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Causes of Irritat. P. 36.

AN

INQUIRY

CONCERNING THAT

DISTURBED STATE OF THE VITAL FUNCTIONS

USUALLY DENOMINATED

CONSTITUTIONAL IRRITATION.

By BENJAMIN TRAVERS, F.R.S.

SENIOR SURGEON TO ST. THOMAS'S HOSPITAL;

President of the Hunterian Society of London; Honorary Member of the Royal Medical Society of Edinburgh, and the Medico-Chirurgical Society of Aberdeen; of the Royal Society of Medicine, and the Medical Society of Emulation, of Paris; of the Imperial Medico-Chirurgical Academy of St. Petersburgh; the Medical Society of Stockholm; etc. etc.

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"Fallax non raro Experientia, si Rationis ductû fuerit destituta: Quapropter, nisi mutuam sibi lucem communicent, æquam erroris ansam præbebunt." BAGLIVI OPERA, CAP. II, SEC. 5.

Southern District of New-York, ss.

BE IT REMEMBERED, That on the twenty-second day of November, A. D. 1826, in the fifty-first year of the Independence of the United States of America, H. Stevenson, of the said District, hath deposited in this office the title of a book, the right whereof he claims as proprietor, in the words following, to wit:

"An Inquiry concerning that disturbed state of the Vital Functions, usually denominated Constitutional Irritation. By Benjamin Travers, F. R. S. Senior Surgeon to St. Thomas's Hospital; President of the Hunterian Society of London; Honorary Member of the Royal Medical Society of Edinburgh, and the Medico-Chirurgical Society of Aberdeen; of the Royal Society of Medicine, and the Medical Society of Emulation, of Paris; of the Imperial Medico-Chirurgical Academy of St. Petersburgh; the Medical Society of Stockholm; etc. etc."

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JAMES DILL,
Clerk of the Southern District of New York.

ADVERTISEMENT.

The following work was transmitted to me at the request of its author, to be published or not in this country, as I should think best, after its perusal. The intrinsic value of the work, and the deserved reputation of Mr. Travers, did not allow me to hesitate on the subject, and I accordingly immediately placed it in the hands of the publisher. I trust that the decision of the public will show that my determination was correct, and will serve, also, as an incentive to the authors of valuable English works, to give them at once to the American public, without waiting for an American editor to publish them. The favourable manner in which the work on Diseases of the Eye, by the same author, was received, has already shown the degree of estimation in which his writings are held in this country, and affords me an additional proof, that the present work will be well received among us.

EDWARD DELAFIELD.

54 Broadway.

PREFACE.

Since my mind was first directed to the practice of my profession, it has been in a particular manner interested by the subject of this treatise. The phrase "irritation," although it has no precise idea affixed to it, is in constant use, and appears so to satisfy or to suspend inquiry relative to unforeseen results, as to be little better than an empirical subterfuge.

My object therefore in undertaking this inquiry was, to ascertain with more precision the morbid state indicated by the term "constitutional irritation," to investigate the causes most commonly productive of that state, the phenomena by which it is manifested, and the laws by which it is governed; and, from the comprehensive view thus obtained, to derive, if possible, some permanent pathological characters, which might serve as a guide to more correct notions of its nature, and more scientific principles for its treatment.

I wish I could congratulate myself on having satisfactorily accomplished my design. It is only for the persevering determination with which I have pursued it, that I feel entitled to any credit; but I must be allowed to add, that they alone who have directed their attention to it, can appreciate the difficulties with which the subject is surrounded.

Its extensiveness, and almost inaccessible intricacy, might well discourage persons more competent than myself to the task.

The undertaking was formidable on another account. Fatal cases, which form its principal studies, are for the most part kept in shadow, in the works of modern authors. The subject imposed upon me the necessity of placing them in the fore-ground; they were the chief sources of my observation. But whilst the labors of the morbid anatomist are appreciated, I presume to think that those of the inquirer into the fatal process during life, deserve to be held in equal estimation by the profession.

Although the size of this volume, independent of the republished documents, has far exceeded my original intention, it leaves the design unfinished.

The illustrations of what I have called "reflected irritation," remain; and as this department of my subject comprehends the investigation of some of the most important and interesting diseases which fall under the notice of the surgeon, I entertain the hope of presenting, at a future day, another volume to the profession.

Bruton Street, Berkeley Square,
April 3, 1826.

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ON IRRITABILITY AS A PRINCIPLE OF HEALTH.

Every part of a living animal has its peculiar function, to the performance of which it is incited by an appropriate stimulus. Its susceptibility of the impression of such stimulus, is denominated its irritability. If an organ, perfect in respect of structure and nourishment, be insusceptible of its stimulus, it is devoid of irritability; if the organ be imperfect, its irritability and function will be imperfect. This property is not confined to any particular form of organization, as nerve, muscle, or blood-vessel; it exists in every organ, simple and compound. It is possessed, however, in unequal degrees by different organs, and even by distinct parts of the same organ. It is not in the ratio of sensibility, nor vascularity, nor muscularity, nor any particular endowment, but according to the importance of the texture or organ

to the functions of life. Thus muscle retains irritability longer than any other texture, and the heart later than any other muscle.

The sign of irritability is according to the function of the organ; in some sensation, in others motion; in some a combination of these, and in others a result of such modifications of sensation and motion as escape our powers of perception, and of which we discern only the effects.

Irritability is indispensable to life, because it is essential to the functions of those organs upon which life depends. Parts, with the functions of which the system, at whatever inconvenience, can dispense, may survive their irritability. Thus a person may live with an inirritable retina, or inirritable muscles of his limbs, although irritability is as essential to the economy of sight and of locomotion, as to that of respiration and circulation; but an inirritable brain, or heart, or diaphragm, is incompatible with life.

Viewed as a whole, the animal body cannot be divested of irritability while it possesses the power of self-preservation; by what destroys this power, the universal irritability is destroyed, but by nothing short of it.

Irritability, then, is an inherent property of the living system, and is not only indispensable to the functions of those organs by which life is maintained, but is the earliest and the latest indication of life. How is the period of its existence ascertained? By the latest demonstration of the capacity of the organ to execute its function. If a person in articulo mortis, when an old and near friend approaches his bedside, and speaks in a loud tone, make an effort to raise his fallen eyelids, and gaze on the speaker, the

ear and the eye are still faintly irritable, even though the effort may be in part automatic. If a tremulous convulsive motion flicker across his countenance, as though he would smile or speak, if he could, it is evident that irritability of the mind, or intellectual faculty, though waning to the extreme point of existence, is not extinct. So, if the contractions of the heart or of the voluntary muscles can be produced by voltaic, or other excitement, the irritability of these parts, though well nigh exhausted, remains; and it is not till absolutely exhausted in the heart, that the hope of re-animation fails. No animal was ever yet recovered, in which the irritability of the heart, evinced by the sign of its capacity for its proper action in life, was dead. But though the sign of existing irritability, and therefore the capacity for resuming the function of life as far as the organ is concerned, remains, it by no means follows that the life of the system can be preserved; for the former may be maintained for hours under circumstances of disease and mutilation, in which such a restoration is impossible.

It is scarcely necessary to remark, that the experiments which demonstrate the continuance for a period of the proper action of an organ, after its connexion with the trunk of the nervous system is cut off, do not warrant the inference that irritability is a quality essentially resident in organs, distinctively from that system of which they form a part. I would not be supposed to undervalue the ingenious experiments which show that the mechanical part of the process of respiration and circulation is capable of being imitated. I say the mechanical, for none of the purposes which circulation serves in the living animal can be maintained, neither temperature, se-

cretion, nor absorption. Do we infer that life can be preserved without the heart in a cold-blooded animal, because it leaps about after its heart is cut out? or that the brain of an animal is unnecessary to muscular motion, because contractions of the limbs are produced by the galvanic stimulus after decapitation? These experiments prove strikingly and satisfactorily the principle of a 'vita diffusa,' to borrow a term of Mr. Hunter, resulting from the co-operation of several actions, neither of which, although with impunity it may be for a time deranged or even suspended, can be abolished without death to the whole. They show the distinction between life and its phenomena, for if irritability were life, the experiment of the circulation of a decapitated animal could not be exhibited. They show that the habitual actions proper to certain organs and inseparable from them during life, and which go on spontaneously for a time after life has ceased, may be prolonged by artificial stimuli; that is, they exhibit the specific irritability of parts gradually exhausting, notwithstanding every effort to preserve it, and incapable of revival, when the irritability of the system, by which alone it can be supplied, is extinct. As an animal does not at the instant of death part with its proper heat and electricity, so neither does it instantly yield its irritability derived from the same vital processes. But irritability or susceptibility of impression and action differs from the former in this: that it is a property peculiar to, and only communicated by the living principle.

Of life itself I am satisfied to adopt the words of the most profound, if not the most logical inquirer which our profession has to boast; "Life," says Mr.

Hunter, "is a property" (principle) "we do not understand, we only see the necessary steps leading towards it."

Irritability is possessed by different individuals in various degrees, and susceptible in all, of infinite modifications. The tone of the nervous and vascular system, and the actions of the secreting and excreting organs, depending on the original frame and constitution, the degree of physical activity and mental energy, climate, diet, regimen, and in general, the nature and strength of the stimuli by which it is excited, are all modifying agents, direct or indirect, and lead to this variety.

SECTION II.

ON MORBID IRRITABILITY.

Every organ has its peculiar mode of irritability. So long as it neither exceeds nor falls short of its due proportion, the harmony of the system, resulting from that of its constituent organs, is strictly preserved. But by a variety of causes, both internal and external, it is subject to be so augmented, diminished, or perverted, as to constitute a material deviation from health, or an actual morbid condition. In this view, it becomes a principal object of attention with the pathologist, as exercising a vast and wide influence over the effects of local injury and disease.

An excess or deficiency of the natural stimuli, or the operation of noxious agents, will convert healthy into morbid irritability; and a natural stimulus applied to an organ, already morbidly irritable, becomes an irritant. Light is the natural stimulus of the

healthy retina; but let an eye, accustomed to the light of day, be exposed for a time to intense light, and a permanent spectrum is the consequence; or let an eye, long accustomed to the darkness of a dungeon, be suddenly exposed to broad daylight, and the same consequence follows. In the first case, the irritability of the retina was rendered morbid by the preternatural excess; in the second, by the preternatural reduction of its habitual stimulus.

An irritable mind is one easily excited, and over excited in reference to the occasion, whether to joy or anger, fear or pity. An irritable stomach is nauseated by many ordinary articles of diet.—An irritable bladder is continually parting with its secretion before the stimulus of distention can be supposed to act. An irritable heart, if quickened by exertion or strong mental excitement, becomes tremulous and palpitating. An irritable skin breaks into a rash from many slight causes of excitement, both of diet and temperature; a plaster, which is in others only rubefacient, acts upon it like a blister. Irritable fauces are slightly sore with a change of the wind, or exposure for a few seconds to a current of air; and an irritable retina is distressed to dimness by a full light, and, like the mind, disturbed by the surviving representation of transitory impressions.

Irritability is either proper or sympathetic.

Irritability, proper or sympathetic.

First: as applied to the system. If the body is deranged through the medium of the mind, or, *vice versa*, the mind through that of the body, it is sympathetic. But it is equally possible for the irritability of either to be singly and directly acted upon, and the other not affected, or, if at

all, secondarily;—thus a man may lose his senses from a shock of mind, terror, and the body discover no sign of disorder but that which the loss of mental intelligence and expression occasions, the animal and vital functions going on as usual; as, to mention for one instance, the case of a young lady who was found playing with the fingers of a skeleton which had been placed in her bed, and who survived to old age in corporeal health, but without a glimmer of returning reason, in a lunatic asylum. Or, on the other hand, a limb may be wrenched off, and the man die in twelve hours, preserving his mind to the last. It must be admitted that the proper irritability of the mind is seldom exhibited, comparatively with the sympathetic; possibly in strict fact never, but we must be content to reason from the evidence of our senses.

Second: as applied to organs. If painful news take away appetite, or pinching a tendon occasion a sensation of sickness; if anxiety or apprehension excite the desire to pass stool or urine; if the sight of savoury food promote a secretion of the saliva; if certain articles of diet provoke an eruption of the skin, or worms in the intestinal canal produce a temporary blindness—the irritability of the affected organ is sympathetic.

Connexion of sympathy and irritability.

In truth, the sympathies of health and disease are closely interwoven with this property; for how would the functions of life be carried on without their co-operation? And by what is the morbid irritability of the system characterized so strongly as by excessive universal sympathy? Every sympathetic action presupposes a direct one, though the latter may elude observation, while the

former is so conspicuous and predominant, as to appear to constitute the disease. With the partial sympathies and their operation in disease, we are acquainted to a certain, but I believe a very limited extent. We avail ourselves of this information, as far as it goes, in the practice of surgery. To the sympathy of the whole with a part, less attention has been directed, and the obscurity of the subject is not inviting.

Sympathies are associations founded on a reciprocity of sensations and actions. Thus they are made up of sensibility and irritability. Some are direct, as between organs served by branches of the same nervous trunk; others circuitous, as between organs remote, but maintaining an indirect communication through the medium of the brain. Contiguity, and continuity, and duplicity of textures and organs, appear to influence, if not to generate, many partial sympathies; and it is probable all are strengthened and cemented by the influence of custom or habit. The morbid sympathies of remote parts influence the course and character of diseases in a remarkable manner, as is seen in the effects of morbid poisons, and in neuralgic and spasmodic diseases. Contiguous and continuous morbid sympathies are best exemplified by the phenomena of local inflammations.

The sympathy of the entire system with the severe forms of injury and disease, is illustrated by the phenomena of constitutional irritation, and of those fevers which are denominated symptomatic and hectic fevers. For the most part sympathy is according to irritability, both partial and general, in health and in disease. But the irritability of disease is subject to no standard, presenting all the fluctuations which can

occur betwixt the extreme states of elevation and depression. The sympathies are, therefore, often exaggerated and capricious, and while some which exist in health or in moderate deviations from it, are suppressed, others, new and peculiar, corresponding to new modes and degrees of irritability, are set up. Irritation of the constitution from injury, as contrasted with symptomatic inflammatory fever, is an example of this, as regards the universal sympathy. The trismus and tic douloureux, as contrasted with contiguous or continuous inflammation, are examples of it as regards the partial sympathies.

Usually an excess of physical irritability in health is coupled with a similar condition of the mind, but this is not invariably the case. In disease, the existence of either speedily calls up the other; their mutual relations are more conspicuous, and their reciprocal agency is decidedly, and often injuriously manifested, as we shall presently have occasion to show.

Mr Hunter's definition of irritability.

Mr. Hunter defines an irritable habit to be, "an increased disposition to act without the power to act with;" in another passage he describes irritability "over-action to the strength of the parts." This definition appears to me to be founded on correct observation. Extreme susceptibility and consequent over-activity are invariably coupled with, and most probably depending upon weak and insufficient powers of constraint and resistance. The same principle which renders a part over-irritable renders it over-active. The balance of the system, adjusted by the state of even health, is disturbed by the preponderance or deficiency of either of its active functions, as by the imperfection or disease of either of

its organs. A weak organ or constitution is one easily disturbed and put out of order, because it is continually excited to greater activity than it has power to support, greater therefore than is consistent with the harmony of the system. But an action may be morbidly excessive or deficient, independently of organization, and this irregularity, although occasional in its commencement, may become habitual. A too irritable nervous or vascular function is therefore as marked a constitutional peculiarity, as irritable lungs or skin. In a physical, as in a moral sense, every individual has a weak part; and this observation would as often apply to the function, viewed abstractedly, as to the organ. Circulation, or respiration, or nutrition, in one or other of their many intricate processes, is below par in tone. The absorbent capillary function is below par in scrofulous habits; the arterial, in the leuco-phlegmatic; the venous, in those disposed to local congestions; the exhalent, in the dropsical; and the pulmonary, gastric, hepatic, and renal, are respectively the failing functions in persons who become eventually the subjects of asthma, gout, jaundice, and stone. Habits of life influence the body and its functions, as education the mind: but original structure, as well as that altered by disease, has a marked influence on function, and constitution is to a certain extent hereditary.

Having explained, as far as I am able, what I understand by irritability, I have only to add, that its subordination is as essential as its existence to the preservation of health, and that its phenomena in sickness form one of the most important, though at the same time abstruse studies, that can engage the attention of the medical philosopher.

Practical illustration of an irritable temperament.

It is scarcely necessary to illustrate the influence of an irritable temperament upon the consequences of casual injury or disease. Practically we all know it well. We say "such a person would be a bad subject for a compound fracture," and whoever has had opportunities of watching several subjects of compound fracture under treatment at one and the same time, well knows the import of this phrase, and that the greatest degree of mischief is often accompanied by the least constitutional disturbance, and for this reason is soonest and most perfectly restored. The first few hours will enable an experienced observer to determine whether the subject of a serious injury or operation will do well or otherwise. How vastly different in different individuals is the inconvenience attending such minor derangements as a boil, an enlarged gland, a whitloe, or a simple ophthalmia. In some the constitution seems ignorant of the affair, and the individual pursues his ordinary occupations. In others, the whole system sympathizes; the spirits are ruffled, the nights are restless, the appetite fails, the pulse acquires an undue bound; and the white tongue, the creepy chilliness, the lassitude, and slight erratic pains of symptomatic fever are present.

An irritable temperament is marked by extraordinary vivacity of the nervous and vascular systems; hence pain, although not earlier excited, nor exceeding in degree that which is experienced by a habit of the opposite description, occasions in this a disproportionate derangement of the general health, and more frequently induces symptomatic fever.

Case. Two gentlemen, about the same time, were the subjects of the common accident, termed a broken shin. The injury was slight and of the same extent

in both. One, accustomed to treat such casualties in his own person, simply defended the part lightly with a thin soap plaster, and without intermitting his habits of much daily exercise, both on horseback and on foot, suffered no further inconvenience. The other, making the same application, and using the limb with reserve, was, in the course of three days, compelled to assume the horizontal posture for nearly three weeks, suffering from a painful inflammation of the absorbents of the limb, and glands of the groin, and of the absorbent vessels encircling the loins, accompanied with a smart degree of fever. The bruise was, in this case, followed by an ill-conditioned sore, which, for many days, admitted of no other application than an emollient poultice.

It is impossible from this constitutional difference in different individuals, for a surgeon, unacquainted with the habit of his patient, to calculate upon a beneficial uniformity in the results of his practice*; thus the application of leeches to an inflamed organ is, in some cases, as strikingly disadvantageous as, in the majority of instances, it is useful†.

Nothing shows the truth of this remark more in ordinary practice than the very various effects, in different individuals, of warm and cold applications to inflamed organs, as, for example, the swollen testis.

From the same cause, the effects of vesicatories and escharotics are, in no small degree, capricious†.

* And hence the origin of the patient's confidence, too often gratuitous, it must be confessed, but not always without foundation, that an individual practitioner knows his constitution, and is, therefore, most competent to treat its maladies.

† I shall hereafter refer to cases, in which the employment of leeches and blisters have induced fatal consequences.

The operations of laying open sinuses and cysts, of extirpating small tumours, tying hemorrhoids and polypous excrescences, of pivoting and implanting teeth, of injecting sacs and sinuses with stimulating lotions, and of passing bougies and sounds, are occasionally, seen to produce very serious degrees of constitutional excitement; in some erysipelas, in others ague; in some continued fever, in others inflammation of the chest. The very remarkable diversity in the effects of medicine upon the system is notorious, but scarcely belongs to my subject. I have seen in more than one instance, acute pneumonia, and in an other, mania, set up by the excitement of mercury, which proved speedily fatal without any previous organic disease, or prohibitory disposition.

Influence of mind

The unfavourable influence of an irritable frame of mind in the severer injuries and operations, is so universally admitted, as scarcely to require illustration. The fear of pain will often suspend the sense of it, as every one knows who has had occasion to lift the dentist's knocker. But it is the fear of death which operates with real and serious force against the best efforts of human skill, and this is excited in a degree, professionally speaking, by no means corresponding to the occasion. It is rare indeed for a person to be harassed with this apprehension, who is approaching that awful crisis. It has been observed, that when the state of trembling alarm is not kept alive by attempts to appease it, the mind, ceasing from further conflict and struggle, gradually subsides into the more favorable condition of tranquil fortitude and resignation.

The following are examples of mental influence.

Case. A lady, Mrs. S—,who, concurring, as a point of duty, with the advice of her surgeons, reluctantly submitted to the removal of a small tumour in her breast, unexpectedly, and without any apparent cause, died on the morning following the operation. It was then, for the first time, ascertained, that she had prognosticated her death, and the impression that she should not survive had taken so strong a possession of her mind, that her minutest household arrangements were preconcerted, as appeared by the papers found in her cabinet.

The following fact, however extraordinary, comes well authenticated to me, and was, as I am informed, much the topic of conversation at the time of its occurrence.

Case. About forty years ago, a young lady, afterwards Mrs. W., rallied her companion aloud for listening to the predictions of an itinerant gipsey, when the latter malignantly threatened her to beware of her first confinement. She was shortly afterwards married and became pregnant, and, as the period of her confinement approached, it became evident to her friends that the remembrance of the wizard malediction began to fasten upon her spirits. The circumstances of her labour were natural, but she survived only a few days. The medical attendants, who were men of eminence of the time, stated it as their opinion that mental prepossession alone could be admitted as the cause of her death; not one unfavourable circumstance having occurred to explain it.

The following case I select, being within my own knowledge, from others of a similar import, of which I have been informed by professional friends.

Case. A young lady, happily married, impressed probably by some unexpectedly fatal occurrence in

the circle of her friends, entertained, from the commencement of her pregnancy, a morbid fear of death in child-birth; which, although unwarranted by any indication of unhealthiness, became, from its continuance and increasing strength, a source of anxiety to one of her immediate and confidential relatives. She was attended by a skilful and experienced accoucheur, who was also her relation. He assured me that the labour was in all respects easy and safe, and that not a single unfavourable circumstance attended it. The child was still-born and imperfect. The mother died suddenly, in six hours after delivery. Every region of the body was examined with care by an eminent anatomist, and presented the appearance of health.

An extraordinary excitement of mind, such as is produced by dread, or by the screwing up of the system for the endurance of painful operations, when it is already much depressed and enervated by continued suffering, or apprehension of it, sometimes proves suddenly fatal.

Case. Thus I saw a man, who was the subject of strangulated hernia, expire suddenly on the table, during the steps preliminary to the operation, which, from the state of the symptoms, and of the bowel, as ascertained by examination after death, might be said to afford the fairest prospect of relief.

The following remarkable case, extracted from one of the periodical journals, is of comparatively recent occurrence.

Case. "A man of colour, of middle age, rather above the common stature, robust, and apparently in good health, was received into the London Hospital, labouring under a moderate sized aneurism of the femoral artery. An operation was proposed to him,

to which he readily assented. On entering the theatre, however, he fainted; some wine and water was given to him, which he distinctly swallowed, and the operation was proceeded in, the artery exposed, and the ligature applied, but not tightened. During the operation, it was observed, that no pulsation could be felt in the tumour, but this was accounted for by the fainting. Before tightening the ligature, it was suggested by the operator to wait until the pulsation was re-established: some increased attention was then paid to rouse the dormant energies of the patient, and, it was remarked, that the syncope had continued an unusual time. After the attempts had been some time persevered in, a more attentive observation proved that he was quite dead. All the usual resuscitative means were tried, but without effect. On dissection, both sides of the heart were found empty, and the lungs turgid with blood; no other particular appearance was observable."

Exhaustion. Bodily exhaustion from continued pain, spasm, and other causes, not unfrequently proves suddenly fatal. I have often observed a sudden deliquium at the conclusion of an operation for recent injury, arising evidently from exhaustion of the nervous system by the effort to support it.

Case. A man who had been bitten in the finger by a cat, and in whom symptoms resembling those of hydrophobia had been present for twelve hours, being in perfect possession of his mind, summoned an extraordinary resolution to command his spasms, while the excision of the bitten part was performed, and died, evidently exhausted by the effort, in three minutes. The suddenness of the event was remark-

able, although the fatal termination of the case, at no distant period, was looked for.

The death by collapse not unfrequently takes place at the moment of transition from pain to ease.*

Case. Sir Astley Cooper, in his Lectures, relates the case of a brewer's servant, a man of middle age, and robust frame, who had suffered much agony for several days, from a thecal abscess, occasioned by a splinter of wood penetrating beneath the nail of the thumb, and who, a few seconds after the matter was discharged by a deep incision, raised himself by a convulsive effort from his bed, and instantly expired.

Influence of the actual state of health. Practical surgeons well know the hazard of operating on persons in a state of rude health,† and the important advantage derived from what may be termed preparatory disease, as preliminary to operations. The difference is scarcely less between the states of robust and delicate health, in persons who become the subjects of severe local injury. Those of the latter description, it cannot be questioned, of-

* This happens occasionally in child-birth ; not during the expelling efforts, but after they have ceased. A cordial, at the critical moment, will sometimes save.

† The state of rude health, as that phrase is commonly understood, I consider to be a forced state,—that in which the nutrient powers are tasked to the uttermost, and successfully struggle with a surplus of diet and stimulus, ridding the body of both by the action, at its full stretch, of every excreting organ. The subjects of this class are perpetually running upon the verge of the boundary between health and disease ; a sudden shock, deranging some important function, destroys the equilibrium of the machine, which its overpressed powers are the less capable of re-instating.

ten do best. A gentleman, of spare frame, and variable health, who had just suffered a bad compound fracture of his leg, above the ankle joint, said to me, "I am not strong, sir, but I am tough."* The event, after a confinement sufficiently trying, proved the accuracy of his observation.

It is notorious that in the provincial hospitals the results of compound fractures and capital operations are more uniformly favourable than with us. The agricultural labourers, forming the majority of their patients, have breathed a pure air, and by constant and healthful exercise in that air have invigorated the processes by which the body derives its support, and disposes of its surplus. Whereas the artisans in the manufacturing districts of crowded cities are not only condemned to breathe a vitiated atmosphere, but are for the most part denied the advantages of proper nourishment and proper exercise. But of all classes of the working community the draymen and coal-heavers, and the multifarious tribe of gin-drinking labourers of London are the most unfavourable subjects for severe injuries and sudden attacks of acute disease.

A pure stimulus, as that of alcohol, contains little nutriment, and having, when taken in habitual excess, a constant tendency to incapacitate the organs of digestion, impairs and at length destroys appetite. Malt liquor, when taken in such excess as to form the chief support of life, operates in the same way upon the digestive organs; but its stimulus being less potent, as well as its nutrient matter considerable, its effects upon the constitution ars less obvious; under ordinary circumstances perhaps, less injurious.

* 'Flectas non frangas'.

Yet no description of patients fare worse than brewers' servants, under the severe casualties to which they are exposed. They struggle with a morbid plethora. The debauchee of high life levels, in respect of constitutional strength, with the low drunkard of all denominations; and both require a mode of treatment, under severe injury, the very reverse of that which is adapted to the man who, from his occupation and habits, labours, when disease overtakes him, under what may be termed a nutrient plethora; for while the latter will be infinitely benefited by full blood-letting and other means of reduction, wine and opium can alone save the former.

No chemical theories can render disputable a fact so obvious as the invigorating efficacy of a pure atmosphere, either to preserve or to restore the functions of health; and it is not, even in this skeptical age, contended, that excess either in quantity or quality of food, or intemperance of any kind, is favourable to these objects.*

* But do we not affect a sagacity in dietetic, greater than plain sense and sober experience give us warrant for? The oracular decrees of some eminent persons in the profession, are expounded with a minuteness, enforced with a precision, and received with a complacency, really amusing. I must take the liberty of entering my humble protest against such sickly fancies; they are indeed, "ægri somnia," and will no more satisfy the minds of reasonable and unprejudiced persons, than the prescribed ration their appetites. Every man's stomach informs him, with as much accuracy as his moral sense distinguishes right and wrong, when it is indisposed for food, when it has received enough, and when it is overloaded; and his personal experience not only instructs him earlier and better than any one can inform him, what articles of diet to select and and what to avoid, but is the only process by which he can obtain the information correctly. For there is the utmost diversity in the digestive powers, as well as in the palates, of different individuals,

Pregnancy, lactation, &c.

Certain natural states act unfavourably on the female system under the additional pressure of

both as to the quality and quantity of food; and a variation almost as considerable, in the same stomach and palate, as circumstances influence at different periods. A parliamentary enactment would be quite as reasonable as a tabular regulation, for the quality and quantity of aliment which people are to consume; and truly it were a sad omen for the nation, if the enervating refinement of the age had reduced our organs to this extremity of imbecility; for that, if such a conceit were generally acted upon, it would lead to this result, and make abstinence a merit of necessity, there can be little doubt. It is hardly possible to conceive a more hideous catalogue of evils than that which follows in the train of animal impoverishment; of the physical consequences we may form some idea, but it would be difficult to estimate the extent of its moral influence on mankind. Neither the physical nor the mental appetites and powers of the individual approach to a state of uniformity, but are, in the highest degree, variable. Man is the creature of circumstance; if he were not, he would be shorn of all his nobler faculties. Emulation, enthusiasm, and all the elevating impulses of his nature would be dormant, and the world would be sunk in a state of senseless apathy.

But it is the abuse of it, not the argument in favour of a rational abstemiousness, to which I take exception. It surely does not follow that the whole science of hygeia turns upon breakfast and dinner, because a sick man requires to be dieted. Every one knows that an imperfect assimilation and separation of the food, whether from the materials of its composition or the state of the chylopoietic organs, is incompatible with health; that a gorged state of the secreting or excreting vessels, a defective or a redundant, or a palpably vitiated secretion is inconsistent with the functions and feelings of health. No elaboration of the soundest organs can separate a wholesome product from an unwholesome mass. If the chyle be bad, the blood will be bad, and if the blood be bad, the solids of the body, which are maintained by it, will partake of the depravation; just as the rank and unwholesome grass impoverishes or taints the milk, and the milk the butter. The various forms of scrofula in children show this best; none more strikingly than the mesenteric disease, both in its origin and its effects. No one can doubt the influence of the fluid on the solid, and the re-action of the latter on the former, who

injury or operation. This is eminently the case in the states of pregnancy and of lactation.

