case, the air and mucus being driven from the lungs, the liquid will be able to enter. Others, however, as MM. Orfila and Piorry, have deduced, from their experiments, that in the case of dogs, killed by strangulation, and immersed in water a short time after death, water constantly enters the trachea, and may pass even to the last bronchial ramification, if the animal be kept in a vertical position, with the head upwards,—in other words, as if it had died from drowning. Hence it may be inferred, that the entrance of water into the air passages is not *necessarily* a vital act. Its presence in the trachea, bronchia, and even in the ultimate subdivisions of the bronchial tubes, would not be a certain sign that the person was living at the time of immersion, even if it should be shown that the liquid was of the same nature as that in which he was found drowned. Still, as has been remarked by M. Devergie, this conclusion is not entirely rigorous, unless we infer that the same results occur on man as on dogs.

Again.—It has been affirmed, that the presence of the frothy mucus is not of itself positive evidence of death from submersion, and that it has been observed in other kinds of death. Orfila says, it is not necessary that water should enter the trachea, in order that this frothy fluid should be found; and that the tracheæ of those who have been hanged always contain some of it. The first of these assertions has been confirmed by daily observation; but Devergie—although he does not deny the latter—asserts, that he has opened the bodies of thirteen individuals who had been hanged, and that in none did he meet with frothy mucus in the trachea. He suggests, moreover, that it is important to have correct ideas respecting the nature of this froth, in order that it may not be confounded with frothy sputa. The froth of the drowned, he says, is commonly white, with very minute and numerous bubbles of air, constituting a foam (*mousse*) rather than a froth (*écume*). It never adheres to the trachea by the mucus, but is applied immediately to the tube. The same slightly viscid water, of which it is formed, attaches it to the trachea: all the bubbles that constitute it have a very fine aqueous envelope; they are readily divisible, and often, when the trachea is opened, the greater part subside like soap-bubbles. Whence, he concludes, the frothy water of the drowned has but little similitude to the sputa either of pneumonia

or of catarrh, and that attentive observation will prevent them from being confounded.

From all, then, that has been said, it is manifest, that although our knowledge on this matter needs some of that certainty, which is so desirable, the presence of frothy water, or of frothy mucus, does not perhaps afford us any unquestionable evidence that death has taken place from drowning rather than from any other form of asphyxia. One observer, Devergie, is of opinion, that the strongest of the presumptive signs of drowning is the existence of the non-mucous froth or foam on the internal membrane of the trachea—itself in a sound state.

Again.—It was at one time thought, that the stomach would be found largely distended with fluid in cases of death from drowning; but this also is erroneous. Perhaps, in all cases, some fluid will be swallowed, whilst the power of deglutition remains; but the convulsive action, induced in the muscles of the throat, will generally prevent much from passing. After death, it does not make its way into the stomach. The presence, therefore, of the fluid of immersion in that organ would be evidence, that the person had been thrown in alive; but the evidence loses much of its value, from the difficulty there must always be in establishing the identity between the fluid in the stomach, and that into which the body had been cast.

All these are interesting topics of medico-legal inquiry.

A fluid state of the blood has been considered, by almost all writers on this subject, as an evidence of death from drowning. It would be a singular circumstance were this the fact;—unaccountable, indeed, unless we were to consider, that the fluid of immersion were to penetrate the tissues to mix with one of its solutions; and we know the avidity with which water will penetrate animal membranes to accomplish this. In canvassing this point, Devergie states properly, that the existence of coagula in the vessels of the drowned is very uncommon, and that the fluidity of the blood is such, that it flows like water,—but, he judiciously adds, this fluidity ought to be common in cases of sudden death; and he says, that he has found it so in a number of persons, who had destroyed themselves otherwise than by submersion. Such, also, has been the result of the observation of the author on this subject.

Of the general impracticability of resuscitation in cases of asphyxia by drowning—where the causes have been fully and effectively applied—even a few minutes after the cessation of respiration, mention has already been made, when treating of asphyxia in general. Allusion was also made to fabulous narrations of restoration after a long immersion. It is but too, true, however, that an immersion of a few minutes only will often seal the fate of the sufferer. It has been asserted, that if the submersion have not exceeded five minutes, and no blow against a stone, or other violence, have occurred to complicate the effects, the efforts at resuscitation, if properly conducted, will generally be successful. After a quarter of an hour, recovery is not very common; after twenty minutes, or half an hour, it may be considered hopeless. The longest period recorded in the Reports of

the Royal Humane Society is three quarters of an hour; and from the first report of the establishment for the recovery of drowned persons in Paris, it would appear, that, out of twenty-three cases restored to life, one had been three quarters of an hour under water; four, half an hour; and three, a quarter of an hour; the rest for a much shorter time. It must be borne in mind, too, that an individual, who falls into water in a state of syncope may be submersed for a much longer period, and be capable of restoration, than if he fell into the water in full activity. To this variety of asphyxia, the epithet "*syncopal*" has been applied. The same may be said of one, who receives a powerful cerebral concussion, prior to, or at the time of, immersion. He is, probably, in the same condition—so far as his vital functions are concerned—as if he were in a state of syncope. The cases, which we see related, of good swimmers being drowned are often, probably, of this last class. They are struck by the wave, stunned, and rendered incapable of exertion. Perhaps, the safest rule is to attempt resuscitation, unless the signs which characterize the existence of death are present;—according to some, unless putrefaction, or cadaveric rigidity, have supervened; but the humane practitioner requires no guide of this sort. He must judge according to his best powers of discrimination, whether the case be one of asphyxia, or of permanent privation of vitality, and, if any doubt remains on his mind, his efforts must be continued until the doubt is removed.

Treatment.—As regards the treatment of this form of asphyxia, much need not be said, in consequence of the immediate application which the remarks made on the general treatment of asphyxia have to this variety. The rules to be adopted may be summarily expressed as follows:

When the body is taken from the water, the mouth and nostrils should be cleansed, and if frothy mucus exists in the fauces it may be removed by the finger, enveloped in a handkerchief. The wet clothes should be removed; the body be wiped dry, and be wrapped in a dry blanket; in this way it can be taken to the nearest habitation, on a board, or in a cart. When the body has been conveyed to a room, admitting of a good fire, if the water has been colder than the medium temperature of the climate, it may be stripped, placed upon a sofa, table, or on a board supported on chairs, before the fire, at such a distance, that the radiant heat does not act too powerfully upon it, and care being taken that the air of the apartment is not above 75° or 80°. A greater degree of heat than this is noxious, for reasons before mentioned; and it has been properly observed, that great caution should be used in the application of an elevated temperature to even a part of the body, excepting to the extremities—and they ought not, perhaps, to be excepted—lest the vital power of some important organ should be thereby enfeebled. Such is the course, as regards the application of warmth to the body, most commonly pursued; yet, as previously shown, it has been a matter of question with some, whether the temperature of the body should not be kept depressed even when that of the atmosphere is low, until respiration has

been restored by insufflation. Whatever doubts may exist on this point, there can be none, that any undue elevation of temperature is positively injurious, and that temperature, as Dr. Kay has observed, must be regarded as exerting chiefly a *conservative* influence.

As soon as the body has been placed in the favourable circumstances mentioned, attempts must be made to re-excite respiration, during which the head and chest should be kept raised, and the nostrils and mouth cleansed and open.

From what has been before said, the rationale of the following recommendations will be obvious. Let the individual be so exposed, that the atmosphere can act on the body; employ friction; and artificial respiration, according to the plans previously advised, by means of the bandage, and the instrument of Leroy or any other at hand, with the precautions that have been pointed out lest serious mischief be done to the delicate fabric of the lungs. Whilst artificial respiration is carried on, and especially if there be signs of returning animation, the warmth of the patient may be somewhat increased, and bottles of warm water, or warm bricks, or warm flannels, may be applied to the feet, knees, armpits, pit of the stomach, and along the spine. The warmth of a healthy person lying by the body is said, in the Report of the Royal Humane Society, of London, to have been found, in some cases of adults, but particularly of children, very efficacious. In the same report it is affirmed, that the warm bath, where it can be procured, is preferable to all other means of communicating heat; but the obvious objection to it is, that free exposure to the air is prevented, and the experiments of Edwards have established, that water exerts an injurious influence on the nervous and muscular systems.

As respects the use of stimulants, blood-letting, and other agents—often had recourse to in this and in other forms of asphyxia—what has been already observed, when touching on the treatment of asphyxia in general, is sufficient, and the same may be said of the means that are necessary after recovery.

It need scarcely be remarked, that the absurd practice of hanging up the drowned by the heels when first taken out of the water, and of rolling them on casks, ought to be universally reprobated. They were introduced at a period when death from drowning was supposed to be owing to the entrance of water into the chest and abdomen. If, in the language of the motto adopted by the Royal Humane Society, of London, "*lateat scintillula forsitan*"—the feeble spark could scarcely fail to be extinguished by such treatment.

2. *Asphyxia from hanging and strangling*.—The phenomena of death from hanging and strangling are identical, so far as regards the intrinsic evidences. The extrinsic differ somewhat, in consequence of the situation of the cord, which in the latter cases is horizontal; in the former more vertical. It can be understood, too, that in the former there may be dislocation of the cervical vertebræ, whilst in the latter this is not to be expected; but more mischief may be observable in the rings of the trachea, owing to the violence with which the rope has been tightened with the view of rendering death certain; for strangulation is *primâ facie* evidence of homicide;

hanging, of suicide,—it not being a very easy matter to hang a person against his will. Occasionally, too, strangulation has been effected by putting a stone or a coal in a handkerchief, and tightening it so that the coal may press upon and obstruct the windpipe; and cases have occurred of manual strangulation, the evidences of which have been apparent in the ecchymosis produced wherever the points of the fingers have pressed.

It is obvious, that the intrinsic phenomena must differ in these cases, according as the ligature is effectually or imperfectly applied; and, again, a difference may exist as regards the *ratio moriendi*,—whether, for example, death has begun in the lungs, or whether, owing to the dislocation of the vertebræ and consequent injury to the spinal marrow, the organs of innervation have been the first to be deprived of vitality. Now, as injury to the spinal marrow could not be easily induced in death by strangulation, this must be esteemed as the more simple form of the two.

Of old, the idea generally entertained was, that death in strangulation is caused by the cord pressing on the jugular veins, and thus interrupting the return of blood from the encephalon, whilst its transmission to the brain by the vertebral arteries is uninterrupted. Engorgement of the cerebral vessels consequently supervenes, and apoplexy. The striking objections to this view are,—that these very vessels may be tied without producing fatal apoplexy, or apoplexy at all. Even the vertebral arteries have been tied, along with the jugulars and carotids, on animals,—and yet they have survived the operation. In some experiments, in which Dr. Kay included both the carotid and vertebral arteries in ligatures, one or two of the animals recovered, although they were exceedingly weak for some time after the operation. More recent experiments, by Sir Astley Cooper, seem to establish, that the functions of the brain are more under the influence of the vertebrals than of the carotids; and that in certain animals—as the rabbit—these functions are instantaneously suspended, when the circulation is simultaneously arrested in both one and the other. Again,—Dr. Kellie tied the common jugular and the recurrent veins low down in the neck on two dogs, one of which appeared to suffer no inconvenience; the other, although rather dull and heavy for two days, speedily recovered.

Another strong objection to the view, that death is owing to hyperæmia of the encephalic vessels, is presented by the well-known experiment of Dr. Monro, Sen., who suspended a dog after having made an opening into its trachea below the place where the cord encircled the animal's neck. Through this aperture, the dog breathed freely during the period of suspension, which was three quarters of an hour. He was then cut down, and did not appear to have sustained any serious injury. When, however, the cord was placed below the orifice, and the suspension was renewed, he soon died. The works on medical jurisprudence refer to cases, in which attempts have been made to save the lives of criminals, by making an opening into the trachea. A well-known case of this kind is that of Gordon, who, at the commencement of the last century, was sentenced to be

hanged for highway robbery. He had become very rich by his avocation, and offered a large bribe to induce a young surgeon to attempt to defraud the law of its victim. An incision was made in his neck, and a tube was introduced through it into the trachea, in such a manner, that respiration might go on, if the upper part of the neck were constricted by the cord. The man was, however, very heavy, and it was considered that other accidents, besides the mere interruption of respiration, were produced by the fall, for when the body had been suspended the accustomed time, and was cut down, and handed over to the friends, the surgeon drew blood from the jugular vein, and used the utmost exertion to resuscitate him, but in vain. Some slight evidence of vitality was manifested. Once he opened his eyes and sighed; but this was all.

A surgeon of the Austrian army informed M. Richerand, that he had saved a soldier by practising laryngotomy some hours before the man was suspended.

It certainly cannot be considered as by any means established, that congestion in the encephalon occurs in death from strangulation or hanging. The affirmative view has doubtless been embraced, chiefly in consequence of the marked turgescence of the vessels of the integuments of the head and face. After death from hanging and strangulation, the vessels of the scalp, and of the integuments of the head and neck, are gorged with blood, as well as those of the mucous membranes of the eyes, nostrils, and lips, and not unfrequently blood exudes from the nose and mouth. From these outward signs of turgescence, it was inferred, that similar engorgement of the encephalon exists; but, although Morgagni, De Haen, and others, directed their attention for a long time to the subject, they did not discover any signs of engorgement in the brains of such as had died by suspension: and the observations of Coleman on animals, and of others, on the bodies of criminals and others who had been hanged, confirm their assertions. Neither is there any appearance of congestion in animals that are killed after a ligature has been put on both the internal jugular veins, or when these vessels have been obliterated by the pressure of tumours. It is proper, however, to remark, that some recent observers affirm, that in a great majority of those who had died from strangulation, they observed signs of apoplexy. Taking all the facts into consideration, we are, perhaps, justified in inferring, that the ligature of the vessels of the neck does not occasion immediate death, and that the constriction by the cord, in suspension and strangulation, does not produce death by engorgement of the vessels of the brain. We have, therefore, to look for another chief cause of death. This is, doubtless, as had been occasionally suggested, and has recently been much insisted upon, by Dr. Kay, the interruption of respiration.

The duration of life, in these cases, may be modified, as has been already suggested, by various circumstances,—such as the mode in which the rope is fixed; the height from which the body has to fall, &c. A humane executioner, can expedite death by adding his weight to that of the criminal, so as to luxate the vertebræ of the neck; and

Louis found, that the Parisian executioner could generally occasion death without a struggle, by rupturing the ligaments which unite the first and second vertebræ, or the ligament which confines the processus dentatus of the latter, so as to occasion pressure on the spinal cord. It may be laid down as a general rule, that death will supervene in a longer or shorter period, according as the obliteration of the air passages is more or less complete. Sometimes, as already remarked, the rope may be placed between the lower jaw and the larynx, or in such a position, that a small supply of air may enter the lungs; or unusual rigidity of the cartilages of the larynx may exist, so as to permit air to enter—if not in sufficient quantity to maintain life, at all events to prolong the suffering. This is often the case with those who attempt to destroy themselves.

In a recent case of penal hanging, in which a series of heterogeneous experiments were performed, the pulse was perceptible at the wrist for seven minutes; and the pulsations of the heart for twelve. (*Amer. Journ. Med. Sciences*, May, 1840, p. 16.)

The interruption to respiration must be regarded, then, as the chief cause of death from suspension; yet, as Dr. Kay has observed, the condition of the sanguiferous system is considerably modified in this form of asphyxia, and the circulation in the brain is somewhat affected, though congestion may not be induced. The sphincters are frequently relaxed; the urine and fæces consequently escape, and there is often erection of the penis with emission of semen. The cause of these different symptoms has been a topic of inquiry. Orfila attributes the last symptom to traction of the spinal cord, consequent on the extension of the ligaments of the vertebral articulations; and in support of the opinion, he affirms, that erection is a frequent consequence of traumatic affections of the cord: he cites, also, a case in which it occurred in consequence of luxation of the fifth cervical vertebra. Dr. Kay—and we suppose every phrenologist will join with him—is inclined to attribute it to some vascular disturbance of the cerebellum. Emission is, however, by no means as frequent an occurrence as has been supposed. In 77 cases, it was noticed 19 times. It is liable, too, to occur from other causes, such as injuries of the spinal cord by direct violence, as by puncture. The membrane of the urethra has also been found greatly injected. It has been affirmed, by M. Devergie, that some effusion of semen into the urethra almost always takes place, although it may not be apparent externally, and that it is detected by the presence of the peculiar animalcules; but fresh observations are necessary.

In some animals, the ligaments of the spine can be readily stretched so as to cause death. Every cook knows, that this is the case with the rabbit,—and we may readily conceive, that death might be produced in this way in man also.

We have before referred to some of the accidents that occasionally complicate asphyxia by suspension;—the injury to the larynx, &c. There have also been cases in which true apoplexy has occurred,—effusion of blood having taken place in the brain; but these appearances present themselves in a few instances only. They are by no

means to be looked for in simple cases of asphyxia from hanging or strangulation.

In a manuscript note, furnished by Sir Benjamin Brodie to Dr. Paris, it is stated as the opinion of that distinguished surgeon, that if an animal should recover from the direct consequence of strangulation, it may probably suffer from the effects of the ligature on the nerves afterwards. Sir Benjamin passed a ligature around the trachea of a Guinea-pig, and tied it firmly on the back of the neck with a knot: the animal was uneasy, but nevertheless breathed and moved about: at the end of fifteen minutes, the ligature was removed; but on the following morning the animal died. On dissection, no preternatural appearances were discovered in the brain, but the lungs were dark and turgid with blood, and presented an appearance similar to that which is observed after the division of the pneumogastric nerves. "I do not," says Sir Benjamin, "positively conclude from this experiment, that the animal died from an injury inflicted on the nerves of the eighth pair, but I think that such a conclusion is highly probable, and it becomes an object of inquiry, whether a patient, having recovered from hanging, may not, in some instances, die afterwards from the injury of the par vagum."

Treatment.—With regard to the treatment of asphyxia from suspension—or strangulation—it does not differ much from that which is applicable to asphyxia in general. The chief modification demanded is by the state of engorgement of the venous system of the outward head, produced by the constriction of the cord. The ligature must be removed immediately from the neck; the head and shoulders be elevated; and the body be stripped, and exposed freely to the air, even when the temperature is somewhat low. The application of heat is the more unnecessary in this case, as the body has not been immersed in a cold medium, as in cases of drowning. Artificial respiration must be adopted as soon as possible, with the other agencies and cautions that have been already advised. Bleeding may be useful, to relieve the turgescence of the external vessels,—but only for this purpose. Especial care must be taken not to extinguish the flickering spark of life, yet it need scarcely be observed, that during recovery the abstraction of blood may be practised with great advantage, should symptoms of irregular vascular action about the head seem to indicate its employment.

3. *Asphyxia from smothering.*—Asphyxia from smothering does not differ, in its essential phenomena, from the other varieties. Except in the case of children, it is scarcely known, and even in them it may be regarded as a rare occurrence. Occasionally it occurs to them as an accident, or is perpetrated as a crime. It is possible, too, for an adult, in a state of intoxication or great debility, to get into such a position as to prevent the entrance of air into the air passages. Death, too, is not unfrequently produced by what is called *overlaying children*, which does not always mean, that they have been smothered by the mother lying upon them. Fatal accidents have happened from the young infant being pressed too closely against the side of the mother during her sleep, so that respiration has been arrested; and it

has happened, that asphyxia has been caused by the anxious care of the mother to wrap her infant so as to shield it against the inclemency of the weather. Children, again, have been smothered by being folded up in a sort of turn-up bedstead, once much employed—by the poorer classes especially—in a double capacity,—

“A bed by night; a chest of drawers by day.”

The same differences may occur in this variety of asphyxia as in those that have been considered,—according as the condition has been induced at once, or as respiration has gone on, though imperfectly, for a time.

Treatment.—As to the treatment, it is precisely that which has been laid down under the former heads, with the exception of the means demanded for their peculiarities. Asphyxia from smothering, may, indeed, be looked upon as the most simple form: to it, therefore, the directions for the management of asphyxia in general are strikingly appropriate.

4. *Asphyxia from tumours, and other morbid conditions.*—Among the causes that give rise to asphyxia, by preventing the entrance of air into the lungs, are enumerated;—obstruction of the air passages by the entrance of extraneous bodies, by the presence of tumours, or by any morbid thickening of the lining membrane of the tubes. For an account of the pathological phenomena, which are consequences of morbid actions going on in these parts, we must refer to the chapters that consider such lesions. It need scarcely be said, that if extraneous bodies or morbid conditions shut off the air at once, simple asphyxia is produced; if more slowly, the phenomena—as in other varieties of asphyxia—must be modified by the circumstance; and that the cases will have to be treated—medically or surgically—according to the rules laid down elsewhere. The same may be said of asphyxia produced by wounds in the parietes of the chest, which admit the air freely into the cavities of the pleura, and occasion contraction of the lungs.

By those who have employed the term “*Asphyxia*” in its wide acceptance, many other varieties have been admitted. Thus, one writer, Most, enumerates Asphyxia from drinking; A. from poisons; A. from cold; A. from lightning; A. from hemorrhage; A. from violent passions or emotions; A. from concussion or contusion; A. from luxation of the cervical vertebræ, &c.; but, according to the definition of asphyxia, given in this article, their consideration would manifestly be out of place here;—the first link in the chain of morbid phenomena being seated in the functions of innervation or circulation, rather than in that of respiration; yet Dr. Kay, who has so well explained the theory of asphyxia, has indulged in an episode on death from cold, which is as much out of place as would have been death from apoplexy, or many of those other varieties that have been admitted by Most, Wagner, and such as allow a more extended acceptance of the term. There is a form of asphyxia, however, which may, with much propriety, be considered in this place,—according to

the views which we embrace of its theory and phenomena. This is the *Asphyxia of the new-born infant*.

e. *Asphyxia of the new-born infant—Asphyxia neonatorum.*

It is well known, that during intra-uterine life, no more blood passes through the lungs than is necessary for their nutrition, and that the blood of the fœtus is sent to the placenta, whence it passes back by the umbilical vein; doubtless after having experienced some changes in the placenta, which better adapt it for the nutrition of the new being. The precise mode in which the nutrition of the fœtus is accomplished, has been a topic of discussion amongst physiologists for ages. The facts and arguments appear to us decidedly in favour of the view, which considers, that the human placenta has no direct agency in embryotrophy. It seems, indeed, that all that is necessary—in order that a fœtus shall be developed in utero—is, that there shall be an absorbing surface surrounded by a nutritive substance, which will admit of being absorbed. The cutaneous envelope of the fœtus—monstrous or natural—is such a surface, and the liquor amnii such a fluid; and the matter of the umbilical vesicle, and the jelly of the cord, when these parts exist, and possibly some material derived through the placenta, after it exists, may lend their aid; but the participation of the last organ is questionable. Its function is probably to admit of the fœtal blood being shown to that circulating in the maternal vessels, in order that some change may be effected in the former, which may better adapt it for serving as the pabulum, whence the secretions from which the fœtal organs have to be elaborated, must be formed. (See the author's *Human Physiology*, 5th edit. vol. ii. Philada. 1844.) The placenta, in other words, may be esteemed a respiratory organ of the fœtus; and yet its presence does not appear to be indispensable, as there are many well authenticated cases of children having undergone intra-uterine developement, in the absence of umbilical cord, umbilicus, and placenta. Still, when these parts have once existed, they are necessary for complete fœtal developement, and any thing that interferes with the due passage of the blood along the cord produces asphyxia,—not only by preventing the requisite changes of the blood in the placenta, but by the interference with the circulation, which has to be effected by the umbilical cord and placenta, until the independent circulation is established by pulmonary respiration. We can thus understand, that if the cord come down in such a manner as to be strongly compressed for some time before delivery, asphyxia may be produced. In like manner, when the breech, feet, or knees, present, there is danger to the child, unless the delivery be rapid. Occasionally, too, the child is still-born, apparently in consequence of some morbid condition of the organs of innervation. Thus, owing to pressure of the head, in its passage through the pelvis, or to some modification in the encephalo-spinal centres, or in the nerves distributed to the respiratory organs, the function of respiration is not established, notwithstanding that the circulation appears to go on well along the cord: the child seems to be in an apoplectic condition.

Asphyxia may persist longer in the new-born child than in the adult, in consequence of the powers of calorification being but imperfectly developed, and there being, in consequence, less need for a highly oxygenized blood for its support.

Treatment.—It has been a question, whether the umbilical cord should be divided in these cases as soon as the child is extruded. In reply to this it may be remarked, that if all circulation have ceased in the cord, there can be no advantage whatever in keeping the connection between the child and the placenta entire, especially as the union cannot fail to interfere with the due application of such means as may be esteemed necessary. Indeed, where the circulation continues, but is becoming weaker, and the breathing has not commenced, it has been properly doubted, whether if the connexion with the mother interfere with the application of other efficacious means, it should be permitted to continue, when, owing to the placental circulation having become weaker, it seems evident that the application of such means cannot be longer delayed with impunity. Sometimes, when the child is extruded and the placental circulation continues, the stimulus of a smart stroke on the breech will arouse the dormant energies, and it will immediately begin to cry; but if this be insufficient, the infant had better be exposed to a moderately warm temperature,—that is, to the moderate warmth of the fire, so that the air can come in contact with a large surface of the body. Edwards found, that the young of some species of warm-blooded animals, when deprived of air, live longest in a temperature of about 68° Fahrenheit, and this may be taken as a guide to the proper temperature for the still-born infant. Generally, immersion in a warm bath is had recourse to, but the rationale of its action is by no means unequivocal, whilst, as Dr. Kay has observed, it is not necessary to the application of a proper degree of warmth to the body of the child; it prevents the beneficial effects of the atmosphere on the skin; and, moreover, it is found, as we have seen, to exert a depressing influence on the nervous and muscular systems.

In addition to these means, friction with the dry hand, or with stimulating liniments, especially over the regions of the chest and stomach, as well as the application of spirits to the nostrils, to rouse the respiratory nerves to action, have been recommended. Should any mucus obstruct the mouth and pharynx, it ought to be removed by means of the finger enveloped in a piece of fine linen, dry or dipped in a solution of common salt. But, after all, these means will often be found unsuccessful, and it becomes necessary to have recourse to artificial respiration. This is, indeed, the great reliance of the practitioner in severe cases, and its salutary influence is frequently marked. Whilst artificial respiration is persisted in, the cord will often be observed to pulsate, and to cease when the operation is suspended. In the still-born fœtus, it is not found practicable to execute artificial respiration by mere pressure on the chest, in the mode recommended for the adult. In one case, Dr. Blundell diligently operated in that manner for fifteen or twenty minutes together, without producing resuscitation, and, on examining the child on the

following day, he found that scarcely a particle of air had entered the lungs. Nor can insufflation be readily effected by blowing in at the mouth. The only mode of doing it effectually is by means of a curved canula or some analogous instrument. The author has been in the habit of carrying a tracheal pipe, or tube of silver, closed at the end, and with an aperture near the extremity, to give passage to the air and mucus. The introduction of this instrument into the larynx is by no means difficult. All that is necessary is, to pass the forefinger of the left hand upon the root of the tongue as far as the opening of the larynx, and then to insert the tube, held in the right hand, along the finger as a director. It will readily enter, and by pressing on the neck, it can easily be discovered, whether the instrument be in the trachea or the œsophagus. The lungs may then be inflated by blowing air from the lungs of the practitioner through the tube, and forcing it out again by pressing on the thorax and abdomen, and repeating this five-and-twenty or thirty times in a minute. It has been objected, that the air, sent into the lungs of the fœtus from those of the adult, cannot be as efficacious as pure atmospheric air; but it is to be borne in mind, that the young being does not require such highly oxygenized air as the adult. In inflating, care must be taken, as has been previously inculcated, that the air is not driven in too powerfully. The experiments of Leroy d'Etiolles show, that insufflation may be performed with much less risk in the infant than in the adult, because the structure of the lungs is firmer in the former, and consequently there is less danger of rupture or dilatation of the air cells.

If the bellows of Leroy be at hand, which they scarcely ever are on such occasions, they may be employed. It has also been proposed, that a small galvanic apparatus, like that recommended by Leroy, and before described, might be used with advantage to rouse the diaphragm to contraction. "The acupuncture needles," says Dr. Kay, "might be introduced into the diaphragm, one or two lines on each side of the chest, and two wires, each leading to an opposite pole of the galvanic circle, might be connected with these needles. On completing the galvanic circle, a contraction of the diaphragm would be produced, which might be suspended by removing one wire, for a moment, from its connexion with the battery. The relaxation of the muscle might then be effected by gentle pressure on the abdomen, and this process might be alternately repeated until respiration was established."

Such appears to be the most approved mode of resuscitation in cases of the *Asphyxia neonatorum*. Désormeaux, however, complains of his want of success from inflating the lungs, even when assiduously used, and he places his main reliance on the external means for exciting the respiratory muscles to contract. For this purpose, he recommends a species of *douche* or ablution with some alcoholic liquor. This the practitioner takes into his mouth, and, having held it there a few seconds, he ejects it forcibly against the anterior paries of the infant's chest. It is rarely necessary, he says, to repeat this more than twice or thrice. Velpeau says he has adopted the plan,

and with success. It has been also advised, that a cupping-glass should be applied to the nipples of the child, or that they should be sucked by the mouth; but, as Désormeaux has remarked, the only use in this can be to excite the action of the muscles. It is utterly impossible, that any dilatation of the chest could be produced by it, as has been believed by many, who were more credulous than judicious.

It is unnecessary to dwell upon the many other expedients that have been occasionally adopted. If the means pointed out should fail, we ought not to expect advantage from such agents as the smoke of linen or burnt paper, or onions or garlic introduced into the rectum, or the application of stimulants to the nose. Their cautious use may be advisable when the spark begins to be ignited, but not before.

When the means are beginning to succeed, the pulsations of the heart and of the cord—if the child be still attached—gradually return; the muscles resume, by degrees, their natural firmness; the skin becomes less pale, and calorification is re-established. Some slight convulsive gasps are made, which become stronger and stronger, and ultimately the child attains sufficient vigour to cry, after which it may be looked upon as safe. This, at least, is a general rule; but every practitioner must have had the mortification to find, that even when he has succeeded so far, unfavourable symptoms have presented themselves, and the child has sunk. Velpeau refers to two cases in which he had succeeded in restoring the movements of the heart and lungs for more than three hours, by means of insufflation and galvanism; yet both infants were subsequently lost.

The same question has been agitated here, as in other cases of asphyxia:—How long ought we to persevere in our efforts at resuscitation? It has been advised, that they should not be relinquished under two or three hours,—but all this must be decided by the good sense of the practitioner. Let him bear in mind, that many a child has been thrown aside as dead, which might probably have been saved. A woman, run over by a stage, was carried into St. Thomas's Hospital, London, and died in a few minutes after admission. Dr. Blundell was requested by Mr. Green to assist in the Cæsarean section. In thirteen minutes from the last respiration of the mother, the child was taken out. In fifteen minutes from the same, Dr. Blundell began the artificial respiration, and, during fifteen minutes longer, he continued it. Ultimately the child was completely resuscitated, and, according to Dr. Blundell, if due care had been taken of it, it would probably have been living still. He affirms, also, that a Mr. Tomkins of Yeovil, a gentleman very accurate in his observations, used resuscitants for an hour and five minutes by the watch, before obvious signs of life appeared. The child recovered, and lived for some time afterwards. Still, much must be left to the judgment of the practitioner. Where, from the appearance of the fœtus or other evidences, he has reason to believe, that it has been for some time dead *in utero*, all his endeavours must necessarily be abortive. It is only in cases in which the child has perished in the birth, that means can be effective,—and in such case all the energetic measures recommended above should be put in force, and not abandoned until hope is lost.

Mr. Burns says, that when a child does not breathe soon after it is born, it is not always easy to say whether it be alive, as we have, at this time, no criterion of death except putrefaction; and, therefore, that it behooves us always, unless this mark is present, to use means for preserving it. His remark might be extended to every case of apparent death happening at any age; but there is generally a chain of phenomena, which enables us to pronounce with tolerable certainty before this criterion of death is observable. There can be no doubt, however, that so long as there is any hesitation in the mind of the practitioner as to whether the child be dead or not, his efforts should be perseveringly continued.

Where there is any reason to believe, that the state of suspended animation is dependent on, or connected with, an apoplectic condition,—as where the respiration is very slow and laborious, and there is evidence of venous engorgement of the head and neck, with pulsation in the cord—advantage is often derived from permitting a teaspoonful or two of blood to flow.

When the attempts at resuscitation have been successful, the same attention is necessary during recovery—that is, for a day or two afterwards—as in the varieties of asphyxia previously mentioned.

BOOK III.

DISEASES OF THE CIRCULATORY APPARATUS.

CHAPTER I.

MORBID CONDITIONS OF THE BLOOD.

AFTER the follies of the humoral pathology had experienced from pathologists the ridicule which they richly merited, it was for a long time believed, that the fluids are never the seat of disease, and *Solidism*—as it was termed—usurped the place of the former *Humorism*. Daily observation shows, however, that the condition of the solids is materially influenced by that of the blood, which bathes them, and furnishes the pabulum for their support; and, at the present day, the disposition is perhaps greater, amongst pathologists of correct observation and reflection, to look to the blood as the source of many diseases, at one time referred to the solids exclusively, than it has ever been. It is not, however, the old humoral pathology that is revived, but one of a different character, suggested by our better acquaintance with the laws of the organism in health and in disease.

Fulness of blood is a condition which enters into the notions of both the professional and the unprofessional; and there can be no question, that a very opposite condition often exists. It is difficult for us, however, to appreciate accurately the effects of difference in quantity of the vital fluid, except when the fulness or deficiency is considerable. The blood, too, can unquestionably be modified in its character, by change of aliment, and by agents, which we are in the habit of administering with this view, as iodine and its various preparations, mercury, &c.; and there can be as little question, that, in various diseases, its character becomes essentially changed, so much so, that the diversities have attracted the attention of numerous observers, within the last few years more especially, and they become a part of the history of individual diseases. Accordingly, in this work, the condition of the blood has already been referred to under numerous heads, and will be still further noticed under diseases that have not yet been considered. It has been properly remarked by M. Andral, that under the triple relation of vital phenomena, intimate structure, and chemical composition, we can draw no definite line of

demarcation between the blood and the solids. It is impossible, indeed, for us to conceive, that the state of the one can be modified, without that of the other experiencing a corresponding mutation; and the more closely we inquire into the pathology of both fluids and solids, the less likely shall we be to admit the claims of either fluidism or solidism, and the more satisfied, that the solids and fluids are in mutual dependence.

Whilst the blood is circulating in the vessels, it appears to consist of a fluid portion, to which the name *Liquor Sanguinis* has been given, and of red particles; but when it is removed from the vessel, and no longer subjected to the vital influence, it separates into fibrin and serum; or, in other words, into a solid, and a fluid portion. The *solid*, when washed, and freed from the serum, and red particles, that are mechanically entangled in its substance, constitutes the fibrin; the *fluid* contains water, albumen, oil, animal extractive; and salts—alkaline, earthy and metallic. (See on the whole of this subject, the author's *Human Physiology*, 5th edit. vol. ii. Philad. 1844.)

It is obvious, that the blood may vary somewhat in its specific gravity, but the difficulty exists in determining, under such circumstances, whether there be a positive increase or deficiency in the solid portions, or whether the difference may not be owing to a modification in the quantity of the aqueous portion. This may be one reason for the discordance, amongst observers, as to the specific gravity of healthy blood; and another is—the difference of temperature at which the specific gravity may have been taken. The mean specific gravity has been estimated, by some, at 1.0527; by others, at 1.0800,—a difference so great as to render it difficult to fix any standard. It is very easy to comprehend, that the specific gravity may be affected by copious loss of blood, especially if fluids be freely allowed. The solid portions are not readily generated; whilst the diminution in the quantity of the circulating fluid increases absorption, and tenuous fluids pass through the coats of the blood-vessels of the stomach and intestines with great facility. The specific gravity of serum affords more precise information. The proper proportion of the saline matters does not raise the specific gravity of serum, above that of distilled water, more than five parts in 1000. The excess, beyond this, is owing to the presence of albumen; so that the specific gravity of serum indicates, pretty nearly, the quantity of albumen contained in it; and hence becomes a useful guide in *Morbus Brightii*. In certain cases of disease, in which albumen is carried rapidly out of the system, as in the renal affection just mentioned, and in dropsies and profuse hemorrhages, the specific gravity of the serum, which, in health, averages 1.027, has been observed as low as 1.013; whilst in other conditions, where the water and even the salts are removed, as in cholera, it has been found as high as 1.041.

The proportion of fibrin in the serum varies very materially according to different morbid states. In 1000 parts of blood, it was found, according to MM. Andral and Gavarret, to vary in proportion from 1 to 10; the globules from 185 to 21; the solid matters of the serum from 104 to 57; and the water from 915 to 725. Taking the

mean of twelve experiments, it was found, that the crassamentum amounted to 53·307 per cent.

The mean proportion of fibrin in healthy blood is found by M. Andral to be 3 in the 1000. It may oscillate, however, in healthy individuals, around this mean, so as to descend to 2·5 or up as high as 3·5. In some persons, indeed, the proportion may be nearly as high as 5; and, in others, nearly as low as 2, without their being indisposed. These cases are, however, rare, and, as Andral has remarked, must be looked upon as idiosyncrasies. The mean proportion of globules is 127 in the 1000; but this may vary in health from 140 to 110; in the former case, however, there is an approximation to the plethoric condition. The proportion of solid matters of the serum, which, on the average, may be taken at 8 in the 1000, likewise oscillates above and below the mean, within limits that are compatible with health.

The coagulation of the blood is more speedy in proportion as the circulatory and nervous systems are more feeble in their action. This is the cause, why, during a syncope, a coagulum forms around a bleeding vessel, which thus arrests the hemorrhage, in many cases. In experiments, instituted with the view of testing the influence of reduction of the powers on the coagulation of the blood, it was found, by Mr. Thackrah, that the last portions of blood drawn coagulated the soonest. On the other hand, when the circulatory and nervous functions are greatly exalted, the blood is slow in coagulating, and this circumstance gives occasion to an appearance of the blood, which is of moment to the pathologist. This is the *buffy coat*, which is formed by the upper stratum of fibrin, from which the red particles have subsided. The blood, consisting of liquor sanguinis and insoluble red particles, preserves its fluidity long enough to permit the red particles, which are of greater specific gravity, to subside through it. At length, the liquor sanguinis separates, by a general coagulation and contraction, into two parts; and this phenomenon takes place uniformly throughout the liquor. That part of it, through which the red particles had time to fall, furnishes a pure fibrin or buffed coat, whilst the portion into which the red particles had descended, furnishes the coloured clot. This, in extreme cases, may be very loose at the bottom, from the great number of red particles collected there, each of which has supplanted its bulk of fibrin, and consequently diminished its firmness in that part.

It would appear, from certain experiments, which have been instituted, that healthy blood is similarly constituted with blood disposed to form a buffy coat,—the main difference being, that the former coagulates more quickly. In some instances, however, as observed by Dr. J. Davy, inflammatory blood does not coagulate more slowly than healthy blood. It would seem, moreover, that the presence of an increased quantity of fibrin in the blood favours the subsidence of the red particles, and hence it has been inferred, that the formation of the buffy coat, may be owing to the blood containing a larger quantity of fibrin, which the blood of inflammation is known to do. The causes, therefore, of the buffy coat in inflamed blood, as suggested by J. Müller, may be its slow coagulation, and the increased quantity of

fibrin. We can thus understand, that in anæmia, in which the proportion of red particles to the fibrin is diminished, we may have the buffy coat; and it is not uncommonly seen in chlorotic cases.

The cupped form, which inflammatory blood assumes at times, is owing, as remarked by Dr. B. Babington, to inequality of contraction. The upper surface, being freer from intervening red particles, contracts more powerfully than the under, and a concavity of the upper surface is the necessary consequence. When, however, the contraction is weaker, the weight of the subjacent red clot, which forms a part of the same mass with the upper colourless portion, weighs this down, and keeps it in a horizontal position.

The crassamentum of arterial blood exhibits the buffy coat, but this appearance is rarely seen in blood, which has been extracted by leeches or cupping.

The buffy coat is commonly met with in diseases of high vascular excitement; but it is likewise observed in pregnancy, and, occasionally, in neuropathic affections. It may, however, as remarked above, be absent in diseases that are highly inflammatory; and perhaps, the explanation of this phenomenon afforded by an observer already cited, Dr. B. Babington, is the true one: the circulation may be so overcharged, either actually or relatively, or the nervous power so oppressed, that the requisite degree of propulsive force is not exerted by the heart and arteries, nor is the vital energy, on which slow coagulation depends, imparted to the blood. In such instances, the buffed coat generally appears on a second or third repetition of venesection. The form of the receiving vessel, the degree of motion to which the blood is subjected, and the size of the orifice in the vein, have a great influence. Blood, that would unquestionably exhibit the buffy coat, when suffered to escape from a large orifice, may present no appearance of it whatever, if it trickle down the arm. In a narrow and deep vessel, too, it is better shown than in one that is broad and shallow.

The condition of the blood, which gives occasion to the buffy coat, when it occurs in inflammatory diseases, has been considered by M. Piorry an inflammatory one of the fluid itself, and has received the name *Hæmitis*, (Fr.) *Hémite*.

In regard to this pathological state, as well as to the plastic powers of the blood, by which concretions may apparently form in the heart, and become organized during life, we shall have to speak, in discussing the morbid conditions in which they are met with. The same may be said of the salts of the blood, to which the attention of pathologists has been directed of late years, especially in the causation of tropical and other fevers, and of malignant cholera. The state of the vital fluid will be found particularly described under these and other affections, where it has been specially noticed, so as to render it unnecessary to anticipate, or repeat the descriptions here.

I. FULNESS OF BLOOD.

SYNON. Plethora, P. vera, P. sanguinea, Polyæmia, Polychymia sanguinea; Fr. Pléthore, Abondance; Ger. Vollblütigkeit, Ueberfluss an Blut.

There can be no question, that a state of the vascular system exists, at times, in which too much blood is formed, and a consequent predisposition is generated to attacks of disease. It has been properly questioned, however, whether general fulness of blood ought to be regarded as a morbid condition: still, as local congestions or hyperæmiæ are very apt to occur under such a condition, it may be properly considered here. The term *polyæmia*—it may be observed—is used to signify fulness of blood in the general system, whilst *hyperæmia* means a surcharge of that fluid in the capillary system.

Diagnosis.—The evidence of fulness of blood may be general or local; and hence, certain writers have admitted *general plethora* and *local plethora*;—not that in the latter case, there is such a superabundance of blood in any part of the organism as to constitute congestion or hyperæmia, but, as observed by M. Dubois d'Amiens, that certain organs, by virtue of their texture and functions, first,—and sometimes exclusively,—exhibit the plethoric condition, which, in reality, is general. Amongst the most common phenomena, are—giddiness, rushing of blood to the head, headache, somnolency, fulness of pulse, suffusion of face and eyes, epistaxis, &c.; the precise phenomena varying, according to the predisposition existing at the time in some organ to be attacked with hyperæmia rather than another.

An examination of the relative proportion of the constituents of the blood in plethora has shown to M. Andral, that it differs from ordinary blood in the greater quantity of globules, and the much smaller proportion of water. In 31 specimens of blood, taken from plethora patients, he found the mean quantity of globules to be 141; the minimum 131; and the maximum 154. His researches have led him to the conclusion, that the grand condition of the blood, which favours the production of hemorrhage, is a diminution of the fibrin of the blood compared with the red globules. In plethora, the proportion of globules is greater than in the healthy state, whilst that of the fibrin may be normal, or below the physiological condition. When hemorrhage occurs under such circumstances, the quantity of globules diminishes, but not that of the fibrin; hence an equilibrium is induced, and the hemorrhage may not recur, or not until an excess of globules is again produced. In scorbutic cachexia, as is shown hereafter, the quantity of fibrin is diminished in quantity, whilst that of the globules may have remained stationary.

Causes.—Certain individuals are disposed to fulness of blood, without the health seeming to suffer; but they are, of course, more liable than others, in whom such plethora is absent, to be attacked with disease. Amongst the exciting causes are, too much nourishment, want of proper exercise, and of the ordinary healthful mental and other excitants. It can be readily understood, too, that the suppression of

wonted evacuations may induce the same condition. M. Andral believes that true plethora is more often constitutional than acquired; and it is well known, that it cannot always be induced at will by too abundant nourishment.

Treatment.—In this affection, precautionary measures are all important. If a marked tendency to fulness of blood exhibit itself, the quantity of food should be diminished, and vegetable should be preferred to animal food, as the latter forms a more copious and a richer chyle. When the evidences of fulness, before mentioned, present themselves, in addition to appropriate restrictions in regard to diet, it may be proper to diminish the amount of blood in the system by blood-letting; but this should be employed only as a palliative; for if it be repeatedly performed, by adding to the activity of absorption, it cannot fail, ultimately, to augment the evil which it was intended to remove. Where the symptoms are encephalic, the application of cups to the nape of the neck, and the loss of ten or twelve ounces of blood, in this way, often afford essential relief. Cathartics are, in such cases, valuable agents. The sulphate of magnesia, for example, may be administered two or three times a week, in such doses as to produce two or three watery evacuations; and exercise on foot should be taken so as to induce slight fatigue, but not so much lassitude as to endanger the supervention of hyperæmia. In this way, the tendency to fulness of blood may often be got rid of.

II. PAUCITY OF BLOOD.

SYNON. Anæmia, Anæmiosis, Oligæmia, Hypæmia, Anhæmatosis; *Fr.* Anémie; *Ger.* Blutleerheit, Blutmangel.

Although the term *Paucity of Blood* is used here, it is not intended to treat solely of deficiency of that fluid, but to include that condition in which the watery portions largely predominate, or what has been called *Hydroæmia* or *Hydræmia*.

Diagnosis.—The most striking symptom is, the paleness of the countenance and of the integument generally, as well as of the mucous membranes, where they commingle with the skin. At times, however, the vessels of the skin of the face are turgid with blood, and instead of communicating the usual florid hue to the cheeks, or the vivid red observed in ordinary febrile affections, they present the appearance of a livid and circumscribed flush of a very peculiar character. This was a prominent symptom in a case, which fell under the author's charge in the Philadelphia Hospital: all the functional phenomena were those elsewhere described as constituting "*Splenic cachexia*," of which the anæmic condition of the blood forms an essential part. In these cases, if suffusion of the cheeks exist, and the blood be forced out of the capillaries, it is slow in returning into them. The pulse is usually small, feeble, slow, or, at times, frequent and almost imperceptible, irregular or intermittent. Occasionally, however, after great losses of blood, and especially after reaction supervenes, the impression conveyed to the finger by the pulsations of the artery at the wrist may deceive, and, unless great care be taken in

the examination, or the history of the case be known, it may be treated as one of polyæmia rather than of anæmia. Usually, under such circumstances, the pulse is quick, but there is little or no arterial tension; and, when the loss of blood has been very great, it appears shattered, as it were.

Where the oligæmia is to a great degree, the patient can make use of no effort without experiencing a sense of suffocation, and palpitations, which compel him to stop; he complains, too, constantly of disagreeable beatings in the chest, and in the vessels of the neck and head, and frequently falls into a state of syncope, when he remains for any length of time in the erect attitude. At times, even rising from the horizontal to the vertical position occasions fainting; and, if the arms be raised above the head, the pulsations at the wrist become imperceptible. The nervous system appears to be impressible in proportion to the anæmia, so that irregularities in the circulation are apt to take place under slight sources of excitation. This is strikingly exemplified in the headache, the beating of the carotid and temporal arteries, and the suffusion of face, that rapidly supervene on sudden and copious losses of blood, as in uterine hemorrhage. The phenomenon of the *venous pulse* is, at times, perceptible,—perhaps, owing to the regurgitation of the blood through the tricuspid valves, which impresses the column of blood proceeding to the heart by the vena cava descendens; and, owing to the thin condition of the blood, a rapid and perceptible subsidence of the veins of the neck occurs synchronously with the active dilatation of the ventricles of the heart.

In most cases of anæmia, the encephalic functions are disturbed, and there is vertigo, with tinnitus aurium, and impaired or depraved vision. The gastric functions are equally disordered, as indicated by loss of appetite, or by a capricious condition of the same, with nausea or vomiting: constipation is common, and the urine is clear and limpid. Usually, towards the termination of the disease, or in its progress, there is more or less infiltration of the lower extremities, or dropsical effusion into one or more of the cavities.

When blood is drawn from an anæmic patient it is found to possess a smaller proportion of the crassamentum, and this is loosely cohering: the quantity of serum, on the other hand, is greatly augmented. In certain cases of anæmia, which fell under the author's charge in the summer of 1840, when blood was drawn from the temples, by means of cups, to relieve the encephalic disorder, there was scarcely any clot, and the blood, as it flowed, appeared to be merely coloured serum. The essential character, however, of the blood of the anæmic is the opposite to that of the plethoric—paucity of globules. In 16 cases of incipient anæmia, Andral found the proportion to be 109; and in 24 cases of confirmed anæmia, 65. That distinguished observer draws attention to different forms of anæmia in connexion with the modifications of composition in the blood. In spontaneous anæmia, slight or considerable, he found the globules alone diminished in quantity; the fibrin and solid matters of the serum

possessed their healthy proportion: thus, in 16 cases of slight anæmia, he found the average proportion of fibrin, 3.0: and in 24 cases of confirmed anæmia, 3.3. In the anæmia, also, that follows hemorrhage, the globules alone may have their proportion diminished; but if the hemorrhage should augment, or be renewed, the blood soon begins to lose some of its other principles; and, along with the globules, the fibrin, and the albumen of the serum diminish. In a female, who had suffered from copious metrorrhagia, the blood was found to contain only 21 parts of globules; 1.8 of fibrin; and 61 of solid matters of the serum. The water had arisen to the enormous proportion of 915 parts. In anæmia, induced by appreciable modifications of the organism, the composition of the blood was affected as in spontaneous hemorrhage; thus—the globules alone were found to be diminished,—the fibrin and albumen of the serum remaining the same. This was the case in several pregnant females, whose blood had lost globules without any diminution of its fibrin. Andral found the mean proportion of globules in them the same as in cases of slight anæmia. (See CHLOROTIC CACHEXIA.)

Owing to the proportion of fibrin to the red globules being increased, the buffy coat is not an uncommon phenomenon in anæmia, and especially in cases of chlorotic cachexia (q. v.); for it has been shown, that whenever there is an increase in the proportion of fibrin, and at the same time the coagulation of the blood is not too rapid, the fibrin accumulates at the surface of the blood, and the buff appears.

Whenever a certain diminution takes place in the proportion of the globules, a bellows' sound is heard, when auscultation is practised over the arteries. According to Andral, this is connected with impoverishment of the globules, inasmuch as it is not heard when the fibrin alone is diminished in quantity. Accordingly, it is not met with in scurvy, at least until the globules have become affected; nor has it been heard in cases in which the impoverishment of the blood is especially owing to diminution in the quantity of the albumen of the serum. Auscultation over the region of the heart generally indicates, that the sounds are distinct, and sharper than usual. They can, at times, be distinguished over the whole of the thorax, and are occasionally accompanied by the *bruit de soufflet* or "bellows' sound." The impulse communicated to the hand applied over the region of the heart—which, in the early period of the disease, is energetic—commonly, in the progress of the affection, becomes feeble. When the arteries are examined by the stethoscope, the same sounds are heard as in chlorosis: they are modifications of the bellows' sound. Chlorosis, indeed, belongs to anæmia; and amenorrhœa is not uncommonly attended with the same anæmic condition. The sounds, heard in the arteries, are best observed over the carotids; but they are not continuous.

The different functional phenomena, which are characteristic of anæmia, generally occur in a gradual manner, and it is long before they induce so much disease as to cause death. In the very thin state of the blood that accompanies it, hemorrhages readily occur from parts in which the vessels are but loosely protected by the tissues

in which they creep, as from the mucous membranes—the gastrointestinal especially;—and these hemorrhages greatly hasten the fatal termination, both by the increased exhaustion which they induce, and by their laying the foundation for hydropic or other mischief.

Causes.—Any circumstance that deprives the organism of the blood necessary for the nutrition of the tissues, may be the cause of anæmia. Hence, copious loss of blood, either spontaneously or by art, is a common cause; but, of late years, since a more wise caution has been inculcated in regard to the employment of the lancet, it is much less frequently induced by the efforts of art than formerly. Next to loss of blood, must be placed insufficient nourishment. In the cases before referred to, in which the oligæmic condition of the blood was so marked, the patients had sailed from the West Indies for America, with provisions for two weeks only; and their voyage being one of three weeks, they were compelled to live for the last week almost wholly on water, which, of course, contained scarcely any reparatory materials; the solid portions of the blood were, consequently, appropriated to the uses of the economy, and their places supplied by water only. In like manner, excessive fatigue, want of rest, the respiration of an impure air,—and especially if there be, at the same time, privation of solar light—impair hæmatosis, and give rise to anæmia. The influence of the last agency is considerable. In many mines,—and those of Anzin and Schemnitz, in Hungary, are particularly specified,—the workmen suffer rapidly and fatally from anæmia; and in all crowded cities, especially amongst the inhabitants who enjoy but rarely the light of the sun, a paleness is produced, which signally distinguishes them from the ruddy inhabitants of the rural districts, and has been termed in the case of London—*Cachexia Londinensis*. Anæmia is also symptomatic of various diseased conditions. Whenever, indeed, any organic mischief exists, the condition of the blood becomes impoverished, and paleness is the result. The same effect is induced by the depressing passions, but in these cases the anæmia is transient. The paleness of surface, which is the result of a febrile attack, and especially of the cold stage, does not belong to this affection. It is owing to the recession of the vital fluid from the surface towards the centre, and is removed by the re-establishment of the centrifugal forces.

Pathological characters.—On the necroscopy of those who have died anæmic, the tissues of the different organs have been found pale, and the vessels and heart almost exanguinous. The heart, too, is often atrophied, and its tissue softened, especially if the disease have been of long duration. The intestinal canal is frequently, also, pale; and the serous cavities and cellular membrane are infiltrated with serous fluid.

Treatment.—In the treatment of anæmia, it is all important to inquire, whether it be idiopathic or symptomatic; and, if the latter, to endeavour to discover the pathological cause, and to remove it. In almost all cases, it is essential to place the patient on nourishing diet; and especially so, where the anæmia has been induced by insufficient nourishment; yet care must be taken, in the very impressible

condition of the system, which prevails in these cases, that undue excitement be not induced. It is likewise important, in all cases, that the patient should be placed in a pure air; and this becomes especially necessary, when the anæmia has been induced by the respiration of an impure atmosphere. In such case, and particularly where the patient has resided in a dark situation, there is very frequently, along with the anæmia, a scrophulous or rhachitic condition, which will demand an appropriate management.

The best therapeutical agents are the preparations of iron, and especially the iodide and the sesquioxide or precipitated carbonate. The iodide may be administered in the dose of two or three grains in solution, twice or thrice a day, which may be gradually augmented. So far as the author's experience goes, it is the best form of ferruginous preparation. By many, the sesquioxide is highly extolled,—commencing with five or ten grain doses, where the patient is much debilitated, and augmenting the dose gradually to one, two, or even three scruples, once or twice a day. The lactate, in the dose of from gr. xij. to xx. in the twenty-four hours, the citrate in the same doses, twice or thrice a day, have been prescribed of late,—the latter frequently by the author. It is an elegant preparation. The neuralgic symptoms are often speedily allayed by the chalybeate treatment, which, as elsewhere remarked, is well adapted for cases of pure neuralgia.

The different mineral and vegetable tonics may be given, as well as the sulphate of quinia, but they are of inferior efficacy to the preparations of iron.

To allay the great nervous impressibility, which always exists to a greater or less degree in such cases, no remedy affords greater service than the hydrocyanic acid.

R.—Acid. hydrocyanic. gtt. iv.
Mucilag. acac. f ʒiij.
Aque camphoræ, f ʒvj.—M.
Dose, one-fourth part, every six hours.

A full dose of opium, (gr. iiss. in the form of a soft pill, or 25 drops of the black drop,) may be administered to allay the excessive turmoil of the vascular and nervous systems, which occasionally prevails; and the strictest mental and corporeal quietude should be enjoined. Under a careful management of this kind, the blood will gradually become richer in its constitution, and the phenomena of anæmia gradually disappear.

CHAPTER II.

DISEASES OF THE CIRCULATORY ORGANS.

ALTHOUGH the functional disorders of the organs of the circulation were carefully attended to by the older writers, in their connexion with diseases of other parts of the economy, the diseases of the organs themselves were but little known, until of comparatively recent periods, when some distinguished observers,—Lancisi, Valsalva, Bonetus, Morgagni, Sénac, &c.—directed great attention to them, and laid the foundation for the important advancement, which has taken place in our own time. There is no portion of the economy, which has received, and continues to receive, more of the investigations of the pathologist.

The number of cases recorded in the reports of the Registrar-General, as having died in England and Wales, of diseases of the heart, or of the organs of circulation, in 1839, was 3788, or about 1·14 per cent of the whole number of deaths.

The diseases of the organs of circulation may be divided into—1. Those of the heart. 2. Of the arteries. 3. Of the veins. And 4. Of the intermediate or capillary system.

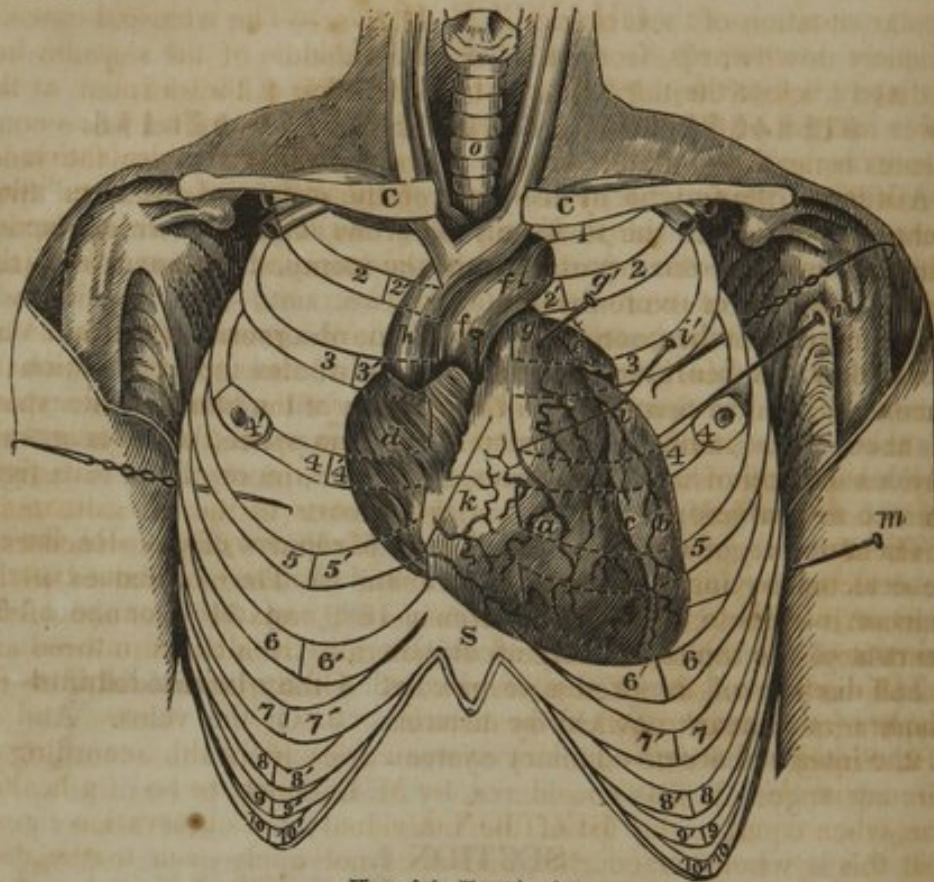
SECTION I.

I. DISEASES OF THE HEART AND ITS MEMBRANES

Before proceeding to the consideration of the particular diseases of the heart, it will be important to premise briefly some anatomical and physiological considerations relative to that viscus, without an accurate knowledge of which, it will not be easy for us to arrive at any exact pathological deductions.

1. *Position of the heart.*—From accurate examinations, made on the dead body, by Dr. C. W. Pennock, of Philadelphia, the valves of the aorta lie beneath the middle of the sternum and opposite the lower edge of the cartilages of the third rib; the valves of the pulmonary artery are more superficial, and are situate to the left, and about half an inch above. The aorta from its origin curves upwards towards the right, extending between the cartilages of the second and third ribs, slightly beyond the right margin of the sternum. At the lower margin of the second cartilage, the arch of the aorta commences, and inclines to the left, crossing the pulmonary artery where it lies beneath the left second rib, and, ascending as high as the first rib, it turns downwards. The pulmonary artery, from its origin in contact with the sternum, commences at its left margin, where it is joined by the cartilage of the third rib, bulges at the interspace between the second and third cartilages close to the sternum, and

dips beneath the aorta opposite the junction of the second cartilage and sternum.