Case. I operated in a case of exomphalos on a lady

has had an opportunity of observing the change in the quality of the secretions, and in the tone of the capillary system, brought about by well-adapted food and medicine. It would too much prolong this digression to discuss several interesting questions connected with so important a subject. Suffice it, for my purpose, to say, mankind are sufficiently aware of the fact, that innutritious and superabundant food are productive of as serious evils as insufficient food; and if we speak the truth, we shall say, that they who act in disregard of this principle, do so from a less venial pretext than ignorance. Nor is any extraordinary penetration required to foresee that, in proportion as the functions concerned in nutrition are performed completely and naturally, and are less subject to interruption, the strength of the body, the energy of the mind, and the powers in reserve (vires medicatrices) that are to support and restore the system under the assaults of injury and the breaches of time, are greatest and most effective. In some individuals, as in some climates, greater care and personal restraint are required than in others. The restrictions necessary to the recovery of health are seldom favourable to its preservation. "They that are whole need not a physician." The system of "la medicine expectante" is a better friend to the college than the community.

If longevity be regarded as a criterion of health, which, in an unqualified sense, it certainly is not, it would be easy to show, by some splendid living examples, that a rigid abstemiousness has not been the prominent virtue of the aged. Of Cornaro it may be worth while to remark, since it is not generally known, that he was a wine-bibber: an early edition of his work represents this hero with a plump capon before him on the table, and a bottle of wine at his elbow. [Luigi Cornaro, overo Discorsi della vita Sobria. Paris. 1646.] If, however, the exemplars of longevity have not been remarkable for temperance, neither have they been notorious sensualists. But how many of the aged, who have lived, as the phrase is, all the days of their lives, have been remarkable for an independence of habit opposed to a slavish adherence to rules and formularies, and a total indifference about the 'juvantia et lædentia' of our modern gastronomists!

in the fifth month of pregnancy; the operation was performed early and promised well, and the function of the alimentary canal was restored. The diffused peritoneal inflammation was however destructive; it set in later and was more feebly marked than usual, and her situation was, I think reasonably, considered to turn the scale.

Case. On the other hand, I was not long since called to operate for strangulated umbilical hernia on a young woman, fifty hours after child-birth, who had been labouring under symptoms of strangulation since the period of thirteen hours from her delivery. Although the protruded omentum and the gut were in part gangrenous, and a temporary artificial anus ensued, she recovered favourably and is now in perfect health. Had the operation been performed prior to the relief of the uterus, the issue, I feel confident, would have been fatal.

Case. I trembled for the fate of a fine middle-aged woman, from whose breast I saw a scirrhous tumour removed in the state of full lactation (seven weeks): the milk sprung as freely as the blood under the knife. She was seized with inflammation of the pleura, and died in six days.

Organic disease. The pre-existence of an organic change in any part, however little connected with the vital operations, is a decided disadvantage, and renders the effects of casual injury and operation most precarious. Thus a woman, the subject of chronic disease of the uterus, though the disease be in no respect malignant, is an unfavourable subject for any operation.

A pre-existing disease of the liver, kidney, or testicle, though chronic, and in itself not alarming the

constitution, becomes a drag upon its elasticity, and stands in the way of recovery. Inspection of the body after death frequently explains the unfavourable result of operations that promised well, by discovering one or more organs in a state of chronic disease, that had not previously deranged the health in a degree sufficient to give notice of its existence; and which might therefore have remained quiet for years to come, had no extraordinary call been made upon the powers of the system.

Case. A man whose hand was amputated for a diseased wrist-joint, supported the operation with firmness, and was proceeding in all respects well, when, on the third day from the operation, he suddenly expired. On examination, the lungs were found to contain numerous small tubercles in an incipient stage; and a recent copious effusion of serous fluid had taken place betwixt the tunics of the brain.

Case. A young man, the subject of amputation of the glans penis and preputium for a cauliflower excrescence of those parts, died in five days, without any manifestation of acute disease. His lungs were discovered, on inspection, to be sprinkled with minute tubercles in the first stage of their formation, of which no suspicion existed; as the local disease in view, and of some months' standing, appeared sufficiently to account for a sickly complexion and somewhat wasted form.

It is well known that the gradual reduction, to which the system is subjected during the progress of a local disease, is, to a certain extent, favourable to the result of a capital operation,* but it may be low-

* Upon the same principal that the artificial reduction of the system, as I have before remarked, is beneficial to the state of full

ered too much; its powers may have been rendered unequal to maintain the process of restoration, nay, even to support life under the burthen of the operation. Thus we frequently see a hectic, which has been originally produced by the incessant irritation of an external disease, as a scrofulous joint, rendered permanent by insidiously supervening diseases of the visceral organs, especially of the lungs. The operation affords a momentary relief, but recovery, in such circumstances, is impossible.

The effect of injuries which leave a state of chronic local disease, is to induce inflammatory diseases of other and remote parts. This has been especially observed of injuries of the head, and the large joints: abscess of the liver and tubercles of the lungs have been discovered under these circumstances, bearing evident marks of their recent and secondary formation. Thus the constitution is predisposed by one disease to the production of another.

Continuous inflammation is most frequent in persons who incur injuries and undergo operations, in a state of health. I have known the amputation of a stiff finger, submitted to as a matter of convenience, fatal from this cause. A case occurs to my recollection of the removal of a small tumor from the scalp of a lady, of which the issue proved disastrous, by

health, when assailed by injury or disease. A plethora, which is not prejudicial while the balance of action is maintained which constitutes health, becomes dangerously oppressive to the system, when it is suddenly attacked by injury or illness. But when, by loss of blood or abstemious diet this plethora has been reduced, the powers of the constitution are no longer oppressed—they play with more freedom—and are, therefore, more capable of sustaining the disturbance which a serious accident or a severe operation will occasion.

inducing erysipelas of the scalp; and I recall other instances of trifling operations, performed in health, in which serious consequences were clearly avoided by imposing a rigorous restraint, and adopting a vigilant plan of treatment. My ingenious friend, Mr. George Young, whose retirement from practice is a subject of general regret, was accustomed to impose restraint before the performance of operations requiring confinement, with excellent effect. Having to extract a cartilage from the knee-joint, he would keep the man, for a week prior to the operation, in the same position as was to be maintained for the week subsequent to it. Thus the irritation of confinement, as well as that of motion, was avoided.

The following is an illustration of Mr. Young's practice in his own words. "A healthy carman came under my care with a loose cartilage in the right knee-joint. It had several times occasioned him to fall suddenly, and he was very anxious to submit to an operation to get rid of it. It appeared to me desirable to accustom him, before the operation, to the reduced diet, rest, and restraint, which would be necessary after it. He accordingly kept the house. On the second or third day of his confinement, I put on the roller and bound on the back splint, exactly as I intended to do after the operation, to keep the limb perfectly steady. This confinement of the limb occasioned a restless night, some fever, a whitish tongue, a quickened pulse, a little headache, spare and high coloured urine. He was very unwilling to continue the bandage and splint, to which he ascribed (and justly) all his constitutional disturbance, and the utility of which, prior to the operation, he could not at all comprehend. This circumstance, however, forcibly suggested to me the importance of accustoming him

to restraint; it was therefore continued; the excitement which it had produced gradually subsided, and when I found that the bandage no longer occasioned any irritation, I performed the operation. Not one untoward symptom arose, the constitution was not in the least ruffled, and the wound healed by the first intention."

CHAPTER II.

ON THE EFFECTS OF LOCAL INJURY ON THE CONSTITUTION.

Irritation is the name given to that state which is produced by an extraordinary excitement of the irritability either of a part or of the system: irritation is, therefore, local or constitutional. The phenomena of irritation are chiefly displayed in the nervous system, and it is thus distinguished pathologically from inflammation, which belongs to the vascular. Their relation is as intimate as that of these systems, of the extraordinary actions of which they are the results. As the causes and degrees of excitement are various, so are the signs and modes of irritation. Inflammation has been sometimes considered a healthy, because a healing action; this, though not a strictly logical, is an intelligible phraseology. In the same sense, the minor degrees of irritation also frequently serve a salutary purpose, and conduce to the preservation of the system. I object to the term "irritative fever," as synonymous with irritation, because

irritation and fever, are, in their nature, as distinct as irritation and inflammation; although their reciprocal affinities are as intimate and complicated as those of the nervous and vascular systems.

SECTION I.

OF LOCAL IRRITATION.

Local irritation is demonstrated by,

Demonstrations of local irritation.

1. An alteration in the habitual and proper sensation or action of a part; as a depravation or suspension of function in an organ of sense; an aberration or delusion of perception; a vitiation, suspension, or redundancy of secretions; an irregular and involuntary action of muscles, or a partial paralysis, &c.

2. Pain, unattended by any other sign of inflammation. The irritable joint, breast, testicle, and prostate gland, give no evidence of inflammation. The irritable organ or its vicinity, has in many instances been affected by sub-acute inflammation at some former period,* but not such as to leave any trace of an altered structure. A carious tooth sometimes occasions a tic douloureux of the dental nerve. Worms in the maxillary sinus have given rise to the

* The most obstinate case of irritable breast which has fallen under my notice, was supposed to originate from a needle having formerly penetrated the integument of that gland. In another female a similar affection of the knee-joint was attributed to the same accident. After the lapse of many months from the extraction of the needles, and in the total absence of inflammation, the complaint continued in either case unrelieved and immoveable.

same painful affection of the sub-orbitar nerve. Some calculous concretions, which form in the kidney, create severe local pain in those organs without a symptom of inflammation. The remedies for inflammation afford no relief, but gentle exercise and medicines, which act chemically upon the concretion, remove it. The urinary organs, rectum, and uterus are, as much as any parts, subject to pain unattended by inflammation. But of all parts, the membranes of the brain and stomach probably suffer most in this way. A blow on the stomach, a compression of the testicle, colic from indigestible matters in the intestines, and the paroxysms of stone in the gall and urinary bladders, are frequent and familiar examples of the insufficiency of transient local irritation, though accompanied by acute pain, to excite inflammation. When irritation is unaccompanied by inflammation, it may be, and often is, remote from the seat of pain and other signs of disorder by which its existence is known. The disease called tic douloureux exemplifies this fact abundantly. Numberless modifications of pain—viz. that degree of uneasiness which attracts attention to a part, and seems to admit only of a negative description, the varieties of prurigo, subacute and chronic inflammation about the orifices of canals, producing elongations and excrescences, or exulcerations and fissures, and the spasmodic contractions of the sphincters—are for the most part demonstrative of a remote local irritation unattended by inflammation.

3. Inflammation. When local irritation is acute and permanent, inflammation ensues, which is proportioned in degree to the severity of the irritation and the habit of the patient. Of this, contusion, sprain, wound, and the operation of extraneous sub-

stances in the production of abscess and ulcer, under an infinite variety of circumstances, are examples.

When local irritation exists in a high degree, it becomes transferred to the constitution, either immediately, i. e. independently of inflammation,—even before time enough has elapsed for its production—or after a short but variable interval, as a consequence of inflammation. As illustrations I may adduce the severest cases of disorganization, chemical and mechanical; as deep and extensive burns, crushed joints, compound dislocations, fractures attended with comminution of bone and dilaceration of muscles and blood vessels.

Terminations. Local irritation may be said to terminate in resolution, in local inflammation, or in constitutional irritation. The first term expresses gradual subsidence or retrocession, whether a natural crisis or effected by the assistance of art. The second I consider a termination, because, having provoked the act of inflammation, the original irritation loses its independent character, and assumes a symptomatic form.* The third and most important termi-

* The symptom may become fixed and inveterate, and re-act upon the inflammation.

Local irriration seldom rises to a higher pitch, than in some purient inflammations of the skin, and it is a remarkable fact, that although the existence of the inflammation is, nine times in ten, due to internal causes, and the irritation stands in the relation of a symptom only to the disease, yet the most if not the only effectual method of subduing the inflammation, when once established and become chronic, consists in the application of such topical remedies as put a stop to the irritation. This can only be explained by considering the inflammation and irritation thence resulting to have

nation of local, is in constitutional irritation, indicated by a propagation or extension of the irritation to the great sources of nervous energy, and from them to all parts of the system.

The constitutional irritation thus set up is direct or reflected; it exists in various degrees, and exhibits very multiform and complicated phenomena, which it is the object of these pages to exemplify.

SECTION II.

OF CONSTITUTIONAL IRRITATION.

The irritation which arises from injury or inflammation, when it passes from local to constitutional, becomes imminently hazardous; constitutional irritation being as much more dangerous than local, as the disorder of the whole is of graver importance than the disorder of a part.

Causes. The causes of constitutional irritation, more especially the province of surgery, are the various forms of injury; as,

1. Compression, concussion, læsion, or disorganization, chemical or mechanical.
2. Inflammation, the result of local injury.

Symptoms of pure irritation opposed to those of inflammation. The symptoms of constitutional irritation which are excited by severe injuries, and are unmixed with local or general inflammatory

gradually changed their reciprocal relations, and the maintenance of the disease to depend upon the symptom. We see the same thing in many chronic diseases. The temporary alleviation of pain is often the surest mode of preventing its recurrence.

action, differ essentially from such as are set up by inflammation and accompanied by a general excitement of the vascular system. In some the cerebral, in others, the spinal medulla appears to predominate in manifesting morbid phenomena. The irregular and preternatural actions of the vascular system are conspicuous in proportion to the strength and distinctness of the symptoms of irritation; and vice versâ, as the morbid actions of the vascular system partake of the febrile or inflammatory character, the symptoms of irritation are blended with them, and present a less prominent character.

Constitutional irritation natural, or morbid;

Irritation may be confined to the part, the constitution, from whatever cause, taking no cognisance of it; and this may endure for an indefinite period, even though it be coupled with a chronic alteration of structure. It may, on the contrary, compel the constitution to notice and sympathize with it even in its nascent state, and before any alteration of texture is threatened. This difference is determined by the seat and character of the irritation, or by the measure of natural irritability in the constitution. When the irritability of the system is morbid, simple causes of irritation become extraordinary, and the local process, whether seemingly spontaneous or a casualty, takes upon itself the impress of the constitution; becomes peculiarly active or indolent, is marked by periods of excitement or distinct intermissions of action. The part, in short, exhibits a correspondence like that which we see in growth, decay, mutilation, and various other circumstances, to the existing state of the system. It is by extension of the same principle that we explain the modifications of inflammation induced by a vitiated

state of the secretions, or of the blood itself, in scrofula, and the numerous varieties of morbid and malignant growths.

direct or reflected. Constitutional irritation I consider to be of two kinds, direct and reflected; by which arbitrary distinction I mean to imply, that the first is wholly and immediately derived from the part, commences and is identified with the local mischief, and the constitution has no share in its production. The second, on the contrary, originates in a peculiar morbid state of the constitution to which the injury or inflammation has given birth, or, it may be, previously existing. The first is truly symptomatic, never originating spontaneously, and being immediately induced by the local irritation, is capable of being essentially mitigated or arrested by its removal. The second is occasionally purely idiopathic, and being oftener the cause than the effect of the local action, is seldom influenced by local treatment. In the first, the local changes are depending on local causes—in the second they depend on constitutional causes. The symptoms characterising direct constitutional irritation, are, in the nervous system, rigor, delirium, convulsion, coma—in the vascular, the fever of phlegmonous, suppurative, ulcerative, and gangrenous inflammation. Those which belong to reflected constitutional irritation, are, in the nervous system, epilepsy, tetanus in all its modifications, and other anomalous forms of spasm, mania, &c.—in the vascular system, the fever accompanying scrofulous and carcinomatous inflammation, erysipelas, carbuncle, &c. I deem it no objection to a division of this sort, that the parts are so blended and interwoven as to render the outline here and there obscure or even imperceptible.

tible:—it is a circumstance unavoidably resulting from the nature of the subject. Nay, if their boundaries did not mutually encroach upon each other, we might be assured that the division was too artificial to be founded on correct observation, and therefore leading to erroneous views of disease. The extremes must be indicated in order to fix and illustrate the fundamental principles of the distinction, and this is all that is required for useful purposes. In pathology, it would be absurd to expect that a line of demarcation could be laid down with accuracy approaching to that which obtains in the mathematical sciences. Let the justness of the principle be admitted upon which the division is founded, and differences upon the accuracy of the references and details may be easily reconciled. I am quite prepared to admit, that cases are of no uncommon occurrence in which after an interval the reflected supervenes upon the direct irritation; which may therefore be regarded as examples of mixed irritation, the part and the constitution acting and re-acting alternately upon each other.

Influence of circumstances. I shall now briefly consider the influence of contingent circumstances in the production of constitutional irritation by local injury. These are as follow:—

1. The texture or organ which is injured.
2. The description of the injury which is inflicted.
3. The magnitude of the injury.
4. The subject of the injury.

Texture injured. The natural and healthy sympathy of the constitution with a local injury, is proportioned in activity and in degree to the sensibility of texture of

the injured part. Hence, if a part moderately endowed with nerves and blood-vessels, as, for instance, tendon, ligament, or cartilage, be subjected to injury, per se, less of this sympathy will be excited than by a similarly insulated injury of a part more highly organized, as skin, muscle, or mucous membrane. But injuries are for the most part complicated, and with the exception of cases of superficial burns and scalds, we are seldom presented with an instance of severe injury limited to a solitary texture. The sympathy with the injury, at the moment of its infliction, is, by no means however, the measure of the constitutional irritation, which is, sooner or later, to follow.* The first belongs to the condition of health; the second is the result of morbid actions.

The fact is, with few exceptions, that injuries of parts of minor sensibility and low organization, induce the highest and most alarming degree of constitutional irritation. The power of reparation in parts being according to their endowment, the system is unusually excited to set up and sustain the restorative effort in injuries and morbid affections, suddenly induced, of the more dense and inert textures. The severe injuries of fibrous and ligamentous texture in all its varieties, create more serious degrees of constitutional irritation than those of the other primary textures, subject to the influence of the modifying causes (2. 3. 4.) above stated. The mucous membrane, which lines the fauces, alimentary canal, and urinary organs, and the serous, immedi-

* The inflammation excited by the injection of the tunica vaginalis for the radical cure of hydrocele is invariably, in my experience, most languid in those persons who suffer most severely from the operation.

ately investing the viscera of the head, chest, and abdomen, arouse, when the subject of injury or inflammation, the highest degree of constitutional sympathy, from their intimate relation to the vital functions. But, if it were possible to abstract the weight of this consideration, I should say, that the constitutional irritation is more intractable in cases of injury followed by acute inflammation of the tendinous sheaths and ligamentous capsules; or of the fibrous membrane, which forms a close covering to the bones. At least, they differ thus essentially in character. The constitutional excitement characterising the former assumes the more intelligible and bold form of inflammatory fever, capable of being combated by a vigorous reduction of the animal powers; while that of the latter presents the complicated phenomena of nervous derangement, commingling with, and mysteriously modifying, if not annihilating, the sympathetic fever.

Integument. Injuries of the integuments of the head, chest and abdomen, excite, cæteris paribus, severer symptoms of irritation than those of other parts of the common covering of the body or limbs. This is doubtless due to the influence of contiguous sympathy. But the injuries of the skin in all regions of the body are especially important, on account of the tendency of this texture to the form of inflammation denominated, erysipelatous.

Muscle. Læsions of muscular fibre are severely felt, on account of its properties, as well as texture.—Spasmodic action, that is, irregular and involuntary, and imperfect contractions, is an unavoidable consequence. The irritation is greatly aggravated if, from

the nature of the injury, any detached or extraneous body acts as an irritant, as in the penetration of muscles by bony spicula in comminuted fracture. To this cause is referable one of the severest, and most frequently fatal forms of reflected irritation —tetanus.

Tendon, ligament, and fascia. The dense, unyielding texture of tendinous and ligamentous fibre, renders the system impatient of injuries of such textures, and irritable under their consequences. Tendons are enclosed in proper sheaths of the same dense fibre. Fascial aponeuroses form the common sheaths to muscles and tendons. Capsular ligaments and bursæ are perfect sacs. Such parts, when extensively exposed, either by injury or operation, slough, their texture not affording a basis, or their properties a disposition, for granulation. I believe, therefore, that the irritation arising from injuries of tendinous and ligamentous structures, which is universally known and acknowledged, is partly referable to the compactness and low vital power of the texture, and in part, to its arrangement in sacs and sheaths—circumstances which strongly dispose to continuous inflammation, and the confinement of morbid secretions.

Bone. The injuries of the lamellar texture of bone, individually considered, are not attended with any peculiar or considerable constitutional irritation; but the medullary membrane and periosteum, in their adhesive and suppurative inflammation, excite a high degree of constitutional irritation. The injuries of arteries are little felt by the constitution. Veins approach nearer to the character of fibrous membranes, and these being more suscepti-

Blood-vessels.

ble of continuous inflammation, are productive of high irritation. The same may be said of
Absorbent. the lymphatic absorbent system. The absorbent glands often serve a salutary purpose in arresting, or, at least, impeding the progress of continuous inflammation.—
Nerve. Nerves, being the subject of injury, occasion serious and alarming symptoms of irritation; whether this is attributable to inflammation spreading along the neurilemma, or to the propagation of morbid impressions from the injury to the source of sensation, is not easy of decision; as the nervous texture has rarely exhibited to the anatomist appearances satisfactorily indicating the existence of acute inflammation*. The chronic changes which nerves are subjected to by inflammation, are exemplified in the production of tumors in their course, or upon their truncated extremities, resembling ganglia.

Organs. The injuries of the several organs which are formed by a combination of the primary textures awaken different degrees of constitutional irritation, according to the importance of the organ in the economy. The viscera, and the organs of sense, furnish

* Mr. Swan, the indefatigable and accurate anatomist of Lincoln, in the course of his minute researches into the morbid appearances of the medalla spinalis and its nerves, has rarely been enabled to discover vascularity sufficient to constitute inflammation, except upon the semi-lunar ganglia of the great sympathetic; which, when the system has been impregnated with mercury, he describes, both upon the surface and in the section, as most unequivocally inflamed, exhibiting, when compared with a sound ganglion, the appearance of a blood-shot eye, as compared with an eye in its natural state, or free from colored vessels.

opposite illustrations in proof of this fact. The function of the former is in a higher degree essential to animal existence, than of the latter. Compare the constitutional excitement in inflammation of the eye or ear, and in that of the brain or stomach.

Description of the injury. That narrow and straight wounds are generally followed by more constitutional disorder than broad and bold ones, is well known to surgeons. A punctured wound is, therefore, reputed dangerous in comparison with an incision. Why is this? The result of inflammation is the effusion of certain secreted fluids. If they have a free outlet, no preternatural separation of parts or sinus is formed, but the formation of such cavity is inevitable, if fluids, so poured forth, have no exit. Even in clean incised wounds, which are said to heal by adhesion, such oozing takes place, and if it did not, no wound could unite by adhesion. If a pointed instrument penetrate a fascia, aponeurosis, or ligament, the form and depth of the wound render it almost impossible that it should afford issue to sanies, serum, or pus, which may be poured out. Nevertheless if the injury be soothed by rest, no permanent mischief ensues; the effused fluids are absorbed; no inflammation is excited of the existence of which a single sign appears after the lapse of a few hours; neither tenderness nor tumefaction. But if, instead of allowing the continuity of the part to be at once restored, the person is unmindful of it, and it becomes, in consequence, inflamed, the process of suppuration ensues; the cellular substance forming a nidus, into which the secretion is deposited, and which in time becomes an abscess. Suppose this to happen upon a subfibrous, instead of a subcutaneous surface, it

becomes, in no very long time, a fascial abscess or deep collection of matter, which rapidly extends in the direction in which the least resistance is offered; as along a tendinous theca, or beneath the palmar or plantar aponeurosis, or within the proper sheaths of the muscles of the fore-arm or leg.

I believe the danger attending punctured wounds depends upon the following circumstances. First. Penetration of some fibrous membrane; for if they do not penetrate deeper than the cellular substance, they are unimportant, even though suppuration ensues, because a cellular abscess quickly developes itself, and readily discharges, or is relieved of its contents. Secondly. The propensity of fibrous and ligamentous membranes to continuous inflammation. Thirdly. The form of wound being unfavourable to the discharge of fluids secreted under inflammation. Fourthly. The occasional puncture of a nervous filament, the division of which would be unimportant.

An inflamed fascia betrays, for a time, no symptom of its existence but that of local tenderness. Where matter is formed, an erysipelatous blush covers the surface and a uniform diffused swelling takes place, though, for a long time, without fluctuation. The symptoms following a pricked nerve are developed in the course of the nerve, or in the system to which it belongs, more than in the wound. It is not, therefore, the form of wound in itself considered, but the form co-operating with the depth and the textures implicated, the obscurity attending suppuration in its commencement and progress, and the consequent neglect of repose and precaution, which render punctured wounds serious in their consequences.

Contused and lacerated wounds seldom admit of adhesive inflammation: being the result of violent læsion, the texture is in part disorganized, and sloughing ensues. The tone of the surrounding parts is destroyed. If the dressing be such as to act like a stricture or ligature, from the tightness of its application, or the swelling which is occasioned by re-action, evil consequences ensue. If the injury be confined to cutaneous texture, erysipelas ensues, as we see in the scalp—if it extend to muscular or tendinous fibre, as in lacerations of the hands and feet, tetanus is the consequence most to be apprehended. It is owing to the widely dissevering and destructive nature of the injury, and the processes of inflammation which must ensue, and not unfrequently, to their interruption and exasperation by ill-adapted treatment, that the system sympathizes so deeply in this form of wound. Gunshot wounds come under the last denomination, with the additional irritation created by foreign substances, and are frequently productive of tetanus. Comminuted fractures are accompanied by laceration, contusion, or irritation of muscles by spicula, and are, for this reason, especially dangerous.

Magnitude of the injury.

The magnitude of the injury must be understood to comprehend not only the extent in space, but in destructiveness. If we consider it, however, only in the former light, it has a weighty influence. An exposure of the entire muscle of the calf, or half the scalp detached in one pendulous flap from the pericranium; balls performing the circuit of the trunk; burns, abrading the cuticle and denuding an extensive surface of the cutis; scalds followed by sphacelus of the entire integument from the

knees downward, are injuries which naturally awaken our fears for the constitution.

On the other hand, it must be admitted, mischiefs of much smaller dimensions, as slight abrasions and punctures, are now and then fatal in their consequences; but these, as we shall hereafter show, admit of a different explanation.

The extensive dilaceration and exposure of the larger joints, the crushing or comminution of them, the displacement and protrusion of the ends of fractured bones, attended with divisions, partial or complete, of the great muscles and blood-vessels, are injuries, of which the magnitude, in the second sense, is such, as to excite no surprise at their fatal termination. When, as often happens, both limbs suffer from the same accident, though in a very unequal degree; or any other, though remote part has shared in the injury, in a manner which, in itself considered, would excite no alarm; the magnitude of the injury, in its constitutional effects, is materially augmented. The magnitude of an injury is felt in two ways, in its immediate, and in its secondary effects. Either the system breaks down at once, and the vital functions are stagnated by the appalling shock which they have received; or having withstood this, the constitution with diminished powers engages in the unequal conflict; erysipelatous or gangrenous inflammation is set up, and it sinks exhausted under the wasting processes which must clear the way for reparation.

Subject of the injury. The influence of age, sex, and condition, by which the habits are determined; climate, regimen, and other adventitious circumstances modifying the physical and moral constitution of the pa-

tient, is so manifest as scarcely to need farther illustration. Some constitutions, I have before observed, are regardless of injuries which excite a smart reaction in others; and very serious degrees of injury and inflammation scarcely disturb the habitual tranquillity of the animal and vital functions in one case, while they subvert and annihilate them in another.

Scrofula. Every experienced surgeon knows that the prevalence in this climate of a scrofulous diathesis gives a seriousness to slight accidents. It is as well known that, in this temperament, idiopathic inflammation is so obscure in its origin, and attended by so little suffering, as often to elude observation, until announced by the palpable signs of disfiguration and lameness. It is to be observed that even in the severe injuries of persons of this temperament, a similar degree of apathy prevails; the symptoms of direct constitutional irritation are masked, or, if they appear, are so comparatively lenient, as scarcely to disturb the health; and the onus of the mischief falls, as by accumulation, upon the more advanced stages of its progress. Reflected irritation is first displayed in the formation of the hectic paroxysm, and ultimately, in the signs of consentaneous morbid changes in visceral, if not in vital organs.

In the next chapter, I shall detail some cases to exemplify the severer symptoms of direct irritation. But such symptoms being the result of casualties, i. e. of agents foreign and not proper to the system, the reader must not look for a methodical arrangement, or a catalogue raisonée; they are anomalies, and stand in a similar relation to the symptoms of fever, as the changes produced in the texture of a part by

external violence to those which are set up by disordered vital actions.

CHAPTER III.

EXAMPLES OF DIRECT IRRITATION.

The symptoms of direct irritation indicate a depression or failure of the functions essential to life—either pure and progressive, or marked by alternations of excitement. The first, prostration without re-action, supervenes upon a degree of shock so intense as to destroy the irritability of the vital organs. The second, prostration with excitement, is the result of a less abrupt or intense degree of shock, and indicates a greater degree of vital power, the excitement being a partial evidence of the un-exhausted irritability of the vital organs.

The following are the more frequent causes of this condition.

1. Sudden, extreme, and unremitting pain, and certain affections of the mind co-operating with bodily disease.

2. Injuries and operations of various kinds.

3. Inflammation the result of injury, or operation, terminating in suppuration or in gangrene.

4. Exhaustion from hemorrhage or colliquative suppuration.

5. Poisons, animal, vegetable, and mineral.

I proceed to offer some examples in illustration of these positions, and in conformity with this arrangement.

SECTION I.

BODILY PAIN. MENTAL IMPRESSION.

Pain, when amounting to a certain degree of intensity and duration, is of itself destructive. Difficult and protracted parturition is every now and then fatal from this cause; and even in cases in which neither extraordinary difficulty nor protraction were experienced, a fatal prostration has sometimes supervened, which has admitted of no other explanation. The delivery has been complete, without any degree of physical injury, and not more than an ordinary quantity of blood has escaped from the vessels of the uterus. Yet the woman, in despite of the encouragement derived from the consciousness of safety to herself and infant, and of comfort from the conclusion that her sufferings were at an end, has never rallied, either in strength or spirits; but after an interval, not exceeding a few hours, spent in a low and sinking state, has unexpectedly and with little perceptible alteration, expired.

It is fair to say, that these cases are by some persons differently explained. I have heard it argued that in a state of exhaustion a very moderate loss of blood is sufficient to induce a fatal syncope, and I admit it, but to what was the previous exhaustion to be attributed, especially where the labor, as above stated, has been neither unusually lingering or diffi-

cult?—an exhaustion so great that even the natural and ordinary circumstances of delivery annihilated the power of recovery. Others have attributed the catastrophe to presentiment or mental impression, and cases have undoubtedly occurred demonstrative of the fatal effect of this depressing cause.* But even where the evidence of this state has been most conclusive, I have been disposed to question its single and unmixed operation to the extent supposed; although coupled with bodily suffering and exhaustion from that cause, its fatal influence is beyond all question.

There is a case in which, with an unconfined state of bowels, abdominal after-pain, aggravated by pressure, augments, at no distant period from delivery, to a degree sufficient to induce the belief that puerperal inflammation exists: the pulse is accelerated, and notwithstanding its want of power, and a general expression of feebleness, the practitioner, suspicious of the pain, takes away a full quantity of blood. No satisfactory result is obtained; the pulse and the patient sink together, and a fatal coma succeeds. This is a pain not of inflammation but of irritation, and would have a better chance of relief from laudanum than the lancet.

The following case I have extracted as well illustrating the effect of acute and enduring pain from Dr. Merriman's "Synopsis of the Various Kinds of Difficult Parturition." It is communicated to the esteemed author of that work in a letter from my brother-in-law, Dr. Gooch.

"DEAR SIR,

"The following case occurred more than twenty

* See Page 21.

years ago, June 1799, to Mr. Borrett, of Yarmouth, with whom I was then residing as apprentice. I do not relate it from my own observation, but from a manuscript account which he drew up at the time, and which as too voluminous for your purpose, I shall try to abridge.

" The patient was a lady, thirty-one years of age, in labour with her sixth child. On his first examination, Mr. B. found a large fleshy substance almost filling the vagina; passing up his finger between the front of the tumor and the symphisis pubis, he felt the orifice of the uterus, the anterior segment completely dilated, but the posterior could not be felt because of the tumor. Whilst he was examining, a pain came on, and the distended membranes descended between the tumor and the pubis, and almost protruded externally; another pain ruptured the membranes, when he discovered the head of the child resting on the symphisis pubis. As the head did not advance, he introduced his hand, brought down the feet, and with some difficulty extracted the child; it was born lifeless, but he persevered in inflating the lungs, and in half an hour it cried lustily. Whilst he was occupied about the child, the placenta was expelled, and after waiting for some time, the patient appearing easy and well, he left her; this was at seven in the morning. At three in the afternoon he was sent for again; she had had such violent pains that she thought there was another child; but as the abdomen was flat, and the contracted uterus could be easily felt, he assured her to the contrary, and gave her an opiate. When he saw her at eight at night he learnt that the pains had continued violent: she felt as if there were something to come away, and on examination there was discovered a

soft tumor pressing against the os externum. What could it be? he would have thought it was the uterus inverted, but it was the same tumor which he had felt in the morning before the child was born; there was no hemorrhage, the placenta had been expelled spontaneously, and the uterus could be distinctly felt in the hypogastric region. He consulted his medical friends in the town, and sent off to Norwich for Mr. Rigby. She took an anodyne mixture; but the pains continued with violent expulsive efforts all night, and the next morning he found her with a languid pulse, and a pallid countenance; a large fleshy livid tumor had been forced out of the vagina, and every pain brought it more and more into sight; she continued to suffer and to sink through the rest of the day; in the evening Mr. Rigby arrived, but she had expired about half an hour before. The body was opened the next day; the uterus was contracted, but its mouth was dragged down as low as the external orifice, by a tumor which grew from it by a broad base; it was attached to the posterior part of the mouth of the womb, and some way up the neck, was of a livid color, and weighed three pounds fifteen ounces. The patient had borne her last child two years before, easily and naturally; but some time before her present pregnancy she looked as large as if she was seven months with child.

"This case is curious, not only as a specimen of the rare coincidence of polypus and pregnancy, but as a striking proof that mere pain can destroy life. The labour-pains continued after the uterus was empty, and she may be literally said to have died of a protracted labour which took place after the child and the placenta were born.

"I am, dear Sir, yours truly,

"ROBERT GOOCH."

Berners Street, March 26th 1820.

Certain forms of mortal injury are productive of sudden excruciating and unremitting pain, such as ruptures of the stomach, gall, and urinary bladders. Death ensues in these cases many hours sooner than where the pain is less intense, and before the morbid changes, which take place in consequence of the injury, are so far established as to make it credible that the result is to be ascribed to their influence. I was called some years ago to a gentleman writhing with pain in the abdomen, which he had endured for the space of two hours previous to my seeing him, and described as unlike any that he had ever experienced. He accosted me in these words: "Doctor, if you cannot put an end to this pain, it will very soon put an end to me." So true was his prediction, that in twelve hours from a state of comparative health (he had been at the theatre the preceding evening) he was no more. His disease was an ulcer in the pyloric portion of the stomach, which had perforated its coats, and allowed of the escape of its contents into the general cavity.

Oxalic acid, arsenic, and some other poisons, taken into the stomach, seem to destroy life by their action on the nervous system; the characteristic expression of this action is overwhelming pain, and no organic change presenting itself competent to explain the phenomenon of almost immediate death, it is highly probable that pain has the principal share in determining this result. I shall not be understood to question the otherwise fatal effects of such injuries and noxious agents as the above, in considering the acceleration of their issue to be owing to excessive pain.

In what degree pain contributes to the speedily fatal result of the various forms of complicated inju-

ry befalling parts not essential to life, and therefore not in their nature mortal, we are only enabled to judge by the expression of suffering. But not to speak of the difference of temperament in different individuals, it is probable that the expression of suffering, whether more or less, is often a fallacious criterion of the measure of pain actually endured, and that the operation of pain upon the system varies both with the character of the pain, and the state of the system. In all cases pain has its seat in the brain, being only a mode of sensation. It is evidently subject to varieties both in kind and degree by the texture injured, by the nature of the injury or exciting cause, and by the state of the circulation. Every texture has its characteristic sensation under irritation. The different forms of injury and of inflammation have also theirs. There is a pain of the nerves, and of the muscles, and of serous membranes —a pain of laceration, of division, and of distention —a pain of suppuration, of ulceration, and of scirrhus—and the figurative terms, burning, pricking, shooting or lancinating, throbbing, gnawing, twinging, aching, and many others, are in constant use to express these varieties. We should, à priori, conclude that the pain excited by the mechanical operations of cutting, burning, and bruising of sound parts is essentially different from that produced by any action of inflammation; and that the nervous system excited by fever, or enfeebled by sickness of any kind, would receive impressions of pain widely different from those transmitted to it when overtaken by injury in a robust and healthy state. It is probable that in these contrasted states of the system very opposite effects are produced by pain; as for example, in one case stupor, and in another deli-

rium; and this is rendered more probable by the fact that anodyne medicines are more than any variable and uncertain in their effects, and that pain in different individuals, or at different times in the same, is relieved by remedies possessing qualities diametrically opposite. Such is the effect of the transient bodily pain experienced in the extraction of a tooth, or the extirpation of a wart or corn, as in some persons to produce syncope, retching, or convulsions. The influence of pain on the stomach to excite nausea and vomiting, and on the kidneys to suspend the secretion of urine, is well known. Surgeons have frequent opportunities of witnessing the first of these effects succeeding to injuries and operations. The following, for the authenticity of which I can vouch, is an example of the second.

Case. A young fellow of unbroken and vigorous constitution was thrown into a dungeon at Hayti. Thumb-screws were put upon him, and a jug of water placed by his side, to which however he could not apply his mouth, owing to the confinement and acute pain in his hands. The gaoler, who came to him occasionally, lifted the pitcher to his mouth, at which times he drank freely; in the intervals his mouth was parched; he was restless but dozed a little. In this state he remained upwards of forty-eight hours, during which period he never felt the least inclination to void either urine or stool. Some hours after the screws had been removed he passed a moderate quantity of very high-colored urine, after which the secretion gradually returned to its ordinary state, and he suffered no subsequent inconvenience.

In most instances of death from violent disorganization of texture, little if any pain is apparently en-

dured. The shock suspends the sensibility of the system without deranging the mental faculties, although their vigor may be considerably abated. But where the symptom of excruciating and enduring pain is present, unaccompanied by the shock of violent injury, it excites and absorbs the faculties of the mind; renders the sufferer wholly indifferent to external objects, and insusceptible of domestic sympathy and the tender emotions; makes death an object not of terror, but of earnest and unceasing solicitude; and terminates life by exhaustion in a very few hours.

Pain in excess, as I have already observed, exhausts the principle of life, so that either its continuance without intermission, or the super-addition of the slightest shock subsequent to its endurance for a certain period, is fatal.*

In operations protracted by unforeseen difficulties, as in cases of lithotomy in which the stone is of such magnitude as to require crushing, the patient has begun to die upon the table. The same happens in parturition protracted by mechanical impediments, as in the case of a hydrocephalic fœtus, where the nature of the impediment has been unknown and therefore unrelieved.

Pain, even of the most harassing kind, when periodical, or relieved by intervals of ease, as in tic douloureux, can be endured for a long time; but this gradually undermines and wears out the preserving principle, as was proved in the melancholy instance of a late eminent physician, whose remarkably athletic and robust frame became emaciated to a sha-

* See Page 25.

dow by mere coporeal suffering. "Pain," he was wont to say, "is the greatest sedative in nature."

The first effect of intense and unremitting pain is precipitation of the action of the vascular system, with corresponding sensorial excitement; but neither of these signs are of long duration. The pulse, which has at first a strong bound or jerk, soon becomes small, tremulous, and irregular, or fluttering; the countenance, the features of which in the first instance are braced and compressed by a strong convulsive expression, quickly becomes relaxed, hollow, and ghastly. The extreme preternatural mobility of the muscular system, indicative of great restlessness, disappears, and a state of stupefaction and indifference to surrounding objects announces the state of exhaustion. If pain be the result of inflammation, its gradual increase prolongs the stage of excitement. If on the other hand its accession in an extreme degree is instantaneous, as from breach of texture or the operation of any destructive agent upon the system, the stage of excitement is comparatively short-lived. And when the description and extent of mischief inflicted are such and so aggravated as to produce a sensorial paralysis, evinced by partial stupefaction without absolute loss of consciousness, it so far neutralises or renders void the effect of painful impressions, as to admit of a direct prostration of the system without reaction. A large loss of blood at the moment of injury tends invariably to this result; that is, it cuts off the stage of excitement.

AFFECTIONS OF THE MIND CO-OPERATING WITH BODILY DISEASE.

In the first chapter of this Essay I have mentioned cases illustrating the effect of mental despondency, to which I refer the reader.

That of Mrs. S., related at page 22, rests upon the authority of Mr. Cline, our late highly esteemed preceptor in anatomy and surgery at St. Thomas's Hospital, to whom so many well reputed surgeons of the present day feel and acknowledge their obligations.

Case. About four years ago I witnessed the fatal issue of a similar operation on the third day from its performance. Great apprehensions had prepossessed the mind of the patient, an elderly and somewhat corpulent lady, and it was only by urgent and repeated solicitation that her consent to the operation was obtained; but neither in the previous state of health, the stage and extent of the disease, nor the circumstances of the operation, had there existed any reason for apprehension in the minds of her attendants. Her symptoms were, continued and unvaried prostration of strength and spirits, with a quick and very indistinct pulse, restlessness, and an extreme irritability of the stomach, which rejected both aliment and medicine. Low delirium and stupor supervened some hours prior to her dissolution. The lips of the wound were found slightly adhering, but on separating them its cavity appeared filled with sanies. Permission for the inspection of the body was refused, but no symptom indicating visceral disease was present.

Mental disposition. Instances are not wanting of the fatal influence of the exciting as well as of the depressing passions on the nervous system, as joy, terror, anger, &c.; fortunately they are of rare occurrence. Every medical man of observation admits and appreciates the influence of the mind in disease, and is aware how much his prognosis is liable to be influenced by this consideration. The variety evinced in the dispositions of different individuals in similar circumstances is remarkable. Some patients are mindful of the smallest attention, and grateful for it; obedient, hopeful; always looking forward to recovery, long and cheerless as is the journey; ever lightening the burthen to themselves and those about them, by a blessed spirit of contentment. Others, on the contrary, lie ruminating on the mischance; sullenly calculating the cost, if all proceed well; cast down by every adverse circumstance, and always anticipating worse; ever slow to acknowledge improvement, and selfishly regardless alike of the feelings they excite and the attention they receive. These though not imaginary, I grant, are extreme cases; there are however many intermediate shades. Such differences as these are not wholly to be attributed to moral causes, neither are their effects limited to the moral constitution; they have, on the contrary, a marked influence on the functions of life and the powers of recovery.

Previous insanity. I subjoin two interesting cases, one exemplifying the effect of an apparently slight injury, the other of an operation for lithotomy, occurring in the persons of individuals, who at a former period of their lives had been afflicted with insanity. Although no circumstance of the accident or operation was

calculated to create alarm for the safety of either patient, both died within a few hours; and as it would appear, from the predisposition of the nervous system to maniacal excitement, although they were somewhat differently affected.

Case. A man aged about thirty, in a fray jumped hastily from a window, about eight feet from the ground, and lighting upon his heels sprained both ancles severely. The accident happened at a late hour of the night. Next morning he was brought to the hospital, suffering pain from swelling and immobility of the ancle joints. His bowels were freely opened, and the evaporating lotion was applied. Next day the tension and pain of the ancles were diminished. He made no complaint. In the middle of the ensuing night he was seized with vehement delirium, attended with hard and quick pulse. The greater part of the following day, having been freely blooded and purged, he was tranquil; in the evening his pulse rose to a hundred and forty, and the fierce delirium returned. Twenty ounces of blood were now drawn from the temporal artery, and a large blister applied to the nape of the neck; mercurial and saline purgatives were given at short intervals alternately. His delirium continued though abated in violence, and on the following evening he died, having survived the accident seventy-two hours. This man had been altogether free from symptoms of cerebral concussion or compression. His ancles were the only parts injured, and these had sustained no greater injury than a severe sprain. It was ascertained upon enquiry that he had been the subject of temporary fits of mental derangement, and had been more than once confined in a lunatic asylum.

Examination. A slight serous effusion was observed between the dura mater and tunica arachnoides, but no other morbid appearance in either of the visceral cavities, except the chronic change so often seen in the liver of a spirit drinker.

The case which follows was obligingly communicated to me by my friend Mr. Soden, surgeon to several charitable institutions, and in extensive practice at Bath.

Case. "A young man nineteen years of age, who had formerly been maniacal and confined in a lunatic asylum, was admitted into our infirmary with stone in the bladder. I operated upon him. The calculus was large, weighing eight ounces, and consequently required a free incision, but the extraction was effected with much less difficulty or violence than the magnitude of the stone led me to expect. Shortly after the patient was in bed he became very animated, and said he should soon be well now that the stone was removed. The animation increased, so that in two hours after the operation he could with difficulty be prevented from getting up. In five or six hours he was in such a state of mania that it was necessary to use the strait waistcoat. The maniacal symptoms continued till death took place, about forty-five hours after the performance of the operation. On opening the body I found the bladder thickened, but all the parts connected with the operation free from inflammation and in a favorable state. The brain could not be examined. In this case it is probable that the man's apprehension about the operation, the operation itself, and his joy at its conclusion, acted upon an organ which was predisposed to disease, and were the exciting causes of the fatal paroxysm."

SECTION II.

INJURIES AND OPERATIONS.

I SHALL first present my reader with some cases of severe burn, to exemplify the symptoms of direct irritation in their most aggravated forms.

BURNS.

Case. The muslin dress of a middle-aged lady, the mother of six children, became ignited as she lay upon a sofa beside the fire; and when the servants, upon hearing her shrieks, entered the apartment, her person was literally enveloped in flames. Upon stripping her, almost the entire surface of the trunk of the body was denuded of cuticle. Her cries were piteous, and she complained especially of her inside (the abdomen,) and shivered, as if from a sense of cold. From the moment of the injury, her pulse was so much contracted as to be scarcely perceptible, and very soon ceased altogether. A full dose of tincture of opium, and afterwards warm cordial drinks were given, without any obvious effect. Her mind, though distracted, was under command, till within a short period of her dissolution, which was preceded by a state of stupor, and took place twelve hours from the injury.

Case. A girl, seven years old, was severely burned by her clothes taking fire. The parts injured were the throat, neck, and chest, to the navel; and both arms, even to the fingers. An hour after the accident the pulse was not to be felt at the wrist, but the extremities were not cold. Turpentine was applied to the surface, and a dose of laudanum administered. The child cried much during the first hour, after

which she became quiet, but remained sensible to questions. Three hours afterwards she was comatose, and could not be roused. The extremities were affected with convulsive spasms. In this state she died, eight hours after the injury.

Examination. Considerable congestion in the vessels of the pia mater and the plexus choroides. The fluid of the ventricles natural, and in healthy quantity. The cortical part of the brain darker than usual, from the loaded state of its vessels. Sections of the medullary part presented innumerable red specks. No morbid appearance in the chest or abdomen.

Case. A female child of three years old was severely burned on the neck, face, and both upper extremities, by her clothes catching fire, at eleven o'clock in the forenoon. The cuticle was in some parts entirely destroyed, in others only detached. Cloths dipped in warm spirit of turpentine were applied, and a full dose, for an infant, of laudanum administered. At three o'clock, p. m., the neck and throat were so much swollen that the child laboured under great difficulty of breathing. At five o'clock, she appeared insensible. Attempts were repeatedly made to rouse her, but in vain. The power of deglutition was lost, the eye fixed and glassy, the pulse imperceptible, and the lower extremities cold. The respiration became more laborious till eleven o'clock at night, when the child expired, twelve hours after the injury.

Examination. The vessels of the brain and its coverings were greatly distended, and the fluid of the ventricles was more abundant than usual. No morbid appearance in the chest or abdomen.

Cases. Two female children, the eldest nine years of age, were received into St. Thomas's Hospital in the beginning of October, 1822, being extensively burned in the abdomen, arms, and thighs; their body linen having caught fire. The cases were remarkably alike in all respects. The cuticle was for the most part removed by abrasion; the pulse in both was exceedingly contracted, the surface pale, and the lower extremities cold. They made little complaint of pain, except occasionally of the abdomen, and soon became torpid, and disposed to sleep, though sensible when roused; convulsive twitchings of the limbs were frequent. Notwithstanding the exhibition of wine and sago, ammonia and camphor, &c., there was no sign of re-action in the system, nor in either case any pulse to be perceived for several hours before death. Neither of them survived the injury twenty-four hours. The parents of these children would not permit the inspection of their bodies.

About the same time, I was present at the examination of the body of a child who had died under similar circumstances in Guy's Hospital, when, in addition to the general congestion of the blood-vessels of the brain, the pia matral covering of the medulla spinalis exhibited throughout its course a remarkable turgescence of its vessels.

Case. A stout woman, aged 27, was brought into St. Thomas's Hospital about two, p. m., on Sunday the 19th January, 1823. As she was sitting by the fire-side, a spark flew out and set light to her clothes. She immediately alarmed the persons who were in the house with her, and the flame was soon extinguished; but her face, neck, arm, and the upper part

of the chest were very severely burned. When admitted she complained of no pain, answered questions that were put to her, but could not give any clear account how the accident happened. She had a slight shivering, her pulse was imperceptible, and her extremities cold. Rags dipped in warm spirits of turpentine were applied to the excoriated parts; thirty minims of tincture of opium were given to her, and she was ordered to take half an ounce of brandy in a cup of warm gruel every two hours. In the evening she somewhat revived, answered questions correctly, and the extremities were becoming warmer. Still no pulse could be felt. She became restless in the night, and took a draught containing twenty minims of tincture of opium.

Jan. 20th. She vomited twice during the night, after having taken the brandy and gruel. She was now lying in a state of stupor, could not be urged to speak or answer any question, and was totally unconscious of a severe pinch of the sound skin of the leg between the fingers. She remained in the same state of stupor, with stertorous breathing, till about one o'clock on the Tuesday morning, when she expired.

Case. A lad carrying a pail of hot soup upon his head, fell and scalded the right arm, face, neck, and side of the chest, as low as the margin of the ribs. The accident happened at about ten o'clock, a. m. The cuticle was destroyed, but the cutis appeared sound. The lime water and milk liniment was applied, and a drachm of laudanum given to him. In an hour afterwards his pulse was 104, and sharp. He complained of excessive thirst, and was constantly shivering, as from cold. Half past one, p. m.: shivering continues. Pulse 112, smaller and feeble,

Ordered some warm drink, and the oil of turpentine to be substituted for the lime water liniment. Ten, p. m.: makes no complaint, but is restless and thirsty, and although not actually in a state of delirium, approaches near to it; upon being asked questions, makes no reply. The shivering has nearly subsided, and the surface is recovering warmth. Pulse 136, thrilling feebly. Ordered an ounce of castor oil, and immediately after its operation, to take sixty drops of laudanum. The surface is kept moist with turpentine. Second day, ten, a. m.: was restless and delirious the greater part of the night, but has been for some hours in a dosing, half comatose state, from which it is difficult to rouse him. The oil had operated as desired. He appears inattentive to questions, expresses no pain, breathing rather hurried, temperature natural, pulse small and feeble, so as to be scarcely perceptible at the wrist,—rather creeping under the finger than distinctly pulsating—about 150 in the minute. The cutis has lost its florid colour, and seems hard and insensible, with little surrounding inflammation. At ten, p. m., he expired, having remained much in the same state as last reported, and survived the injury about forty-eight hours.

To these disastrous cases, which unhappily form but a part of my collection, I subjoin two which occurred in February of last year, within two days of each other. I give them in the words of my hospital register, with the treatment adopted, which it will be seen was successful in the latter, the symptoms of which were as imminent as several of those that I have here recorded, and of others that I have watched to a fatal termination.

Case. Anne's ward, No. 20.—Feb. 20, 1823, four o'clock, p. m.—Esther Knowles, aged six years. A severe burn caused by the clothes taking fire, extending over the arms and face, with two small patches upon the chest; the cuticle abraded and detached; pulse small and quick; shivers, but does not feel cold; complains of much pain. Sum. syr. papav. ʒiij statim :—Ol. lini : liq. calcis : M. p. æq. pro linim.

Nine, p. m. She now complains very little, and appears almost in a state of stupor; pulse hardly perceptible; answers when spoken to. The feet were cold about an hour since, but warmth is restored by bottles of hot water.

21, two o'clock, p. m. Still in a state of stupor, but answers rationally to questions. Pupils rather dilated; no pulse at the wrist, but the pulsations counted at the groin, 160 in the minute. The heart is fluttering, and only half acting. She has had two stools since her admission, and has dosed continually. An enema, spir. terebinth. ʒss. in D. avenæ ʒiv. was injected, but almost immediately returned. A teaspoonful of brandy was then given in three of gruel, and a leech applied to the nape of the neck, which removed about an ounce of blood. In ten minutes, another dose of brandy was given; both were rejected by vomiting. When the first dose was given, the pulse was felt at the wrist for a few minutes, and then became imperceptible. After the bleeding, and the second dose, it again became evident, and remained pretty full and distinct, although very rapid. The child however was very little roused. Ordered to give the brandy every hour.

Nine, p. m. The pulse evident at the wrist. None of the brandy has been retained upon the stomach.

Half a pint of oxygen was now inhaled, and appeared to rouse her considerably; the pulse became rather more distinct. Ordered to continue the brandy.

22, nine o'clock, a. m. Has been rather more lively during the night, and has several times spoken without being first addressed. Pulse just perceptible at the wrist, and very rapid. There is occasional subsultus, and grinding of the teeth. The brandy has been given three times since last night, but has never been retained.

Two o'clock, p. m. Appears rather more lively; the eyes being open. Pulse just perceptible at the wrist. Breathing become laborious, with frequent sighing. Respirations forty-seven in the minute. Constant vomiting. Subsultus tendinum, with grinding of the teeth. A blister to be applied to the scrobiculus cordis, and an injection, T. opii ♏ xxx in D. avenæ ℥iv. to be administered.

Five, p. m. Has retained several doses of brandy; a tea-spoonful of a mixture of three tea-spoonfuls of gruel and one of brandy having been given every half hour. Breathing less difficult. Extremities warm.

Ten, p. m, Breathings laborious, and thirty-six in the minute. Still retains the brandy. Pulse perceptible at the wrist, and 160. Insensible for the last hour.

23, two o'clock, a. m. Died.

Examination. The vessels of the brain were not particularly turgid, but there was fluid effused between the tunica arachnoides and pia mater, over the hemispheres and at the base. The membrane covering the pineal gland contained half a drachm of water. The plexus choroides was dropsical, but the water

in the ventricles was not in unusual quantity. There was some serous effusion under the mucous coat of the larynx, which was rather more vascular than usual. No other morbid appearance.

Case. Mary's ward, No. 17.—Feb. 22, 1823, eight, a. m.—Ann King, aged eleven years. A severe burn from the clothes catching fire. It extends over the arms, the lower part of the abdomen, pubes, and thighs, and the neck, under the jaw on the left side. The cuticle is destroyed on these parts, and the cutis is very red and inflamed. She was burnt two years ago in the neck and arm by a similar accident. The pulse is quick, and pretty full; much pain and tremor. To apply spir. terebinth. to the parts, and to take T. opii gtt. xv.

Three, p. m. Pulse 125. Does not complain of much pain. Sum. Ol. ricini ʒss. statim.

Five, p. m. Attacked with convulsions. Lower extremities very cold. To apply bottles of warm water to the feet, and to take a tea-spoonful of brandy in three of gruel. In half an hour the convulsions returned, and another dose of brandy was given. To take the brandy every hour.

Seven, p. m. Two doses of castor oil having been given without effect, a common enema was thrown up, which procured a full motion.

Ten, p. m. She is now in a state of stupor, occasionally convulsed. Pulse weak and frequent. Breathing not much affected. Pupils rather dilated. To continue the brandy every two hours.

23, ten o'clock, a. m. Not so much stupified as she was; complains of much nausea, though she takes nourishment readily. Pulse hardly perceptible.

Two, p. m. Stupor. Pulse imperceptible at the wrist.

Six, p. m. Pulse at the wrist felt occasionally, but as slender as a thread; feet cold; breathing natural; sensible, but unwilling to answer questions; dosing constantly. To continue the brandy, and apply bottles of hot water to the feet.

Half past eight, p. m. Pulse returned, quick, and pretty full. Tongue dry and white, with a red streak in the middle. She is more lively now, and the extremities are warmer. To continue the brandy.

24, nine o'clock, a. m. Symptoms much relieved; no stupor; pulse 130 and fuller; extremities warm; face flushed, and a general glow over the body. Has had two stools during the night, and is now more sensible to pain. Tongue white and moist.

Two, p. m. Much the same. Pulse 128. Complains of pain in the belly. The turpentine having excoriated the sound parts adjacent, ordered to apply simple dressing. Brandy discontinued. Haust. salin. 4tis. horis. sum.

Ten, p. m. Has had two stools since two o'clock. Pulse 130. Body warm.

25, two o'clock, p. m. Pulse 110; not much flushed, and much better; has had several stools; tongue white and moist.

Nine o'clock, p. m. Much the same.

26. Bowels regular; no fever; some appetite.

27, one o'clock, p. m. Pulse very rapid, 140, and small; feet cold; some difficulty of breathing.

Five, p. m. Pulse 130, and full. The feet have been warmed by bottles of hot water. Face flushed, and hot; breathing regular; tongue white; bowels

insufficiently open. Ordered, Pulv. Scammon. c. Cal. gr. xij. statim. Milk diet.

28. Much better; pulse regular; no fever.

March 4. Sores all improving; health good.

10. A disposition in the elbow-joints to contract, which was prevented by the application of splints. Sores are healing kindly. She was soon afterwards discharged well.

Remarks. It may be inferred from these histories, of which scarcely a day passes in the winter season, without presenting parallel instances, as the newspapers of this metropolis abundantly testify, that the first three days include a period of imminent danger in these casualties. When this period is passed, reaction may be considered as established, and, speaking generally, the injury has nothing more in its character peculiar. Infants are sometimes suddenly attacked, and carried off by convulsions, as late as the fifth day after re-action is fully established; but this is rare. If, on the contrary, very aged, or from any cause infirm, the patient may fall a victim to the process of sphacelus, a week or ten days subsequent to the injury, of which I have lately seen an instance, in the person of an old lady who set fire to her neckerchief with the candle she carried in her hand; or, after the separation of considerable portions of disorganized cutis, the patient may sink exhausted by the drain of a very extensive suppurating surface; or, from the same cause, become the subject of a confirmed hectic, terminating in pulmonary consumption, of which I have also seen an example. This was in a distiller's servant, who had by accident immersed his legs in a boiling liquid, and in whom the cutis separated completely, from the knees down-

ward. In a case of scald, in which the superficial extent of the injury was almost equal to that of the body, and the cuticle, though raised into vesicles, was very partially removed, I have seen a sudden gangrene take possession of the injured surface on the sixth day, and carry off the patient, an adult, who had escaped the severer symptoms of direct irritation.

I could, of course, adduce many cases, in themselves sufficiently interesting, of the successful treatment of severe burns and scalds; in which, by favor of youth and constitutional power, and assiduous attention, critical dangers were surmounted. But this would not aid my purpose, because they did not present the symptoms above described of primary irritation, amounting to a suspension of re-action. This is the broad line of distinction between the cases of death and recovery; and not so much the severity in which these symptoms exist, as their existence or otherwise.

Constitution? What then is the cause of this distinction? Is it constitution? I answer generally, no; because in this first conflict, the apparently robust do not fare better in my experience than the feeble. But the opportunity of knowing the stamina of individuals thus brought under our notice, is very rare, and it is a point quite impossible to be ascertained in such circumstances. It is important chiefly as regards predisposition, for the state of shock once established, whatever be the species of injury which has occasioned it, reduces all constitutions to a level.

Age? Is it the period of life? I think it probable that the greater physical irritability, and the feebler powers of resistance in infancy and childhood, may

be accompanied by a greater susceptibility to shock, and thus tend to swell the fatal catalogue, which, it should however be recollected, includes a larger proportion of young subjects from their greater liability to such injuries. The unfavorable influence of mind in adults, opposed to this, is scarcely worth appreciating, for in no form of severe shock is the mind capable of sufficient collectedness and abstraction to be alive to its natural impulses.

Circumstances? Is it the extent or other local circumstances of the injury? These points, like strength of constitution, have more weight in regard to the after-stages than the first. Where the cutis is charred and killed, the constitutional sympathy is less than where the cuticle, ravelled up into rolls like wetted paper, leaves the living cutis bare; and, for a similar reason, vesications however large or numerous, excite less irritation than the state last mentioned. The unqualified statement that constitutional irritation is in proportion to the extent of surface destroyed, or the depth to which the destroying agent has penetrated, would be incorrect; such a statement would apply generally, if not universally, after the lapse of three or four days from the injury, or, in other words, to the after-stages of the process; but it is unquestionable that the situation of the injury is, as regards the first days, of greater importance,—burns upon the neck, chest, and abdomen, exclusively, proving oftener fatal by direct irritation. For this reason it is that the most destructive form of injury by fire is that in which the body-clothes are burned. Indeed burns of the extremities, exclusively, are dangerous chiefly from the extent of reparation required, overwhelming the powers of the constitution.