View of the Heart in situ.

S. Outline of Sternum. C. C. Clavicles. 1, 2, 3, 4, 5, 6, &c. The ribs. 1', 2', 3', 4', 5', 6', &c. Cartilages of the ribs. 4''. Right and left nipples. a. Right ventricle. b. Left ventricle. c. Septum between the ventricles. d. Right auricle. e. Left auricle. f. The aorta. f'. Needle passing through aortic valves. g. Pulmonary artery. g'. Needle passing through valves of pulmonary artery. h. Vena cava descendens. i. Line of direction of mitral valve; the dotted portion posterior to the right ventricle. i'. Needle passed into the mitral valve at its extreme left. k. Line of tricuspid valve. o. Trachea.

The right divisions of the heart, being most superficial, form the greater part of the anterior surface: the right auricle reaches from the cartilage of the third rib to that of the sixth; and between the third and fourth, where its breadth is greatest, it extends laterally nearly two inches to the right of the sternum. About one-third of the right ventricle lies beneath the sternum,—the remaining two-thirds being to the left of that bone. The septum between the ventricles coincides with the osseous extremities of the third, fourth, and fifth ribs; and, on the fourth rib, is midway between the left margin of the sternum and the nipple. A small part, perhaps one-fourth, of the left ventricle presents anteriorly; and when the lungs are separated, a portion of the left auricle is visible between the second and third left ribs, two inches from the left margin of the sternum. With the exception of these portions, the whole of the left ventricle and auricle lie posterior to the right ventricle, and the entire left heart, with the exception of a small portion of the base connected with the valves of the aorta, lies on the left of the sternum.

As the heart is movable, the auriculo-ventricular valves of both sides necessarily change their relative position in regard to the

parietes of the thorax, in every change of posture of the body. When examined in the dead body—the subject being on the back—the regular situation of these valves is as follows:—The tricuspid extends obliquely downwards, from a point in the middle of the sternum immediately below the third rib, to the right edge of the sternum, at the lower margin of the cartilage of the fifth rib. The mitral valve commences beneath the lower margin of the left third rib, near the junction of its cartilage with its bony extremity, (two and a half to three inches to the left of the sternum,) and runs slightly downwards, terminating opposite the left margin of the sternum, where it is joined by the cartilage of the fourth rib.

It is important to bear in mind—in the diagnosis of cardiac disease—that the heart, in the healthy state of the thoracic organs, is uncovered, and in contact with the parietes of the chest, over a space of about two inches in diameter. In this space, there is a very obvious dulness of sound on percussion; but the organ extends from an inch and a half to two inches farther over to the left side, under cover of the lung, where, according to M. Piorry, its existence may be detected by forcible mediate percussion. The vertical extent of dulness is slightly less than the transverse; and the distance of the heart from the top of the sternum is generally from three to three and a half inches, unless when enlargement of the viscus exists, or the diaphragm is thrust upward by disease.

2. *Size of the heart.*—This of course varies in health according to circumstances. It was considered, by M. Laënnec, to be of a healthy size, when equal to the fist of the individual; but observation shows, that this is wholly inaccurate, and does not apply even to the dead body; for, as remarked by M. Piorry, the appearance and size of the heart vary greatly, according to the kind and promptitude of death. In twelve hearts, taken from male and female subjects, between 25 and 40 years of age, and which were, to all appearance, perfectly sound, the average length of the ventricles, including the apex of the heart, was found by Professor Gross of Louisville, to be four inches; of the auricles, one inch and three quarters. The mean circumference, measured around the auriculo-ventricular groove, was nine inches and a half; the breadth four inches. The thickness of the ventricles varies in different parts of their extent. The thickness of the right, in those cases, was scarcely two lines at the middle, whilst it was nearly two and a half at the base, and about one and a quarter at the apex. In like manner, whilst the left ventricle was seven lines in thickness at the centre, it was only six at the base, and four and a half at the apex. The mean thickness of the right auricle was one line; of the left, a line and a half. The thickness of the interventricular septum was found likewise to vary in different parts of its extent,—being at its maximum in the middle, where it was six lines and a half; and at its minimum at the apex, where it was nearly the sixth of an inch less. The mean thickness of the interauricular partition was a line and a half.

It has been affirmed by an accurate observer, M. Bizot, that the dimensions of the heart are in a direct ratio with the breadth of the

shoulders, and that the organ is always larger—not relatively but absolutely—in persons of middle stature or under, than in those who are remarkable for their height.

3. *Weight of the heart.*—This of course varies also in different individuals, and at different periods of life; so much so, indeed, that but little importance is attached either to the weight or size by some observers. Compared with the weight of the body, it has been estimated by Carus as 1 to 160, and by Weber as 1 to 150. The mean weight has been variously estimated,—by some, as by M. Cruveilhier, at six or seven ounces; by others, as by M. Bouillaud, and Professor Gross, of Louisville, at from eight to nine ounces. A recent writer, Dr. Clendinning, states, that he carefully weighed nearly four hundred hearts of both sexes, and of all ages above puberty. The result was about nine ounces avoirdupois:—the average weight of the female heart being about an ounce less than that of the male. This, however, is a much smaller average than that recently obtained by Dr. John Reid, who found the mean weight of the male heart, of 89 weighed, to be eleven ounces and one drachm; and of the female heart, of 53 weighed, to be nine ounces and half a drachm.

4. *Sounds of the heart.*—When the ear or stethoscope is applied to the præcordial region, we hear, first, a dull lengthened sound, which is synchronous with the arterial pulse, and is evidently produced by the contraction of the ventricles. This is instantly succeeded by a sharp, quick sound, like that of the valve of a bellows, or the lapping of a dog. It corresponds to a part of the interval between two arterial pulsations. Between this second sound and the first is a period of repose, which makes up the entire interval between the pulsations. To convey a notion of these sounds, Dr. C. J. B. Williams employs the word *lubb-dup*. The first word of the compound expressing the protracted first sound; and the latter the short second sound.

The cause of the sounds of the heart has been an interesting subject of inquiry, and has engaged the attention of some of the best modern observers. (*Human Physiology*, 5th edit., vol. ii. Philada. 1844.) The view, that the first sound is referable to the systole of the ventricles, and the second to the obstacle presented by the semilunar valves to the return of the blood from the arteries into the heart, is most in accordance with the results of the author's own observations and reflection. That the first sound is synchronous with the contraction of the ventricles, and the second with their dilatation, is scarcely disputed by any; and recent researches by competent observers, Drs. Pennock and Moore, of Philadelphia, have shown, that the above views are probably correct. These gentlemen found, from their experiments on animals, that the sounds are more distinct when the muscle is thin, and contracts quickly; hence the clear flapping character of the first sound over the right ventricle as compared with that of the left. The first sound, the impulse and the systole of the ventricles were synchronous; and they suggest, that it may be a compound of the sound caused by the contraction of the auricles—which is extremely slight, however—the flapping of the auriculo-ventricular valves, the rush of blood from the ventricles, and the sound of muscular contraction. It

would seem, from one experiment, that the auriculo-ventricular valves can have but little agency in the production of the sound. Dr. Billing, however, ascribes the first sound wholly to the tension produced in the shutting of the valves. The second sound, Messrs. Pennock and Moore found to be caused exclusively by the closure of the semilunar valves by the reflux blood. There can be no rational doubt, then, that the first sound is synchronous with the contraction of the ventricles,—the second with their dilatation.

The first sound, heard through the stethoscope applied over the inferior part of the sternum, is clearer and shorter than that which is heard over the left nipple. The sound heard in the former place, is ascribed to the contraction of the right ventricle;—that in the latter situation, to the contraction of the left ventricle. Such has been the view of the author, and it is held by many. On the other hand it has been doubted, whether, in the natural condition of the parts, the distinction be admissible, when we take into consideration the limited extent of these cavities, their close apposition, and the manner in which the right ventricle lies over, and in front of the left.

5. *Impulse of the heart.*—In the upright posture, the apex of the heart beats between the fifth and sixth left ribs, about two inches below the nipple, and one inch on its sternal side; but as the heart is fixed only at its base, the position of the apex changes in different postures of the body: and, of course the heart is liable to displacement by diseases, either of the thorax or abdomen, which forcibly press upon it. In a case of ascites, it has been pressed up so that the impulse was felt, during life, by Dr. Pennock, as high as the third rib,—one inch above the left nipple. In the course of the last winter, the author marked it in a case of saccated ascites between the third and fourth ribs.

During inspiration, the heart is carried a little downwards and backwards, so that, in deep inspiration, it may beat below the sixth rib: and on the other hand, in a forced expiration, the strongest pulsation may be raised to between the fourth and fifth ribs. It will be readily understood, that as the ribs rise during inspiration, and the chest is expanded, the impulse—in the former case—may be very slight; whilst in the latter, owing to the ribs being brought into contact with more of the heart, the impulse may be perceptible over an extended surface, as high, according to Dr. Williams, as the third rib, and on the lower half of the sternum.

In many diseases of the heart, the impulse may be strong, whilst the pulse at the wrist is feeble; and there is soundness in the opinion of Laënnec, that the pulsations of the heart afford a better index of the degree of danger in a disease, as well as of the appropriateness of depletion, and of the extent to which it may be carried, than those at the wrist. In cases, too, where the pulse at the wrist intermits, the beats of the heart may be uninterrupted. In a case of endo-pericarditis, which the author watched closely, the pulse exhibited a decided intermission every few beats, yet the heart beat its due number of times. It seemed to the author, that, in this case, the contractility of the aorta was unusually developed by the inflammatory

condition of the heart, and that the flow of blood from the ventricle into the aorta was occasionally diminished or wholly impeded.

Uncertainty still rests as to the cause of the heart's impulse against the chest,—whether, for example, it be produced during the contraction or the dilatation of the ventricles. The observations of Drs. Penock and Moore make the first sound, the impulse and the ventricular systole synchronous; but all observers do not accord with them.

6. *Rhythm of the heart*.—In the state of health, and when no disturbing moral or physical cause is in action, the rhythm of the heart is as follows:—if we divide the time from the commencement of one first sound to that of its successor, into four periods, the two first periods will be occupied by the first sound, the third by the second, and the fourth by the interval of repose.

The substance of the heart is essentially muscular, especially in the ventricles, the muscular fibres of the auricles being comparatively few,—so few as to exhibit, that they are not intended for energetic contraction. Its investing membranes are of great interest to the pathologist; and have become so of late years more especially: they are—the *pericardium*, a fibro-serous membrane, the inner or serous layer of which is reflected over the heart, and is lubricated by the serous secretion—the *liquor pericardii*; and the *endocardium*, the serous lining of the heart, which differs on two sides of the organ, that of the right side being very extensible, resisting, and not very liable to ossification; whilst that of the left is scarcely extensible, remarkably brittle, and very liable to bony depositions. (See, on the character and manifestations of the heart's action in health, the author's *Human Physiology*, ii. 158. Philad. 1841.)

I. INFLAMMATION OF THE PERICARDIUM.

SYNON. Pericarditis, Inflammatio Pericardii; *Fr.* Pericardite, Inflammation du Péricarde
Ger. Herzbeutelentzündung, Entzündung des Herzbeutels.

Inflammation of the pericardium may exist both in the acute and chronic form.

a. *Acute form*.—**Diagnosis**.—When pericarditis occurs with all its characteristic phenomena, and is uncomplicated, it is, perhaps, as easily recognisable, as any other internal disease. These phenomena are essentially as follow:—After the occurrence of the ordinary evidences of internal inflammation—an acute, pungent, or lacerating pain in the region of the heart, under the sternum, which extends towards the epigastrium, and sometimes between the shoulders; a sense of more or less oppression, giving rise to rapidity of breathing, often amounting, in the progress of the disease, to panting; palpitation; irregular jerking, or intermittent pulse; dull sound over the region of the heart; at times, a sound as if two dry surfaces were rubbed against each other, or of the creaking of new leather, (*bruit de frottement*, and *bruit de cuir neuf*,) without the existence of any sign of inflammation of the lung or the pleura. Incapacity of lying on the left side has been pointed out, by Dr. Joy, as amongst the functional derangements most commonly present, but the author has observed it

to be very frequently wanting. It rarely happens, however, that there is this catenation of symptoms present; or that the disease is simple: more commonly many of the functional phenomena are wanting; and, not unfrequently, other affections of the chest are present; but what renders the diagnosis more difficult is the fact, that certain of the symptoms are common to different diseases of the heart. Such is the case with the pain in the cardiac region; the sense of oppression; palpitation; irregular jerking or intermittent pulse, &c.

The pain experienced in pericarditis is frequently very dull, and so slight, that it can only be detected by percussion, or by pressing upwards on the epigastrium, and on the left hypochondrium in its vicinity; and when the disease is complicated with violent pneumonia, pleuritis, or articular rheumatism, the pain is frequently masked or obscured by that which accompanies those diseases. In the course of the disease, severe pain is often experienced in the shoulder blade, and towards the shoulder, but this seems to be neuralgic, and generally soon shifts its seat towards the anterior part of the chest, or wholly disappears. Frequently, too, pain, when it exists, is referred to the epigastrium and left hypochondrium, more than to the region of the heart. When positive pain is not experienced, the patient complains of a disagreeable sense of constriction and weight in the chest, which causes the horizontal posture on the back to be preferred. In some cases, lying on the left side aggravates these uneasy feelings, but in others, he can lie as well on the right as on the left side, and in the advanced stage of the disease, he usually prefers the sitting posture, with the body leaning somewhat forward, or to the left side.

The blood, when drawn, always exhibits a buffy coat, and the coagulum is generally firm. The degree, to which the system sympathizes, varies greatly. Usually, the face is flushed, and expressive of great anxiety; and the fever runs high; but in other cases, which have nevertheless proceeded towards a fatal termination, the febrile symptoms have been slight, and the temperature of the skin, throughout the greater part of the disease, has been but little higher than natural. Intermission of the pulse is not unfrequently the character which strongly attracts the attention of the practitioner; yet it is often absent until within a short period of the fatal termination; and at times, even when the solid effusion has been considerable, it has been wanting. The author has recently watched attentively two fatal cases, in which, although the pulse was irregular, it was never intermittent. The pain, too, in both cases, was altogether insignificant; but palpitations were induced on the slightest movement of the body.

Dyspnœa coming on suddenly, and without any evidence of pulmonary or pleural mischief, is properly considered an important symptom.

Mention has been made of a dull sound, over the cardiac region, on percussion, as a sign of pericarditis. This, however, is only present when effusion has taken place into the pericardium. Under the same circumstances, the impulse of the heart will be less, so that it can neither be seen, nor felt by the hand. The supervention, indeed, of these signs may diagnosticate the period of effusion.

The first effect of inflammation of a serous membrane—as elsewhere remarked—is to diminish, or totally arrest, the secretion, which takes place from it in health; hence, the sound of friction is an evidence of the early stage of pericarditis. A similar sound may, however, be produced by the friction of plastic lymph, which is often copiously exuded after the inflammation has continued for a time. This friction sound, is equally heard during the contraction and dilatation of the ventricles, and has been—not very euphonically—termed the *to and fro sound*. The sound, thus rendered, has been compared to the rustling of taffetas, bank-note paper, or parchment. When the effusion is very considerable,—in addition to the great and extensive dulness on percussion, the sounds of the heart seem to be distant, and consequently obscure. This secretion takes place at an early period of the disease, and is occasionally very considerable; the quantity of serum effused in the first three or four days amounting, at times, to ten or fifteen ounces. When the disease terminates in health, this is gradually absorbed. Occasionally, there is an evident tumour over the cardiac region.

At one time, pericarditis was considered to be invariably fatal, but that this is not the case is sufficiently shown by the many opportunities we have of witnessing—in the bodies of those who have died of other diseases—old adhesions between the heart and the pericardium proper. It may terminate fatally in a few days, but more frequently not until two or three weeks; and the fatal termination is preceded, at times, by signs of encephalic excitement. In a very interesting case, which fell under the author's charge some years ago, the patient expired in the most furious maniacal excitement. At other times, the patient sinks to death, with but slight suffering; the fatal termination being preceded by great rapidity of breathing and of pulse; but the senses remaining entire until the very last. In cases which have terminated in health, the presence of false membranes and of adhesions may occasionally be detected by the friction and creaking sounds before described; and in cases of close adhesion, the contraction of the ventricles has been accompanied by a corresponding retraction of the left portion of the epigastric region. This is, however, a very rare occurrence. These adhesions may interfere with the normal action of the heart, and lead to serious results; but generally the viscus accommodates itself to the new circumstances, and does not suffer.

Causes.—Cold, as in every case of internal inflammation, is assigned as a cause,—especially exposure to damp cold, when heated. It is said, likewise, to have been produced by a blow, by violent exertion, and by mental emotions. It is a frequent concomitant of acute rheumatism, so that it has been regarded as almost constituting a part of that painful disease. Of twenty persons, labouring under acute rheumatism, one half, at the least, it is affirmed by M. Bouillaud, exhibit evidences of pericarditis, or endocarditis, or both. This is probably exaggerated; but there is no question, that the inflammation is very apt to attack the investing membranes of the heart in that disease. Sex appears to afford a predisposition, as it is said to

attack men more than women. The author thinks, that this scarcely corresponds with his observation. In his practice, the disease has occurred more frequently in females. It occurs at all ages, but more especially between those of 12 and 50. There is reason to believe, that it may attack the fœtus in utero. In children that have died in less than forty-eight hours after birth, adhesions have been found between the pericardium and the heart, so strong as to lead to the belief, that the malady had existed for some time prior to birth.

Pathological characters.—The appearances presented after death resemble essentially those of inflammation of the serous membranes in general. When the disease ends fatally, at an early period, there is more or less redness, produced by the injection of the vessels of the subserous cellular membrane; yet neither its thickness, transparency nor consistence may be modified. It rarely, however, happens, that death takes place before the inflammation has been attended with effusion of a serous fluid, with more or less plastic lymph; at times, mixed with blood, and, at others, with large quantities of pure pus. In some cases, which have fallen under the author's care, and which have terminated fatally in the course of a week, the pericardium has been united, in spots, to the heart, by a thick stratum of plastic lymph, whilst a straw-coloured serum, containing flakes of the same substance, has been contained in the cavity of the pericardium. Where the individual survives the effusion of this plastic lymph, the watery portions are absorbed; the lymph becomes organized; and hence the old adhesions sometimes met with, when the person has died of other affections. The white spots, seen upon the heart, have been regarded as evidences of previous inflammation; but it is questionable whether they constitute a pathological condition.

Pericarditis is often complicated by endocarditis—constituting *Endo-pericarditis*; a complication which is indicated by the existence of the *bellows' sound*, and the other functional phenomena and physical signs described under Endocarditis. When the lining membrane is deeply implicated, it adds very materially to the danger of the disease.

Air, it is said, has been found along with the sero-purulent secretion, but this must be a rare occurrence. Where it exists alone—*pneumopericarditis*—it is said to be indicated by remarkable resonance when percussion is used over the region of the heart—a resonance which is much greater than when a portion of emphysematous lung is between the chest and the heart. When the air is associated with an effused fluid, it may be detected by the sound of splashing, or of fluctuation, perceptible when the chest is shaken.

Treatment.—Acute pericarditis must be met as actively as any of the inflammations of serous membranes, although it is not, perhaps, as dangerous as inflammation of the pleura, peritoneum or arachnoid. Blood-letting should be practised freely, so as to make a decided impression upon the system, and it must be repeated, if the state of the patient should render it necessary, along with cupping, or the application of leeches. If the carditis should continue unsubdued, after general blood-letting, local blood-letting may be employed alone with

advantage. Of late years, it has been strenuously recommended to bleed largely and repeatedly; and M. Bouillaud asserts, that he has, by this plan, rarely failed to cut short the disease, when he has been called early. He generally bleeds three or four times from the arm, to the amount of sixteen ounces each time, within the first three or four days, and employs leeching and cupping very freely. As, however, he believes almost all cases of acute rheumatism are complicated with pericarditis, and treats them accordingly, his estimates are probably too favourable. It is certainly good treatment to endeavour to strangle the inflammation at the onset by blood-letting; but if it should not succeed, when aided by the sedatives mentioned below, no time should be lost in having recourse to mercurial and other revellents. The safest course—even should the pulse be irregular and feeble, and the signs of general debility considerable—is to bleed, if the disease have been of short duration; but, on the other hand, the cupped and buffy appearance of the blood must not induce the practitioner to push the lancet too freely; for this, especially where the disease has a rheumatic origin, will commonly continue,—as the author has observed,—notwithstanding the blood-letting; and, it is affirmed, will even augment under its use.

Along with the blood-letting, general or local, the tartrate of antimony and potassa may be administered either as a nauseant^a or as a contra-stimulant.^b

^a R.—Antim. et. potass. tart. gr. ij.
Tinct. digit. gtt. xl.
Aque, f3vj.
Dose, one-fourth, four times a day.

^b R.—Antim. et potass. tart. gr. xij.
—xxiv.
Mucilag. acaciæ, f3ijj.
Aque, f3vi.—M.
Dose, a tablespoonful, every two hours.

Should, however, the necessary tolerance, as regards the tartrate of antimony, not exist, it must be discontinued after the second or third dose. The author was of opinion, that a very serious case of rheumatic pericarditis, combined with endocarditis, was saved by the sedation induced by the acetate of morphia, which caused insupportable nausea, that did not entirely cease for forty-eight hours.

Colchicum often proves useful, and, it has been thought, especially so when the disease is of rheumatic origin.

After blood-letting has been freely practised, revellents may be had recourse to—as blisters over the cardiac region, and sinapisms to the feet; and large emollient poultices; or the dry hop fomentation,—made by placing hops between two pieces of flannel, and heating the bag,—may be kept over the chest. Cathartics exert their agency partly as revellents and partly as depletives, or simple evacuants, but care must be taken that the patient is not unnecessarily disturbed during their operation.

When the disease does not yield speedily, and effusion is apprehended, it has been advised to give mercury, so as to induce rapidly a complete and continued salivation, but the revellent action will be established sufficiently without pushing it farther than merely to exhibit its first effects upon the system. With this view calomel may be prescribed.

R.—Hydrarg. chlorid. mit. gr. viij.
 Morphine acet. gr. ss. fiant pilulæ iv.
 Dose, one, four times a day.

The cuts made by the scarificator, or the leech-bites, or the blistered surface—if any there be—may likewise be dressed with mercurial ointment, which, if necessary, may be placed also in the axillæ, and left there to be absorbed. Should the internal use of mercury disagree, reliance must be placed altogether on the external.

The diet should be of the mildest kind, and consist of cooling, demulcent drinks, as lemonade, barley water, gum water, &c., and the strictest quiet—mental and corporeal—be enjoined.

b. *Chronic form.*—**Diagnosis.**—Chronic pericarditis gives rise to modifications of the same symptoms as the acute; except, that they are less marked, and, consequently, more difficult of detection. They resemble, on the whole, those of hydro-pericarditis and of organic disease of the heart. Pain is generally present, which may be constant, or occur at intervals, and be accompanied by palpitations and more or less dyspnœa. The pulse is usually very frequent, and may be more or less irregular. Where effusion has taken place, this will be indicated by the signs described under acute pericarditis; and it is considered to be a symptom of adhesion between the pericardium and the heart, when there is a kind of abrupt, undulatory, jogging or tumbling motion of the organ, on placing the hand or ear below the part where the heart strikes in health.

The physical signs are similar to those of acute pericarditis, of which it is commonly a sequel.

The disease generally terminates fatally, or it may end in organic disease of the heart.

Pathological characters.—These are the same as in acute pericarditis; excepting, that time has usually elapsed for the formation of firm adhesions between the pericardium and the heart, and, perhaps, of white spots on the pericardium occasioned by the organic changes in the sub-serous tissue produced by the inflammation.

The disease may be of the chronic form from the first, or it may be the sequel of the acute form.

Treatment.—This must consist, essentially of revellents—as cups, with or without the scarificator, over the region of the heart; and intermittent vesication by the *ceratum cantharidis*, which is preferable to perpetual blisters. A seton over the region of the heart has been advised by some; or friction with the tartarized antimony ointment or croton oil; or the application of the moxa. Mercurials, administered in small doses,^a so as to produce their effects upon the system, are beneficial upon the same principle.

^a R.—Hydrarg. chlorid. mit. gr. iv.
 Morphine acet. vel
 ——— sulph. gr. j.
 Confect. rosar. q. s. ut fiant pil. iv.
 Dose, one, night and morning.

Colchicum, given as advised under acute rheumatism, is said to have sometimes proved adequate to the cure, on persevering many months in its exhibition.

Where tumultuous action of the heart exists, digitalis may be given internally, or be administered endermically, as recommended under Hypertrophy of the Heart.

All sudden and powerful mental and corporeal excitement must be avoided, but advantage may be derived from easy gestation. The diet must likewise be gently nutritious, and yet devoid of every stimulating property.

II. DROPSY OF THE PERICARDIUM.

SYNON. Hydropericarditis, Hydrops pericardii, Hydropericardia, Hydropericardion; Fr. Hydropéricarde, Hydropisié du Péricarde; Ger. Herzbeutelwassersucht.

Diagnosis.—The symptoms and signs, referred to under acute inflammation of the pericardium as indicating effusion, are those that diagnosticate hydropericarditis. When the ear is applied to the cardiac region, the sounds of the heart are found to be dull, and, at times, not perceptible. The region of the heart is prominent; the intercostal spaces are greater than in health, project, and are soft and doughy. Percussion affords a dull sound over this region; the pulse is generally small, unequal, irregular, or intermittent; the respiration impeded and hurried; and the dyspnœa at times so great, that the patient cannot breathe, except when upright or leaning forward, so that the fluid may gravitate from the heart to the pericardium; the *dyspnœa* amounts—in other words—to *orthopnœa*. For the same reason, rest is more easily obtained by lying on the side affected; the sense of suffocation is often great; and the individual starts from his sleep under the influence of frightful dreams or a feeling of impending danger, breathing with excessive difficulty. It has been affirmed, however, that in cases in which there is coexisting effusion into the pleural cavity, the patients, from the commencement of the disease, cannot bear the horizontal posture; and that, where the effusion is confined to the pericardium, they prefer to lie with the head remarkably low. The reason assigned for this is, that the weight of the fluid is taken from the diaphragm and rests on the spine. In cases of hydrothorax, when the patient lies in this position, the fluid flows back and presses on the root of the lungs, thereby preventing the free ingress of air, and causing dyspnœa and sense of suffocation. In hydrops pericardii this cannot take place, in consequence of the water being inclosed in a firm bag, which is bound down to its place by its attachment to the diaphragm. In very severe cases, the face is pale and swollen, and, where hæmatisation is materially interfered with, livid; infiltration of the limbs supervenes; and the patient expires,—at times suddenly, as in other chronic cardiac diseases.

Causes.—Dropsy of the pericardium is rarely a primary disease. It generally supervenes on chronic pericarditis, or on some disease of the heart, or lungs, which interferes with the circulation of the blood through the organs. It, likewise, appears under the same circumstances, and the same organic causes, as other dropsies.

Pathological characters.—Much diversity of sentiment exists as to the quantity of fluid in the pericardium, which may be esteemed to

constitute disease. Six or seven ounces have been regarded as dropsy, by M. Corvisart,—the quantity exhaled at the time of death from other diseases never, perhaps, amounting to more than one or two ounces, according to M. Bouillaud. This accords with the author's own observation. In some cases, the quantity of fluid collected is astonishing—two or three pints; and in one case, given by M. Corvisart, as much as eight have been met with. In a case, described by Dr. Wright, of Baltimore, in which four quarts of purulent fluid were found in the pericardium, there was, strange to say, not the slightest evidence of impediment to the heart's action; the pulse was free, moderately full, and regular; there was no embarrassment of breathing; no distress of countenance; no syncope; no cardiac pain; and no infiltration of the extremities: circumstances, which confirm the remark already made, as to the difficulty in the diagnosis of cardiac diseases.

The anatomical lesions vary according as the hydropericarditis is accompanied, or not, with pericarditis, or with some organic disease of the heart. If it be the result of pericarditis, the appearance of the membrane and the effused fluid will be such as have been described elsewhere. If, on the other hand, the effusion be owing to a loss of balance, occasioned by chronic disease of the heart or any impediment to the venous circulation, the fluid may be perfectly limpid and colourless. At other times, it is fawn-coloured, greenish, or yellowish,—the yellow having, at times, the tint that characterizes the solutions of gold.

When fluid has long pressed upon the lung, the organ may become atrophied. There are no cases on record in which a similar effect has been produced on the heart by the fluid of hydropericarditis; but this result has been observed from the pressure of the pseudo-membranous secretion.

Treatment.—This is essentially the same as in chronic pericarditis, namely, revellents to the cardiac region, with diuretics, and mercurials, singly, or combined.

R.—Scillæ, pulv. gr. j.
Hydrargyri chlorid. mit. gr. ss.
Ol. junip. gtt. ij.
Extract. taraxaci, gr. iv.—M.
Divide in pil. ij. ter die sumend.

R.—Potassæ bitartrat. ℥ij.
Cort. limon. ℥i.
Aquæ ferventis, Oij.—M.
To be used for common drink.

The plan of treatment, recommended in hydrothorax, is equally applicable to hydropericarditis.

It has been proposed, when all means for promoting the absorption of the effused fluid have failed, to perform the operation of paracentesis of the pericardium, either through the fifth or sixth intercostal space, according to M. Desault; between the xiphoid cartilage and the cartilages of the seventh rib, according to Baron Larrey; or by trepanning the sternum, according to Skielderup. It has likewise been recommended by Richerand, in order to obtain a radical cure,

to inject excitant substances into the pericardium as in cases of hydrocele, but the judicious practitioner will be cautious in having recourse to such formidable modes of procedure.

III. INFLAMMATION OF THE HEART.

SYNON. Carditis, Inflammatio cordis, Empresma carditis, Inflammatio corditis, Cauma corditis; *Fr.* Cardite, Inflammation du cœur; *Ger.* Herzentzündung, Entzündung des Herzens.

Inflammation of the substance of the heart, to which the term *carditis* is commonly applied, is probably a rare affection; much more so than that of the lining membrane or endocardium—thence called *endocarditis*. It is difficult, however, to suppose, that the pericardium or endocardium can be extensively inflamed without the substance of the heart participating.

a. *Acute form.*—**Diagnosis.**—The symptoms of acute inflammation of the substance of the heart are not well known. Along with the phenomena of internal inflammation in general, we may expect more or less pain, with violent palpitation, dyspnœa, sense of suffocation, augmented impulse of the heart, great anxiety, fainting, &c. Where the lining membrane of the heart is the chief, or only seat of the disease, an affection, which is much more common than is generally believed,—as much so, according to some, as pericarditis—the above symptoms are usually present accompanied with a *bruit de soufflet* or *bellows' sound*. This bellows' sound is admitted to be one of the most constant and characteristic of the phenomena of endocarditis. It varies in intensity, and is, at times, so great as to mask one or both of the sounds of the organ. It is owing probably to the diminution in the size of the ventricles or their orifices, produced by the inflammatory engorgement of the lining membrane and its consequences. The impulse of the heart against the chest is generally so forcible and superficial as to be distinctly seen, and readily recognizable by the hand. The pain is commonly very slight, and, in many cases, the author has observed none whatever; nor is the dyspnœa urgent, unless the membranes of the chest are simultaneously affected, or the action of the heart is so irregular or tumultuous as to impede the due circulation of the blood.

The impulse of the heart is perceptible over an unusual surface, which is supposed to be owing to the inflammatory turgescence of the organ; and for the same reason, there is dulness of percussion, over a larger surface—twice as large as in health, according to M. Bouillaud. There can be no mistake between this dulness of sound of endocarditis, and that of hydropericardium. The former—as already remarked—is accompanied by the bellows' sound, and the beat of the heart appears quite superficial, whilst it is indistinct and remote in the latter, and varies remarkably with change of posture, both as to the points, and the degree in which it is felt.

The blood, when drawn, always exhibits a great predominance of fibrin, and when coagula form in the cavities, they may, by reason of the great plasticity of the blood, adhere to the endocardium, and be

ultimately organized, giving rise to the polypiform concretions occasionally met with, and described hereafter.

In very acute cases, the disease may terminate fatally in a few days; and in cases of what the French term *Cardite foudroyante*, death takes place at times very suddenly. Rupture of the heart is met with under these circumstances. Where the disease terminates in a few days, death is often owing to fibrinous concretions, which form in the cavities of the heart, and obstruct the circulation of the blood through that viscus.

Causes.—These are the same as those of pericarditis. The most common of all, however, is the *metastasis*, or the *extension* of the rheumatic inflammation; for it is not clear to which it ought, of right, to be ascribed. The common idea, with the best pathologists, is, that rheumatism is a metastatic or changeable phlegmasia, and that it leaves the joints to affect the heart; but there are plausible reasons for the opinion, that the pericarditis is rather an extension of the arthritis. Therapeutically, this is not a matter of much moment, as in all cases the supervening carditis or endocarditis must be treated as if it were a primary affection.

There are certain poisons, as arsenic, which leave spots of a violet red hue on the heart, with softening of the endocardium.

Pathological characters.—Redness of the substance of the heart or its lining membrane—at times having a bluish or brownish tinge—has been esteemed a constant sign of carditis or endocarditis; but redness is often met with, when there has been no reason to suppose that inflammation of the viscus had existed. In such cases, it is cadaveric, and is produced by the imbibition of the blood; hence it is, that we have cases of endocarditis and of aortitis, which never existed except in the imagination of the practitioner. It has been asserted, that the cadaveric redness is removed by washing, whilst the inflammatory is not; but this is an inadequate test. It has also been affirmed, that if we examine carefully, we observe, that in carditis the capillary vessels are injected, are manifest in the cellular tissue, and can be followed as far as the origin of the principal trunks, which always participate in the inflammation. In cadaveric redness, on the other hand, the vessels are not manifest, and the redness is so uniform, that it might be said the surface of the heart was dyed. In the inflammatory redness, too, there is this important difference, that it has generally the same character and the same shade every where, whilst in cadaveric hyperæmia, according to M. Andral, it is a brown red in the right heart, and a vivid red in the left. The microscope exhibits, too, in the former case, organic changes, which are not perceptible in the latter. The redness is generally most marked in the part of the endocardium that invests the valves and the orifices.

Inflammation induces, at times, *ramollissement* or softening of the muscular tissue of the heart or of its lining membrane, which latter becomes so soft, that it can be readily removed by scraping with the back of a knife, or using the forceps. Induration is likewise one of its consequences; but it is more frequently met with in the chronic form.

Another termination of carditis is suppuration. The abscess may form either immediately beneath the endocardium, or in the substance of the heart, or in the septum between the ventricles. The opinion has been hazarded on the high authority of M. Andral, that the presence of these abscesses is not a certain index of inflammation of the organ. Such abscesses have been seen after important surgical operations, phlebitis, &c. It is not easy, however, to embrace the opinion, that they were not the result of carditis; yet it must have been restricted to very slight limits.

Ulcerations are occasionally met with—sometimes, externally, at others, internally. At one time they were esteemed much more common than they now are,—false membranes having been often confounded with them. These last are not very frequently seen. When formed, they may be acted upon by the blood, and be carried back again into the circulatory current. The same may be said of purulent and other secretions from the endocardium.

Acute inflammation of the endocardium may, likewise, occasion narrowness of the orifices, roughness, and granulations of the membrane, and the production of vegetations, which give rise to the bellows and other abnormal sounds of the heart, described under diseases of the cardiac valves.

Treatment.—This is identical with that recommended under Acute Pericarditis.

b. *Chronic form.*—**Diagnosis.**—The symptoms of chronic carditis and endocarditis are not very distinctive. More or less painful uneasiness or anxiety may be felt in the cardiac region, with occasional palpitations, and oppression; but no clear signs may be afforded by auscultation or percussion. Should any narrowness in the orifices exist, a bellows' sound may be heard. All these evidences of disease may, however, be very slight, and yet the frequency and irregularity of the pulse may direct the attention of the practitioner to the nature of the affection.

When chronic carditis gives rise to organic disease of the heart, the particular affection is denoted by its appropriate symptoms.

Pathological characters.—The main morbid appearances in chronic endocarditis are as follows:—thickening of the endocardium; vegetations or granulations on its surface, which may be *globular* or *warty*,—the former being commonly of a softer texture, like concrete albumen or fibrin, which has as yet undergone little change,—the latter of a firm, or horny, or cartilaginous consistence. They are met with of various sizes, and especially on the valves. In addition to these appearances, there may likewise be lymph adherent to the endocardium; alteration of the auriculo-ventricular valves; adhesion of the auriculo-ventricular valves to the heart, and of the valves at the mouths of the pulmonary artery and aorta to the sides of those vessels; adhesions also between the valves themselves, which interfere with their functions; ulceration and even total absorption of the valves, &c. &c. Pus is often found in the cellular tissue beneath the endocardium.

Where the substance of the heart has been chronically inflamed,

we may find induration, and cartilaginous and osseous depositions in its substance. Some of these changes may, however, be induced, without the existence of inflammation, by modified nutrition of the part from other causes. This, at least, is probable.

Treatment.—The treatment is essentially that of chronic pericarditis.

IV. HYPERTROPHY OF THE HEART.

SYNON. Hypertrophie cordis; *Fr.* Hypertrophie du cœur; Hypercardiotrophie, (*Piorry*.)

Hypertrophy of the parietes of the heart is not uncommon. It may occur along with dilatation, diminution, or the natural condition of the cavities. "These puerile distinctions," observes M. Rostan, "have fixed, in a singular manner, the attention of persons who see few patients; but they attract little attention from those who cultivate medicine in a vast field of observations." The remark is more severe than just, when applied to such men as Laënnec, Bertin, Hope, and Williams; all of whom have adopted three varieties—one in which the hypertrophy is simple; another in which there is a dilatation of the cavities; and a third, in which there is concomitant contraction.

In the opinion of many, the parietes of the left ventricle are more frequently hypertrophied than those of the right. Dr. Swett, of New York, in 48 cases, in which the enlargement of the heart was partial, found the left side most commonly affected in the proportion of 17 to 8. But this is not the view of all: on the contrary, the accurate author of the numerical method asserts, that of 49 cases of hypertrophy of the ventricles, 29 were of the right ventricle. The auricles are still more rarely hypertrophied; and scarcely ever alone. They usually participate in the condition of the corresponding ventricle.

When dilatation of the cavities accompanies hypertrophy, the whole heart is enlarged. This constitutes the *active aneurism* of the heart, or *excentric hypertrophy*.

Hypertrophy, it is believed, may affect particular parts of the heart only—as the auriculo-ventricular valves; the interventricular septum; different points of the parietes; the columnæ carneæ, &c.; but the existence of partial hypertrophy of the septum, and of the columnæ carneæ, has been denied by Cruveilhier.

Concentric hypertrophy is when the parietes augment at the expense of the cavities—constituting the *cardiac* of Piorry—a form of the disease which is familiar to us; yet its very existence has been contested by M. Cruveilhier.

Diagnosis.—The augmented size of the muscular parietes of the heart would lead us to expect the exertion of greater force of contraction. Such is the fact. The pulsations are much stronger than in the healthy state;—so strong, indeed, as to raise the side of the chest, and to be perceptible to the sight and touch over a greater or less extent of surface; and, at the end of each pulsation, there is a jog or shock which has been termed the *back stroke*, or *diastolic impulse*, and would seem, as suggested by Dr. Hope, to be owing to the refilling of the ventricles. The head or the hand applied over the

region of the heart is forcibly raised, and the movement of the bed-clothes, when the individual is in the horizontal posture, and of his dress when he is up, is strikingly apparent. Generally, the pulsations of the heart are distressing to the patient, but, at times, when distinct to the physician, they are not perceived by the sufferer himself. When the hypertrophy is unaccompanied by dilatation of the cavities, the sound of the heart is dull and obscure; the contractions take place slowly, and extend only to the præcordial region; when, however, the hypertrophy is accompanied by dilatation, the sounds are clear and extensive.

In all cases of hypertrophy, the patient is liable to an increase in the frequency of the heart's action, or to palpitations, which are at times excessive, and during the existence of which, the physical signs, above described, are more evident.

Percussion gives occasion to a sound, which is more dull than natural, but the difference may not be marked even to a practised observer. The pulse is generally sufficiently diagnostic of the energy of the heart,—being strong, jerking, or vibratory; but when palpitations are induced,—and they readily are by unwonted exercise, as running, especially up stairs, or by any moral emotion,—the pulse participates in the frequency and tumult in the central organ of the circulation. Under these circumstances, the pulmonary circulation cannot be accomplished as in health; the blood is not freely returned to the left heart, and dyspnœa and oppression of breathing supervene. Owing, likewise, to the blood being forcibly sent along the arteries, the face is generally flushed or florid, and hyperæmia, ending in hæmorrhage, or true inflammation, is apt to be induced. In younger individuals, this is exhibited by the supervention of epistaxis; in older, of apoplexy.

The physical signs vary somewhat according as the hypertrophy is general, or restricted to the left or the right ventricle. When general, the pulsations are felt both to the right and left of the median line, and at times extend even to the epigastrium: when in the left ventricle, the pulsations are more sensible on the left side towards the cartilages of the fifth and sixth ribs; and when the hypertrophy affects the right ventricle, they are felt under the inferior part of the sternum, and much less to the left of the median line. It can be understood, that this form of cardiac hypertrophy may give occasion to hæmoptysis; and, as the right auriculo-ventricular valves are insufficient to prevent a part of the blood of the ventricle from reflowing into the corresponding auricle, an impulse may be given by the reflux blood, during the energetic contractions of the ventricles, to the blood arriving by the descending vena cava, so as to occasion the phenomenon in the jugular veins, termed the *venous pulse*,—*phlebopalia*. It is probable, however, as has been suggested by Dr. Hope, that this jugular pulsation may be induced without the reflux in question; and that an impulse, fully adequate to the effect, may be given by the auriculo-ventricular valve of the right side, driven, during the contraction of the ventricle, when the heart is enlarged, and acting impe-

tuously against the column of blood in the right auricle and venæ cavæ.

When a decided impediment exists to the flow of blood from the cavities into the corresponding vessels, which is a common cause of hypertrophy, other phenomena are associated with those described above: one of these is the *frémissement cataire*, or agitation like the purring of a cat—a tremulous condition of the organ during its systole, which is distinctly felt, not only when the ear is placed over the cardiac region, but likewise by the hand. It is in these cases more especially, that the bellows' sound is largely developed. Whenever, indeed, the two signs exist together, along with the other evidences of hypertrophy, we can have little doubt in inferring the existence of obstruction to the passage of the blood from the ventricles into the arteries.

When hypertrophy of the heart terminates fatally, it is generally owing to the induction of asphyxia, or of other diseases—especially dropsy. The prognosis, indeed, of every form of hypertrophy must be guarded. Sudden death occurs only in cases in which a clot exists in the heart, or where there is a rupture of the organ.

Causes.—The chief causes are mechanical obstacles—as affections of the orifices of the heart, which narrow them, and give occasion to a more powerful contraction of the muscular fibres that form the parietes of the organ;—insufficiency of the valves, which permits a certain portion of the blood to reflow into the cavities, and consequently gives occasion to more energetic action of their parietes;—and narrowness of the arteries that emanate from the ventricles, either owing to the deposition of fibrinous matter on the inner coat, or of ossific points. In the author's experience, this state of the vessels has been most frequently connected with the hypertrophied condition of the heart after acute rheumatism, in which the *bruit de soufflet* and the *frémissement cataire* have been marked.

Amongst the other causes of hypertrophy have been reckoned—inflammation of the pericardium, palpitation, and too much action of the heart, howsoever induced.

Pathological characters.—The heart is sometimes found greatly increased in size, and especially in weight. The increase in the thickness of the parietes varies in different cases, being, at times, double or triple the ordinary size. The cut surfaces are found to be redder, and the substance firmer than natural. Eleven ounces may be regarded as hypertrophy, but the heart may weigh twenty-four ounces, or even more. Cases have occurred in which it weighed two pounds and a half, and upwards.

When the hypertrophy is seated in the left ventricle, it is commonly uniformly thickened: partial hypertrophy is rare. At times, it has been found from an inch and a half to two inches in thickness. When the hypertrophy is in the right ventricle, the thickening is generally irregular; the greatest being near the base, where it is often twice as thick as usual. In almost all cases, the columnæ carneæ participate in the hypertrophy. When it is limited to the left ventricle, the right appears to be—and perhaps occasionally is—

atrophied. At other times, the right ventricle alone is implicated, and acquires the thickness of the left; whilst at others both are equally affected; but this is the rarest case of all. The cavities of the ventricles may be augmented in size, diminished, or natural.

As the hypertrophy is commonly owing to some obstruction in the outlets of the heart, in protracted cases more especially cartilaginous or bony concretions may be found in the semilunar vales, and, at times, ossific deposits in the aorta. Calcareous concretions are likewise seen occasionally, in the auriculo-ventricular valves.

At times, in hypertrophy of the parietes, the heart itself is much less than usual; the increased thickness having been formed at the expense of the cavities. In a case, lately published by Dr. James Johnson, the heart was not more than half the natural size, yet the parietes of the left ventricle were full an inch in thickness. This had encroached so much upon the ventricle that it could not contain more than three teaspoonfuls of blood. A similar case has recently occurred to the author.

Treatment.—In the early stages of hypertrophy, of every form, blood-letting is indicated, especially if it occurs in young and plethoric individuals, and it may be repeated according to the judgment of the practitioner. Generally, however, it is more advisable, after the first, to draw blood by leeches, or by cupping, so as to have the joint effect of the depletion and revulsion thereby induced. The method, advised in cases of aneurism,—of beginning with copious bleeding every three or four days, and lengthening the intervals gradually, until the signs of hypertrophy are greatly diminished—has been recommended by many, but care must be taken not to reduce the powers too much, especially if there be much tendency to hydropic effusion.

Along with the blood-letting, in the cases above mentioned, it has been advised to diminish the diet, until the individual arrives at the minimum quantity required for his sustenance;—perfect mental and corporeal quietude being, at the same time, rigidly enjoined. The followers of this rigorous system recommend, that the quantity of food or nourishment should not even be gradually augmented, until several months after the disappearance of the signs of heart disease; and that the patient should not be permitted to engage in any occupation that may even appear to be most suitable for him, until at least one year has elapsed. This very restrictive system is rarely, however, needed, and is, at times, for the reasons already assigned, objectionable. Occasional cupping, with the employment of other revellents—as of the croton oil, (four to six drops rubbed on the cardiac region twice a day,) sinapisms, and the avoidance of every cause of excitement, are generally sufficient to moderate the hypertrophy. To remove it, when it has once formed, is probably beyond the efforts of art.

As sedatives, digitalis and hydrocyanic acid are excellent adjuvants to the means already advised. They may be given alone or in combination; or the cyanuret of potassium may be substituted for the hydrocyanic acid, (a quarter of a grain in the place of a drop of the acid.)

R.—Acid. hydrocyan. gtt. iv.
Tinct. digital. gtt. xl.
Mucilag. acaciæ, f ʒij.
Aquæ, f ʒivss.—M.

Dose, a fourth part, four times a day.

M. Bouillaud, who has the highest opinion of digitalis in active diseases of the heart, prefers the endermic mode of exhibition, by applying a blister over the præcordial region, and sprinkling fifteen or sixteen grains of the powder on the raw surface daily. In similar cases, the acetate of lead is sometimes given, alone or in combination with the acetate or sulphate of morphia, but it is less efficacious than the sedatives already mentioned.

R.—Plumb. acet. gr. vi.
Morphiæ sulph. vel acetat. gr. j.
Confect. rosæ, q. s. ut fiant pilulæ iij.
One, three times a day.

Dr. A. T. Thompson considers, that the most efficient method of unloading the circulation, as well as of lessening the nutritive deposition in the heart, is by the use of elaterium as a cathartic.

R.—Elater. gr. j.
Alcohol. f ʒij.—Solve.

Dose, eight minims, in a wineglassful of water, three times a day.

Advantage may, doubtless, be derived from this as well as from other cathartics in simple hypertrophy, but still more when the disease is accompanied by hydropic symptoms. It is in such cases that we administer diuretics likewise,—the strongest objection to which is, that they are somewhat uncertain in their operation. The author is in the habit of employing the *pulvis jalapæ compositus* (gr. xxx.—xl.), which consists of jalap and the bitartrate of potassa, as a cathartic in these cases; and, to exert a joint diuretic and cathartic effect, he adds the latter article, in solution:^a or digitalis and colchicum may be given in combination—both agents having the power of controlling the action of the heart;^b and, as in other cases of hydropic accumulation, the joint revellent and depleting action of a diuretic and a mercurial may be advantageously used.^c

^a R.—Baccar. junip. ʒss.

Potass. bitart. ʒij.

Aquæ bullientis, Oj.—M.

To be used for common drink.

^c R.—Hydrarg. chlorid. mit.

Scillæ, pulv.

Digital. pulv. aa gr. j. f. pil. ter die sumenda.

^b R.—Tinct. digital.

—colchic. aa gtt. vj.

Aquæ, f ʒiss. f. haustus ter die sumendus.

It has been already remarked, that great care must be taken, that the diet be neither excitant by quantity nor by quality. Milk diet has been highly extolled; and, where it agrees, none can be better, especially if it be associated with the farinaceous vegetable.

V. ATROPHY OF THE HEART.

SYNON. *Atrophia cordis*, Thinness of parietes of the heart with dilatation of the cavities, Dilatation of the heart, *Cardieuryisma*; *Fr. Atrophie du cœur*, *Acardiatriphie*, (*Piorry*.)

This affection is by no means so common as hypertrophy. We meet, however, with occasional examples of the heart of the adult being unusually small, which may be the result of wasting or of disease; but, in the generality of cases, it is probably congenital.

The term atrophy is appropriated rather to a diminution in the thickness of the parietes of the heart than to smallness of the whole organ. On examination, the heart may be of the usual size, but, when cut into, the parietes may be found reduced in thickness, whilst the cavities are correspondingly enlarged. This is a state of atrophy. In other cases, again, the heart may be larger than natural, the cavities becoming larger in proportion as the parietes become thinner, constituting the *cardiectasie* of Piorry,—and *passive aneurism*, in contradistinction to the *active*, already described. A heart, in a state of atrophy, has been found to weigh not more than from five to six or seven ounces.

Atrophy of the heart is generally perhaps partial; and, as before remarked, whilst the left ventricle becomes hypertrophied, the right may be atrophied to such a degree as to be reduced, in the language of M. Andral, to “an imperceptible appendage.” This we have never seen, nor any approximation to it.

Diagnosis.—In atrophy of the heart, with dilatation of the cavities, we may expect the pulsations of the organ to be dull and prolonged, and the pulse to be regular, but feeble and small. When percussion is practised over the cardiac region, there will be dulness of sound over a greater extent than usual; the impulse of the heart will be diminished, and, at times, cannot be perceived; whilst, on the other hand, the sounds may have become more clear. If the atrophy affects the heart but partially, the evidences will of course be more obscure.

Causes.—Atrophy may be induced by the same causes as hypertrophy. Diseases about the valves, or any obstruction to the flow of blood from the cavities during their contraction, may cause dilatation of the cavity.

Treatment.—If thinness of the parietes of the heart be diagnosticated, and especially if it be presumed to be accompanied with dilatation, the management ought to be the opposite to that recommended under hypertrophy of the organ. In two cases of sudden death, that fell under the author's care, the cause of death appeared to be the existence of this condition, under which, if syncope should at any time occur, it might prove fatal,—the heart not being able to resume its action.

If, in hypertrophy, blood-letting and depletives in general be esteemed advisable—partly with the view of diminishing the amount of stimulus, and consequently of cardiac action, and partly of breaking in upon the too great nutritive action in the parietes of the heart—an opposite plan is obviously suggested, where the parietes of the organ

are greatly reduced in thickness, and at times, as the author has seen them, to such a degree as to be translucent. Accordingly, it has been recommended to administer tonics, as the different vegetable bitters, and the preparations of iron;—the subcarbonate, (gr. x.—gr. xx. three times a day, in molasses,) or the proto-carbonate, (gr. iij.—gr. x. three times a day,) especially. In these cases, as has been properly remarked by M. Andral, we must be careful not to enfeeble the heart, as all its powers may be needed to overcome the obstacle to the course of the blood.

With the same views, a nourishing, but not excitant, diet should be allowed.

A kind of *partial aneurism of the parietes of the heart* has been recorded, consisting of an aneurismal sac or pouch, containing concrete fibrin. Several cases are on record. The celebrated French tragedian, Talma, was found to present this lesion on dissection, although no signs had announced its presence during life.

VI. INDURATION AND SOFTENING OF THE HEART.

SYNON. Cardiomalacia, Malacosis cordis; *Fr.* Ramollissement du Cœur; *Ger.* Erweichung des Herzens.

The nutrition of the heart becomes affected under various circumstances. At times, it is indurated, with or without hypertrophy. This induration may be the result of chronic inflammation, but we know of no signs during life, that indicate it.

Softening of the heart may likewise be caused by inflammation of the organ; and, it may occur in consequence of some lesion of the function of nutrition, which is independent of inflammation. It is a common concomitant of typhus, and affords valuable indications of treatment, as shown under the proper head. The softening may affect the whole heart, or only a part of it.

Diagnosis.—This is very obscure. A tremulous and intermittent pulse has been mentioned; and great anxiety, occurring during the existence of an organic disease of the heart, has been thought a symptom of importance. In such a condition of the organ, it is to be presumed, that its contractions would not be as energetic, nor the sounds as loud, but in reality we have no symptoms that can be looked upon as pathognomonic.

Pathological characters.—The condition is easily detected,—the tissue of the heart being readily lacerable, tearing with the slightest pressure of the finger, and, at times, being almost diffuent. The colour of its substance is of a deep red or livid, and at times of a yellowish or dull white hue.

Treatment.—As we have no diagnostic signs, we can adapt no particular management. We are guided rather by the general symptoms, which may often demand the treatment recommended under Atrophy of the heart.

VII. RUPTURE OF THE HEART.

SYNON. Cardiorrhæxis, Ruptura cordis; *Fr.* Rupture du Cœur; *Ger.* Zerreißung des Herzens.

Rupture occasionally occurs, owing to softening of the heart, and at other times, to thinness of its parietes, and to ulceration,—*Cardielcosis*—the consequence of endocarditis. It is commonly followed by immediate death, and, on dissection, a quantity of coagulated blood is found in the pericardium. Cases are on record, however, in which death has not been immediate. When the rupture is very small, and is seated where the great arteries leave the heart; or when, if larger, all the fibres are not torn, a clot of blood may form in the solution of continuity, and prevent the copious extravasation of the vital fluid. Partial pericarditis may, likewise, be induced, which may give occasion to adhesion between the pericardium and the heart, so that the person may live for years.

We can readily understand how death may not always occur from rupture of the heart, when we bear in mind the facts on record of wounds of the organ by penetrating instruments, which have not been mortal. The cases are, doubtless, rare; but they have occurred.

At times, on dissection, the columnæ carneæ alone have been found ruptured, or the cordæ tendineæ.

As this case is rarely, if ever, diagnosticated, and can, therefore, only be suspected, it is unnecessary to speak of the treatment.

VIII. FIBRINOUS CONCRETIONS IN THE HEART.

SYNON. Polypous or Polypiform Concretions, Polypi, Pseudopolypi.

In ordinary cases of death, we find, on dissection, the fibrinous portion of the blood in the heart coagulated, and either confined to the cavity in which it is chiefly met with, or extending to the arteries proceeding from it. These concretions were at one time looked upon as morbid, and were termed *polypi*, in consequence of the shape of their extensions. They probably take place before death; and at times interfere with the circulation of the blood through the heart, so as to give rise to physical signs, which may cause their presence to be suspected.

They are, doubtless, owing to impediment to the free flow of the blood through the pulmonary artery or the aorta, the consequence of which is retardation in its flow through the cavities of the heart, and consequent coagulation. Wagner affirms, that the absence of blood corpuscles in their interior is an evidence of their formation some time prior to dissolution;—the columnæ carneæ and cordæ tendineæ acting upon the blood in the same manner as the switch acts upon freshly drawn blood, when we beat it to separate the fibrin from it.

In a case of great impediment to the circulation of the blood through the lungs, which fell under the author's care, and in which, on the application of the stethoscope, the respiratory murmur was totally inaudible in any part of the right lung, whilst it was very distinct in the

left; and percussion on the right side gave the dull, heavy, circumscribed sound of a solid mass,—the sound of the left side of the heart was so loud as to countenance the idea of dilatation of the cavity, with thinness of the parietes; whilst on the right side, the sound was indistinct; but there was a peculiar *bruit*, appearing, as it were, compounded of the *bruit de soufflet* or bellows' sound, with the *frémissement cataire*, and evidently indicating the existence of some impediment to the circulation of the blood through the right heart. On the dissection of this case, the right lung was found completely hepatized through its whole extent, whilst the left lung was nearly healthy. On taking out the heart, the right pulmonary artery was found completely plugged up by a semi-organized mass, having the appearance of muscle, extending through the semilunar valves, and attaching itself strongly to the columnæ carneæ of the right ventricle. This morbid production was, doubtless, caused by the engorgement of the lung occasioning a remora of blood in the heart, and deposition of fibrin. The symptoms during life, and the signs afforded by auscultation, as well as the semi-organized appearance of the concretion, showed, that it could scarcely have been formed after dissolution. Many similar cases have been seen by the author, and several have been recorded by Messrs. H. M. Hughes, Bouillaud, Velpeau, and Ferrus. At the very last Clinical Lecture of the author at the Philadelphia Hospital (Nov. 11, 1843,) he exhibited to the class a semi-organized fibrinous concretion in the right ventricle; the existence of which he had diagnosticated before dissolution, owing to the sound of impeded transmission of blood in a person dying of pleuro-pneumonia.

It appears to be admitted, that blood, under particular circumstances, may become organized after coagulation in the vascular system, and there is great reason to believe, although this has been doubted, that the same thing may happen to coagula effused into the tissues. No one denies the plastic powers possessed by the liquor sanguinis or coagulable lymph of the blood; and it is not difficult to comprehend, that the blood itself may be endowed with similar properties.

Diagnosis.—This cannot be easy. It has been conceived, however, that if, along with an increased, irregular, and confused action of the heart, there be a sudden and excessive aggravation of dyspnœa, without any obvious cause, the patient being in agony from an intolerable sense of suffocation, remaining restless and distressed till death, with cool surface and extremities, and a livid countenance, occasionally accompanied with nausea and vomiting, the presence of a fibrinous concretion of the heart may be suspected. It is not clear, however, what can be the connexion between this state of the heart and the affection of the stomach: the nausea and vomiting can only be regarded as accidental concomitants.

Occasionally, the polypoid or polypiform concretions induce death by blocking up one of the apertures of the heart.

Treatment.—As the diagnosis is so uncertain, the treatment must be so likewise. When detected, indeed, the affection can only be treated according to the symptoms that present themselves. There is no way whatever of reaching the mischief. Alkalies have been advised, from

their property of diminishing the tendency of the blood to coagulate, and the borate of soda has been considered, by Dr. Copland, the most effective agent in preventing the concretion of fibrin and in dissolving coagulable lymph: little or nothing can, however, be expected from them in the affection under consideration.

IX. ADIPOUS AND OTHER FORMATIONS IN THE SUBSTANCE OF THE HEART.

• The heart is liable to many forms of morbid deposition, which will require a brief consideration only.

a. *Adipous formation*.—It has been considered, that the tissue of the heart, in certain cases, becomes transformed into fat; but such is probably not the case; the fat appears to be infiltrated between the muscular fibres, so that, ultimately, they become atrophied, and so small, that the organ seems to be changed altogether into fat, and rupture may be the consequence. The heart, being deprived of its muscular energy, syncope is apt to occur, which may terminate fatally. The causes of this *vice* of nutrition are not known. At times, in cases of sudden death, no morbid appearance has been perceptible, except an unusual deposition or surcharge of fat towards the base of the heart. In these cases, should syncope occur—owing to the weight of the fat, the heart may be unable to resume its action. There is no mode of diagnosing this morbid condition.

b. *Fibrous formation*.—As the fibrous tissue—*tissu jaune*—exists in the structure of the heart around the auriculo-ventricular and the arterial orifices and in the valves, we can understand, that it may increase in size, so as to constitute a true hypertrophy, which projects, at times, internally, and, at others, externally into the pericardium.

c. *Cartilaginous, and osseous formations*.—These formations do not frequently occur in the muscular structure of the heart; yet they are occasionally seen. The apex of the organ, and its whole substance, as well as the columnæ carneæ of the left ventricle, have been found converted into cartilage, and cartilaginous vegetations are not unfrequently seen on the valves. *Ossific depositions* are more common. They may take place in the cellular structure of the organ; in the fibrous tissue especially, by virtue of the great general law, that the fibrous tissue is the matrix of the osseous; in the cordæ tendineæ of the valves; in the valves themselves, and in the muscular fibres. They are more frequently met with in the left heart than in the right.

There are many cases recorded of partial ossification of the muscular substance of the heart, and some in which the ventricles have been found so completely changed, that they resembled the bones of the cranium. In these cases, the physical signs have not been observed; but the impediments to the circulation have been indicated by excessive dyspnœa; great anxiety; livid countenance; and other evidences of imperfect hæmatosis.

Where the transformation is seated in the endocardium, or at the orifices of the heart, the symptoms and signs will be those of narrowness of those apertures, described under the next section.

The causes of these transformations have been sought for in in-

flammation, which may, doubtless, act like other agencies that give rise to a *vice* in nutrition; but inflammation would not seem to be necessary to occasion this. In old age, there is, perhaps, a natural tendency in the fibrous structures to become ossified; yet no one supposes, that this is the result of an inflammatory process.

d. *Tubercular formation*.—This is extremely unfrequent, and as in the case of the intestines, when tubercles are met with in the heart, they are constantly found in other viscera.

e. *Scirrhus, and cancerous formations*.—It is only necessary to remark, that these affections have not been noticed until after death; none of the evidences during life, having given rise to any suspicion of their existence. They may occur solitary, or in numbers. The same may be said of the

f. *Encephaloid formation*.—This has been observed infiltrated between the muscular fibres, converting it into a yellow substance.

The different cancerous formations are more likely to occur after the age of virility; but there are cases in which scirrhus has been met with in infants.

g. *Melanotic formations, serous cysts, and hydatids*.—All these affections have been seen in the substance of the heart; but they are extremely uncommon. Not being able to diagnosticate their existence, it is unnecessary to dwell upon them.

X. DISEASES OF THE CARDIAC VALVES.

Diseases of the valves of the heart are by no means uncommon. Formed, in part, of the fibrous tissue, they are subject to ossification, whilst the endocardium that covers them is liable to vegetations. The most frequent formation is the osseous, especially in the valves of the left heart: it has been estimated, indeed, that nineteen-twentieths of valvular diseases are of this nature. This is probably too high an estimate, but there can be no doubt, that it is by far the most frequent lesion. The tricuspid valves, and the semilunar valves at the mouth of the pulmonary artery, are less frequently diseased than the mitral valves and the semilunar valves at the mouth of the aorta.

Diagnosis.—Any disease about the valves must lead to impediment of circulation, and generally to narrowness, either of the auriculo-ventricular openings, or of the mouths of the pulmonary artery or aorta. In consequence of this, more effort is required on the part of the muscular fibres of the parietes of the cavities, by whose contraction the blood is propelled onwards. When the hand is placed over the region of a heart thus diseased, the *frémissement cataire*, or *purring of cat agitation* is distinctly appreciated, and the same when the head or stethoscope is applied on the same region. The pulsations of the heart are usually very strong, especially under any mental or corporeal agitation; but the pulse, at the wrist, in place of being strong,—as it is under violent action of the heart, provided the blood can be freely sent into the arteries,—is, in these cases, small, hard and unequal. It is generally, also, more or less irregular, and often intermittent. These are the symptoms, that may be expected

from lesions of the valves of the left heart; the same *frémissement* is likewise observed, when the disease of the valves is in the right heart; but, in the latter case, for obvious reasons, the pulse is not implicated, and may be almost as in health.

It is not an easy matter to diagnosticate in what valves the lesions are situate. It is affirmed, that if a *bruit de râpe* or *rasping sound* be heard during the dilatation of the ventricles, along with a *bruit de soufflet* or *bellows' sound*, we may infer, that the lesion is in the auriculo-ventricular valves;—the rasp sound being occasioned by the cartilaginous or ossific formations on the valves rubbing against each other; and the bellows' sound by the impediment to the free passage of the blood from the auricle into the ventricle; whilst if the rasp sound, and the *bruit de soufflet* be heard during the systole or contraction of the ventricles, we are justified in referring the lesion to the valves at the mouths of the aorta or pulmonary artery. It must be borne in mind, however, that whilst the auricles are dilating, the blood is falling back upon the valves at the mouths of the arteries; and that, on the other hand, whilst the ventricles contract, the auriculo-ventricular valves are rendered tense: hence, if lesions exist in these last valves, the physical signs might be equally heard during the contraction of the ventricles; and, if in the semilunar valves at the mouths of the arteries, they might be heard during the dilatation of those cavities.

It must be admitted, that the diagnosis of valvular disease is somewhat obscure, if we be guided by physical signs only. Dr. Graves, indeed, gives it as his opinion, that the functional derangements produced by disease of any particular part of the heart, are seldom sufficiently characteristic to enable us to make out, whether the disease be situate in the auriculo-ventricular or in the semilunar valves; and he owns, that it has frequently occurred to him, that all the symptoms supposed to be indicative of disease of the right side of the heart have been occasioned by disease of the left; and conversely. We can, however, have little hesitation, provided the signs above described are constant, with the concomitant symptoms of imperfect hæmatisis, as indicated by livid complexion, dyspnœa, and infiltration of the limbs, or augmented secretion of the fluid of the serous cavities, in deciding that such disease is present. Some observers place the greatest reliance on the physical signs as means of diagnosis, whilst others regard them as altogether uncertain. It has been even affirmed by distinguished observers, Messrs. Graves and Stokes—1. That the physical signs of valvular disease are not fully established; 2. That, taken alone, they are in no case sufficient for diagnosis; 3. That even in organic disease, the nature and situation of murmurs may vary in the course of a few days; 4. That all varieties of valvular murmurs may occur without organic disease; and 5. That organic disease of the valves may exist to a very great degree without any murmur whatsoever.

The bellows' sound, the author can say from experience, is an uncertain sign; but still it affords a presumption, that the calibre of the vessel, through which the blood has to flow, is diminished. We can

induce it artificially, by pressing upon a large vessel. The rasp sound we have occasionally heard when the appearances on dissection have not been such as to account for it satisfactorily; but still, if we have these physical signs coexisting with the symptoms described above, we may generally regard the case as one of valvular disease, in which there is some formation that diminishes the capacity of the outlet, and occasions a rubbing sound when the valves are opened or closed. The physical signs are, however inadequate to point out, in all cases, whether the valves of the right or left heart be affected.

When the auriculo-ventricular valves are diseased, it happens occasionally, that they are united, by adhesive inflammation, to the side of the heart, as the semilunar valves may be to the aorta or pulmonary artery when they are diseased. If we be right as to the mode in which the second sound of the heart is produced;—should this phenomenon happen to the semilunar valves, the closure of the valves during the dilatation of the ventricles must be incomplete; and, consequently, the second sound should be interfered with. Absence or indistinctness of the second sound would consequently lead to the belief, that the semilunar valves do not close perfectly;—and this view would be encouraged if the action of the ventricle were more forcible than natural; as a greater effort might be expected on the part of the ventricle to send back the blood, which reflowed from the artery, along with that arriving at it from the auricles.

Owing to insufficiency of the tricuspid valves, some degree of regurgitation, generally perhaps, if not always, occurs. Lesions of these valves are very unusual, and almost always slight. They are rarely so much diseased as to yield a murmur on auscultation. Regurgitation through the mitral valve is the result of disease; and it is attended by a murmur synchronous with the impulse and first sound, which is produced by the blood being thrown back through the imperfectly closed valve when the ventricle contracts. "The character of mitral murmurs," says Dr. C. J. B. Williams, "is generally blowing, but sometimes passing into a whistle, and more rarely grating. In some cases, it accompanies the whole systolic act, and terminates with the second sound: in others it is confined to the end of the first sound, giving to it an additional vowel or roughness, as we may express by the words *loo-dup* or *lurr-dup*; or, if confined to the beginning, *rehub-dup* or *jub-dup*."

Various conditions of the valves may give occasion to regurgitation: they may be ossified or cartilaginous: vegetations may exist upon them: they may be unusually thin and perforated in various places, a marked case of which the author has seen lately; or a portion of the valve may have contracted adhesion to the neighbouring parts; but, as Dr. Hope has remarked, perhaps the most common cause of all is shortening, usually with thickening, of the chordæ tendineæ, which prevents the valve from closing. Very recently, M. A. Fauvel has concluded from observed cases, that an abnormous pre-systolic *bruit*, localized towards the apex of the heart is, in the present state of knowledge, the most probable stethoscopic sign of narrowness of the

left auriculo-ventricular orifice. He admits, however, that this requires to be sanctioned by fresh observations.

Pathological characters.—These are various. Ossific deposits of various forms and sizes may be found occupying the whole, or only a part, of the valves; and these may be situated upon or under the prolongation of the endocardium, which forms their inner coat. In all cases, the conformation of the valves is altered, and their functions more or less interfered with. The same may be said of the cartilaginous and fibrous formations: these exhibit a dense, yellowish-white tissue, also of various shapes and sizes. In other cases, fleshy vegetations are found commonly occupying the free edge of the valves, and having, at times, the appearance of warts: they are usually round and rough, and of a bluish or red colour. At times, they resemble small cysts, and are most commonly found on the aortic or mitral valves.

Treatment.—This must be chiefly palliative and hygienic: too great polyæmia must be avoided, and every thing that can unduly excite the sanguiferous system. We know of no remedy which can act on the morbid formations themselves.

XI. CYANOSIS.

SYNON. *Kyanosis, Cærulosis, Cyanopathia, Morbus cæruleus, Blue disease; Fr. Cyanopathie, Maladie bleue; Ger. Blaue Krankheit, Blausucht, Kyanose.*

Immediately after birth, the blood, which had passed in part through the foramen ovale, from the right into the left auricle, and that which had passed through the pulmonary artery into the aorta through the ductus arteriosus, are solicited in another direction, and proceed through the pulmonary artery to the lungs. Should, however, any mal-formation exist, such as narrowness of the pulmonary artery, the blood may still continue to pass in part from the right side of the heart to the left, and those parts of the body which are covered by a thin cuticle—as the lips—may exhibit that an imperfectly oxygenized blood is circulating through the system. This livid or blue colour has given rise to the various names, commonly assigned to the affection of the heart under consideration.

Diagnosis.—The colour of the skin and mucous membranes is livid, blue, or purple, and this usually from the time of birth. More or less dyspnœa is generally present, especially on exertion, with palpitations and occasional syncope: the general heat of the body is diminished, and there is unusual susceptibility to cold.

The affection is generally connected with a patulous state of the foramen ovale from birth; but there have been cases in which, after having been closed, it has been re-opened. When the pulmonary artery is properly formed, however, there may be no cyanosis, even when the foramen ovale has remained open. A case has been recently recorded, by Mr. H. J. Johnson, of a woman, who was admitted into St. George's Hospital, London, with intractable ulceration of the leg. Her complexion was remarkably dingy, but not blue. She died of erysipelas, and on examining the body, the foramen ovale was found so open that two fingers could be passed from one auricle to the other. Mr. Johnson thinks, and probably correctly, that an open

condition of the foramen ovale is of no serious consequence, unless it is accompanied by some malformation; and a similar view was urged by Dr. West, before the Pathological Society of Philadelphia, on a recent occasion (Oct. 31st 1842); and, still more recently, by Dr. Craigie, in the Edinburgh Medical and Surgical Journal for October, 1843. Dr. Craigie states, that he is satisfied from a case related by him in the Journal, as well as from several others; *first*, that the open state of the foramen ovale is rarely a primary and solitary lesion; *secondly*, that when it is a solitary lesion it is not injurious, and the venous blood of the right auricle is not thereby necessarily mixed with the arterial blood of the left auricle; and *thirdly*, that in opposition to what has been hitherto usually taught, the open state of the foramen ovale is in a large proportion of cases the means of prolonging life; an imperfectly oxygenized blood being adequate to maintain vital action. (See Asphyxia.) Dr. Craigie is, moreover, disposed to infer, from various facts in the history of the development of the ovum, that the obstructed, or, it may be, the undeveloped state of the pulmonary artery, is the anatomical cause of the perforated septum often observed in cases of cyanosis, and of the origin of the aorta from the two ventricles, when that malformation is observed. Cyanosis, again, may be present, when there is no communication between the two sides of the heart. Any thing, indeed, that interferes with the return of the blood to the heart, and prevents hæmatisation, may be the cause of the blueness of the surface, and especially of the mucous membranes. Still, we cannot incur much risk in diagnosing a communication between the right and the left side of the heart, if, along with blueness from birth, we have the indications of cardiac disease laid down above.

Pathological characters.—The appearances, found on the dissection of those who have died of cyanosis, are various. The lesions, presented on the dissection of 53 cases, have been recorded by M. Gintrac. In 22 of these, the aorta was found to arise from both ventricles. In 33, the foramen ovale was open; in 14, the ductus arteriosus was wanting; in 4, the heart was single, consisting of one auricle and one ventricle; in 5, the ventricular septum was imperfect; in 22, the pulmonary artery was contracted; in 5, that vessel was obliterated; in 1, the aorta was obliterated; and in 4, the aorta arose from the right ventricle: the pulmonary artery from the left.

The various *Malformations of the heart* have been well investigated by different pathological writers, and especially by Meckel and Hope, and more recently still by Warnatz, of Dresden, who has described them with special reference to cyanosis. The various malformations given by the second of these writers, are as follows:—1. The heart single, like that of a fish, consisting of one auricle and one ventricle, from which a trunk originates, that presently divides into pulmonary artery and aorta. 2. Two auricles and one ventricle. In one case, the patient attained the age of 22. 3. The foramen ovale remaining open, which is the most common malformation. 4. The foramen ovale and ductus arteriosus both remaining open. 5. The foramen ovale and ductus arteriosus open, and the pulmonary artery oblite-

rated at its origin. In one case, the cavity of the right ventricle was nearly obliterated, and in two others, the septum of the ventricles was perforated. 6. Ventricular septum deficient; auricular imperfect. 7. Ventricular septum deficient at the aortic orifice, so as to leave a common opening into that vessel from both ventricles;—this malformation being generally accompanied by contraction of the pulmonary artery, frequently by an open state of the foramen ovale, and occasionally by obliteration of the pulmonary artery and patescence of the ductus arteriosus. 8. Ventricular septum separated, perforated towards the base, associated with contraction of the pulmonary artery and patescence of the base. 9. Foramen ovale open; and pulmonary artery arising from both ventricles, and giving off the descending aorta; whilst the ascending aorta arises in the usual way. 10. Aorta arising from the right ventricle, and the pulmonary artery from the left; the foramen ovale, and sometimes the ductus arteriosus, remaining open. An interesting case of this kind has been lately described by Dr. Walshe: the child lived ten months. 11. The right auricle opening into the left ventricle instead of into the right, and the ventricles communicating by an aperture immediately below the aortic valves. The foramen ovale open. In a case of cyanosis, communicated to the author, by Dr. Rohrer, of Philadelphia, the heart appeared to resemble that of the higher reptiles—the ophidian, saurian and chelonian, which consists of two auricles, with a partitioned ventricle, or a single ventricle. Of this variety of malformation, many examples are on record; but although these cases greatly resembled each other, in the fact of a ready communication existing between the ventricles, they differed greatly in the details. In one case, the aorta arose from the ordinary place in the left ventricle, which was more than usually developed: at the same time, there was an opening through the septum ventriculorum in a straight line with the embouchure of the aorta, which permitted a free communication between the right and the left ventricle, in such sort, that one half of the aorta might be considered to open into the right, and the other into the left ventricle. The pulmonary artery was greatly diminished in size. In another case, besides hypertrophy of the heart, a communication existed between the right ventricle and the aorta, at the place where the pulmonary artery ought to have been, and at the same time the carotid arose from the left ventricle. In another case of a blue child, but a slight trace existed of the septum ventriculorum; the valve of the foramen ovale, which was open, and the Eustachian valve, were present; and the ductus arteriosus was divided into two branches, one of which went to the right, and the other to the left lung, from the aorta; the pulmonary artery was wholly wanting. Generally, the pulmonary artery has been found of very small size. Duret and Caillot not only found the mouth of the pulmonary artery very narrow, and the coats thinner than usual, but the artery itself entirely imperious and the ductus arteriosus wholly obliterated. In another case, recorded by Ramsbotham, the pulmonary artery was found wanting; its place appearing to have been supplied by the bronchial arteries.

In a case of cyanosis, described by Romberg, the aorta, near the heart, terminated in a *cul-de-sac*. It had received its blood through the ductus arteriosus, from the pulmonary artery, which was of unusual size: the child lived four days; and in one already referred to, on the authority of Dr. Craigie, the cyanosis was connected with mutual adhesion of the semilunar valves of the pulmonary artery. Many of these cases show, that the nutrition of different parts may go on well, even when a small quantity only of oxygenized blood is distributed to them, provided only, that the deficiency has existed, as it necessarily does, in such cases, from birth.

Treatment.—No special medical treatment can be of any advantage. The case must be managed in the same manner as the other chronic heart diseases, which have been described. Commonly, in the cyanosis which is congenital, death takes place in the first few years; and it rarely happens, that the patient survives the age of puberty. He more readily falls a victim to any severe attack of disease, than one whose conformation is normal. In the cyanosis of the new-born—*cyanosis neonatorum*—Professor Meigs lays great stress upon the effect of position. He recommends, that the child should be placed upon its right side, with its head and shoulders inclined upwards upon pillows, and be kept in this position for hours. "Upon placing the child thus, its septum auriculorum becomes a horizontal plane, supporting the blood in the left auricle. The weight of that blood presses the valve of the foramen ovale into coincidence with the plane of the septum, and closes the patulous orifice. The succeeding injections of blood take their proper route to the lungs and the system, so that a few acts of the respiratory muscles give sufficient doses of oxygen to the blood, to diminish, and to rapidly remove, the excess of carbon, and the child is cured." Rest, is doubtless an important agent in many of these cases in establishing the circulation properly; but, on the other hand, a smart blow on the breech not unfrequently effects the object more speedily. Where the cyanosis is owing to positive malformation, no agency will be of any permanent advantage.

XII. PALPITATION.

SYNON. Clonus palpitatio, Palmus, Palpitatio cordis, Cardiopalmus, Nervous palpitatio.
Ger. Herzklopfen.

Under this term are meant those palpitations only, which are purely nervous. Such as are connected with various organic diseases of the heart have been referred to already.

The effect of the mental emotions on the action of the heart is well known. Although the contractions of the organ appear not to be dependent upon the action of the brain or spinal marrow, or of both, there is no doubt of the rapidity of the contractions being greatly influenced by the passions, and, consequently, by the encephalon. It can readily, therefore, be understood, that, in unusually impressible persons, palpitations may be induced on slight causes; and, accord-

ingly, it is often a neuropathic phenomenon, and a frequent concomitant of hysteria.

Diagnosis.—When we examine a patient, whilst labouring under palpitation, which is, notwithstanding, unquestionably nervous, it is impossible, at times, to decide as to the condition of the heart. There may, indeed, be the usual evidences of various organic diseases of the viscus. After the palpitations have passed away, auscultation may aid us; and if no abnormal sound be rendered, and the dyspnoea end with the paroxysm of palpitations, we can have little doubt that the affection is neuropathic. The history of the case will, also, throw considerable light on the matter; and if the palpitations be nervous, the patient, as suggested by M. Andral, will probably be able, in the intervals between them, to endure more severe exercise than if organic disease were present.

Causes.—It has been already remarked, that mental emotions are common causes. Whatever, indeed, adds to the impressibility of the nervous system may act as a predisposition, and under such circumstances, slight exciting influences are sufficient to develop them. The inordinate use of tobacco, excessive fatigue and exhaustion—no matter how induced—and anæmia are, in this way, concerned in the causation. They accompany dyspepsia, and hysteria,—diseases in which the impressibility in question is largely developed.

In some cases, the affection would seem to have been induced by polyæmia or fulness of blood; but this, we apprehend, is a rare event.

Treatment.—This is essentially that recommended for hysteria. If fulness of blood exist, blood-letting, either general or local, may be demanded. Commonly, however, the palpitations yield to rest, and the employment of agents, which induce a new action in the nervous system,—as the various substances considered to be *direct antispasmodics*, all of which, however, act by virtue of the new impression they exert on the gustatory nerves, and on the nerves of the stomach, thus detracting from the nervous erethism directed towards the heart. It is in this way, and in this only—in all probability—that leeching, cupping, and blistering the region of the spine, produce their good effects, not only in nervous palpitations, but in hysteria.

The indications laid down under hysteria, and the mode of carrying them into effect, may, indeed, be transferred, without change, to the affection now under consideration, when it is purely nervous.

When the palpitations are accompanied by energy of contraction of the ventricles, digitalis may be administered either alone or in combination.

R.—Tinct. digital. gtt. x.
 — hyoscyam. gtt. xv.
 Acid. hydrocyan. gtt. j.
 Aquæ camphor. f3xj.—M. et fiat haustus ter die sumendus.

In all cases, it is important to inquire into the pathological cause of the palpitation, and to adapt the system of medication accordingly. There is always more or less alarm, which must be allayed, where it can be done, by assuring the patient of the absence of organic disease,

as the mental agitation cannot fail to react on the heart, and aggravate the palpitation.

Not unfrequently we meet with cases of irregularity of the heart's action,—especially of the rhythm,—which appears to be greatly dependent upon a want of nervous power generally, and of the nerves distributed to the heart especially. Auscultation may here exhibit no evidence of valvular derangement, or of altered nutrition of the organ; but a loss of beat is observed occasionally at the pulse, whilst at the same time the impulse of the heart may be exaggerated. This pathological condition is often accompanied by languor, and by irregularity of calorification,—the hands and feet being kept warm with difficulty; and occasionally, immediately after the irregularity of the heart's action is felt in the epigastrium, the patient breaks out into a profuse perspiration. Along with these phenomena, he is affected with flatulence of the stomach and bowels; and, in many cases, the anomalous symptoms are present, which have been described as characterizing Torpor of the colon. (q. v.)

The treatment ought to consist of agents that are calculated to obviate debility and erethism. The preparations of iron in full doses are of great service; and a glass or two of wine at dinner, or half a pint of porter or of ale, with animal food in proper quantity, has afforded essential relief.

XIII. SYNCOPE.

SYNON. Leipopsychia, Apsychia, Apopsychia, Lipothymia, Asphyxia, Animi defectio, A. deliquium, Swoon, Fainting fit; *Fr.* Evanouissement, Défaillance; *Ger.* Ohnmacht.

Syncope or fainting is a state of suspended animation from causes connected with the heart's action. It is to this condition, that the term asphyxia, which—as elsewhere seen, means *pulselessness*—is most appropriate; but, of late years more especially, the term has been applied to suspended animation, owing to an arrest of the respiratory function. (See ASPHYXIA.)

In many affections of the heart, syncope is an important, and often a most serious symptom; but there are numerous cases, as in impressive females, in which it occurs independently of any such morbid condition of the heart, and is of little consequence.

Diagnosis.—Complete syncope rarely takes place at once. Usually, a sense of faintness or deadly sickness is experienced, with more or less dimness of vision and tinnitus aurium, accompanied by a sense of coldness and tingling in the lower extremities, cold perspirations, and deadly paleness. These may exist for a longer or shorter period, when the individual falls down; the pulse and respiration cease momentarily, or are imperfectly accomplished, and all consciousness is lost. If the ear be placed on the chest at this time, the contractions of the heart are found to be exceedingly feeble,—the first sound being greatly diminished in intensity, and the second commonly inaudible. Usually, the functions are re-established in the course of a few seconds, so that the practitioner, when sent

for, finds the patient recovered. At times, however, the syncope continues for a long period; and the recorded cases of *trance*, said to resemble death closely, are probably examples of this affection.

Occasionally, as the patient recovers and the blood is re-distributed to the capillaries, there is more or less confusion of intellect, vertigo, and headache; and, often, feelings that are described as extremely disagreeable and even painful, so that, in those who are liable to syncope, the *coming to* is at times more dreaded than the precursory symptoms. In recovery from an attack of syncope, it is the spinal nervous system of which the activity is first renewed. The respiratory movements recommence, and the power of deglutition is restored, before voluntary movements are executed.

Syncope is an event to be feared, where the heart is diseased; and not unfrequently it is the immediate cause of death in such cases. Embarrassment of circulation occurs; the heart ceases its action, and, owing to the morbid condition, its functions cannot be resumed. In ordinary cases, however, fainting is attended with little or no immediate danger.

Cases of sudden death, originating from cessation of the heart's action without any obvious cause, have been described by Mr. Chevalier under the name *asphyxia idiopathica*.

Causes.—Unquestionably, a predisposition to syncope may be afforded by organization. Impressible persons are far more liable to it, and hence it is so much more frequent with females than males. When the system is reduced in any manner, as from profuse evacuations of any kind, or from protracted illness, a similar predisposition is induced. Under such circumstances, any unusual impression made on the nervous system, as rising suddenly in bed, or a strong mental emotion, may bring on an attack. In very impressible individuals, peculiar odours, or the sight of disagreeable or disgusting objects, mental emotions, corporeal suffering, slight fatigue or fasting, may act as exciting causes; and, in any person, long continuance in the erect attitude, and especially with the hands raised over the head, so as to require greater exertion on the part of the heart to propel the blood, may induce it. A distinguished teacher, Dr. James Gregory, of Edinburgh, was in the habit of stating, that he had succeeded in causing it at will in this manner, but he desisted under the well-grounded apprehension that he might lay the foundation for serious cardiac disease.

The tendency of an elevated temperature,—as in crowded rooms, or by standing with the back to the fire—to induce fainting, is well known.

In all cases, the circulation is rendered irregular before it is arrested; but, perhaps in all, such irregularity is induced by a modified condition of the nervous system. Certainly, most, if not all of the causes, enumerated above, would seem to exert their influence primarily on the nerves.

Treatment.—As before remarked,—in an ordinary case of syncope, the practitioner has rarely an opportunity for exercising his skill. In favourable cases, he finds the functions restored before his arrival;

and, in unfavourable cases, the state of suspended animation may have terminated in positive death. The syncope, that supervenes on blood-letting, on surgical operations, and uterine hemorrhage, or the discharge of morbid accumulations of fluid, where proper pressure has not been made, is that which he is chiefly called upon to treat.

In a case of simple syncope, it is generally but necessary to place the patient in the horizontal posture, in order to favour the re-distribution of the blood from the heart; to loosen all tight clothes; to expose him to a draught of cold air; and to arouse directly the peripheral nerves, and indirectly the nervous centres, by sprinkling cold water over the face, and holding excitants—as ammonia—to the nostrils. When the patient is able to swallow, a little cold water may be given, to which may be added twenty or thirty drops of hartshorn, or sal volatile—the *spiritus ammoniæ aromaticus* of the Pharmacopœia of the United States,—a teaspoonful of the *spiritus ætheris sulphurici compositus*, or of the *spiritus ætheris nitrici*, or a little sulphuric ether itself, or brandy, or wine. In more prolonged cases, it may be advisable, in addition to these means, to employ turpentine injections, and hot applications to the epigastric region. In the faintness that ensues on copious uterine hemorrhage, it is sometimes requisite to administer the most powerful stimulants—as brandy—with great freedom; and, in cases of prolonged suspended animation that simulate death, as those that are on record, it might be considered proper to apply heat, in the form of the moxa, of a drop of boiling water let fall on the epigastrium or the back, or by dipping a knife in hot water, and applying it to the same parts.

It may be well to remark, that during the existence of chronic heart disease, should symptoms occur to suggest blood-letting, it ought to be practised with great caution, and should never be carried to such an extent as to induce syncope. The author saw one case in which the syncope was fatal; and many such have occurred. In aged individuals, the syncope, caused by blood-letting, is frequently protracted and alarming.

Where the person is liable to faint, attention must be paid to the removal of the remote causes. As these generally consist in unusual nervous impressibility, the means, elsewhere inculcated for the removal of such a condition, must be recommended; and especially all mental and corporeal agitation should be sedulously avoided. Certain cases of syncope would seem to be connected with a plethoric condition; but this must be uncommon. The mode of treatment, in such cases, will be obvious.

XIV. ANGINA PECTORIS.

SYNON. Sternalgia, Syncope anginosa, Asthma dolorificum, A. convulsivum, A. arthriticum, A. diaphragmaticum, Arthritis diaphragmatica, Orthopnoea cardiaca, Stenocardia, Suffocative Breastpang, Neuralgia of the heart; *Fr.* Angine de Poitrine, Névrose du cœur; *Ger.* Brustbräune.

Much difference of sentiment has existed in regard to the character of the disease known under this name. By many writers, it has been

ascribed to disease of the heart, as spasm, accumulation of fat, polypous concretions, ossification of the coronary arteries, or disease of the valves; whilst others have considered it to be a spasm of the diaphragm and other muscles of respiration. Dr. Good thinks, that both may probably be regarded as causes in different instances; for, that the heart is not always affected is clear, he conceives, from the frequent regularity of the pulse through the entire paroxysm. This argument is not, however, conclusive. In many cases of serious heart affections, the rhythm of the pulse remains unmodified.

By an eminent pathologist, M. Andral, angina pectoris has been ranked among "lesions of the sensibility of the heart;" whilst another, M. Laënnec, is of opinion, that although it may be accidentally associated with diseases of the heart, it does not necessarily depend upon them. The opinion, that the aggregate of symptoms, known under this name, is primarily referable to the heart, seems, however, to be the most accurate.

Diagnosis.—Angina pectoris consists essentially of a violent sense of constriction and pain across the chest, extending along the neck, shoulder, and arm, with great distress and sense of suffocation; these symptoms recurring in paroxysms, and at uncertain intervals. The first attack of the disease is, at times, sudden—commonly so, indeed,—and takes place when the person is ascending a staircase, or going up hill; he is arrested by an excessively lancinating and constrictive pain, which causes him to stop. This pain, which is in the region of the heart, generally ceases soon, and leaves the individual nearly in his accustomed health. At first, the interval may be considerable, but, subsequently, the paroxysms become more frequent, and are brought on by slighter and slighter exciting causes,—the most trifling mental uneasiness giving rise to them. Their approach may be indicated by yawning and a sense of heat in the chest. In very bad cases, the paroxysms occur several times in the course of the day, and the pain shoots to the neck, and along both upper extremities, especially the left, as far even as the fingers. The patient is under constant apprehension of impending dissolution: this sooner or later happens, for the prognosis is always unfavourable, death taking place very suddenly, at times, in one of the paroxysms;—at others, fatal syncope occurring when least expected, and when the person may be under no unusual mental or corporeal excitement.

Even in the midst of the paroxysm, the patient can usually take a full inspiration. He avoids doing so, however, in consequence of the increase of the pain, and generally compresses his chest, and avoids every kind of movement. The contractions of the heart are feeble; and, although palpitations are commonly enumerated amongst the many anomalous symptoms of this singular affection, they are not often perhaps present, unless there is some complication of organic disease of the heart along with the angina. In the paroxysm, the patient's whole appearance indicates intense anguish; the face is pale; and the extremities are cold, and covered with a clammy perspiration.

The disease may be confounded with different organic affections

of the heart and thorax. These must be diagnosticated, between the paroxysms, by their appropriate characteristics.

Angina pectoris is the disease which is considered to have proved fatal to the celebrated John Hunter; but in his case there were strange symptoms. He presented one of the most singular examples on record of suspension of two of the most important of the vital functions. (See the author's *Human Physiology*, 5th edit. vol. ii. Philad. 1844.) In the year 1769, being then forty-one years of age, of a sound constitution, and subject to no disease, except a casual fit of the gout, he was suddenly attacked with a pain in the stomach, which was speedily succeeded by a total suspension of the action of the heart and of the lungs. By violent exertion of the will, he occasionally inflated the lungs; but over the heart he had no control whatever. In about three quarters of an hour, however, the vital actions began to return of their own accord, and, in two hours, he was perfectly recovered. During the whole attack, sensation, thinking, and volition were perfect, and all the voluntary actions were executed with as much strength as ever.

Causes.—Angina pectoris seems to belong to no particular climate or season. It is asserted, by M. Andral, to have been seen more frequently in males than in females, and it certainly rarely occurs before the age of 40. Foundation for it would appear to have been laid by gout and rheumatism. The immediate causes are great muscular exertion—as walking rapidly up stairs or up any ascent; and, indeed, great muscular exertion of any kind; violent mental emotions, under which the individual may die suddenly, as was the case with Mr. Hunter. Whatever inordinately excites the action of the heart cannot fail to act as an immediate cause of the paroxysms.

Pathological characters.—There seem to be none that can be esteemed special. The disease has been supposed by Dr. Parry, to be dependent upon ossification of the coronary arteries of the heart; and this condition would appear to have been met with in the generality of cases; yet it is often absent when the symptoms of angina pectoris are well marked.

Various morbid appearances have been seen about the valves of the heart; adhesions of the pericardium to the organ; depositions of fat around the viscus and large vessels, &c. &c.; yet, each and all of these appearances have been found in other affections of the heart. The very nature of the disease is, indeed,—as already remarked,—a matter of dispute. To us it would seem to be seated in the nervous plexus distributed to the heart, and to be, therefore, essentially nervous. Certainly, those remedies would appear to have been most successful in the paroxysms, that act by inducing a new nervous impression. Various lesions have, doubtless, been observed on the dissection of those who have died under symptoms of angina pectoris, but it is by no means established, that these were more than complications, or concomitants. In Mr. Hunter's case, for example, the pericardium was unusually thickened; the heart itself was small, appearing too little for the cavity in which it was contained, its diminished size being the result of atrophy or wasting. The muscular

structure of the organ was pale, and of loose texture; the coronary arteries had their branches converted into long tubes, which were with difficulty divisible by the knife; and the mitral valves were much ossified. These were the main appearances. But Hunter died in his sixty-fifth year, an age at which cardiac lesions are not uncommon. Which of these appearances, or whether any, were connected with the symptoms of angina pectoris, remains a question.

On highly respectable authority, that of Professor Hosack of New York, and of Dr. Forbes, the disease has been supposed to consist in a plethoric condition, more especially of the heart and great vessels. Dr. Forbes argues, that its seat is in the heart, as well from the frequency of sudden death in the paroxysm, for which derangement of no other thoracic or abdominal organ would adequately account, as from the unquestionable frequency with which cardiac lesions are found in those who have died of it. These lesions, however, are not considered its immediate or essential cause, which, it is conceived, is more probably some unusual irritability of the nerves of the organ.

It has been affirmed by Dr. Corrigan, that several of the symptoms, which are considered to indicate the existence of angina pectoris,—such as paroxysms of dyspnoea induced by exercise, a sense of tearing asunder within the chest, together with anxiety and mental distress, may originate in aortitis or inflammation of the mouth of the aorta, which will occasionally yield, even when of rather long standing, to leeching, counter-irritation, and a mild mercurial course.

Treatment.—This must be essentially palliative. If errors in diet seem to be the cause of a paroxysm, an emetic may be administered. Revellents over the cardiac region have been serviceable. Whatever, indeed, excites a new impression is indicated; hence it is, that magnetism, applied in the form of two strongly magnetized steel plates,—the one to the left præcordial region, and the other exactly opposite, on the back,—in such manner that the magnetic current shall traverse the affected part, has been found serviceable; more so, indeed, it has been affirmed by M. Laënnec, than any other, both in relieving the paroxysm and in warding it off. When the magnet has afforded but little relief, a good effect, according to Laënnec, has followed the application of a small blister under the anterior plate. Large doses of opium have been advised, and they would doubtless be often highly valuable, as in other neuralgic affections; but to afford any great benefit they must be full. In Mr. Hunter's case, opiates are said to have aggravated the symptoms, but they were administered in small doses, which could scarcely fail to be injurious. At least two or three grains of soft opium should be given in the form of pill, or a full dose of the *tinctura opii*, associated with remedies that make a new impression on the gustatory nerves and on the nerves of the stomach.

R.—Tinct. opii.

— assafoetid. aa. f3j.

Aquæ camph. f3x. f. haustus.

To be repeated every half hour, if necessary.

All the remedies, indeed, advised in nervous palpitation, would appear to be indicated in angina pectoris.

In stout plethoric individuals, advantage has been found from the cautious use of the lancet, which unloads the heart and great vessels, and enables them to react freely on their contents. In dubious cases, recourse may be had to cupping or leeches; or, after the leeches have fallen off, cups may be placed over the leech-bites. In this way, we have a joint depleting and revellent operation.

After the paroxysm has passed off, great attention should be paid to prevent a recurrence. This must consist in avoiding the exciting causes. The diet should be carefully regulated, so that it be neither excitant by quantity nor quality. It should consist of food easy of digestion; the bowels should be kept in a regular state; and it can only be in this way that sulphur, recommended of late, (3ss.—3j. once or twice daily,) can be of service. Every physical and moral excitement, that could occasion an increased afflux of blood to the heart, should be carefully avoided. Mental emotions—being the most frequent of the excitant influences—must be scrupulously guarded against.

It need scarcely be said, that if, in the intervals, phenomena exist, which indicate that there is organic disease of the heart, they must be met by the directions given under such disease. A recent writer, Dr. Joy, affirms, that he has known a belladonna plaster over the præcordial region, renewed every week or ten days at farthest, procure very considerable alleviation of the attacks.

XV. NEURALGIA OF THE HEART.

Under the name *Neuralgia of the Heart*, an acutely painful intermittent affection of the heart has been described, which is obviously of a nervous character, and seems to differ from angina pectoris more in regard to the small number of parts, which are drawn into morbid consent with the suffering cardiac nerves, than in regard either to its nature or appropriate treatment: many writers, indeed, term angina pectoris, neuralgia of the heart. It consists in acute lancinating pain, often of great intensity, darting through the præcordium from before backwards, and emerging under the left shoulder. It is commonly confined to the heart itself, the respiratory system continuing unaffected. Those cases in which the pain extends to the left arm and side of the neck, and *a fortiori* those in which the parietes of the chest are implicated, are referred to the disease last considered. These very cases, however, which are classed under neuralgia of the heart, might be ranged under Angina Pectoris by those who consider this disease to be neuropathic. It is said to originate most frequently under the influence of long continued over-exertion of mind, or anxiety, acting on an irritable and nervous temperament, and is sometimes connected with a rheumatic or gouty tendency.

The *treatment* is essentially that adapted for angina pectoris, or rather for neuralgia in general. It is frequently very obstinate, and resists all remedies, finally yielding to some new evolution of the system with which it is incompatible.

XVI. DISPLACEMENT OF THE HEART.

SYNON. Ectopia cordis.

Occasionally, the heart is thrust out of its place by diseases of other organs—as by a copious effusion of serous fluid, blood, or air, which may force it into the right side, or farther to the left, according to the precise seat of the effusion. In the same manner, the fluid of ascites, great enlargement of the liver, or abdominal tumours, by pressing on the diaphragm, may displace the heart upwards. The heart may likewise be drawn over, in a remarkable degree, to the right side, by the absorption of fluid effused into the right pleura as the result of pleuritis.

These displacements may be detected by percussion and auscultation.

SECTION II.

DISEASES OF THE ARTERIES.

In treating of the diseases of arteries, allusion will be more especially made to the morbid conditions of the larger vessels, and especially of the aorta. The other more superficial vessels are rarely affected with disease, except as the result of external injury; and, consequently, their lesions fall under the domain of surgery. The morbid conditions of the larger arteries are of the same nature, however, as those of the smaller, and the results of the consideration of the former may, with propriety, be transferred to the latter.

All the arteries, so far as they can be traced, consist of three coats, separated from each other by the common uniting and separating tissue—the cellular. The *outermost* coat is cellular in its character; the *next* is fibrous, composed of the *tissu jaune* of the French anatomists, eminently elastic, and perhaps contractile, but not formed of muscular fibres; and the *inner* coat is of a serous character, and secretes a thin fluid, which, in health, keeps it lubricated, and thus prevents friction.

The sympathetic relations between the larger arteries and the rest of the economy are by no means intimate. They form tubes, endowed with more or less contractile and elastic property, through which the blood moves; and when any particular lesion affects them, the chief symptoms are those produced by mechanical obstruction of the circulation: there is rarely much disorder caused in other functions.

The organic lesions, to which the arteries are subject, are inflammation—acute and chronic; cartilaginous, osseous, and steatomatous formations; cysts, *ramollissement*; dilatation; contraction, &c., each of which will require a distinct consideration.

I. INFLAMMATION OF ARTERIES.

SYNON. Arteriitis, Arteritis, Inflammatio arteriarum; *Fr.* Artérite, Inflammation des artères; *Ger.* Schlagaderentzündung, Arterienentzündung.

Inflammation of the arteries is seated in the vasa vasorum or the vessels which supply the arteries with blood for their nutrition.

During the last century, the ideas of practitioners on the subject of inflammation of the inner coat of arteries were extremely vague; and if redness were perceptible, this was esteemed to be sufficient evidence of its presence. Of late years, however, experiments have been made on this subject, and the researches of various pathologists have shown, that when there is only redness without any physical alteration of the inner membrane, this may be wholly cadaveric, and simply owing to imbibition. It is constantly met with where putrefaction has commenced, as well as in those who have died from smallpox or other eruptive fever.

Diagnosis.—The arteries are by no means sensible in the healthy state; but, when affected with acute inflammation, pain is commonly present, and at times to such an extent as to lead to the belief that it is neuralgic. The pain follows the course of the aorta, if the inflammation be there, (*Aortitis, Inflammatio aortæ*; *Fr.* *Aortite, Inflammation de l'aorte*; *Ger.* *Entzündung der Aorta, Aortenentzündung*;) or the particular arterial trunk in which it may be seated. The local pulsations, at the commencement of the disease, are frequently extremely energetic, and are regarded as one of the best single signs of incipient arteriitis—the difference between the energy of the pulsations in the affected vessels and in others being marked. Where the artery can be pressed upon—as in the case of the carotid—the pain is augmented; and, at an early period of the disease, more or less rigidity of its parietes may be felt by the finger. Recently, too, it has been affirmed, that in the early period of the disease a particular *bruissement* or murmur is appreciable to the touch, but especially to the ear, aided by the stethoscope, which appears to be owing to the rugous and unpolished state of the inner membrane induced by the inflammation. It exists more especially in the large vessels, as the aorta and its principal divisions.

In a case of aortitis, in which the inflammation was limited to that vessel, the following symptoms were observed. After being exposed to cold, the patient experienced a sense of constriction in the chest, which disappeared gradually. A few days afterwards, under the influence of a moral emotion, he was attacked with considerable dyspnœa, which was intermittent, and accompanied by acute pain under the sternum. The number of the pulsations was 80 in the minute. He died in a paroxysm of dyspnœa; and, on dissection, no morbid appearances were perceptible except those of unequivocal inflammation of the aorta. In three fatal cases that have been described by M. Thierfelder, there was a very frequent and hard cough along with the other symptoms.

The same phenomena have been observed in inflammation of the pulmonary artery.

In the smaller arteries, arteriitis may end in the obliteration of the vessel, and death may supervene on spontaneous gangrene induced from this cause. It has, indeed, been presumed by M. Bérard, that acute arteriitis must always end in such obliteration; but facts, according to M. Gendrin, have not confirmed this. It can be readily understood, that if one of the arteries proceeding to an extremity be obliterated by inflammation, the limb may become atrophied; but, in other cases, the atrophy may be prevented by the collateral circulation, which is gradually established. The danger as to life from this inflammation must depend upon the importance of the vessel, and the extent of the mischief. After all, however, the disease almost always runs its course for good or for evil, without being suspected by the physician.

Causes.—Inflammation of arteries may be induced by mechanical agents,—as by ligature; but, most commonly, the disease is developed spontaneously, and under the influence of internal causes. It would seem, likewise, that the rheumatic, gouty, and syphilitic diatheses have a decided influence on its development; and certain poisons, mercury and ergot, for example,—it has been affirmed by M. Maisonneuve,—exert a like effect.

Pathological characters.—It has been already remarked, that simple redness of the inner coat of an artery is not of itself sufficient evidence of inflammation, as it may be cadaveric, and be caused by imbibition. It is always present, however, in true inflammation, but not singly. Some morbid change is to be met with in the texture of one or more of the coats of the vessel. The inner coat may have lost its polish from the arrest of the wonted secretion, and have a villous, rugous, or granular aspect. Slight excoriations, or superficial ulcerations are likewise observed here and there. At other times, the membrane is softened, and so pulpy that it can be removed by friction with the handle of a scalpel; whilst at others, again, it is thicker and firmer than usual. When the cellular tissue that separates the inner from the middle coat is infiltrated and softened, the inner coat can be more readily removed in its entire state. In addition to these appearances, plastic lymph is often found adhering to the inner coat, and this appears, at times, to have gradually augmented in quantity until the calibre of the artery has become obstructed; and, lastly, when the arteriitis is carried to a very high degree, suppuration takes place, and all the coats of the vessels may be involved. While these phenomena are taking place chiefly in the inner coat, the external coat is largely injected, and this has been esteemed, by M. Gendrin, as the very first phenomenon in arteriitis.

In the course of the inflammation, the affected vessel loses its elasticity, and under its softened condition may give way on the slightest effort.

The morbid phenomena in arteriitis have been studied on animals, and found to correspond essentially with those just described. If an artery be subjected to pressure so as to induce irritation, in ten or twelve hours a false membrane is secreted into the interior of the vessel, and the blood is found to be coagulated. If the clot and the

false membrane be removed, the inner coat is observed to be red and friable, to have lost its polish, and to present a granular appearance; but the hyperæmia is especially marked in the cellular tissue situate between the internal and the middle coat, which—as well as the cellular tissue between the middle and the outer coat—is found to be infiltrated by a reddish-coloured serum. Later on, the inner coat is more rugous, thicker, and opaque, and can be readily detached: the other two membranes are likewise more friable, and, in process of time, they form but one mass, which tears with the greatest facility.

Treatment.—Where the disease is diagnosticated, it must be treated energetically by blood-letting, repeated according to the strength of the individual. Leeches may be applied over the inflamed vessel where this is practicable, and the pain must be relieved by large doses of opium or its preparations, (two or three grains of opium in a soft pill—or 70 or 80 drops of the *tinctoria opii*—or a grain or a grain and a half of one of the salts of morphia—the acetate, the muriate, or the sulphate.) Large doses must be administered for two reasons:—in the *first* place, they relieve the pain: they must, consequently, be repeated, until the effect is induced; and, in the *second* place, they are precious sedatives, and well adapted to allay the morbid condition of the vasa vasorum, which constitutes the disease.

II. OSSIFICATION, AND OTHER MORBID FORMATIONS IN THE ARTERIES.

a. *Ossification; Artériostéie*, of Piorry.

Under the influence of chronic arteriitis—it is presumed by many, but, doubtless, often from a morbid condition of the system of nutrition of the parietes of the vessels—various morbid depositions take place in them; and among these, one of the most common is ossification, which may be seated in detached parts of the artery, or occupy its whole circumference, so as, at times, to constitute a true calcareous canal.

Diagnosis.—When the deposits are first formed, there are no symptoms, which can indicate their existence; but when the ossification has made much progress, and especially if the artery be superficial—as the radial artery at the wrist—there is the feeling of a solid cord; and the pulsations are much less distinct than in the normal condition of the vessel. When the ossification is in the deep-seated arteries, there is no sign which diagnosticates its presence. It has been affirmed, indeed, by M. Gendrin, that a murmur (*bruissement*) may be heard, which is owing to the friction of the blood against the rough parietes of the vessel. In the cases in which the more superficial arteries are ossified, ossific deposits also exist in the heart, which may give rise to the different sounds already mentioned. In a case, which recently fell under the author's care, in a man 63 years of age, and in whom the arteries of the forearm and of the thigh could be felt distinctly osseous, a strong *bruit de scie* or “saw-sound”

was heard synchronously with the first sound of the heart; which last had a ringing character, whilst the second sound was roughened.

After an artery is ossified, it is liable to become obliterated or ruptured; and in all cases, the circulation cannot fail to be retarded, by the destruction of the elastic and contractile power of the parietes of the vessel. It can be readily understood, that the lesion may give occasion to aneurisms, hyperæmiæ, and hemorrhage; and it is pretty generally thought, that the ossification of the vessels of the lower extremities is the cause of the *gangræna senilis*.

Causes.—Ossification of the arteries is a very common occurrence in old age, and has, indeed, been regarded as a part of the healthy state of the aged. Above 60 years of age, it is rare to meet with the arterial system perfectly free from ossific depositions. They have been found, however, at all ages; and it is believed, that syphilis, mercury, gout and rheumatism may favour their developement.

Pathological characters.—At first, the affected portions of the vessels are soft and easily lacerable, the morbid production seeming to be nothing more than a deposition of plastic lymph in the substance of the inner coat, or rather between it and the second. At a later period, these portions acquire a cartilaginous consistence; and at length calcareous salts are deposited, which give the appearance of bony concretions. They are not, however, real bone, appear to be possessed of no definite arrangement; have no bond of union of animal matter, and are devoid of vitality. In the case referred to above, the left ventricle was hypertrophied, and the aortic valves irregularly ossified, except at their free margins. The ossific deposits were of an irregular shape, angular, and varying in size from that of a grain of wheat, to that of a mustard seed—each valve containing fifteen or twenty. The aorta, in this case, presented a few roughened points; but the external iliacs, commencing at the bifurcation of the aorta, were ossified, the ossification extending to the termination of the arteries. This ossification was so complete as to prevent the collapse of the vessels, and to allow tubes of solid calcareous matter, half an inch in length, to be removed. The calibre of the vessels was less than usual,—the femoral artery admitting with difficulty, an ordinary silver female catheter. Commencing at the subclavian artery, the same condition existed throughout the superior extremities. The carotids were not ossified.

Treatment.—No plan, either of prevention or cure, can be suggested.

b. Morbid Formations.

Various morbid formations are met with at times, which follow nearly the same course as ossification of the arteries. Yellowish patches are occasionally found beneath the inner coat: these, when opened, discharge an *atheromatous matter*, which has been regarded, by Professor Gross, of Louisville, as tubercular,—the physical properties, mode of secretion, and final conversion into purulent fluid, marking its similarity, if not identity, with tubercular formations in other textures of the body.

At other times, morbid depositions are observed in the same situations, which are of a firmer consistence, and of a steatomatous character. Cysts, too, of the size of a walnut, and containing a reddish or blackish matter, have been met with.

c. *Ulcerations.*

Ulcerations are occasionally seen,—at times isolated, but, at others, aggregated together,—their surfaces being covered by a puriform layer. At times, it would seem, the ulcerations lead to perforation of the vessel and to fatal hemorrhage. They may, however, cicatrize: appearances, at least, of cicatrization have been perceptible, which may have been the only evidence of the previous existence of ulceration.

There are no symptoms by which these different lesions of the internal arteries can be diagnosticated, and, accordingly, it is impossible to lay down any definite plan of treatment.

III. ANEURISM.

SYNON. *Exangia aneurisma, Aneurisma, Abscessus spirituosus, Aneurysma, Aneurysm, Dilatatio arteriarum, Arteriectasis, Arterieurysma; Fr. Aneurysme, Anévrysme; Ger. Pulsadergeschwulst.*

It has been properly remarked, by Dr. Mackintosh, that there is no disease, which shows the absurdity of the division of medicine into physic and surgery more than aneurism. When it is within the reach of the knife, it is called a surgical case; if not, it is handed over to the physician.

Aneurism properly means dilatation of a vessel; but this dilatation may be variously effected. All the coats may be dilated at once, in which case we have *true aneurism*, in contradistinction to the *false aneurism*, which is owing to the giving way of the coats, and the extravasation of the blood. In *mixed aneurism*, the tumour may be formed by the dilatation of the outer coat of the artery, the inner and middle coats having experienced a solution of continuity; or it may be formed by the dilatation of the inner and middle coats, through a solution of continuity of the outer coat. Occasionally, the blood insinuates itself through a fissure of the internal and middle coats of the aorta, and forms itself a channel between the outer and middle coats. In one case, described by Mr. Shekelton, the blood, after detaching the two inner coats of the aorta, made its way again into the vessel lower down. This is what is termed *dissecting aneurism*; cases of which have been reported by Drs. Pennock, Goddard, and Washington, of this country. In all the cases, described by these gentlemen,—according to Dr. Pennock, in his excellent edition of Hope on *The Diseases of the Heart and Great Vessels*, (Philad. 1842)—the lesion was identical, and consisted in the separation of the laminæ of the middle coat by blood driven by the propulsive force of the heart through a rent caused by a laceration of the inner coat, and a partial rupture of the layers of the middle coat. “I am induced,” Dr. Pen-

noek remarks, "from the examination of these pathological specimens, and from the fact that the attachment of the external fibres of the middle coat to the cellular is much firmer than is that of the layers of the middle tunic between themselves, to believe, that dissecting aneurism, when it occurs to any extent, will be found to be *between the laminae of the middle coat*, and not between the middle and the outer coats, of the artery. An interesting history of the affection, with cases, has been published by Dr. T. B. Peacock, in the Edinburgh Medical and Surgical Journal, for Oct. 1843.

Wherever aneurismal tumours exist, they cannot fail to affect the organs in their vicinity. Their walls become gradually thicker, and they seem to be occasionally formed at the expense of the cellular texture with which they come in contact. Adhesions, too, are gradually formed, and, as the dilatation augments, pressure is made on the surrounding organs and tissues, under which they become at times inflamed: at others, the absorption of soft parts, and even of bones, is occasioned, so that an aneurism of the aorta may, in this manner, destroy the sternum. When such is the case, and the aneurismal sac loses its support, its parietes undergo morbid changes, give way, and the patient may die at once from the profuse hemorrhage; or the blood may be extravasated into a fresh cellular cavity, which sooner or later may yield likewise. In rare cases, the fibrinous coagulum, which forms in the aneurismal sac, becomes organized in its external layers, whilst the rest of the clot is absorbed; the calibre of the dilated vessel may, in this way, be diminished, and a spontaneous cure be effected.

There are but few vessels in the internal parts of the body, which are liable to aneurism, and which, consequently, fall under the attention of the physician. The thoracic and abdominal portions of the aorta are most frequently affected, and the consideration of aneurism of those vessels may be transferred to the same lesion when affecting others.

a. *Aneurism of the Aorta.*

SYNON. Aorteurysma; Fr. Anévrysme de l'Aorte, Aortiectasie, (Piorry.)

The thoracic aorta is more frequently aneurismal than the abdominal; and commonly the dilated portion is limited in extent.

Diagnosis.—In the early period of aneurism of the aorta, and when the tumour is small, there may be no symptoms to indicate its existence. This is what has been termed the latent period of the disease. Sooner or later, however, unusual pulsations are experienced in the direction of the sternum, and over the ribs, in situations where they are not perceived in health.

Attempts have recently been made by M. Piorry to diagnosticate the course of the ascending aorta and its arch, by pleximetric percussion, so as to deduce the abnormal sounds of aneurism. On applying the ear or stethoscope to the chest, along the course of the aorta, and even over the costal cartilages of the right side,—when aneurism exists, a double beat is heard, which is not very intelligible; or a

simple shock is felt. The sound is peculiar at times, but at others it is a *bruit de soufflet* or *bellows' sound*.

When the aneurism is seated in the ascending aorta, the pulsations are most perceptible at the sternum and the cartilages of the ribs; but when the descending aorta is affected, they are more perceptible along the dorsal vertebræ. When the tumour attains such a size as to press upon the pulmonary apparatus, more or less difficulty of breathing arises, which gradually increases; and when it presses on the trachea, a peculiar whistling sound is heard on inspiration and expiration, and, at times, there is a remarkable change in the character of the voice. If the tumour presses upon the œsophagus, difficulty is experienced in deglutition; and if on the veins, the return of blood to the heart is impeded, so that it accumulates in the superficial veins of the arm and chest. It can be readily understood, too, that, according to the precise seat of the disease, the pulse of the two arms may be variously affected, and that the same result may follow the pressure of the tumour on the subclavian artery, or the brachial plexus of nerves of one side.

Pain is not always a concomitant of aneurism of the aorta. At times, however, acute pain is experienced under the ribs or sternum, or in the back, whence it irradiates to every part of the thorax, and frequently, it is affirmed, this is the only symptom—neither pulsation nor tumour being perceptible; but strange pains are felt, which cannot be easily accounted for, and which may be confounded with neuralgia or rheumatism.

The author has known several cases in which the thoracic and laryngeal symptoms have caused aneurism of the aorta to be mistaken for cynanche laryngea, and the mistake has not been detected until after death.

When the aneurismal tumour becomes very large, sounds are heard on auscultation, which lead to its detection. These are pulsations, which are isochronous with those of the pulse at the wrist, but are clearly distinct from those of the heart. Occasionally, the tumour projects at the superior aperture of the chest; but, more commonly, it is first observed forming a prominence at the sides or front, pressing against the ribs or sternum, and occasioning their absorption; and, at times, disarticulating or destroying the clavicle, and projecting in the form of an irregularly shaped but acuminate tumour.

The progress of these aneurisms is usually slow, and, occasionally, they attain an enormous size. Generally, death occurs, owing to the giving way of the sac; the blood being, at times, discharged into the pericardium, but this is rare; at others, into the cavity of the pleura; or, through adhesions, into the trachea or bronchia,—the event being announced by profuse hæmoptysis; and at others, again, into the œsophagus, when the blood is discharged by vomiting.

When the aneurism has made its way externally, it commonly breaks by means of an eschar or slough; but if it give way in the chest, it is usually by a simple fissure, or by rupture. Still, there are cases in which aneurisms of the aorta have been cured spontaneously. In such cases, on examination after death, the tumour has been found

reduced to an inconsiderable size, and to be occupied by a fibrinous deposition arranged in very dense laminæ, which has obliterated the cavity of the sac. These results may have supervened either spontaneously, or under the efforts of art.

Lastly, death may occur before the rupture of the aneurismal sac, either owing to the pressure of the tumour on the œsophagus, which may prevent the necessary sustenance from being taken, or to asphyxia induced by the flattening of the trachea by it.

Such are the symptoms of aneurism of the thoracic aorta. When the *abdominal aorta* is concerned, and the aneurism is of a small size, no symptoms may indicate its presence. When larger, a tumour can at times be detected by careful examination, which affords pulsations isochronous with those of the heart, and occasionally a distinct bellows' sound may be heard. It must be borne in mind, however, that any tumour of the abdomen, which lies upon the aorta, may be the medium of communicating the pulsations of the artery to the hand placed on the abdomen. Feculent matter detained in the folds of the colon, or gas pent up in the intestine, may simulate aneurism; and excellent observers have been deceived in this way. Pulsations in the epigastrium may, also, like palpitation, be dependent upon nervous causes, and occur in paroxysms, in dyspeptic persons, from mental emotions, &c. Unusual abdominal pulsation can, therefore, only be regarded as a symptom belonging to various morbid conditions. It is sometimes the cause of great distress with thin, nervous persons, under the apprehension that it unequivocally indicates the presence of aneurism of the abdominal aorta.

As the tumour augments in size, it cannot fail to interfere with the functions of the abdominal viscera, and with the proper circulation of the blood; hence arise various dyspeptic symptoms, infiltrations into the peritoneum, lower extremities, &c. When the aneurismal tumour gives way, the blood may be poured into the cavity of the peritoneum, or, through adhesions, into the stomach or intestines.

Causes.—These are not clear. Those enumerated are,—hypertrophy of the heart; the isolation of the vessel; the frequency of accidental productions in its parietes; tight clothing; intemperance; moral emotions; and whatever augments the activity of the circulation. It is probable, however, that some nutritive change takes place in the parietes of the vessels themselves, so that they are predisposed to aneurismal dilatation; and, when this is the case, the causes, above enumerated, may act as excitants.

Treatment.—When the disease is detected, the great object must be to moderate the impulsion of the blood, and to diminish the amount of the circulating fluid. This is applicable to all aneurisms, where the object is to cause their obliteration without any surgical operation. Blood, it is presumed, may thus coagulate, and form the laminæ, before described as existing, where an aneurismal sac has become obliterated spontaneously or under the efforts of art. This plan may be carried into effect by repeated small bleedings, and a diet so restricted as to be merely adequate to the maintenance of life. It is essentially the method of Valsalva, and it affords the greatest probability of suc-

cess; yet the cures produced by it have not been numerous. The acetate of lead has been recommended as a sedative, (gr. vj. to x. in the day,) and good effects are said to have resulted from its protracted use. Dr. Joy affirms, that it has been prescribed with the view of augmenting the coagulability of the blood.

b. *Aneurism of other vessels.*

Aneurisms have been noticed in other internal vessels; for example, in the *coronary artery of the heart*. One case at least of this is recorded, in which a deep-seated pain was experienced under the sternum, which returned periodically at night, and when the patient was in the horizontal posture, and ceased when he was erect. He was able to attend to his occupations; but, one night, on retiring to rest, he experienced an acute pain in the back and in the occiput, and immediately fell dead, the artery having given way, and the blood being poured into the pericardium.

Aneurisms have also been observed in the *basilary*, the *cæliac*, the *hepatic*, *gastric*, *renal*, *mesenteric*, and other vessels of the splanchnic cavities; but their occurrence is very rare, and they afford no certain signs by which they can be diagnosticated.

IV. CONTRACTION OF THE ARTERIES.

SYNON. *Fr.* Rétrécissement ou Resserrement des Artères, Artériarctie of Piorry.