Texture? Is it on account of the texture, the seat of one of the most important functions of the animal body and the sudden arrest of this function? if in part only by disorganization, of the remainder, it may be presumed, by continuous sympathy. If we consider the texture injured, as the organ of exhalation, vicarious with the pulmonary and alimentary excretories, or as an expansion of the sentient extremities of nerves, the destruction of which must propagate an instant shock to their source and centre, the brain —does this view offer any better solution of the phenomena? The ordinary relief of the circulation, if the skin be obstructed or destroyed, may be reciprocally afforded by the lungs and kidneys, as we see in aggravated cases of altered cutaneous texture affecting the entire surface; and though the time occupied by morbid changes makes the analogy less pertinent, (as we see persons living upon a very reduced portion of lung, or even brain if *gradually* reduced,) yet we know that the organic function of the skin is more important to health than to life; and that the lungs afford a substitute sufficient to meet the exigency, at least for a season. But the brain can offer no substitute for the sentient apparatus of the skin. The principal seat of tangible impressions is the surface of the body, and the involuntary sympathies connected with it by the medium of the brain, necessary to the due execution of the vital functions, regulating circulation, respiration, temperature, secretion, are so numerous, that the simple arrest of these sympathies would be sufficient to throw the system into a state of universal tumult. But, perhaps, the instant conversion of natural into morbid sensations, or irritants, may best explain the fatal shock which such accidents communicate to the brain, the organ to

which all sensitive impressions are first transmitted, whether healthy or morbid, and from which they are reflected upon the subservient organs of the system.

But however these suggestions may contribute to explain the origin of these fearful symptoms, they leave us at a loss to understand why, in some instances, they appear, and not in others; and the question recurs, why they are occasionally fatal in less adverse, and absent in more threatening circumstances. It is probable that the true answer to this inquiry, and which, more or less, suggests itself to the mind of the observer in every species of injury, consists in this, that all the circumstances above adverted to are capable of an injurious operation, either in the way of predisposition or aggravation, and that it is chiefly to their combined agency, that the unfavorable complexion of the case is attributable, and vice versa. Thus age, sex, constitution, the mode, extent, and situation of the injury, and the texture, may severally participate, though in unequal degrees, in determining the immediate result. To speak candidly, treatment, both in a positive and negative sense, may, we know not how often, have a share. In some instances, pain may be added to the list of aggravants, but this is not a description of injury in which pain extinguishes life. On the contrary, I should say that in burns it is a good symptom; the complaint of pain in the fatal cases is remarkably disproportionate to the mischief, or, at least, it disappears early; and it is a favorable sign, where the continuance of it seems to demand the use of opiates. The early subsidence of complaint, unwillingness to be disturbed, apathy approaching to stupor, as if the scale of sensibility had shrunk below the point of

pain, is invariably a fatal symptom. Continued shivering is an ill omen. The failure of the pulse and consequent coldness of the extremities, with a livid hue of the transparent skin of the cheeks and lips from congestion in the capillaries, drowsiness, with occasional muscular catchings, are sure prognostics of death. The disposition to coma is characteristic, and invariably occurs in a marked degree, even if no opium be given. The respiration is light, scarcely audible until, the pulmonary circulation failing from the diminished power of the heart, congestion takes place in the capillaries of the lungs; but this does not happen until long after the same state has pervaded the system. Finally, laborious breathing and stertor ensue, and the patient expires in an apoplectic coma, with or without convulsions.

It is remarkable to how late a period the faculties of the mind are preserved, although somewhat benumbed, so that to rouse them a strong external impression is often required. A patient in a case of fatal burn, after the first expressions of anguish have subsided, nearly resembles a person stunned by a fall, or as much as possible stupified with liquor, without suffering an actual suspension of his senses. Inspection demonstrates fullness of the veins of the brain and its membranes, and effusion beneath the arachnoid membrane, confirming the symptoms which occur in the latter stage. But these appearances are too slight, and too frequently seen in the bodies of persons who die rapidly, to be much dwelt upon. The proximate cause of death appears to me to be a species of concussion, functional, not organic, by which the brain is deprived of its influence over the organ of circulation; for the symptoms of cerebral disorder are first manifested; secondly, a diminution

of the power of the heart; thirdly, the respiratory function becomes impeded, as a necessary consequence of the two first.

An inflammatory blush and œdematous tumefaction of the fauces and pharynx have sometimes been observed in inspections of these cases after death, but I do not know that they have been noticed in any case in which the throat and neck have been uninjured. I shall reserve the observations I have to make on the treatment of these cases, until their pathology has been further illustrated by analogy. I shall now offer other miscellaneous examples of complicated injuries of parts not essential to life, in which the extreme state of direct irritation ensued, which was in some destitute of re-action, in others accompanied by excitement, and in all, within a very short period, fatal.

FRACTURES, CONTUSIONS, LACERATIONS, ETC.

Case. About six o'clock in the evening of the 2nd of July, 1819, I was called to a fine lad of thirteen years of age, who had received the charge of a musket, consisting of slugs, in his thigh, from the accidental firing of the piece as he was standing within six feet from the muzzle. The charge entered about two inches from the trochanter major, and passed obliquely across the limb. The external wounds were small. The comminution of the bone was plainly to be perceived. There had been no external hemorrhage, but the pulse could not be felt at the wrist. His countenance was pallid; the surface cold; and the pupils as fully dilated as if under the influence of belladonna. He was perfectly rational when roused, but strongly disposed to stupor; made

no complaint of pain, but was troubled with insatiable thirst. Hot cloths were applied to the pit of the stomach and extremities, and warm cordial drinks freely given. He died, without any material alteration, except an increase of stupor, at the expiration of nine hours from the injury.

Examination. The hip-joint was uninjured; the trochanter and upper part of the body of the femur were shattered to fragments; the surrounding muscles extensively lacerated; and the artery torn across. The effusion of blood was inconsiderable, the torn ends of the vessel having contracted, and receded to a distance of nearly two inches. The contents of the head, chest, and abdomen were perfectly natural, and free from any morbid appearance.

Case. A waggoner, aged about fifty, fell under the wheel of his waggon, which passed obliquely across the left leg and right thigh. This happened at a village near London, at four p. m. It was ascertained upon his admission into the hospital, that both the bones of the left leg were fractured, a little above the ancle joint, and the femur of the opposite side broken transversely, a little below the trochanter. His pulse was scarcely perceptible at the wrist, and soon failed altogether; his extremities were cold; and though sensible when questioned, he lay in a state of stupor, and died within eight hours from the accident. Camphor mixture, with æther and ammonia, was repeatedly given without any obvious effect.

Examination. A considerable quantity of blood partially coagulated was found lying around, and detaching the muscles from the bone. The fracture extended through the cervix femoris, and obliquely

across the root of the trochanter, so as to detach this process, and was attended with much comminution. The coats of the femoral artery presented a number of ossific patches, and a small lacerated wound was found in it, a little below the groin, from which the effused blood had escaped.

My friend and colleague, Mr. Green, has obliged me with the following particulars of a case which created much interest at the time.

Case. "A man fell from the roof of a coach, and in the fall suffered a compound fracture of the leg. He was replaced on the coach, and brought to London, a distance of forty miles. On his arrival at the Hospital, he appeared as if intoxicated, but recovered from this state in the course of a few hours. On the third day, without any considerable previous inflammation, the leg began to assume a gangrenous appearance. On the fourth day he became insensible; his breathing stertorous, and the pupils of his eyes dilated. The symptoms so much resembled apoplexy, that it was supposed some effusion of blood had actually taken place in the brain. The same night, he died, and on examination no morbid appearance whatever was found in the brain or other viscera."

For the following valuable communication, I am indebted to my friend Mr. Soden, surgeon to the General Infirmary at Bath.

Case. "A girl, eighteen years of age, fractured her leg in jumping off a low wall, about one o'clock in the day. The fracture, which was a simple one, and rather below the middle of the tibia, was reduced by Mr. Hill about an hour after the accident. Cold lotion was used, and in the evening, the patient was conveyed home, a distance of three miles, in a boat. When her surgeon visited her at night, he found the

limb in a very comfortable state; the patient made no complaint, and her pulse was only seventy-two. At midnight she appeared very restless, tossed her head and arms about, and made no reply to what was said to her. Her face was flushed, skin hot, and breathing laborious. In the morning I saw her, with Mr. Hill and Mr. George Goldstone, who had also been consulted. I found her in a state of coma, with a quick and feeble pulse, stertorous respiration, face slightly flushed, pupils contracted, and skin cold, particularly the lower extremities; but there was no difference in temperature between the sound and the injured limb. The parts about the fracture were slightly swelled and bruised, but presented no appearance which could at all explain the formidable symptoms that had taken place. On examination no injury could be detected about the head. About the middle of the day, the skin became hot, and the circulating system acted with greater vigor; but this state of excitement was of short duration, and at no period could she be roused so as to manifest any sign of consciousness. In the afternoon she again became cold, and the pulse weak. She expired at eight o'clock, about thirty-one hours after the accident.

Examination. "About three o'clock on the following day the brain was examined by Mr. Hill, in the presence of Mr. George Goldstone and myself. Our friend, Mr. George Young, was also kind enough to accompany me. The cerebrum was very firm; the ventricles were unusually dry, but a small quantity of serum was observed in the basis of the skull. The cerebellum was softer than usual, and the vessels throughout the brain were loaded with blood—no trace whatever of injury was observed about the

scalp, cranium, or brain, but it may be important to state, that the pituitary gland was unusually large and hard, and that the patient had complained, for a fortnight previous to the accident, of severe head-ache, and had talked of being bled for it."

Case. Between twelve and one o'clock on the morning of the 27th December, 1822, a wine-porter, of robust frame, aged 54, was brought into Guy's Hospital, having fallen under a waggon, upon the shaft of which he was riding; and the wheel passing over his left leg, had made an extensive lacerated wound, six inches in length, on the inner side of the calf. The gastrocnemius muscle was exposed and torn, and the integuments so separated from the limb, that the finger could be passed beneath them round the knee-joint. He refused to submit to amputation, which was strongly advised; the wound was in consequence dressed with adhesive plaster and roller, and the limb placed on the outer side semi-flexed on a pillow. In the course of the day, he complained of much pain in the wound, but his countenance, manner, and pulse were natural. In the evening, the pulse became quick, and the patient somewhat restless, complaining of extreme pain in the part; his answers were quick and snappish. On the morning of the second day, it was reported that he had slept a little during the night, and had passed one stool. His countenance was sunken; pulse so thready as to be scarcely perceptible; the muscles of the countenance and upper extremities in a state of tremor, and he was unable to support his hand when raised from the bed. The wound seemed to have undergone no change; a poultice was directed to be applied, wine to be taken at intervals, and a grain of opium every six hours. At three in the afternoon, he was with-

out a pulse at the wrist, except for a few seconds after taking his wine. His respirations were short and quick, forty-eight in the minute. The motions of the heart were thrillings rather than distinct pulsations, the features distorted by frequent playing of the muscles, and the hands in continual involuntary motion. His manner was irritable and inconsistent; for example, taking his night-cap from his head and spitting vehemently into it. He made no complaint of pain in the limb, was rational, though short in his answers, and affected to make light of his case; was strongly disposed to doze, but quickly roused up after each attempt in great agitation. In the evening he fell into a raving delirium, but though his manner was resolute and determined, he was easily controlled, being altogether powerless. This state continued with very little intermission during the night; towards morning he became comatose, and expired at eleven o'clock, a. m., on the 29th, having survived the injury about sixty hours.

Remarks on the foregoing cases. The first two of the cases above related of complicated injury accompanied by an effusion of blood, bear a considerable resemblance to each other. It is probable that the loss of blood, though not in either case sufficient of itself to be a cause of death, may have influenced the period of survival, if not the symptoms consequent upon the injury. But of this I am doubtful, as the intensity of the shock would not be from this cause augmented, and the comatose disposition prevails in all cases in which re-action fails. I have heard Sir Astley Cooper mention a case in all respects analogous to these, which occurred many years ago in Guy's Hospital. The injury was a crush of the knee-joint. The pa-

tient pale, cold, and pulseless, but without loss of consciousness, died comatose, within a few hours of his admission. I have seen several cases of ruptured intestine and urinary bladder, in which the symptoms bore a strong affinity to these, excepting only that pain acted as an excitant, and that the progress of the cases to their termination, was slower, so much so as to admit of an abundant inflammatory secretion. I mean only to observe, that the mortal symptoms of the injury sustained, manifested themselves by similar characters from the commencement. Of the third case, which was admitted under the care of my lamented colleague, Mr. Henry Cline, and of which I regret that so few particulars are preserved, I have to observe that it does not admit of being classed with cases of cerebral concussion, in the common acceptation of the term, that is, in a physical sense. The spontaneous recovery from the state of stupor existing on the man's admission, and the supervention of symptoms resembling those of apoplexy on the fourth day from the injury, seem to prove that he had never recovered the functional shock received at the moment of the injury, a conclusion which is supported by the absence of all morbid appearances on dissection.

The case of simple fracture, transmitted to me by Mr. Soden, a gentleman eminent for information and ability in his profession, is one of extraordinary interest and importance. For a period of several hours the patient's state was natural, and at the time when some febrile action might naturally be expected, symptoms of high nervous excitement presented themselves. This was in a few hours followed by coma and insensibility, and at the expiration of twenty-four hours from the injury, a slight but very tran-

sitory re-action occurred; the relapse was fatal in a few hours. With the exception of vascular turgescence, I am of opinion that neither of the observations made on inspection are entitled to notice as illustrative of the symptoms. Can the previous complaint of severe head-ache be regarded as indicative of a predisposition to shock? The slightness of the injury, in respect of danger, and its frequency without any marked constitutional sympathy, almost compel the belief of some predisposing condition or idiosyncracy.

The last of these cases was of a description the most formidable, viz. extensive laceration and detachment of the integument from the subjacent muscles and fascia. Mr. Key, who was at the time assistant surgeon to Guy's Hospital, and received the accident, was aware of this, and very strenuously urged the removal of the limb. Until the evening of the first day, the man was in all respects as well as could be wished, and even then the only change observable was a little pettishness of manner in answering questions, for which continued and extreme pain throughout the day sufficiently accounted. The morning of the second day discovered a fatal alteration. The powers of life as evinced in the imperfect and irregular actions of the muscles from the heart downwards, were failing rapidly. The excitement produced by wine and opium, with which he was plied freely throughout that day, terminated in a paroxysm of frenzy, and this in exhaustion. From the direct effects of such an injury the soundest constitution has but slender chances of escape. The subject of this accident was a hard drinker, to which his calling invited, a circumstance by which I apprehend his chance was further diminished. I watched

ed him narrowly during the state of agitation described on the afternoon of the second day; every muscle was in motion, not a vigorous spasmodic contraction, but like the tremulous and transient twitching produced by slight and often repeated galvanic shocks. It is to be regretted, chiefly for form's sake, that no opportunity was afforded of examination after death.

OPERATIONS FOR RECENT INJURIES.

I shall now present the reader with one or two histories of operations performed for recent injuries, exhibiting symptoms of extreme direct irritation, nearly allied in character, and as I believe in their origin to the foregoing, with some not unimportant varieties.

Case. Bryan, a stout lad of fifteen, whose employment was to feed a wool-carding machine, had his wrist and hand literally smashed to pieces, by being drawn into a part of the apparatus. There was little or no hemorrhage, and he bore the amputation at the middle of the fore-arm, which was performed immediately on my arrival at St. Thomas's Hospital, at nine in the evening of the 29th June, 1818, almost without complaint.

30th, nine a. m. A quiet night, makes no complaint of pain or spasm of the stump. Pulse rather quick and full. Cap. Ol. Ricin. ℥ ss. statim.

One p. m. Three copious evacuations of a bright green color. Since the last he has complained of nausea, rejected all diluents given to relieve the thirst, which has been distressingly urgent for the last two hours. Pulse very quick, and the beats not quite distinct. The upper part of his body, particu-

larly the breast and forehead, are covered with a copious cold perspiration. Complains only of thirst and sickness.

Five, p. m. The effervescing saline draught given since the last report is not retained. Five drops of tincture of opium to be added to each draught.

Ten, p. m. The vomiting is the same. Every thing is rejected with violent retching. The extremities are cold, partial sweats profuse; the beat of the heart is quick and sharp, but the pulse does not reach the wrist. Respiration much oppressed, with great anxiety of countenance, and distress about the præcordia. Occasionally drops into a doze, and suddenly wakes powerfully agitated.

July 1st, seven, a. m. Has passed the night in the state last described. A pill of five grains of calomel and one of opium has been twice given at an interval of two hours, and instantly thrown up. I directed cupping-glasses to be applied to the scrobiculus cordis, and after drawing a few ounces of blood, a large mustard poultice to be laid upon the same part.

Twelve at noon. No favorable change; extreme anxiety, cold clammy surface. Countenance livid, and extremities purple from venous congestion. Respiration goes on by the intercostals only, and with great labor.

Two, p. m. Alcohol in the form of wine and brandy has been given; of the latter, some was retained, and the vomiting was evidently abated for about an hour and a half after the cupping and application made to the stomach, though without the smallest effect upon the circulation. An enema containing three grains of opium was administered. The anxiety and labor of breathing continued till his death,

which happened at five, p. m., about eight-and-forty hours from the accident; and till within half an hour of dissolution his senses remained perfect.

Examination. The examination was made with great care the following morning. All the organs were remarkably sound and healthy, nor was any morbid appearance discoverable in any part of the body, except a slight erythematous blush upon the villous coat of the stomach—an effect, I considered, of the incessant inverted action of that viscus.

I may observe, by the way, that this is one of four cases of amputation of the hand in healthy lads, two at the wrist-joint and two above it, which I have been called upon to perform for the same accident. The other cases were unattended with any extraordinary symptom and did perfectly well.

My friend Mr. Brodie favored me with the interesting case which follows:

Case. "Richard Dodd, a patrole, 50 years of age, was admitted into St. George's Hospital about one o'clock on the morning of Sunday, the 5th of February, 1815. He had had a pistol in his belt loaded with slugs and nails. While he was sitting down the pistol was by accident discharged, and the contents of it went through the upper part of the thigh. This happened about an hour and a half previous to his being brought into the hospital.

"On examination, I found a very large longitudinal wound on the fore-part of the thigh, extending as high as the crural arch, where the slugs had entered; and an extensive lacerated wound of the skin and muscles on the outer and posterior part of the thigh where the slugs had passed out. The thigh-

bone close to the hip-joint was broken in several pieces. There had been bleeding, but to what extent could not be ascertained. The trunk of the femoral artery had escaped injury, the wound being situated about an inch and a half on the outside of this vessel. On his first admission into the hospital, the man complained but little of pain, but in about half an hour the pain became excruciating. His pulse was regular, full and strong, beating from 84 to 90 in a minute.

"As nothing short of the removal of the limb at the hip-joint seemed to afford any chance of recovery, and as the man consented immediately to the operation, I proceeded to perform it at a quarter before two o'clock. The operation was accomplished without much difficulty, the trunk of the artery having been previously secured underneath the crural arch, to prevent the loss of blood as much as possible; and a large flap of skin and muscles was formed on the inside of the thigh, the soft parts on the outside having been too much injured to be useful for this purpose.

"The patient having been replaced in bed at half past two, a. m., was very faint and the pulse scarcely perceptible. At three, a. m., the faintness less. At four, pulse 144, weak and irregular; a little blood has oozed through the bandages. At six, a. m., pulse nearly the same. He had been sick and vomited; he complained of a little pain in the stump. At seven, a. m., he was nearly in the same state; the sickness and vomiting continued; when he attempted to swallow any thing, it was immediately rejected from the stomach. The oozing of blood had ceased. At eleven, a. m., the nausea and vomiting continued; he had taken cordials, but they were always rejected

from the stomach. He was perfectly sensible; had no disposition to sleep. Pulse 160 in a minute, and stronger. At two, p. m., he was nearly in the same state. I prescribed him an enema, with forty drops of tincture of opium. Previous to the administration of the enema he had an evacuation from the bowels, and after he had the enema he dozed for nearly two hours, but he was not refreshed by it. At four, p. m., his stomach continued to reject whatever was given him to swallow. Pulse 164 and feeble. At eight, p. m., the sickness and disposition to vomit were relieved, so that he was able to take brandy in small quantities. He became very restless and uneasy. At nine, p. m., he was in a state of low delirium; pulse scarcely perceptible. A quarter before ten he was insensible to external objects, breathing with difficulty; pulse not perceptible, but the heart could be felt acting irregularly and feebly. At ten, p. m., he was seized with convulsions and died, having survived the operation about twenty hours."

Remarks. The period of the accession and duration of the disorder constitutes the chief difference between these cases. This difference is, I apprehend, to be attributed to the greater severity of the injury and operation, and the unavoidably larger loss of blood in the latter. No interval transpired before the commencement of the symptoms; the prostration was rapid and uninterrupted, and life could not be maintained beyond twenty hours. In the case of Bryan, on the contrary, the system, which was not absolutely exhausted in less than forty-eight hours, preserved a comparative tranquillity for the first twelve, and the symptoms of irritation then presented themselves, as in the case of the girl, page 82, in lieu of

fever. These were an excessive velocity and feebleness of the pulse, increasing to indistinctness, then a total failure of the pulse, with cold sweats, while the beat of the heart was quick and vibratory; the unceasing struggle of respiration seemed to be an effect of spasm. The predominant symptom in which these cases coincided is characteristic of the most intense degree of shock, viz. the early and unappeasable irritability of the stomach. Does the prolonged or re-iterated aggravation of the injury, by the operation which succeeds it, at an interval of one or more hours, tend to the production of this symptom? In neither of the cases last related did it occur.

I subjoin a case of that less frequent form of direct irritation which I have denominated "prostration with excitement," and which occurred very shortly after that of Bryan, above related. It will I trust be read with interest, and not the less that its termination was fortunate.

Case. Pike, a stout lad of fourteen, on the evening of the 20th of August, 1818, had his leg jammed by a piece of timber falling upon it. The tibia was comminuted rather above its middle. The integuments on the fore and outer part of the leg were separated from the bone and muscles, from a little below the tubercle nearly to the outer malleolus, and the extensor muscles considerably lacerated. He was pale and sleepy from a free hemorrhage. The bleeding had ceased on his admission, but returned in a few minutes, and a tourniquet was applied. He was received into the hospital about eleven o'clock, and at midnight I amputated the leg an inch below the tubercle. The incision through the integuments

was carried obliquely downwards as it extended backwards, so that a semi-oval flap was formed, the verge of which corresponded to the centre of the gastrocnemius muscle. The superior part of the wound was unavoidably included in the formation of the stump, but as there was not much contusion, this was not considered of importance. It was united by suture, and the flap being brought up from below, the edges were approximated, a roller having been previously applied so as to bring the integuments as much as possible forwards from the thigh. One ligature only was employed. During the operation he was very faint; the pulse extremely quick, and sometimes almost imperceptible. A small quantity of wine, and twenty drops of laudanum were given, but rejected before he was carried to bed.

21st, five, a. m. Has been restless, and slightly delirious; frequent muscular catchings. Seven, a. m. Has vomited again, but has since taken a cup of gruel, which he retains; is disturbed by the convulsive action of the muscles. Ordered to take twenty-five minims of tincture of opium. In ten minutes he fell into a tranquil sleep; the pulse sunk to 94, and increased proportionably in fulness. Two, p. m. Disposition to coma; rather incoherent, but can give a rational answer when roused; pulse 120, and full; tongue white; no evacuation from the bowels since last night. Ordered to take an ounce of castor oil. A cloth dipped in cold water to be kept constantly upon the stump, which oozes a good deal. Five, p. m. The lips parched; skin hot and dry; pulse increasing in fulness and frequency; no motion from the oil. Six, p. m. Since last report has had a convulsive attack, which, from the description given of it, was epileptic. The pulse is now very rapid, the

eyes are fixed, and the body covered by a profuse perspiration. Breathing quick and laborious. Habeat enema domest. statim. Nine, p. m. Still no alvine evacuation, but the more violent symptoms have subsided. He is now comatose, does not answer questions, and seems impatient of being disturbed. Pulse 100, and soft; skin moist: rep. ol. ricin. Eleven, p. m. Bowels not relieved; constitutional disorder increasing. After sleeping ten or fifteen minutes he suddenly starts up, bawls vehemently, and then falls back upon his pillow. Six ounces of house physic were administered in the form of an enema.

22d, nine, a. m. Continued very restless until six o'clock, when his bowels were relieved, and he became composed. Ordered, Castor: gr. x. Opii gr. $\frac{1}{4}$ M. f. bolus. 4^{tis} horis sum. Two, p. m. Has been tolerably quiet since taking the medicine, but when awake is some time before he can give a rational answer. Three copious pale evacuations. Ten, p. m. Evidently better, sleeps soundly for half an hour together, and answers readily. Pulse 110, and soft; skin hot and dry; face flushed, tongue white, but not thickly coated; but little muscular catching.

23d, eight, a. m. Has passed comparatively a good night, is perfectly sensible, makes no complaint; pulse 100; tongue less coated; no evacuation since yesterday afternoon; subsultus has entirely ceased. Two, p. m. The enema domest. was again administered, which in the course of the afternoon produced two copious evacuations. He has at intervals slept soundly during the day. Pulse 100, full and soft; skin still hot and dry; tongue much cleaner; no anxiety of countenance.

24th, eight, a. m. Has slept soundly from three o'clock. Tongue perfectly clean; skin and pulse as

before. Ten, p. m. Has had a natural motion, and passed the day comfortably.

25th, seven, a. m. Complains of a beating sensation at the extremity of the stump. Catap. lini. Two, p. m. Dressings removed. No adhesion about any part of the stump, but suppuration profuse and fœtid; the edges of the wound, particularly toward the inner part, sloughing; the flap supported by adhesive plaster.

26th. Discharge less, and more purulent; bowels regular; countenance tranquil; poultice to the face of the stump.

27th. Suture supporting the flap has given way; surface cleaner, and disposed to granulate.

28th. Ligature separated; sloughs throwing off kindly: discharge purulent, and not in excessive quantity; about one inch of the extremity of the tibia denuded of periosteum; the granulating edges above drawn as much as possible downwards, and the flap still supported by a strap of adhesive plaster.

Sept. 2d. Health improving; appetite good; slough all separated, and the entire surface granulating kindly.

9th. The shell of bone not yet detached; health good; granulations exuberant.

16th. The angles of the flap cicatrized; the sore much contracted, and health continuing good.

Oct. 7th. The flake of bone broken off by forceps, leaving a healthy surface exposed. From this time the wound healed quickly, and he was shortly afterwards discharged in good condition.

OPERATIONS FOR CHRONIC DISEASES.

The next cases in the order of my subject are those of operations for chronic states of disease, proving fatal by direct irritation. I shall confine my illustrations to some remarkable cases of lithotomy in children.

Case. A child, three years old, was the subject of lithotomy at St. Thomas's Hospital, in the summer of 1805. The operation was admirably performed, and did not exceed one minute by the watch. A slight shivering came over the patient on being replaced in bed, and the natural temperature of the surface was not restored. He was inclined to doze, and a little convulsed, and at two o'clock the following morning died. Although this child suffered considerably from the disease, he was otherwise healthy, and his death, which excited much surprise, was attributed to fright.

Case. On the same day, a boy of five years old was cut by the same gentleman, and though some minutes elapsed before the stone was extracted, he recovered without an unfavorable symptom.

Case. In December, 1807, a child, aged three years and a half, underwent the same operation under as favorable circumstances. An hour after being put to bed, he also chilled; a stupor came over him, but without convulsion; and he gradually sunk into a state of deliquium, and died before ten o'clock the same night.

Case. About the same time, a lad of sixteen was cut at St. Thomas's. Every thing went on well in the theatre; the same chilliness and torpor ensued,

he sunk rapidly, and died at nine o'clock the same evening.

In each of these cases, the unfavorable symptoms shewed themselves about an hour after the operation; all of them watered, but not so abundantly as usual.

In neither of the preceding cases was the calculus remarkably large, nor had any unusual hemorrhage or other untoward circumstance occurred during the operation.

So many unfavorable results within a short compass of time, led to minute inquiries, on the part of the surgeons, as to the previous habits and nourishment of these patients; and the conclusions formed from the information thus obtained, led to the mode of treatment so successfully adopted in the case which follows.

Case. A child, six years old, became restless within an hour after the operation, which had been in all respects favorable. Between five and six o'clock, the operation having been done at noon, he was cold, faint, without a pulse at the wrist, and apparently dying. In this state, gin and æther diluted with barley water were got into the stomach, and repeated at intervals, until the pulse acquired a steady beat, and the surface its natural warmth. Its effect was immediate, and as salutary as could be desired. In diminished quantities the cordial was occasionally administered during his convalescence, which was from this time uninterrupted.

It was in fact ascertained that the parents of these children had been in the habit of giving them gin, to allay the severity of the paroxysm in micturition. The same treatment has been since resorted to in cases where similar symptoms have presented them-

selves. A man from the neighbourhood of Maidstone declared that he could not survive the operation, if deprived of his ordinary beverage.

I introduce the following case in the words of my friend Mr. Young, as strikingly illustrative of the same principle.

Case. "A livery-stable keeper in Moor Fields fell with his horse and broke his leg; I saw him soon after the accident; he was cold, pale, with a thready pulse; yet he was calm and self-possessed, and took a part in directing those who removed him to his bed, and who afterwards assisted me in placing his limb properly. On the following morning, I was informed that he had taken little or no notice of any thing; that he had refused whatever was offered to him, and that he had not moved, but lain as if in sleep, as I then saw him; breathing very gently, with a pale, cold surface; a thready and rather quick pulse. I could rouse him by speaking firmly; he answered rationally, put out his tongue, said he had no sort of pain in the limb, which was cool, and not in the least swollen. I urged the necessity of his taking nourishment, and as he preferred porter, I gave him by spoonfuls, a pint, and directed that he should take beer caudle freely. He gradually recovered, but several days passed before he felt quite restored, or complained of pain, or that any swelling was perceivable in the broken leg.

"Precisely the same train of symptoms, ending however in the gradual extinction of life, followed the removal of a large fatty tumor from the fore part of the thigh of a middle-aged woman. The operation was quickly over, and had been borne with exemplary self-possession."

Case. In January, 1808, a young and delicate child was cut for the stone, at Guy's Hospital. The opera-

tion was favorable, but symptoms of irritation, and ultimately, a state of stupor succeeded, and the child died on the morning of the third day, in strong convulsions.