This is an uncommon affection, but it is occasionally met with congenitally; and at others as the result of disease. The aorta, for example, has been found contracted throughout its whole extent, but in other cases in a limited space only. The narrowness is, at times, so great that a common goose-quill cannot pass, or even a fine probe; and occasionally, the artery is wholly obliterated.

The causes of contraction are either chronic inflammation, or some of the morbid formations already described.

The diagnosis must necessarily be difficult. If blood cannot pass freely along the aorta, we should expect to hear the *bruit de soufflet*, and hypertrophy of the heart to supervene in consequence of the increased effort required, on the part of the left ventricle, to propel the blood. It is presumable, likewise, that the parts of the frame, seated beneath the obstacle, would at first, at all events, be less perfectly nourished, and that they might become atrophied; but a free collateral circulation may be established, and the patient survive.

The pulmonary artery, as elsewhere remarked, has been found contracted; and there is no part of the arterial system that is not liable to it.

SECTION III.

DISEASES OF THE VEINS.

The veins, like the arteries, have three coats in superposition. The *outermost* is cellular, dense, and very difficult to rupture; the *middle coat*, the proper membrane of the veins, is fibrous, but exhibits no signs of muscularity, although its chemical nature is suspected to be fibrinous. Like the middle coat of the arteries, it is considered to be formed of the *tissu jaune* of the French anatomists, is more probably gelatinous in its nature than fibrinous; and, like it, is perhaps contractile, and unquestionably elastic, but not to the same degree. It has been supposed, but on insufficient evidence, that its contractile action is one of the principal causes of the return of the blood to the heart. The *inner* coat is extremely thin and smooth, very extensible, and yet presenting considerable resistance, so that it bears a very tight ligature without being ruptured.

In many of the veins, parabolic folds or valves exist, which are intended to permit the blood to flow towards the heart, but to prevent its retrogression. They are entirely wanting, however, in the veins of the deep-seated viscera; in those of the brain and spinal marrow; of the lungs; in the vena porta; and in the veins of the kidneys, bladder and uterus; but they exist in the spermatic veins, and sometimes in the internal mammary, and in the branches of the vena azygos.

The veins, like the arteries, are nourished by *vasa vasorum*, or by small arteries, which have their accompanying veins.

The extensibility of the veins in the longitudinal direction is less than that of the arteries, whilst it is greater laterally; on this account, they more readily admit of dilatation. Dilatations or *varices* are often seen in the superficial veins of the extremities. When the integuments possess their proper degree of tone, and no impediment exists to the return of blood to the heart, these vessels may be imperceptible; but, under opposite circumstances, they dilate. The parietes of the veins are much thinner than those of the arteries; hence they are of a bluish tint during life, owing to the colour of the blood appearing through them. After death, they are whitish and translucent.

Although the same nerves—the ganglionic—are distributed to both arteries and veins, there seems to be a more intimate relation between the latter and other important parts of the system; so that when inflammation, for example, affects them, the central organs are more liable to be seriously implicated.

I. INFLAMMATION OF THE VEINS.

SYNON. Phlebitis, Inflammatio venarum; *Fr.* Phlébite, Inflammation des veines; *Ger.* Blutaderentzündung.

Inflammation of the veins has been studied more especially in recent times, and in some of its bearings—as regards the uterine veins for example—in recent times only.

Diagnosis.—The inflammation may be local, or it may be accompa-

nied by general symptoms. The phlebitis that supervenes occasionally on blood-letting affords a good example of its progress. In this case, a local pain is first experienced, with tumefaction and redness of the edges of the wound; a reddish or purulent fluid is discharged from the aperture in the vein; and the inflammation, which was restricted to the orifice, terminates either by resolution, or by the formation of a small abscess, which heals in a few days. More commonly, however, the inflammation extends along the vessel; the pain increases; the skin becomes red and tense; the course of the vein is readily determined by a red mark; and when the vessel is pressed upon, the pain is greatly augmented; and the vein is felt more or less hard, knotty, and rolling under the finger. The limb swells, and becomes œdematous; a whitish secretion covers the wound in the vein, and pus is discharged more or less copiously from it. The constitution now sympathizes; symptomatic fever arises; and death takes place—according to some, owing to the sympathetic connections between the inner membrane of the blood-vessels and the vital organs:—according to others, by a kind of poisoning from the absorption of pus. The last period of the disease is generally marked by shivering, heat, and vague pains, superficial or deep-seated, in the joints or different viscera, putting on the appearance of the erratic forms of rheumatic affections. To these succeed ataxic symptoms; and delirium supervenes, which recurs by exacerbations, or continues until the end of the disease. At other times, the patient sinks into a state of adynamia or collapse; the features become changed; the face pale, and the debility general; the tongue is at first red, but afterwards dry, and covered with a blackish fur; the abdomen is tympanitic; diarrhœa ensues; the pulse is small, quick, and frequent; copious clammy sweats bedew the surface; and there is an eruption of petechiæ, with gangrene, and subsultus tendinum, which are the precursors of a fatal termination.

When the inflammation of the veins is local, it is susceptible of cure; but when once it has become general, it defies all the resources of art. At times, a complete remission takes place in all the symptoms, and the case appears to be improved; but suddenly the febrile symptoms reappear; all the phenomena become more serious, and the patient sinks rapidly.

When phlebitis takes place in the deeper seated vessels, the diagnosis is not easy, and often it can only be suspected by the general symptoms which have been pointed out. The delirium may attract the attention of the practitioner to the head; the redness of tongue and diarrhœa to the intestines; and the erratic pains may induce the belief that the mischief is mainly rheumatic. The most careful discrimination is demanded in such cases; and, after all, the true nature of the disease may only be revealed by dissection. In a communication to the Medical Society of Riga, Dr. Stracksen gives the following symptoms as having been present in three cases of phlebitis so prominently as to warrant them, in his opinion, in being considered diagnostic of the disease:—an indescribable restlessness and anxiety, seen in scarcely any other disease to the same extent,—pulsation of

the veins and proportionately violent fever, with very frequent pulse, but softer than in arteriitis; short and painful breathing, very different from that which attends pneumonia,—the fatal termination of the disease often occurring on the fourth or sixth day, from complete disorganization and consequent loss of power of the veins.

Causes.—The causes of phlebitis are generally lesions of the inner coat of the veins; at times from mechanical injuries; at others from no assignable influence.

Pathological characters.—These may be observed in the veins in which the phlebitis commenced, or in the different organs which have become implicated secondarily. The internal coat of the vein is injected and red; but this appearance, as was remarked of the endocardium, and the lining membrane of the arteries, is equivocal; unless, on careful examination, organic changes are found to have been induced in it. When the inflammation has persisted for some time, the redness will be found to have extended to the other coats of the vessel, all of which may be thickened, softened, unusually lacerable, and readily separable from each other. Ulcerations have likewise been met with in the inner coat. Within the vessel, fibrinous clots and purulent matter, or a fluid resembling pus, have been found. Suppuration is said, indeed, to be the most common result of phlebitis, but it has been doubted by Dr. Mackintosh, whether pathologists have always been able to discriminate between pus and lymph effusion.

Obliteration of the vessel is a common sequel. At times, the course of the blood is impeded; or it may be wholly arrested by coagula which form in it. These may be redissolved, so that the course of the blood may be again rendered free; but if the inflammation be very violent, the vein may become wholly obliterated, and be converted into an impervious ligamentous cord. Of course, when this happens, there is for a time more or less interruption to the return of the blood to the heart; but this becomes sooner or later rectified.

When the inflammation of the veins affects the superficial vessels, the skin presents the same appearance as in erysipelas; but when the deep-seated vessels are concerned, it may be less coloured than natural, and œdematous. This is supposed to be the case in phlegmatia dolens, which is presumed by many to be owing to phlebitis of the large veins, that carry the blood back from the lower extremities, and consequent transudation of the watery and albuminous portions through the coats of the distended veins into the surrounding cellular tissue; hence it has been termed by Dr. Lee, *crural phlebitis*.

The morbid secretions and the modified blood—it has been conceived—by passing into the mass of blood, and vitiating it, may be the cause of the serious symptoms that arise in many cases, which, as has been shown, terminate fatally under all the symptoms of the ataxic and adynamic (typhoid) condition. It has, indeed, been maintained by M. Dance, that typhoid or malignant puerperal fever is essentially caused by uterine phlebitis and its consequences. It may admit, however, of great question, whether the typhoid condition, in such cases, be entirely owing to the admixture of pus and other matters with the blood; inasmuch as where the phlebitis remains entirely

local, and terminates in health,—notwithstanding the secretion of pus and of plastic lymph may be established in the part affected,—no such constitutional mischief arises, although these secretions must as necessarily pass along the inflamed vein, and become mixed with the general mass of blood. That the condition of the circulation is modified in some manner, however, would seem to be shown by the fact, that abscesses are apt to take place in various parts of the economy, and especially in the lungs, the parenchyma of which is often found to contain numbers of small, purulent collections; so numerous, indeed, that if the scalpel be made to penetrate any portion of the lungs, it will enter one of them.

Similar morbid collections have been found in the liver, spleen, encephalon, heart, kidneys, &c., and the most rational mode of accounting for them seems to be—that the modified condition of the blood occasions, in the tissues in which they are found, a secretion of pus, in the same manner as the blood, modified by the virus of small-pox inserted under the cuticle, gives occasion to small, purulent secretions over every part of the cutaneous surface. The notion that the pus, secreted by the vessel affected with the phlebitis, is carried along the vessels, and deposited in the parts where these purulent collections are found, can scarcely be maintained.

Besides these collections, other morbid changes, of a most serious character, are generally met with—as softening of the digestive tube, partial gangrene, different effusions, either into the splanchnic cavities or into the joints, and various other pathological changes, consequent on the extensive disorder in the solids and fluids of the whole economy. In some instances, it would seem, the eye has become disorganized, after tying the saphena, and after the inflammation and obliteration of the jugular vein, and examples of a similar disorganization, ascribed to the same cause, are recorded as having occurred in the puerperal state.

Treatment.—At the commencement, and whilst the disease is external and local, the affection is wholly surgical. General blood-letting may be needed, but this is not often the case. Leeches may be applied in the course of the inflamed vein, followed by fomentations and cataplasms, and it may be advisable to make incisions into the tense and inflamed parts. Where the pain is very violent, full doses of opiates should be administered.

To prevent the absorption of pus, which—as has been remarked—has been looked upon as the cause of the alarming symptoms, it has been proposed to compress the vein immediately above the seat of the inflammation, but this plan has not been attended with any successful results. With the same view, the vein has been divided, but not with more advantage.

When the alarming constitutional symptoms have set in, the case must be regarded as almost hopeless. The system may have to be supported by tonics; and the distress allayed by opiates. No specific plan of treatment can be laid down, however; the practitioner will have to act to the best of his judgment in the emergency.

a. *Uterine Phlebitis.*SYNON. *Phlebitis uterina*; *Fr. Phlébite utérine.*

Diagnosis.—Various phenomena have been assigned to uterine phlebitis,—a circumstance which shows, that the symptoms are equivocal. It has been affirmed, that in the first few days after delivery, and succeeding to a sudden suppression of the lochial discharge, a painful tumour is felt in the course of the veins of the ovary, [?] followed by infiltration of the lower extremities, or of one of them, with enlargement of the glands of the groin, and great pain in moving the hip joints;—that here and there, in the subcutaneous cellular tissue, or around the articulations, indolent abscesses or tumefactions occur; and that, sooner or later, these local symptoms are followed by delirium, irregular chills, and by the general symptoms already pointed out as indicating that the mischief has extended to the whole economy. By others, it is affirmed, that the uterus is enlarged in the first place, and gives rise to a hard, roundish, and considerable tumour, extremely painful on pressure; the lochia being, at times, diminished, and at others suspended, and a purulent, thick, whitish, or sanious, and commonly fetid matter flowing in their stead; that whilst the disease is limited to the veins of the uterus, the fever is not high, and the general phenomena are by no means marked; but as soon as the inflammation extends, either to the veins of the ovary, or to the other veins of the abdomen, the symptoms denoting the typhoid stage of phlebitis declare themselves. None of these symptoms can be regarded as pathognomonic of uterine phlebitis; and the fact would seem to be, that it may occur at first without any local pain, or other symptoms to indicate its existence, and may be limited, for a time, to the veins affected, in the same manner as in ordinary phlebitis from bleeding. In some cases, however, it rapidly implicates different veins,—the uterine, the spermatic and the renal; and in one case, described by Dr. Robt. Lee, in which the disease proved fatal on the evening of the fifth day after delivery, all these veins were found to be disorganized.

When the veins of the uterus are alone inflamed, the peritoneal and muscular coats being unaffected, there may be either no pain or merely a dull pain with a sense of weight in the region of the uterus, and no local symptom by which the disease can be detected. The uterus, too, may return to its proper size or nearly so, and it is only on the accession of the constitutional symptoms;—rigors, prostration of strength, rapid, feeble pulse, low, wandering delirium, attacks of vomiting and diarrhœa, with brown parched tongue; and ultimately rapid and destructive inflammation of the eyes, and purulent deposits in the substance of the lungs, that the existence of this insidious and dangerous affection can be determined. As to the lochial discharge, much difference of sentiment exists. The opinions of Rostan and Andral have been already given. According to Dr. Lee, it has sometimes been observed to be fetid and puriform, and, at others in a perfectly natural state; and where the lochia were offen-

sive, this, in every case, appeared to be a consequence, and not a cause of the uterine disease.

When phlebitis is restricted to the veins of the uterus, it may, if suspected, be treated successfully, like ordinary phlebitis, by antiphlogistics; but if it spread so as to affect the system, it is of as unfavourable prognosis as any similar form of phlebitis. Generally, it soon terminates fatally, but there have been cases in which the patient has lived as long as four months after delivery.

Causes.—Uterine phlebitis is chiefly met with after delivery; but it sometimes results from the ligature of uterine polypus, and from metritis. Laborious labours have been ranked among the most common causes, but this is not a settled point. The disease is certainly observed after natural labours: it would appear, too, to be remotely dependent upon epidemic influence in many cases; and by some it has been even ascribed to contagious miasmata.

Pathological characters.—The size of the uterus may be natural; but generally it is larger than it ought to be. At times, its cavity is lined by a grayish layer; and at others by a sanious and fetid secretion. Its parietes are thickened, softened, and occasionally of a blackish colour. The veins of the parietes of the organ are tortuous; their inner coat covered with a layer of plastic lymph; or the interior filled with a purulent fluid. The disease may be found to have extended to the ovarian, hypogastric, and more distant veins; and, as in the case of phlebitis in general, purulent depositions may be found in different viscera, with redness and softening of the digestive mucous membrane, extensive suppuration about the articulations, &c.

Treatment.—As has already been remarked, the symptoms of uterine phlebitis are equivocal; and, consequently, the disease is not detected in the first instance. The early symptoms may, however, suggest the application of leeches to the hypogastrium; but it does not appear, that we are in possession of any remedial agency, which can effectually control the disease, when once it has extended so as to affect the general system. Some, however, are satisfied, that mercury, employed in the worst cases, even so far as to excite salivation, is a powerful remedy. It would certainly be important, in all the varieties of inflammation that affect the deeper-seated structures of the uterus, to induce a new action in the system as speedily as practicable, and no agent can do this so effectually as mercury. Should it fail, the case must be regarded as sufficiently hopeless. It has, however, been employed, in several cases of uterine phlebitis, to bring the system speedily under its influence, yet the progress of the disease was not arrested, and the patients died, as others had done, to whom mercury had not been administered.

In the latter stage, the great depression of the powers of the system suggests the cautious use of stimulants, of which wine, in the form of wine whey, is perhaps as efficient as any that can be given. In all such cases, it is proper to afford a certain degree of support; but to be careful not to administer diffusible stimulants too freely, as they may exhaust the excitability, and thus be productive of more rapidly fatal consequences.

b. *Crural Phlebitis.*

SYNON. Phlegmatia dolens, Ph. lactea, Ph. alba dolens puerperarum, Anasarca serosa, Ecphyma œdematicum, Ecchymoma lymphatica, Ischias à sparganosi, Sparganosis puerperarum, Leucophlegmasia dolens puerperarum, Œdema puerperarum, Œ. lacteum, Sceloneus dolens puerperarum, White leg, Swelled Leg, White swelling of lying-in Women; *Fr.* Dépôt laiteux sur la cuisse, Enflure des jambes et des cuisses de la femme accouchée, Engorgement des membres abdominaux à la suite des couches; *Ger.* Weisse Schenkelgeschwulst der Wöchnerinnen.

The nature of this affection, to which lying-in women are almost solely liable, has been a topic of contention among pathologists; and it is only of late years, that the majority of observers have agreed to refer it to the head of crural phlebitis, to which it would appear to belong.

Diagnosis.—At a longer or shorter period after delivery, but generally within the month, pain or some degree of uneasiness is felt in the hypogastric, lumbar, or inguinal region, with slight fulness at the upper part of the thigh, which increases and extends downwards so as to implicate the labium of the same side. Generally, the enlargement of the limb takes place gradually, but at times it attains twice the size of the other in the course of 30 hours from the first feeling of uneasiness. Commonly, two or three days elapse before it reaches its greatest dimensions.

The limb is found to be tense, somewhat elastic, of a white colour, shining, hot, and extremely painful—particularly on pressure, or on motion, so that the patient can obtain no rest. Generally, the disease is confined to one extremity. It rarely happens, that both sides are affected simultaneously; but, occasionally, after the affection has left one limb, it attacks the other. The swelling has, at times, appeared as early as 24 hours after delivery, and at others, not till five weeks afterwards. The accompanying fever, which is of a hectic character, usually declines at the end of a fortnight, or three weeks; but in some cases it runs on for six or eight weeks, and the patient becomes greatly emaciated. The first appearance of improvement generally occurs in the part where the affection commenced—in the groin;—the pain and tumour gradually subsiding. The amendment is progressive, but very slow; and, in many cases, the limb continues weak, and remains through life larger than its fellow.

Crural phlebitis occurs also during pregnancy; it has been seen in the unmarried and unimpregnated female, and it does not seem to be confined even to the female sex. It appears to attack lying-in women under all circumstances; occurs in all seasons and situations, and has never been observed in any other part of the body than the lower extremities. It takes place, too, in all conditions of the lochial and lacteal secretion.

Causes.—These will be best understood by a consideration of the

Pathological characters.—The irrational views at one time embraced regarding the nature of phlegmatia dolens are sufficiently shown by the names *œdema lacteum*, *dépôt laiteux*, and *phlegmasia lactea* once appropriated to it, which indicate, that the disease has been conceived to be owing to a translation of the milk, which was imagined to be infiltrated into the limb, and to account for the whiteness and other

characters of the swelling. After this, the affection was generally referred to some morbid condition of the lymphatics of the diseased side; but the supporters of this doctrine differed as to the precise nature of such morbid condition. The view of Dr. Marshall Hall has been most commonly embraced—that there is lymphatic inflammation, *lymphangeitis* or *angeioleucitis*, accompanied by an effusion of coagulable lymph—not an effusion of the lymph of the lymphatics by a rupture of their coats, as imagined by some.

In the year 1823, M. Bouillaud of Paris, and Professor D. Davis of the London University, first drew the attention of the profession to the fact of crural phlebitis being present in those cases. In a fatal case, that occurred in Dr. Davis's practice, the dissection of which was made by Mr. Lawrence, no distended lymphatics or diseased lymphatic glands were found, but the crural vein was diseased, thickened, and its cavity obliterated by an organized coagulum, and a matter which appeared like pus. Since that period many observations of fatal cases have been made, which have appeared to confirm the view of Dr. Davis.

A similar affection appears to have been induced in the male by tying the saphena vein for the cure of varix. All the phenomena of phlegmatia dolens supervened. The man recovered. An analogous case from tying the same vessel occurred to Sir A. Cooper. A male patient, according to Dr. Mackintosh, was operated on in the Westminster Hospital; phlegmatia dolens took place in the other limb, and after death the disease was traced from the vein of the stump, which became inflamed soon after the operation. The disease ascended along the vessels so as to affect the iliac portion. After reaching the bifurcation of the vena cava, the inflammation extended down the iliac vein on the opposite side, which was found thickened, and contained the kind of plug observed in Dr. Davis's case.

In crural phlebitis, occurring in women not in the puerperal state, the disease appears to have arisen from suppressed menstruation, malignant ulceration of the os and cervix uteri, as well as from other organic affections of the uterine apparatus. It is affirmed, too, by Dr. Lee, that the disease has occurred in the male, commencing either in the hemorrhoidal, vesical, or some other branch of the internal iliac veins, in consequence of inflammation or organic changes of structure in one or more of the pelvic viscera, but most frequently excited in the superficial veins of the leg, whence the mischief extends upwards so as to involve the great venous trunks of the thigh and pelvis.

It would seem, consequently, that all the phenomena of phlegmatia dolens may be produced by inflammation of the large veins of the pelvis, which are concerned in returning the blood from the pelvic extremities; the inflammation giving rise to obstructed circulation, and to the effusion of the watery parts of the blood through the parietes of the veins, or to a secretion of sero-albuminous fluid, which occasions the tumefaction, &c. of the limb. At the same time, it must be admitted, that this condition of the venous system may not be the only cause; and perhaps it may be occasionally induced by the condition of the lymphatics. The opinion of M. Velpeau, recently ex-

pressed before the *Académie Royale de Médecine* of Paris, is, that the disease most frequently commences by an inflammation of the deep-seated lymphatics of the limb in which the œdema occurs; and on the same occasion M. Andral stated, that in certain cases he had verified the cause to be inflammation of the lymphatics; but the œdema from such a cause was slight. On the contrary, when phlebitis was present, the œdema was considerable, and the pain acute. In the great majority of cases, the painful engorgement was owing to the obliteration of veins previously inflamed.

Treatment.—At one time, repeated and copious bleedings were highly recommended, and there may be cases in which general blood-letting may be serviceable; but, in by far the majority of cases, it will be sufficient to employ topical blood-letting, and in many cases there is so little vascular excitement, and, at times,—on the other hand,—so much prostration of strength, that the abstraction of blood from the general system is a very questionable remedy. Whenever fulness, with pain augmented by pressure, is experienced in the inguinal region, with incipient tumefaction, two or three dozen leeches should be applied above and below Poupart's ligament, and the bleeding may be encouraged by warm fomentations, or the application of a warm bread and water poultice, over the leech-bites, which acts as a fomentation. Should the pain not be decidedly relieved, the application of leeches may be repeated, and in numbers proportionate to the intensity of the disease, and the evidences of vascular excitement; and this may be over and over again necessary, should the symptoms demand it.

The contra-stimulant use of tartarized antimony has been advised, where the necessary tolerance exists;* but should vomiting follow each dose, it must be discontinued.

* R.—Antim. et potass. tart. gr. xij.
Mucilag. acaciæ f 3iij.
Aquæ, f 3vj.—M.

Dose, a tablespoonful, every two hours.

In contra-stimulant doses, it has been regarded as a powerful means of saving blood-letting. Where the necessary tolerance does not exist, the antimony may be given according to the form prescribed above, diminishing the quantity of the tartrate in the mixture to two grains, until its nauseant effects are exerted.

The use of digitalis* is said to have been followed by good results, yet the testimony of some observers would not induce us to expect much from it, either in uterine or crural phlebitis.

* R.—Tinct. digit. gtt. xxx.
Mucilag. acaciæ, f 3iij.
Aquæ, f 3ivss.—M.

Dose, one-third, three times a day.

The employment of mercury as a revellent has been advised, and especially calomel combined with opium. As the bowels are often disordered, no better remedy can be suggested; and the revellent operation of the mercurial can scarcely fail to be beneficial; whilst the opium relieves the pain.

R.—Hydrarg. chlorid. mit. gr. j.
 Pulv. ipecac. comp. gr. vj.—M. et divide in pil. ij.
 A dose, night and morning.

Should the mercury excite the slightest action on the mouth, it must be discontinued, and relief from pain be obtained by the opiate singly.

As to the local applications to the limb,—during the early period of the disease, they may consist—as before remarked—of warm fomentations; but some derive more advantage from the use of cold, or a tepid evaporating lotion.

R.—Alcohol.
 Liq. ammon. acet.
 Aquæ, aa f3iv.—M.

When the active stage has passed away, and the limb remains tumefied, great uneasiness may still be experienced from congestion of blood in the veins, which may be relieved by the application of leeches. In those cases of phlegmatia dolens, that are unquestionably crural phlebitis, no remedies can afford entire relief, until the collateral circulation is established. Prior to this, according to Dr. Lee, mischief has been found to result from too early recourse to remedies intended to promote the absorption of the effused fluid. When there is reason to believe, that this is accomplished, blisters may be applied so as to occupy both the lower part of the abdomen and the upper part of the thigh; protracted frictions, too, may be used either with the hand, dipped occasionally in flour to prevent abrasion, or with a stimulating liniment.

R.—Linim. ammon. mit. f3iss.
 Tinct. opii, f3ss.—M. or
 R.—Linim. saponis, f3j.
 Tinct. cantharid.
 ——— opii, aa f3ij.—M.

Mercurial ointment, and an ointment of the iodide of potassium, have been recommended by some; but they have not seemed to be more efficacious than ordinary counter-irritants.

It is at this latter period of the disease, that bandages, carefully applied over the whole limb, afford essential relief, by supporting the distended integuments, and favouring the absorption of the effused fluid.

In the early period, the diet must be that adapted for febrile and inflammatory diseases in general; but, in the latter stages, one more generous may be permitted. The preparations of the farinacea,—as arrow-root, sago, &c. with milk,—may be allowed throughout.

The debility, which is left in the limb, must be met by a perseverance in frictions, sea-bathing, change of air, and every means that can improve the general health.

II. ULCERATION, PERFORATION, DILATATION, OBLITERATION, OSSIFICATION, &c. OF VEINS.

The veins are liable to the same lesions as the arteries, but, with the exception of dilatation, and perhaps obliteration, to a less degree. Some of these are the results of previous inflammation; but others may occur independently.

a. *Ulceration and perforation of veins.*—Mention has been made of suppuration as a consequence not only of ordinary phlebitis, but also of uterine phlebitis.. Ulceration is another of its sequelæ. It begins in one or more points of the lining membrane, whence it may extend to the other coats, so as to cause perforation and copious effusion of blood,—the more serious according to the size of the vessel, and the part of the body in which it is situate.

Ulceration and perforation are rarely perhaps the cause of hemorrhage. Pathological observations show—as elsewhere remarked—that in the most violent cases of hemorrhage, the vessels are not often ruptured. Congestion has occurred in the vein; its parietes have perhaps become softened; and under these combined causes, if the circulation be suddenly and inordinately excited, transudation of blood takes place from the interior to the exterior of the vessel.

b. *Dilatation of veins.*—Of this we have striking examples in the veins of the lower extremities and the testicles;—constituting the surgical diseases of *Varix*—the *Phlébectasie*, of Piorry—and *Varicocele*. Occasionally, they are observed in an over-dilated condition in other parts of the body. Constant standing or active exertion in the upright posture; and, in females, the pregnant condition, which prevents the ready return of blood by the veins of the lower extremities, may give occasion to this morbid condition. Under the circumstances last mentioned, the author has seen the distension, and the impediment to the return of the blood so considerable, that the varicose vessel has given way, and the life of the patient has been threatened from the hemorrhage. There is great reason for the belief, that over-dilatation of the vessels of the portal system is induced, at times, by disease of the liver, which prevents the free circulation of the portal blood in that viscus; the consequence is, that the portal veins may become distended to their radicles in the stomach and intestines, and hæmatemesis or melæna be the result; or transudation of the watery portion of the blood may take place through the parietes of the distended veins, so as to cause ascites or dropsy of the peritoneum.

c. *Obliteration of veins, Phlébectiarctie*, of Piorry.—It has been already remarked, that this, also, may be, and commonly is, the result of phlebitis. The inflamed sides of the veins may unite together, or they may be obstructed by fibrinous or other concretions. Numerous cases of obliteration of even the large veins—as the vena porta and even the vena cava—are on record; yet the mischief has not been diagnosticated during life. In a case, which fell under the author's care, and in which the prominent symptoms were those of jaundice, the vena porta, at its bifurcation, was found to be completely filled with encephaloid matter, so that no blood could pass through it to the liver.

The jugular veins have been found obliterated on dissection, yet no symptoms have indicated the lesion during life. This is owing to the collateral circulation being, in general, speedily established. In other cases, however, the phenomena, referred to under the last head, present themselves.

Obliteration of the vena cava and of the portal vein gives rise to

ascites; whilst obliteration of the veins proceeding from the extremities occasions œdema of the corresponding limb.

d. *Ossification, &c. of veins.*—Calcareous depositions have been observed in the parietes of the veins, but not so frequently as in those of the arteries. Loose concretions have likewise been occasionally met with. These have been termed *phlébolites* or “vein-stones.” They vary in size, are of a yellowish, brownish or bluish colour, and of a hard brittle consistence. They vary likewise in number; at times, being solitary, or rarely more than two or three. They are most frequently, perhaps, found in the pelvic veins. Like other calcareous concretions, they are composed chiefly of phosphate and carbonate of lime, and would seem to be deposited from the blood.

Treatment.—As these various affections of the internal veins cannot be diagnosticated during life, it is impossible to lay down any definite plan of treatment. The indications must be formed from the symptoms,—bearing in mind, that certain of the phenomena, which are common to different morbid conditions, may be owing to one of these lesions. When they occur in vessels that are external, they fall under the domain of surgery.

SECTION IV.

DISEASES OF THE INTERMEDIATE OR CAPILLARY VESSELS.

The capillary, or intermediate system of vessels is most important in both its physiological and pathological relations. It is between the part of the artery that ceases to be visible, and the earliest perceptible radicle of the corresponding vein, that the change from arterial into venous blood occurs,—a change which marks the nutritive action that has been exerted upon the blood, and at the same time exhibits the important agency of the capillary vessels. On the precise anatomical arrangement of those vessels, obscurity still exists. The author has elsewhere (*Human Physiology*, 5th edit. ii. 80, Philad. 1844) expressed the opinion, that some of the arteries proceed, by continuity of vessel, to open themselves into corresponding veins; but that others, perhaps, pour their blood into a spongy tissue, as a river pours its water into a marsh, from which corresponding veins arise;—that, in other words, in the very intimate tissue of organs, the vessels cease to have coats, so that when the blood comes in contact with those tissues, an affinity is exerted, under the influence of vitality,—the blood parting with certain of its elements, to be inservient to the nutrition of the tissues, and the tissues themselves rendering up to the blood matters which have to be eliminated. Without such an arrangement of the minute arteries and veins, it is difficult to understand how the nutrition of the tissues could be accomplished. The idea of pores in the sides of vessels has, indeed, been entertained, but it would be difficult to understand how the various heterogeneous substances could, in this manner, be separated from the blood.

In passing through this extremely minute capillary or intermediate

system, it is easy to comprehend how obstructions may arise, and these obstructions are the source of many of those phlegmasiæ of the different organs described in this work. In different experiments, that have been made by injecting coarsely powdered and oleaginous substances into the blood-vessels, the mischief has arisen from the very minute vessels having been clogged up by the matter of the injection. It would appear, too, that if the blood be greatly deprived of its fibrin, it escapes from the vessels, and is the source of a different kind of obstruction, but quite as real as in the former case.

It has been a question with physiologists, whether there be any action of the capillaries distinct from that of the heart. Whilst some are of the former opinion, there are others who still embrace the latter. It appears to us, however, that the phenomena of inflammation are sufficient evidences of independent action of those vessels; but if this be doubted, it must certainly be admitted, that the greater or less activity of nutrition in a tissue must influence the quantity of blood sent to it. In other words, nutritive irritation may exist, which demands a greater supply of blood—the pabulum of all nutrition. In like manner, any source of irritation—as will be seen presently—is the source of a greater afflux of blood to the capillary vessels, which may thus become over-distended and obstructed, and be the cause of excitement or increased action in the vessels that communicate with the over-distended and obstructed capillaries.

Perhaps, in strictness of classification, most diseases ought to be ranged under diseases of the capillary vessels. Certainly, there is no spontaneous morbid condition of any tissue in which they are not the parts implicated. A different classification has been adopted in this work, for convenience of description; and it would, perhaps, be impracticable to form any satisfactory arrangement on the other basis. Hyperæmia and inflammation belong, however, so essentially to the capillaries, wheresoever situate, that it is desirable to treat of them generally in this place. The hyperæmiæ and phlegmasiæ of special organs are referred to elsewhere.

I. HYPERÆMIA.

SYNON. Hyperhæmatis, Hyperhæmia, Congestion; *Fr.* Hyperémie, Angiohémie, (*Piorry*;) *Ger.* Blutanhaufung, Blutüberfluss.

The term *hyperæmia* has been introduced into modern medical terminology, to signify an accumulation of blood in the capillary or intermediate vessels; as *polyæmia* signifies general plethora, or fulness of blood in the general system. Pathologically, it has been employed by a distinguished modern pathologist, M. Andral, to include inflammation,—a term which, he remarks, “has become so vague, and its interpretation so arbitrary, that it has, in reality, lost all value, and is like an old coin with the stamp effaced, which ought to be thrown out of circulation, as it can only cause error and confusion.” “Inflammation,” he adds, “can no longer be regarded as the expression of a complex phenomenon, which comprises several other phenomena, whose dependence is neither necessary nor constant.” In the sense in which the term is used in this work, it signifies simply—an

increased quantity or congestion of blood in the capillary vessels, no matter on what cause dependent.

The term *congestion* has been long employed in medical language without any definite ideas being attached to it, and we daily hear of congestions of several of the internal organs, without that precision of thought which ought to prevail with the well-informed pathologist. It is a kind of cabalistic expression, which is, nevertheless, received, in too many cases, as an evidence, that the speaker is acquainted with the pathological condition of the organ to which it is applied. It is obvious, that in order for engorgement or congestion of vessels to take place, at least two opposite states may exist;—either the arteries may carry to the affected capillaries the blood in too large quantity, or the action of the veins—the vessels of return—may be impeded. In either case, hyperæmia is induced; but, in one case, it is the hyperæmia of activity, and in the other of inaction; and the remedy indicated can be by no means the same in both cases. The author well recollects the confusion into which a respected friend, who had not thought profoundly on this matter, was thrown, on the occasion of a discussion before a medical society on the then especially interesting subject of cholera, by a question, in relation to this matter, innocently put to him. After an examination of many of the views that had been promulgated on the subject, the speaker expressed his decided opinion, that the pathology of cholera consisted in a congested state of the gastro-enteric mucous membrane. The author inquired, for his own information, whether by congestion, in this case, it were meant that the blood was sent in too great activity and quantity to the membrane, or that the engorgement of the capillaries was owing to diminished action on the part of the veins. His friend was unable to reply; and exhibited so much embarrassment and confusion, as to show very clearly, that the term had been used by him—in the manner in which it is too frequently used—without any definite meaning.

It need scarcely be said, that the second form of congestion, described above, is what is usually termed *venous*, a pathological condition which has given rise to much discussion at all periods.

The divisions of hyperæmia that have been made by M. Andral, are as follows:—1. Hyperæmia by irritation, active or *sthenic*. 2. Hyperæmia from defective tonicity of the capillary vessels, passive or *asthenic*; 3. Hyperæmia owing to obstacle in the venous circulation, or *mechanical*; and 4. Hyperæmia, which does not take place until after death, or *cadaveric*. Under the two first divisions he includes sthenic and asthenic inflammation, as they have been occasionally termed. The consideration of these will fall under the next head. It may be remarked, however, that although—as will be seen—hyperæmia must be regarded as a concomitant of all inflammations; it may exist independently of any inflammation; and hence, in the course of this work, hyperæmia of an organ is treated separately, and distinctly from the phlegmasia or inflammation of the same. It rarely, perhaps, happens, that active hyperæmia occurs, without the phenomena of inflammation following, and the same may be

said of passive or asthenic hyperæmia, especially if seated in parts where the vessels are but loosely protected, as in the mucous membranes. "Sthenic hyperæmia," says the writer just cited,— "is one of the degrees of what is called *Inflammation*: it is one of the elements of this complex phenomenon. Asthenic hyperæmia, regarded in its nature and causes, is entirely different. It approximates the condition, which has long been designated asthenic *inflammation*, an expression which ought to be discarded, inasmuch as *inflammation*, and *asthenia* imply a contradiction." M. Andral properly adds, however, that the expression was probably first embraced, in consequence of their being morbid states, which yield to a more or less stimulating system of medication; although, as regards the anatomical characters, these states are exactly like others, which cannot be combated successfully except by antiphlogistics.

In all cases of augmented secretion from an organ, or of increased nutrition in any part of the economy, there is a greater afflux of blood to the vessel concerned, and a consequent congestion or hyperæmia. This, however, may be healthy; but the hyperæmia—now under consideration—exceeds the healthy limits, and gives rise to local disturbance of function. It is easy to see, however, that any inordinate augmentation of the natural secretory or nutritive action may give rise to morbid phenomena. In like manner, passive congestions may take place, which may interfere little or not at all with the healthy actions—as where mechanical pressure is made, which impedes or prevents the return of the blood to the heart; and it is a wise provision, that the effects of such retardation are devoid of injury when within certain limits; and that morbid congestions do not often result from such pressure, in consequence of the numerous anastomoses between the different veins. When, however, congestions occur that are unquestionably morbid, they give rise to phenomena, which are not always easy of appreciation.

Diagnosis.—Where the parts are visible, the evidences of hyperæmia can be readily appreciated: there is redness of various shades, according to the greater or less activity of the congestion. Inflammation of the fauces, in its early stage, exhibits these various appearances, according to the character of the inflammation. When very active, the parts are of a vivid red; when more of the asthenic form, they are dusky; and vessels of a larger size containing black blood, may be seen distributed over the mucous membrane. That, which applies to inflammation of those parts, applies equally to the stage of hyperæmia, which precedes the inflammation. Along with the red colour, there is always more or less tumefaction, owing to the engorgement of the capillaries.

When the hyperæmia concerns deep-seated parts, it may be impracticable to detect it, except by a process of reasoning founded on the derangement of function induced by it. In all cases, there is tumefaction; it is, indeed, impossible, to conceive the existence of an increased quantity of blood in the capillaries of an organ, without there being increased size of the organ; yet in many of the internal organs—the encephalon and lungs for example—this cannot be de-

ected by any external examination. In others,—as the liver and spleen,—it may be discovered where the congestion is considerable.

The diagnosis of internal hyperæmia being chiefly dependent upon the disorder of function of the organ implicated, it must obviously be obscure. There is not, indeed, any functional phenomenon, which can be esteemed pathognomonic, and it is owing to this very obscurity, that the unreflecting pathologist finds it easier to invoke the existence of congestion in a difficult case, than by laborious investigation to endeavour to detect the true pathological condition.

A recent writer, Dr. Macrobin, gives the following as the most prominent of the symptoms of local congestion:—sensations of chilliness, languor, depression of spirits, lassitude, and sense of muscular debility, coldness of the extremities, with occasional paroxysms of excitement of the heart and arteries, assuming, at times, the form of an irregular and imperfectly developed pyrexia: but none of these symptoms are distinctive, and they may be all present in disordered conditions of internal organs, which may partake more of inflammation than of congestion. It is, indeed, impracticable to distinguish between the two conditions in many cases.

The terminations of congestion are more interesting to the pathologist than the congestion itself. It is a precursor—as has been shown—of inflammation in almost all, if not in all, cases. It is easy to see, also, that distension of capillary vessels cannot continue in any organ, without materially interfering with its functions; and in some cases, without abolishing them—for a time or permanently—as in the case of apoplexy induced by hyperæmia of the encephalic vessels. When to a less extent in these vessels, epilepsy, mania, &c., may be the resulting affections. In other cases, the hyperæmic state of the vessels may lead to an augmentation of the secretions; whilst in others, again, the secretions may be for a time diminished or arrested, and subsequently greatly increased. It can be equally understood, that the hyperæmia may be the source of nutritive irritation in the organ, so that hypertrophy, either of the natural structure of the organ or of a morbid kind, may be induced; and, lastly, in constitutions predisposed to such formations, tubercles or some of the other heterologous tissues may be developed.

Causes.—Polyæmia or fulness of blood is generally considered an important predisponent cause of hyperæmia, and it doubtless may be so. In such a condition of vessels, any source of irritation occasions a ready afflux of blood into the capillaries, which generally lays the foundation for inflammation. The opposite condition of paucity or unusual thinness of blood equally, however, predisposes to it. The great liability to this pathological state in anæmia demands, indeed, the most watchful care on the part of the practitioner.

In proportion as the blood is diminished in quantity, or loses its healthy proportion of solid constituents, the impressibility of the frame becomes augmented, and irregularities of circulation are apt to supervene, which give occasion to hyperæmia. This is well exhibited in cases of uterine hemorrhage. After the patient has been rendered almost exanguinous, reaction takes place, and in the course of a few

hours, the practitioner may be called to relieve phenomena that indicate hyperæmia of the encephalon,—as throbbing of the carotid and temporal arteries, intense cephalalgia, accompanied by suffusion of the face, and every evidence of active congestion, or what is often called *determination of blood to the head*. This pathological state has been induced in the mode just described: under the inordinate loss of blood, the nervous impressibility becomes irregularly developed; and, in the case in question, affects the vessels of the encephalon most prominently. The consequence is—hyperæmia of those vessels, which is not to be removed by farther abstraction of blood, but by sedatives,—such as opium,—which will allay the impressibility, and exert an equalizing and soothing operation.

That, which applies to uterine hemorrhage and its sequelæ, applies equally to loss of blood howsoever induced; and, hence, the well-informed therapist, whilst he reduces the amount of the stimulus or of the blood, where such reduction is indicated, is careful not to carry it to such an extent as to develope nervous impressibility, but rather to combine with the blood-letting sedative agents, which are adapted both for allaying vascular excitement and suppressing nervous erethism.

The ordinary causes of inflammation are of course causes of hyperæmia, which—as has been seen—is the precursor of inflammation; hence irritants of all kinds are concerned in the etiology of both. A sedentary life, especially if the individual indulge too much in diet improper by quantity or by quality; perhaps, even, the constant retention of the same position of body, may interfere with the general distribution of the blood, and cause its accumulation in particular parts. It is well known, that fistula in ano is so common amongst tailors, that they have, in London, a fistula club. This is, doubtless, owing to the capillary circulation of the part being modified by constant pressure, and continuance in the same sedentary posture. All impediments to the circulation of the blood in internal organs are causes of hyperæmia; hence it is, that induration of the liver is so frequent a cause of congestion of the portal vessels, and, consequently, of ascites, or hæmatemesis; and that hæmoptysis is a common result of tuberculous formations in the lungs.

Hyperæmia generally takes place very readily, where the vessels are loosely protected by the parts in which they creep; and which, consequently, allow the vessels to become readily distended when any source of irritation gives occasion to greater afflux of blood to them by the arteries, or any cause prevents the ready return of the blood by the veins. The mucous membranes are, accordingly, frequent seats of hyperæmia and hemorrhage. The lungs, brain, uterus and kidneys, which receive a large quantity of blood, are likewise liable to hyperæmia under favouring causes.

Pathological characters.—The evidences of hyperæmia on dissection may be null, and yet it may nevertheless have existed during life; and, on the other hand, hyperæmia may be clearly apparent, which may have taken place at the time of dissolution, and even afterwards. Hence it is, that its signs during life cannot be determined with any

thing like certainty; and hence, also, the encouragement for invoking this pathological condition in obscure cases.

Where simple hyperæmia exists during life, unaccompanied by inflammation, the capillary vessels may be empty after death, so that the morbid condition may not be perceptible; and, on the other hand, during the last movements of the circulating fluid, accumulations may take place in depending parts of the body, which can, in no respect be esteemed morbid. This *hypostatic* hyperæmia is observed in depending portions of the body; and it is equally observed in the internal viscera; the lowest portions of which may exhibit a congested state of the vessels, whilst the upper are comparatively devoid of blood. This is well seen in the lungs and intestines.

The kind of death has likewise a marked influence in the production of hyperæmia. Thus, where death has taken place—as in asphyxia—from nonconversion of venous into arterial blood, and consequent stagnation in the pulmonary radicles, the right side of the heart, and the vessels communicating with it, are engorged with blood, and the evidences of it are marked on dissection.

Where the hyperæmia has been accompanied by inflammation, the appearances—as will be seen hereafter—are less equivocal: generally, they cannot be mistaken; but in simple hyperæmia—considered to be such during life—the evidence may be by no means satisfactory.

Dr. Macrobin affirms, that the evidence of the existence of an actual and pathological congestion as derived from *post mortem* examination can only be satisfactory under the following circumstances—many of which apply equally to inflammation:—*First.* The appearance of an increased vascularity and redness is not altogether confined to depending situations; but when, on the contrary, the minute arteries and capillaries of the superior and least dependent portions of a membrane or organ are found highly injected; for example, the edges of the upper surface of the lungs, the superior part of the gastro-intestinal mucous membranes, or of the membranes investing the anterior and superior portions of the brain. *Secondly.* When the vascularity is not limited to veins, or to branches of arteries whose diameter in the natural state might be considered of sufficient size to circulate red blood; but where, on the contrary, the very minute and delicate colourless vessels are found penetrated with red blood. *Thirdly.* When the redness is of the florid or arterial hue rather than of the dark venous shade—the latter being more characteristic of turgescence of the venous system; that is, of a congestion which is the consequence of a stasis of the blood from the force of gravitation, or from a mechanical obstruction to the circulation, (the simple *hypostatic* and *mechanical* congestions.) *Fourthly.* When, in the absence of any unusual vascularity or injection of the capillary vessels of a part, there is found to be a more than ordinary quantity of a serous or bloody fluid deposited. *Fifthly.* When, looking to the posture of the body generally, and of the different viscera in particular, as well before as after death, there is no ground for supposing that the position could have materially favoured the formation of a hypo-

static congestion. And *lastly*. When all the foregoing particulars coincide, and when, by a careful review of all the symptoms during life, and consideration of the manner of the patient's death; that is, whether it was sudden or gradual—in the way of asphyxia, coma, or simple exhaustion—there is no contradiction in—but, on the contrary, a confirmation of—the preceding evidences.

It is in consequence of hyperæmia being so apt to occur where the functions of innervation and circulation are greatly disordered, that the practitioner has to be on the watch in long protracted fevers, the danger of which is, indeed, greatly dependent upon the occurrence of hyperæmia or of inflammation in some internal organ.

Treatment.—As it is extremely difficult to diagnosticate the existence of hyperæmia, so is it to lay down any fixed plan of treatment. Where its existence is suspected it will be all important to attend to the causes that may have given rise to it. Should these seem to be of an active character, the same plan of treatment will be needed as in inflammation. Where, however, it is more of the asthenic kind, as is the case in the diseases termed *congestive*, and where the affection is induced by unusual nervous impressibility, the treatment may have to be greatly modified. In such cases, general blood-letting, if employed at all, should be so with great caution; and it may be necessary—as remarked under Congestive Fever—to employ excitants at the same time;—the bleeding acting revulsively, and attracting the blood from the congested organs, whilst the excitants tend to diffuse the blood towards every part of the organism, and thus to exert an equalizing operation. General blood-letting rarely, however, effects this salutary revulsion as well as local blood-letting, which is appropriate in almost all cases of hyperæmia; and where it is not, or is considered to be doubtful, excitants may be exhibited internally, and counter-irritants or sinapisms be applied externally. The hot bath is in such case serviceable, or the warm bath of such a temperature (92° Fahr.) as will tend to equalize the circulation on the surface.

Where the hyperæmia is dependent upon nervous erethism, this may have to be allayed by opiates and sedatives generally, of which the hydrocyanic acid is one of the best, and every attention must be paid to avoid nervous agitation or disquiet. The indications applicable to all cases of hyperæmia are, indeed, to avoid all sources of irritation—physical and moral; and, where the tendency is obstinate, to endeavour, by change of air, society and scenery, to excite new impressions, which will frequently, by their revulsive agency, restore the individual after other remedies have been tried in vain. This course is equally indicated after the hyperæmia has been removed.

Should the hyperæmia be dependent upon or accompanied by polyæmia or plethora, the diet should be spare; and in all cases it should be of such a nature as not to endanger vascular fulness or over-action. With this view, abstinence from fermented liquors of all kinds is essential. The cases must be few where they can be demanded.

The special phenomena and treatment of hyperæmia, when it affects particular organs, is described under the appropriate heads.

II. INFLAMMATION.

SYNON. Inflammatio, Incendium, Phlogosis, Phlegmone, Phlegmasia, Hyperhæmatisis, Angiite, (*Piorry*;) Ger. Entzündung.

If the condition of hyperæmia be interesting to the pathologist, as the cause of many phenomena, explicable with difficulty, which are presented by various organs,—that of inflammation is still more so. It is always, indeed, a topic of paramount interest to the practitioner, when called to a case of disease, to investigate whether there be inflammation or not; and where the surface of the body only is implicated, the diagnosis is sufficiently easy. The affection then belongs to the class of *morbi externi*, and is generally considered to be in the domain of Surgery. It is only, therefore, internal inflammation, that properly enters into the province of this work; but still, some remarks may be necessary, that will apply equally to inflammation wherever it presents itself.

With some pathologists, the disposition exists to refer almost all morbid conditions to inflammation preceding or existing; and the mistake is doubtless often made of assigning diseases to it in which it may be little, if at all, concerned;—for example, the different accumulations, which occur in shut sacs and constitute dropsies; the various forms of hypertrophy, and of hypercrinia or increased secretion, &c.; yet still, if the list of diseases treated of in this work be rapidly run over, it will be seen, that inflammation plays a most important part in many of them. Under those diseases, the phenomena and treatment of special phlegmasiæ have been described. Here, it will be necessary to consider those of inflammation in general.

It has been already remarked, that hyperæmia or simple congestion or distension of vessels is the precursor of inflammation; and it has been shown, that the former affection may pass away without the supervention of the latter. In order that the hyperæmia may be followed by inflammation, it would seem to be necessary, that the blood should accumulate in such quantity as to over-distend the capillary vessels; the consequence of this over-distension is atony of the capillaries, which are incapable of emptying themselves of the contained blood. In some cases, the blood coagulates, and, owing to the obstruction of the capillaries, in all cases, a morbid nutritive process is set up; changes occur in the vessels themselves, as well as in the cellular texture surrounding them; the vessels, immediately communicating with the over-distended capillaries, take upon themselves increased action; effusion of fluid occurs; and, where the inflammation is extensive, or seated in parts that are of great importance in the organism, the constitution sympathizes, and fever of greater or less severity ensues.

From this brief narration of the phenomena of simple inflammation, it will be obvious how impracticable it is to give any definition of it that can be satisfactory. As has been remarked by M. Magendie, “a whole book might be made of the ideas represented by the word inflammation, for it is synonymous with ‘disease.’” Yet, although the term has been vaguely employed, a consideration of the patholo-

gical phenomena may enable us, perhaps, to approach its proper acceptance. With this view, it will be convenient to inquire briefly into the

Pathological characters.—The observations, which have been made with the microscope, on the phenomena that accompany and constitute inflammation, have been very numerous, and are detailed in various essays on inflammation. In no part of this work has it been the desire of the author to detail the various views that have been from time to time entertained on the different topics discussed, but rather to give the existing state of knowledge on the subject. He will not dwell, therefore, upon the different and discordant opinions of observers, but confine himself to what he considers the most authentic results.

When any irritating agent is applied to a part, the flow of blood through it appears to be accelerated; the arteries convey the blood more freely to it than in the healthy condition, and the fluid is seen to flow irregularly, and often in a retrograde direction, and in channels which were not previously observed. Soon afterwards, if the part be examined by the microscope, the extreme vessels appear to be distended, and in an evident state of hyperæmia. The flow of blood is next evidently retarded, and in some of the vessels wholly arrested;—owing partly, it would seem, to the coagulation of the blood, and partly to the atonic condition of the coats of the extreme vessels. It has been lately affirmed by Mr. Addison,—and a recent writer in the *British and Foreign Medical Review* for July, 1843, states, that he has verified the observation,—that in the passage of the blood through the capillaries, the corpuscles pass in single file; some of these occasionally turning aside, as it were, from the current, and for a time attaching themselves to the parietes of the vessel—the succeeding corpuscle passing round or rolling over them. In the inflamed or irritated state of the same capillaries, the corpuscles rush in greater quantities through them, the calibre of the vessels being increased. The globules now pass in double and triple files even in greater quantity—the sides of the vessels being occupied by numbers in a state of stagnation, some of which, from time to time, roll off into the general current; others advancing and taking their places; until, ultimately the vessels become obstructed, and there is a complete stagnation.

Very early, effusion of the serous portion of the blood into the cellular tissue takes place, and soon afterwards—if the inflammation continue—the *liquor sanguinis* exudes; and, subsequently, in many cases, morbid secretions, as pus, are poured out, under the new affinities that take place from the deranged vital actions. It has, indeed, been well maintained by Dr. Alison, that a peculiar perversion of nutrition or of secretion ought to be held essential to the very existence of inflammation; and that “all attempts at explanation of the changes to which the term is applied, if they do not include this, their most essential peculiarity, we must regard as necessarily and fundamentally defective.”

From what has already been said, it will be obviously difficult to appreciate the vital actions of the capillaries in inflammation, and

impossible to adopt any explanation that can apply to all stages. The main views entertained have been three. — *First*. It has been ascribed to increased action, or to an increase in the tonicity or contractility of the extreme vessels; but a sufficient objection to this view is what we have before remarked be correct—is, that an essential stage of the morbid process is over-distension and want of tone of those vessels. *Secondly*. It has been ascribed to a loss of tone in the vessels from the first—a view which is liable to the objection, that a larger quantity of blood certainly passes in the early stage of inflammation through these very vessels, and, therefore, they must be *active* rather than *passive*. And *thirdly*. It has been supposed, that one of the earliest phenomena is a *turgor vitalis* of the extreme vessels, under which they become expanded actively, as the heart is expanded actively during its diastole. This vital power of expansibility, or turgescence has been ascribed to the capillaries in health, but, as the author has elsewhere remarked, (*Human Physiology*, 5th edit. ii. 139, Philad. 1844,) it is not proved. The same may be said of it as applied to inflammation. The phenomena presented by the erectile tissues have been adduced in its favour; but if they be attentively studied, it will be found, that the turgescence is not the first link in the chain of the phenomena; excitation is first induced in the nerves of the part—generally through the influence of the brain—and the afflux of fluid supervenes. This is still better observed in inflammation. If *irritation* be caused in any tissue, an afflux of fluid takes place to the part irritated; and in consequence of such afflux, the extreme vessels become over-distended;—want of tone, as already remarked, succeeds to this over-distension; and it is not until the parietes of the over-distended vessels have recovered their tone, and emptied themselves of the stagnant blood, that the mischief ceases. In the meanwhile, important changes have taken place in the vessels communicating with the over-distended capillaries; the increased action of which may have been so great as to demand the most vigorous sedative measures.

These remarks are applicable to most cases of inflammation; but where it is owing to arrest of the venous circulation in the first instance, hyperæmia may be the first link in the chain of phenomena, and the source of the irritation, which gives rise to the increased action of the vessels. This increased action must be presumed to be present at some period of every case, and it would, therefore, seem to be the most characteristic of the morbid phenomena. It is, indeed, difficult not to agree with Dr. Macrobin, that there is in every case of inflammation an *increased action* or augmentation of the vital properties of the vessels, whatever other invisible intermediate circumstances there may be, in the part or system generally, antecedent to the increased impetus;—"a point of more practical importance for the student to bear in mind than any other, and which, although, disputed by theorists, is nevertheless that which is most consistent with the whole phenomena of the disease, and at the same time safest as a principle of practice."

The pathological characters, presented by the different organs when inflamed, will be given under the proper heads.

Diagnosis.—When inflammation is seated on the surface of the body, or in any of the outlets, which can be examined by the eye, it presents, in its early stage, certain phenomena, which are termed the *local signs or symptoms*, and which—when the inflammation is within certain limits—may exist alone; but when they are beyond these limits, the whole organism may sympathize, and give occasion to *general or constitutional symptoms*. Where the inflammation is seated in an internal organ, the local signs are often of but little service; and some of them unsusceptible of detection. We have then to form our diagnosis from the general symptoms, in association with the disordered function of the affected organ.

From the earliest periods, the local signs of inflammation have been considered to be four in number,—*dolor, calor, tumor, rubor*,—pain, heat, swelling, and redness. It is not necessary to dwell upon the mode in which these are induced. The *pain* is admitted to be owing to the compression or distension of the nervous filaments, by the new pathological condition of the vessels and surrounding tissues. The pulsatory pain in inflamed parts has usually been ascribed to modification of the vitality of the vessels; but it has been suggested, that the mechanical modification experienced by the local circulation may not have been sufficiently regarded. “Whenever an artery is closed at one end, and thus presents an insurmountable resistance to the passage of the fluids into the capillary rete, its coats support very considerable pressure, and dilate under each contraction of the heart. Now this is the state of things in an inflamed part. The nerves, compressed at the instant each arterial pulsation takes place, transmit the impression to the brain; the phenomenon alluded to is therefore physical in existence, though vital in its results,—the first cause of all the disorders observed is the obstruction of the capillary vessels.” The *heat* is owing to the blood passing in greater quantity, and with increased velocity, through certain of the vessels which continue permeable; the *swelling* is owing to the dilatation of the vessels, and to the effusion from them into the cellular membrane; and the *redness* is caused by the presence of an unusual quantity of blood in the vessels.

When the inflammation is seated in internal organs, the diagnosis is formed on the occurrence of constitutional irritation or fever, associated with derangement of function in the organ or organs implicated. The definition of internal inflammation, by an eminent nosologist, Dr. Cullen—Fever with fixed pain in some internal part, and deranged function of some internal organ—although applicable in general, is not so universally. Endocarditis and pericarditis may pass through their course to a fatal termination with little or no pain. The lining membrane of the stomach may be inflamed, and yet no evidence of suffering be afforded. Still, pain or tenderness upon pressure is generally a concomitant of internal inflammation. Often, however, it is not directly available in the diagnosis, as where the

organ is in a cavity surrounded by bony parietes, yet it may occasionally be discovered indirectly. Thus, in pericarditis, the pain may be obscure or null, when pressure is made on the cardiac region of the thorax; and yet it may be vividly experienced, when pressure is made on the abdomen so as to force up the diaphragm, and impress a succussion on the heart. On the other hand, tenderness on pressure may be felt, when a part is not inflamed, and error is often incurred from not bearing this in mind. It is, indeed, the most marked phenomenon in hyperæsthesia, and in most of those neuropathic affections that have, of late years, been classed under *spinal irritation*. When the intestines are distended with flatus, the abdomen is at times acutely sensible to the touch; and, after delivery, tenderness on pressure is frequently felt to such a degree, as to lead to a belief in the existence of peritonitis; yet this is relieved by remedies—as opiates—which are adapted for allaying nervous erethism. It is proper, however, to bear in mind, that what is neuropathic in the first instance may become inflammatory afterwards; and hence nice discrimination is often needed to detect when the morbid condition changes its character. Enteralgia, for example, which is entirely neuropathic, may terminate in enteritis, and the transition may not always be detected, except by a careful attention to symptoms, and a thorough acquaintance with the phenomena that characterize both affections. The effect of remedies aids us not a little in the diagnosis, in doubtful cases.

In neuropathic affections, there is usually but slight tolerance of the loss of blood, whilst in highly inflammatory diseases, the amount of the tolerance—before syncope is induced—indicates, to a certain extent, according to Dr. Marshall Hall, the intensity of the inflammation. It often happens, too, that persons, who are liable to neuropathic affections, are at the same time liable to phlegmasiæ, or at least to active hyperæmia or determination of blood to some organ; and the author has frequently observed, that, in cases of neuralgia faciei, after the pain had been excessive for some time, ophthalmia has supervened; and this has been the sequence whenever the patient has had a severe paroxysm of the former malady. It is known, too, that paralysis of certain nerves may give occasion to inflammation of organs to which they are distributed. If the fifth pair of nerves be divided in the interior of the cranium, on the petrous portion of the temporal bone, and remote from the eye, one of the effects of the section—as might be presumed—is to destroy the sensibility of the conjunctiva, so that the eye becomes as devoid of feeling as the epidermis. Ophthalmia, however, soon succeeds; so that inflammation may be produced in one case from excitement, and in another from paralysis of a nerve. In both cases, obstruction is probably induced in the extreme vessels, with modification of their vital endowments; but of the intimate nature of the irregularities thus developed in the capillary circulation we are profoundly ignorant.

As in cases of internal inflammation, there is but one of the four symptoms of external inflammation—the pain—that can be available in the diagnosis; and, as this is not always present, it is important to

attend to the phenomena before mentioned—the disorders in the functions of the inflamed organ, and the degree of constitutional disturbance. Perhaps in no case can active inflammation attack an internal organ without its functions being materially deranged; and a reference to the particular diseases—gastritis, peritonitis, bronchitis, encephalitis, &c. &c.—will show how important a part these functional expressions play in the diagnosis of those important diseases. Generally, in proportion to the extent of the inflammation, will be that of the general or constitutional phenomena. In high degrees of inflammation, the fever is intense, and the general disorder of functions extensive; yet, in many most dangerous maladies, which are running their course to a speedy termination in death, the amount of pyrexia may be by no means great. Such is not unfrequently the case in enteritis of the peritoneal coat, and especially in that which forms part of the morbid condition in strangulated hernia. On the other hand, the accompanying fever may be excessive in inflammation of a part, which is of but slight moment to the economy. Such is the case in inflammation of the tonsils,—a disease commonly of but little consequence, and nevertheless accompanied, generally, by great constitutional disturbance.

The fever, which accompanies the first and active periods of inflammation, belongs essentially to the synochal class, and is indeed the type of that elsewhere described as *inflammatory*. Yet inflammation may exist, occasionally, even from the onset, and frequently in the progress of an affection, which is of the typhoid or adynamic character; of this we have examples in the irritative fever, that results from serious, and, at times, from slight, injuries in persons of unhealthy habit, and in such especially as have been accustomed to over indulgence in fermented or spirituous liquors. These cases belong to the province of surgery; yet we frequently meet with similar conditions, where inflammation attacks an internal organ, of which we have good examples in typhoid pneumonia and typhoid pleurisy, and in the inflammation which is induced by the reception of some virus into the system. These cases are less under the control of the therapist; *first*, on account of the impaired condition of the constitution; *secondly*, on account of the change induced in the circulating fluid, and, through it, on the capillary vessels by the peculiar character of the virus; and, *thirdly*, because the most active antiphlogistics,—those which are so effective in the sthenic or active forms of inflammation,—are inadmissible.

Lastly,—it is important to bear in mind, that in persons who are greatly debilitated, and in the progress of continued fever, inflammation may be masked, or *latent*, and may even proceed to a fatal termination, perhaps without the nature of the lesion being suspected, until it has been revealed by dissection. Of this, we have an excellent example, in the disease already mentioned—typhoid pneumonia.

The state of the blood in inflammation has been long attended to, so far as regards the *buffy coat*, and the shape and character of the crassamentum. In most cases of high inflammatory action, in which

the constitution sympathizes, if blood be taken in a full stream from a vein, the fibrin and red particles separate,—the latter subsiding so as to form the lower part of the clot, and the fibrin forming the buff or crust at the top. In such cases, the crust is generally very firm, and the whole clot of great cohesion, and exhibiting a cupped appearance on its surface. In order that this inflammatory crust should exist, it would seem to be necessary, that constitutional symptoms shall be present; and, accordingly, in the very early stage of inflammation, it may not appear in the blood drawn, and yet be marked on blood taken at an after period,—a fact to be borne in mind by the therapist. Of the nature and causes of the appearance in question, the author has treated at some length elsewhere. (*Human Physiology*, 5th edit. vol. ii. Philada. 1844.)

It is not only perceptible in cases of high internal inflammation, but in acute rheumatism, in the pregnant condition, and in persons of great nervous excitability. In the first of these cases, there may be no disorganizing inflammation present,—none that requires the same activity of treatment to preserve life, that pleurisy, for example, does; and in the second, the buff appears when the female is in perfect health. Perhaps, the most important fact to be recollected is, that we observe the buff on the blood of persons of great nervous excitability, even when no inflammatory condition is present; and when, on the contrary, the blood is watery,—or, in other words, does not contain the healthy proportion of fibrin and red globules. It would appear, too, that a cupped and buffed state of the blood, which might be mistaken for the pure effects of inflammation, and as an indication for the prosecution of antiphlogistic measures, is often induced—and kept up, if already present—by the excitement and reaction of the system, which is so generally observed to follow extensive loss of blood. (See the remarks on the *Morbid conditions of the blood*, at the commencement of this Book.)

In cases of violent inflammatory action, the crassamentum is commonly supposed to be increased in bulk, but this has been esteemed doubtful by Dr. B. Babington. The fibrin is certainly more abundant than natural. From some experiments, instituted on this point, by Sir Charles Scudamore, it resulted, that in 1000 grains of the clot—obtained from eight specimens of healthy blood, the average of dry fibrin amounted to 3·53 grains; the maximum being 4·43, and the minimum 2·37; whilst the same quantity of blood, drawn in slight pleurisy, and slightly buffed, yielded 7·05 grains; in another case, 11·37 grains; in a case of cough, 7·24 grains; in acute gout, blood not buffed, but of firm texture, 5·88 grains; in a disease not named, clot compact, buffed and cupped, 12·41; and in another case of the same kind, 13·73 grains; making the average, 9·62 grains. In eight cases of inflammation recorded by another observer, Mr. E. A. Jennings, the proportion of fibrin in the blood was increased from 2·1, the standard of health, according to M. Lecanu, to 9·8, 11, 6, 5·3, 7, 6·9, 7—the average being 7·525, and the alkaline salts were diminished from 8·37, the healthy standard, to 4·9, 4·8, 5·1, 4·3, 4·2, 4·4, 4, 5·6—the average being 4·61. The serum of the blood is like-

wise found to contain a larger proportion of albumen than in the healthy state of the system.

All these estimates are confirmed by the recent investigations of MM. Andral and Gavarret. In another work, the healthy proportion of various constituents of the blood is given. It is there stated to consist, on the average, in 1000 parts, of fibrin, 3; red globules, 127; solid matter of serum, 80; water, 790; the proportion of fibrin probably varying, within the limits of health, from $2\frac{1}{2}$ to $3\frac{1}{2}$ parts, in the thousand, (*Human Physiology*, 5th edit. ii. 111, Philada. 1844.) In acute inflammatory affections, M. Andral found an invariable increase in the proportion of fibrin, the increase being proportionate to the intensity of the inflammation, and the degree of symptomatic fever accompanying it; and he asserts, that if we find more than 5 parts of fibrin in 1000, in the course of any disease, we may positively affirm that some local inflammation exists. The average augmentation of fibrin in inflammation, he estimates at 7; the lowest at 5; and the maximum at $10\frac{1}{2}$. Pneumonia and acute rheumatism are the only diseases in which he has found the proportion of fibrin rise as high as 10. There is, consequently, in inflammation, an excess of fibrin over the red globules, or the reverse of what is observed in typhous fevers. Hence, the difference in the appearance of the blood drawn in these affections: whilst in fevers in general the clot is bulky, soft, and imperfectly separated from the serum; in inflammation, the clot occupies less space; is of much greater density and consistence; and if the blood have flowed properly from the vein, is covered with a buffy coat of greater or less thickness. M. Andral, therefore, approves of Meckel's definition of inflammation,—“a congestion with tendency to a new production;”—that new production being, according to M. Andral, an excess in the quantity of fibrin. He found, however, considerable difference in the increase of fibrin according to the seat of the inflammation. In inflammation of the cellular tissue, it did not exceed 5; in pneumonia, it rose occasionally to 10, and more. In inflammations of the mucous membranes, when slight, and unaccompanied by fever, it remained in the usual quantity; but when they attained a certain degree of intensity, and were accompanied by febrile reaction, the fibrin invariably rose in amount. In inflammation of the serous membranes, the increase was more marked; and in acute rheumatism, it rose as high as in pneumonia.

The increase in the proportion of fibrin appears in the blood from the time the inflammation commences. In no case was it observed in the blood before the modification of the solid that characterizes the phlegmasia was present. He properly, however, considers the question yet unsettled as to which of the two phenomena is primary, or whether they do not arise simultaneously. In the case of a burn, the blood clearly becomes affected secondarily, and analogy might lead to the belief, that the same may be the case with other inflammations.

Dr. C. J. B. Williams thinks, it is pretty clear, “that the increase of fibrin, and its more contractile and separating quality, originate in

the vessels of the inflamed parts, and must be regarded as an augmentation of the vital process of nutrition; developed by inflammation;" and the fact, that the ratio of fibrin is increased in pregnancy and other conditions of the system before-mentioned, favours this position.

In the same manner as the appearances of the blood that are seen in many forms of active inflammation may be met with in diseases not inflammatory, it can be understood, that they may vary materially in inflammation of different tissues. They are most marked in cellular and serous inflammations—less so in mucous inflammations: this has been ascribed, and perhaps correctly, to the little pain and comparatively trifling general disturbance attending inflammation of these parts. It certainly would seem to be necessary, in order that the buffed appearance should be marked, that the nervous and vascular disturbance should be considerable. This is the case when the pleura is inflamed, and, accordingly, the blood is so much cupped and buffed in that disease, that the crust has obtained the name *crusta pleuritica*.

Dr. Macrobin considers, that it may be stated as a general fact, that the contracted and sizzly appearance of the blood will be most strongly exhibited,—*first*, in inflammation of serous and fibrous membranes and their modifications; *secondly*, in inflammation of the parenchymatous or compound textures; and *thirdly*, least so in inflammation of mucous membranes. The decidedly buffed state of the blood, however, which is seen in the inflammation of the fibrous membranes, that forms part of acute rheumatism, is less perhaps dependent upon the inflammation itself than upon the constitutional disturbance that precedes and accompanies it; so that the blood may exhibit the signs of *hæmitis*—to use the language of a recent pathological writer, M. Piorry—before even the evidences of local phlegmasia are distinctly perceptible.

The remarks, just made, lead to the consideration of the phenomena presented by various tissues when labouring under inflammation. When the skin or mucous membranes are attacked with this affection, the inflammation is more of the *erythematic* or *erysipelatous kind*, and spreads over a greater extent of surface than when it implicates chiefly the cellular membrane, or is of the *phlegmonous kind*, which has been esteemed the type of *healthy inflammation*, as it has been termed; the erysipelatous or erythematous form being more apt to occur in impaired states of the constitution, and to terminate by one of the least favourable results of phlegmonous inflammation.

It has been already remarked, that inflammation of the mucous membranes is usually of a less active kind than that of the serous membranes; and the same may be said of inflammation of the skin as compared with that of the cellular membrane. The skin and mucous membranes belong, indeed, to the same system—the dermoid; their anatomical constituents are essentially alike, and their diseases congenerous. So is it, likewise, with the cellular membrane and the serous membranes—which last are but condensed cellular membrane.

Inflammation of fibrous membranes, as we meet with it in gout, is

accompanied by copious effusion, but this generally disappears rapidly. When, however, it has often attacked the textures surrounding the joints, as in gout, the phosphate of lime is at times absorbed, and tophaceous concretions, containing urate or lithate of soda, are deposited in its place. (See Gout.)

Inflammation may differ materially, according as the causes inducing it are *common* or *specific*. When not otherwise mentioned, the descriptions are considered to apply to the former,—the latter being attended by phenomena that are somewhat peculiar. We have examples of specific inflammation in scrophula, as well as in that produced by morbid poisons;—as in smallpox, measles, glanders, poisoned wounds, &c. &c.

The effect of various conditions of the blood in the production of inflammation has been the subject of much investigation—of late years more especially. It has been long known, that if oleaginous or finely pulverized substances be injected into the blood-vessels, they may circulate freely until they reach the extreme vessels; but in them they become the source of obstruction and consequent inflammation. A viscid matter, innocuous in itself—gum for example—was dissolved by M. Magendie, in a little water; and, after being coloured, the fluid was injected into the jugular vein of an animal. So long as the injection traversed the large venous trunks, no disorder was occasioned, but as soon as it reached the radicles of the pulmonary artery, the circulation was almost instantly arrested—and as the encephalon no longer received the necessary excitement from arterial blood, its functions ceased and the animal quickly perished. The body was immediately examined, and on cutting into the pulmonary parenchyma, in a direction perpendicular to that of the principal vessels, they were invariably found filled with the substance injected. Viscidity of the blood may likewise arise spontaneously from disease, and in all such cases some serious lesion of the lungs is to be apprehended.

On the other hand, experiments have shown, that if blood be deprived of its fibrin, and be injected into the vessels, death speedily results; and in such cases the blood has been found to have become so utterly unfit for circulation in the capillary vessels, that it was extravasated into the various tissues, and especially into the parenchyma of the lung. If the fibrin be removed from the blood in small portions, local lesions are induced, of which the origin cannot be mistaken. It would appear, consequently, that whenever, the blood becomes much thinner than in health, it ceases to be adapted for the vessels in which it circulates, and transudation takes place through their parietes. In this mode—as the author has repeatedly remarked—bleeding in many cases of hemorrhage proves detrimental,—especially if watery fluid be freely allowed at the same time. “We were speaking,” observes M. Magendie, “of the visciduity requisite for the circulation of the blood through our organs. Now, here is the blood of an individual who had an attack of hæmoptysis, and was bled freely for it. You know well what I think of that remedy—worse perhaps than the disease. Be that as it will, you may perceive, that this blood is very slightly viscous. I, in consequence, presume, that farther mischief

will occur. We shall see if my presumptions be realized;" and he adds—"If you bleed an animal several times and replace the blood withdrawn by water, exhalation and effusion into the cavity of the pleura will follow, and subsequently into the peritoneum. Now you have done no more than diminish the viscosity of the blood by adding a little water to it."

On the *Terminations*, as they are called, of inflammation, it will not be necessary to dwell. The morbid condition may pass away without leaving any alteration of structure in the part affected or it may end by *resolution*. It may terminate suddenly, or by *délitescence*, as the French term it; or, it may leave one part and pass to another, by what is termed *metastasis*, or *shifting of seat*.

One of the earliest and most constant of its effects is an effusion of the serous or watery part of the blood, which—as before remarked—is one of the causes of the tumefaction of an inflamed part. The appearance of this effusion, when it occurs at a later period, varies greatly;—at times, being limpid and colourless; at others, variously tinged, in consequence of admixture with the red particles of the blood, or with coagulable lymph or pus. In extensive inflammations of serous membranes, the quantity of fluid, mixed with flakes of coagulable lymph, is sometimes very great.

The effusion of coagulable lymph itself or of the *liquor sanguinis* is an early result of the inflammatory process, where parts are divided, and especially of the inflammation of serous surfaces. The exudation is possessed of plastic properties; gradually becomes organized, and is the medium of those adhesions, between the pleura costalis and pleura pulmonalis, for example, which are so often found on dissection, even when the patient has died of some other disease, and *à fortiori*, where death has been owing to pleuritis. When first poured out, the exudation is fluid, but it soon coagulates, the serum being absorbed. When examined by the microscope at the commencement of its becoming organized, a number of exudation-corpuscles, formed as the fibrin coagulates, is seen in it, which have the appearance of regular cells arranged in layers, and adhering together by an intermediate unorganized substance. Some hours later, a fibrous character presents itself, which is considered to be owing to the adhesion of the cells together in lines. Between the cellular fibres a considerable amount of cytoblastema yet remains, and they may be readily separated or torn in any direction. A vascular network next appears, which forms a connexion with the vessels of the subjacent surface.

According to M. Andral, two matters—the one globular, the other reticular—characterize, in the solid, the morbid process, which we term inflammation. The reticular matter is nothing more than fibrin, perfectly similar to that which exists in the blood; the globular matter, he thinks it probable, is also fibrin, but altered in its nature, and arrested in its coagulation. These two matters have very different destinations. The one, the reticular, is susceptible of passing into the organized state; vessels may be seen ramifying it, and it may become a tissue. It is this which forms adhesions, and under the name of

coagulable lymph is interposed between the lips of wounds, and becomes the medium of their reunion. In place of being injurious by its presence, it is, consequently, an instrument of reparation for the tissues, and ultimately becomes completely identified with them. The other, on the contrary—whether it have a common origin or not with the reticular, can never remain in the textures without disturbing more or less the whole economy. It is incapable of organization, exhibits no trace of vitality, and is rejected by the organism. If not eliminated, disease results, and the elimination itself is frequently not accomplished without the supervention of unpleasant symptoms.

It is not common for the mucous membranes, when inflamed, to secrete lymph copiously; but the various diphtheritic affections afford examples of it. When such effusion does occur to any amount, the affection is always one of grave import, and is generally dependent upon a peculiar state of the system as well as of the part affected, which predisposes it to this form of inflammation, rather than to the ordinary erythematic variety.

Another termination is by *suppuration* or the formation of pus. Much discussion has taken place as to whether the pus is formed within or without the vessels, or in both situations. The common belief is the last; and the process is conceived to consist in the conversion of the globules of the blood and lymph, from which the colouring matter has been separated, into an opaque fluid nearly of the colour and consistence of cream. Magendie considers the essential difference between the terminations by resolution and suppuration to consist in the fact, that in the former the molecules of blood re-enter the circulation after having been softened; whilst, in the latter, they undergo further modification and are expelled from the system. In the opinion of Gerber, which has been embraced by many observers, those exudation-corpuscles that lie beyond the vivifying influence of the suppurating surface, and are exposed to external agencies, cannot be expected to retain their vitality for any length of time: they begin to degenerate in their organization, and to suffer changes in their chemical constitution, whilst those that continue in immediate contact with the living structures advance in their organization. The globules that are cast loose then die. In ill-conditioned sores, the surface of which is not giving origin to new structure, the discharge is not found to contain the true pus-globule; but in place of it are found what are called ichor-globules, which have been considered to be evidently altered blood-corpuscles. These points of microscopic anatomy require, however, renewed observation.

That pus may be formed from blood, apparently without any action on the part of the capillary vessels, is shown by the fact, that distinctly purulent matter, according to M. Andral, has been found within coagula in the large vessels and in the heart, where there has been no suppurating surface,—the result, it has been supposed, by M. Piorry, of hæmitis or inflammation of the blood:—and, that the vessels are, in other cases, implicated, is equally demonstrated by the circumstance, that when inflammation has continued for some time in any

important organ, globules of pus are said by Mr. Gulliver, to have been recognised in the blood. This, however, has been combated by M. Mandl, who maintains, that the white globules, considered to be pus-globules, originate in the fibrin as it coagulates on the object-glass of the microscope. They do not exist—he affirms—whilst the blood is circulating, and form either on the object-glass, or in the vessels after death. M. Mandl maintains, that microscopic examination cannot determine, whether the blood be pure or mixed with pus; as the purest blood contains globules in every respect like those of pus. The size of the pus-globules varies between the $\frac{1}{80}$ th, $\frac{1}{100}$ th, and $\frac{1}{110}$ th, of a millimetre, a circumstance, which he considers to decide the question of purulent absorption, since globules of this size could not pass through the parietes of the vessels.

When pus is effused from large membranous surfaces, as from the pleura, the membranes are often found thickened instead of extenuated; and this has been adduced as a reason for the belief, that pus is not formed at the expense of the tissues. The phenomena of *ulceration*, on the other hand, seem to show, that there may be solution of the solids; but the loss of parts is probably owing, mainly, to absorption. Why this absorption takes place under such circumstances, it is not easy to say. The remark of Dr. Alison, that “the commencement of ulceration, as an effect of inflammation, implies merely, that the attraction by which extra-vascular matters are constantly taken into the small veins, preponderates over that by which portions of the blood pass out of the capillaries,” is a mere expression of what is conceived to be a fact. It throws no light on the subject.

It would appear, that the globules of various species of pus may be recognised by certain physical characters, which vary, however, according to the organs or tissues in which it is formed. It is thin and grayish in the bones; opaque and caseiform in the cellular membrane; flocculent in the serous, and greenish and thready in the mucous membranes; reddish in the liver, and yellowish-gray in the muscles. Magendie asserts, that one of the gentlemen present at his lecture, M. Kluge, was able to distinguish the different species of pus from each other, by simple inspection of the globules. He was subjected to a variety of tests, and in every instance was successful. Magendie took pus from the hospital, which had been collected in the lung, the pleura, the peritoneum, and the cellular tissue, and M. Kluge invariably announced its source with perfect accuracy. On one occasion Magendie endeavoured to entrap him by presenting him with some artificial pus of his own making, as if it had been taken from one of his patients, but M. Kluge was not to be deceived. “This important fact,”—adds Magendie,—“is another to be added to the list of experimental discoveries.”

Other terminations of inflammation, are—*induration*, and the opposite condition—*Ramollissement*, *mollescence* or *softening*. It is not known how these changes in the nutrition of the part are induced. Where coagulable lymph is thrown out and becomes organized, it may be understood, that the parts may acquire a firmer texture; but it is not easy to comprehend the modified nutrition sometimes induced,

as where orchitis or inflammation of the testicle is converted into scirrhus.

The modified nutrition that occurs in ramollissement is equally inexplicable.

Lastly. The most unfavourable of all the results of inflammation, is *gangrene*. It is probably owing, mainly, to the stagnation of the blood in the capillaries of the part; for when substances have been injected into the capillaries, so as to choke them and arrest the circulation, gangrene has taken place rapidly in the limb. There is reason, however, for the belief, that this is not the sole cause, but that the death of the blood, and of the textures surrounding the blood in inflamed parts, is an effect, at least in part, of the previous changes in them during the state of inflammation.

Such are the general terminations of inflammation;—at times supervening rapidly, as in the *acute* forms; less speedily and decidedly in the subacute; and still less so in the chronic. Between the acute and subacute forms of inflammation, the difference consists in the relative intensity of the inflammation. The chronic form often succeeds to the two others; but although the word *chronic* implies, that time ought to enter as an element into the definition, the diseased conditions may be, from the very first, such as characterize the chronic form when it succeeds to the acute. All these forms may, however, and often do, run into each other, so that, in practice, they are not always easily distinguishable.

From the whole consideration of the subject, we are justified, then, in adopting the following views of an able writer, Dr. Alison. "In order to give the requisite precision to the general notion of inflammation, as a local change of the condition of any part of the body, it seems only necessary to include in it, besides the pain, swelling, heat, and redness, the tendency always observed, even when the changes in question are of short duration, to *effusion* from the blood-vessels of some new products, speedily assuming, in most instances, the form either of coagulable lymph or of pus. It is true, that there may be inflammation either of so slight intensity, or so short duration, as never to show these, its usual consequences; but we shall escape a great deal of useless verbal discussion and misapprehension, if we lay it down as a rule, never to apply the term except in cases where we are satisfied, that the tendency to these effusions exists, and that, if they do not appear, it is only because of the minute scale, or the rapid abatement of the diseased action. A peculiar *perversion of nutrition*, or of *secretion*, we hold to be essential to the very existence of inflammation; and all descriptions, and all attempts at explanation of the changes to which the term is applied, if they do not include this, their most essential peculiarity, we must regard as necessarily and fundamentally defective. It is true, that the various effects, which we ascribe to inflammation, adhesion, suppuration, ulceration, gangrene, are very different from one another, and that we cannot satisfactorily point out the cause, or even the mode, by which each is effected; but we may be fully assured, from ample observation, that all these occur as effects of an inflammatory action, originally of the

same kind; we can go a certain length in pointing out the conditions under which each of these results takes place, and we may refer to them as general and established facts, in many pathological discussions on more obscure phenomena."

Causes.—Any condition of the system, or of any part of it, which gives occasion to irregularity of circulation in the capillary vessels, may be the cause of inflammation. Amongst the circumstances which predispose to it, must be reckoned polyæmia, as well as the opposite condition—anæmia; the irregularity of circulation induced by general diseases,—as fevers of all kinds, and constitutional predispositions, as gout, rheumatism, scrophula, &c. In the evolutions, too, that take place at different ages, predisposition to inflammatory and other affections, in certain parts of the economy, is developed. In childhood, for example, the predisposition is to the mucous lining of the bowels, and to the encephalon; after the age of puberty, the tendency is to the lungs; and in old age, it is rather to the lining membrane of the urinary apparatus. Climate, likewise, affords a predisposition. In hot regions, as in India, we find a predisposition to disease of the lining membrane of the bowels and of the liver; whilst in temperate regions, the tendency is rather to the mucous membrane of the air passages. The same may be said of seasons:—winter predisposes rather to inflammation of the air passages; summer to that of the mucous lining of the bowels. Perhaps at all times, in every individual, there is a predisposition in some part of the economy, rather than in another, to assume irregular action under the influence of adequate exciting causes. When, for example, a dozen persons are subjected to the same exciting cause,—exposure of the feet to cold and moisture,—all may not be affected in the same manner. Some may escape disease altogether: of the rest, one may be attacked with bronchitis, and another with inflammation of the tonsils, according to the greater predisposition in one of those parts, at the time, to assume inflammatory action. It can rarely happen, that there is so much harmony of function, that all parts of the organism are in a perfectly healthy condition. A difference likewise exists in individuals, as to the degree of this predisposition:—thus, some are liable to catarrh and sore throat, on exposure to the slightest deranging influences.

As regards the exciting causes,—those termed *common*, when they concern the surface of the body, are easily appreciated. If we apply certain irritants to the skin, inflammation is developed under the eyes of the observer. Occasionally, too, inflammation of the alimentary tube, and of the air passages, is induced, by powerful irritants received into those channels; but, more commonly, internal inflammation is developed spontaneously,—or, in other words, we are unable to discover the immediate cause. Most commonly, perhaps, it is owing to partial and irregular exposure of some part of the body to cold and moisture; yet it is rare, that this morbid impression is made directly on the membrane of the air passages, either by cold alone, or by cold combined with moisture. In the arctic regions, no inconvenience has been experienced from receiving into the lungs air at a temperature of from 55° to 70° below the zero of Fahrenheit's scale. The

character of the atmosphere, as to heat and dryness, varies so much, that the air passages are accustomed to resist its action; but if a part, habitually dry and covered, be exposed to cold and moisture; or if cold air be suffered to impinge for a time on a small surface, few persons escape disorder of some kind. These partial exposures are proverbially noxious.

Lastly. In addition to the common causes of inflammation, there are others—as already remarked—of a *specific* character, as the contagion of smallpox, and other morbid poisons.

Treatment.—On the treatment of inflammation in general, it will be the less necessary to expatiate, in consequence of the full therapeutical details given under the inflammations of different organs. It is scarcely necessary to say, that in this morbid condition, as in all others, regard must be had to the state of the patient; the character of the inflammation, whether produced by common or specific causes; the tissue in which it is seated; its character, whether acute or chronic, &c. &c.

Although active inflammation demands the vigorous employment of the most potent antiphlogistics, there are other forms,—for example, the erysipelatous, in unhealthy individuals, and chronic inflammation in many of its stages,—which may demand a different course. The rule, laid down by those who prescribe for names, rather than for pathological conditions,—that wherever inflammation exists, antiphlogistics are demanded,—is injurious and unfortunate, and has often led to erroneous practice.

A great difficulty with the therapist, in many cases of external inflammation, consists in his not being able to determine in all cases,—whether the atonic condition of the extreme vessels induced by over-distension, or the excited state of the vessels communicating with them, be the condition which more especially requires attention;—hence, the difficulty of deciding in certain cases, whether astringents or slight stimulants, or the opposite plan of treatment—the antiphlogistic or soothing—ought to be adopted. This difficulty often impresses the practitioner; and, not unfrequently, he finds himself compelled to resort empirically to one set of applications, and if they should not succeed, to have recourse to the other. In some varieties of burn, which is an inflammation of the skin, excitant applications are found of service; in others, powerful antiphlogistics. In cases of ophthalmia, in which the extreme vessels have remained dilated for a length of time, essential benefit has been derived from dropping strong stimulants upon the inflamed surface; and even from radiant caloric applied to the eye as hot as it could well be borne.

The essential indications in inflammation are generally; *First*, to reduce the amount of stimulus or of blood circulating in the vessels, and the activity of the heart and arteries. *Secondly*, to diminish the excitement more directly in the inflamed part, and to modify the morbid condition of the extreme vessels.

The chief agents, employed with the first view in active inflammation, are sedatives,—as blood-letting; tartrate of antimony, given, either in contra-stimulant doses, as a revellent, or to excite and keep up nausea, as a sedative; and digitalis, colchicum and the hydro-

cyanic acid, given as sedatives. Of the sedative agents, blood-letting is the most important. It reduces directly the amount of stimulus in the vessels, and diminishes the local excitement. Elsewhere (*General Therapeutics*, p. 397, Philad. 1836, and *General Therapeutics and Mat. Med.* vol. ii. Philad. 1843,) the author has entered into a consideration of the rules that ought to guide the practitioner in the use of this important agent; and has especially dwelt on the importance of not pushing it so far as to induce symptoms, that may be fairly referable to loss of blood, rather than to the morbid actions, for the removal of which it was practised. Even when blood-letting is clearly indicated, it is always, perhaps, improper to push it to the extent of inducing temporary collapse, as in syncope; for in all cases reaction succeeds, and the full amount of benefit is not derived, as in cases where the lancet is used to such an extent as to diminish the amount of the circulating fluid without endangering violent reaction.

Recent researches into the constitution of the blood in various diseases have led him to infer, that when once the blood has commenced producing an excess of fibrin, a certain time is required before this disposition is exhausted, or in other words, the process is self-limited. Still he thinks at the earliest period, when the solid is merely congested, and the fibrin of the blood is scarcely above its healthy proportion, the advancement of the disease may be arrested by blood-letting, and in certain cases it may be cut short.

Of late, the arrest of the blood in the veins of the extremities—*hæmostasis*—has been employed by Professor Nathan R. Smith, and Dr. Thos. H. Buckler, of Baltimore, as a sedative agent to relieve inflammatory engorgement in parenchymatous organs, or inflammations of membranous tissues; to remove hyperæmia and to restore the balance of the circulation; as well as to prevent hemorrhage resulting from either rhexis, diapedesis, or from wounds inflicted upon blood-vessels. If a bandage be applied around a limb sufficiently tight to arrest completely the venous circulation, and at the same time allow the arteries to pulsate, the blood within the distended veins is cut off as it were from the general circulation: a depletory effect is in this manner induced, and if the arrest of the venous circulation be practised on all the extremities at once, the skin becomes relaxed; the force of the action of the heart and arteries is weakened; and if the ligatures be applied when the heart and arteries have been deprived of a portion of the ordinary amount of blood, owing either to anæmia or to bleeding, so that the vessels are partially empty, it is found, according to Dr. Buckler, that the exhalents of the skin pour out the most copious perspiration,—that the patient complains of a light feeling about the head, of weakness and sickness of stomach; and if the carotids be pressed upon, they are discovered to be scarcely pulsating, and all the phenomena of syncope are found to take place.

Possessed of such powers, *hæmostasis* may, doubtless, be found a valuable agency in the phlegmasiæ more especially, and it has been urged upon the notice of the profession by Dr. Buckler. "*Hæmostasis*," he strongly remarks, "accomplishes what no other known remedy is capable of doing. It puts syncope under our control, both

as to duration and degree. It is capable of exerting, under given conditions, a more powerful control over the circulation than the lancet, antimony, or digitalis, and controls the heart's action without exhausting the vital forces, or giving rise to the ill consequences, which the protracted use of most of the sedative agents is likely to do. And, finally, hæmostasis in the hands of judicious practitioners, must prove the means of saving an incalculable amount of blood; to say nothing of the incredible benefits, which would be derived from its adoption by those Sangrados of our art, who bleed empirically in all conditions, and who, in many cases, like the fabled vampire, suck the living current until the vital powers are spent."

It is, of course, only in the active stage of inflammation, that copious blood-letting can be required, or be proper. In the chronic form, topical blood-letting may be more beneficial,—at times, by relieving the system of a portion of blood; but less in this way, than by diverting the current towards the part whence the blood flows; and acting revulsively in another manner, by the irritation from the leech-bites or the wounds made by the cupping instruments.

Next to sedatives, revellents are the most powerful remedies in inflammation. Where the disease is not seated in parts that can be irritated during their operation, emetics and cathartics often act most beneficially by concentrating the vital manifestations towards the stomach and intestines. Blisters, too, as well as pustulation by the tartrate of antimony and potassa, croton oil, &c., are excellent derivatives when the force of inflammatory action has been somewhat subdued by the appropriate employment of sedatives. In the violence of inflammation, when the blood is already surcharged with fibrin, the inflammation, that results from any cutaneous irritant, extensively applied, may still further augment the proportion of the fibrinous element, and thus be productive of disadvantage.

With the view of its revellent action, mercury is extensively employed in many phlegmasiæ, but less so in others; and the same may be said of opium, which, in large doses, is a precious sedative. There are many cases, too, in which it proves most salutary by deadening the sensibility of the nervous system, and thus preventing those reflected irradiations, which react upon the inflammation, and doubtless often augment it.

In regard to topical remedies to the inflamed part, where it can be reached, soothing and excitant applications are employed, according to circumstances not always appreciable or easily designated. As before remarked, where the atonic condition of the extreme vessel predominates, and especially if there be not much increased action, hot and excitant applications may be needed;—on the contrary, where the increased action of vessels is considerable, cold and sedative applications will be more beneficial. In many cases, experiment alone can indicate which ought to be preferred.

The subacute form of inflammation requires a treatment based on the same general principles as the more active; whilst in the chronic, more is to be done by revellents than by depletives or sedatives; and,

not unfrequently, as in certain forms of unhealthy inflammation, excitants carefully exhibited may be required throughout.

In every form of active inflammation, mental and corporeal quiet should be enjoined, and the diet should be spare and unirritating. The same may be said of the diet in the subacute and chronic forms; but, where excitant remedies are considered advisable, it may be of a more nourishing character. The chronic forms, which have resisted every variety of treatment, occasionally yield at length to the thorough revulsion effected by change of air, society, and scenery. The special adaptation, however, of particular agencies to the inflammations—common and specific—of particular organs, can only be considered under those heads.

BOOK IV.

DISEASES OF THE GLANDIFORM GANGLIONS.

THE terms—*glandiform ganglions*, *adenoid* and *vascular ganglions*, *blind glands*, *aporic glands*, &c., have been given to certain organs, which resemble the glands in many of their characters, and yet differ widely from them in others. These organs are the spleen, the thyroid, and thymus glands, the supra-renal capsules, and the lymphatic ganglions or glands, commonly so called. All these bodies are considered, by most physiologists, to be mediately or immediately connected with the circulation of the blood and lymph; and hence the consideration of their diseases properly follows that of the diseases of the circulatory organs. They differ from glands in having no excretory ducts. They are formed of modified cellular tissue, blood-vessels, lymphatics and nerves,—the whole enclosed in a cellular sheath, which sends prolongations internally. They are all situate in the course of the lymphatic or venous circulation, and appear to exert some action on the absorbed matters, to fit them for conversion into blood. Some of them, indeed,—as the spleen, thyroid, and thymus,—have been conceived to act as diverticula to the blood under particular circumstances, and consequently to form more immediately a part of the sanguiferous system; hence their diseases have occasionally been treated of under the diseases of the circulatory apparatus. The glands, on the other hand, are formed of ramified prolongations of mucous membrane, of blood-vessels, lymphatics, and nerves; the whole aggregated and enveloped by cellular tissue. They are placed at the confines of the arterial circulation, and appear to be concerned in the depuration of the blood. Hence—as has been well remarked by M. Béclard—the *vascular ganglions*, which are organs of absorption and assimilation, ought not to be confounded with *glands*, which are organs of depuration and excretion—their functions being of an opposite character.

The diseases of some of those bodies are obscure and unimportant, and will, therefore, demand little or no attention.

CHAPTER I.

DISEASES OF THE SPLEEN.

THE diseases of the spleen are involved in a good deal of obscurity. Where the functions of an organ are not very intelligible, it is easy to understand, that its pathology may be obscure. This is the case with the spleen. There are many phenomena, however, that reveal to us morbid conditions of this organ, which are almost always secondary or dependent upon a morbid state of other organs or functions.

The spleen—it must be borne in mind—is situate deeply in the left hypochondriac region, beneath the diaphragm, above the left kidney, and to the left of the stomach. Its position is such, that any considerable enlargement might interfere by pressure with the functions of important organs, and might impede the passage of the blood along the great vessels. It is loosely attached by folds of the peritoneum and by vessels; but in certain states of disease it becomes more firmly united by the effusion of coagulable lymph; and occasionally, but very rarely, escapes from its bonds, and moves to and fro in the cavity of the abdomen. In the very recent subject, it is of a grayish-blue colour, which, a few hours after death, changes to a purple, so that it resembles a mass of clotted blood. Its size varies materially in health, but the medium length may be estimated at about four and a half inches, and the average weight about eight ounces.

For the different views that have been entertained in regard to the functions of the spleen, the author may refer to another work, (*Human Physiology*, 5th edit. ii. 300, Philada. 1844.) The fact that it has been lost, and yet the individual has not suffered in a marked manner in any of his important functions, renders it extremely difficult to arrive at any theory regarding its precise offices. Of forty dogs, operated upon on the same day by M. Dupuytren, by removing their spleens, without tying any vessel, but merely stitching up the abdominal wound, none were attacked with hemorrhage. Half the dogs died within the first eight days from abdominal inflammation; the other half got well without any accident at the end of three weeks at the farthest. At first, they manifested a voracious appetite, but this soon passed off. They fed on the same aliment as before, and the same drinks, took the same quantity of aliment, and digestion appeared to be accomplished in the same time. None of the functions, indeed, presented any modification, nor did dissection reveal any change in the abdominal circulation.

The spleen would not seem to be very liable to idiopathic affections; but it frequently participates in other diseases, and especially in those of a malarious character, as intermittent fever, as well as in typhoid fever and typhus.

In 1839, according to the Report of the Registrar-General, the number of deaths from diseases of the spleen, in England and Wales, was 29. In this country, the proportion is doubtless greater.

1. INFLAMMATION OF THE SPLEEN.

Synon. Splenitis, Inflammatio Splenis, Inflammatio Lienis, Empresma Splenitis; *Fr.* Splénite, Inflammation de la Rate; *Ger.* Milzentzündung, Entzündung der Milz.

Acute inflammation of the spleen is uncommon, and the same may, perhaps, be said of the chronic form, unless we regard—with some—hypertrophy of the organ to be the sequel of such a pathological condition, which, as will be seen afterwards, we are not justified in doing.

Diagnosis.—The symptoms, that would appear to indicate splenitis, are;—pain in the left hypochondriac region, augmented on pressure, and sometimes extending over the whole of the abdomen, so as to give rise to a belief in the existence of some inflammatory condition of the peritoneum or intestines. As in hepatitis, the pain in the side is augmented by coughing, or by drawing a full breath. Along with these symptoms, and dependent somewhat upon the degree to which the inflammation is present, there are the ordinary phenomena of inflammatory action in the general system, and the stomach usually sympathizes greatly. Such are the chief ordinary signs of splenitis: but it must be admitted, that they are often insufficient to establish the diagnosis. Cases frequently occur, in which the practitioner has great difficulty in deciding as to the precise organ implicated, when the functional phenomena, above mentioned, are present. Taken together, however, they afford a strong presumption, that the inflammation is seated in the spleen.

Not unfrequently the spleen has been found diseased on dissection, when no symptoms during life have indicated disease of that organ, rather than of any other in the abdomen.

Chronic splenitis may be the result of the acute form, or it may supervene in the course of some other disease. It is indicated by the same general symptoms, and may end by inducing dropsy or marasmus.

Causes.—The causes of acute splenitis are generally of a mechanical nature, as blows or falls on the left side, or wounds implicating its tissue. It has been affirmed by M. Andral, that acute primary splenitis is almost, if not wholly, unknown: but it is easy to comprehend, that an idiopathic inflammation may arise in the spleen, in the same manner as in the liver.

Pathological characters.—The inflammation may be found to have been seated in the substance of the spleen itself, or in its envelope, and it may present various appearances. The inflammation may have ended in softening or in induration of the organ; but these conditions, when observed on dissection, are not perhaps sufficient evidence of the previous existence of inflammation. They may be dependent upon a vice of nutrition, like similar conditions of other organs. The affection may also end in suppuration, and the pus may either be collected in one cavity or in several, and it may be discharged into the cavity of the peritoneum; or, by the formation of adhesions between the parietes of the abscess and the neighbouring parts, it may pass into the stomach, intestines, left side of the chest, &c. An interesting

case of probable suppuration of the spleen has been recorded by Professor Gross, of Louisville. The pain, which was of a sharp, lancinating character, similar to that which accompanies acute pleuritis, continued almost uninterruptedly for nearly two weeks. The spleen gradually augmented in volume, and at the expiration of this time, it projected over towards the umbilicus, forming a large rounded tumour between the linea alba and the margin of the ribs. In a short time, fluctuation was perceived, and, on introducing a trocar, about three pints of fetid, dark-coloured matter, issued from the incision. The wound was kept open for several days, by means of a tent; but in a short period it closed, and the patient's health began gradually to improve. This case supervened on repeated attacks of intermittent fever, and was characterized by excessive irritability of the stomach, great pain and tenderness, and an impending sense of suffocation,—caused, no doubt, as Dr. Gross suggests, by the pressure of the enlarged organ upon the diaphragm. The disease was probably suppuration of the spleen; yet doubt must exist, as no opportunity occurred for establishing the point by dissection. It may have been connected with, but not originating in, the spleen.

Gangrene of the spleen is a very unusual occurrence.

Treatment.—Acute splenitis requires the same management as the like pathological condition of other internal organs;—general and local blood-letting, followed by revellents, the warm bath, cathartics, rest and regulated diet. The chronic form must be treated by local bleeding and revellents, and by the other agents that are advised under Hypertrophy of the organ.

II. HYPERTROPHY OF THE SPLEEN.

SYNON. Hypertrophia seu Supernutritio splenis seu lienis, Intumescencia lienis, Splenalgia subinflammatoria chronica, Splenonecus, Splenemphraxis; *Fr.* Hypertrophie de la rate, Hypersplénopathie, (*Piorry*;) *Ger.* Milzgeschwulst.

Hypertrophy of the spleen must be distinguished from vascular hyperæmia or engorgement—the latter disappearing gradually with the cause that induced it; whilst the former is an addition to the substance of the viscus, which may remain for life, or disappear under agencies to be mentioned hereafter. Vascular engorgement of the organ,—*splénohémie* of *Piorry*—is present in many diseases, and strikingly so in typhoid and intermittent fevers. It is rare in the former disease not to meet with the spleen tumid and more distinctly prominent; and there is probably no severe case of intermittent fever, which does not exhibit more or less splenic enlargement. The fact is one of the strongest evidences in support of the function that has been ascribed to the spleen, of serving as a diverticulum to the blood when thrown into irregular distribution from any great disturbing agency. Such we may consider the paroxysm of an intermittent to be. During the cold stage, the blood leaves the surface of the body, and circulates more largely in the internal organs; hence the spleen becomes engorged; and under the repeated recurrence of the paroxysms, it may be understood, that the organ itself may become more permanently engorged, and to such an extent as to require time before it can

regain its wonted size; or its nutrition may become modified so as to constitute hypertrophy.

In highly malarious districts, splenic disease, of the nature under consideration, is attended with a series of symptoms which have been termed, in the aggregate, *splenic cachexia*; and although this *vice* of the whole system of nutrition is more frequently seen in torrid climes we not uncommonly meet with it here. The patient is sallow, almost anæmic; liable to dropsical effusions, and to hemorrhages, which are checked with difficulty, owing to the irregularity in the circulation, which is partly owing to the modified transmission of blood through the spleen. A writer on tropical diseases, Dr. Twining, has described the character of this cachexia accompanying splenic engorgement and hypertrophy, in a manner that would apply to a similar condition in a less degree which we yearly witness in our highly malarious districts. "During the continuance of vascular engorgement of the spleen," he observes, "patients are very prone to foul sloughing ulcers from slight wounds or bruises. When local inflammations or ulcers exist in patients who are suffering from the severer degrees of spleen disease, those peculiar characters of active inflammation, and that healthy constitutional energy on which the deposition of coagulable lymph depends, and by which we find injuries repaired, and the extension of ulceration, as well as the progress of sloughing arrested on ordinary occasions, seem to be in a great measure, if not entirely, subverted. Blood drawn from veins of patients suffering from splenic cachexia varies much in appearance: sometimes it coagulates imperfectly, and no serum is separated; in other cases, the cruor is black and soft, and after being exposed to the air, its surface does not generally assume that more florid colour which we observe on the top of a coagulum of blood drawn from the vein of a healthy person; and it seldom exhibits a buffy coat, except when ardent pyrexia is present, or where the disease is attended with acute pain in the side. The serum, when heated, coagulates as firmly as that of a healthy person, but the coagulum is more friable and less tough, and it frequently has a slight yellowish appearance: sometimes it has a greenish colour. During the vascular engorgement of the spleen, several of the characteristics of scorbutus are present: there is a tendency to hemorrhage from slight causes or injuries; leech-bites, blisters, and issues occasionally ulcerate during the rainy season, and, at times, the slightest ulcerations are apt to slough. Foul gangrenous ulcers of the lips and gums are liable to form, in consequence of slight local irritation, (and often without any obvious cause,) whereby the jaw-bones become carious and exfoliate, and the teeth fall out. Hæmoptysis, as well as hæmatemesis, occasionally occurs when the spleen is very large; and probably the blood, which is vomited, sometimes flows into the stomach from vessels communicating directly with the splenic vein, as the intumescence of the spleen has been observed in some cases to be immediately reduced by these evacuations of blood. Profuse hemorrhages from the lungs or stomach sometimes suddenly destroy life; but we see other cases in which the functions of the system not having been much disordered previously,

the patients recover quickly after these profuse losses of blood; the enlargement of the spleen for the time subsides, and the disease is thus entirely cured. The results of these spontaneous hemorrhages should not be forgotten in deciding on our plans of treatment in ordinary cases of spleen disease."

Diagnosis.—Hypertrophy of the spleen may be detected by careful observation. The increase of size may be partial or total; and the degree to which it exists may be somewhat determined by the dulness of sound on the percussion of parts which ordinarily yield a clear sound. If the enlargement be upwards towards the diaphragm, it may not be detected by pressure; and, on the other hand, it must be borne in mind, that the fact of the viscus being felt distinctly beneath the ribs may not be a positive evidence of enlargement, but may be owing to some effusion into the left side of the thorax pressing upon the diaphragm and slightly dislocating the spleen. Pressure and percussion will generally, however, indicate the existence of hypertrophy.

Causes.—It has been already remarked, that not only vascular engorgement but hypertrophy of the spleen may be owing to malarious influence, or to the diseases induced by it. Induration with enlargement of the viscus, is indeed so common a sequence of intermittent fever, that it has received the names, *Ague-cake*, *Placenta febrilis*, &c. In the course of the intermittent and remittent fevers of Bengal, and of almost all the low and marshy districts in India, enlargement of the spleen is said often to take place so suddenly, that in a few days it can be seen as well as felt, extending far below the cartilages of the false ribs. The degree of enlargement is variable: it is very common, we are informed, to see the spleen extending downwards on a level with the umbilicus, and laterally from its usual situation as far as half-way between the cartilages of the ribs and the umbilicus. In extreme cases, the diseased spleen fills more than half the abdomen, extending to the right of the navel, whilst its lower extremity reaches the left iliac region. Several cases of this enormous tumefaction, according to Mr. Twining, are to be seen yearly in Calcutta; and some of them recover.

Pathological characters.—Hypertrophy of the spleen may be induced by nutritive irritation of the organ, in which case it appears to be entirely healthy, and merely enlarged. This has been denied; and Professor Gross, of Louisville, remarks:—"Some writers, and, amongst others, Dr. Abercrombie, speak of what they call simple enlargement of the spleen, unaccompanied with derangement of structure; if such a state exists, I have never met with it, and am much disposed to doubt the possibility of its occurrence." "This remark," he adds, "applies, of course, exclusively to cases of permanent hypertrophy, and has nothing to do with that tumid and erected condition of the spleen which results from the temporary congestion that occurs during the cold stage of intermittent fever, or from violent emotions of the mind."

The author has met with several cases of hypertrophied spleen, in which the most careful examination did not indicate any change from the characters presented by the organ when in health; and he can as

readily comprehend the occurrence of hypertrophy of the spleen without inflammation, as he can that of tumours or of any form of polysarcia. If the vessels of the system of nutrition, whose office it is to take up, do not execute their functions in an equal ratio with those whose office it is to put down, hypertrophy must necessarily ensue. There may be, in such case, nutritive irritation, but without there being any reason to suppose the presence of an inflammatory process. In many cases, however,—probably in most,—along with hypertrophy, the nutrition of the organ is morbidly changed; and it is found to be softer or harder than natural. At times, indeed, it is so soft, that it resembles a clot of blood enveloped in a thin membrane, which, in the advanced stages of softening, readily gives way. The enlargement, in such cases, is more or less globular. In other cases, it is of the oblong kind; and the organ is more firm than natural, and the edge thin and notched; and lastly, a uniform opaque-white, or milky colour of the peritoneal coat is observed,—the membrane being unusually tough, like a thin bladder that had been dried and afterwards wetted in hot water,—the substance of the spleen itself being, at the same time, soft and flexible. This is said to have been observed on the necroscopy of persons who had been long subject to agues.

Treatment.—This must be regulated greatly by the accompanying symptoms. If the enlargement of the spleen be observed in the course of febrile affections, it will remain as long as these affections continue; after which it gradually subsides. In the cases of hypertrophy that follow long protracted intermittents, the same plan of management, which is demanded for the cure of the intermittent, is appropriate. The sulphate of quinia, in ordinary doses, has been found highly efficacious; as well as the subcarbonate of iron, in full doses, (gr. xv.—xxx. ter die.)

Of late, strong testimony has been induced in favour of very large doses of the sulphate of quinia (gr. xij—lxxx. and more, in the 24 hours;) the most obstinate cases having yielded to continuance for a few days of this treatment. The sulphate of quinia has also been used both endermically and iatroleptically, but this course appears to have had more effect upon the fever than upon the splenic enlargement.

R.—Quiniæ sulph. gr. xl.—l.
Adipis, 3ij.—M.

Some of this ointment to be rubbed on the groins and armpits three times a day.

In most cases, the action of the sulphate of quinia is aided by the previous abstraction of blood, by cupping or leeches, from the left hypochondrium. Occasionally, the application of a mercurial plaster, with which six or eight scruples of the sulphate of quinia have been incorporated, has removed the enlargement effectually. The plaster must be renewed, when the substances of which it is composed are exhausted, which requires from 40 to 50 days. This method, however, must be slow in its action.

In some cases, where the enlargement is very great, the viscus weighing eight or ten pounds, the treatment has, of course, to be

protracted. No better preparations exist than the combinations of bromine or iodine with iron, (*Ferri. iodid. vel bromid. gr. ij. ter die*), gradually increasing the dose. The iodide of iron is preferable to the other preparations of iodine, in the generality of cases, owing to the concomitant cachexia, which is rarely absent. Should such not be the case, however, the ordinary preparations of iodine, (*Tinct. iodin. gtt. x. ter die*; vel *Potassii iodidi, gr. ij. ter die*), in gradually increased doses, may be prescribed.

The preparations of mercury have been frequently prescribed in these cases; but care must be taken not to push them to ptyalism for fear of inducing an augmentation of the cachectic condition. A combination of mercury and iodine may be given with much advantage, where it is considered proper to prescribe the former.

R.—Hydrarg. iodid. rubr. in syrup. benè distributi, gr. v.
Micæ panis.

Sacchari albi pulv. aa q. s.—ut fiant pilulæ lx.

Dose, two, morning and evening; to be gradually increased.

Along with the internal use of the preparations of iodine, iodine alone, in the form of ointment,^a may be rubbed on the region of the spleen night and morning; or the ointment may be composed of iodine and iodide of potassium;^b or of iodine and mercury.^c

^a R.—Iodin. gr. iij.
Adipis, ʒij.—M.

^b R.—Iodin. ʒss.
Potass. iodid. ʒj.
Adipis, ʒij.—M.

^c R.—Hydrargyri iodid., vel
Hydrarg. iodid. rubr. ʒj.
Adipis, ʒviij.—M.

When the hypertrophy of the spleen is very great, advantage may be derived from methodical compression by means of an appropriate bandage.

The diet should be regulated according to the attendant phenomena. If symptoms of febrile or inflammatory action exist, it should be restricted. On the other hand, when the splenic cachexia is established, it may consist of animal food easy of digestion; and wine, or porter, or both may be permitted to an extent warranted by the special case. Flannel may be worn next the skin; and, where circumstances admit of it, change of air may prove advantageous.

III. ATROPHY OF THE SPLEEN.

SYNON. Atrophia splenis seu lienis; *Fr.* Atrophie de la Rate.

This is not a very common disease, yet many cases are on record. The viscus has been seen not larger than a walnut. A case has been described, by Professor Gross of Louisville, in which it was scarcely as big as a billiard ball. In this case, it was of a grayish colour, rounded in figure, indurated, almost bloodless, and weighed only one ounce. Both coats were thickened, and the innermost was partially converted into cartilage. The patient—a man, 72 years of age—had died of tubercular phthisis.

It is said to have been observed chiefly in connexion with chronic affections of the alimentary tube, liver and kidneys; with ascites, and

with profuse discharges of blood from different parts of the body. An interesting case of this kind fell under the care of the author, and was exhibited by him to the clinical class of the Philadelphia Hospital, in the winter of 1842-3. The spleen was not larger than an almond: the patient died of dropsy, without any indication of splenic disease.

IV. TUBERCLES, CANCER, CALCAREOUS DEPOSITS, SEROUS CYSTS, AND HYDATIDS, &c. IN THE SPLEEN.

Some of these affections are by no means unfrequent. Tubercles are often met with in children, and they are generally coexistent with similar morbid productions in the lungs. True calcareous productions—scirrhus or encephaloid—rarely occur in the spleen. Calcareous depositions are not common, and the same may be said of serous cysts and hydatids. These and other morbid productions give rise to no symptoms that are pathognomonic; and, accordingly, they are less interesting to the therapist than to the pathologist.

V. DISLOCATION OF THE SPLEEN.

SYNON. Dislocatio splenis seu lienis, Splenectopia.

The spleen may be dislocated or removed from its place, but this must of course be an uncommon occurrence; and, when it does take place, must give rise to phenomena, that are often by no means easy of comprehension. Few such cases are on record. One of a deeply interesting character fell under the author's notice, and has been described by him elsewhere. (*General Therapeutics*, p. 305, note. Philada. 1836.) It happened in the person of an estimable lady, the wife of a physician, who had resided for some time in a malarious region of Virginia; and, whilst there, had suffered from the endemic fever of the country, which had left behind it manifest enlargement of the spleen. During her visit to her family in Baltimore, she was attacked with symptoms of severe thoracic and abdominal mischief, somewhat paroxysmal in their character, which yielded so much to appropriate management that the author, who had been requested by a professional friend,—Professor Hall, of Baltimore,—to see her, considered it unnecessary for him to continue his attendance. She was, at this time, about six months advanced in pregnancy. From this period, the author heard nothing more of her until about a week prior to her dissolution, when he was again requested to visit her two days after her delivery, which had been somewhat premature. She was then labouring under great pulmonary and cardiac distress,—the heart being evidently hypertrophied. She was so much enfeebled, however, that auscultation was postponed, and could not subsequently be practised, as she died in a short time afterwards. On examining the right side of the abdomen,—in which pain had been experienced, especially on change of posture, a large tumour was found extending from the hypochondriac region as far as the pelvis. The umbilical margin of this tumour could be felt distinctly lobated, as if it were shaped like the cactus. The tumour was perceptible in some positions of the patient more than in others, evidently changing its seat in

the abdomen. On examining the urine, she was found to be labouring, at the same time, under albuminuria. Taking these circumstances into consideration, with the fact, that in a fall from a horse, some years previously, she had injured the right lumbar region, and that although she had not experienced any prominent or protracted signs of renal or vesical irritation, she had occasionally suffered from severe pain in the loins, and from some uneasiness in passing the urine, there could be little hesitation in referring the tumour to the right kidney; and, under the whole aspect of the case, in regarding it almost hopeless, and demanding palliative management only. From the time of her delivery, she gradually sank until the period of her dissolution.

On opening the abdomen, the tumour of the right side was found to be an enlarged spleen, which had broken away from its attachments, and was resting, with its convex surface on the brim of the pelvis; the lower extremity of the organ being turned up so as to reach the lumbar region. It was suspended by its peritoneal and vascular attachments, and could be moved freely in any direction. The left kidney was greatly hypertrophied, nearly four times the natural size, mottled on its surface, the cortical substance granular, and the tubular discoloured in parts, and evidently diseased; the pelvis of the organ was enlarged, and the parietes of the ureter were hypertrophied. The left kidney was healthy. In the thorax, the heart was found in a state of hypertrophy, and the right lung completely atrophied, its place being occupied by a purulent or sero-purulent secretion, which completely filled the cavity of the pleura.

Treatment.—It is scarcely necessary to say, that if the dislocation of the spleen be detected during life, no skill on the part of the practitioner can restore it to its former situation. That position must of course be selected for the patient, which gives occasion to the least inconvenience; this will probably be on the left side; but it can rarely happen, that the dislocated organ does not speedily give rise to fatal inflammation of the peritoneum.

CHAPTER II.

DISEASES OF THE THYROID GLAND.

THE situation of the thyroid gland is at the anterior part of the neck, beneath the skin and some subcutaneous muscles. It rests upon the anterior and inferior part of the larynx, and the first rings of the trachea; and passes outwards, so as to overlap, on each side, the great vessels and nerves of the neck. It is formed of lobes and lobules; has a red and sometimes a yellow colour; and presents, internally, cells or vesicles, filled with a viscid, colourless, or yellowish fluid, which appears like a weak gum.

The thyroid gland is larger in the fœtus than in the adult; and, therefore, has been supposed to be inservient, in some manner, to fœtal existence. It continues, however, through life, receives large arteries, as well as a number of nerves and lymphatics; and, consequently, the inference would seem to be, that it ought to fill some important office throughout the whole existence. It has been supposed, that the absorbent vessels of the thyroid convey its peculiar secretion to the great veins of the body. The idea, indeed, prevails—as previously remarked—that all the glandiform bodies are concerned in the function of absorption; but if we admit this, it is impossible, in the present state of knowledge, to decide in what manner they act.

The average weight of the thyroid is about an ounce.

It may suffer from acute inflammation and its results, but this happens, spontaneously, very rarely, and only, it has been affirmed by Dr. Copland, in scrophulous persons. The physician is, indeed, but seldom consulted, except for one of its diseased conditions—*hypertrophy*.

I. HYPERTROPHY OF THE THYROID GLAND.

SYNON. Bronchocele, Deironcus, Struma, Panus thyreoideus, Tumidum Guttur, Hernia Gutturis, Thyrocele, Thyreocnus, Thyreophyma, Thyremphraxis, Thyreophraxia, Derbyshire Neck, Swelled Neck; *Fr.* Goitre; *Ger.* Kropf, Anschwellung der Schilddrüse.

Hypertrophy of the thyroid gland, to a slight extent, often exists without exciting any attention; but it is, occasionally, to such a degree as to induce an unsightly deformity.

Diagnosis.—In this, there is usually no difficulty. The patient's attention, or that of the friends, is directed to a swelling in the situation of the thyroid, sometimes commencing in both lobes; but, at others, in the isthmus between them. This swelling may proceed to a certain extent and no farther, and it may be so small as not to induce the patient to seek for medical advice; at times, however, the hypertrophy goes on increasing, until ultimately it invades the whole of the anterior part of the neck from the chin to the sternum. It is rarely equable, but admits of the distinction being made between the

lobes and the isthmus; and it is commonly more developed on one side than on the other.

In the early periods of the disease, and often for years, the tumour is soft and elastic, but in the progress of time, it becomes harder, and, in some cases, ultimately acquires the consistence and feel of fibro-cartilage.

Causes.—Of the causes of goître, nothing satisfactory has been offered, until of late. It was at one time universally supposed to be owing to the drinking of snow-water from the summits of lofty mountains by the inhabitants of the valleys beneath;—but the fact that the disease exists in countries in which snow is never witnessed—as in Sumatra—was sufficient to dispel this idea. In Captain Franklin's expedition to the polar sea, goître was found to be very prevalent at Edmonton, where the soil is calcareous. It was discovered, according to Dr. Richardson, that the disease attacked those only who drank of the water of a certain river—the Saskatchewan—and that the natives, who confined themselves to *snow-water* in the winter, and drank of the small rivulets which flow through the plains in the summer, were exempt from it. These facts naturally draw attention to the water of districts as a cause of the disease; indeed, in many places, it has been usual so to ascribe it. At Nottingham, in England, where it prevails, the common people refer it to the hardness of the water,—that is, to its impregnation with calcareous salts; and a writer on bronchocele, Dr. Inglis, affirms that the presence of magnesian limestone, always implies the co-existence of the disease. If to this testimony we add that of Mr. M'Clelland, a recent writer in India,—who states, that in the course of his professional inquiries, which extended over 1000 square miles, and were prosecuted without any regard to theory, no instance occurred, in which goître prevailed to any extent, where the villages were not situate on or close to limestone rocks,—the evidence is strong, indeed, that goître may be owing to the drinking of water containing calcareous salts. Still, it is proper to observe, that there are many places, as the Valois, in which there are no limestone formations; and in other cases where goître prevails, the water contains no calcareous salts. Although it is probable, therefore, that water, containing calcareous salts, may afford a predisposition, something, at present inscrutable, in the locality is necessary for the development of the disease; and, perhaps, after all, we know no more in reality, of the immediate cause of this endemic, than we do of that of endemic diseases in general.