Case. In 1822, a fine boy of eighteen months, from Essex, was the subject of a private operation for lithotomy. The stone, which was oblong, was easily extracted. A somewhat freer hemorrhage than ordinary occurred at the moment of the incision, but it was immediately restrained after the removal of the stone, and was too inconsiderable to create anxiety. The child, though somewhat languid and drowsy during the remainder of the day, wetted freely, and passed the night without complaint; but early on the following morning was attacked with convulsions, and died suddenly. In the afternoon of the same day, the body was minutely and carefully examined; the incision of the prostate was clean and smooth, the bladder healthy, and no morbid appearance whatever presented itself.

Remarks. The preceding cases speak for themselves. The youth of the patients, the debility induced by previous suffering, the influence of terror or of pain, the loss of blood, and in some the privation of an habitual stimulus, when really needed, may have been one or all accessary to these untoward results.

When a degree of vacancy and stupor comes over the child shortly after replacing him in bed, and the countenance and general surface assume the paleness and coldness of death; the pulse, small, rapid, and indistinct, soon ceases, and the patient becomes in a few hours comatose, and in that state expires. This is the extreme state of prostration from shock.

There is no essential difference, or rather there is

a close analogy in the symptoms and general state of these children, and of the subjects of the severest burns and complicated injuries.

It will be observed, that in the two cases last related, the patients died in convulsions. The unavoidable effusion of blood in operations, though insufficient to create alarm for the patient's safety on that score, obviously predisposes to the convulsions which sometimes prove fatal, especially to children. I have known an infant die of convulsions on the day after the removal of a nævus from the scalp, of no extraordinary size and without any after-hemorrhage.

Convulsions. The phenomenon of convulsions is invariably coupled with the state of cerebral irritation. This irritation may have been propagated to the brain from any suffering organ, as from a wounded muscle or nerve; from worms, or sordes in the primæ viæ, suppressed catamenia, or tension of the gums in dentition; or it may arise from the pressure of bony spicula on the brain; læsions, vascular congestion, or effusion in that organ. In either case, convulsions are symptomatic of disturbance, amounting to an interruption or temporary suspension of the cerebral influence, whatever that may be.

We see these spasms arise in apparently opposite states of the system—in the plethoric and the ex-sanguine—in the robust and the debilitated—in congestion and in effusion—in acute inflammation and in destructive ulceration.

Severe local irritation will occasion vascular congestion, and ultimately effusion in the brain, and hence gives rise to convulsions.

Inflammation, being a frequent cause of local irritation, also operates to produce convulsions. When

the irritating cause is in its nature such as to admit of removal, the convulsions cease upon its removal. Thus I have seen them cease after removing a spiculum of bone by the operation of the trephine; also after the discharge of confined matter; by blood-letting in parturient women; by the same and the operation of purgatives in recent acute inflammation, as in hydrocephalus, prior to effusion. The tendency of a local irritant to produce convulsions is augmented by any sudden depression of power, as for example by shock, by hemorrhage. When the system is thus exhausted, convulsions are often abrupt in their appearance, and overwhelming in their effects, as in the cases last related. This occurs most frequently in infants, and is chiefly owing to the powerless and unresisting condition of the body; for the irritation acting singly, i. e. unaccompanied by such depression, gives a more permanent character to the convulsions.

In short, there is an active and a passive form of convulsions, and to the proper treatment of the disease upon which they are symptomatic attendants, the understanding of this distinction is of the last importance. In one case we look for relief to cordials and tonics, in another to venesection and purgatives.

In the commencement of inflammatory diseases, whether affecting the brain or other organs, convulsions, if present, are of the sthenic kind, and subside by the free use of the lancet; but if this treatment be pushed too far, or the inflammation should terminate in effusion or disorganization, the powers of life yield, and they become asthenic or passive, i. e. symptomatic of exhaustion. Such are the convulsions which appear after hemorrhage or any other

rapid depression of the system, and in the last stage of acute diseases. The smallest direct reduction of strength will, in such cases, extinguish life. It can only be maintained by the timely administration of such aliment and medicine as support without exciting, and therefore tranquillize the system.

It is with this form of convulsions that we have to do in most cases of prostration following injuries and operations, but not in all, as is shewn in the case of prostration with excitement, Pike, p. 93. With every sign of high cerebral irritation, this symptom presented itself in an alarming shape, viz. a fit resembling epilepsy. The relief obtained in this case by exciting the action of the bowels was most marked, but there was insufficient vital power to have warranted even the most temperate use of the lancet, and on the other hand, stimulants of any kind were totally inadmissible. When convulsions suddenly extinguish life, or, in the common phrase, a patient expires in convulsions, as in the state of prostration indicated by the previous signs of cerebral torpor (Cases pp. 99, 100), they most probably destroy by arresting the muscle of respiration, and perhaps the heart, and the external affection is consentaneous, or even secondary. In a limited sense, life is always terminated in convulsions.

SECTION III.

INFLAMMATION FOLLOWING INJURIES AND OPERATIONS.

I PROCEED to exemplify the phenomena of direct irritation arising from the inflammation ensuing upon injuries and operations.

Case. Mosely, æt. forty, was admitted into Guy's Hospital on the morning of Jan. 1, 1823, for a superficial collection of matter in the palm, with an excessive inflammatory œdema of the whole hand and fore-arm. He stated that he had bruised the back of his hand with an iron hook, five days before, and had since poulticed the part. The original wound was now nearly healed. The abcess in the palm was freely opened and two ounces of sanious unhealthy matter discharged; it was again poulticed. In the evening three gangrenous vesicles appeared on the back of the hand; the man was in a state of severe irritation, as was indicated by his countenance and manner. His eyes looked glassy, and their pupils contracted; his pulse was very small and quick, and his tongue much furred. During the night all the symptoms of disorder were aggravated; his restlessness became delirium, and on the next day (the seventh from the injury) which closed his existence, the whole arm was found to be in a state of gangrene.

Case. Woodcock, æt. sixty-six, a muscular strong featured woman, washing a gown in pearlash, in November, 1808, pricked the ball of her left thumb with a concealed pin. Next day the finger became much swelled and painful, and on the morning of the third day the swelling affected the whole hand and wrist, while the inflammation was spreading alarmingly upon the fore-arm; the swelling and redness were equally diffused, and not confined to the track of the absorbents. The pain was excruciating, and the constitutional disorder extreme; viz. a quick, small, jerking or vibrating pulse; dry foul tongue; precordial oppression; total failure of appetite; thirst; great restlessness and anxiety. After repeated and copious leech bleedings, continual fomentations, free

purging with calomel, and the exhibition of antimonial opiates, the swelling and redness subsided, and the inflammation was arrested in its course, midway between the shoulder and elbow, on the eighth day from the accident. But the hand now assumed a livid cast; large phlyctenous vesications appeared, both on the palm and dorsum; the pulse was very small and feeble; the tongue covered with a dry and dark crust; she was exceedingly depressed, and refused both wine and nourishment. In the evening and during the following night, she was violently delirious, and with difficulty kept in bed; in the morning she appeared exhausted; stupor succeeded, and she died in that state on the ninth day from the injury, at one p. m., the hand and arm presenting a state of sphacelus.

Case. Laurisson, æt. seventeen, a healthy lad, on the 29th of November, 1819, received a severe wound from a piece of timber, in endeavouring to defend his boat from being run down by a barge. On his admission into Guy's Hospital, it was ascertained that the integuments in front of the knee-joint were lacerated, so as to expose the insertions of the vasti and rectus muscles; there was besides an aperture in the hollow of the ham, into which the little finger might be passed. There was no considerable hemorrhage, nor any escape of synovia, so that the joint was thought to be uninjured. The edges of the wound were approximated with strips of adhesive plaster, and the limb placed in a relaxed position. In the evening he complained of cold and numbness in the injured limb; his whole system seemed much depressed, and he was strongly disposed to sleep. His bowels had been once relieved; his pulse was 120 and small. He was ordered the camphor mixture

and julep. ammoniæ acetatis, with twenty drops of laudanum, every four hours. The next day there was much pain and tension in the knee and calf of the leg: the plaster was removed, and the knee enveloped in a poultice. Symptoms of irritation were present and increasing. On the third morning the boy was much changed, the constitution sympathising deeply, and great general debility very manifest. The leg was cold, clammy, and senseless, on the verge of gangrene. The surgeons in consultation declined amputating. On the two following days, mortification spread rapidly over the whole limb. On the fifth day, at noon, he died.

Examination. On examination neither the popliteal artery nor nerve, nor any principal branch, appeared to have been injured. The popliteus muscle was torn across, and a small orifice was discovered in the capsule of the joint, behind the external lateral ligament. The edges of this wound, and the synovial membrane lining the external half of the joint, presented an appearance of very high inflammation; while the fossa for the reception of the internal condyle, and its membrane, were in a perfectly healthy condition. Much blood was extravasated in the muscles and cellular membrane surrounding the joint.

Case. Fretter, æt. thirty, 21st Dec. 1822, was thrown from a horse upon the stones, and the animal falling upon the patient's left leg, produced a compound fracture of the tibia at the inner malleolus, and a fracture of the fibula three inches above the joint. The man was immediately carried to Guy's Hospital. The joint had been opened, but not extensively, by the accident. A small splinter of bone, which protruded, was removed, and as the external wound

was small, with little surrounding injury, a dossil of lint was applied to it, and the limb placed in the half-bent position on its outer side, upon a splint resting on a pillow; the whole of it covered with linen, moistened with spirit wash. Five grains of calomel, and one of opium, were given at bed time.

Next day, the pulse being quick and hard, the patient was blooded to ten ounces, and the pill repeated at bedtime.

On the third day it was reported, that the patient had passed a restless night. The pulse was 120, and hard; the bowels were moved, three times by a dose of castor oil, and the patient was ordered the julep. ammon. acetatis every fourth hour. A poultice was laid on the wound, without disturbing the lint.

Fourth day. The limb was considerably inflamed, and the fever had rather increased.

Fifth day. The patient had passed a very restless night. The entire limb was much swollen, and the foot put on a gangrenous appearance. The pulse less frequent, and small, occasionally irregular. Twenty drops of tincture of opium were added to the saline draught every fourth hour.

Sixth day. The patient was much sunk, and the opium was discontinued, as it seemed to affect his head. The foot and leg were evidently gangrenous, and the discoloration was rapidly extending to the thigh. The pulse was so small as scarcely to be felt and fluttering; the countenance sharp and hollow. Short fits of delirium, and a floccitation with subsultus tendinum, were the symptoms preceding his dissolution, which took place at 9 o'clock, p. m.

Examination. On examination of the limb, the leg and thigh were found to be in a highly putrescent state;

the anterior and deltoid ligaments were entire, so that no dislocation had occurred. The fractured bones had undergone no change, but all the muscles, even to the psoas and iliacus, were so completely softened in texture as to admit of easy laceration with the finger.

Case. Fuller, æt. forty-two, was brought into St. Thomas's Hospital with a compound fracture of the leg four inches below the knee, from the falling of a plank upon it on the morning of the 3d of September 1819. This wound was two inches long, and appeared as if incised. The fracture was oblique, and the lower fragment protruded at the wound. A small portion of this was removed with Hey's saw, and the reduction easily effected. The limb was then placed in a straight position on a pillow, the wound dressed as a simple wound, with adhesive straps, and the long splint applied. In the evening it became necessary to change the dressings, owing to the free oozing of blood. The limb was but little swollen. Pulse 70.

Second day. Had passed a restless night. The limb exceedingly painful. A slight shivering, followed by heat. Tongue white; pulse 96, full and soft. In the evening, complained of intense pain at the seat of the fracture. The bandages were loosened, and short splints substituted for the long; his bowels had been relieved in the course of the day; pulse 120, with some hardness; skin hot and dry. He was blooded to sixteen ounces.

Third day. Had had a better night; limb but little swollen; wound looked favorable.

Fourth day. Had slept well, and but little pain. The limb was more swollen and tense; and a blush

of inflammation extended along the outer side of the leg, and inner side of the thigh. Pulse 120.

Fifth day. Had passed a quiet night, with some sleep. The leg was more swollen and discolored, and the blush of color extended upon both sides of the thigh as far as the trochanters. A thin dark colored fluid issued from the wound; complained little of pain; bowels gently open; pulse 100. A poultice ordered to the wound and a spirit wash to the rest of the limb. He was to take saline draughts, with a few drops of opium tincture in each.

Sixth day. In all respects the same as yesterday.

Seventh day. Had had no sleep, owing to extreme pain in the leg; two or three vesicles appeared on the outer side of the leg, and one large vesicle on the foot. The tension and discoloration of the limb were reduced, and the wound discharged good pus; bowels open; pulse 100; little fever.

Eighth day. Had passed a very restless night. The whole leg was more discolored. Complained of severe pain in the outer ankle, which had a worse aspect than the rest of the leg. Wound discharged scantily; pulse more frequent and small. Ordered bark, with opium and porter.

Ninth day. State of the limb the same; that of the system much altered for the worse. His countenance pallid and sunk, and his strength evidently declining rapidly. Ordered wine ad libitum.

Tenth day. Leg covered with dark colored vesicles, and a few appeared upon the surface of the thigh, near to the groin; no complaint of pain; symptoms of exhaustion.

Eleventh day. At six in the evening, he expired.

Examination. The tibia was extensively fractured; two portions of bone were completely detached, and the

upper fragment of the tibia had a longitudinal fissure. The fibula was also much comminuted; there was a partial laceration of the tibialis anticus muscle, and a large collection of matter found in the breach of it. The viscera were all sound and healthy.

Remarks. Mosely. Woodcock. These cases exemplify the rapid and fatal termination of acute inflammation of the tela cellulosa, consequent upon slight wounds, in extraordinary constitutional irritation. This is by no means, however, a legitimate consequence of the mischief inflicted. When such cases have been permitted by the patient's neglect, or slight appreciation of an injury apparently trifling, to reach a certain point, the efforts of art are often ineffectual to preserve life. The patient in this class of life seldom applies for proper assistance until, to use his own phrase, he "feels ill all over." Then we find him labouring under the established symptoms of constitutional irritation. A contracted and quick pulse, foul and encrusted tongue, rigors and flushes, great anxiety, bewildered expression, constant vigilance, diffused pain, &c. Then follow increased rapidity and intermission of the pulse, cold clammy surface, hiccup, subsultus, muttering, or paroxysms of frenzy, stupor, and death.

This is a description of case which happens, yet more frequently in the lower limbs. An old leg ulcer, a slight recent injury, as an abraded instep, ancle, or shin—a diseased toe-nail, an inflamed corn, or ganglion, irritated to acute diffused inflammation of the cellular membrane of the limb, gives origin to a constitutional state over which medicine has little control. Unquestionably the susceptibility to such a state is greater in the aged, the dram-drinker, the

man of broken constitution; but in these the aggravation is less because the constitution sooner takes alarm. The robust and healthy, relying on the soundness of constitution, quickly reach the same perilous crisis by braving the evil. "This ought not to have been," is the instant impression which the sight of the case conveys. This the patient always feels, and often expresses; but to look back is as little consolatory as the prospect. I have known eminent practitioners prescribe calomel and jalap every six hours, within two days of the patient's decease, in the belief that so vitiated a condition of the visceral secretions as of course and consequence exists, is yet the gravamen of the mischief. At the same time wine and strong nourishment have been proscribed. This is the ultraism of faith in certain doctrines unimpugnable when unabused, but capable, like every thing excellent, of being injured by a blind devotedness. The most important practical indications which these cases convey are, 1st, early and free venesection to the relief of pain; 2nd. early and free openings of abscesses. If these are overlooked, the effective aid of medicine is questionable; if they are fulfilled, it is capable of affording most essential benefit, both in the stage of excitement and collapse.

The common error is reliance upon topical blood-letting, till general blood-letting is interdicted. This was the point lost in both these cases. Under a prudent restriction, pain may be taken for a director to the use of the lancet, even in incipient gangrene.

It is not the process of mortification which destroys in these cases; it is the irritation of the nervous system by the inflammation, and the acutely-agonizing pain which accompanies it. When the powers of life are well nigh exhausted, the part, the

texture of which has been broken up by the disease, presents the phenomena of gangrene; but this is an effect, not a cause of the constitutional malady. The general impression which the appearance of gangrene on the eve of dissolution has given, is erroneous. The part is disorganized, and no longer retains the principle of resistance to decomposition, but the mischief is done before the discoloration and bloody vesicles appear; nay, it as often happens before the part has so lost its organization as to part with its vitality. How many instances do we see in which with very moderate constitutional disturbance, gangrene passes on to sphacelus, and limbs are separated, to use Mr. Hunter's phrase, by 'the natural surgeon.' But the power required for the process of separation depends upon a less disturbed state of the system, a state comparatively tranquil, and opposed, in all respects, to that of direct irritation.

Laurisson. The gangrene in the case of Laurisson was an obvious result of the irritation communicated to the system by the acute inflammation, following a penetrating wound, of the knee-joint. With the joints the sympathy of the brain is most active; even the instant effects are severe, indicated by a peculiar depressing pain, nausea, faintness, cold chills and tremors pervading the entire frame. The acute inflammation of the synovial membrane, however capable of producing irritation under any circumstances, would not have given rise to such extreme universal disorder as was indicated by the state of the patient, and of his limbs, on the third day, unless combined with the shock of severe injury An inflammation from sprain or contusion without a penetrating wound, and still less, from cold, or constitutional causes, would either not have assumed the

same degree of intensity in the interval of time, or would have obtained relief at once by the natural events of effusion or of suppuration; but the sudden and remarkable depression of the nervous system determined the arrest of the inflammation in its first stage; and the disorganization of the limb ensued, not from mechanical interruption of the vessels or nerves, for this did not exist, but from the prostration of vital power. Already, i. e. on the third day, the patient was too much sunk to make the removal of the limb a justifiable proceeding. Inflammation of the stomach would scarcely have destroyed life more rapidly, it would have destroyed it however on the same principle.

Fretter. Fuller. In Fretter's case we see the symptoms of irritation consequent upon one of the severest forms of reparable injury, increasing with the inflammation up to the fifth day, and terminating in those of dissolution on the sixth. Fuller was a country laborer, of a spare frame, a sound and inirritable constitution. In his case the same career of symptoms was only a little more protracted. The mischief in both cases was sufficient to excite the highest inflammatory action. This could neither be prevented nor repressed by the adoption of measures which might have been effectual for one or other of these purposes, in the absence of extensive disorganization. These are the cases involving the important question of an immediate operation as a preventive of the constitutional irritation so much to be apprehended. Here was no second opportunity, as sometimes happens, viz. when the symptoms of primary irritation subside, and the constitution rights (if I may use the expression) so as for a time at least to struggle with its burden. Aware of the uncertainty of this issue, I

earnestly and repeatedly urged upon Fuller to submit to immediate amputation, but to no purpose—he obstinately refused the alternative. The case which follows shews that this is not always to be relied on.

OPERATIONS.

Case. Haggar, a drayman, æt. forty-four, was admitted into St. Thomas's Hospital, at seven o'clock on the evening of the 24th, of November 1823, with a compound fracture of his left leg occasioned by the wheel of his dray having passed over the limb about two hours before. The tibia was fractured to comminution in three or four places, and the fibula was also broken above the inner ankle. The belly of the gastrocnemius muscle projected through the upper half of the laceration, and the lower was filled by coagula of blood. The man had bled freely before his admission, and but little since that period. He felt considerable pain in the limb, his countenance was pale and anxious, his manner indicative of extreme distress. His pulse 96 and full. At half past eight o'clock the limb was amputated below the knee, a flap being formed of the integument on the outer side of the leg. The patient was very faint during the operation, but recovered on taking a cordial. After he was put to bed the cordial was once or twice repeated, by which his circulation and warmth were restored; and forty drops of laudanum were given in an ounce of camphor mixture.

25th. Had not slept during the night, but was free from pain, except in his back. Had complained of sickness at the stomach between twelve and two, but it soon passed off. At six in the morning, jumping and starting of the limb came on, which continued,

and prevented his sleeping. His tongue was white and dry, except at the edges. Respiration oppressed, pulse 120, full and rather hard. Coughed a little and complained of thirst, and of slight tenderness in the epigastrium on pressure.

26th. Had slept pretty well: the limb was quiet; tongue white and dry; not so thirsty as yesterday; pulse 144, full and quick, but softer; respiration freer, and the tenderness in the epigastrium diminished No stool since his admission. Ordered to take half a scruple of compound scammony and calomel powder in two pills.

27th. Had slept well till about one o'clock this morning, when shooting and starting of the limb came on, which continued till six o'clock and was succeeded by heat. At ten o'clock some bleeding occurred, but it was stopped by cold effusion, and the wound was afterwards dressed. He lost, as was supposed, about half a pint of blood. His countenance became more pale and anxious; he was faint and chilly; respiration laborious; tongue parched; pulse 120 tremulous, and rather small. The bowels had been twice relieved by the medicine. The limb was till disposed to start. He had taken a little brandy and water during his faintness, and was now ordered the effervescing draught, with five minims of tincture of opium, every six hours, and four ounces of Port wine in sago in the course of the day.

28th. Had passed a very restless night, and was at times delirious; pulse 126; tongue dry and brown; thirsty; frequent hiccough; pain in the epigastrium on pressure; bowels open twice during the night. A discoloration of the thigh, which had been first noticed yesterday, was deeper and more extended. He had vomited repeatedly since the last report. This af-

ternoon the dressings were removed from the stump, which was covered with a purulent sanies; it was well washed, and two or three strips only of adhesive plaster were applied. He was ordered half a scruple of castor in a bolus, with a draught of camphor mixture and ether every four hours. Wine to be continued, and porter, for which he felt inclined, ad libitum.

30th. Great restlessness at night with occasional mutterings and short dosings; has continued drowsy with his eyes and mouth half open; nearly insensible when roused. His countenance had become contracted and death-like; pulse about 130, but irregular; very thirsty; respiration sonorous, and frequent hiccough. His bowels had not been open since the night before the last. His adomen was a little swollen, but not hard. The stump and thigh had assumed a blackish hue; it was ordered to be often bathed with warm spirit wash. At four in the afternoon his pulse began to fail, and at half past six he died.

Examination. Several ounces of a dark-colored fluid were contained in each of the pleural sacs. The lungs were preternaturally loaded with blood, and the bronchia with mucus. The internal coat of the stomach erythematous. Liver, large yellow, and indurated. Integument of the stump livid and depraved. A copious purulent secretion in the loosened cellular membrane of the limb, corresponded to the gangrenous discoloration of the integument noticed before death.

Case. Anne Pearson a native of Gibraltar, æt. thirty-six, was admitted a patient of St. Thomas' Hospital for a tumor situated on the inner side of the tibia

of the left leg, near its lower extremity, on Thursday, the 28th June, 1821.

She perceived the tumor about four or five months ago, after a day's hard labor at the washing-tub. The enlargement of the tumor was marked by severe lancinating pains, increased upon stooping or walking. The tumor had a knotty and uneven surface, discolored from a number of superficial vessels contorted and diffused thereon. No distention of the larger veins was apparent. It felt, as its appearance bespoke, irregularly hard and soft, containing slight depressions and elevations in its substance. Its greatest length was about four inches, its breadth three inches. Its size was sensibly increased and diminished on an alternate application and removal of pressure upon the popliteal blood-vessels.

Friday, 27th July, 1821. After having ineffectually employed pressure with a view to the absorption of the tumor, it was cut out this day. So strong and intimate were its adhesions to the skin above, that they could scarcely be separated, while its attachment to the subjacent strong fascia near the bone, covering the muscles of the leg, was but slight and easily broken through.

Its consistence was hard, tough, and granulated, being composed chiefly of molecules of fat, connected by numerous vessels and reticular membrane. From these vessels during the operation there was a pretty free bleeding.

28th. Symptomatic fever with an inflammatory redness extending up the leg and thigh along the absorbents. Pulse 110; bowels open. Applic. lotio spirituosa.

29th. Inflammation of the superficial absorbents

clearly marked. Pulse 110. Ordered aperient and saline medicine. Contin. lot. spirituos.

30th. There was extension of the inflammation along the absorbents as high as the groin, where the inguinal glands were enlarged. No disposition in the wound to heal; a slip of lint spread with the ung. ceræ was applied to it, and a linseed meal poultice laid over the whole. She had no inclination for food, but rather nauseated it, and frequently could not retain her drink. Pulse from 100 to 110; bowels open; tongue much furred. To the leg and thigh were ordered leeches and fomentations. ℞ Hydr. submur. gr. iij. Pulv. rhei gr. x. M. 6^{tis} horis sumend.

31st. The inflammation has subsided a good deal; there is less nausea and sickness; pulse 100; skin hot and dry; tongue much cleaner. Four or five motions have been produced by the calomel and rhubarb, and she feels better. She drinks tea, lemonade, &c. Rep. Hirud. xij. et fotus.

1st. August. Inflammation much diminished; she feels considerably relieved.

2d. During the greater part of this morning she was very anxious and restless, notwithstanding she had passed a quiet night. Towards evening this anxiety increased. She complained of violent pains, particularly in her right arm and down the right side and leg. On looking at the arm, a patch of redness appeared a little above the elbow, and during the night the redness diffused itself over the whole arm, and upwards to the shoulder.

3d. At four o'clock this morning, the attendant found that the arm had changed its color from red to black, in large irregular patches. The patient was delirious, and could not be restrained from talking

incessantly. She was very thirsty, and drank much tea, water, &c.

At eleven o'clock there seemed to be every sign of approaching death. The blackness or lividity had diffused itself entirely over the arm, reaching to the right mamma, and extending over the shoulder to the scapula. The same disposition to discoloration appeared on both legs, and spread rapidly over the whole body. No pulse could be felt in the wrists, nor could the beating of the carotid artery be perceived; scarcely that of the heart itself. Excessive prostration of strength; cold clammy perspirations; anxiety; nausea; with a tongue black, dry, and furred. The wound on the leg clean. Camphor mixture with aromatic confection was ordered, and as much wine as the patient could take.

The extremities recovered somewhat of their usual warmth, although no pulse was to be felt. In this slightly altered condition she remained till about three o'clock in the afternoon, when a large vesicle containing sanious fluid appeared on her right arm, more decidedly marking the supervention of gangrene; a short time subsequent to this appearance she died.

Examination. The only morbid appearance upon a careful inspection of the body after death, was a chronic and firm adhesion between the costal and pulmonary pleuræ, on both sides of the chest.

Case. Gillard, æt. twenty-three, baker, a sober healthy young man, underwent amputation of the ring finger, at the metacarpal bone, on the 1st October, 1817, in consequence of its having become useless and stiff by a chronic inflammation from injury. The integuments were at the time in an unfavorable state,

adhesion did not take place, and the wound turned sloughy. Some secondary hemorrhage took place upon the separation of the ligature, which was re-applied. Although the loss of blood was not considerable, the man was evidently rendered irritable by it, and the appearance of the wound was farther altered for the worse. No alarming constitutional symptoms however ensued till the 11th, when he was attacked by a severe rigor, and became feverish, restless, and excessively irritable. He was ordered pills of calomel and antimony every six hours, but without relief.

14th. The rigors recurred, the pulse was frequent and jerking; he was much debilitated, watchful, and extremely irritable; his countenance anxious, and his skin covered with a clammy moisture. Ordered a draught of ammonia and bark, with a few drops of laudanum, and two ounces of red wine, every four hours.

15th. A considerable alteration for the worse. The eye languid, countenance sunk, pulse depressed and rapid; in short, he was moribund. The arm was now observed to be much swollen, and upon dilating the wound freely, a large quantity of purulent matter escaped from beneath the palmar fascia. At half past past seven, p. m., he died, being the fourth day from the attack of rigor.

Case. Elsden, a footman, æt. twenty-eight, was afflicted with a caries of the first phalanx and metatarsal bone of the great toe. It had existed five months; several fistulous openings had formed both on the upper and under side of the toe, and having tried various applications without relief, he consented to have it removed on the 16th of August, 1822. A

double flap was made of the sound integument, and the metatarsal bone having been sawn through in the middle, the edges of the integument were brought together by adhesive plaster.

17th. Complains of pain in the wound and has passed a restless night; bowels have been relieved three times.

18th. Has passed a better night; is free from pain; bowels open.

19th, twelve o'clock, a. m. About two o'clock this morning was seized with rigor, which was followed by delirium. The dressings have been removed, and the wound looks sloughy; lint dipped in a solution of opium to be applied to the wound, and a poultice over it. Pulse 90, full and soft. A very wild expression of countenance, and incoherent speech. As he obstinately refused to take medicine, two drachms of laudanum were given in an enema. Ten o'clock, p. m. Is now in a profuse perspiration; has had a second severe rigor since last report; continues delirious. The enema opiatum to be repeated.

20th, ten o'clock, a. m. Had two hours' sleep in the night, and has been quiet since twelve o'clock; appears to be recovering sense; wound looks cleaner. Ordered a turpentine glyster, a spirit wash to be constantly applied to the shaved scalp, and a large blister to the nape of the neck. Six o'clock, p. m. Is perfectly sensible, and has asked for drink. Ten o'clock, p. m. The glyster has not returned; he has slept for an hour and a half, and remains tranquil. The wound is beginning to suppurate.

21st, ten, a. m. Slept two hours during the night, but awoke in fright. Tongue moist, and covered with a white fur; pulse weak and quick. Has had no motion; an ounce of castor oil to be given, and

repeated in four hours if required. Six, p. m. Has slept two hours; bowels still confined; pulse and tongue as before. Oil to be repeated.

22nd, ten, a. m. Has passed a good night, had five motions, and appears composed; wound discharges freely, and looks cleaner; complains of his head feeling light. Nine o'clock, p. m. Expresses himself as quite easy; two stools since morning; has taken broth and sago.

23rd. Much improved in every respect.

24th. Has passed a comfortable night; and had a healthy motion from a dose of castor oil.

26th. Continues convalescent; wound healing; to be dressed with the emplastrum adhesivum.

27th. Complains of a bad cough; pulse soft, and no pain in the chest. Ordered a linctus, and blister to the chest.

September 4th. Cough relieved by the blister; pulse natural; wound healthy.

9th. Pulse quick; is much pinched in countenance, and altered in manner; seems in danger of phthisis.

12th. Cough very troublesome; pulse quick and small; appetite gone; rambles in his sleep.

15th. Expired, having sunk within a month from the operation under symptoms of hectic.

Examination. Extensive but not recent adhesions between the pleuræ on both sides of the chest. Substance of the lungs healthy. The ventricles of the brain somewhat fuller of fluid than usual, and some effusion between the membranes. A large collection of pus was found beneath the flexor tendons in the sole of the foot. This was not suspected during life, the wound being clean, and nearly healed.