The disease is known to prevail, especially at the base of lofty mountains, in many parts of the globe. It is endemic at the foot of the Alps—where it is frequently associated with cretinism—and of the Apennines; in Derbyshire, where it is called the *Derbyshire neck*; at the base of the South American Andes, where it is called *papas*; and in the valleys of the mountain chains in most parts of this country. The author has seen many cases of it in the vicinity of the Blue Ridge, in Virginia; and it is prevalent in the mountainous regions of Pennsylvania, New York, New Hampshire, Vermont, &c. This

very day, (Dec. 18, 1840,) he has exhibited to the class at the Philadelphia Hospital, a case of soft goître in a female, recently from Baden, in Germany, where the country is mountainous, and the disease by no means uncommon. In this case, there is the peculiarity of a varicose condition of the external jugular vein and its various tributaries, probably produced by the pressure of the enlarged thyroid gland, preventing the ready return of the venous blood to the heart.

But although most frequently seen in deep valleys of mountainous regions, it is sometimes endemic in lofty situations:—for example, at Bogota, 6000 feet above the level of the sea.

Goître is much more common in females than in males. Of 49 cases, according to Mr. A. Crawford, admitted into the Hampshire County Hospital, England, in ten years, 48 were women. Of 70 patients, treated in the Chichester Infirmary, in nine years, two only, according to Dr. Watson, were males, and they were boys of a very feeble and feminine habit, and backward for their years. Of 25 or 30 cases, treated by the author, all were females. It would appear, however, that in Switzerland, and in some parts of India, where the disease prevails extensively, the proportion of males is greater. The disease is rarely seen before the age of puberty; but cases have been met with in the new-born.

Pathological characters.—It has been remarked, that the characters of the tumour are different at different stages of its existence. At first, it is soft; but the texture gradually becomes of greater consistence, until, ultimately, it may acquire a cartilaginous hardness. It may be naturally inferred, that the internal character of the tumour will correspond with these external indications. In the soft condition, when cut into, it generally gives issue, on pressure, to a ropy gelatinous fluid. In the more chronic cases, the consistence is greater; and, owing to the enlargement of the cells which enter into its composition in the healthy state, it appears to be interspersed with numerous cysts of about the size of a pea, which contain a fluid varying in character, but generally glairy. In very old cases, osseous depositions exist, and these are frequently accompanied by cartilaginous formations. The latter may also exist alone. Occasionally, the whole organ is transformed into an osseous capsule, filled with various kinds of matter, especially the jelly-like, the suety, and the meliceric. Dr. Gross states, that he has a specimen of the kind in his cabinet; one of the lobes has almost disappeared; the other is converted into a firm solid capsule, as hard as bone, though scarcely a line in thickness. On sawing through this osseous tumour, which does not exceed the volume of a hen's egg, he found it filled with a white, curdy, friable substance, not unlike semi-concrete cheese.

Hypertrophy of the thyroid gland—like other hypertrophies—has been presumed, by many pathologists, to be the result of chronic inflammation; but the remarks on hypertrophy of the spleen are equally applicable here. Any loss of balance between the vessels of nutrition that deposit, and those that take up, which induces a preponderance of the deposition by the former, may give rise to it. That this, however, is often combined with chronic inflammation, is shown

by the concomitant alterations of structure; but these are probably concomitants only, and the inflammation, which gave rise to them, may have had nothing to do with the production of the hypertrophy itself.

Treatment.—The discoveries of modern chemistry have rendered the management of this disease much more simple than it was formerly. It had long been known, that under the administration of burnt sponge, the nutrition of the hypertrophied thyroid was frequently so modified, that the enlargement gradually disappeared; but as it was a matter of difficulty to discover any agent in it, to which the remedial efficacy could be referred, many therapeutists were not disposed to place much reliance upon it, and frequently subjected it to very imperfect trials. The discovery of iodine in it led to the employment of that agent, and soon the published cases of its wonderful effects were numerous. Nor, as in the case of many other therapeutical agents, brought forward with equally lofty pretensions, has it declined in the estimation of practitioners. The author has succeeded in wholly removing nearly twenty cases of soft goitre by it; and multitudes have been equally successful. It has been recommended, by some, that its exhibition should be preceded by blood-letting; and, as the abstraction of blood facilitates absorption, this may be advisable,—especially where little, if any, effect seems to be induced by it, after it has been administered for some time. By many persons, the internal administration of iodine has been trusted to alone, either in the form of the tincture (gtt. x. ter die in aq. sacchar.), of the solution of the iodide of potassium, (same dose as the tincture,) or of Lugol's solution—which is a solution of the ioduretted iodide of potassium.

R.—Iodin. ℥j.

Potass. iodid. ℥ij.

Aquæ, f 3vj.—M.

Dose, ten drops, three times a day.

Whatever be the preparation of iodine employed, it must be persevered in for a length of time, and the dose be gradually increased. The author has never witnessed any marked benefit from it until it had been continued for at least a month.

Others prefer the external administration of iodine in the form of the *unguentum iodini*,^a the *unguentum potassii iodidi*,^b the *unguentum iodinii compositum* of the London Pharmacopœia,^c the *unguentum hydrargyri iodidi*, or the *unguentum hydrargyri biniodii* of the same Pharmacopœia,^d &c. &c.

^a R.—Iodin. gr. iij.

Adipis, 3ij.—M.

A drachm to be rubbed on the tumour twice a day.

^b R.—Potass. iodid. 3ss.

Adipis, 3iss.

^c R.—Iodin. 3ss.

Potass. iodid. 3j.

Alcohol. f 3j.

Adipis, 3ij.—M.

^d R.—Hydrarg. iodid., vel. biniodid. 3j.

Ceræ albæ, 3ij.

Adipis, 3vj.—M.

The various other preparations of iodine may likewise be prescribed. (See the author's *New Remedies*, 4th edit. Philadelphia, 1843.) Some have advised, that the external use of the remedy should

be prescribed first; and that, at a later period, it should be directed internally also.

The preparations of bromine, as well as bromine itself, appear to be equally efficacious in the treatment of goître, but they are not as much employed.

It is not improbable but that the animal charcoal in the burnt sponge may be possessed of some efficacy in modifying the nutritive actions in the hypertrophied thyroid. It is asserted, by Weise, that goître, even when scirrhus, has been made to disappear under the use of animal charcoal, especially when associated with burnt sponge.

R.—Carbon. animal. gr. vj.

Spong. ust. gr. xij.

Glycyrrh. pulv. ʒss.—M. et divide in partes vj. æquales.

Dose.—One, night and morning.

Many other therapeutical agents, that modify the function of nutrition, as the *liquor potassæ*, the carbonate of soda, the chloride of calcium, mercury, &c., have been prescribed, but they are far inferior to those above mentioned.

When the tumour is so large as to threaten suffocation, and does not yield to the remedies recommended, the aid of the surgeon becomes necessary,—either to extirpate the hypertrophied gland, or to interfere with its nutrition by tying the thyroideal arteries, or by passing a seton through it. These, however, must be the last resource, and can very rarely be required.

CHAPTER III.

DISEASES OF THE THYMUS GLAND, AND SUPRA-RENAL CAPSULES.

THE thymus gland—being an organ of foetal existence chiefly—is not of much interest in its pathological relation. It is situate in the superior mediastinum. Its appearance is glandular, and its colour various. In the progress of age, it diminishes, so that in the adult it is extremely small, and in old age can scarcely be discovered amongst the cellular tissue. It is surrounded by a thin cellular capsule, which sends prolongations internally, and divides it into lobules of unequal size, in which several vesicles, filled with a milky fluid, are distinguishable.

The ordinary weight of the thymus at birth is said to be about half an ounce; but this probably exceeds the average. Its size is very variable.

The chief pathological condition of interest is hypertrophy of the organ which is sometimes met with, and has been regarded as a cause of asthma in children. (See THYMIC ASTHMA.) In some cases, the gland has been found to weigh an ounce or two, and to be so voluminous as to compress not only the lungs and the trachea, but the pneumogastric nerves in their passage downwards.

The disease appears to consist in simple hypertrophy. Often no change of structure is perceptible.

Various degenerations—*calculous*, *scirrhus*, &c., of the thymus are recorded to have been met with, but they are so rare as not to merit any more than a mere mention.

THE SUPRA-RENAL CAPSULES, situate above the kidney, and which were at one time supposed to be the seat of atrabilis or melancholy, are not possessed of much pathological—still less, of therapeutical—interest.

CHAPTER IV.

DISEASES OF THE MESENTERIC GLANDS.

THE mesenteric glands or ganglions are a part of the absorbent system, and hold the same ratio to the chyliferous or lymphatic vessels of the intestines, that the lymphatic ganglions of the axilla and groin hold to the lymphatics of the upper and lower extremities. In them, the lymphatic vessels of the intestines terminate; and the chyliferous vessels traverse them in their course from the intestines to the thoracic duct. In health, their substance is of a pale rosy hue, and their consistence moderate. By pressure, a transparent and inodorous fluid can be forced from them. Difference of opinion exists as to their structure. According to some, they consist, essentially, of a pellet of chyliferous vessels, folded a thousand times upon each other, subdividing, and anastomosing almost *ad infinitum*, united by cellular tissue, and receiving a number of blood-vessels. In the opinion of others, again, cells exist in their interior, into which the afferent chyliferous vessels open, and whence the efferent vessels set out; these cells being filled with a milky fluid, carried thither by the lacteals, or exhaled by the blood-vessels.

In the general opinion of physiologists, these ganglions impress changes on the chyle in its passage through them, and animalize it, or serve to transform it into the nature of the being to be nourished. This is supposed by some to be produced by the fluid exhaled into their cells. Others consider, that the veins of the glands remove from the chyle every thing that is noxious,—or purify it. Howsoever effected, it would seem that they impress important changes on the chyle; as its rosy colour is more marked on the thoracic, than on the intestinal, side of the glands, and it is richer in fibrin after having traversed them. Such being the case, it can be understood, that disease of these bodies must interfere with the important process of animalization, and may give occasion to the impaired nutrition, which characterizes their state of inflammation. In two ways, such inflammation may act. In the *first* place, it may interfere with the animalization of the chyle; and in the *second*, it may prevent the course of the chyle through the chyliferous vessels towards the thoracic duct.

I. INFLAMMATION OF THE MESENTERIC GLANDS.

a. *Simple inflammation of the Mesenteric Glands.*

SYNON. Adenitis mesenterica, Mesenteric Ganglionitis; Ger. Entzündung der Chylusdrüsen.

Simple inflammation of these ganglions appears to be by no means a common affection. If, however, prolonged irritation should exist in the mucous membrane of the intestine, they may become inflamed in the same manner as the lymphatic ganglions in the axilla and groin are inflamed from sources of irritation seated in the upper or lower extremities. The connexion, too, of this affection with an inflamed

state of the intestines, or with gastro-enteritis, has been long pointed out; and hence, in the description of the anatomical characters of different fevers, an altered condition of the mesenteric glands, will usually be found, where there were, at the same time, diseased appearances in the intestinal mucous membrane. On this point, most recent authors are in accordance. It is not equally settled, whether the same condition of the ganglions may not be induced by inflammation of the peritoneum. Broussais lays down the proposition, that "the mesenteric ganglions do not inflame from simple peritonitis;"—this fact, he says, he has observed in a vast number of cases. He states, that in engorgements of the cellular tissue of the mesentery and omentum, subsequent to chronic peritonitis, we find tuberculous ganglions in the midst of lardaceous muscles, and fibrous, scirrhus, encephaloid or melanosed tissues; but, he adds, that if the mucous membrane of the small intestines be closely examined, ulceration or some other trace of enteritis will generally be found. In another work, the same writer is bolder, and less justified in his generalizations. "These small parenchymatous bodies,"—he observes—"are endowed with great vitality, and whilst it is impossible to discover any sympathy between the lacteal vessels and the rest of the body, we observe very active sympathies between the mesenteric ganglions, and the gastro-intestinal mucous surface. This discovery belongs likewise to the physiological doctrine, which has shown that all gastro-enterites are accompanied by tumefaction of the mesenteric glands. Although chyle may be charged with acrid, irritating, or even poisonous matters, they traverse the ganglions with impunity, provided they do not inflame the gastro-intestinal mucous surface. Our attention has been for a long time directed to this question, and we have not observed any instance of mesenteric ganglionitis, which had not been preceded by well-evidenced gastro-enteritis."

Although, however, it may be admitted, that inflammation of the mesenteric glands is most commonly caused by irritation in the lining membrane of the intestines, it can doubtless arise independently of such irritation, in the same manner as inflammation of the lymphatic ganglions may arise spontaneously, independently of any irritation in the lymphatic vessels on the peripheral side of those ganglions.

When simple inflammation of the mesenteric ganglions exists, it cannot be diagnosticated by any special morbid phenomena. As it is so generally connected with disease of the intestinal follicles or of the mucous membrane, the symptoms that indicate these pathological conditions will alone attract the attention of the practitioner, although they may lead him to suspect the presence of disease of the ganglions.

b. *Scrophulous inflammation of the mesenteric Glands.*

SYNON. Atrophia infantum, A. glandularis, A. infantilis, A. mesenterica, Macies infantum, Pædatrophia, Scrophula mesenterica, Tabes mesenterica, T. glandularis, Scrophulous or Tubercular degeneration of the mesenteric glands or ganglions; *Fr.* Carreau, Scrofules ou Écrouelles mésentériques, Étié mésentérique, Rachialgie mésentérique, Physconie mésentérique, Entero-mésentérique. (*Baumes*); *Ger.* Darrsucht der Kinder.

Scrophulous inflammation of the mesenteric ganglions, and *tabes*

mesenterica stand towards each other in the relation of cause and effect; yet, they are so generally associated, that the terms have been used by most writers synonymously. Originally, the French term *Carreau*, ("a square tile,") was employed figuratively by authors to designate any disease, that was characterized by hardness and swelling of the abdomen, and, of course, it embraced enteritis with tumefaction of the mesenteric ganglions, scrophulosis of those ganglions, tubercular peritonitis, &c.; but, at the present day, its acceptance is restricted to the affection now under consideration.

Diagnosis.—Scrophulous inflammation of the mesenteric ganglions may appear under two forms, which are very distinct. It may be latent, as it were, or be attended by well-marked phenomena. Scrophulous matter may be deposited in the ganglions, and yet there may be no symptom that attracts the attention of the practitioner to them. This has been accounted for, by the assertion, that in such cases the tubercles are crude, and that it is the process of softening, which alone gives occasion to functional disorder. It would not seem, however, that this explanation is satisfactory, inasmuch as mesenteric tubercles have been seen in the most advanced stage of mollescence, without having given occasion to the least indisposition. A young girl, who enjoyed excellent health, fell into the fire, and died a few hours afterwards. On dissection, twelve mesenteric ganglions were found tuberculous, and some of them in a state of suppuration; and many similar cases have been observed by the pathological anatomist. Perhaps, the most satisfactory mode of accounting for the innocuousness of this pathological condition is the absence of any inflammatory complications of the intestine or peritoneum,—complications, which appear indeed, to give rise to the phenomena that constitute *tabes mesenterica*.

M. Guersent divides the disease into two stages, according as the ganglions can, or cannot, be felt through the parietes of the abdomen. In the *first stage*, the main symptoms are:—increased size of the abdomen; emaciation; puffiness and paleness of countenance; at times, loss of appetite, but more commonly, great voraciousness and insatiable appetite; vomiting of glairy matter, and uneasiness after having eaten; alternation of constipation and diarrhoea; alvine evacuations of a gray colour resembling clay; and, towards evening, a febrile movement with dryness of the skin. It is obvious, however, that none of these symptoms are diagnostic of the disease, and that they may all belong to simple chronic endoenteritis.

In the *second stage*, the functional phenomena are of more importance. The mesenteric ganglions are now so large, that they can be felt through the parietes of the abdomen; giving the feeling of hard, round, knotted or knobbed bodies, seated deeply in the middle portion of the abdomen, and painful when pressed upon. Copious diarrhoea is now a general concomitant; and there is constant fever, with extreme emaciation. Frequently, too, there is œdema of the lower limbs; and, occasionally, accumulation of serum in the cavity of the peritoneum, and even in the chest; under which the patient gradually dies in the last stage of marasmus. Where the tuberculous masses

are very large and hard, they may give occasion to serious inconvenience by pressing upon important organs. Thus, they have been known to obstruct the pylorus and the biliary ducts, the ureters, the vena cava inferior, and the vena porta,—in the last case occasioning ascites and anasarca of the lower half of the body.

It is clear, from the above detail, that the only pathognomonic symptom of *tabes mesenterica* is the presence of hard, knobbed, tumours, deeply seated about the middle part of the abdomen; yet these may be confounded with *scybala* in the intestines. *Scybala*, however, are generally contained in the left iliac region, and they are not painful when pressed upon; whilst the mesenteric tumours are usually seated in the umbilical and right iliac regions. Moreover, *scybala* are generally accompanied by constipation, whilst mesenteric ganglionitis is as commonly associated with diarrhœa. If doubts, however, should still exist, they may be dispelled by the administration of a gentle cathartic, which may remove the *scybala*.

In the first stage of the disease—as already remarked—there is no pathognomonic symptom.

Causes.—As the predisposition to this disease would appear to lie in scrophulosis or tuberculosis, it would seem, that all those causes, which have been elsewhere pointed out as favouring the development of those conditions, must equally favour the development of scrophulous inflammation of the mesenteric ganglions. It is important, too, to bear in mind the unfavourable influence of a complication with inflammation of the lining membrane of the intestines; and, therefore, to avoid all such unwholesome food, as might derange the gastric and intestinal functions, and thus augment the morbid condition of the ganglions.

The disease has been considered as one of infancy exclusively; but this is not accurate. Tubercular enlargement of the mesenteric glands has been found at all ages, even in the fœtus, and in adults. In one-fourth of those who had died of phthisis, and whose bodies were examined, tubercles, according to M. Louis, were found in the mesenteric ganglions. In 100 adults, who had died of phthisis pulmonalis, they were found by another observer, M. Lombard, ten times; and in the examination of the bodies of 100 tuberculous children, thirty-one times. At the Hôpital des Enfants Malades, of Paris, in tuberculous subjects, from two to fifteen years of age, tubercles were found in the mesentery in one half. From these facts, the disease is evidently more frequent in childhood.

The common opinion is, that girls are more liable to it than boys, but this does not appear to rest upon sufficient statistical evidence. It is true, however, as regards the predisposition of the two sexes to tuberculosis; but although it probably applies also to *tabes mesenterica*, this is not certain. The author has stated elsewhere, that although the scrophulous and the tuberculous cachexia are congenereous affections, it by no means follows, that they are identical. They may exist, however, together; and such would frequently seem to be the case with the disease under consideration. In most cases, it appears to resemble the affection of the lymphatic ganglions of the

neck, so common in children, and which we unhesitatingly refer to scrophulosis.

When the disease has once become fairly established, the ganglionic affection must terminate either by the softening of the tuberculous matter, or by its transformation into a calcareous substance; the latter being the more favourable termination; but it is very rare. When the tumours soften, they may give occasion to peritonitis; or the matter may, by adhesions, be discharged into the intestines; or, where the tumour is very large, adhesions may take place between it and the abdominal parietes, and the matter may be discharged through them by an ulcerative process.

The danger has been regarded by some to be dependent mainly upon the diseases with which it is complicated. M. Guersent, indeed, affirms, that he has not met with a single case in which a child died from it alone: in all the fatal cases, which he has seen, it was combined with other diseases capable in themselves of causing death.

Pathological characters.—In the first period of *tabes mesenterica*, the mesenteric glands are red, and hypertrophied, and at times very friable, but at others indurated. Occasionally, there is no alteration whatever in their appearance. The scrophulous matter is at first disseminated in the form of white points, which gradually increase in size, and ultimately invade the whole or the greater part of the ganglions; forming rounded masses, of different sizes, which appear superposed, as it were, on the ganglions. The tubercles—if they may be so termed—go on augmenting, and may form large tumours, which have been compared to chestnuts deprived of their envelope. They have been seen of the size of a hen's egg, and even larger. As the tubercular matter is deposited, it subjects the ganglions to pressure, so that they frequently become greatly diminished in size, and at times their natural texture cannot be recognised.

In all fatal cases, evidences exist of complications of even greater importance than the primary disease itself. Almost always, there are marked evidences of inflammation, simple or tubercular, of the peritoneum, or of the mucous membrane of the intestines, or of both; and in the large mass of cases, the endo-enteritis is accompanied by inflammation and ulceration of the intestinal follicles. It would seem to rarely happen, that tubercles exist in the mesenteric ganglions alone. Commonly, the bronchial ganglions are affected, and tubercles are found in greater or less quantity in the lungs. They pass, too, through the same stages as similar formations elsewhere. They do not, however, proceed, like the pulmonary tubercles, to complete softening; and are scarcely ever transformed into liquid pus; an additional fact, which exhibits the similarity between the inflammation of the mesenteric ganglions, and that of the ordinary lymphatic ganglions, in which the pus is always mixed with a matter of a cheesy appearance.

It would appear, from all that has been said, that the danger from scrophulous inflammation of the mesenteric ganglions is mainly dependent upon the accompanying complications. When once, however, the disease has proceeded so far that the enlarged ganglions can

be felt through the parietes of the abdomen,—and it is not till then, as already remarked, that we are certain of the true nature of the affection,—the prognosis must be of the most unfavourable character, inasmuch as complications will be found to be co-existent; and under the cachexia thereby developed, no expectation can be entertained, that the tubercular matter will be taken up. The generality—if not the whole—of the cases of *tabes mesenterica* said to have been cured, have probably been cases of disease resembling *tabes*, in which the symptoms accompanying the first stage were present, but the enlarged glands were not felt through the abdominal parietes.

Too much stress has been laid on unusual prominence of the abdomen as a symptom of this disease. Such prominence cannot be caused by enlargement of the mesenteric ganglions, unless when they have attained an enormous size. Moreover, the ganglions have frequently been found diseased in those who presented no particular abdominal protuberance,—and, as already remarked, they have been extensively softened, where the person has appeared to be in good health, and no ganglionic affection was suspected.

Treatment.—As scrophulous enlargement of the mesenteric glands, when it exists to such a degree as to be distinctly felt through the abdominal parietes, is usually fatal, in consequence of the mischief in other parts with which it is complicated, it is not necessary to dwell upon the treatment. It must be such as is adapted for the palliation of those complications. As, however, it has happened occasionally, that when the enlarged glands have been perceptible to the touch, the complications have been to a slight degree, it may be proper to adopt such a course as is advisable in scrophulosis in general, and as is laid down under *Scrophulous Cachexia*. With this view, the preparations of iodine promise the best success; but as there is frequently concomitant inflammation of the lining membrane of the intestines, it may be preferable to use them externally, rather than internally. All the preparations of iodine are not, however, equally well adapted for external use, as some of them induce too much irritation of the skin. The iodide of lead^a is not liable to these objections, and it has been employed in enlargement of the glands with gratifying success, in cases in which frictions with other preparations of iodine had been used ineffectually.

^a R.—Plumbi iodid. ℥i.
Adipis, ʒj.—M.

If it be desired to administer any of the preparations of iodine internally, a solution of the iodide of potassium,^a or of the ioduretted iodide of potassium;^b or—what suits the scrophulous constitution better, perhaps—of the iodide of iron,^c may be prescribed. A small quantity of laudanum added to each dose may prevent it from disagreeing.

^a R.—Potass. iodid. ʒj.
Aquæ destillat. f ʒj.—M.
Dose, to a child, three or four drops, three times a day.

^b R.—Iodin. ʒj.
Potass. iodid. ʒij.
Aquæ destillat. f ʒvij.—M.
Dose, to a child, two or three drops, three times a day.

^c R.—Ferri iodid. ʒj.
Aquæ destillat. f ʒj.—M.
Dose, to a child, two or three drops, three times a day.

Where there is much tenderness on pressure, and accompanying febrile irritation, it may be necessary to employ antiphlogistics, taking care not to carry them farther than is indispensable, inasmuch as they may augment the existing cachexia, which, as elsewhere shown is one of defective nutrition, and therefore demanding rather the corroborants that are advised under scrophulous cachexia. The whole hygienic and therapeutical treatment, there recommended, is indeed required. It has been properly remarked, too, by M. Guersent, that in the inflammatory form of *tabes mesenterica*, the lungs have almost always been diseased for some time; and the liver, spleen, and sub-peritoneal cellular tissue are frequently invaded by the tubercles. "The patient is tormented by hectic fever; the *tabes* is then said to be in its third stage, and all the pretended resolute medicines would be incendiary and dangerous; they would accelerate the fatal termination. The physician is reduced to the sad office of employing the palliative treatment, which is appropriate for the last stage of *phthisis pulmonalis*, tubercular peritonitis, or intestinal ulcerations."

BOOK V.

DISEASES OF THE GLANDULAR ORGANS.

THE different glands of the body are of complex organization; yet, when unravelled, their composition is not, perhaps, so intricate as it would, at first sight, appear. Every gland has a vessel, which conveys arterial blood for its nutrition, and from this arterial blood the secretion is in all cases formed,—the chief supposed exception being in the case of the liver, which receives both arterial and venous blood. A vein communicates directly or indirectly with the artery, whose function is to convey back towards the heart the venous blood, which has become such, owing, in part, to the arterial blood having experienced modifications in fulfilling the offices above mentioned;—and, likewise, a radicle or radicles of an excretory duct, which receive the secreted fluid, and convey it to some outlet. Lymphatics also exist, as well as nerves; and these are all bound up together by cellular membrane, so as to form minute granular masses, which, again, are associated by cellular membrane, so as to constitute, in some organs, distinct lobules. These granular masses are closely connected by means of cellular membrane, and finally a cellular sheath covers the whole organ, and preserves its various anatomical constituents *in situ*. The exact mode in which the vessel, from whose blood the secretion is effected, communicates with the excretory duct, does not admit of ready detection. An interesting pathological case, which fell under the author's observation, (*Human Physiology*, 5th edit. vol. ii. p. 267, Philad. 1844, and article "*Cancer of the Liver*," in the present work,) confirms the view, that the glandular structure consists essentially of a duct with a blind extremity, on whose parietes plexuses of blood-vessels ramify, from which the secretions are immediately produced.

Of the mode in which secretion in general is accomplished, we know nothing. It occurs—like nutrition—in the very tissue of the organs. Our knowledge appears to be limited to the fact, that in particular organs, various humours are separated or combined from the blood, some of which can be detected in that fluid, others not. In the upper classes of animals, it would seem, that the function requires, for its perfect execution, the presidency of a nervous system; yet if we take an enlarged view of organized bodies, the presence of nerves would not seem to be indispensable. In the very

lowest classes of animals, nothing like a nervous system has been discovered; and we have the most indisputable testimony of the existence of secretion in the vegetable, in which, if there be a nervous system, it is certainly only rudimental; yet the function is accomplished as perfectly, and perhaps in as multiple a manner as in man. In the upper classes of animals, however, we have many examples of modification of the function, through the agency of the nervous system:—the sight of luscious food will excite the secretion of saliva, and there can be no doubt, that the sight of the offspring occasions an increased secretion from the mammary glands of animals.

The first effect of inflammation of any glandular organ is to arrest its secretion; if the inflammation, however, continues, the secretion is restored, but it does not possess the healthy character. It is more or less modified, and may act upon the excretory ducts, or the parts over which it passes, very differently from the healthy fluid. For example, although bile, when it passes along the intestines, may not irritate the lining membrane, when the secretion possesses its usual properties; it may be the source of much irritation, when its properties have become changed by inflammation, or any other pathological condition of the organ that secretes it. But although inflammation may arrest the secretion from glandular organs, irritation—short of inflammation—may augment it. Thus, the presence of food in the duodenum excites the lining membrane of that intestine, and the excitation is propagated along the ducts to the liver, which increases its secretion; and the same effect is more distinctly induced by cathartics, that act more especially upon the upper part of the intestinal tract. A yet more striking example of the secretory irritation, induced by particular agents, is that of mercury, whose action upon the salivary glands is one of the most notorious of its properties.

CHAPTER I.

DISEASES OF THE SALIVARY GLANDS.

THE glands, which secrete the saliva, are the *parotid*, the *submaxillary*, and the *sublingual*;—the parotid, situate in front of the ear and behind the neck and ramus of the jaw,—the submaxillary, beneath the body of the bone; and the sublingual, immediately beneath the tongue;—the parotid and submaxillary having each but one excretory duct,—the sublingual several. The secretion from these various ducts is poured into the mouth, where it becomes mixed with the exhalation and mucus from the mucous membrane. It usually contains free alkali, but in rare cases, during meals, it has been found acid, and during fasting, it is occasionally neutral. It has, indeed, been affirmed to be acid whilst fasting, and to become alkaline during eating, the alkaline character disappearing, at times, with the first mouthful of food.

I. INFLAMMATION OF THE PAROTID.

SYNON. Inflammatio parotidis, Parotitis, Parotiditis, Empresma parotitis, Angina parotidæa, Cynanche parotidæa, Angina externa, Mumps, Branks; *Fr.* Parotide, Inflammation de la Parotide, Oreillons; *Ger.* Entzündung der Ohrspeicheldrüse, Ohrdrüsenentzündung, Bauerwetzeln, Ziegenpeter.

Inflammation of the parotid gland is singular in regard to some points connected with its pathology, and, especially, in affording examples of strange sympathies, which exist in the morbid condition of the gland, but are not perceptible in the physiological or normal state.

Diagnosis.—The disease is ushered in by the ordinary general phenomena of internal inflammation; after which, or simultaneously, a sense of pain or uneasiness is experienced in the region of the parotid, with difficulty in mastication, which becomes, at times, almost impracticable. Sooner or later, beneath one or both ears, more or less tumefaction is observable, which is commonly red and hot, and extremely painful on pressure. Occasionally, the pain is so severe as to deprive the individual of rest. When the inflammation is considerable, the swelling extends to the submaxillary glands, to the tonsils and the neighbouring parts of the pharynx, so that deglutition becomes very difficult and painful. The tumour, in such case, is generally of a deep red, tense and glossy; and if both sides be affected at the same time, the face becomes of an enormous size. The swelling rarely goes on augmenting more than four or five days; after which it gradually subsides, when the termination is about to be by resolution. Cases occasionally occur, in which the swelling is rather œdematous than highly inflammatory, and in which it presents neither redness, very marked resistance, acute pain, nor difficulty in moving the jaws. The general symptoms, may, in such cases, be slight also.

Most commonly, the disease terminates by resolution. About the fourth or fifth day, the swelling, pain and fever gradually subside, and the inconvenience disappears. It has been asserted by M. Andral, that about the fourth or fifth day, a copious perspiration bathes the parotid region and the parts of the neck, ears and head in its vicinity; and that, in other cases, a general perspiration precedes the gradual softening and disappearance of the tumour;—but there is nothing constant in the order of the phenomena. Those, mentioned by Andral, are often seen in cases where the cutaneous transpiration has been arrested, for a time, in consequence of febrile or inflammatory indisposition. In some cases—but they are rare—inflammation of the parotid ends in suppuration; the tumour points, and fluctuation is manifest. The author has met with but one case of this kind. The termination in gangrene is still more uncommon.

A very frequent occurrence, and one which is the most interesting point in the pathology of the disease, is the metastasis or translation of the irritation from the parotid to the testicle of the same side in the male; and to the mamma in the female. In the female, the sexual organs are also said to swell occasionally under the same circumstances, but the author has never met with such a case. Usually, the tumour of the parotid suddenly subsides, and all the signs of inflammatory irritation diminish, or cease; and almost immediately afterwards pain and inflammation are experienced in the parts mentioned. The orchitis in the male, and the mastitis in the female, under appropriate management, generally terminate by resolution; but, at times, the affected testicle is entirely absorbed. Occasionally, the inflammation in this *changeable phlegmasia*—as it has been termed—leaves the testicle or mamma as suddenly as it invaded the organ, and a fresh attack of parotitis supervenes.

Causes.—Age certainly offers a predisposition; for the disease is most common in children, and the proportion of males attacked is greater than of females. After the period of puberty it is less frequently seen. One attack appears to produce an effect upon the constitution, which renders the individual less liable to the disease again; for second attacks are not common. The disease unquestionably appears epidemically, or rather endemically;—that is, we see it in a particular locality prevailing more than in others, and perhaps exclusively; showing, that there are local causes which give rise to it, under probably favourable atmospheric influences—or the disease must be esteemed endemico-epidemic in its character. Inflammation of the parotid often, too, occurs as sympathetic of other diseases; as in the course of severe fevers; but to this variety reference is made elsewhere. In some of the visitations of cholera, it was noticed, especially towards the end of the epidemic. This was the case in Paris, according to MM. Rayer and Duplay, and in Rostock, according to M. Most. Generally, the disease is looked upon as contagious, but the author's observation does not enable him to speak positively on this point. It is, indeed, extremely difficult to decide the question, in consequence of the persons attacked being generally in the same locality, and more or less exposed to the same influences.

Treatment.—This must be altogether antiphlogistic; but the disease does not usually demand much activity. If the tumour be extremely large, hot and painful, local depletion, by means of leeches, may be employed, and repeated as it may be necessary; and after each application, emollient poultices may be placed over the leech-bites. At the same time, saline cathartics may be administered, so as to act gently on the bowels; and the patient be put upon diet, which is appropriate to other inflammatory affections,—strict quiet being, at the same time, enjoined. This treatment is generally sufficiently active for the more severe cases. In those that are less so, cataplasms, rest, abstinence, and covering the part with flannel, are sufficient. Both in its stage of inflammation and of suppuration, this phlegmasia has to be managed according to general principles:—it must be borne in mind, however, that the affection usually runs a definite course, or appears to be self-limited; and that any unfavourable termination is extremely rare; so that great energy of treatment cannot be demanded.

When the inflammation has attacked other organs metastatically, the rule of treatment should be, to combat these secondary affections as if they were primary, having no regard to the original inflammation of the parotid. Usually, the indication is presumed to be, to call back the irritation to the part primarily affected, by the application of revellents—as of sinapisms or blisters—to the region of the parotid. The remedy, however, as the author has elsewhere said, (*General Therapeutics* p. 348, and *General Therapeutics and Mat. Med.* vol ii. Philada. 1843,) is not as clearly indicated as might at first appear. The organs concerned seem to possess a reciprocal sympathy under particular morbid conditions only, between which, and the irritation excited by revulsives, there may not be the least similitude; and this accounts for the want of success experienced, whenever an attempt is made to recall a “changeable phlegmasia” to its former seat. The author—in accordance with the views generally entertained on this matter—has repeatedly attempted to bring back the inflammation to the parotid, yet he does not recollect any instance in which the appeal was responded to; and hence he attends to the superinduced inflammation, as if it were primary. It is, indeed, by no means clear, that the artificial irritation, which we excite over the region of the parotid, in such case, can be practised with entire impunity. The inflammation, which we are desirous to call back—it must be recollected—was originally seated in the region which we are about to irritate artificially; and a question might properly arise, whether the artificial irritation, which we induce, may not equally pass to the organ secondarily implicated, and add to the mischief already existing; so that revellents, applied to the parotid region, might in reality be less safe and efficacious than if they were applied to any other part of the economy.

Occasionally, symptoms of encephalitis and of gastric inflammation occur in the course of parotitis. They must be met upon the same principles.

II. PTYALISM.

SYNON. Ptyalismus, Sialismus, Sielismus, Sialachus, Salivatio, Epiphora ptyalismus, Sialorrhœa, Salivation; *Ger.* Speichelfluss.

An increased secretion of saliva may arise from various causes, and is frequently altogether symptomatic,—as in children, during dentition. When it occurs as a symptom, it will be described under the primary affection.

Ptyalism may be considered under two heads—the *first* embracing that which arises spontaneously, often without any obvious cause; and the *second*, that which is produced by mercury.

a. *Spontaneous Ptyalism.*

SYNON. Ptyalismus idiopathicus, P. spontaneus, Idiopathic Ptyalism or Salivation.

Salivation occasionally occurs, especially in children, with all the characters of mercurial salivation, when not a particle of mercury has been administered. It is essential to bear this fact in mind, inasmuch as blame is frequently attached to the medical practitioner, where such symptoms arise, under the idea that he has been administering mercurials to an objectionable extent. Salivation may be induced by various articles,—as by iodine, the preparations of gold, copper, antimony, arsenic; and it is said, by Dr. Watson, that it has followed the employment of castor oil, digitalis, and opium. Cases are on record, in which it has occurred to a profuse extent, without any obvious cause. Thus, one is related in which two or three pints of saliva were discharged daily, for some time. The affection ceased under the use of gentle cathartics. Many similar examples are on record.

Treatment.—Should such a case present itself, it will be important to examine, whether there be inflammation, or irritation, from carious teeth or otherwise, in the mouth. Should no adequate cause be discoverable, the disease must be referred to some constitutional or local affection of the glands, which gives rise to secretory irritation, and consequent hypercrinia.

Certain of the remedies, recommended under the next form of ptyalism, may be found serviceable.

b. *Mercurial Ptyalism.*

SYNON. Ptyalismus hydrargyratus, P. mercurialis.

Diagnosis.—The symptoms of mercurial salivation are well known; but, fortunately, not so much so as formerly, in consequence of the comparative unfrequency of the affection, owing to our improved knowledge of the therapeutical effects, and *modus operandi* of mercury. Prior to the supervention of full ptyalism, phenomena present themselves, which indicate that the mouth is *touched* by the mercury. A disagreeable coppery taste is experienced, accompanied by a painful feeling or soreness in the mucous membrane of the mouth, and in the teeth, which appear to be loosened in their sockets; to these phenomena succeed swelling of the gums, inner surface of the cheeks,

tongue, and soft palate, which become hot and painful, and, where the cheek and tongue are pressed upon by the teeth, they are found indented. The gums now fall away from the teeth, and at the edges a whitish secretion is poured out, which has an albuminous appearance. This secretion seems, indeed, to invest the mucous membrane of the mouth, which, consequently, does not appear to be as red as the symptoms would indicate. The parts that are the most swollen and subjected to pressure, soon begin to ulcerate, and the ulcers spread, and present a grayish, flabby and fungous appearance, blood readily flowing from them. The lymphatic ganglions, situate between the parts affected, and the centre of the lymphatic system, now become swollen and painful; and, at times, the patient is unable to separate his jaws, and almost to swallow, owing to the excessive tumefaction of the parts. From the very commencement, the breath has a peculiar fœtor, and this augments, so that at the height of the disease it is strong and disagreeable. As soon as the mouth is touched by the remedy, the flow of saliva, and of the mucous secretions of the mouth becomes so much augmented, that the individual is compelled to eject the fluid continually, and where complete ptyalism has set in, the quantity evacuated is occasionally enormous. Eight pounds in the 24 hours have been mentioned by M. Andral, but this is not the limit. Sixteen pounds are said by Most, to have been discharged in this way; the average quantity in health not exceeding four ounces, according to Mitscherlich. This increased flow may exist—to a greater or less extent—for many days or even weeks.

At one time, the effect of the remedy in syphilis was measured by the quantity of saliva discharged:—if the disease were of a certain duration the patient must spit a quart; if of a longer, two quarts, and so on: but now, since the conviction of the practitioner is, that salivation is rarely or never necessary, and that it is rather to be deplored,—inasmuch as the increased discharge exhausts and irritates, without being of itself beneficial,—the practice has been abandoned, and if we meet with excessive ptyalism, it is generally in those who are easily affected by mercury and in whom the affection supervenes rapidly; or in those in whom the remedy has, by accident, been persisted in for a longer period than was contemplated. The books were formerly filled with descriptions of the horrible accidents induced by mercurial ptyalism, some of which the author has witnessed;—as extensive sloughing, loss of teeth, caries of jaw bones; protrusion of the tongue from the mouth; adhesions of the tongue and cheeks, &c. &c.; with, at times, excessive febrile irritation, marasmus, and death. This last event was, however, uncommon. Usually, after a tedious convalescence, the sufferer was restored to health, but occasionally the system received an injury from which it never wholly recovered.

Although the plan of exciting profuse salivation for the cure of syphilis may now be considered as generally and properly exploded, and, therefore, these cases of ptyalism are comparatively rare, we still now and then observe the deplorable effects of mercury pushed

with equal incaution for the treatment of many of our bilious and other fevers. Not many years ago, an interesting case fell under the author's care, in which the lower jaw became firmly closed in consequence of the formation of ligamentous bands, and of the contraction that had occurred during the cicatrization of mercurial ulcers of the mouth; the bones of the jaw were carious, and portions of them exfoliated; yet, by careful management,—improving the general habit, and separating the jaws gradually by an instrument contrived for that purpose, they became movable. Within the last few years, the author has known of other similar cases, the subjects of which had sought Philadelphia for surgical relief under their deformities.

Causes.—The term mercurial ptyalism sufficiently indicates the exciting cause; but a few remarks are necessary on predisposition. Unquestionably, age has its influence. It is almost impossible,—wholly so, perhaps, in most cases,—to salivate a child under two years of age. There is something in the peculiar evolution of organs at this age that prevents it; yet, after the age of two, children become very susceptible of mercurial influence, and remain so, although not perhaps to an equal degree, throughout the remainder of existence. There is, likewise, a marked difference in individuals as to their susceptibility to the action of mercury,—some being affected by the smallest quantity, whilst it is impossible to salivate others by any amount. Temperature has some effect, and exposure to cool air. In hot weather, especially if the individual take exercise, the mercury appears to pass off by the cutaneous transpiration; and, on the other hand, the repression of the transpiration frequently induces ptyalism. Constipation also appears to favour the action of mercury, as diarrhœa usually prevents or retards it.

It is difficult to account for the action of mercury in inducing ptyalism. It obviously enters the blood, for it has been detected in that fluid; and, in this way, probably, it excites a new action not only in the salivary glands, but apparently, in almost all the secretory organs of the economy. M. Andral examined the condition of the blood in some cases of mercurial stomatitis, but did not discover any difference between it, and the blood of other inflammatory affections. He never witnessed a diminution of fibrin, as is supposed to follow its use by those who prescribe it in certain diseased conditions to diminish the plasticity of the blood, as in diphtheritis, and, indeed, in inflammatory affections in general.

Treatment.—If the febrile and inflammatory symptoms run high, blood-letting—general and local—may be demanded; but this can seldom be the case. It is a favourite remedy, at the commencement, with one distinguished individual, M. Cullerier. Generally, it is best to administer saline cathartics, which act in a twofold manner, both as depletives and revellents.

R.—Magnes. sulphat. ʒvj.

Aq. menthæ pip. f ʒiv.—M.

Dose.—One fourth, night and morning.

They should be given to the extent of producing at least two or three liquid evacuations in the twenty-four hours, for the first two or three days, unless their use is contraindicated. The preparations of sulphur—sublimed sulphur, and sulphuret of potassium—combined, or not, with sulphurous baths, have been long prescribed; under the idea, that the sulphur would exert some chemical agency in modifying the action of the mercury. Few entertain this opinion at the present day: sublimed sulphur is, however, a gentle and pleasant laxative, and may be given with that view.

In the early period of the disease, emollient and warm collutories are found to be the most soothing. These may consist of mucilage of gum arabic, flaxseed tea, infusion of the slippery elm, and similar mucilaginous articles; but, in the after stages, greater advantage is derived from agents of a more excitant character. Various astringents have been used for this purpose, such as the acetate of lead, the sulphate of zinc, and the sulphate of alumina and potassa. The author thinks that he has derived as much benefit from the solution of chlorinated lime, and from that of creasote, as from any other agents. It must be borne in mind, however, that the art of medicine, in the generality of cases, does not appear to possess much power over the disease, and that whatever internal or external remedy is employed, *time* is an essential element in the cure. A collutory of chlorinated lime not only appears to diminish, in many cases, the excessive secretion from the salivary glands, but speedily mitigates the sense of burning in the mouth, induces the healing of the erosions of the mucous membrane, and corrects the mercurial fætor.^a If either this, or the creasote wash,^b should be too stimulating, it must be reduced by the addition of water.

^a R.—Calcis chlorin. 3j.

Aquæ, Oj.

Vini opii, fʒiss.—M.

The mouth to be well washed with a little of this solution, six or seven times a day.

^b R.—Creasot. gtt. xxx.

Aquæ, Oj.—M.

By many, the internal use of iodine has been highly extolled; yet, in the experience of others, its efficacy has been doubtful. It may be given in the form of the tincture, (ten drops, three times a day, in gruel.)

If ulcerations exist, and they resist the local management above directed, they may be treated upon the plan advised under the head of Stomatitis. M. Ricord prefers applying strong muriatic acid to the ulcerations, repeating the application every day, or every other day,—the bleeding of the surface presenting no obstacle. The acute pain it produces soon ceases, and nothing, he thinks, equals its beneficial effects. Should the pain be so severe as to preclude rest, opium or its preparations may be freely administered.

Recently, a case of mercurial ptyalism, occurring in a child four years of age, which had continued for two months and a half, and had resisted all the usual remedies, yielded to warm baths acidulated

with equal parts of nitric and muriatic acid, prescribed by Dr. Baumgartner.

The diet, throughout the severity of the disease, should consist of farinaceous substances; but, later on, milk, broths, and the lighter preparations of animal food, may not only be permitted, but be advisable.

The salivary glands, and especially the parotid, are liable to *cancer*, and other *morbid transformations*, and their ducts to various diseased conditions; but as these belong rather to the domain of surgery, they are passed over here. Their pathology is the same as that of similar affections of the pancreas, to be next considered.

CHAPTER II.

DISEASES OF THE PANCREAS.

THE pancreas or "sweet bread" is so like the salivary glands in structure and functions, that it has been called by some the "abdominal salivary gland." Its position must be borne in mind, which is transversely in the abdomen, behind the stomach, and towards the concavity of the duodenum. It is, on the average, about six or seven inches long, and weighs from two and a half to three or four ounces. Of six observed cases, the mean weight, according to Professor Gross, was two and a half ounces, and the mean length seven inches. In thirty-two other cases, however, Bécourt found the average length eight inches, and the weight between three and four ounces, French. Its excretory ducts all terminate ultimately in one—the duct of Wirsung—which opens into the duodenum,—at times, distinct from the ductus communis choledochus, but close to it; at others, confounded with, or passing into it.

The consistence of the pancreas, at different periods of life, does not vary greatly; but, like the salivary glands, it becomes materially modified by disease.

In 1839, the number of deaths from diseases of the pancreas in England and Wales is stated to have been 4. (W. Farr, in Third Report of Registrar-General, 1841.)

I. INFLAMMATION OF THE PANCREAS.

SYNON. Inflammatio pancreatis, Pancreatitis; *Fr.* Pancréatite, Inflammation du Pancréas; *Ger.* Entzündung der Bauchspeicheldrüse, Bauchspeicheldrüsenentzündung.

It is only of late years, that the diseases of the pancreas have been much investigated. In the year 1812, an *ex professo* treatise was published on the subject by Harless, and, within the last few years, a more complete monograph, by Mondière, has appeared, which received a prize from the *Société Médicale d'Emulation* of Paris. The author last cited, is of opinion that acute inflammation of the pancreas is more common than is generally believed.

Diagnosis.—The symptoms assigned to this disease, are;—disagreeable feeling of oppression, and dull pain, deep in the epigastrium, which is fixed, and increased when the stomach is filled, on full inspiration, and when strong pressure is made on the abdomen. The epigastric region is at times swollen, and the functions of the stomach are greatly disordered; more or less anorexia and evidence of dyspepsia exists; and there is, occasionally, a copious vomiting of matter, having the appearance of saliva,—as well as diarrhœa, constituted, at first, of a mixture of aqueous and bilious matters with the aliment, and, subsequently, of fluid like saliva. When the tumefaction of the pancreas is considerable, the pulsations of the aorta are conveyed

forcibly to the hand placed on the epigastrium. Along with these symptoms, there is more or less general febrile irritation, as in other phlegmasiæ of the abdominal organs. None of these can be looked upon as pathognomonic; nor do they, when taken together, lead to more than a probability that pancreatitis exists; yet the probability is so strong, that it may be unhesitatingly acted upon.

The disease rarely proceeds to suppuration; more frequently, it terminates in induration, of which the author has seen many examples. The termination in gangrene is very rare.

Causes.—Pancreatitis may—like inflammation of the salivary glands—be idiopathic; but, doubtless, it more frequently arises from diseases of the stomach or duodenum. It is often, especially in the chronic form, connected, also, with disease of the liver; and, in the majority of instances, the two diseases will be found to acknowledge the same cause. The constant irritation of the stomach and duodenum in drinkers of alcoholic potations may be propagated along the duct of Wirsung to the pancreas, as it is propagated along the common choledoch duct to the liver, so that the functions, carried on in the capillary system of the pancreas, may be morbidly implicated simultaneously with those of the liver.

Pathological characters.—In the few cases of acute pancreatitis that have been examined after death, the pancreas has been found red and swollen, and sometimes of greater, but at others, of less consistence than in health.

Treatment.—Where acute pancreatitis is suspected, it must be met by bleeding—general and local—and the whole antiphlogistic plan. The only caution, needed, is in the administration of violent cathartics, whose exciting action could scarcely fail to be extended along the pancreatic duct, and to add to the irritation. It is sufficient to keep the bowels daily open by the gentlest laxatives, or by enemata.

Chronic pancreatitis has been more frequently described than the acute. It may be the result of the acute form, or may exist from the first, and it is a more frequent concomitant of diseases of other organs of the abdomen. In one case, in which an opportunity occurred for examining the body after death, the symptoms were;—copious evacuations of fluid from the bowels, which was regarded as resulting from an increased secretion of the fluid of the pancreas. At a later period, constipation supervened, and, ultimately, a tumour was perceptible in the epigastric region. On dissection, the pancreas was found red, swollen, and as soft as a sponge; the duct much dilated. It weighed, according to Schmackpfeffer, seven ounces. In other cases, it has acquired a great increase in density.

The pancreas is also liable to various transformations, as the *adipose* or *fatty*; the *encysted*; the *scirrho-cancerous*; the *encephaloid*; the *tuberculous*; the *melanotic*; the *calculous*, &c. &c.; of which Mondière has given an ample description; but there are no phenomena that positively indicate their presence, and they are, consequently, most interesting in their relations to pathological anatomy.

Various diseases have been ascribed to an increased secretion of the fluid of the pancreas. It has been suggested, indeed, whether cases of enterorrhœa be not of this nature. Others have referred most forms of diarrhœa to this cause; and a distinguished surgeon, M. Dupuytren, has suggested, whether the pancreas may not furnish the matter evacuated by persons labouring under cholera. It has, moreover, been presumed by M. Mondière, that the fluid of pyrosis may proceed from the pancreas. We cannot say, that these speculations are altogether devoid of foundation, or that they are irrational; but it may be averred, with safety, that the observed phenomena and arguments in their favour are by no means convincing.

CHAPTER III.

DISEASES OF THE BILIARY APPARATUS.

THE apparatus for the secretion of bile consists of the liver and hepatic duct; the gall-bladder and the cystic duct; and the common choledoch duct, formed by the union of the hepatic and cystic ducts.

The *liver* is situate in the right hypochondriac region, and more or less in the epigastrium. Its ordinary weight is three or four pounds; and in health it probably never exceeds, materially, the latter. In disease, it has been known to weigh 20 or 25 pounds; and, in other cases, not as many ounces. The connexion or proximity of the organ to other organs must be borne in mind. Its upper convex surface touches, every where, the arch of the diaphragm. The lower concave surface corresponds to the stomach, colon and right kidney. It receives—it will be recollected—two kinds of blood—that of the hepatic artery, and that of the vena porta. The common opinion is, that the former is intended for the nutrition of the liver; the latter for the secretion of bile. For reasons elsewhere given, (*Human Physiology*, 5th edit. vol. ii. p. 275, Philad. 1844,) the author has been disposed to embrace the view, that as in the case of other secretions, the bile is formed from arterial blood; and that the arrangement of the portal system is for the purpose of mixing thoroughly the various heterogeneous fluids, which are readily absorbed from the mucous membrane of the stomach and duodenum, so that they may not be sufficiently concentrated to act injuriously on the heart when they reach that organ.

Besides the radicles of the hepatic artery and the vena porta, the liver consists of the following anatomical elements;—the various terminations of the excretory or biliary ducts, which are probably blind at their extremities, having the capillary vessels that secrete the bile ramifying upon them;—lymphatic vessels,—nerves, some proceeding from the pneumogastric, but the majority ganglionic,—the supra-hepatic veins, which, according to common belief, communicate both with the final ramifications of the hepatic artery, and the vena porta, and return the blood to the heart. All these parts, united together by cellular substance, constitute the liver, which has two coats,—the outermost peritoneal, and the innermost cellular, and forming the proper coat. The former does not cover the posterior part of the organ, the excavation for the gall-bladder, the vena cava and the fissures in the concave surface. The latter invests not only every part of the surface of the liver, but the large vessels that are proper to it.

The colour of the liver differs in health according to age and various circumstances. In the adult, it is generally of a reddish-brown colour, with bluish spots, especially on the anterior margin

and the under surface, dependent probably upon cadaveric hyperæmia. When it is torn, it exhibits the appearance of numerous granules, each of which probably consists of the anatomical elements mentioned above, packed together so as to constitute one of the myriads of glands inservient to the biliary secretion. In certain cases of disease, this granular arrangement becomes very manifest.

The situation of the *gall-bladder* must be kept in mind. It is at the inferior concave surface of the liver, with which it is connected; and above the colon and the duodenum. The largest part or fundus is turned forwards; and, when distended, it frequently projects beyond the anterior margin of the liver. Externally, it is partly covered by the peritoneum, which attaches it to the liver, and to which it is moreover adherent by cellular tissue and vessels. Connected with its diseases, it is important to remark, that it has, at least a mucous coat, which extends down its duct—the cystic, and into the common choledoch duct; and a coat, which is exterior to this, between the mucous and the peritoneal coat, which is contractile. Without this belief, it would not be easy to explain certain phenomena in disease; and, besides, pathological anatomy has sufficiently demonstrated the existence of fibres, which must have been contractile.

The *hepatic duct*, which is formed by the union of all the excretory ducts of the liver, is constituted anatomically like the cystic duct; and the same may be said of the common choledoch duct. The hepatic and cystic ducts are about the same length—an inch and a half,—and about the size of an ordinary writing-quill. The common choledoch duct is about three or three and a half inches long. It descends behind the right extremity of the pancreas, through its substance, passes for an inch obliquely between the coats of the duodenum, and opens at the inner surface of the intestine, at the distance of three or four inches from the stomach. Towards its termination, it diminishes in diameter, and its orifice in the duodenum is more contracted than any other portion.

As in the case of the pancreas, a continuous surface exists between the interior of the duodenum, the gall-bladder, and the minutest radicles of the biliary ducts in the liver; so that it can be readily understood, how much the condition of the biliary apparatus is connected with that of the intestinal canal. To this subject, however, reference will have to be made in the consideration of the various diseases of the apparatus.

In regard to the fluid secreted by the liver, it differs according as it proceeds directly from the liver along the hepatic duct, or has been retained in the gall-bladder. The latter possesses greater bitterness, and is thicker, and of a deeper colour; but they do not differ much from each other, except in the greater concentration of the different elements in the latter. We know not the amount of bile excreted in the course of 24 hours: it will be readily understood, however, that it must vary greatly. The presence of food in the stomach and duodenum during digestion is a natural excitant to the liver; but if the mucous surface of those organs be in a morbid condition, the quantity and quality of the secretion may be materially modified.

In 1839, the mortality from diseases of the biliary apparatus, throughout England and Wales, is stated to have been 3990. (W. Farr, in Third Report of Registrar-General, 1841.)

I. HYPERÆMIA OF THE LIVER.

SYNON. Hyperæmia hepatis, Congestion of the liver, Hepatic engorgement; *Fr.* Hyperémie du Foie, Hépatohémie, (Piorry); *Ger.* Bluthäufung der Leber, Blutüberfluss der Leber.

At a time when it was the custom to refer more diseases to the liver than has been sanctioned by subsequent and sounder observation, congestion of the liver was supposed to account for many morbid phenomena, which did not admit of ready explanation. No term, indeed—as elsewhere remarked—in the whole range of medical terminology, has been employed with less precision than *congestion*.

As regards hyperæmia of the liver, it is probably generally induced, as hyperæmia is elsewhere, by disease in some part of the circulatory organs, which prevents the blood from returning regularly to the great central organ of the circulation. The hyperæmia under consideration, perhaps always consists in some obstacle to the passage of the blood through the right cavities of the heart, which gives occasion to an accumulation in the hepatic vessels.

Diagnosis.—Should hyperæmia of the liver exist to any extent, it is to be presumed, that the size of the organ will be augmented, so that it may extend below the cartilaginous margin of the ribs, towards the left side, or force the diaphragm upwards. In such case, the *jecoral sound*—as it has been termed by M. Piorry—on percussion, would be heard over a larger space. There may, likewise, be more or less difficulty in lying upon the left side. These, it is presumable, would be the signs of simple hyperæmia of the liver, which, moreover, may supervene rapidly, and disappear as rapidly when the impediment to the circulation is withdrawn.

When the hyperæmia is active, the symptoms will be essentially those of inflammation of the liver.

Pathological characters.—Recent researches induce their author, Mr. Kiernan, to affirm, that the usual appearance in a healthy liver, of darker spots mottling a yellow parenchyma, results from congestion of the hepatic veins,—the congestion, beyond a certain limit, constituting an abnormal condition or a state of disease; and that, on the other hand, when congestion of the portal system is alone present, the peritoneal surface of the liver, or a section of the liver, displays the appearance of yellowish spots mottling a dark parenchyma. In the former case, the central vessels of the lobules are congested; in the latter, the vessels in the interlobular spaces. Again, when hyperæmia of both sets of vessels exists, the yellow colour disappears from every part of the liver, from the lobules as well as the interlobular spaces. They, who believe in the existence of two distinct substances in the liver, ascribe the mottled appearance to one of the substances being in a state of hyperæmia, whilst the other is unaffected. (See Cirrhosis of the Liver.)

In another work, the author has given at length the views of Mr.

Kiernan, which are generally but not universally admitted, and has inserted representations of both the *hepatic* and *portal* venous congestion; (*Human Physiology*, 5th edit. ii. 270, Philad. 1844.) It is there stated, that Mr. Kiernan's observations explain the different statements of anatomists concerning the red and yellow substances of which the liver has been considered to be composed,—the red substance being the congested portion of the lobules, which, as seen in Mr. Kiernan's figures—may be either interior, or exterior, or irregularly disposed—the yellow being the non-congested part, in which the biliary plexus is seen more distinctly.

Hyperæmia of the liver is said to be a common affection in India; and, wherever met with, we might expect the colour of the organ to be darker than in the healthy condition, owing to morbid accumulation of blood. When in this state, its texture is usually softened, and the section made with a knife bleeds freely. The peritoneal surface, in such cases, is often marked with numerous clusters of minute vessels, "like the veins on the nose of an old gourmand," according to Mr. Twining.

Treatment.—The attention, in cases of hyperæmia dependent upon disease of the heart, must be directed almost wholly to the latter organ: where, however, there are signs of activity of circulation, it will be advisable to apply cups or leeches over the region of the liver, and to give cathartics occasionally, which, by acting upon the lining membrane of the intestines, occasion watery discharges at the expense of the portal system.

R.—Pil. Hydrarg. gr. v.—horâ somni.

R.—Infus. sennæ, f3x.

Tinct. sennæ, f3j.

Magnes. sulph. ʒiij.—M. f. haust. manè seq. sumend.

Where general blood-letting is considered advisable—as it often is—it is a valuable aid to diagnosis; for almost immediately after the operation, according to M. Piorry, percussion will exhibit, that there is a diminution in the size of the liver.

II. INFLAMMATION OF THE LIVER.

SYNON. Inflammatio hepatis, I. jecoris, Hepatitis, Febris hepatica inflammatoria, Empresma hepatitis; *Fr.* Hépatite, Inflammation du Foie; *Ger.* Leberentzündung, Entzündung der Leber.

Inflammation of the liver may be considered under two forms,—the *acute* and the *chronic*;—for although the former may terminate imperceptibly in the latter, the essential phenomena of the disease may be chronic from the first.

a. *Acute Inflammation of the Liver.*

SYNON. Hepatitis acuta.

This is certainly an uncommon disease in temperate regions, whilst in torrid climes it is by no means unusual.