Remarks. Haggar. The circumstances attending Haggar's case rendered the operation unavoidable, but were far from being propitious to its success. He was the subject of a chronic disease of the liver, resulting probably from the habitual abuse of fermented liquor. He had the aspect of an unhealthy man, had evidently lost much blood at the moment of the injury, and was irrecoverably sunk by the secondary hemorrhage on the morning of the fourth day, though it did not exceed eight ounces. The stump, which is generally a faithful index of the state of the system, fell at once into gangrene; and the extension of this morbid condition to the cellular membrane of the thigh a day or two preceding his death, indicated that it was not so much a result of the local injury as of the exhausted state of the system.

Pearson. The operation in Pearson's case was performed for a chronic disease. It was undertaken at the solicitation of the patient, partly on account of the inconvenience it occasioned her, and in part from apprehension of its increase and intractableness. Up to the seventh day, the case presented nothing unusual. Absorbent inflammation and its accompanying fever excited no surprise; it was not out of the ordinary course; it yielded to the ordinary treatment. The concluding part of this history resembles the action of a subtle poison absorbed into the system. Having felt and expressed considerable relief from the means successfully employed during the preceding days, to reduce the inflammation, and after passing a quiet night, the patient on a sudden becomes restless, very anxious, and complains of acute diffused pain in the limbs of the opposite side to that which had been the subject of the operation. An erythematous blush appears above the elbow,

and quickly spreads over the whole arm, breast, and shoulder; and its florid hue, resembling scarlatina, in a few hours assumes a dark livid cast. The discoloration is not confined to the inflamed parts, but appears upon the lower limbs, and becomes quickly diffused over the entire surface. Talkative and wild delirium, and parching thirst, are succeeded by the extreme state of prostration, in which the heart is incapable from diminished power of performing its function, and in six and thirty hours from the attack, she dies.

Was not this erythema, tending directly to gangrene? Its color, appearance in patches, rapid diffusion and discoloration, and the formation of a vesicle filled with sanies, contribute to this impression. I should say it was a sympathetic inflammation of the reticular texture of the skin, exciting the nervous system to such a pitch as at once to prostrate the vital powers. I shall bring forward, in another section, abundant evidence of the fatal excitement of the nervous system attending upon acute erythema. The existence, for some days preceding, of absorbent and glandular inflammation with severe sympathetic fever, had perhaps predisposed the patient to fall an easy victim to the attack. How it should happen that at the moment when the inflammation of the operated limb and the attendant fever were to all appearance subsiding, the remote morbid action should spring up, is a mystery which I do not pretend to fathom.

This case reminds me of another, so extraordinary, of acute diffused erythema following the application of leeches to the mamma of a young lady apparently in high health, that I take the liberty of introducing it here. I am obliged to Dr. Ramsbotham,

at whose request I visited the patient, for the following particulars.

Case. Miss ——, æt. 17, well grown and healthy, was the subject of a cutaneous affection, resembling scabies, which a child had brought into the family from school, and who, there was reason to believe, had contracted the disease from another recently arrived from India. It was attended with inveterate itching. For this complaint, the warm bath and simple sulphur ointment were prescribed. After pursuing these remedies for two days, the patient complained of an acute pain beneath the right mamma, for the relief of which leeches were applied to the pained part for two successive days, viz. Wednesday and Thursday. A blush of redness was apparent after each application of the leeches, which on the following day (Friday) assumed the aspect of erythema. On the Saturday, the inflammation had extended, the leech bites had ulcerated, and the young lady complained of an increase of pain. On Sunday (the day on which I first saw her,) the inflammation had taken on a decidedly gangrenous character, and considerable sloughs had formed in the vicinity of the leech bites. The symptoms of irritation were at this time alarming. The pulse was very rapid and feeble, the countenance anxious and sunk, the mind wavering, and every indication present of excessive debility. Next day almost the entire surface of the skin appeared to be inflamed, the discoloration had extended down the side, and was attended with an emphysematous sensation to the touch. The patient had passed a very restless night with frequent wanderings. The symptoms of dis-

order increased until her death, which took place at an early hour on Wednesday morning.

Gillard and Elsden. The cases of Gillard and Elsden pointedly illustrate the effect of a latent and unsuspected accumulation of matter within a theca, fascial sheath, or aponeurosis, after a wound communicating with such parts, to excite the destructive irritation of the system. In Gillard's case no external sign of this shewed itself until the morning of his dissolution, and in Elsden's it was not discovered until after death. When with an indolent and not otherwise unhealthy condition of the wound symptoms of irritation, ushered in by rigor, arise on the third or fourth day or later after an injury or operation, the vicinity of the wound should be most carefully explored, all adhesive dressings be laid aside, and any sinus that can be detected be fairly dilated. The tendency to form sinuses is an argument for the early and easy dressing, au plat, as the French term it, of stumps and deep wounds of all kinds. A perseverance in the attempt at union in defiance of unfavorable appearances, has been often, I suspect, instrumental in creating these mischiefs. Rigors, irregular spasmodic action of the muscles, even to confirmed tetanus; delirium, stupor, and sinking, are consequences of which this confinement of secretion is productive.

SECTION IV.

HEMORRHAGE AND COLLIQUATIVE SUPPURATION.

Effusion of blood. THE state of direct irritation is often produced by exhaustion from loss of blood, concomitant with, or consequent upon injury, and from what I shall term, colliquative suppuration. A hemorrhage which does not prove directly fatal, as from a wounded artery, sometimes leaves the patient in a state of exhaustion so great that he is incapable of sustaining the shock of an operation. In lacerated, especially gun-shot wounds, complicated with fracture, a person is occasionally reduced to such extremity of weakness by loss of blood, that it becomes a question very difficult to decide, whether he will survive the removal of the injured part, if that measure be necessary. The following is an example.

Case A man was sent up to me from a distance of ten miles in the country, with a shattered arm, owing to the bursting of a gun. The surgeon had secured the tourniquet upon the limb, but his wife, who accompanied him, apprehending from his faintness that he was bleeding, in attempting to tighten, unfortunately relaxed the screw, so that he arrived at the hospital in a state of collapse from hemorrhage. I waited for a couple of hours to ascertain his condition before proceeding to amputation, which from the extent of the mischief, was indispensable. His pulse was then, viz. at the expiration of two hours from his arrival, beating 60 in a minute, and neither thready nor intermitting, as before; his faculties were perfect; his limbs warm; and his complexion much recovered. In the operation, which was performed above the elbow, scarcely an ounce of blood was

suffered to escape. He supported himself with remarkable firmness until the limb was separated, when he suddenly swooned, as if from the effort. From this he soon recovered; but although closely watched, and well plied with cordials, swoonings returned at intervals, and he expired on the evening of the following day.

Very analogous to this appears to have been the case of Grainge, the constable of Shenley, who was shot in the arm by Mr. Conolly on the 31st of December, 1823, in the execution of his duty. The amputation was deferred only on account of the very alarming state of exhaustion from loss of blood. When somewhat revived it was performed, but he lived only a few hours.

A considerable loss of blood either during an operation, or consequent upon it, is most commonly attended with serious consequences of another kind. It so prostrates the vital powers as to expose the parts to imminent hazard of erysipelas and gangrene.

Case A stout middle-aged gentleman was cut for a deep fistula, and some hours afterwards bled from the wound, to the extent, it was conjectured, of two pints or more. On the fifth day following the operation, the nates, scrotum, and top of the thigh on the same side, were attacked with acute erysipelas, which threw up phlyctenous vesications, and ran rapidly into gangrene. To this he speedily fell a victim, in spite of every effort to support him by diet and medicine.

Case. I have known a case of the excision of hemorrhoids, from which a considerable quantity of blood had been for some time previous discharged at the daily stool, terminate in erysipelatous inflamma-

tion of the mucous membrane of the rectum, which in a few days destroyed the patient. A similar result where the patient has been much debilitated, has been known to follow the operation of tying a portion of the gut in prolapsus ani; and in one remarkable instance a copious secretion of pus was found upon the interior membrane of the bowel, and also in the hemorrhoidal veins; but this patient was, at the time of the operation, the subject of scrofulous tubercles in the liver.

When the system has been rendered irritable, but is recovering, either from hemorrhage, or from an injury or inflammation unattended by hemorrhage, a secondary bleeding, even though it be inconsiderable, often extinguishes life. This is the case in wounded arteries which have been unadvisedly trusted to the compress and bandage; and in deep suppurations, where a vein is opened by ulceration. I have seen persons really recovering from severe injuries, thus suddenly carried off. The symptoms in these cases are those of sinking, or pure prostration.

The loss of blood by injury, when insufficient to destroy life by syncope, induces that state of the arterial system which prevails in gangrene; in other words it converts healthy inflammatory, or sympathetic fever into the asthenic excitement which accompanies prostration: and the inflammation of healing (granulation) into that of destruction (sloughing.) Debility is the basis of morbid irritation, and those causes of debility which operate with the greatest force and directness, most invariably aggravate the state of irritation.

These I call examples of death by irritation assuming the character of prostration, because, how-

ever the cause by which direct debility is induced may differ from that which operates in shock, where little or no blood escapes, the symptoms bear a close resemblance, and are equally to be referred to a great and sudden reduction of power with a local irritant. The loss of blood is not fatal in cases in which the circulation, although feeble in the extreme, recovers and maintains its regularity, and no excitement remains, as in uterine flooding after delivery; but where an extra burthen lies, or is imposed, upon the system, whether the unrelieved uterus, the unrecovered shock, the mutilated limb, or the removal of it, the vital powers succumb. It is very questionable whether the administration of stimulants is not more frequently injurious in these circumstances than beneficial. Excitement to increased action where the power is so much reduced as to be scarce able to maintain that which is necessary to life, only the more rapidly exhausts it. Hence it has been a good turn of fortune for many persons to have been left for dead, as it is called, on the field of battle. Sleep will restore where alcohol destroys. And whether life thus reduced in power can be maintained artificially in any case, i. e. where the patient being left to himself, the relief of natural sleep comes not to his aid, or comes in such a shape as not to refresh, may well be doubted. I am sure I have seen cases in which the remnant has been more quickly consumed by the incessant appliance of stimulus, than would have been the case had nature been left to her own economy. On the other hand, it must be admitted, in cases of such extreme prostration as is indicated by the entire relaxation of the sphincters, that the very sparing, but frequent supply of a nutrient liquid, a tea-spoonful at a time, or

of a stimulus so diluted as not sensibly to swell the pulse, has sometimes succeeded in preserving the life 'of him that was ready to perish.'

Excessive suppuration. A rapid and profuse suppuration so sinks the vital powers as to induce the state of direct constitutional irritation in an extreme degree. In many cases, this result is due to the excess of the secretion alone, in others, to the excess coupled with the situation of the secreted fluid. In the former case, the symptoms are those of prostration without excitement; in the latter, they are mixed, or the excitement is even preponderant. Thus the confinement of matter within a theca or fascia, as in the cases of Gillard and Elsden, related in the preceding section, and others that will be found among the examples of reflected irritation, is competent to the production of violent delirium or tetanus.

The cases which follow, shew the effect of colliquative suppuration ensuing upon different forms of injury, and the fact which renders them important and interesting to a painful degree, is this—that at a certain period subsequent to the primary disturbance of the system, both were in a condition of tranquillity approaching to convalescence.

Case. Friday, May 30th, 1823. Gurton, a robust man, aged thirty-seven, by trade a fisherman, while cleaning some periwinkles, rubbed a piece of skin off the back part of the hand, on Monday, May 26th, four days previous to his admission into St. Thomas's Hospital. Poultices had been applied, and an incision made above the wrist, but matter had not then formed. The arm was excessively swollen, being nearly twice the natural size, very painful, the skin red and shining, and tense, with large vesications on

the fore arm. The redness extended as high as the axilla. The pulse was full and quick, tongue white, bowels confined.—The poppy fomentation poultice was applied. Aperient pills of calomel and colocynth were administered immediately, and a mixture of sulphate of magnesia and infusion of roses directed to be taken three times a day; an anodyne draught containing sixty drops of tincture of opium was given at night.

Saturday, May 31st. Had been restless in the early part of the night, but had slept a few hours towards morning. Mixture repeated, and a pill containing a grain of opium given every six hours.

June 1st. Had passed a better night, the arm rather less swelled, a small portion of the integuments above the elbow sphacelating. Bowels open, evacuations healthy, tongue moist. Pulse frequent and full.

June 2nd. The sphacelus extending; the arm swelled below the elbow, forming a little pouch, into which an opening was made, but no fluid escaped. Erysipelatous inflammation appearing upon the side and upper part of the back. Medicines continued. A pint of porter to be taken daily. Poultices and fomentations as before.

June 4th. A large portion of the integuments of the upper arm sphacelated; arm less swelled; pulse quick; tongue and skin dry; bowels regular. Decoction with tincture of bark, to be given three times a day. Anodyne pills continued, and to take a pint of port wine daily.

8th. The integument of the fore-arm sphacelated. Scarifications made to facilitate the separation of the parts. Medicines and applications continued.

10th. A fluctuation felt below the elbow. A punc-

ture was made, and twelve ounces of matter escaped. The integuments separating above the elbow, the surface underneath very healthy. Medicines continued.

13th. Discharge considerable from the arm. Porter to be increased to two pints daily. Poultice, &c. continued.

17th. Bowels confined. To take castor oil p. r. n. Arm discharging profusely; sloughs separated above and below the elbow; surface and secretion very healthy; medicines and applications continued. The man's health much improved; countenance cheerful; good appetite; rests well.

20th. The sloughs had completely separated; the surface granulating and healthy. It was dressed with simple cerate, and a bandage applied from the fingers to the axilla. Opium pills discontinued. A draught containing pulv. cinch. ℈ij. decoct. cinch. ℥ij. tinct. opii ♏ v. tinct. cinch. ʒj. was given every six hours.

28th. Bowels much relaxed. Bark discontinued; mist. cretæ comp. ordered to be taken every six hours; arm going on well; dressings and bandages continued.

30th. Bowels in a much better state. Bark resumed.

July 7th. Had passed a restless night; complained of sickness, loss of appetite; the pulse small and frequent; tongue coated. The arm looking much less healthy, having a white and glazed appearance. Discharge less in quantity, and thin.

13th. Had passed a very restless night, and has been delirious; constant hiccough.

14th. In all respects worse. A consultation held to consider the propriety of amputating at the shoulder joint, as a last chance. The man considered to

be too much exhausted to undergo the operation. To take an ounce of brandy every six hours.

16th. Died; being the forty-eighth day from the injury.

Case. Boulivant, aged thirty-eight, robust and plethoric, dislocated the ancle by a fall from the causeway, a height of three feet, into the road. The articulating surface of the tibia was seen to protrude through an angular wound of the integuments at the inner ancle. About two inches of the tibia above the joint lay exposed by the wound. A fracture of the fibula was perceived three inches above the joint, and the foot was turned outwards. A portion, equal to about three quarters of an inch, of the tibia, was sawn off; the luxation was then easily reduced. The edges of the wound were approximated by a suture and adhesive plaster, which was covered with lint. Very little hemorrhage had occurred, and the soft parts surrounding the wound appeared uninjured. The limb was placed on the outer side on a pillow, with the knee fixed, and the foot well supported. About the fourth day the lint loosened, and a healthy discharge of pus commenced. A slight degree of hardness of the pulse was removed by venesection; his bowels were regulated; he had a soft but firm pulse, about eighty in a minute; he rested well; had appetite; granulations rose healthily from the wound, secreting good matter; and up to the 30th of October, the injury having occurred on the first of that month, the man was, in all respects, comfortable. On this day a fluctuation was felt at the edge of the wound, and about three drachms of pus discharged. From this time the discharge, though healthy in appearance, became very profuse. The man was al-

lowed porter, and took an opiate at bed-time. In a few days several small abscesses arose in the neighbourhood of the wound; the matter was secreted in great abundance; and the patient began to show signs of extreme constitutional weakness. It had been found necessary to lay open a sinus or two in the vicinity of the wound, and on the 14th of November a lodgment of matter was discovered at the edge of the foot; about an ounce of pus escaped upon incision. Wine was now directed for the patient, in addition to a nourishing diet. On the 22nd of November the discharge was much diminished; the granulations were beginning to cicatrize; but his countenance was thin and pallid; pulse small and feeble; sleep broken and unrefreshing; and his spirits remarkably depressed. His manner was changed; he became restless and irritable, and was troubled with catchings of the muscles. On the morning of the 24th of November the patient was seized with low delirium, and in the evening he expired in a state of stupor; being the fifty-fifth day from the injury.

I subjoin a rare case of profuse and exhausting suppuration, directly supervening upon the amputation of a crushed limb, where the prostration obviously occasioned by it, and progressively increasing, terminated in the death of the patient, on the eleventh day. Of this case, though it cannot strictly be said, as of those which precede it, that the patient was at any moment in a state approaching convalescence, yet the reduction of inflammation and swelling, an entire freedom from suffering, and the preservation of appetite, encouraged the more natural expectation that the man, at an age little beyond

middle life, would gradually recover his power, than that he would suddenly sink.

Case. Izzard, a drayman, aged forty-two, fell from the shaft of his dray, and one wheel passing over his right leg, produced a comminuted fracture, with incurable laceration of the soft parts. The injury was attended by a free hemorrhage. Amputation was performed immediately above the knee; no symptom of extraordinary irritation ensued, but a considerable swelling of the thigh was noticed two days after the amputation. On the third it was opened, and a profuse and fetid discharge issued from it. On the fifth day, the swelling had so much increased as to make the thigh appear half as large again as the other. The surface was tense, and covered with a blush of inflammation. The integument on the face of the stump, which was abundant, was loose, flaccid, and discoloured; no adhesive process had been set up; the divided muscles had a ragged and sloughy appearance; the discharge was thin and of a bad color, and excessive in quantity. The man made little or no complaint, but his pulse was very quick, weak, and compressible. Warm spirituous fomentations were applied to the limb; he was ordered bark and opium, and a quart of porter per diem. His bowels had been kept regular from the first with Epsom salts in mint julep occasionally. From this time to his dissolution the man's symptoms were simply those of great and daily increasing debility. He passed much of his time in sleep, which was disturbed by starting, and was unrefreshing. The discharge continued profuse, and of nearly the same quality, although the blush upon the skin had disappeared, and the size and tension of the limb

were much reduced, so that the skin had collapsed and the swelling did not extend to the groin. He always drank his porter with relish, and even asked for rabbit for his dinner the day before his death. This event, which was preceded by the ordinary signs of exhaustion, took place on the eleventh day from the accident.

SECTION V.

POISONS.

The last class of cases which I select for the purpose of illustrating the symptoms of direct irritation, is that which exhibits the deleterious influence of certain substances on the nervous system. Of these the animal, vegetable, and mineral kingdoms contribute examples; but I shall principally direct my attention to the first, and avail myself of this opportunity to discuss a subject of momentous practical importance to the surgeon, as well as deeply interesting to the physiologist, namely, that of wounds received in dissection; some of which may be regarded, in my opinion, as apposite, and unhappily almost familiar instances of the irritation set up by poison.

Many of the cases of rapid inflammation following slight wounds, and occurring among persons accustomed to handle dead animal substances in a state more or less advanced of decomposition, undoubtedly belong to this class. The poor say 'the wound was poisoned,' and although this is often erroneous, it is sometimes correct, and not the silly ignorant prejudice which persons, generally better informed, have supposed. Veterinary students, farriers, slaughterers, butchers, sausage-makers, cooks,

are, in common with ourselves, the persons exposed especially to these grave accidents. Until very recently it has been a fashion, for no profession is more subject to the dominion of fashion, to discredit altogether the absorption of putrid matter, and this theory of the origin of these cases; and I am old enough to remember the hardy assertion, ex cathedrâ, that exposure of an absorbing surface to dead animal matter was uninjurious, and that the form of the wound and a certain predisposed irritable state of constitution—induced by impure air, sedentary habits, deficient rest, anxiety of mind, &c.—afforded the real explanation of the phenomena attending upon these injuries. I am so far of opinion that an unhealthy state of the system in many cases pre-exists, that I do not presume to question, much less to controvert it. But admitting that it were an essential ingredient in the composition of the case, which it certainly is not, I contend that it is quite inadequate to the explanation of the facts which I am about to lay next before the reader. In addition to numerous instances of dissecting room cuts, and punctures made by the needle, in sewing up bodies after examination, it has of course fallen to my lot to witness many cases of persons laboring under alarming constitutional irritation from acute diffused inflammation ensuing upon venesection; trifling cut and punctured wounds with clean instruments; slight abrasions of the hand or foot; agnails, or corns cut to the quick; and bites or scratches of domestic animals, not the subjects of disease. I am impressed with the belief that one of two circumstances operates towards the production of a large proportion of such cases—first, an existing cachexia, or bad habit of body; second, a severe aggravation of the injury by some mismanagement,

negative or positive. It is poor comfort to a patient to say 'you never ought to have been thus,' but in truth, if not in courtesy, we should often be warranted in so saying. But although a bad state of body or bad management may explain the serious aggravation of a slight injury, to which, from its nature, no suspicion of poison can attach—and may also assist to explain the less resisting power of the constitution, the more rapid and uncontrollable march of the symptoms of destruction, in a case open to the suspicion of poison—it can obviously be urged no further. The fatal effects of poison taken into the system are but too rapidly developed, although the previous health has been undisturbed, and the existing inflammation is insignificant.

The argument that a puncture with a knee or shoe-buckle, or a pen-knife, has now and then proved speedily fatal through the medium of inflammation; and on the contrary, that persons residing in the country in full health, and habits of exercise, are seldom visited by any troublesome degree of inflammation from these accidents, only corroborates the influence of constitution, which I admit. But it is said, many persons escape inflammation who are equally the subjects of these inoculations with those who pay the forfeit of their lives. This is a statement of which it is impossible to ensure the accuracy, and from which consequently no fair inference can be drawn. It is a well-known fact that if two men cohabit with an impure female, it happens continually that one escapes the disease. Let it be shown that the poison is imbibed by any two individuals, and then we are beyond the reach of contingency, and

it will be fair to inquire why one person is destroyed and the other is unharmed.*

Some of the cases to which I have adverted of simple injuries which tend to acute cellular inflammation, and through that medium excite a fatal constitutional irritation, are exemplified in the preceding sections.

I consider the cases of this class and those of inflammation from the poison of animal matter, as exhibiting distinct varieties of local phenomena. But before proceeding to detail the distinction it is important to observe, that in the latter the inflammation is a sign or symptom only, and not the disease; and that the symptoms of constitutional irritation are not depending upon the inflammation, though they may, in some cases, be aggravated by it. The following case demonstrates that inflammation is not necessary to the most virulent and fatal action of the poison, and in general, I should be disposed to say of these cases, that the symptoms of local inflammation and constitutional irritation exist in an inverse ratio of

* At the same time in which the melancholy case of Mr. Archer occurred, reported in a subsequent part of this section, there happened a curious and interesting proof of the difference in their effects of an inoculated and a simple puncture. A practitioner, in whose house he lodged, and who was engaged with him in inspection of the body, also punctured his finger, *after wiping the needle to put it by.* He had thecal inflammation, and swelling of the last joint of the fore-finger, from which he suffered so severely as to induce me to lay open the finger; the superficial absorbents of the arm and the axillary glands were acutely inflamed, and the local inflammation was in this gentleman as marked as in the fatal case it was trifling. His constitutional symptoms were very slight, and the whole affair passed away in two or three days under the ordinary antiphlogistic treatment.

severity. The following case rests upon the authority of Sir Astley Cooper.

Case. Mr. Elcock, student of anatomy, slightly punctured his finger in opening the body of a hospital patient, recently dead, about twelve o'clock at noon, and in the evening of the same day (Monday) finding the wound painful, shewed it to Mr. Cooper, after his surgical lecture, by whom he was referred to Dr. Haighton, in whose house Mr. E. at that time resided. He applied a poultice to the finger, and took some active aperient medicine. During the night the pain increased to extremity, and symptoms of high constitutional irritation presented themselves on the ensuing morning. No trace of inflammation, however, was apparent, beyond a slight redness of the spot at which the wound had been inflicted, which was a mere puncture. In the evening he was visited by Dr. Babington, in conjunction with Dr. Haighton and Mr. Cooper. Still no local change was to be discovered, but the nervous system was agitated in a most violent and alarming degree, the symptoms nearly resembling the universal excitation of hydrophobia; and in this state he expired at three o'clock on Wednesday morning, within the short period of forty hours from the injury.

Four several textures subject to inflammation from injury. Inflammations of the limbs from injury may be thus classed:

Inflammation of the absorbents and their glands, superficial or deep-seated, or both.
Inflammation of the veins.
Inflammation of the cellular membrane, phlegmonous, erythematous, erysipelatous, gangrenous.

Inflammation of the thecæ of tendons and fasciæ of muscles.

Although in their origin these several forms of inflammation are marked by distinct characters, they are subject by continuance to become complicated, as for example, by the occasional termination of absorbent, venous, or thecal inflammation in diffused abscess or gangrene of the cellular membrane; and, vice versa, absorbents, veins, and fasciæ sometimes partake of the inflammation of this texture.

Inflammation of the absorbents and their glands.

The inflammation of the absorbents has been long well known and understood. It is at first seldom accompanied by inflammation of cellular substance, except of that in which the vessel lies; the swelling is inconsiderable, the blush is confined to the raised, swollen, and cord-like absorbent lines, so is the chief pain; but above the bend of the elbow, and in the axilla, the glands are swollen, and acutely tender to the touch. From the wounded finger or hand a sensation of heavy pulsatile pain shoots upward along the arm, and the absorbents are conspicuous from the base of one or more of the fingers, upon the dorsum of the hand and wrist, along the radial or ulnar side of the fore-arm to the bend of the elbow, and from thence to the axilla. Sometimes the lines are lost between the elbow and axilla. In a short time the inflammation, if acute, extends to the fascia enveloping the flexor muscles, and the whole limb becomes swollen, heavy to the sensations of the patient, tense to hardness, and acutely sensible to contact, even the lightest. The termination of this inflammation, if unreduced, is in circumscribed abscess of the lymphatic glands and their con-

necting tissue. These are the visible signs of inflammation of the absorbents. The constitutional symptoms are at first those of agonizing pain, superadded to the sympathetic fever of suppuration, and afterwards those of irritation resulting from the confinement of matter. The pain in the first stage is of a nature so intolerable that it often occasions delirium, and, in failure of active measures, has sometimes been followed by fatal collapse and exhaustion.

Inflammation of the deep-seated absorbents.

A very slight and transitory visible inflammation of the superficial absorbents following an injury to the finger, is sometimes accompanied by acute pain and tenderness to the lightest touch, of the inner side of the upper arm and axilla; shortly, a deep-seated and firm swelling, marked by a vivid blush, occupies the channel of the large vessels from a little above the elbow to the hollow of the axilla. The depending position of the limb, which is more tense than swollen, cannot be borne for an instant. The pain is attended by inflammatory fever, and only relieved by free blood-letting. The blood bears the stamp of acute inflammation. The disease terminates in humeral, or axillary, or pectoral abscess, properly so called. This is inflammation of the deep-seated absorbents, and the slight and transient blush in the course of the superficial vessels, if present, is sympathetic.

Inflammation of the vein.

This disease is rare, and generally arises from venesection, viz. by the employment of a foul lancet, or an unfavorable predisposition of the constitution. The moderate swelling, but great tension of the limb, and cordy hardness of the vein traceable towards the axilla—the insupportable pain,

sense of weight, and immobility, with a festered or oozing state of the orifice, are local characteristics; but the extreme constitutional excitement, morbid vigilance, mental irritability, and despondency, partaking more of the nervous than the simple inflammatory type, and running rapidly from delirium to exhaustion, is peculiar. The blood drawn is strongly cupped, and buffy. The pulse, rapid and stringy, becomes more full and soft after copious depletion, but the pain is only partially relieved. The inflammation is slow in affecting the surrounding textures; it terminates in a free purulent discharge from the ulcerated orifice, and in one or more abscesses, in the course or vicinity of the vessels. The disease, if overcome, leaves a state of extreme debility, and hardness and stiffness of the limb. The diagnosis between this and cellular or fascial inflammation, which much more frequently follows venesection, is not difficult to those who have witnessed both and compared them.

Inflammation of the cellular membrane.

1. Simple, acute, or phlegmonous. Many diminutive injuries, such as the wound in blood-letting, punctures, cuts, and abrasions of the fingers, exasperated by neglect of ordinary precautions, excessive use of the limb, or casual intemperance, give origin to the local and contiguous inflammation and suppuration of this texture. It is especially frequent in the palm, or on the back of the hand, in injuries of the fingers. It is attended with conspicuous but ill-defined swelling, throbbing pain, and more or less sympathetic inflammatory fever. If the distention be not relieved by an early and free opening and other suitable treatment, the limb partakes of the inflammation, which extends along the

fascia and subfascial cellular membrane. Thus, owing to extreme distention, and to that alone, instead of one or two proper, i. e. circumscribed abscesses, the entire limb becomes a diffused abscess or a nest of abscesses, eventually followed by a corresponding loss of substance from sloughing of the spoiled membrane. The sequel involves a two-fold danger; 1st, that of diffused gangrene; 2nd, that of destructive suppuration. See as an example of the first, the case of Mosely, page 104. Of the second, Gurton, page 131.

Serous or erythematous inflammation of the cellular membrane.

Another inflammation from wounds passes over, or very slightly touches, the absorbents and the entire extremity, and shews itself in a slight fulness and tenderness to the touch, of the neck, subclavian, humeral and pectoral regions. The axilla is generally also a little full and tender. The inflammation spreads backwards over the scapular region, and downwards and backwards by the serratus and latissimus dorsi. Some time subsequent to the feeling of tenderness, an erythematous blush appears, of a pink hue, irregular in its outline, but abruptly defined. If the finger is placed within the disc of color, it gives acute pain, so that the patient convulsively shrinks, while beyond this, pressure gives no pain. After a day or two, the part loses its vivid efflorescence, and becomes less exquisitely sensible; but the appearance of fulness rather increases, and the sensation to the touch is that of a very obscure or diffused fluctuation, as if the cellular membrane was broken up, a doughy or quaggy feel. If punctured, a serous fluid only escapes. If the patient survive a fortnight, this becomes purulent, in short it is a diffused cellular suppuration. It should

be mentioned that in some, if not in most cases, the superficial absorbents of the arm are very slightly inflamed for a day or two before the pectoral blush appears; but the inflammation is trifling and evanescent. The pectoral region is often swollen and the seat of pain for a day or two before it is reddened, as on the second or third day from the injury. In this variety of inflammation, the wound is sometimes the centre of a vesicle or pustule, sometimes of a cellular abscess, and more frequently, is little, if at all, inflamed.