Diagnosis.—The prominent symptoms of acute hepatitis are,—pain, at times acute and lancinating, at others, dull and heavy, in the right

hypochondrium, frequently extending to the chest, and as far as the shoulder of the same side; the pain in the right hypochondrium is increased by pressure, inspiration, coughing, and lying on the left side; and, on the contrary, is relieved by lying on the side affected. The pain in the right shoulder has, by many, been esteemed pathognomonic; but there is reason to believe, that it is a very equivocal sign, and—having been observed in a few cases—it has been copied from one author to another as diagnostic of hepatitis. In some cases, the size of the liver is augmented; this state may be detected by the signs described under hyperæmia of the liver, and especially by percussion, when the dull *jecoral* sound will be heard over a larger space than usual. The functions of the liver are necessarily modified, and their morbid alterations are detected chiefly by the condition of the alvine and urinary evacuations, and the colour of the skin. Early in the disease,—as in the case of other secretory organs when inflamed,—the secretion of bile is mainly or wholly arrested; the alvine evacuations, under such circumstances, are ash or clay coloured; but commonly the bowels are constipated. The urine is high coloured, so much so as to tinge the linen yellow, and the skin and whites of the eyes exhibit a yellow hue,—symptoms which indicate an approach to, if not the actual existence of jaundice. It is not uncommon, too, for the duodenum and stomach to participate in the inflammatory condition, and should this not be the case, the alimentary canal may be sympathetically irritated to a greater or less extent; the patient is affected with vomiting, pain, and tension in the epigastrium, bitter taste in the mouth, yellow furred tongue, and thirst. The accompanying fever is usually highly inflammatory; the skin is hot, and the pulse full and bounding.

The relative frequency of the symptoms, described above as indicative of acute hepatitis, was noted by M. Roche in *sixteen* cases. *Eleven* times, there was pain in the right hypochondrium; *once*, pain at the top of the right shoulder; *five* times, tumefaction of the hypochondrium; *nine* times, jaundice; and *five* times, there was no local symptom. In all, there was fever; but it was not always the same; it was continued in *thirteen* cases, and paroxysmal in *three*. There is truth, consequently in the opinion, that although no one of the symptoms can be esteemed pathognomonic, yet when taken together they can scarcely fail to lead to a satisfactory diagnosis.

It has been a question with observers, whether inflammation of the convex surface of the liver present symptoms differing from those that belong to inflammation of the concave surface. Perhaps, in the generality of cases, the pain—in the former—will be found more acute and lancinating, and more increased on inspiration, coughing, and pressure; whilst, in the latter, it is more deep-seated; it is little, if at all, augmented on pressure, and efforts at vomiting always increase it greatly. Differences of this kind may, and do, exist, and yet we may have to pronounce on the precise seat with caution. The more superficial the inflamed surface,—that is, the nearer it is to the abdominal parietes,—the more likely will it be to be indicated by the signs given above.

When the inflammation is seated at the surface of the liver constituting *sero-hepatitis*, the pain is more severe than when it exists deep in the parenchyma of the organ, constituting *puro-hepatitis*. This has been laid down as an illustration of a general law, that if we consider inflammatory affections of the solid viscera, we shall find that the more superficial the inflammation the more painful it is; and, on the other hand, the more deep-seated it is, the more is it latent, so far as pain is concerned. One author, G. H. Bell, states, that in the sero-hepatitis of India, the patient is attacked with sudden pain in the region of the liver, and this is so severe, that even the weight of the bed-clothes is insupportable, nor can he bear to turn or lie on his left side owing to the pressure exerted in that position on the inflamed organ. But in puro-hepatitis, the affection may proceed in such a latent manner, that the first symptoms of liver disease may be those of suppuration. This assertion has been confirmed by the experience of Mr. Annesley, and by a succession of cases of hepatic abscess, which were under treatment at the Meath Hospital in 1828, by Dr. Stokes.

Acute inflammation of the liver may terminate in various ways. Like all acute phlegmasiæ, it may pass off by resolution, or end in suppuration or gangrene, or proceed to the chronic state. When it terminates by resolution, the symptoms gradually disappear, and if percussion over the region of the liver had shown the existence of dulness of sound over a greater extent of surface than in health, successive percussions will now show that the enlargement of the liver is gradually subsiding. When the inflammation is about to end, or has ended, in suppuration, the fever becomes hectic; the hepatic tumour continues, or even becomes augmented in size; a feeling of increased weight is complained of in the region of the liver; and where adhesion has taken place between the peritoneal coat of the organ and the peritoneum proper, the matter may make its way towards the surface, and fluctuation, with decided pointing, be perceptible. This is the ordinary course of the formation of hepatic abscesses with us; but, occasionally, even in temperate climes, the abscess forms rapidly, and with symptoms which might seem to belong to the early stage of the disease.

The most prevalent form of acute liver disease, in Bengal, is inflammation, with tendency to central abscess. A very common symptom of the incipient stage of this tendency in the right lobe of the liver is said to be,—a much greater degree of tension of the right rectus abdominis muscle, than of the left; the muscle on the right side resisting pressure by a quick involuntary action, whilst the left rectus is lax, and other parts of the abdomen of the patient are comparatively soft and elastic. Mr. Twining considers this one of the most undeviating symptoms of congestion, with incipient interstitial deposit into the texture of the liver, which commonly goes on to deep-seated abscess, unaccompanied by urgent signs of pain or pyrexia. In these cases, suppuration, is often established, when it is not indicated by any symptoms except those that are present in the early stages of hepatitis. Unless the abscess makes its way externally through the parietes of the abdomen, or through the stomach, duodé-

num, colon or air passages, suppuration of the liver is almost always fatal. The termination in gangrene is very rare, and is always rapidly fatal. It is announced, according to M. Andral, by the sudden cessation of pain, sinking of the pulse, cold clammy sweats, coldness of the extremities, hiccough, and rapid alteration of the features. This mode of termination has, however, been called in doubt, yet it occurs occasionally.

Causes.—Excessive heat unquestionably predisposes to hepatitis; hence it is, that the disease is much more common in the torrid regions of the globe, than in the temperate or frigid. Excessive heat, alone, produces erethism of the mucous membrane of the stomach and intestines,—as has been elsewhere remarked—and this erethism is readily propagated to the liver. The mode in which the livers of the geese are enlarged, at Strasburg and Metz, with the view of forming the *patés de foies gras* is illustrative of this subject. They are crammed up to the neck with food, are nailed to a board, and exposed to the heat of a strong fire, until, with the aid of punctures made through the parietes of the abdomen to penetrate the liver, but more frequently without this last refinement of cruelty, the livers are enlarged to correspond with the desires of the gourmand. (See the author's *Elements of Hygiène*, p. 49.) The heat is, doubtless, in this case, a predisponent, by enervating the digestive organs, whilst the enormous quantity of aliment excites the stomach and duodenum, and from these the excitement is conveyed to the liver. It can hence be understood, that in the torrid regions of the globe, repletion of any kind, and especially by stimulating aliments, may be likely to induce the affection under consideration; yet where hepatitis prevails to an unusual degree, local influences must be combined with elevated temperature in the causation. This is proved by the fact, that the average annual per centage of hepatitis, in the East Indies, is, according to Annesley, at least treble what it is in the western hemisphere. It would appear, too, from the statistical report of the British troops in the West Indies, that although diseases of the liver are by no means so common amongst the troops in that service as amongst those employed in the tropical regions of the eastern hemisphere, they are nearly three times as prevalent as amongst troops in Great Britain and Ireland, and occasion about five times as high a rate of mortality. Yet, what confirms, again, the influence of locality in addition to elevated temperature, those diseases vary materially in prevalence and severity, at different stations in the West Indies,—occasioning, at Grenada, for example, three times as great a mortality as at most of the other islands. In Jamaica, notwithstanding the high degree of atmospheric heat, they are by no means very prevalent or fatal, and many parts of the island are remarkably exempt from them. It would seem, too, from the statistical report, that the mortality in the West Indies, from these diseases, is much less amongst the black than amongst the white troops.

In certain parts of the globe, and especially in the East Indies, the causes are of such universal application, that hepatic disease in animals is by no means unusual. Animals, carried to India from more

temperate climes, are peculiarly subject to it, and many of them die. Staff-surgeon Blest informed Dr. Stokes, that he had seen many cases of hepatic abscess in dromedaries and horses under these circumstances. In temperate climates, the most common causes of acute hepatitis are such as act mechanically on the liver;—for example, blows on the right hypochondrium, great efforts to raise heavy weights, falls from a height, and penetrating wounds. The hepatitis, thus induced, is almost invariably fatal. For the reasons before mentioned, it will be readily understood, that any excessive irritation of the stomach and intestines may cause it; hence, it is a result of hyperemesis and hypercatharsis, and of gastro-duodenal inflammation, which may be propagated along the biliary ducts, as already remarked, and also—it has been conceived—by the veins, which arise from the stomach and intestines, becoming inflamed, and the inflammation extending along the vena porta to the liver. Inflammation of the rectum has, in this way, been observed to reach the liver, and to induce numerous abscesses in that viscus.

Like other phlegmasiæ, hepatitis would seem to be induced by irregular exposure to cold; and it is asserted to have succeeded to the repercussion of some cutaneous or other irritation or discharge. Europeans, who have recently arrived in India, are very liable to liver disease from slight exposure to atmospheric vicissitudes, or to the common causes that induce fever in Europe or this country. Habitual intemperance, or dram-drinking, according to the experience of Mr. Twining, is not as common a cause of hepatitis as has been supposed, and it has been affirmed by Dr. Mackintosh, that in temperate climes, it produces diseases of the stomach more frequently than of the liver. The author has extensive opportunities for observation on this matter at the Philadelphia Hospital, and although he may agree with the writers cited, that acute hepatitis is not common, his whole experience leads him to the assertion, that inveterate habits of drinking spirituous liquors produce death, not by their effect upon the stomach alone, but by the chronic inflammation, and other diseases of the system of nutrition of the liver. The mode of causation is sufficiently evident. The alcohol irritates, and often inflames the lining membrane of the stomach and duodenum, so as to give rise to softening, thickening, and the other results of chronic gastro-enteritis; and the effects of these pathological states are extended along the ducts to the liver, which becomes morbidly implicated. Along with this chain of causation, the alcohol passes readily through the coats of the veins of the portal system by endosmose; and, before it becomes well mixed with the blood of the vena porta, it is distributed through the liver, whose organic actions cannot fail to be unduly excited, and often perverted under the stimulation. It has been observed, by an excellent writer on the diseases of the liver, Dr. Wm. Saunders, that in dram-drinkers, the diseased structure may often be traced from the stomach along the ductus communis choledochus, and that the gall ducts may be so contracted and thickened, that they cannot transmit the bile.

Acute hepatitis is not a disease of infancy. With regard to its

comparative frequency in the two sexes, discordance of opinion exists. Whilst some, as M. Andral, affirm, that females are rarely affected by it; others, as Dr. Mackintosh, assert, that in Great Britain, women are more liable to diseases of the liver than men, owing, probably, to their sedentary occupations. It is affirmed, by Twining, that in India, women are less liable to acute liver disease than men of a corresponding class of society, owing to their more temperate habits of mind, as well as to less exposure to the exciting causes, and more abstemious method of living.

Pathological characters.—Some difference of sentiment has existed as to whether the liver be augmented in size in acute hepatitis. It has been affirmed, that no increase is perceptible, but others, and the generality of observers, have maintained the contrary. The truth is, that but few opportunities have presented themselves for observing the pathological appearances in acute hepatitis. Generally, perhaps,—especially in the first stage or that of congestion or engorgement,—there is enlargement; but it must be borne in mind, that the liver is, at times, very large in persons, who are unaffected with hepatitis; and if such persons were to complain of symptoms referable to the liver, this increased development of the organ might receive greater attention as a means of diagnosis than it merits. There are cases in which, to employ the language of Dr. Stokes, “there exists, in adults, a persistence of the embryonary condition of the liver.” This condition—it is presumed, by the writer cited, and properly we think—is one of the varieties of arrest of development, and is observed in those persons, whose constitutions give manifest indications of scrophula. This additional fact exhibits the importance of having a correct knowledge of an organ in its healthy state, before we can accurately appreciate the pathological appearances; and perhaps we are scarcely justified in indicating any other *post mortem* appearances, as of general occurrence in acute hepatitis, than those of hyperæmia in the earliest stage; of redness with softening; and, at a later period, of infiltration or collections of pus, when the inflammation has ended in suppuration. These collections vary greatly in size and number: at times, they are not larger than a hazel-nut; at others, they occupy one-half of the viscus. They may be seated near the circumference of, or deep in, the organ, and are usually surrounded by redness, and softening of the hepatic parenchyma. Frequently, the liver is found to have contracted adhesions with the neighbouring parts;—the diaphragm, stomach, duodenum, colon, or the parietes of the abdomen;—the peritoneum serving as the bond of union, through which the matter of abscesses at times makes its way to be discharged externally. At other times, the pus is found in the cavity of the peritoneum, where it has excited fatal inflammation. Tubercular degeneration, in a state of softening, has not unfrequently, perhaps, been mistaken for abscess of the liver. Gangrene of the liver, it has been already remarked, is extremely rare.

Treatment.—As in all cases of active inflammation of internal organs, bleeding is a most important remedy, pushed to such extent, and repeated as often, as the symptoms indicate, and the habit of the

individual will justify. There is considerable tolerance of loss of blood, and this, indeed, has been regarded by Dr. Marshall Hall, as a useful diagnostic. In the early period of the disease, the decisive use of the lancet is important, yet it is not often cut short by it; it is, however, mitigated in violence, and the diminution of the quantity of the circulating fluids prepares the way for other remedies. When the disease is too far advanced, the application of leeches is to be preferred, and after they have dropped off, a warm emollient poultice may be placed over the bites. The leeches may be applied again and again, should circumstances indicate the necessity. If the patient have been liable to hemorrhoids, or if there is reason to believe, that the inflammation is seated at the concave surface of the liver, some of the French practitioners prefer, that the leeches should be applied around the anus; and this form of revulsive bleeding, the author has found advantageous in all cases of hepatitis.

Drastic purgatives are of questionable utility. It has been already remarked, that irritation of the lining membrane of the intestines is readily communicated to the liver, and hence, any therapeutical agent that greatly stimulates the canal, and especially its upper portion into which the biliary ducts open, may add to the hepatitis. Cathartics, however, like the salines, which act on the whole tract, and increase the secretion from the lining membrane, without producing too much irritation, are of decided advantage. When the inflammatory symptoms have been reduced by the vigorous employment of antiphlogistics, counter-irritants—as blisters—may be applied over the region of the liver, and the prolonged use of the warm bath be prescribed.

It has been a common custom, borrowed from the practice of the physicians of India, to administer mercury largely, so as to induce salivation. Some commence this at the very outset of the disease; but if it be employed at all, it should be prescribed after the inflammation has been reduced by antiphlogistics; its revellent operation may then be of decided benefit.

When the hepatitis has terminated in suppuration, and the abscess is deep-seated, nothing can be done, excepting to meet the general symptoms, and support the individual—if this be necessary—by appropriate diet. Should, however, the collection of matter be superficial, it will be necessary to open it, as soon as practicable, if there be reason to believe, that it is making its way by adhesion to the surface of the body, and if there be no likelihood, that, should an incision be made, the matter will be discharged into the cavity of the peritoneum. This is not easily diagnosticated, inasmuch as it has been found, that an abscess of the liver may be so large as to form a distinct tumour on the surface, which may be fluctuating, discoloured, and painful, and yet, on dissection, there may not be the slightest trace of adhesion; so that, if paracentesis had been performed, the matter must have made its way into the peritoneum, and been the cause of death. Where doubts exist as to whether adhesions have formed so as to render it safe to open the abscess in the ordinary manner, the plan, proposed by Dr. Graves, may be adopted. It consists in making an incision down to the peritoneal coat of the liver,

and filling the wound with lint. This will be followed by the requisite adhesions, and the abscess will probably advance towards the part where the incision is made. When patients have not permitted the abscess to be opened by incision, the potassa has been applied to the most prominent part of the tumour; but it does not appear that there was any advantage in this mode of procedure. On inspecting the bodies of those individuals after death, adhesions of the peritoneal coat of the liver to the parietes of the abdomen have very rarely been found. Where the abscess bursts into the cavity of the peritoneum, the case has to be treated in the same manner as peritonitis produced by rupture or perforation of the intestine.

Care must be taken not to mistake a distended gall bladder for an abscess. This may be done. An interesting case is referred to by Drs. Stokes and Graves, in which the gall bladder was actually punctured, under the idea that the tumour formed by it was an abscess.

The exploratory needle is now extensively used in India in supposed cases of hepatic abscess.

It has been attempted to induce absorption of the pus by mercury, pushed so as to induce salivation. This, however, is not always easy. It has, indeed, been found, in many instances, impracticable to salivate persons labouring under hepatic abscess, so that it has even been conceived, that the presence of matter in the liver may be determined, in doubtful cases, by the circumstance of the patient being unsusceptible of the full effect of mercury. It is indeed difficult to induce ptyalism when the organic actions are greatly excited in any part of the economy.

Throughout the whole of the period of activity of the inflammation, the diet must be strictly antiphlogistic; but when the violence of the disease has subsided, mild farinaceous aliment may be allowed, with milk or chicken broth, unless these articles disagree; in such case, one-sixth part of cream, mixed with five-sixths of water, forms an agreeable and nutritious aliment. To allay the thirst, it is best to allow small pieces of ice to be taken into the mouth frequently. Where large quantities of fluid are permitted, especially when bleeding, general or local, has been premised, so as to diminish the quantity of blood circulating in the vessels, the fluid passes readily through the coats of the stomach and of the veins of the organ, so that in a short time after the bleeding, the portal system may be as full of fluid as it was previously.

b. *Chronic Inflammation of the Liver.*

SYNON. Hepatitis chronica, Inflammatio Hepatis lenta, Hepatitis occulta; Chrono-Hépatite. (Piorry.)

It has been properly remarked, that many of the cases, usually denominated *chronic hepatitis*, differ rather in degree, than in any other essential, from the acute form of the disease; and that they require more perseverance in the use of remedies, although the same active treatment may not be so necessary as in acute cases. There can be no doubt, however, that *liver disease*—as it is commonly

called—is by no means as frequent as was at one time supposed; and that many of the morbid conditions, which were looked upon as hepatic, are really gastric or duodenal.

Diagnosis.—The symptoms are essentially like those of acute hepatitis. There is a dull, heavy pain in the right hypochondrium, increased by pressure, by succussion of the body, or by lying on the left side; and it may not be felt except under these circumstances. These symptoms are accompanied by more or less fever, which occasionally has a marked exacerbation in the evening. Sooner or later, the skin usually becomes more or less yellow; the *faeces* white or clay-coloured, and the urine brown or yellow, depositing a copious sediment. By pressing upon the abdomen, after the inflammation has persisted for some time, the liver may be felt extending beneath the false ribs, and more or less towards the epigastric and the umbilical regions; and, frequently, the right hypochondrium is observed to be manifestly more tumid than the rest of the abdomen. Percussion indicates the existence and extent of this tumefaction. Along with these symptoms, there is generally yellow, furred tongue; want of appetite; nausea and vomiting; and, at times, diarrhoea; in short, disordered function of the stomach and the whole intestinal tract. These are the symptoms usually assigned, and which belong, to chronic hepatitis; but they equally belong to other chronic liver diseases, to be described presently. Many of the symptoms, again, may be absent; nay, few—if any—of them, may be present, and yet chronic hepatitis may, notwithstanding, exist. The pain in the hypochondrium may be the only symptom. It is said, indeed, by M. Andral, that nothing but great itching of the skin may lead to a suspicion of its presence; whilst others, as Dr. Mackintosh, assign an eruption, attacking the face and back between the shoulders, generally in the form of acne, as one of its symptoms; but neither of these cutaneous affections is deserving of much diagnostic weight, especially when taken singly.

Chronic hepatitis may also be confounded with disease of the neighbouring viscera—as scirrhus of the pylorus, chronic disease of the duodenum, and of the pleura when accompanied by effusion; and it may be complicated with one or more of these affections, so as to render the diagnosis very difficult.

It is stated on the excellent authority of M. Andral, that chronic hepatitis frequently terminates in suppuration which in a very great number of cases, occurs without being suspected by either the patient or the physician; whilst, in other cases, it is foretold by the symptoms mentioned under acute hepatitis. The author has never met with a case of the kind; and, consequently, such a termination, in these climes, must be extremely unfrequent.

Causes.—These are essentially the same as those of acute hepatitis.

Pathological characters.—The appearances on the cadaveric examination of a person, who has died under chronic hepatitis, are varied. The most constant is the increased size of the liver. The texture of the viscus is variously changed. Usually, it is indurated, more dense, but more readily lacerable. The colour, too, may differ: it may be

brownish, reddish-yellow, slate-coloured, or blackish, in spots or patches. Abscesses may be found, and the same kind of adhesions may exist with the neighbouring parts as in acute hepatitis. Along with the evidences of chronic hepatitis, tubercles, melanosis, cirrhosis and the different degenerations, to be described hereafter, may be met with.

Treatment.—The management of cases of chronic hepatitis is analogous to that of the acute form. Whatever excites the lining membrane of the stomach and bowels, whether in the way of aliment or medicine, must be sedulously avoided: the plan, consequently, of administering cathartics repeatedly, which are reputed to be cholagogue in their action—or which, in other words, excite the lining membrane of the upper portion of the intestinal canal, is objectionable. The diet must be carefully regulated; leeches and emollient cataplasms be applied to the hypochondriac region, or to the anus, from time to time; gentle laxatives be administered; with counter-irritants,—as blisters, the tartarized antimony ointment, or frictions with croton oil; and the warm-bath. This plan of treatment, carefully persisted in, will often be entirely successful, but should it fail, revellents of another kind may be demanded. Mercury then becomes advisable, which may be administered either internally, or by way of friction, until the effects of the remedy become perceptible on the mouth.

R.—Pil. hydrarg. gr. iij.—v.
Every night at bedtime.

Or, R.—Hydrarg. chlorid. mit. gr. j.
Ext. taraxac.
— hyoseyam. aa gr. ij.—M.

If blisters have been employed, the blistered surface may be dressed with mercurial ointment. The author has never found it necessary to push the mercury beyond this point; but actual salivation has been recommended, should the pain continue to be severe, the swelling undiminished, the symptoms obstinate, and no contra-indication—as the presence of scrophula—coexisting. It is proper, by the way, to remark, that in the opinion of certain observers, hepatitis and other diseases of the liver may be induced by mercury, and that in venereal establishments, hepatitis and jaundice have not unfrequently been seen to follow the use of the remedy.

As a revellent, capable of being substituted for mercury in these cases, the internal and external use of chlorine has been advised. Favourable results were obtained from the administration, internally, of the aqua chlorini, in the Children's Hospital of St. Petersburg. (See the author's *New Remedies*, 4th edition, p. 157, Philad. 1843.) When the external agency of the chlorine is desired, the nitro-muriatic acid is commonly employed,—bathing the feet, or sponging the right hypochondrium with it. The form, usually advised, is the following.

Take of strong nitric and muriatic acids, of each, four ounces: add to these eight ounces of water. Of this mixture, take from two to five ounces, and dilute with three gallons of warm water. When this is used in the form of a pediluvium, the patient should keep his feet in it for 20 minutes or half an hour. If the bath be of proper strength, it will cause a prickling sensation in the skin. Should it not do so, an ounce or two more of the acid mixture may be added to it. (Scott.)

Fumigations of chlorine have a similar agency; and they have been regarded as more certain than ablutions and baths of nitromuriatic acid. When chlorine is used in this way, it also occasions a prickling sensation; increase of transpiration; great afflux of fluids to the surface of the body; and, at times, a pustular eruption; increased secretion of saliva, urine and bile; slight inflammation of the mouth and fauces, &c. It is evident, from this active revellent operation, that the application of chlorine may be serviceable in many diseases, as well as the one under consideration. It has been considered peculiarly adapted for cases of chronic hepatitis, in which mercury has been used irregularly, or for a long period, without benefit; or, where the patient is of a broken down constitution, and the practitioner is anxious to dispense with the use of mercury.

A strict observance of hygienic rules is all important in this disease. The diet should be unirritating, but moderately nutritive; and as there is generally a desire for fruits and acidulous or acid substances, the taste may be indulged under due precautions. Lemonade forms an agreeable and proper drink. Moderate exercise may be allowed, with travelling air, and exercise properly adapted to the case. Mineral waters have been advised,—as the Harrowgate or Cheltenham,—or, in other words, the sulphurous or saline class. The trans-allegany springs of Virginia, furnish sufficient variety; as well as the Fauquier springs, and those of Saratoga; but the waters are not of the efficacy, in such cases, that has been supposed, and, by disagreeing with the gastric and intestinal organs, they may do positive mischief. The revellent effect of change of air, scenery, and society is unquestionably calculated to be advantageous in long protracted cases of chronic hepatitis; but care should be taken, that the change be to a situation in which the patient can rigidly follow the regimen adapted to his case; otherwise, the resulting evil may more than counterbalance the good.

III. HYPERTROPHY OF THE LIVER.

SYNON. *Hypertrophia hepatis*; *Fr.* *Hypertrophie du Foie*, *Hyperhépatotrophie*, (*Piorry*); *Ger.* *Hypertrophie der Leber*, *Uebernahrung der Leber*.

Under acute and chronic hepatitis, it was observed, that the liver, owing to hyperæmia, is sometimes greatly enlarged. This is not, however, a case of hypertrophy of the liver. The latter term is applied to augmentation of size, resulting from increase of the tissue of the organ.

Diagnosis.—The symptoms of hypertrophy of the liver vary, according as the affection is general or partial, and according to the part of the organ that is hypertrophied. If the whole liver be enlarged, a tumour will exist in the right hypochondriac region, and the liver may be detected, both by palpation and percussion, beneath the false ribs; and may, or may not be painful on pressure. Where pain is present, it appears to be owing rather to the traction of the peritoneum than to the condition of the liver itself. The disease is slow in its progress, and may produce more or less disturbance of the digestive function. It has been asserted, that it

never proves fatal of itself, but it is easy to see, that it may readily induce other affections, which may destroy life.

It has been affirmed, that, in certain cases of enlarged liver, a loud sound is heard through the stethoscope, between a crepitous rattle and a bleating, and accompanied by a vibration of the parietes of the thorax, communicated to the hand applied to the part; and in one case, it is said, such a sound was caused by the thin edge of the lung being compressed against the costal pleura by an enlarged liver; and, in another, Mr. Malcolmson was able, "by placing the patient in a sitting posture, to remove the symptom, and to let the lung descend a little farther into the chest, and, by pressing the liver forcibly upwards, again to produce it."

Causes.—It is not easy to assign a cause for the increase in the nutritive acts of the liver. In the fœtus, and the infant, a state of hypertrophy of the organ may be esteemed natural; but the proportion diminishes gradually after birth. It has been already observed, too, under hepatitis, that there are certain persons in whom the change does not take place, and who grow up with the liver bearing the same proportion to the other organs as it did in the fœtal condition. Such individuals are generally of a strumous habit.

Pathological characters.—Hyperæmia of the liver may coëxist with various colours of the organ, and with different degrees of consistence. When the liver is hypertrophied in every part, its shape may be preserved; but, in other cases, it may be variously modified. Generally, the hypertrophy is seated in the right lobe; but it may occur in any part of the organ. Various cases of excessively enlarged liver are on record; yet few, if any, were examples of simple hypertrophy. When the hypertrophy has been accompanied by disease, the organ has weighed as much as twenty, and even twenty-eight, pounds.

Treatment.—It is not an easy matter to remove the derangement of functions, which gives rise to a loss of balance between deposition and absorption. As the disease, however, is usually associated with scrophula or defective development, it is not advisable to place the patient on too strict a regimen, or to reduce him by powerful remedies. The preparations of iodine would seem to be indicated: they have been used accordingly, and it is said with much advantage. They may be given internally,^a or be rubbed over the region of the liver night and morning.^b

^a R.—Tinct. iodin., seu
Tinct. iodin. comp. (Pharmacop.
Lond.) gtt. x., ter die.

^b R.—Iodin. 3ss.
Adipis, 3i.—M.
Quantity, the size of a hazelnut.

IV. ATROPHY OF THE LIVER.

SYNON. *Atrophia hepatis*; *Fr.* Atrophie du Foie; *Ger.* Atrophie der Leber.

Defective nutrition, like supernutrition of the liver, may affect the whole, or a part only, of the organ. It may likewise exist alone from causes affecting the intimate nutrition of the liver, which are not appreciable; but, most commonly, it is associated with induration or softening.

Atrophy of the liver is understood by pathologists to mean atrophy of the proper substance of the viscus. This may disappear without the whole organ being less; it may, indeed, be larger than natural, owing—as remarked by M. Andral—to the circumstance, that as the proper substance of the liver disappears, it is replaced by cellular tissue. The disease is usually slow in its progress. The patient may, or may not, complain of more or less uneasiness in the region of the organ; his nutrition falls off; the gastric functions are imperfectly executed; the abdomen increases in size; and symptoms of ascites become developed, and exist as long as the individual lives. The ascites is owing to the obliteration of some of the portal and hepatic vessels in the progress of the atrophy, and it is one of the common accompaniments of the affection.

The existence of atrophy of the liver may be suspected by the presence of the symptoms above mentioned; but the diagnosis must necessarily be imperfect; and if it were easy, it would be difficult to suggest any rational plan of management.

V. SOFTENING OF THE LIVER.

SYNON. Hepatomalacia, Malacosis hepatis; *Fr.* Ramollissement du Foie; *Ger.* Erweichung der Leber, Lebererweichung.

Ramollissement of the liver may exist in different degrees, so as not to be perceptible on dissection, except by pressing the parenchyma between the fingers; or when it is to such an extent as to be appreciable by simple inspection;—the tissue of the liver, in the latter case, being liquefied, as it were, and having the appearance as if it had been long subjected to maceration. The sort of red or gray pulp, to which the substance of the organ is reduced, permits the different vessels, distributed through it, to be distinctly seen, owing to their being deprived of their means of union. The softening may exist without any change in the colour of the organ; but, in certain cases, it is black, and has the appearance of grumous blood. In some cases, the organ is of the natural size; in others, it is larger; and in others, again, smaller; and it may affect the whole organ, or only a part of it. It has no diagnostic symptoms, and is a rare affection.

VI. INDURATION OF THE LIVER.

SYNON. Induratio hepatis; *Ger.* Leberverhärtung, Verhärtung der Leber.

When the liver is indurated, it usually exhibits, when torn, a granulated surface. This condition, like softening, may exist with the natural, augmented, or diminished size of the organ; but, generally, the bulk of the gland is much reduced, sometimes nearly to one half. Its colour may be various—brown, red, or green, and sometimes it is purple, or lilac. The granules become atrophied—as described under Atrophy of the liver—and, in some cases, they seem to be wholly removed, their place being occupied by cellular tissue, which gives the organ the dull grayish colour. Such a state cannot exist without the obliteration of many of the hepatic vessels and ducts, which may give occasion to ascites, (see *Atrophy of the Liver*,) and

to yellowness of the conjunctiva and of the surface of the body. These symptoms cannot, however, be esteemed pathognomonic.

As the presence of either softening or induration of the liver can only be suspected, the treatment will have to be regulated upon general principles. Both conditions have been supposed to be the results of chronic inflammation. They are certainly lesions of nutrition, but not necessarily connected with an inflammatory process, and certainly not with one, which is indicated by the usual symptoms.

VII. CIRRHOSIS OF THE LIVER.

SYNON. Cirrhoneosis, Kirrrosis or Kirrhoneosis of the Liver, Granulated, Granular, Mammillated, Tuberculated Liver; *Fr.* Cirrhose du Foie; *Ger.* Cirrhose der Leber.

This affection, so called from the yellow colour of the liver, (*κίρρος*, "yellow,") like the last described, is more interesting in its pathological than in its therapeutical relations.

Diagnosis.—There are no symptoms, which can lead to more than a suspicion of its existence, and when such symptoms are present, they are equally referable to induration and to atrophy of the organ. The region of the liver may afford no symptoms or signs: ascites, however, appears to be a universal concomitant, and commonly œdema of the lower limbs also,—the latter succeeding to the former. When the reverse is the case, it is affirmed by M. Becquerel, that Bright's disease of the kidney or disease of the heart is always indicated. The dropsical effusion into the abdomen usually occurs slowly; and if it should take place to such an extent as to require paracentesis, it is quickly re-established after the operation. In some cases,—it has been estimated, by M. Littré, in about one third,—jaundice coexists; but in other cases, there is simply a yellow tint of the skin and conjunctiva. It has been affirmed, indeed, that icterus is not one of its concomitants or consequences, but this is an error. In process of time, the nutrition of the body becomes so much affected that marasmus is established, and the individual gradually sinks.

Causes.—The most common cause of this, as well as of every chronic disease of the liver, is the abuse of spirituous liquors. In all of the few cases of cirrhosis, which have fallen under the author's care, the subjects have been dram-drinkers; and this accords with the experience of others. It can be understood, however, that other affections of the liver,—hyperæmia, chronic hepatitis, &c.—may lead to the same result. M. Becquerel conjectures, that it may arise from active and long-continued congestion of the liver, consequent upon chronic disease of the lungs or heart, with the affections of which organs, cirrhosis is often complicated.

The immediate causes of the disease are, however, unknown. It appears to be met with more frequently in men than in women. Of 18 cases of the simple or uncomplicated form of the disease, 12 occurred in males, and 6 in females; and in regard to the influence of age, the cases may be thus arranged—

| | |
|--------------------------|---|
| Between 18 and 20 years, | 1 |
| “ 20 “ 30 “ | 2 |
| “ 30 “ 40 “ | 7 |
| “ 40 “ 50 “ | 3 |
| “ 50 “ 60 “ | 5 |

 18

It would hence appear, that persons between 30 and 40 are more liable to cirrhosis. It is also met with in children; and M. Becquerel is disposed to think, that it occurs more frequently in young subjects than has been generally supposed.

Pathological characters.—Pathologists do not agree as to the nature of the change of structure in cirrhosis. The disease consists essentially in the developement of granulations of various sizes, both at the surface and in the very substance of the liver. These granulations may not be greater than shot of the largest size; but, at times, they are as big as cherries. The form of the liver is always more or less changed; commonly, it is much less than natural, and shrivelled as it were,—its tissue being denser than in the healthy condition. The granulations are of different colours,—red, brown, but more commonly yellow—and, at times, of a beautiful canary yellow. By the eminent pathologist, Laënnec, who first described this morbid state, these granulations were supposed to consist of a peculiar tissue, which, as it was developed, gave occasion to the absorption of the proper tissue. This tissue—Laënnec conceived—like some other accidental tissues, has two stages,—the crude and the softened. The views of Laënnec have not, however, been generally admitted. MM. Bouil-land and Andral, believing the liver to be formed of two distinct substances—the yellow and the red—are disposed to refer the lesion to an hypertrophied condition of the yellow substance,—the red becoming, at the same time, atrophied; hence the mammillated appearance which is presented by the yellow substance. M. Cruveilhier, on the other hand, does not admit, that the granules are formed of two distinct substances. His views of cirrhosis are,—that it consists essentially in atrophy of the greater number of granulations, and hypertrophy of the remainder to supply the deficiency thereby engendered. The two distinct substances in the liver,—the yellow, the secreting tissue,—and the red formed by the ramifications of veins and arteries—are, however, by no means generally admitted, and, until they are established, any theory founded upon them, cannot be implicitly received. The views of Mr. Kiernan in regard to the minute anatomy of the liver have given rise to another explanation, which is considered by Dr. Carpenter to be satisfactory. The small masses are regarded as uncongested patches, composed of parts of several adjoining lobules, and having one or more interlobular spaces as a centre; and the biliary plexus of these, being filled with bile, gives them their yellow colour. In the other, there is a more or less complete atrophy of the portions of the substance of the liver intervening between them, so that the size of the liver is much diminished. This may be the

true explanation; but the opinion of Laënnec has appeared to the author to be most entitled to favour; and the circumstance that, in certain forms of cirrhosis, little granules having the appearance of adipocire, can be washed out of their cellulo-fibrous capsules, after a maceration of some days in water, is greatly in favour of their adventitious formation. The matter of which the rounded masses in cirrhosis consists is not considered by Mr. Goodsir as a new deposit, but merely as the natural tissue of the liver, altered by the pressure exerted by their fibrous envelope. These alterations consist in constriction, more or less powerful, of the vessels and ducts which pass out of and into the rounded mass; the necessary difficulty with which the circulation is carried on, and the bile advanced along the ducts, and latterly in a change in the constitution of the nucleated cells themselves, which, instead of being distended with bile containing oil-like globules, contains matter of a darker colour and less oil. The cells may at last contain matter perfectly black, and then the rounded mass assumes the appearance of a melanotic tubercle,—the black cells, in some instances, becoming pyriform and caudate. Mr. Goodsir does not state the exact nature of these various changes in the liver, although he is inclined to believe, that the forms of cirrhosis and melanosis are due to the contractile tissue, as a product of inflammatory action more or less acute. His remarks on the whole subject can only be regarded in the light of suggestions.

The following case, which fell under the author's care, and was reported at length by a then resident physician of the Philadelphia Hospital, Dr. Edwin A. Anderson, of Wilmington, N. Carolina, will illustrate the general character of cases of cirrhosis. A woman, aged 65 years, was admitted into the hospital on the 31st of July, 1838. She had been in the habit of working in the open air, at gardening, and had been subject, for three years, to palpitation and severe attacks of dyspnœa, which continued for ten or fifteen minutes. She also had cough, attended with expectoration in the morning, and profuse sweating at night, for a long period. Her appetite was bad, and her habits were very intemperate. A month previous to her entrance into the hospital, she had an attack of pleurisy of the left side, for which she was bled and purged. An attack of inflammation of the uterus supervened on the pleuritis, followed by extensive infiltration of the upper and lower extremities, and effusion into the thoracic and abdominal cavities. The effusion into the thorax was so extensive, that, according to the voluntary account of the patient, when she suddenly moved or rose from bed, she was sensible of a body of water rushing from one part of the chest to another. The day after her reception into the hospital, (Aug. 1,) she was labouring under excessive dyspnœa, which obliged her to assume a semi-recumbent posture; the lips were pallid; the skin was of a deep yellow hue, and the conjunctiva was of the same colour. There was extensive infiltration of the upper and lower extremities; the abdomen was distended, and presented very evident fluctuation; and the lower portions of both pleuræ were dull on percussion. Soon after her admission, she was

attacked with delirium tremens, and sank under her complication of diseases on the 6th.

On examining the abdomen, the liver was found much enlarged, weighing about ten pounds; granulated, the surface raised into a number of round mammillated protuberances, of a tawny colour, closely resembling beeswax, none of them larger than a pin's head: the substance of these granulations was compact, and when divided, they presented a smooth, flat, even surface. The consistence of the liver was very firm, admitting the finger with much difficulty; semi-cartilaginous, and evidently greasing the scalpel when cut into. The whole organ presented an excellent example of cirrhosis combined with hypertrophy,—not with diminution of bulk, as defined by Laënnec. The gall-bladder contained a dark-coloured bile. The stomach presented, along its great curvature, a highly injected state of vessels; and the mucous membrane could be readily detached. These were the most marked appearances, and the most interesting in their application to the subject under consideration.

Cirrhosis never affects the liver partially; but attacks almost all its substance simultaneously.

VIII. MELANOSIS OF THE LIVER.

SYNON. *Melanosis hepatis*; *Fr.* *Mélanose du Foie*; *Ger.* *Melanose der Leber*.

This affection is not common; yet many cases of it have been recorded; and it has been affirmed, that the liver and the lungs are the only organs in which melanotic tumours, of the encysted character, are liable to become softened, their contents to be discharged, and to leave after them excavations similar to those left by pulmonary tubercles.

The opinions of pathologists have differed in regard to the modifications induced by melanosis of the liver. Thus, it has been affirmed, that numerous and considerable melanotic tumours may exist in the organ, without inducing any unusual symptoms. On the other hand, anasarca, emaciation, and prostration have been ascribed to them. The condition is rather of pathological than of therapeutical interest, inasmuch as it cannot be diagnosticated during life.

IX. FATTY DISEASE OF THE LIVER.

SYNON. *Fatty liver*, *Adipous* or *Fatty degeneration of the liver*, *Adiposis of the liver*, *Adiposis hepatica*, *Pimelosis hepatica*; *Fr.* *Dégénérescence graisseuse du Foie*.

The liver, in a state of health, contains a certain quantity of fatty matter; and the cholesterin, which is secreted by it, is of the same character. It can be readily seen, therefore, that under certain modifications of the functions of nutrition of the liver, the quantity of fatty matter may become augmented, so that we may have a state of hypertrophy of the fatty substance, as we have of the cellular membrane. The portions of the liver that contain the fatty matter resemble in colour a dead leaf, figured irregularly with brownish or deep orange spots. Internally, it has a somewhat corresponding appearance, excepting, that the brown and pale yellow tissues are much more uniformly distributed than upon the surface. Their con-

sistence is diminished; and they give no evidence of the presence of the colouring matter of the blood. When they are cut into, the appearance of grease is evident on the scalpel; and, by boiling, the oily matter can be separated. This is, at times, small in quantity; but at others it would seem to occupy more space than the parenchyma of the organ. This was the case in a liver examined by M. Vauquelin. One hundred parts were found to consist—of oil, 45 parts; parenchyma, 19; water, 36. The oily matter has been examined more recently by Dr. Golding Bird. It is a soft brownish substance, possessing a peculiar and disagreeable odour. A pound of the tissue of the liver has been found to yield about five drachms and a half, but—as before remarked—the quantity must vary according to the extent of the disease.

Sometimes, the fatty liver does not exceed the natural size: at others, it is greatly enlarged. It has been seen to extend beyond the brim of the pelvis; and, in one instance, to weigh 16 pounds. In all cases, it is of less specific gravity than healthy liver, the ratio, in two specimens, according to Dr. G. Bird, being as 1.027, to 1.062. In one case, cited by Dr. Mackintosh, large sections of the liver floated even in strong alcohol. At times, the depositions are partial, and are surrounded by sound hepatic parenchyma. Some of these have been found entirely composed of cholesterine.

In this, as in other diseases of the liver, it is reasonable to expect that the bile should be a good deal altered in its properties. It is frequently of a dirty brown colour, and contains an infinite number of carbonaceous granules. The addition to it of most of the acids gives occasion to the exhalation of an intolerable odour. The urine, likewise, is commonly much changed; its specific gravity is less; it is neither acid nor alkaline, and holds numerous flakes of mucus in suspension.

Diagnosis.—There are no symptoms or signs which can be regarded pathognomonic. Dr. Addison, has, indeed, affirmed, that he has found the disease associated with a remarkable appearance of the face,—dependent not so much on the expression of countenance, as on the texture and aspect of the integuments. The appearance, according to him, is purely tegumental, and is not confined to the face, but may pervade the whole surface of the body, although he is disposed to think, that it is earliest observable, as well as most conspicuous, in the integuments of the face and the backs of the hands. The skin has the appearance of being bloodless, almost semi-transparent, and waxy; and when this is associated with mere pallor, it is not very unlike polished ivory; but when combined with a more sallow tinge, as is now and then the case, it resembles more a common wax model. To the touch, the general integuments, for the most part, feel smooth, loose, and often flabby; whilst, in some well-marked cases, all its natural asperities would appear to be obliterated, and it becomes so smooth and soft, as to convey a sensation resembling that experienced on handling a piece of the softest satin. Whether this condition of the integuments precede or follow that of the liver; and whether the two be necessarily associated, in

every instance, Dr. Addison is not prepared to offer a decided opinion. His observations ought to be borne in mind; although it would be singular were it a universal evidence of this lesion of the liver; and still more singular, if it were an evidence of this lesion only. A recent writer, Dr. Albers, considers the most important diagnostic to be,—great emaciation without dropsy:—and he affirms, that in hypertrophy, cirrhosis, and all other chronic diseases, dropsy always occurs both in the form of ascites and anasarca; but the generalization is evidently too comprehensive.

Causes.—The causes of adiposis of the liver are entirely unknown. It has been believed to be owing to irritation of the organ; but this view—as has been well observed by M. Andral,—is mere hypothesis. Nor can we say more of the opinion—that it is owing to chronic inflammation with venous engorgement. We know, that adiposis takes place—not in the liver only, but in the adipous tissue in every part of the body, yet we should hardly be justified in referring obesity, occurring either spontaneously or artificially, to chronic inflammation with venous engorgement. The suggestion, that we might, with as much propriety, assign it to the nutrition of the liver having become less active, is good. We find, indeed, that in proportion as an organ—say a muscle—is exercised, its nutrition is augmented, and that the fat, deposited in the cellular tissue between its fasciculi, and surrounding it, is diminished in quantity, so that the outline of the organ is well pronounced; but if the muscle be kept in a state of inaction, its nutrition diminishes, whilst the secretion of fat becomes augmented. Andral, indeed, affirms, that it is a great law of the economy, that whenever an organ tends to atrophy, a fatty matter is deposited around it, or in the place of its molecules. Recently Mr. Bowman has suggested, and Mr. Goodsir accords with him, that the fat in fatty liver is deposited within the nucleated cells of the organ, and that the disease is to be considered in fact as a redundancy of the oil globules naturally existing in these cells, with atrophy of the other structures.

It is a singular fact, that fatty degeneration of the liver is most commonly observed in consumptive individuals. Of 123 cases of consumption, observed at La Charité in Paris, 44 had the lesion in question. It is met with, however, occasionally, when the lungs are not diseased. Of 49 cases, which occurred to M. Louis, 47 were in phthisical individuals. It has been hitherto witnessed more frequently in young than in old persons; and, according to M. Louis, in females oftener than in males. Of 65 cases, observed in the Royal Infirmary of Edinburgh, by Dr. Home, all but one occurred in women.

Treatment.—As there are no pathognomonic signs of the disease, no precise plan of treatment can be laid down.

X. CANCER OF THE LIVER.

SYNON. Carcinoma of the liver, Encephalosis of the liver; *Fr.* Cancer du Foie, Hépatopathie cancéreuse ou Hépatosarcomie, (*Piorry*); *Ger.* Krebs der Leber.

Under this head may be considered *scirrhus*,—which, according to

some, is a common affection, but according to Dr. Mackintosh is as rare as mortification,—and *encephalosis*.

Diagnosis.—There are no pathognomonic symptoms of this lesion. The same uneasiness may be experienced as in other chronic diseases of the liver; and, as in them, there may be no marked evidence of the existence of these malignant degenerations; or there may be jaundice, ascites, and anasarca. Where the morbid production is *encephalosis*, the countenance, it is affirmed by Dr. Marshall Hall, will be pallid, whilst if the disease be carcinoma, the countenance will be rather sallow, or straw-coloured, as in other cancerous diseases. Occasionally, the liver may be felt extending below the false ribs, and having on its surface irregular prominences, which may be painful on pressure. In *encephalosis*, the tumours are almost always much larger than in scirrhus.

A case of *encephalosis*, which fell under the care of Professor Hall, of the University of Maryland, and which the author saw both before and after dissolution, strikingly exhibits the slight disturbance, that may, for a time, attend these serious transformations. The case is reported at length in the North American Archives of Medical and Surgical Science, with some comments by the editor of the Journal, Professor Geddings, now of Charleston. A seaman was admitted into the Baltimore Infirmary on account of necrosis of the metatarsal bones. Professor Hall made an incision, with the view of removing the portion of bone affected with necrosis, but finding it adherent, he desisted. The patient became very much depressed during the operation, and was seized, on the following day, with alarming irritability of stomach, and incessant vomiting and purging. There was no pain or tenderness on pressing the epigastric or hypochondriac region, nor any symptom indicative of inflammation of the gastro-intestinal surface, unless the vomiting and purging be regarded as such. The pulse was feeble, undulating, and indistinct, and did not exceed forty-five beats in the minute. The tongue was red on the margins, and coated with a dark fur in the middle. The evacuations were dark, watery, and fetid. On the third day, universal jaundice supervened, without any marked change in the other symptoms. From this time, the emaciation and debility went on increasing for a month, at the expiration of which time the patient died, without experiencing any pain in the region of the biliary apparatus. On laying open the cavity of the abdomen, the liver was found to be greatly diseased. It was increased in size, hard, exceedingly uneven on its surface, and of a dirty grayish-brown hue. The stomach presented no marked evidences of disease. In the duodenum, there was a large indurated mass, intimately incorporated with the head of the pancreas, which was much increased in size, and exceedingly hard, and uneven on its surface. On laying open the diseased portion of the duodenum, it was found to be extensively involved in *encephaloid* degeneration, which formed a thick mass surrounding the whole intestine, and involving the contiguous portion of the pancreas. This mass was extensively ulcerated on the intestinal surface. The common choledoch duct was so much obstructed as to render it almost impervious; and,

in consequence, the gall-bladder was enormously distended, and its neck, with the cystic duct, so much dilated as to form a continuous tube from the gall-bladder as large as the finger. The whole excretory apparatus of the liver was equally distended. The common choledoch duct was of the size of the middle finger; and, on tracing it up towards the transverse fissure of the liver, the hepatic duct, and the two branches that form it, were found in the same condition. At the point, at which the latter emerge from the gland, they were large enough to receive the tip of the middle finger. They were distended with a greenish coloured mucous fluid, which flowed out in great abundance when the liver was sliced; and, before the real condition of the ducts was discovered, led to the supposition that it proceeded from numerous cysts in the substance of the gland. The coats of the excretory ducts were much thickened throughout their entire extent. The gall-bladder contained, in addition to the large quantity of fluid by which it was distended, a number of small dark coloured biliary calculi; and several of the same kind were lodged in the common choledoch duct, where they tended to augment the obstruction occasioned by the encephaloid tumour of the duodenum. The most interesting morbid appearance was the complete occlusion of the trunk of the vena porta, and its primary bifurcations, by encephaloid matter. The trunk of this vessel, for some distance from the liver, was completely plugged up; and on laying open its left and right branches, the same obstruction was found to exist in the former, nearly as far as the point at which it branches out into the left lobe; whilst, in the latter, it extended even farther—several of the subdivisions of the vessel, within the substance of the right lobe, being closed up by the same material. In one portion of the trunk of the vein, it seemed to be slightly attached to the inner surface of the vessel by means of an exceedingly delicate false membrane of a red colour; but no adhesion was discovered at any other point. The hepatic artery was in a healthy condition, and did not seem to be increased in size.

In this case, the encephalosis implicated the excretory ducts more than it did the parenchyma of the liver; but it is singular, that such extensive disease could have existed with so little local uneasiness.

Causes.—Besides the causes of cancer in general, it has been affirmed, that blows on the region of the liver, intemperance in diet, the abuse of purgatives, &c., are circumstances that favour its production: in all cases, however, the cancerous diathesis must be present.

Pathological characters.—The liver may be found studded with tumours, varying in size from that of a pea to that of the fist. These are yellow, opaque, hard, and commonly, when cut into, present fibrous radii converging towards the centre of the tumours; but, at other times, forming concentric circles. Usually, they present no trace of organization. Their texture is firm, and they cry, as it were, under the scalpel. At times, they are softened towards the centre, and contain a fluid like lees of wine,—the tissue surrounding them, both when of this nature and when encephaloid, being healthy.

Commonly, the scirrhus tumours are smaller than the encephaloid; the latter, indeed, may be as large as the fist, or of the fœtus at the full period. The tissue, which forms the basis of the scirrhus tumour, is dense and fibrous; that of the encephaloid tumour is cellular and loose. The progress of the former is generally slow; of the latter, much more rapid.

It often happens, that these morbid appearances are not met with alone, and that the carcinomatous and tubercular degenerations exist in different stages of their progress.

Treatment.—If the symptoms be so obscure as to lead to no satisfactory diagnosis, the treatment must be unsatisfactory likewise. Should the lesion be suspected, it must be treated on the same principles as cancerous diseases of other organs.

XI. TUBERCLES OF THE LIVER.

SYNON. *Tubercula hepatis; Fr. Tubercules du foie, Hépatopathie tuberculeuse ou Hépatostromosie, (Piorry); Ger. Lebertuberkeln, Tuberkeln der Leber.*

These are, by no means, of common occurrence. Even when they are present in the lungs, the liver is so rarely affected by them, that distinguished observers have never met with them, whilst others have only found them rarely. Of 123 cases of pulmonary consumption, noted by M. Louis, there were but two that exhibited tubercles in the liver. Yet, by Professor Gross, of Louisville, they are said to be of very common occurrence. It is probable, however, that this is an accidental error, as in the next page he remarks, that, on the whole, he is induced to believe, that the lesion of the liver is rare in this country. Rostan affirms, that true tubercles of the liver are more rare than cancer of the organ. The tuberculous matter itself undergoes no changes, except that it is occasionally coloured by the bile, and this bilious coloration in the midst of tubercular masses, has been met with in the fœtus.

Tubercles of the liver give rise to no symptoms, which can be esteemed diagnostic of their presence.

XII. CYSTS IN THE LIVER.

SYNON. *Fr. Kystes du Foie.*

Cysts in the liver containing watery fluid, are not uncommon. They are usually confined under the peritoneal coat, and may appear either upon the convex or concave surface of the organ. It has been a matter of question how they form. Doubtless, there is some organic change, in the first instance, in the capillaries of the viscus, which gives occasion to the effusion of plastic lymph, or to some obstruction in those vessels. This becomes a source of irritation, and when we reflect upon the rapidity with which cysts are formed, even in the case of the most acute and rapid abscesses, we can have some idea of the reason why they form so readily in the liver.

The following is one of the most remarkable cases of extensive serous cysts of the liver on record. It is given by Dr. Abercrombie:

A man, aged 32, was affected with an immense tumour of the abdomen, which filled the greater part of it, extending from the region of the liver considerably below the umbilicus, and into the left side. At the upper part, near the ribs, on the right side, there was an evident fluctuation. This was most remarkable, when the patient was erect: in the horizontal posture, it seemed as if the fluid retired under the ribs. No fluctuation was perceived in any other part of the mass. The breathing was much oppressed and laborious, especially on any attempt to turn on the left side, when the patient seemed in danger of instant suffocation,—gasping, for several minutes, in the utmost agony, before he recovered his breath. He was much emaciated, and the affection was of about a year's standing. A puncture was made in the spot where fluctuation was felt; and a clear serous fluid drawn off, to the amount of nine or ten pounds. The opening continued to discharge freely for several days. He was much relieved by the operation, but his strength continued to fail, and he died about ten days after it.

On inspection afterwards, the liver appeared very little enlarged. The tumour was found to consist of an immense sac, formed on the convex surface of the viscus, under the peritoneal coat; it was of such a size as—on the one hand—to press down the liver below the umbilicus; and, on the other, to force the diaphragm upwards as high as the second rib. The right lung was compressed into a small flaccid substance less than a kidney; the left was also much diminished in size; and the heart was as small as that of a child of five or six years of age. This immense cyst adhered firmly to the posterior half of the diaphragm; but, betwixt it and the anterior part of the diaphragm, there was a distinct cyst, containing a watery fluid. This last had been opened by the operation. The great cyst was entire, and contained 18 pounds of transparent colourless fluid. Its parietes were firm and dense, like peritoneum very much thickened. In the bottom of the cyst, were found two singular bodies, consisting of flat cakes of a soft gelatinous matter rolled up into solid cylinders; when unrolled, they were about ten inches in diameter, and about one-eighth of an inch in thickness, and had the appearance of a deposition, which had been separated from the inner surface of the cyst. The liver was not diseased in its structure, and the other viscera of the abdomen were healthy, but remarkably displaced,—the stomach being on the left side and the pylorus towards the left os ilii.

One of the singular circumstances of this case was—the uncommon firmness of the tumour, which gave occasion to the belief, that an immense mass of organic disease existed, without fluctuation, except at the part which was opened.

A similar case to the above is said to have occurred in the Infirmary of Edinburgh many years ago, under the care of the late Dr. Gregory. The tumour was supposed to be an immense enlargement of the liver; but the whole hardness suddenly disappeared, with a sensation to the patient as if something had burst internally. Fluctuation then became evident, although none had been perceived before. The patient died

on the following day; and, on dissection, it was found, that this remarkable change had been owing to the cyst having burst into the cavity of the peritoneum. Cases of an analogous nature have been recorded by other observers.

XIII. HYDATIDS IN THE LIVER.

SYNON. *Fr.* Hydatides du Foie.

There is no organ in the body in which hydatids are so frequently found, as in the liver. Generally, it is the "multiple acephalocyst," (*A. socialis* seu *prolifera*.) which is met with. At times, however, it is the "solitary acephalocyst," (*A. eremita* vel *sterilis*.)

Although the author has placed these collections under the head of hydatids, he is doubtful whether they ought not to have been considered under that of serous cysts, to which, he thinks, they belong. The more he examines into their nature, the more satisfied is he, that they are not animals, but ought rather to be esteemed diseased products, not necessarily, however, the result of inflammation,—a view which, by the way, has been stigmatized by M. Rostan, as "sinking of itself before the simple lights of common sense, and not needing refutation."

The most common seat of hydatids is in the right lobe; and these are often contained in the interior of a large cyst, or *maternal hydatid*—as it has been termed. Occasionally, more than a thousand have been counted. Their size is various. Sometimes, they are not larger than a millet-seed, whilst at others, they are as large as the fist. The liquid, in which they swim, is rarely limpid. It is of a yellowish hue, and its quantity is, at times, considerable. A case is recorded by M. Bianchi, in which twenty quarts of fluid were discharged from a swelling of this kind. The fluid consisted of serum and a thick jelly, which was regarded as the *detritus* of an acephalocyst. Mr. Annesley has referred to a case in which a cyst was attached to the concave surface of the liver, which contained a quart of watery fluid, having a hydatid floating in it.

Hydatids—like serous cysts in general—are found inclosed in a large cyst, which may be of considerable thickness, and composed of fibrous layers in super-position, which are often incrustated with phosphate of lime in irregular patches. Like those cysts, too, they may experience various alterations, so as to be taken for steatoma, atheroma, meliceris, and even for softened tubercles. The author has occasionally met with tumours resembling scirrhus, some of which have contained bladders filled with a thin watery fluid: others have been seen containing a fatty matter, and others, again, a sandy substance.

Diagnosis.—As these cysts become very slowly developed, they do not give rise, in the first instance, to any symptoms that indicate their presence in the liver. It is only when they become so large as to interfere with the functions of that viscus, that any suspicion can be entertained of their existence; and even then there are no symptoms of their presence distinct from those of other chronic affections of the organ. Commonly, the digestive functions are disturbed; the hypo-

chondrium is swollen; the false ribs are raised up, and fluctuation is, at times, perceptible.

With regard to the termination of these hydatid formations;—if they attain the biliary passages, they may pass into the duodenum, and be discharged by the bowels; or if any adhesion occur between the cyst and the intestines, they may be discharged in the same manner. In such case, their existence admits of detection. Again, they may be discharged into the cavity of the peritoneum, and occasion fatal peritonitis. In a case, which occurred in the Middlesex Hospital, a cyst in the liver, containing hydatids, burst into the lungs; and, for a long period, hydatids continued to be expectorated along with a yellowish mucus. All doubts as to the real nature of the case were removed by the necroscopy.

Treatment.—Where the presence of serous cysts in the liver is decidedly proved by the existence of fluctuation, it has been advised—from the success obtained by evacuating purulent collections in that organ—to adopt the course of evacuating them artificially. Cases, indeed, would seem to have occurred, where their spontaneous rupture through the parietes of the abdomen has eventuated favourably. The operation has, accordingly, been practised; and five well authenticated cases of a successful result have been published by M. Récamier. This gentleman first introduces a capillary trocar, by way of exploration; and applies over the canula a cupping glass, which draws out the limpid fluid of the cyst, if such there be. He now applies caustic potassa, and as the eschar separates, he applies it again and again, with a view of causing inflammation in the peritoneum, and exciting adhesion between it and the peritoneal coat of the liver, or the parietes of the cyst. Gradually, the parietes of the cyst are destroyed, and in this way the fluid is evacuated. To prevent the access of air, which is regarded as a deleterious agency, in cases of a spontaneous rupture, the interior of the cyst is injected, and kept constantly filled with a liquid, which is at first emollient, and, later on, made slightly irritating and antiseptic. The progressive diminution in the quantity of fluid required to fill the cyst is a measure of the gradual approximation of its walls. Another method is, to make an incision, about two or three inches long, in the skin, over the most prominent part of the tumour; the muscular layers are then successively divided, until the peritoneum is exposed, which the surgeon elevates with the dissecting forceps, and cautiously opens. If the omentum or intestine present, it is gently pushed back, and, by the aid of a director, the incision into the peritoneum is made as large as may be esteemed advisable. The tumour presents itself at the bottom of the wound, which is now dressed, and the patient is placed on the same regimen as after serious operations. Two or three days afterwards, the dressing is removed; the peritoneum is found inflamed, and the cyst has contracted adhesions with the margins of the wound. The scalpel is now passed into it, the liquid evacuated, and a tent of lint introduced into the opening. It need scarcely be said, that these operations require much cautious reflection, and that they must always be extremely hazardous, and liable to uncertainty in the results.