This is the serous or erythematous inflammation of the cellular tissue—not by continuity, for I have stated that the arm either escapes, or is so slightly and transiently affected as to excite little notice,—but, as I believe, by the specific irritation of a poison conveyed by the wound into the circulation. Whether it passes from the wound by the veins, the deep-seated, or the superficial absorbents, I cannot take upon me to say, but it does not appear by any manifest sign that, in either case, the vessel is inflamed by its contents. The tendency of this inflammation, in its severest form, is to excite.

Its terminations. 1st. A serous or lymphatic effusion into the cells of the subcutaneous membrane, and an early disorganization of this texture, for it is frequently emphysematous on the second, third, or fourth day from the commencement.

2ndly. In its milder and less fatal form, a weakly and diffused suppuration throughout the same substance, unpreceded, as in the formation of proper abscess, by any adhesive action; and this disposition, for the most part bounded to the same side of the median line, afterwards appears in large unde-

fined collections in different and distant regions of the body; and, if the patient live long enough, in slow succession.

The constitution, in the severer form described, is affected in a very peculiar manner and degree; in the milder, it is subjected to an irregular and protracted hectic fever.

I believe that this is a specific inflammation peculiar to poison. The tendency to a repetition of the inflammatory action in the same texture is seen in common phlegmon, and even in these cases the repetition may at length become sympathetic, and but the shadow surviving the substance, as it is evident that the action, if it do not wear out the patient, becomes weaker and weaker, till it wears itself out. But the question suggests itself, if this be a poison which has reached the mass of blood, why should its effects first appear in or about the same spot, and that spot be at the opposite extremity of the stricken limb?* I do not consider this to depend simply upon the natural and ordinary sympathy which prevails between the opposite extremities of a limb, either of which has been morbidly excited by the irritation of a wound. The poison conveyed by the absorbents, in its passage irritates the axillary glands, and this irritation is reflected upon the sentient extremities of the nerves distributed thereto. The pain, be it observed, is referred to the axilla, shoul-

* There is an occasional variety in this respect, but it is rare enough to be regarded as an exception. I have seen and shall relate a case, in which the erythema was confined to the side and extended from the lower true rib to the ilium, the breast and shoulder escaping altogether. But it is always on the same side of the trunk that the inflammation appears, in the absence of local irritation on the other.

der, and pectoral region, before any appearance of the specific inflammation; nay, even in the total absence of inflammation. The lymphatics terminating in these glands and the cellular texture connecting them afterwards partake of the inflammation, which ensues as a consequence of extraordinary local irritation.

Erysipelatous inflammation of the cellular membrane.

Phlegmonous inflammation terminating, or, I should rather say, permitted to terminate in erysipelas or gangrene, is a thing totally distinct from erysipelatous or gangrenous inflammation, sui generis, as these are also distinct; though erysipelas may, and often does, pass into gangrene. The erysipelatous, more than any other inflammation following injuries, connects itself with peculiar states of constitution, and gives the impression from the seeming inadequacy of the exciting cause, and the sudden, rapid, and destructive character of the disease, of its originating from some specific irritation. It in fact occurs most frequently in persons of lax fibre, or of broken constitution, enfeebled by age or by intemperance.

The limb is equally and enormously swollen and tense from serous infiltration of the cellular membrane; the skin has at first a florid red, then a yellowish hue, and appears polished, by distention of the loaded tissue; transparent vesicles are seen here and there; and ultimately large undefined depôts of matter are formed at a considerable depth from the surface. In other cases phlyctenæ and sphacelated spots announce the rapid gangrene of large portions of the integument. In short, the process which has been described as a sequel of neglected or aggravated phlegmonous inflammation, and occupying

therefore some period of time, is similar to that which characterises this inflammation almost in its commencement. The constitutional state is that of high excitement terminated abruptly by prostration and collapse.

Gangrenous inflammation of the cellular membrane.

This occurs chiefly as a direct termination of inflammation in the severest and most extensive injuries. I have instanced it under the denomination of 'disorganizing inflammation' in some of the preceding cases of compound fracture. The discoloration and sanio-purulent œdema of the cellular membrane are ushered in by acute pain; the livid cuticle is separated in bladders containing a thin dark sanies; and the surrounding soft parts, without exception of texture, become black, disorganized, and putrescent. With these appearances a rapid and small, or thready pulse, which soon becomes intermittent or faltering, a tongue, mouth, and lips encrusted with a thick brown sordes, a relaxed and sodden skin, hiccough, tremor, and subsultus, a heavy and vacant expression of face, anxiety, low delirium, and stupor—are the constitutional signs in connexion.

Inflammation of aponeuroses, thecæ, and fasciæ.

This, the case of acute paronychia, is frequently accompanied with absorbent inflammation, but not invariably, nor is it on this account more serious. Matter is secreted by the inflamed synovial surface of the tendinous sheath, or the particular fascia investing the tendinous extremity of a muscle of the arm or leg; or beneath a ligamentous expansion, as the palmar or plantar aponeurosis. Sometimes the symptoms supervene in a few hours after the injury, sometimes not for

days, so that the patient scarcely recognises the injury, usually a small penetrating wound. If the wounded thumb or finger is disfigured by excessive œdema, the symptoms of disturbance are less severe than when with great tension the swelling is inconsiderable, and void of fluctuation, so as to make the existence of matter doubtful. The quantity of pus is so small, and the relief of discharging it so great, as to demonstrate that its situation alone had given rise to the intense pain, and extreme constitutional disorder. Is it owing to the partial escape of matter into the cellular substance, or to the inflammation having originally attacked this texture exterior to the theca or fascia, and affected the interior only by sympathetic connexion, that the symptoms are less urgent when the œdema is present? Certain it is, that the incision of the theca or fascia, is necessary to the relief of the symptoms, and this must not be delayed,* even though the external signs are obscure. When but a flake of matter has escaped, nay, when blood only has issued, I have often witnessed as complete a subsidence of the pain and alarm of the nervous system, as when it has been discharged in quantity. This looks more like a relief of tension than of distention.

Investing fascia. The inflammation of the general investing fascia of a limb is not attended by any corresponding severity of constitutional suffering, yet it is often considerable. An inflammation following venesection, which continues slowly increasing for a considerable period subsequent to the operation, yet clearly commencing from that time—marked by a

* See Page 25.

stiff and swollen elbow, and an extensively diffused blush over a part of the upper, and the whole fore-arm, attended with exquisite tenderness to the touch, and pain shooting to the points of the fingers—is productive of much constitutional harass, and generally leaves a permanent immobility of the joint.

Periosteum. The presence of matter beneath the periosteum, when the bone is sound, as when produced by acute periostitis from injury, is capable of producing the most urgent constitutional distress. I have seen it accompanied by fierce delirium, which ended in complete stupor of two days' continuance, and that in death.

To recapitulate briefly. Inflammation of the absorbents, and their glands, of the vein, the phlegmonous inflammation of the cellular membrane, and of the fascia, are all ordinary results of simple irritation, and may be distinct or combined, or consequential, one with another. These comprise all the textures which are the seat of active inflammation from injuries such as those to which I refer. But there is, as I have endeavored to shew, a variety in the modes of inflammation, and though I am unable to say in what degree the absorbents, and veins, and nerves, and fasciæ may be subject to be affected by the varieties which I have described as affecting the cellular membrane, it is highly probable that, in some degree, they are.* The open texture of the latter,

* The veins and absorbents have been found to contain pus through an unbroken course of their canals. Such a termination is always fatal. Owing to the defect of adhesive inflammation, no barrier, and of consequence no abscess, is formed. This must be the result of a morbid variety of inflammation, for the disposition to adhesion is stronger in both these orders of vessels, and such

and its universal distribution as a medium of connexion, enable us better to observe the varieties, of which it is the subject. The erythematous, I consider, belongs to a specific irritation, the erysipelatous to a specific state of constitution; the gangrenous is to be referred to age or constitution, if not plainly occasioned by the extent of mechanical disorganization.

All inflammations are indications of natural resources, be they more or less than the occasion. The erythema and erysipelas seem to be modes of inflammation with inadequate power to carry them on to a termination. Thus they are deficient altogether in the adhesive stage; they are incapable of a healthy suppuration; and their imperfect effusion or suppuration is at the expense of the life of the parts, i. e. complicated with a chemical decomposition of the fluids (emphysema) or solids (gangrene.) Now this is either due to the nature of the injury, or to the state of the system. A poison taken into the system will set up this inflammation in a healthy subject; in an unhealthy subject such an inflammation will be produced by a simple injury; or a poison may be generated in the constitution, independent of local irritation. In scrofula the inflammation is always weak, and the secretion imperfect; in cancer this is yet more defective and vitiated, as is evinced by the deviations from a healthy character in the purity, consistence, color, and odor of the matter. Some poisons deprive the blood of the coagulating principle when drawn from the body. In such a condition of the system and the material as this change im-

deviations are, I believe, the results of specific irritation, as e. g. a poison.

plies, is it possible that healthy secretions should be formed? Is it extraordinary that, in particular circumstances, the vascular action should be so modified or altered by an enervation of vital power as to be incapable of forming the first products of sanatory inflammation—incapable of circumscribing and determining secretions to the surface, and thus operating its own relief? Either these inflammations are constitutional, i. e. the result of certain unhealthy conditions of the system, whether arising spontaneously or from injury; or they are the result of specific irritations, the nature of which is to destroy the principles by which the constitution is preserved from destruction. Such, in my belief, is the explanation of the erythema and erysipelas set up by poison, whether extraneous or morbid.

A bold inflammation of the absorbents and their glands, the cellular membrane or fascia, even of the vein, I consider to be in a much less dangerous action than that which affords the first and principal manifestation of its character in its effects upon the constitution. When therefore I have been applied to by students and others, laboring under such inflammations, I have regarded them in a favorable light, for if they are to be referred to the inoculation of the wound with a poison, it is a local poison, its virulence appears and is exhausted upon the part; the constitutional disorder, however severe, being such as belongs to ordinary irritation. When, on the other hand, there is a degree of inflammation very inconsiderable, and disproportionate to the pain and general nervous excitement; when the local affection shews itself, not upon the arm, but on the breast, and assumes the character of erythema or erysipelas, with which the constitution always sympathizes

in an extraordinary degree—then I entertain a less cheerful view of the case.

I shall offer now some details illustrating the effects of the poison of dead animal matter upon the system. The symptoms marking the highest degree of constitutional irritation from this cause, are faithfully portrayed in the following painful narrative, drawn up at my request by Mr. Toulmin, junior, of Hackney. This is not the place in which to speak of the individual who forms the subject of it, with whom I had the happiness of enjoying a close intimacy for upwards of twenty years; but I cannot forbear to remark, that a more unaffected and universal feeling of regret, the best attestation that can be offered to worth of character, has seldom been evinced on any similar occasion, either in or out of the profession.

Case of Dr. Samuel Pett. "On Saturday morning, December the 28th, at eight o'clock, Dr. Pett, in conjunction with Mr. Hacon, surgeon, of Hackney, examined the body of a lady who had died of peritoneal inflammation after her confinement. This lady was taken ill on the Sunday, and died on the Thursday following, December the 26th. I was present at the latter part of the examination. Dr. Pett handled the diseased parts, and, although advised to the contrary, assisted in sewing up the body; he had, however, made but few stitches when he gave me the needle. He was not aware of having wounded himself at this time.

"I met Dr. Pett by appointment at eleven o'clock on the same day. He adverted to the examination, but never hinted that he had injured himself. Between eight and nine o'clock in the evening, he join-

ed a party at my father's house, and, after having been there about two hours, he complained of feeling some heat and uneasiness on the outer side of the last phalanx of the middle finger, and suggested that he might have pricked himself in the morning. I examined the finger cursorily, but saw no wound; there was, however, a slight blush upon it. Upon my observing that I saw no wound, he, for a while, seemed satisfied; but his attention was again drawn to the finger, by a feeling of uneasiness; he then, in a stronger light, and by the aid of a lens, discovered a minute opening in the cuticle. This I now saw distinctly, both with the glass and without it, in the centre of the redness which I had before observed.

"In compliance with Dr. Pett's wish, I at first touched the spot with a pointed piece of nitrate of silver, which was his usual practice on similar occasions, and subsequently with a very small quantity of nitric acid. Neither application produced pain; and he left my father's house at one in the morning, his mind not appearing to be much directed to his finger.

"At half past eight o'clock on the same morning (Sunday) my father received a message to call early on Dr. Pett. He saw him by a little after nine, and found the finger much swollen and inflamed, the inflammation extending on to the back of the hand, and red lines proceeding partly up the fore-arm. There was an eschar about the size of a split pea, where the caustic had been applied. His countenance was haggard and depressed; his pulse about ninety in the minute. Dr. Pett stated that upon his return home, the finger felt uneasy, and as the former caustic applications had not given him pain, he was induced to apply the nitrate of silver again, which

he did, until he felt it sensibly. The pain thus produced, he said, increased 'to agony.' He got into bed, and shortly after was seized with violent shivering, which was followed by some degree of heat. He got up and took ten grains of calomel. My father ordered him some senna and salts, to cover the finger and hand with leeches, and to employ fomentations and poultices.

"About one o'clock I accompanied my father in his visit to Dr. Pett. On entering the room it was impossible not to be struck with his extremely altered appearance; his countenance was rather suffused with redness; his eyes were hollow and ferrety. There was a peculiarity in his breathing which never forsook him during his illness; it was a suddenness and irregularity in the act of breathing amounting almost to sighing. His manner, usually gay and playful, was now marked by excessive torpor. Indeed his whole appearance reminded me strongly of a person who had taken an excessive dose of opium. His pulse was between 90 and 100, and rather soft. Dr. Pett described himself as having suffered intensely. He said that 'he was completely knocked down,' and that 'he had not the strength of a child.'

"Upon removing the poultice, the finger and hand appeared more swollen than in the morning; the skin of the last and middle phalanges was very tight, and of a blueish livid appearance, with effusion under the cuticle surrounding the crust where the caustic had been applied. A lancet was passed freely into this, and down to the bone; some bloody serum escaped, but it gave no pain; the last and middle phalanges were, in fact, completely gangrenous. The inflamed absorbents could be traced to the elbow, and there was uneasiness in the axilla.

"My father, having an appointment with Dr. Babington, expressed to him his anxiety respecting Dr. Pett, and requested Dr. B. to visit him, which he did immediately, and continued to do afterwards. The remainder of Sunday was occupied principally by heavy sleep, and in the intervals there was much suffering.

"On the Monday morning Dr. Pett complained of having passed a wretched night, and of extreme exhaustion and feebleness. The hand and arm were rather more swollen, and the absorbent vessels could be traced to the axilla, where the glands were enlarged and tender; the breathing was marked by the same irregularity and oppression; the pulse was rather quick, and somewhat irregular.

"Sir Astley Cooper saw Dr. Pett between two and three o'clock, and kindly visited him twice each day whilst he lived. Sir A. C. believed that he felt obscure fluctuation of matter in the hand, and made an opening into it, from which, I believe, a minute quantity of matter escaped, but not having been present I cannot speak accurately on this head. Leeches were applied in the axilla, and over the pectoral muscle, with poultices and fomentations.

"On Tuesday morning we found things looking worse than before. Dr. Pett's general appearance and powers were more sunk; the pulse was quick and more irregular; the breathing more oppressed; and that torpor of manner which was present at first was now converted into restless anxiety. There was, however, no increase of inflammation, nor extension of gangrene on the hand, but the same kind of virulent inflammation which had existed in the finger seemed to be proceeding in the axilla and parts adjacent. The skin over the axilla and side of the

chest was marked by an erysipelatous blush, and pitted on pressure. It was at this time, and under these circumstances I think that you first saw him.

" Early on Wednesday morning you will recollect that Dr. Pett appeared to be more tranquil in manner, and cheerfully, though somewhat wavering in his succession of ideas, detailed a dream he had had in the night. His general appearance was, however, frightfully worn and haggard; his pulse upwards of 110, irregular and feeble; his breathing still more quickened and oppressed. The inflammation had subsided in the arm and hand, but had extended more over the side of the chest from the axilla; the skin too was of a deeper hue, and conveyed to the finger a sense of crepitus with obscure fluctuation. An opening was made with a lancet without giving much pain; a small quantity of bloody serum only oozed from the opening. It became evident that the inflammation in the neighbourhood of the axilla had terminated in extensive gangrene of the cellular membrane. From nine o'clock in the morning, Dr. Pett grew most rapidly worse; his pulse quick and faltering; his breathing hurried, and intellect confused.

" He died at six o'clock, p. m., on Wednesday, the 1st of January, the fifth day from the examination of the body.

" With respect to the medical treatment, Dr. Pett took ten grains of calomel very early on the morning of Sunday, which was followed up by a brisk cathartic mixture. During Sunday he took a diaphoretic draught, as follows:

" ℞ Lip. ammon. acet. ℥ ss.
Mist. camph. ʒ vii.
Liq. antim. tart. ♏ xx.
Syr. aurantii ʒ ss. f. haust.
4ª quâq. horâ sum.

"The bowels were again freely acted upon on the Monday morning, by the purging mixture, and six min. of tincture of opium were added to each of the above draughts. These were continued until the Tuesday evening, when the prescription was as follows:

"℞ Ammon. subcarb. gr. v.
Castor in pulv. trit. ℈ ss.
Mucilaginis q. s. ut f. massa in pil. iij divid. et 4ta. quâque horâ sumend. mist. seq. cochlear. trib. majorib.

℞ Mist. camph. ℥ vi.
Spir. æther. sulph. co. ℥ ij. f. mistur.

Wine whey was directed to be given for drink."

The following notes were taken on examination of the body on Friday, the 3d of January.

Examination. "Abdominal integument loaded with adeps. Heart of extraordinary size; walls thin, and substance flabby. Valves and internal surface of the chambers and great arteries free from earthy deposit or morbid change. No increase of liquor pericardii. Mouths of the coronary arteries remarkably large.* Lungs choked with air, and containing much blood, especially at the lower part. Texture sound, and no difference between lung of right and left side, except a slight chronic adhesion on the right. The liver large, smooth, and firm on its peritoneal surface, but on its interior presenting a bloodless granular texture of a clay brown color, and readily breaking down under the finger. Gall bladder empty and small. Pancreas larger and harder than usual. Omentum and mesentery loaded with adeps; espe-

* Dr. Pett considered himself the subject of a disease of the heart.

cially the latter. Stomach, spleen, kidneys, and intestinal canal healthy. Head not examined."

Case of Professor Dease. "On Saturday, February the 13th, 1819, Mr. Dease, late Professor of Anatomy and Surgery to the Royal College of Surgeons in Ireland, lectured on the cervical nerves and brachial plexus. The subject which was dissected for him, a female about forty years of age, had died in one of the hospitals of a chronic pulmonary affection; the body had not been buried, and was nearly fresh, for she had not been dead above forty-eight hours.

"On the morning of Friday, when she had just been brought into the College from the Hospital, I saw the thorax opened by Mr. Shekelton,* who called my attention to a thick brown fluid contained in the pericardium. The lecture was delivered at one o'clock on Saturday, by Mr. Dease; and on Sunday morning early, he awoke with a violent shivering and sickness of the stomach; the former was very severe, and the latter continued for upwards of two hours. He threw up his dinner, consisting of fish, of which he had eaten very freely; and afterwards he vomited a large quantity of bile. Even at this time he complained of acute pain in his left shoulder. His friend Dr. Sheridan saw him early this morning.

"He sent for me at half past eleven o'clock, and earnestly besought me to bleed him for this pain in the shoulder, which he described as very severe, and as aggravated by the slightest attempt to move the arm. I found him at this time labouring, as I supposed, under high symptoms of the prevailing fever,

* I sincerely regret to state that this young gentleman, eminently distinguished for his zeal and attainments, has since fallen a victim to the pursuit of anatomy under similar circumstances.

and conceiving that his complaints of the arm were, in some measure, the effects of impatience, I declined bleeding him except by the desire of his physician. At three o'clock, p. m. I again saw him, and although I was still of opinion that he was affected with common fever, attended with derangement of the stomach and liver, greater than ordinary, yet I could no longer resist his importunate solicitation to be blooded, and I took away nearly twenty ounces of blood from his arm by a large orifice; the blood flowed freely. He thought himself relieved of the pain in his shoulder while the first cup was filling, but this was probably ideal, as he did not express relief towards the conclusion of the operation, and as I found his pain not at all mitigated at nine o'clock, p. m. when the fever was as high as it had been at any time of the day. The blood was neither buffed nor cupped, and the proportion of serum was considerable. I now observed a slight fulness above the clavicle along the left side of the neck, in the space of the sterno-mastoid and trapezius muscles; and being in doubt whether this apparent fulness might not be owing to the position of the head, which was held rather towards this side, I wished to satisfy myself by the touch, but on applying my finger, even with the slightest pressure, he complained of exquisite pain.

"Monday morning, February 15th. I was called upon at eight o'clock this morning to see him, and found that he had spent a very restless night, owing to the pain in his shoulder, and when I went into the room he had the entire joint covered with leeches, to the amount perhaps of 100. We advised a draught with elect. scam: fomentations, and opiate liniment. At five o'clock, p. m. we met again; Dr. Sheridan,

Dr. Brooke, Mr. Richards, and myself. We learned that the draught was rejected, almost as soon as it had reached the stomach, and although the pills had brought away some liquid stools, yet the fulness of the abdomen remained unreduced. No relief has been derived from the fomentations and liniment. Repeat the pills, and assist their operations by enemata.

"Tuesday morning, 16th. Bowels have been more satisfactorily freed; symptoms, however, remain as yesterday. We felt at a loss to account for the pain in the shoulder, which, however, was less severe. We advised him to persevere in the use of purgatives, giving him the infus. sennæ et tamarind. with tinct. jalapæ.

"Nine o'clock, p. m. On visiting him this evening, he accidentally mentioned an uneasiness he felt in his left side. On examination I discovered a colorless swelling on the side of the thorax, a little behind and below the posterior border of the axilla; upon which the recollection of Hutchinson's case at once occurred to my mind. On my suggesting to him my suspicions of the cause of his sufferings, Mr. D. denied his having received any cut; of which he was so positive as almost to refuse to let me examine his hand. I discovered on the dorsum rather toward the ulnar side of the second joint of the thumb, the mark of a slight scratch, not one-fourth of an inch long. This formed the diameter of a vesicle, which was almost half filled with a fluid of a milky whiteness and consistence, and about this size, ◯.

"I should have observed that the pain of his shoulder was better on Monday night and Tuesday morning; so that he was not, as on Sunday and Monday morning, fixed to one spot, but he could now lie

with his body slightly turned towards the right side, and could raise himself in the bed by pulling with the left hand a cloth tied to the foot post. The skin above the clavicle at this time bore pressure very well; the skin at the swollen part of the side was not discolored, but was possessed with the most painful sensibility to the touch. It should be observed that every evening, about six o'clock, he had an exacerbation of restlessness and depression of spirits.

"Wednesday, February 17th. This morning we resolved to give him a bolus of calomel, with a liquid purgative, and at night, a draught, with twenty-five drops of laudanum.

"Thursday, February 18th. The discharges from the bowels in the course of yesterday were very free and natural. He slept for four hours after taking the draught, and awoke cheerful and refreshed. He was directed to take a bolus of carbonate of ammonia, together with the same diaphoretic medicine; also to foment the side, and rub it gently with a liniment of camphorated oil and aqua ammoniæ. Draught to be repeated at night, with forty drops of laudanum.

"Friday, February 19th. Had a very bad night. Some delirium this morning; but is now, at half past eleven, more composed. Face with a yellow tinge; countenance sharp, yet not indicative of much pain or inward distress; pulse smaller. He desired me to look at the right arm, which had been blooded. I found the incision inflamed in the ordinary way; but I remarked on the fore-arm, about two inches below the incision, a small vesicle ◯, containing a fluid like that produced by the original wound

on the thumb. N.B. This vesicle did not increase in size or alter in any way, until the time of Mr. Dease's death.

"Saturday, February 20th. At our visit this morning, eleven o'clock, we observed his manner quick and bordering upon delirium. Pulse 126, and smaller. The entire side, from a very little below the axilla down to the hip, was swelled. This day we observed the swollen part studded pretty thickly with small elevations, to the eye like vesicles, but hard to the touch. They bore a resemblance to the elevations which arise in the cicatrices of a part which had been scarified, when it is affected with swelling.

"An erysipelatous blush which had been first observed on Thursday, and had rather increased on Friday, was now more strong, but occupied only a small portion in the middle of the swelled side. Tongue covered with a white coating; countenance less yellow than yesterday, but still contracted and small; abdomen full.

"Saturday, evening, nine o'clock. Delirium set in soon after our visit, and has continued high; perspirations warm and rather general; however the left side of the trunk of the body, where the clothes lightly cover him, is quite dry though warm. Pulse weaker; the swelling has passed more from the abdomen towards the back; erysipelatous redness more extended and more strong, occupying a considerable portion of the side; bowels free. Although the perspiration is warm, while he remains covered, yet if his hand remain uncovered for a few minutes, it feels cold and clammy.

"Sunday morning, February 21st, nine o'clock, a. m. At ten o'clock last night he took tinct. opii gutt.

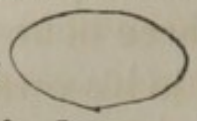
xl.; but the delirium continued for three hours after it. He insisted upon being moved into an adjoining bed, and there he lay for nearly three hours without any clothes. On being again laid in his own bed, he was stupid, and his left leg was stiff; countenance still sharp, but not yellow; lips of a good red; he has clammy sweats on the head and upper parts of the body; frequent deep inspirations like sighing; pulse 126, and weak. Wine negus, with nutmeg.

"Twelve o'clock. General state as at nine. Inflammation of the side extended up to the axilla, and on the posterior edge of the axilla appears as if there were an abcess, but is without fluctuation. Color of the inflamed part darker. He has passed no urine since nine o'clock last night, although he had an enema this morning, We advised a poultice to the side, a bolus of scammony, calomel and jalap, and cordial draughts every two hours. We now observed a swelling on the anterior part of the right arm, occupying about a hand's breadth of the belly of the flexor muscles, beginning about an inch and a half below the orifice made in bleeding him. The vesicle on this arm remains as when first discovered. A poultice to this swelling.

"Five o'olock, p. m. We agreed to puncture this tumor, although he appeared approaching fast to dissolution. A quantity of serous fluid, nearly a teaspoonful, flowed from the opening, but did not, in the slightest degree, diminish the swelling.

"Sunday evening, nine o'clock. Pulse in right wrist not to be felt; heat of limbs not reduced; breathing quick and labored. He passed urine at five o'clock this evening, and at ten o'clock he died (8th day).

"Monday morning. I was called early this morning to examine his body, as one of the pupils who

remained in the room fancied he heard him breathing. I now observed that two or three vesicles of this size  , had formed on his back; the swelling had extended down the thigh; the left arm was swelled, and rather hardened from the elbow nearly up to the shoulder. This swelling was chiefly along its anterior surface, but it could also be felt all around; yet there was no redness or vesication on the limb. Along the left side of the trunk the raised hard spots continued as in life."*

Case of John William Newby, Esq surgeon.

"On Saturday, the 31st May, Mr. Newby was exposed to a heavy rain. On the following day he opened the body of a child which died of enteritis, having also, as I was informed, erysipelas of the abdomen. On the Monday and Tuesday, he was, as usual, occupied in his profession, but complained of great languor and depression. On the evening of Wednesday, I was requested to see him. At that time he complained of head-ache, general pains of his limbs, heat, nausea, and constipated bowels. His pulse was frequent, but neither hard nor full; the tongue was white. He showed me a pustule on the back of the left thumb, exactly resembling the small-pox, but did not, in any way, account for its appearance; nor even mention the circumstance of having opened the body of a child on the preceding Sunday. He had slight pain in the axilla, without tumor or any appearance of inflamed lym-

* Extract from Dr. Colles's paper, "On slight Wounds received in Dissection." Dublin Hospital Reports, vol. iii. From the same able surgeon the medical public will shortly receive the particulars of Mr. Shekelton's case.

phatics on the arm. He had taken a purgative and diaphoretics, by the advice of his friend Mr. Barry, which we directed to be continued. The evacuations from the bowels were very offensive. On Thursday he seemed somewhat better, and continued so till the evening of Friday. The thumb gave very little uneasiness, and the pain in the axilla was much diminished. During the day he took more nourishment, and a little wine and water.

"Saturday. He had passed a restless night, and complained of a deep-seated pain in the left breast, which assumed a light pink tinge; and the axilla and arm became more uneasy; the thumb being nearly well. I requested that Mr. Copeland might be sent for, to give us his aid and assistance in the management of the diseased part. The pulse increased in frequency. He took very little nourishment or medicine during the day, but had an opiate at bed-time.

"Sunday. He had some sleep in the early part of the night, but afterwards excessive irritability, with some delirium. The inflammation of the breast had extended, and was surrounded with a deeper red margin of about one-eighth of an inch in breadth. The pulse was about 108, more feeble; the tongue had become dry and brown. He had, during the day, infus. cuspariæ, with acid. muriat. and opium, given in considerable doses every four hours; wine, &c. In the evening he was visited by Dr. Hooper.

"Monday. Passed a very restless night, though the opium had considerably lessened the irritability. The pain of the head was greater, and that of the left breast much increased. The tumor had extended from the sternum to the scapula, and from the clavicle to the left hypochondrium. The heat of the skin was much greater; the tongue was dry and

brown; the pulse 110. He had had two fetid stools. The medicines were continued. He was very restless during the day.

"Tuesday. The arm had swelled during the night, and the tumor of the breast appeared to contain a considerable quantity of effused serum, and was of a brownish yellow color; the symptoms nearly as on Monday. Decoct. cinchonæ, with acid. sulph. dilut. opium and wine were directed to be given.

"Wednesday. He had passed a restless night. All the symptoms were aggravated; and he died about twelve (11th day).

"It is worthy of remark that during Mr. Newby's illness, Mr. Jackson, his assistant, had an inflammation of the fauces of an erysipelatous appearance, which terminated in suppuration of the tonsil. His pupil had an attack of low fever, which continued about a week. The housemaid was severely affected with cynanche tonsillaris, which terminated by resolution. The nurse had a slight attack of pyrexia, with pain and stiffness of the back of the neck; on account of which she went home for a day or two, but returning to the house, she was attacked with erysipelas phlegmonodes, which proved fatal. Another woman, who assisted in the room after Mr. Newby's death, had also the erysipelas phlegmonodes, but recovered.

"Was the disease which destroyed Mr. N. erysipelas, produced by inoculation affecting the cellular substance of the breast, and parts adjoining? Did the five cases which occurred during his disease, and after his death, arise from erysipelatous contagion?"*

* From the Medical and Physical Journal, August, 1823. Communicated by Dr. Nelson.