XIV. WORMS IN THE LIVER.

The liver of the human subject has been found to contain an entozoon, which, however, is more common in animals,—as the sheep, goat, ox, stag, fallow-deer, horse, ass, hog, and hare. In sheep, affected with the rot, the organ is sometimes filled with them. This entozoon is the *distoma hepaticum* or *fluke*, which has been already referred to, (p. 186.) It is somewhat lance-shaped, with both extremities obtuse, having two orbicular openings,—one in front, which is directed obliquely inwards, and another behind and inferiorly, which is slightly prominent, and answers to the anus. The young worm, generally seen, is of a variegated brownish white colour; the adult, of a dirty yellowish, greenish, or brownish hue. These worms have been said to exist in the branches of the vena porta, as well as in the pori biliarii. It has been denied, that they are ever seen in the former, but the evidence is too strong to be set aside. There can be no doubt, however, that they are more frequently met with in the biliary ducts, where their presence—especially in animals—is found to have produced much thickening of their coats. This has been ascribed, however, to induration of the mucous secretions. In a liver, thus circumstanced, the organ is unequal in its surface, and if the projecting parts be pressed upon, a crepitation is heard, which proceeds from the bruising of small osseous laminæ. These incrustations are, at times, so extensive, that, on dissection, small bony tubes can be obtained. In such case, the entozoa generally die.

Occasionally, other entozoa crawl from the small intestines into the common choledoch duct, and ascend even as far as the gall-bladder. Such is the case with the *ascarides lumbricoides*, the presence of which may excite much irritation and profuse suppuration. In a case recorded by Dr. Thomas Bond, of Philadelphia, a large abscess was found in the substance of the liver, which contained nearly two quarts of bloody matter, with a worm nearly two feet long by an inch in diameter. It is impossible, however, to form any accurate judgment of the species of the worm from the description.

Recently, a rare species of hydatid—the *Echinococcus hominis*—has been found in the human liver by Mr. Curling.

On examining the liver of a rat, Professor Gross found a serous cyst, about the size of a marble, on the under surface of the organ, which contained a *tænia* one foot in length, by two lines in breadth. It was completely coiled up, and lived for upwards of an hour after its removal.

When the presence of entozoa in the liver is suspected, the verminous diathesis must be remedied by the agents described elsewhere (p. 192).

XV. HEMORRHAGE OF THE LIVER.

SYNON. Hæmorrhagia hepatis, Apoplexia hepatica; Fr. Hémorrhagie du Foie, Hémorrhagie hépatique, Apoplexie hépatique, Hépatorrhagie, Hémohépatorrhagie, (Piorry); Ger. Blutfluss der Leber, Leberblutfluss.

Hæmorrhage of the liver is by no means a common occurrence. It can rarely happen, that the engorgement of vessels is such as to

give rise to rupture of their coats, and consequent effusion of blood into the organ. It has been maintained, indeed, by Cruveilhier, that the affection is more common than is generally thought; and that the structure of the parenchyma of the liver, and the great number of vessels predispose to it. It is a fact, however, that the lesion is rarely met with on dissection; and, in opposition to the views of Cruveilhier, the belief has been expressed, by M. Heyfelder, that the very richness of the organ in vessels, as well as the softness of its parenchyma, is adapted to prevent rupture of vessels, and effusions similar to those that take place in the brain and lungs.

When effusion of blood does occur, it may either form a cavity in the organ, or the parenchyma may be torn, and the fluid be effused into the cavity of the peritoneum; or it may make its way into the biliary ducts, attain the duodenum, and be evacuated by vomiting or *per anum*. The disease cannot be diagnosticated during life; should, however, the liver exhibit sudden evidences of great augmentation of size; and deep-seated fluctuation be, at the same time, observable; and should symptoms of internal hemorrhage supervene; and, especially if, after evidences of great hyperæmia, hemorrhage should suddenly take place from the stomach and bowels, with diminution of the hepatic hyperæmia, the existence of hemorrhage of the liver may be suspected; but unless these signs are co-existent, it is obviously impossible even to suspect the origin of the hemorrhage, as we have no means of distinguishing, whether the blood proceed from the biliary apparatus, or from the mucous membrane of the stomach and bowels.

XVI. NEURALGIA OF THE LIVER.

SYNON. Hepatalgia; *Fr.* Névralgie du Foie; *Ger.* Leberschmerz.

The nerves of the liver—like those of other organs—are liable to morbid conditions, independently of inflammation. Neuralgia may likewise accompany neuropathic affections seated elsewhere.

Diagnosis.—This is by no means easy. The pain may readily be confounded with that arising from the passage of a gall-stone. Where, too, distinct evidences of chronic inflammation of the liver have existed, and, under the influence of appropriate treatment, the signs of inflammation and organic derangement have subsided, but severe pain continues in the region of the liver, the nature of the pain is often mistaken; it is supposed to depend upon a continuance of the inflammatory action, when it is nothing more than a neuralgic affection,—a remnant or successor of the former disease, and to which the antiphlogistic treatment may be wholly inapplicable. “Under such circumstances”—says Dr. Stokes—“the patient goes from one practitioner to another, taking different medicines and submitting to repetitions of the usual modes of treatment, with but little or no benefit. Now, I have seen in several cases, this symptom yield completely to treatment calculated to remove purely neuralgic affections. In a case lately under my care of a gentleman who had been attacked with enteritis and hepatitis in India, and who had taken enormous doses of calomel ‘for the liver,’ and of croton oil ‘for the bowels,

this circumstance occurred. When first I saw him, he was emaciated, the skin yellow, the urine high-coloured, with thirst, costive bowels, and great tumefaction in the region of the liver. These symptoms completely subsided under treatment, but a violent pain, recurring at intervals, continued obstinate. This was rapidly removed by a course of the carbonate of iron, and the use of the belladonna plaster."

The seat of the disease is presumed by pathologists to be the hepatic plexus, the morbid condition of which is conveyed to the great nervous centres. It occurs in the nervous, and the hysterical; and is said, by Dr. Stokes, to be not unusual. During the height of the exacerbations, the pain, as in other forms of neuralgia, is commonly most excruciating, but, at times, it is less severe. It may be continuous, but, more usually, it is intermittent, and there may, or may not, be sensibility on pressing the region of the liver. There is not, however, any tumefaction. It is a mistake to say with some, as M. Andral, that there is no sensibility on pressure in hepatalgia. The author has elsewhere remarked, that pain may exist, with great sensibility on pressure, in an organ, and yet there may be no inflammation; and, on the other hand, the circumstance of excruciating pain, with exquisite tenderness in the region of the liver, furnishes—as has been well observed by Dr. Stokes—a sort of key to diagnosis; for along with it we have, in hepatalgia, the skin cool, the pulse tranquil, no fever, no permanent derangement of the bowels, and no tumefaction of the liver. If the disease, too, have been of long standing in a person of nervous habit, and have resisted bleeding, mercury, and counter-irritation, or have been caused by those agents, the diagnosis may be considered established.

Treatment.—This, it need scarcely be said, is the same as in neuralgia in general. Certainly, powerful antiphlogistic measures, which would be so serviceable in acute hepatitis, can scarcely fail to do mischief here. The very subjects, in whom it is generally seen, would at once contra-indicate the employment of such measures. Some of the most deplorable cases, that have been witnessed, have occurred in those, in whom neuralgia of the liver had been mistaken for hepatic inflammation, and the patient subjected to such modes of treatment as gave the constitution a shock from which it never recovered.

The treatment that promises most success is the use of the subcarbonate of iron in large doses, and relieving the violence of the pain, during the exacerbations, by mustard plasters, and anodynes, given both by mouth and rectum. In the intervals, the emplastrum belladonnæ of the pharmacopœias may be worn. The following form has been advised, but it does not seem preferable to the officinal.

Take of extract of belladonna, three parts; of gum ammoniac and soap plaster, each one part. Spread these on a piece of leather with an adhesive margin, and make the patient wear it over the region of the liver.

XVII. INFLAMMATION OF THE GALL-BLADDER.

SYNON. *Inflammatio vesicæ felleæ, I. Cystidis felleæ, Cystitis fellea, Cholecystitis; Fr. Inflammation de la Vésicule du Fiel, Cholecystite, (Piorry,) Cystite biliaire; Gallenblasen-entzündung, Entzündung der Gallenblase.*

This disease is not common as an idiopathic affection. It is a con-

comitant, however, of other diseases of the liver, especially in India, and particularly of biliary calculi.

Diagnosis.—The ordinary symptoms are said to be ;—sudden, acute, and, at times, excruciating pain at the margin of the false ribs, increased by pressure, by inspiration, and the horizontal posture on the back. The patient can scarcely straighten himself, and commonly lies on the left side, with his lower limbs drawn up. The paroxysm of pain continues for some hours, when it diminishes ; and commonly, as it diminishes, jaundice appears. At the same time, the digestive functions are more or less disordered, and vomiting is a usual attendant. Along with these local symptoms, are those of general fever, which, it is asserted, by M. Andral, is accompanied by a small, contracted pulse, great thirst, but without shivering or much heat of skin. It is obvious, however, that there must be variety in the last mentioned phenomena. Constipation exists, and the urine resembles that of jaundice. The disease may prove fatal from the intensity of the inflammation, or the gall-bladder may become perforated, and its contents pass into the cavity of the peritoneum,—a result which is announced by the supervention of sudden and fatal peritonitis, and which has to be dreaded in all cases of inflammation of the gall-bladder. The inflammation may become chronic, and extensive supuration form. In such cases a globular tumour of greater or less size may be detected on careful examination beneath the margin of the ribs on the right side, which may exhibit distinct fluctuation.

The common choledoch duct, like the gall-bladder, may be inflamed, constituting the *cholédocite* of M. Piorry, and the lesion may occur in both situations, simultaneously or consecutively. It may be suspected, when icterus supervenes on inflammation of the duodenum, along with symptoms indicating distension of the gall-bladder and hepatic disorder.

It has been affirmed by Mr. Twining, that small tumours are occasionally developed in the capsule of Glisson, which may be the cause of obstruction to the bile in its passage to the duodenum. Two small bodies—it is stated—are always to be found, on careful dissection, which appear to be absorbent glands or ganglions. One of them is situate near the termination of the gall-bladder, in the cystic duct,—the other at the upper part of the ductus communis choledochus ; and Mr. Twining affirms, that enlargement of these bodies, with inflammatory excitement about the capsule of Glisson, may cause closure of the biliary ducts. He has, at least, found the ducts obliterated exactly at the point where these enlarged glands were causing pressure.

Causes.—Inflammation of the gall-bladder may be idiopathic, or it may supervene on inflammation of the stomach and duodenum. It has been supposed, indeed, to be always secondary or symptomatic. It may be caused by the presence of extraneous bodies, as of worms or calculi, in the gall-bladder, and it more frequently acknowledges the last cause than any other. It may be produced, also, by blows over the right hypochondrium.

Pathological characters.—On dissection, the gall-bladder, and the

ducts—if they have been inflamed likewise—will exhibit manifest signs of inflammation. It may have terminated in suppuration, in which case the quantity of matter may be very great. In one case, described by Dr. James Johnson, it contained a pint of thick purulent secretion, mixed with a great number of calculi. The cystic duct was wholly obliterated, and the parietes of the gall-bladder, which had contracted extensive adhesions to adjacent organs, were much thickened and ulcerated in places. In another case, recently recorded by Dr. B. G. Babington, the gall-bladder appeared to have contained three washhand-basinsfuls of a purulent fluid. The cause of the obstruction in this case was not discoverable. In other cases, evidences of perforation, are met with.

Morbid changes in the gall-bladder are very common amongst the residents in India. Two opposite conditions as to size are seen, which are supposed to depend upon the length of time the patient has resided in the East. 1. The gall-bladder is increased in size and distended with bile, by the pressure of which the sulcus in the right lobe of the liver, that lodges the gall-bladder, becomes enlarged and deep. This state is said to have been commonly found on the examination of the bodies of those who had recently arrived in India. 2. The gall-bladder is of less size than natural, and not in proportion to the sulcus in which it is lodged, and in many of these cases, a false membrane is found covering it, and sometimes uniting it to the adjacent parts. This morbid condition is said, by Mr. Twining, to be observed in the bodies of those who have been long resident in India.

Frequent repletion and habitual over-excitement of the gall-bladder, and irritation of parts in its vicinity, with a disordered condition of the upper portion of the intestinal canal, are said to give rise to transient and circumscribed inflammation, which is often followed by a deposition of coagulable lymph, that covers the gall-bladder; and a similar exudation sometimes occurs in the cellular structure of the capsule of Glisson. This lymph, which in many cases unites the fundus of the gall-bladder to the adjacent portion of the colon, soon becomes organized, and, like other newly formed parts of a similar nature, is subject to absorption and shrinking, so that the gall-bladder, which had been previously enlarged by frequent over-distension, becomes ultimately contracted. These are, of course, the results of chronic and repeated inflammation, between which and the acute forms all intermediate degrees are met with.

Treatment.—This must be decidedly antiphlogistic. As, however, it is not easy to distinguish inflammation of the gall-bladder from circumscribed inflammation of the liver, the treatment will usually have to be regulated by the rules laid down under the latter affection; the extent to which the antiphlogistic regimen should be carried being regulated by the degree and duration of the inflammation.

XVIII. DISTENSION OF THE GALL-BLADDER.

SYNON. Turgescencia vesiculæ felleæ, Hydrops vesicæ felleæ, Cystocele biliosa, Ascites hepato-cysticus, Physconia biliosa, Hepatalgia Petitiana; *Fr.* Hydropisie de la Vésicule du Fiel, Distension de la Vésicule du Fiel, Cholicystiectasie, (*Piorry*;) *Ger.* Gallenblasenwassersucht.

The biliary ducts are liable to the same kind of pathological conditions as the gall-bladder; and if any obstructing cause exist in them to the discharge of the bile, great distension of the gall-bladder may be the consequence. In such case, the fluid may consist merely of bile; but, in other cases, it is a mixed secretion, and occasionally so thin and aqueous as to have given to the affection the name of *Dropsy of the gall-bladder*. This term has not, however, been restricted to accumulation of fluid in the gall-bladder, but has been applied, also, to cases in which the submucous cellular tissue of the gall-bladder has been infiltrated with serous fluid,—an affection which might be termed *Œdema of the gall-bladder*, and,—as has been remarked by M. Andral,—belongs rather to the domain of pathological anatomy than of pathology.

Diagnosis.—When the gall-bladder undergoes distension, owing to occlusion of the cystic duct, the symptoms, at first, are not such as to direct attention to the real pathological condition. More or less pain is felt in the region of the gall-bladder, which may be constant or intermittent; and, if the former, is liable to exacerbations. It varies, likewise, in intensity, according to the suddenness or more protracted nature of the affection. When these symptoms have persisted for some time, a tumour is perceived in the right hypochondrium, beneath the margin of the false ribs, which gradually increases,—at times, in the direction of the epigastrium; at others, in that of the iliac region. This tumour may be felt to contain fluid. Where the cystic duct is alone obstructed, the condition may exist for a long time, so that the patient may be able to attend to his business without experiencing any great derangement of health. In other cases, however, the gall-bladder, or the duct or ducts above the seat of the obstruction, become perforated, and death occurs from peritonitis. The diagnosis of these cases requires great attention. The difficulty lies in distinguishing them from abscess of the liver, as remarked under Hepatitis. Mistakes of this kind have, indeed, been made; and, under the supposition that the tumour was an hepatic abscess, an opening has been made into it, bile has been discharged instead of pus, and, by getting into the cavity of the peritoneum, it has caused fatal peritonitis.

A case has been detailed by Mr. Howship, in which the termination was more fortunate. A patient, who had suffered under hepatic disease in India, was admitted into St. George's Hospital, London, with a tumour beneath the cartilages of the right ribs, attended with pale stools, and a bilious tinge of the skin. Fomentations were applied. A central softness induced Mr. Heaviside to puncture it, and about two ounces of a thin purulent bilious secretion flowed daily. In three months, the discharge became scanty and purulent, and the

opening contracted and healed,—the stools reassuming their healthy colour, and the patient his feelings of perfect health.

Mr. Howship has given the particulars of a case, in which there was reason to believe, that *permanent spasm of the gall ducts* had occasioned death. He took the ducts, placed them on a piece of glass in a cool place, laid them aside, and examined them six hours afterwards, when he found, that air from a common blowpipe passed through a portion of the duct, which he had at first thought to be obliterated, “and when further dissected for putting up to demonstrate the contraction, it had become as perfectly relaxed as any other part of the tube.”

Abscess of the liver—it must be borne in mind—is generally attended by symptoms of inflammation, whilst distension of the gall-bladder may not always present any corresponding train of phenomena. Such is the view of Dr. Stokes; but the exceptions must be numerous. He considers, therefore, the first part of the diagnosis to consist in “the occurrence of a tumour in the hypochondriac region not preceded or accompanied by any of the symptoms which characterize hepatic inflammation.” Again, in abscess of the liver, we have first induration and tumefaction, and then evidences of fluctuation, whilst, in cases of distension of the gall-bladder, the tumour is soft and fluctuating from the commencement; the patient is generally jaundiced, and there is no accompanying hectic. In severe cases, it is affirmed, the whole of the liver may be filled with bile, and communicate a distinct fluctuating feel, owing to the engorgement of the ducts, which are filled with that fluid.

The average quantity of bile found in the gall-bladder after death has been estimated, by Dr. Wm. Saunders, at one ounce; but this is probably too high. One half the quantity is perhaps nearer the truth.

Pathological characters.—On dissection, the cause that has given rise to the dilatation of the gall-bladder will be apparent. At times, it is the result of an inflammatory process; but, most commonly, it is owing to a calculus impacted in the ducts. At other times, again, scirrhus induration of the duodenum or pancreas may prevent the flow of bile into the intestine; and, under such circumstances—as in the case described under another head—the biliary ducts may be largely distended even as far as their terminal extremities. In some cases, the gall-bladder has been found enormously distended,—as large even as the urinary bladder. The fluid contained in the reservoir is not always alike. It may be bile but little altered in its characters; or it may be watery and without any bitterness: sometimes it is like jelly, and at others, resembles albumen or synovia, and even urine.

Treatment.—It is impossible to have recourse to any plan of treatment, which can remedy the evil. It must be altogether palliative, and adapted to the removal of coexistent symptoms. Puncturing the tumour can scarcely be said to be the only resource, inasmuch as it can rarely, if ever, be proper.

The gall-bladder is liable to other morbid alterations, which are more interesting as questions of pathological anatomy than of pathology. Of these, *ossification* is one. There are many cases on record, in which the reservoir has become almost wholly converted into bone, and others, in which the gall ducts, and especially the ductus communis choledochus, have undergone this conversion. These lesions cannot be diagnosticated during life.

Occasionally, too, *atrophy* of the gall-bladder and its ducts is observed,—the cavity becoming progressively less, and the parietes converted into a small solid fibrous mass. Cases, too, are on record, in which the gall-bladder has been altogether wanting,—at times, as the result of a morbid process; at others, as a congenital defect: a fact, which shows, that the reservoir is not indispensable to the execution of the digestive or other functions. There are no symptoms, which can be regarded as pathognomonic of these lesions.

Of *obliteration and obstruction of the biliary ducts* mention has already been made. The subject is also intimately connected with those of gall-stones and of jaundice, which will next engage attention.

Cancer of the gall-bladder and ductus communis choledochus is met with at times, without the liver participating; or those parts may become affected secondarily. In most of these cases, the symptoms have been—jaundice, with a tumour in the right hypochondrium, and more or less disorder of the stomach and bowels.

XIX. BILIARY CALCULI.

SYNON. Calculi fellei seu biliarii, Gall-stones; Fr. Calculs biliaires, Pierres au Fiel; Ger. Gallensteine.

The formation of gall-stones in the gall-bladder is by no means of uncommon occurrence; and, frequently, they are found on the dissection of those who have given no reason to suspect their existence. In these cases, they have formed gradually in the gall-bladder, and have remained there; but when they leave that reservoir, and pass along the ducts, the irritation excited by them in the biliary passages is so great, that its source can scarcely be mistaken. These two conditions have given rise to the distinction between the *chololithus quiescens*, and the *chololithus means*,—the “quiescent, and the passing gall-stone” of Dr. Good. To the pathological state, that gives occasion to their formation, and characterizes their presence, the names, —*Chololithus*, *Cholelithus*, *Cholelithia*, *Cholelithiasis*, *Lithiasis hepatica*; Ger. *Gallensteinkrankheit*, *Steinerzeugungssucht in der Gallenblase*—have been given.

Diagnosis.—The presence of calculi in the gall-bladder, of recent formation, may give rise to no uneasiness whatever; or pain may be felt in the epigastric region towards the right side, shooting through to the back, with more or less disorder of the stomach and first passages; and, at the same time, a yellowish hue may be perceptible. These may be all the uneasy feelings experienced even when the gall-stones may be so large, or so numerous, as to form a prominence beneath the cartilages of the ribs, so as to permit the calculi to be detected by palpation in thin subjects. When, however, a calculus

begins to move along the ducts, the symptoms are much more marked. Then commences the aggregate of phenomena, which have been termed *hepatic colic*. The patient is attacked, more or less suddenly, with excruciating pain in the epigastrium and right hypochondrium; and, along with this, with nausea and vomiting. The abdominal muscles are thrown into spasmodic contractions, the extremities are cold, the body bathed in perspiration, and the pulse generally unaffected. The sudden attack of most excruciating pain, whilst the pulse is not more excited than natural, has, indeed, been esteemed diagnostic of this affection. The suffering is sometimes so great, that the author has seen strong individuals writhing on the floor in the utmost agony. At times, this condition is followed by jaundice, but the latter is not a universal sequence. It has, however, been affirmed by Dr. Stokes, that if the gall-stone becomes impacted in the duct, jaundice is sure to follow.

When these symptoms have continued for a time with extreme violence, an interval of rest is sometimes experienced, which is of longer or shorter duration, and may be followed by a renewal of the suffering in all its severity. Difference of sentiment has existed as to the cause of this alternation of pain and ease. Some have presumed that the recurrence of the suffering is to be ascribed to the passage of another calculus. The author has been disposed to regard the first paroxysm to be owing, in most cases, perhaps, to the progress of the calculus from the gall-bladder through the cystic duct, and the cessation to its discharge into the ductus communis choledochus, which is of much greater capacity; and the second paroxysm has appeared to him to be caused by the calculus reaching the extremity of the choledoch duct, which is known to be of smaller calibre than the rest of the canal. As soon as it clears this portion of the duct, it passes into the duodenum, and the relief is permanent. If the evacuations be now carefully examined, a biliary calculus may be found mixed with the discharged fæces, but the calculus is not always discoverable even when the symptoms have been marked. It has been affirmed, that the subsidence of pain is no proof of the removal of the disease unless bile is discharged by stool or vomiting, and, as a general observation, this is true; but, at times, the evidences of bile in the evacuations are equivocal, and yet no doubt may exist as to the calculus having been discharged.

In consequence of the severe spasm, induced by the presence of the gall-stone in the ducts, signs of inflammatory action sometimes supervene,—as indicated by tenderness on pressing the right hypochondriac and the epigastric regions, and more or less febrile indisposition. These symptoms usually subside, and the individual is speedily restored to health; but, in other cases, lymph may be thrown out, and the duct be permanently closed; or ulceration of the gall-bladder, or of the ducts, may ensue, with all the fatal symptoms previously depicted. In other cases, it has been found to have made its way into the duodenum by ulcerative absorption, and to have been discharged.

Causes.—Age certainly affords a predisposition. Biliary calculi

are extremely uncommon in young children. The author knows of no case of the kind. They would seem to be more frequent after the age of forty or fifty; and to occur most commonly in persons of sedentary habits, and hence, perhaps, in women oftener than men. All observers, indeed, agree, that women are more liable to them, and by some, as by M. Andral, it is affirmed, that they are more subject to them about the critical period. It has been estimated that in England, five-sixths of the cases of gall-stones occur in the female sex; but the estimate does not appear to be founded upon any data observed numerically. The attacks are said to occur more frequently in winter than in summer, but here, again, data are wanting, and all that we are perhaps justified in affirming, with M. Thénard, is,—that the calculi appear to form less in summer than in winter.

Pathological characters.—The number of calculi met with on dissection is at times considerable. It rarely, indeed, happens, that they are solitary. Their number varies from a few to some thousands. As many as 3646 have been counted, according to Morgagni. When they are so numerous, they are usually very minute: on the other hand, they have been seen as large as a hen's egg, and even larger.

In regard to chemical composition, biliary calculi are of different kinds. The most recent analysis of healthy bile, by Muratori, assigns it for constituents—peculiar fatty matter; colouring matter; cholesterin combined with soda; picromel; extract of flesh; mucus; soda; phosphate of soda; phosphate of lime, and chloride of sodium. Now, certain of the biliary calculi are formed of almost pure cholesterin; others of inspissated bile, or at least of its resinous matter, with the nature of which chemists are not yet well acquainted; and others—and the greatest number—consist of cholesterin and thickened bile in various proportions. All, moreover, contain concrete mucus or albumen, phosphate and carbonate of lime, and traces of oxide of iron. Occasionally, the proportion of calcareous salts is very large, so that the calculus seems to be formed of them entirely with a tinge of bile.

Calculi of pure cholesterin are white, transparent, and of a crystalline, radiated or laminated structure; they are of a yellowish, greenish or green colour, and they may still preserve their semi-diaphanous character, and the same texture, when a small quantity of the colouring matter of the bile is combined with them. Their shape is commonly ovoid, and their size that of a pigeon's or sparrow's egg. More than one rarely exists in the gall-bladder. They are insoluble in water, in which they swim, but are soluble in hot alcohol, from which they are precipitated, on cooling, in brilliant plates; they are soluble, also, in oil of turpentine, and the caustic alkalies. Exposed to a high temperature, they soften, melt, and are volatilized without decomposition. They are the *cholesteric* calculi of some writers.

The biliary calculi, that are formed wholly of inspissated bile, or of the resinous colouring matter of the bile—termed the *inspissated*—are not common in man, but are the most so in animals, especially the ox. Their colour is brown and blackish, their size not considerable, varying from that of a pea to that of a hazel-nut; their surface

granular, and studded with hard irregularities; their consistence considerable, and a specific gravity greater than that of water. They have no regular arrangement; but, in the centre a cavity is sometimes found filled with a blackish, shining mass; very distinct from the rest of the concretion. They have a bitter taste, and are affected by reagents like inspissated bile. When this same matter, mixed with a very slight portion of cholesterin, exists at the surface of other concretions, it forms a brownish layer of greater or less thickness, constituting, at times, a kind of rind of an ebony colour.

The most common calculus is, doubtless, that which is composed of a mixture in various proportions—or of alternations—of cholesterin and the colouring resinous matter, forming the *mellitic* calculus of some. These calculi are rarely solitary. They are frequently seen crowded together in the gall-bladder to the number of 15, 20 and upwards: at times—as already remarked—of some thousands. When only one exists, it may be very large;—as large as a hen's egg, and even larger. When they are in great numbers, they are usually small, often not larger than a grain of sand. They are soft, smooth, and almost always of a polygonal shape,—all, indeed, that the author has seen, have been so; the larger have, however, been observed of an oval or round shape. Their colour is determined by the proportion of two substances that enter into their composition. Usually, they are of a honey-like hue, whence the epithet *mellitic*. Some of them are blackish, brown, yellow, or greenish at the exterior; yellow, of different shades, or greenish, internally; others, again, are marbled, or form mixtures of green, yellow and white. They bruise and break readily, and may be reduced to a powder, which is greasy to the touch.

The examination of a great number of biliary calculi has led to the belief, that the yellow colouring matter of the bile constitutes the nucleus of the greater part of them.

Biliary calculi are found in various parts of the excretory apparatus of the bile;—in the hepatic ducts of the interior of the liver; in the cystic, hepatic, or common choledoch duct; in the intestinal canal, or in the cavity of the peritoneum or elsewhere, owing to the perforation of the parietes of the canal whence they may have escaped. As to the causes that give rise to their deposition from the bile, we are much in the dark. It has been imagined, that there may be an excess of cholesterin in the blood; that inflammation of the biliary apparatus may favour the deposition of cholesterin, and that such deposition may be further favoured by lesions of the gall-bladder, which give rise to the formation of small diverticula in which the concretions are formed. These and various other hypotheses, have been hazarded; but light is still wanted, and farther observations are necessary on this interesting topic of pathology.

Treatment.—The indications of treatment in the *chololithus* means are sufficiently evident. The pain is occasioned by the violent spasms of the ducts around the calculus, and the mode of relief is for the calculus to pass onwards into the intestine: at the same time, there is danger of the supervention of inflammation of the ducts. The indi-

cations will, therefore be:—*First*, To allay the spasm, which prevents the progress of the concretion; *Secondly*, To employ remedies, that may solicit its onward course; and *Thirdly*, to have recourse to agents, that may prevent or remove inflammation. It has been already remarked, that a diagnostic symptom of gall-stone is—the pulse being unaffected whilst the patient is writhing in agony. Blood-letting can, therefore, only be suggested as a means of resolving spasm, and of preventing inflammatory action. The author has always succeeded in such cases, without the necessity having arisen to make use of the lancet; but, at the same time, if the patient be plethoric, no hesitation should exist in having recourse to it. It is an excellent antispasmodic; and if pushed to the induction of full relaxation, as indicated by incipient or complete syncope, it may resolve the spasm, and facilitate the progress of the calculus. Blood-letting, too, is a good preparative to the use of the most important antispasmodic—opium. If blood-letting be premised, it should be followed up by full doses of the anodyne;—commencing with not less than two and a half, or three grains of opium in the form of soft pill, or of the equivalent of the tincture, the black drop, or the preparations of morphia. In this, as in other spasmodic diseases, it is astonishing how much opium may be administered without inducing narcosis. The author has sat by the bedside of a delicate female labouring under this affection, to whom he has administered the *tinctura opii* every few minutes by the teaspoonful, until, in the course of an hour, she had taken one ounce by measure, and without the supervention of narcosis, or of any evidence, at the time or afterwards—except the relief of pain—that an opiate had been administered.

It has been remarked, by Dr. Wm. Thomson, that a starch and laudanum glyster will frequently produce immediate relief.

R.—Mucilag. amyli, f 3iv.

Tinct. opii, ℞. 40.—M.

To be repeated every six hours, if necessary.

Where objections exist to the use of opium by the mouth, the author is constantly in the habit of adopting this course; and with entire impunity. The object in the administration of anodynes, should be the alleviation of the pain, care being taken not to induce narcosis—which, as already remarked, does not easily supervene in such cases. Dr. Gerhard, of Philadelphia,—it may be proper to add—in commenting upon the recommendation of Dr. W. Thomson, has the following remarks:—“Against this advice we must protest most decidedly. No physician is authorized to prescribe so large a dose of laudanum as an enema, knowing, as he must, that sudden death will occasionally result. It is true, that, in the large majority of cases, forty minims of laudanum may be given with impunity; but it is equally true, that the dose is occasionally a fatal one. We do not believe, that more than forty drops of laudanum should ever be given as an injection, unless in the rare cases in which the suffering of the patient may compromise life.” These views are the honest convictions of their author, but his apprehensions can scarcely be considered to rest on any sufficient foundation. The author is not

aware of a single case of biliary calculus, in which death—or even a slight narcosis—has resulted from an enema of forty minims of laudanum.

After the spasm has been in some degree moderated, by the use of bleeding or opium, or both combined, a cathartic enema—especially of turpentine, which is, in addition, an excellent revellent—may be properly administered. The increased peristaltic action, in this manner induced, cannot fail to be felt by the biliary ducts now in a state of relaxation, and the calculus may thus be solicited in the direction of the bowel. A sequence of remedies, advised on respectable authority, does not appear as satisfactory as the one just laid down. Dr. Stokes advises to bleed first, then leech, next employ purgatives; and, when the bowels are emptied, have recourse to opiates. As to leeches, their application is difficult; they interfere, likewise, with the use of other agents, and, withal, they are by no means as effective anti-spasmodics as bleeding from the general system. To aid the bleeding and narcotics in allaying the spasm, the warm bath has been found serviceable. The patient should be kept in it for a considerable time, and, whilst he is immersed, the opiates may be administered. Hot applications to the side have also afforded relief. On the other hand, pounded ice applied to the epigastrium has succeeded immediately, in many instances, in allaying the pain, and in retarding its return, when it has not succeeded in dispelling it entirely.

Much difference of sentiment exists as to the employment of emetics to fulfil the second indication; or, in other words, to solicit the onward progress of the calculus. In simple cases, where there is no accompanying inflammation, organic disease of the liver or distension of the gall-bladder, they would appear to be appropriate remedies,—the only inconvenience, likely to attend their employment, being the painful succussion of the parts affected, which they must necessarily occasion. The indirect emetics, whose action is preceded by nausea,—as tartarized antimony,^a or ipecacuanha,^b or both combined,^c are the most appropriate.

^a R.—Antim. et potass. tart. gr. iv.
Aque, f 3iv.—M.

^b R.—Ipecac. pulv. gr. xv. ad xxx.

Dose.—A fourth part, every 15 minutes, until vomiting is induced.

^c R.—Antim. et potass. tart. gr. ij.
Ipecac. pulv. gr. x. ad xx.—M.

The precursory nausea relaxes the spasm of the ducts, and the subsequent efforts at vomiting exert a degree of succussion and of traction on the biliary passages, which aids the dislodgment of the calculus from its position, and its discharge into the duodenum. With the same view, a brisk cathartic, and especially one which, like calomel, exerts its action on the upper part of the intestinal canal, may be administered alone or combined with the turpentine enema, as advised above.

R.—Hydrarg. chlorid. mit. gr. v.
Jalap. pulv. gr. xij.
Zingib. — gr. iv.—M.

To meet the third indication,—which consists in preventing or removing inflammation,—the employment of general or local blood-

letting, by means of leeches, may be demanded. In almost all cases a certain amount of febrile irritation supervenes, with more or less tenderness on pressing the right hypochondriac and epigastric regions, but it commonly passes off without any treatment whatever.

As to the various means that have been proposed for dissolving the calculi, it is not necessary to say more, than that they obviously cannot come into direct contact with them. For a long time, the *Remède de Durande*, which consists of three parts of *sulphuric ether* to two parts of *essence of turpentine*, enjoyed a high reputation. It was given every morning, in the dose of from two scruples to a drachm, and Durande recommended that it should be continued until the patient had taken a pound of it; after which the treatment was to be finished by purgatives. It frequently, however, induced excessive irritation, and, at the present day, but few employ it. As a solvent, it could have exerted no agency.

After the calculus has passed into the intestines, it may be well for the patient to make use of saline cathartics for some time, to keep up a gentle action upon the bowels. If his circumstances and the season will admit of it, the change produced by a visit to any of the saline or sulphureo-saline waters, with the effect of the waters themselves, cannot fail to be advantageous. Should this be impracticable, a Seidlitz powder may be taken twice or thrice a week, or an appropriate saline solution may be a succedaneum for the saline mineral waters drunk at their source.

R.—Magnes. sulphat. ʒj.
Potassæ bitartrat. ʒj.
Ferri sulphat. gr. x.
Aquæ bullientis, Oij.—M.

Dose, a wineglassful, every morning.

XX. JAUNDICE.

SYNON. Icterus, I. flavus, I. verus, Aurigo, Morbus regius, Arcuatus morbus, Morbus auriginosus, Ileus icterodes, Cachexia icterica, Choliæmia, Icteritia flava, Fellis superfusio, Yellow Jaundice; *Fr.* Ictère, Jaunisse, Bile répandue; *Ger.* Gelbsucht, Königs-krankheit.

The most prominent evidences of jaundice—as the French word *jaunisse* imports—are *yellowness* of the skin and conjunctiva. It can very rarely be esteemed an idiopathic affection. It is generally, indeed, symptomatic of many of the diseases of the biliary apparatus, already described.

a. Jaundice of the Adult.

Diagnosis.—Usually, before an attack of jaundice, the gastro-intestinal functions are more or less disordered. The patient complains of loss of appetite and dyspepsia, with vertigo, nausea, and perhaps vomiting, flatulence and tension in the epigastric and hypochondriac regions, with furred and yellow tongue. Usually, too, there is more or less lassitude and dejection of spirits. After these symptoms have continued for a longer or shorter period, the eyes are observed to be yellow, as well as the skin: the urine may be hot, is very high-coloured, sometimes of a green hue, turbid, and tinging the linen;

and the alvine evacuations are clay-coloured;—although this last symptom may not be very evident. Commonly, the bowels are confined; and, often, there is morbid sensibility when pressure is made over the region of the gall-bladder and capsule of Glisson; but in the absence of pressure, the uneasiness is generally referred to the epigastrium. This tenderness on pressure is considered to be owing to inflammation of the upper part of the digestive tube, which has been esteemed an extremely frequent cause of jaundice, and is, generally speaking, independent of any mechanical obstruction of the gall-bladder or biliary ducts. Taking all the cases into account, this form of jaundice has been regarded by Dr. Stokes, as the most frequent.

In the mildest forms, the pulse is but little affected, but where it is owing to, or connected with, inflammation of the liver, or of the lining membrane of the stomach and bowels, the circulation is quickened. In very bad cases, the brain is more or less affected, and, as has been properly remarked, the supervention of symptoms denoting an affection of the nervous system, must be looked upon with anxiety in any form of the disease. A most alarming complication is coma. Robust patients have been known to die with symptoms of oppressed brain, within thirty-six hours after the sudden appearance of intense jaundice. Many cases have been detailed, which were complicated with this formidable symptom, the majority of which resisted all the ordinary resources of art; and Dr. Stokes affirms, that he has never seen a case, in which the coma was distinctly established, terminate favourably. The experience of the author has been more fortunate; but still, the complication must, in all cases, be looked upon as alarming, and more so even in hot, than in temperate climes.

It is proper to remark, that the colour of the skin is not always the same; it may vary from a citron almost to a black, whence the name *black jaundice*, applied to it in some cases. Usually, too, before the coloration appears, there is a disagreeable itching or tingling of the whole surface, which may continue for some days; as long, indeed, as the morbid condition of the blood.

The attacks of jaundice sometimes come on insidiously; at others, especially when the disease originates from a mortal cause, it may appear almost instantaneously. A case is related by Dr. Mackintosh, of a man, who sat down to dinner in tolerably good health, but was soon compelled to retire, owing to feeling indisposed, his whole surface being suddenly tinged. The first circumstance, that excited attention to him, was a remark which fell from himself, that the tablecloth was of a greenish colour. It is said that Murat, on learning that his queen had assumed the sovereign power at Naples, in his absence, fell into a violent rage, and was almost instantaneously jaundiced. In referring to the case cited above, Dr. Mackintosh states, that he has known several individuals affected with jaundice, who saw every object coloured. It is strange, that this *chromatism*, as it may be termed, should exist in a very few cases only. Most of the secretions are unquestionably tinged yellow, but not all. The colouring matter of the bile is rarely found in mucus or milk, for example. The yellowness of the conjunctiva is, however, one of the pathognomonic

symptoms. Bile is also necessarily present in the blood-vessels of the retina; yet yellow vision is not common. In the experience of one observer, Dr. P. Frank, it was observed but five times in about a thousand cases. The cause of the phenomenon, when it does present itself, has been a question. It has been supposed to be owing to inflammation of the cornea, the vessels of which become dilated, and receive yellow blood, but strict observation has not always exhibited such a pathological state. The most probable supposition seems to be,—that the humours themselves are tinged yellow; and it has been suggested, that where vision is not yellow, they may have escaped the tinge. As, however, the phenomenon is observed in very few cases only, the coloration of the humours must be an uncommon occurrence, provided the fact and the explanation be true:—yellow vision, in other words, must be an exception to the general rule in this disease. Lastly, the phenomenon has been ascribed to direct nervous influence, on the ground, that patients, in other diseases, as in typhus fever, without being in the slightest degree jaundiced, have seen every thing yellow. It is possible, that all these conditions may be, occasionally, concerned in the causation.

Commonly, the disease is tedious; its duration varying from a week to three, four, five, or even longer. As a general rule, too, when uncomplicated, it terminates in health, but where the liver is diseased, or the encephalic complications, before described, supervene, the result may be fatal. Occasionally, the indisposition is so trifling, that the patient attends to his business as usual; and Dr. Stokes states, that he has seen persons, who laboured under this affection for more than a year, and yet who had, during the whole of that time, the digestion good, the bowels regular, the flow of urine natural, and the circulatory, nervous, and respiratory systems apparently conformable to the healthy standard.

Causes.—These are very numerous; inasmuch as jaundice may be the result of every organic lesion, which acts directly or indirectly on the liver and the biliary ducts. Allusion has already been made to moral emotions as a cause. Of 19 cases, observed with great care in reference to causation, by M. Piorry, symptoms of gastro-enteritis existed at the outset in eight; and, in one, a violent blow had been received on the head, three months previously; in two cases blows had been inflicted on the abdomen on the right side, a short time before the invasion of the jaundice; and in almost all the liver was large. There were six cases, in which the first symptoms were referable to hepatitis; one in which there was disordered menstruation, and two others in which the patients did not assign any appreciable cause for the disease. In two instances, constipation had preceded. M. Piorry considers, from all his observations, that along with a moral, there is always a physical, cause.

Obstruction of the ducts from any cause,—as from hepatic tumours, gall-stones, or enlargement of the absorbent ganglia in the vicinity of the ducts,—are evident causes, by obstructing the course of the bile, and occasioning its absorption into the blood-vessels; and mention has already been made of inflammation of the upper part of the ali-

mentary canal as an extremely frequent cause of jaundice. This is, generally speaking, independent of any mechanical obstruction of the gall-bladder or biliary ducts, and probably gives occasion to a diminution or arrest of the biliary secretion. It is a variety of jaundice from non-elimination.

Where the jaundice arises from hepatitis, the inflammation is said to have been most commonly situate on the concave surface of the liver. At one time, it was the common belief, that when the disease appears suddenly and without any premonitory symptoms, it is owing to spasm, or to the opposite condition—paralysis of the gall-ducts; but the belief does not appear to rest on any pathological observations.

Pathological characters.—The general opinion of pathologists is, that jaundice is owing to the presence of the bile, or of its elements, in the blood. Chemistry has not, however, positively established this. Deyeux, John, and Lassaigne did not find, that the yellow principle of the serum of the blood, in a case of chronic jaundice, had either the taste or the smell of the bile, and they inferred that the bile was not mixed with the blood. On the other hand, Clarion found in the serum a green matter similar to that of the bile; and Orfila found, in the urine, the colouring matter of the bile. If to the serum of jaundiced blood, diluted sulphuric acid be added, it will be found to change its yellow straw colour to the characteristic green of the bile. Of the existence of a yellow colouring matter in the blood of the jaundiced, there can be no doubt, whatever there may be in regard to its nature. It would seem, however, that some of the most distinguished observers are of opinion, that it is analogous to that of the bile. The fact of bile being in the blood is likewise confirmed by the circumstance already stated, that in cases of jaundice, where an opportunity has occurred for *post mortem* examination, more or less obstruction has commonly existed to the course of the bile. It was found, also, experimentally, that icterus could be induced on animals, at will, by tying the branches of the hepatic duct. All the portions of the liver, that corresponded to the branches of the obliterated trunk, were filled with bile, and jaundice supervened. Still, a question may arise in these cases, whether the bile is absorbed and passes into the mass of blood; or whether, owing to the obstruction of the duct, bile is no longer separated from the blood, but remains in it; as urea is found in the blood after the kidneys have been extirpated. The latter opinion has been embraced by some; and a recent pathological writer, Mr. H. Mayo, adopts the view, that ordinary cases of jaundice depend upon suppression of bile, and that the bile, abnormally accumulated in the blood, finds vent in the secretions of other parts, which thence become coloured yellow. In confirmation of this opinion, he states, that bile is detected in the blood of jaundiced persons, whilst the liver, in those who have died of the disease, is generally pale, and without bile.

In the difficulties of the subject, it has been supposed by some, that jaundice consists in an altered condition of the blood independently of the bile; but if such condition exist it cannot well be an altered

state of the colouring matter of the blood, inasmuch as the red particles are apparently unchanged; and, moreover, the adventitious colouring matter is present where there are no red globules, as in the serum, and in different secretions obtained from the blood. Under every view, the rapid—almost instantaneous—development of jaundice, under certain moral affections, is sufficiently difficult of explanation. It is not unique, however; for we have examples of other singular changes in the body under similar circumstances—as of the hair changing colour in a short space of time under terror, &c. &c.

On the whole, we are justified, perhaps, in the conclusion, that jaundice is most commonly the result of the absorption of the yellow colouring principle of the bile from the biliary passages, but that it may possibly be owing, in some cases, to arrest of the biliary secretion, and the retention of the bile or its elements in the blood.

Treatment.—The therapeutical management of jaundice must obviously vary according to the accompanying pathological condition. If the disease have come on spontaneously, and the most accurate investigation cannot detect any of the morbid states previously pointed out; if there be no epigastric pain, and no evidence of accompanying gastro-duodenitis; if—in other words—there be only evidence of the bile having passed into the blood, and time alone is required to correct the *error loci*—no particular treatment is demanded. Rest, laxatives, moderate diet, and the use of diluents—as lemonade, may be all that is required. If, however, fever exist with manifest signs of inflammatory action of the lining membrane of the stomach and bowels, or of the liver, a more vigorous treatment is necessary. Leeches may be applied over the affected region:—the French advise them also to the anus:—ice water may be allowed, and the whole of the antiphlogistic treatment be inculcated—using the warm bath; keeping the bowels open by any gentle laxative—as Epsom salts with or without senna, or castor oil—or by enemata; and carefully avoiding every form of mental or corporeal excitement. In India, where this—as well as every other hepatic affection is extremely frequent, the most successful plan of cure is the antiphlogistic;—depletion by general blood-letting, and leeches; active purgatives, tepid baths; low diet, and quiescence in the beginning of the disease, followed by mild cathartics, and a small blister over the region of the gall-bladder.

The routinist, under the idea, that mercury is capable of modifying all disorders of the biliary system, whatever may be their nature, is in the habit of prescribing this agent in jaundice. In a simple case of the disease, it is difficult to see what can be its beneficial operation. The notion under which it is usually prescribed is, that it augments the biliary secretion; but if the pathology of jaundice consist, as many maintain, in the absorption of bile from the biliary ducts, any agent that will increase the secretion of bile cannot fail to act injuriously, and to augment the evil. Mercury, with a view of exciting biliary secretion, in such cases,—it has been judiciously remarked, by Mr. Twining,—would be as unreasonable as the administration of diuretics to a man with a distended bladder, and whose

perspirations had a urinous odour, showing that urine was freely secreted and absorbed into the system, when we knew, at the same time, that he had an impervious stricture of the urethra. It is only, indeed, in cases, where there is reason to believe in the existence of chronic hepatic disease, that we can expect advantage from mercurials, and then not from any agency which they exert on the biliary secretion especially. Under the new action, which they induce in the secretory system in general, they may act beneficially on the hepatic disease; and, by removing it, remove likewise one of its consequences—the jaundice.

When coma supervenes on jaundice, the case should be treated as one of hyperæmia of the encephalon; the head should be shaved; leeches or cups be applied behind the ears, or to the nape of the neck; blisters be directed to the same region, with revellent glysters (turpentine) and sinapisms to the feet;—the treatment in short, elsewhere recommended in hyperæmia of the encephalon. In such cases, where the patient dies, and the head is examined, no lesion may be perceptible in the brain or its membranes.

b. *Jaundice of the Infant.*

SYNON. *Icterus infantum*, *I. neonatorum*, *Auriga neophytorum*, *Pædicterus*, Yellow Gum, Yellow Gown; *Fr.* Ictère des nouveau-nés; *Ger.* Gelbsucht der Neugeborenen.

This is a common affection in infants every where. It comes on soon after birth, without any known cause; continues for some days, and gradually disappears;—the only other symptom, generally observed, being perhaps unusual drowsiness. It has been presumed to depend upon some irritation of the intestinal canal, which seems to result from the circumstances of the digestive system being called into active exertion for the first time, and receiving a new stimulus from the mother's milk. It is more probably owing to the common choledoch duct being obstructed by inspissated mucus, or by the meconium, which has collected in the intestines during utero-gestation. By some, it has been referred to too viscid a state of the bile; and by others to a congested state of the liver; and it would certainly appear, that the organ is frequently congested in new-born infants. It is an affection of no consequence. Even in torrid climes, recovery is so general, that opportunities have not occurred for discovering the precise pathological condition.

It rarely exists at birth; but is commonly observed from the third to the seventh day; seldom in the second or third week, and terminates in health in the course of a week or two.

The disease would probably yield without any treatment whatever; but inasmuch as the cause would appear to be, in many instances, at least, obstruction of the duct, it may be well to facilitate its removal by gentle laxatives;—as the *syrupus rhei*, (a teaspoonful,) magnesia, (gr. iv.—vj.) or castor oil.

R.—*Ol. ricin.*

Syrup. aa f 3ss.—M.

Dose.—A teaspoonful, occasionally.

XXI. MORBID SECRETIONS FROM THE LIVER.

A modified condition of the fluid secreted from the liver was, at one time, regarded as the cause of almost all disorders of the digestive apparatus, and even of organs remotely connected with it; and the evacuations were regularly inspected, with the view of determining, whether the bile was secreted in too great or in too little quantity, or was of improper quality. Were we acquainted with the characters of the bile physiologically, when mixed with the different secretions from the alimentary canal, and the various ingesta,—as well as with the exact quantity, that ought to be secreted in plenary health,—we should have a point of departure, whence we might deduce the pathological manifestations. It is clear, however, that these data must generally fail us. The consideration of the different diseases of the stomach and bowels, and of the liver and pancreas has shown, that numerous agencies must interfere with the biliary secretion independently of the condition of the liver itself; and that we should infer most erroneously were we always to ascribe the varying characters of the fæcal evacuations to a morbid condition of the bile.

The biliary secretion may be in too great quantity, or too sparing; or it may be perverted; and each of these conditions is worthy of a brief notice.

a. *Augmentation of the Biliary Secretion.*

SYNON. Bilious plethora, Bilious hyperæmia, Polycholia.

Bile is certainly, at times, secreted in larger quantity than usual: but it is not easy to say on what this pathological state is dependent. The liver—like other organs—may increase its secretion under some source of secretory irritation; or, irritation existing elsewhere—as in the stomach or upper part of the intestinal canal—may be propagated to the liver, which becomes affected secondarily. This is probably the mode in which *Polycholia*—as it has been termed—is generally induced; and hence, where evidence exists of redundancy of bile, the pathologist properly looks to the condition of the lining membrane of the alimentary canal. It has been elsewhere stated, (*General Therapeutics*, p. 208,) that when an emetic is administered which gives occasion to much retching, bile is almost sure to be freely evacuated; and that this circumstance is no evidence, that the secretion, prior to the administration of the emetic, was superabundant. It is only an evidence, that an emetic has been taken, the irritation, produced by which, is propagated to the liver, and induces a more copious secretion from that viscus. In like manner, under the repeated administration of cathartics, especially of such as act upon the upper part of the digestive tube, the alvine evacuations may exhibit, that the secretion of the liver is largely augmented. Yet the augmented secretion may have been wholly owing to the action of the cathartic. In neither of the above cases, therefore, should we be justified in considering the individual *bilious*. This result was common in the system adopted by Abernethy, and which still prevails with certain therapeutists, of appealing to the liver in all cases in

which the stomach is disordered; by requiring, as has been quaintly expressed, "a blue pill at night and a pot of fæces in the morning." The lining membrane of the stomach and bowels—already irritated or inflamed in many of these cases—was often still more morbidly implicated; and, as an almost necessary consequence, the irritation was communicated by continuous sympathy to the liver, so as in some cases, where the inflammation was considerable—to diminish or arrest, and in others to augment, the secretion of bile.

A recent intelligent writer—Dr. Billing—has drawn attention to what he considers a common error in regard to a white appearance of the tongue, which, he affirms, is always the accompaniment of an empty stomach. "Persons," he remarks, "who are in the habit of thinking themselves 'bilious,' and taking physic, look at their tongue when they rise in the morning, and find it white: a good breakfast will make it look red, unless they take a dose of salts, Seidlitz powder, or sometimes even whether they do or not. The same persons will perhaps put out their tongue before a looking-glass just before dinner-time; and, seeing it white, forego a part of the wholesome meal which would bring the tongue to a natural colour of redness, which it assumes after eating, from its natural paleness before eating, unless they be gourmands and hypochondriacs at the same time; in which case they will run the hazard of eating, and take a calomel 'peristaltic persuader' afterwards. I have been constantly in the habit of warning my young medical friends to consider, when they see a white tongue, what time of day it is, and *not to purge* for merely a white, or more properly a *pale* tongue." The observation of the author is confirmatory to a great extent of the views of Dr. Billing, and he certainly has often witnessed the effects of repeated cathartics in augmenting the milkiness of the tongue, and the good effects of the course recommended by Dr. Billing.

Granting, however, that an augmentation of the biliary secretion may, and does, take place at times, it may be properly asked, whether this circumstance would necessarily give rise to any morbid phenomena? The author is disposed to give a negative opinion, and where bilious diarrhœa occurs, which has been esteemed the principal symptom of bilious plethora, it may be rather owing to healthy bile passing over the irritated surface of the intestines, which has caused the increased secretion from the liver, than to the action of too great a quantity of bile on a healthy surface. A case, analogous to this, is met with daily in the urinary organs. If the secretion from the kidney be greatly augmented, we do not necessarily observe symptoms of irritation or inflammation of the membrane over which the urine passes; but if the membrane be inflamed as in blennorrhœa, then the healthy urine gives rise to great irritation.

Along with diarrhœa of a bilious character, augmentation of the biliary secretion is said to be indicated by languor, indisposition, want of appetite, intense headache, with continued, remittent, or intermittent fever,—symptoms which equally denote the existence of gastro-duodenitis, or an approach thereto.

Treatment.—In regard to the management of such cases, difficulty

exists. If the cause be any form of gastro-enteritis, it must be combated upon general principles; but, for the pathological reasons before given, emetics and cathartics cannot be indicated. Perhaps, in such cases, one of the best remedies would be—the general action on the secretory organs, which mercury, administered so as not to affect the bowels, but to gently touch the mouth, is capable of inducing.

b. *Diminution of the Biliary Secretion.*

This is a condition, on which, as has been remarked by M. Andral, “much was said about twenty years ago, and of which much is still said in England.” M. Andral might have added in this country also. As a general rule, it is considered to be evidenced by want of colour, infrequency, and smallness of the evacuations, disordered digestion, and the various symptoms of dyspepsia. It may be caused by hepatitis, directly or indirectly induced; and, in severe cases of inflammation of the duodenum, the secretion may, for a time, be arrested; but if the inflammation continues, without hepatitis supervening, the secretion from the liver may be subsequently augmented and perverted.

Treatment.—In a chronic case of this kind, purgatives, that act upon the upper portion of the tube, are clearly indicated, and if mercurials be administered, it must be with the view of producing their local action upon the duodenum, and thence upon the liver,—not to diffuse their action over the secretory system in general, as in augmentation of the biliary secretion. In such cases, the *pilula hydrargyri*, or the *hydrargyri chloridum mite*, with saline cathartics, given so as to affect the bowels, will be advantageous.

R.—Pil. hydrargyri, gr. v. :—vel
Hydrargyri chlorid. mit. gr. ij.—iij.
forma pilulæ.

To be taken at bed-time.

R.—Magnes. sulphat. ℥ss.
Potassæ bitartrat. ℥j.
Aq. bullient. Oj.

Dose, a wineglassful, night and morning.

They should be so administered as to act slightly and daily on the bowels; the mercurials being given once or twice a week so as not to induce their peculiar action on the system. The inspissated bile of the ox or the swine has likewise been administered in these cases. (See vol. i. p. 163.)

c. *Perversion of the Biliary Secretion.*

The bile undergoes various changes in disease. Its colour is altered, its quantity modified, and its physical and chemical properties present the greatest diversity of character. Cases of such alterations of this fluid are numerous. It is recorded to have been found black, grayish, or colourless; thick, viscid, pitchy, concrete, thin and transparent, acrid, acid, &c. &c. Yet the evidences of these changes are not great in the living body; and it is difficult to say—when either the discharges from the stomach or bowels exhibit an unusual character, that might be referred to bile—whether they are really dependent upon the morbid condition of that fluid, or upon some pathological secretion from the lining membrane of the stomach or bowels. This difficulty is signally exemplified by the fact, of every day occurrence, of green evacuations in infancy, which were at one time referred to

morbid bile; but which a better pathology instructs us are owing to predominance of acidity—the admixture of acids with healthy bile producing a green colour.

Treatment.—In almost all—probably in all—cases, the liver is diseased directly or indirectly, and it is important for the pathological inquirer and therapist to investigate the nature of the primary affection. Generally, this is not an easy matter; and, accordingly, it is difficult to lay down any precise plan of treatment. Where the case admits of it, it may be advisable to endeavour to effect a total change in the secretory system, which can be best done by the administration of mercurials, pushed so as to slightly affect the mouth. It must, also, be borne in mind, that by the constant repetition of powerful cathartics, we can morbidly modify the secretion from both the liver and the follicles of the intestines,—a fact, which should be held in special remembrance where the practitioner is disposed—as was more the case formerly than now—to lay down the indication, that cathartics must be persevered in so long as the alvine evacuations present an unhealthy character.

END OF VOL. I.

John P. Morgan M.D.

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
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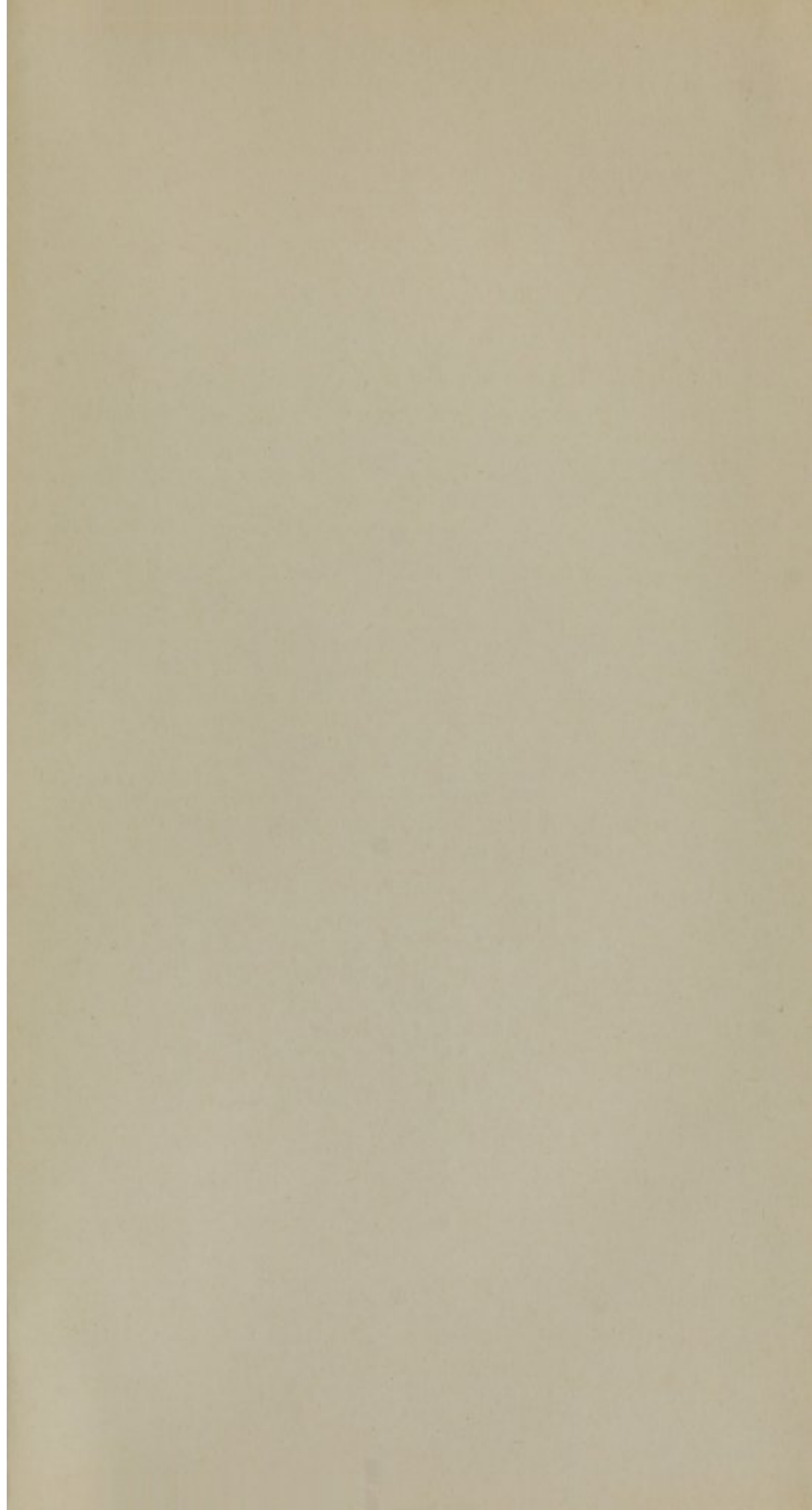
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