Case of George Heginbotham, undertaker, aged 27.

On Tuesday, the 4th August 1818, Heginbotham was employed to remove the corpse of a woman who had died of typhus, in a shell, from the fever hospital. In conveying the body from the shell into the coffin, he observed that his left hand was besmeared with a moisture which had oozed from it. He had, at the time, a recent scratch on the second joint of the left thumb. On Wednesday morning, the scratch was inflamed, but he took little notice of it. At eight o'clock in the evening, he was attacked with a cold shivering, and pain in his head and limbs. On Thursday, at two, p. m. he was visited by Mr. Newington, surgeon, of Spital Square, to whom I am indebted for these particulars, He was then vomiting; his face flushed and turgid; pulse 120 in a minute, full and hard; tongue very white. He was fearful he had caught the fever, and manifested great anxiety. A full dose of calomel and jalap, with a brisk purging draught, were given, and the latter directed to be repeated every three hours. In the evening the medicine had not operated, and his symptoms were not relieved. The pills and draught were repeated, and operated four times in the course of the night, which was passed in great restlessness.

Friday. The sickness had subsided; tongue cleaner; pulse 100. He now complained of a sensation of soreness on the top of the left shoulder; and fulness in the axilla, with a numbness or want of feeling in his fingers. These parts were however natural both to sight and touch. The draught to be continued, and the pills repeated at bed-time.

Saturday. Constitutionally much better. Pulse 90; tongue less loaded; the scratch on his thumb suppurating; the absorbents and their glands quite

natural; but the uneasy sensation continued in his shoulder, and he now also complained of a soreness in his left breast, which was slightly puffed and of a pink hue. To repeat the calomel at bed-time.

Sunday. Had passed a restless night; more fever; pain in his breast and head; bowels relaxed. Ordered saline mixture with liquor ammoniæ acetatis, and an opiate at night.

Monday. Pulse 120; great anxiety; pain in his head and breast increased; the latter more swollen. Some leeches applied to it gave relief. Continued the fever mixture.

Tuesday. Had passed a bad night, and became delirious. Pupils of his eyes very much contracted. Ten ounces of blood were taken from his arm, and more leeches applied to his breast, which was more tumid and high colored. A blister was placed upon the nape of the neck. An opening draught which he took, operated two or three times in the course of the afternoon.

Wednesday. Had continued very delirious throughout the night. His fever was increased, with great debility. In the evening he was visited by Dr. Babington, who ordered him a calomel and opium pill, with a draught of liquor ammoniæ acetatis containing conf. damocrat. ʒj. every fourth hour.

Thursday. Comatose and insensible. Pupils contracted almost to obliteration. In the afternoon he died, being the 10th day from the inoculation.

Case of Mr. C. student of medicine. Mr. C. aged twenty, was attacked with a severe rigor on the morning of Friday, the 9th of January, 1824. He had been dining in company the preceding day, and was supposed to be laboring under the effects of a disordered stomach,

from some intemperance in diet. When visited by his surgeon he complained of pain in the left pectoral muscle extending to the axilla. He had some head-ache, a quick and hard pulse, and a hot and dry skin. A full dose of calomel and James's powder was given immediately, and directed to be followed by a brisk cathartic draught. In the evening he was somewhat relieved by alvine discharges and a profuse perspiration; his pulse was softer, but still quick; he had intense thirst. He complained principally of the same pain as in the morning, but no appearance of inflammation could be discovered. Calomel and antimony and salines, at stated intervals, were prescribed.

Saturday, 10th. Had passed a restless night. Still suffered pain in the same spot; his head was slightly disordered. Leeches were applied to the temples, the purgative draught repeated, and other medicines continued.

Sunday, 11th. Had passed another bad night, but had less fever; pulse less frequent; skin moist; and tongue cleaner. He was considered better. Remedies as before.

Monday, 12th. Had passed a turbulent night; at times violently delirious; pupils dilated; extreme thirst; pulse 120. The leeches were again applied. Calomel and antimony given every four hours, with a saline draught. In the evening he was seen by a hospital physician, who ordered cold lotion to the head, a blister to the nape of the neck, and a continuance of the medicine, with the addition of digitalis.

January 13th. Much the same. A second physician of eminence joined the former medical atten-

dants. Medicines continued, with the exception of the digitalis.

Wednesday, 14th. Had passed the greater part of the night in a state of insensibility with paroxysms of fierce delirium, and was now apparently exhausted and sinking. Nourishing broth and a limited portion of wine were ordered. On the evening of this day he raised his hand in his delirium, and exclaimed "here's a big fellow," when the nurse discovered that the forefinger of the left hand was considerably swollen. I was in consequence desired to visit him on the following day. When I entered the apartment he was in a state of violent delirium, so as to be, with great difficulty, kept in bed. I found the finger swollen and tense, and some inflamed absorbents extending from its base a short way above the wrist. A diffused purple-colored blotch appeared on the integument of the ribs, and iliac region of the left side; it was very slightly, if at all tumid, but evidently tender to the touch, and its margin abrupt. I could discover no tumefaction nor blush upon the pectoral region or in the axilla, nor was there any sign of tenderness on pressure. A dusky red papular eruption appeared in pretty thick clusters on the forehead and breast, but this was stated to have existed prior to the attack of fever. Upon the dorsum of the first phalanx of the index finger, there was evident fluctuation, and I divided the extensor fascia, and let out about half a tea-spoonful of matter. I also incised the opposite flexor theca, but no pus escaped. The hand was then plunged into a basin of hot water and bled freely, during which time he became tranquil, and in ten minutes fell into a sound sleep. This was of short duration; but he had no return of fierce delirium. It was now of the low kind, with incoherent

muttering. In the evening he remained tranquil, and was partially sensible, but too weak to articulate intelligibly. During the night he became comatose, and in this state expired early on Friday morning, being the sixth day from the attack.

About a week prior to this young gentleman's illness, he had mentioned to a fellow student having pricked his left fore-finger; and received, at the time, a caution from the latter. During the two days immediately preceding his confinement, he was engaged in dissecting ligaments. It was not known to his attendants that he had either wound or scratch, but on minute examination a cicatrix was discovered on the extremity of the affected finger.

Case of Mr Graves, student of medicine.

Mr. Graves, a native of Barbadoes, and a dresser of the late Mr. Chandler, of St. Thomas's Hospital, in examining the body of a man who died of a fractured skull, slightly punctured his finger with a thin spiculum of bone; the accident was so trifling that he took no notice of it. This happened on the 26th October, 1819. On the following evening he complained of being indisposed, and thought he had taken cold. He put his feet into warm water, and took a diaphoretic draught on going to bed. Next morning, 28th, he was irritable, had head-ache, great heat, and much restlessness. His pulse at this time beat 130 in the minute, and was strong and full, and he complained of soreness in the axilla, and about the breast on the same side. By the advice of a physician attached to the hospitals he lost a pint of blood from the arm, and took in pills half a scruple of extract of colocynth and three grains of calomel.

29th. Pulse 135, great soreness under the arm and over the left breast; no relief from the medicine. Ordered to repeat the pills, and apply leeches and fomentations.

30th. Has been talking incoherently at intervals during the night; is now more tranquil; pulse 110, and strong; has had two motions. In the evening of this day the symptoms of irritation increased and delirium came on.

Nov. 1st. Had no rest during the night; for the most part delirious; towards the morning furiously so. At nine o'clock attempted to seize a razor, and destroy himself, under the influence of an impression that he had committed murder. Pulse 135, not so full. Has much nausea and vomiting, with singultus, at intervals. Ordered to take five grains of calomel, and a solution of one drachm of the sulphate of magnesia hourly. Complains of great tenderness of the axilla; fifteen leeches to be applied to it. The saline aperient could not be kept on the stomach; the same dose of calomel was therefore repeated, and a diaphoretic draught, containing forty drops of laudanum.

Nine o'clock, p. m. Had had no evacuation, and but little rest; fomentations are continually applied to the breast and arm-pit. Pulse 120. Calomel pill of five grains repeated, with one grain of opium, and a drachm of sulphate of magnesia to be given every hour in infusion of roses.

Nov. 2d. Had passed a part of the night with composure, but much troubled at intervals with hiccough and vomiting. Has had five thin dark-colored motions; is delirious; pulse 120, and depressed; tongue foul. To continue the solution of salts in mint water. Four o'clock. Three slight motions, thin and of

dark color; pulse 120, and small; tongue red; could not retain any medicine.

Nov. 3d. Dozed some part of the night; singultus more frequent; pulse 128, and feeble; tongue furred; great soreness along the right arm, foot, and ankle. Since the last report, has had eleven natural-colored motions, with vomiting at each. One o'clock, p. m. Is sensible only at intervals, and very weak; cannot be moved without the greatest pain. Pulse 110, and feeble. Four o'clock. Pulse irregular; ordered one grain and a half of opium in a pill. Ten, p. m. Has had two motions of a brown color; abdomen much swelled; hiccough very troublesome; ordered an enema, containing thirty drops of tincture of opium.

Nov. 4th. Very restless all night; pulse 120, and feeble; tongue furred in the centre, and red at the margins and apex. Passed three motions in bed; great nausea, without the power to retch. Two o'clock, p. m. Hiccough continues; pulse weaker; complains of feeling as if his arms and legs were broken. Ordered a grain of opium every hour. Nine o'clock. Pulse 128, and fuller. Comatose from the effect of the opium. Abdomen tympanitic. Injic: enema terebinth. statim. Has taken a tea-spoonful of brandy in water occasionally, but is compelled to discontinue it, as it creates a burning sensation in his stomach. Eleven o'clock. Pulse 132, and fuller; a gentle moisture on his face and forehead.

Nov. 5th, eight a. m. Comatose during the night. Pulse increased to 150; will take no more medicine; says he shall die. Hiccough less frequent, but more violent. Ten o'clock, a. m. Breathing frequent; pulse irregular; countenance sunk. There o'clock, p. m. Pulse so small as to be arrested with the slightest pressure; the eyes look dull; pupil con-

tracted; respiration difficult; appears sinking fast. Six o'clock, p. m. Symptoms the same; has passed a feculent motion, and a little urine of high color. Pulse 140, and fluttering; has passed wind freely by the mouth and anus, by which his breathing is relieved. Twelve, p. m. Great efforts to expel wind; some relief afforded him in this way, by a syringe introduced per anum. Has taken some brandy and water, and discharged much wind from his stomach. Complained of tenderness of the right arm.

Nov. 6th, ten, a. m. Hiccough has left him, and he is more composed; a blush upon the surface of the right fore-arm, with great soreness and tenderness. Passed a thin dark-colored motion. Four o'clock, p. m. Pulse 140, and very feeble. Much difficulty in throwing off the bronchial secretion; makes great efforts to expectorate. Nine o'clock, p. m. Distressed with thirst; takes cold water frequently. The abdomen now sunk and soft, but respiration laborious.

Nov. 7th, two o'clock, a. m. Exhausted by his repeated efforts to get rid of the bronchial secretion. Eight o'clock, a. m. Died; being the 13th day from the injury.

Examination. The viscera were all healthy. The lymphatic vessels of the extremities were thickened, and some purulent matter was found in the cellular membrane tracking these vessels, in the extremities of the opposite side, as well as of that which had been injured.

Case of Mr. Archer, student of medicine. William Thomas Archer, dresser to Mr. Forster of Guy's Hospital, on Tuesday, February 11th, 1817, was engaged in examining the body of a man who died on the preceding day of an

inflamed vein after blood-letting. Whilst sewing up the body he punctured the middle finger of the left hand; the puncture gave him excessive pain. The next day he complained much of uneasiness in the finger, which shewed scarcely any inflammation; it presented a small appearance of a spot much like a flea-bite. On Thursday evening, he was evidently laboring under general constitutional irritation; towards evening the axilla became affected with considerable pain, swelling, and hardness. He now, for the first time, applied a poultice to his finger and to the axilla. The finger gave him little pain, but that in the axilla was most excruciating upon the slightest motion of the arm. He took some pills of calomel with cath. extract.

On Friday morning, he was more indisposed, having had an extremely restless night. The bowels were relieved three times; he took very little during the day except diluents to quench his thirst and promote perspiration. The axillary glands were now considerably enlarged and painful; some tumefaction over the pectoral muscle; accelerated pulse; white and dry tongue. Five grains of calomel, and one of opium were given at night, and a purgative and antimonial draught ordered alternately, and at short intervals. Twelve leeches were immediately applied to the axilla, and parts adjacent, the bleeding from which was very copious. The parts were afterwards fomented and poulticed every four hours. The hand was also immersed in poultice.

Saturday. Passed a restless night, but complained much less of pain. Pulse quick, but soft; much thirst; furred tongue; no appetite; medicines and applications continued; an opiate at night procured some sleep.

Sunday. An increase of pain and tumefaction; twenty-four leeches applied to the parts affected; functions of the brain somewhat deranged. Pulse 120, but soft. Tongue partly covered with a brown fur; debility very great; excessive thirst. Was this day ordered beef tea, sago, arrow root, &c. Medicines continued.

Monday. Passed a better night; expressed himself much relieved. Medicines and applications continued. Slept much during the day and following night; occasional slight delirium. From this period up to the 20th, the same state of stupor, with occasional delirium, continued. The symptoms now indicated the formation of matter. He was put upon the bark, with a generous diet.

On the evening of the 22d, he was attacked with a pain in the left side below the ribs, increased upon coughing and inspiring deeply; no fluctuation could be detected. The side was now bathed with a spirituous embrocation very frequently, and a cold poultice of the same and bread applied to the axilla, and over the pectoral muscle.

Monday, 24th. Pain less. Was attacked with severe diarrhæa. Sum. mist. cretæ $\bar{c}$ conf. arom. et tinct. opii.

Tuesday. An opiate enema was exhibited in addition to the medicines.

Wednesday. Pain, cough, and difficulty of respiration increased.

Thursday evening. The side was punctured, when twelve ounces or more of well-digested pus escaped. Pain and breathing much relieved. Bowels as before.

Friday. Diarrhæa continued. The quantity of opium increased.

Saturday. Increase of pain. Another large collection of matter confined under the pectoral muscle, was discharged by puncture. Bowels the same.

Sunday. Pain in the side very severe with cough. Nine or ten ounces of matter again discharged from the side. Takes much nutriment, with half a pint of port wine daily. Bowels very irritable; purulent matter passed at stool. From this time the symptoms became hourly more unfavorable, and terminated his existence on the 22d day from the injury.

Mr. Smartt, a surgeon, of Bishopsgate Street, drew up at my request the following cases at the time of their occurrence.

Case of Mr. Delph, surgeon of Edmonton. "On Sunday afternoon, May 11th, Mr. Delph, son-in-law to Mr. S., and Mr. Smartt, jun. were employed in examining the chest and abdomen of a woman who had died the same morning of visceral inflammation. The body was yet warm. The dissection displayed a very extensive inflammation of the right lobe of the lungs, both surfaces of the diaphragm, and the upper surface of the right lobe of the liver. There was a considerable quantity of serous fluid in both cavities, and coagulable lymph was shed out abundantly. During the examination, Mr. Delph's left hand was pricked or scratched several times, and in sewing up the body, Mr. Smartt's right hand was wounded with the needle.

"On Tuesday, May 13, Mr. D. found himself unwell, being chilly, with thirst and head-ache; to remove which, he took six grains of calomel, and a draught of infusion of senna.

"On Wednesday, May 14th, severe rigors were alternated with great heat, and the febrile symptoms became established. He now complained of pain passing along the arm towards the axilla, but there was no inflammatory line to be observed, neither was there any axillary tumor. The pain extended to the pectoral muscle, and the motion of the arm was interrupted. The hollow between the pectoral muscle and the muscles of the back immediately below the axilla, was lost, and its place occupied by a tumor of considerable bulk, not circumscribed, but diffused, exceedingly tender, and having a light pink blush. As this increased, the fever became violent, and the sensorium was considerably affected, skin burning hot, pulse 130 to 140, thirst great, with total inability to move. On the first appearance of the tumor, sixteen leeches were applied, which produced a very copious bleeding; the bowels were freely opened, and the arm was enveloped in a bag of chamomile flowers continually, as a fomentation. Poultices were also applied to the side.

"May 15, Mr. Travers saw him, and on a careful examination thought he discovered some obscure fluctuation in the anterior part of the tumor near to the edge of the great pectoral muscle, and with the view in any event of unloading the cellular membrane, he passed a lancet deeply into it, but blood only flowed from the wound. This part was then poulticed and fomented, and during the six succeeding days, the practice hitherto adopted was pursued; each day a considerable number of leeches being applied.

"Mr. T. visited him on the 16th, and again on the 18th, when he was joined in consultation by Dr. Pett

and Mr. G. Young. Their joint opinions concurred in the practice adopted.

"May 23. The tumor had now extended downwards and backwards to the vertebræ, and here a fluctuation appeared so evident that Mr. Hammond, surgeon, of Edmonton, who kindly visited Mr. D. made a second opening, but with no better success than the former. However in a few days a considerable discharge took place spontaneously from this latter opening, and continued in very considerable quantity for a fortnight. Another opening was subsequently made, anterior to that last described, by Mr. Travers, from which much pus issued, the fluid appeared good of its kind, but excessive in quantity.

"About the end of May, and beginning of June, very considerable irritative fever existed, pulse as high as 140, with great restlessness and severe rigors, followed by heat.

"June 6 or 7. The opening first made by Mr. Travers, had for some days appeared angry and inflamed; it now gave way, and permitted the escape of a coffee-cup full of well digested pus; the opening healed in about a fortnight. After the discharge of this last collection, Mr. Delph began to sit up in his chair, and took a moderate quantity of solid nourishment, and brown stout pretty freely.

"The affected arm remained for some time nearly useless, although no tumor had formed in it, and at this time, July 7, he can scarcely hold a fork in his hand. His health promises to be restored very slowly, his emaciation and weakness being extreme.

"July 1st. He complains of severe pain on the upper part of the sternum inclining to the left side,

to remove which six leeches were applied, and the part was afterwards covered with a blister.

"It is to be remarked that the parts never presented that sensation to the finger which usually attends phlegmon, but a sort of undulation which indicated the presence of matter, but at the same time left its precise situation uncertain." Mr. Smartt adds, "the woman who nursed the person from whose body the poison was received, and who also washed her linen, was seized with fever, and considered in great danger, as I have been informed."

Case of Mr. J Smartt, surgeon, of Enfield. "Mr. Smartt was also attacked with febrile symptoms on the 13th of May with a numbness and inability to move the right arm.

"May the 15th. The side of the chest became very tender and swollen, as was also the whole of the right side, as low as the groin. The fever, which was of the typhoid kind, was violent and alarming, the sensorium being much affected. The mode of treatment in the first instance was the same as that adopted for Mr. Delph, but the loss of blood was not carried to so great a length.

"May 22d. Matter being felt near the groin, although equally undecisive as in Mr. Delph's case, an opening was made, and a cupful escaped. This did not afford much relief, as suppuration was evidently about to take place on the other parts of the side, and on June 1st a second abscess was opened three or four inches above the former. This also discharged very considerably.

"The febrile symptoms now had much abated, but about the 10th of June great uneasiness took place

in the right breast, which became very much swollen and enlarged.

"On the 14th, an opening was made three or four inches below the axilla, from which issued about fourteen ounces of healthy pus. The quantity poured out from these several openings for a fortnight was prodigious. To lessen it in some degree, Mr. Travers made counter-openings to the two lower ones, which very soon reduced the quantity, and the upper opening near the axilla soon assumed a better aspect, the discharge being much diminished.

"On the 20th of June, fever having returned for three or four days, the arm became very uneasy, and on examining it a fluctuation was evident on the inner edge of the biceps muscle, which I opened. The cavity appeared to extend as high as the axilla, as matter escaped on our pressing that part.

"The whole side appeared tender and tumid for some days, and I thought suppuration had taken place, but the integuments were so little raised, that I could not be certain of this; however about the 1st of July, the discharge was so much increased from the lower opening, that I felt persuaded a communication had taken place between the two cavities. For the last month, Mr. S. has perspired very much, and has been so debilitated as to be even now, July 8, unable to leave his bed, where he has lain for seven weeks. He can with great difficulty move his arm, or close his thumb and fingers. He takes freely bark and acids, meat, wine, and porter. The swollen parts have been generally covered with linen cloths wet with equal parts of liq. ammon. acet. and water, with a little spirit of wine.

"During the early part of Mr. Smartt's illness, he was taken care of by a man servant, who happened

to wound his hand during his attendance, with a nail, but it was very slight. This wound was on the back of the index of the right hand. It became highly inflamed and swollen, and put on a livid hue. I opened it, and discharged a table spoonful of pus, but soon perceived that the extensor tendon of that finger had suffered; and although the wound is now healed, the use of the finger is lost, and the part continues swollen and angry. Notwithstanding the early opening I made in his hand, a tumor formed in the axilla, which I also opened. This man suffered much from fever for about a week, so as to deprive Mr. S. of his services. During the latter part of Mr. S.'s illness, he, having been removed to his father's house, was principally nursed by his mother, and it is remarkable that she had an attack of inflammation on the back of one hand, from which the cuticle peeled off, accompanied for two or three days with considerable fever. It is worthy of particular attention, that in neither of these unfortunate cases were the absorbents of the arm inflamed shewing the red line, which usually marks the track of the mischief of whatever kind it may be, from the punctured part into the system. The mode of communication then becomes an important subject for inquiry."

Remarks. I do not hesitate to regard the foregoing as well-marked cases of the admission of a poison into the system.

Dr. Pett's case. The case of Dr. Pett was evidently precipitated by the incautious use of a stimulus after the lapse of many hours from the injury, to which his attention was roused by its being already the seat of pain. Had the caustic never been resorted to, the

event would probably have been equally disastrous; but the progress of the case would have been less hurried, and consequently more time, a point of no small importance, would have been afforded for treatment. Of those who are disposed to consider that the escharotic application had to do with the production of the disease, I would inquire,

1st. Whence originated the pain prior to the application of the caustic?

2d. Whether sphacelus of the last joint of a finger, accompanied by very moderate and fugitive inflammation of the absorbents of the arm, for such it was, has ever been known to occasion a disorder of the system so great and unremitting as to extinguish life in three days?

Let it be granted, for argument's sake, that the gangrenous inflammation, the part being already inflamed, was excited by the stimulus of caustic; that the severe rigor of three hours' continuance, and the intense pain endured on the first night, were due to this inflammation, which in less than twenty-four hours terminated in sphacelus; and that to these causes was to be ascribed the awful change of appearance observed on the second morning. The transient inflammation of the absorbents we shall consider as sympathetic. It is not the property of caustic to act beyond the sphere of its application, or to produce a continuous inflammation.* The pro-

* I once directed a caustic issue to be opened upon the summit of a large and indurated glandular tumor of the neck of a scrofulous boy, after the usual means of promoting absorption had been freely and ineffectually employed. Gangrene took possession of the entire swelling, which I attributed to its low organization and the feeble habit of the subject, and proved fatal in about five days from the formation of the eschar. This is the only instance which

per termination of absorbent inflammation is in enlargement and phlegmonous abscess in or about the lymphatic glands; nor have I ever seen the serous erythema supervene upon simple inflammation, whether of the absorbents or the cellular membrane. Therefore I consider the case mixed, and thus—the gangrene and sphacelus and sympathetic inflammation of the absorbents determined by the local irritant, and the rapidity and vehemence of the constitutional disorder aggravated by the violence of the local action; the erythema, like the attending disorder of the system, pathognomonic, and such as would have taken place independent of any application, i. e. the legitimate result of absorption prior to the use of caustic.

Professor Dease's case. It was, in Mr. Dease's case, only by analogical inference, on the evening of the third day from the attack, that the origin of the disease was traced to its real cause, viz. a slight scratch on the thumb presenting the appearance of a vesicle corresponding to the wound in diameter, and filled with a milky fluid; consequently there had been no inflammation of the absorbent vessels of the arm. To the rigor which supervened, after about the same interval as in Dr. Pett's case, were added sickness and retching. The acute pain in the shoulder was accompanied by no external sign of inflammation. It was not mitigated by a full blood-letting, nor did the blood shew any sign of inflammation. Well might the intelligent narrator of the case feel "at a loss

I have known of the action of caustic as a topical application becoming diffused. With this single exception, it is as little consonant to my experience that a caustic should occasion gangrenous inflammation, even when applied to a part already inflamed, as that a poison inserted by abrasion or puncture should have this effect.

to account for the pain in the shoulder." The appearance of an erysipelatous blush in the centre of the hitherto colorless, but exquisitely sensible swelling on the side. was noticed only on the sixth day. On the seventh day a vesicle appeared on the opposite arm two inches below the incision of the vein, containing a fluid like that produced by the original wound. It is impossible to dis-connect the origin of this appearance from the wound made in bleeding. It demonstrates,

1st. That any local irritation sufficed to produce in any part of the body the characteristic sign of the prevailing morbid action.

2d. That this was independent both of contiguous and continuous sympathy, and pervaded the whole system without reference to any particular track or channel.* The appearance of small elevations, to the eye like vesicles, but firm to the touch, thickly studding the swollen part on the seventh day from the injury, will not escape the reader's notice. These were doubtless of the same character with the former, but modified in appearance by the inflammation of the surface. The appearance of an incipient suppuration on the posterior edge of the axilla of the injured side, and of another below the bleeding orifice on the opposite arm, was noticed on the day of his death. Here again the site of the secondary abscess, as of the vesicle, must be referred to local irritation.

Rigor, nausea, and retching, abdominal tension, restlessness, and depression of spirits, with a rapid and feeble pulse, coated tongue, pinched counte-

* It would have been interesting to have ascertained, by the experiment of inoculation, whether the fluid contained in this vesicle was possessed of the same properties as that formed upon the original wound.

nance, partial perspirations, and at length, delirium, followed by stupor and laborious breathing, and terminating existence in the space of ten days, are all legitimate signs of high constitutional irritation, peculiar to no individual form of local injury. But when we find, super-added to these, and seeming to hurry on their career, acute pain and swelling, occupying, within a very few hours, that region of the body which connects the trunk with an injured extremity, the supervention of erythema to the extended swelling of the integument, and the subsequent threatening of diffused suppurations—it is impossible to resist the strong evidence of analogy which such symptoms bear to those which attend upon injuries having a similar origin, and upon those only. But the vesicle furnishes at once the most curious and convincing proof of poison. The pustule of small-pox, and the vesicle of cow-pox formed upon the wound, are not more conclusive of the inoculation of their fluids respectively than was the vesicle in this case of the insertion of its proper virus. The appearance on the seventh day of a second vesicle in the vicinity of a clean wound, inflicted twenty-four hours after the first, determined, as before observed, by local irritation as to its origin and site, is only to be explained on the hypothesis of poison. Had the bleeding wound been made with a lancet which had been employed to puncture the original vesicle, there can be little doubt that the vesicle would have been formed at once, and upon it, instead of two inches below it; for then the irritation, as well as the inflammation, would have been specific.

A short time ago, a woman applied to me with a vaccine vesicle upon the cicatrix of a lancet wound. This was surrounded by several spurious and imper-

fect vesicles of the same character. I entertained no doubt that the practitioner had incautiously employed a lancet charged for vaccination. The wound had inflamed as usual, and the secondary vesicles were, I considered, in this case the result of a specific irritation added to a common inflammation, for the action or process denoting the proper inflammation (areola) of the vesicles, failed; whereas, in the case above related, the irritation was simple, the inflammation specific, of which the strongest proof is furnished by the formation of a vesicle, containing a fluid resembling the orignal, in the vicinity of the clean wound. It is to be remarked again, that the formation of a tumor to appearance so advanced as to induce Dr. Colles to puncture it, took place in this same spot, to wit—"about an inch and a half below the orifice made in bleeding" a few hours prior to dissolution. A serous fluid only, as is usual in these cases at this period, issued, to the quantity of a teaspoonful; the swelling was undiminished; but there can be no doubt, had the patient lived, and the constitution been equal to it, that this tumor, as well as that on the edge of the pectoral muscle, would have suppurated. This is a strong corroboration of the preceding argument, viz. that the inflammation was that of a poison predominating throughout the system; the demonstrations of which, both as to mode of action and to place, were determined partly by the stage of the constitutional malady,* and in part by the casual application of a local irritant. Whether, therefore, the disease first shews itself in the shape of vesicle or pustule, or of erythema with lymphatic

* Mr. Brice's ingenious and satisfactory test for vaccination shews the influence of the constitutional stage over the local action in a remarkable manner.

exudation, terminating in spurious abscess of the cellular membrane, depends perhaps as much as situation upon accidental circumstances; but such forms are, in my belief, essentially characteristic of the action of poison.

Mr. C.'s case. Although in Mr. C.'s case, from the circumstances of the injury having been totally disregarded by the unfortunate subject of it, and its purely accidental discovery in a fit of delirium the day before his death, we are deprived of the confirmation which his attention pointed to the subject might have elicited, I think the case in itself so complete and striking as to be enhanced in value by the divestment of all circumstances which could create prejudice or influence opinion. The illness was sudden and peculiar; and the nervous system so remarkably affected that the slightest evidence of the fact of a local affection was sufficient, as it was also necessary to explain it. But it was the appearance of the erythema on the side of the chest, as reported, and which I consider diagnostic, that instantly carried conviction to my mind. After-inquiry into the case of this unfortunate young man brought us full satisfaction on two points not before known to me, as he was engaged in the pharmaceutic department of the hospital; first, his having been recently engaged in dissection, and secondly, his having asked advice about a week before, for a wound in his finger. This insidious introduction of the poison should put dissectors on their guard, and rouse instant attention to a wound however apparently trifling. In Mr. Dease's case, the source of mischief presumed by others was not admitted by himself. If it be possible for the enemy to approach without the signal of acute local

pain—and the history of these cases shews some variety in this respect—the danger becomes formidable indeed. It is probable that lives have been lost in this way under a total ignorance of the mischief. A lamentable case not long since occurred in the French schools, which furnishes a reasonable ground for this painful suspicion.

Mr. Newby's case. I do not consider that Mr. Newby received any disease from the subject of his dissection, and he certainly was not affected with erysipelas of any sort. He had absorbed the poison of decomposed animal matter from the body which he examined on the Sunday. All the symptoms conform to this theory, both local and constitutional. The pustule in all probability was formed upon the site of a slight and superficial abrasion or puncture,* and was characteristic of the poison. Languor, headache, nausea, and other symptoms of fever preceded the appearance of pustule, and this, without any affection of the absorbents of the arm, was followed by soreness and the erythematous swelling and inflammation of the breast, pain, excessive irritability, delirium, and death. There is much reason certainly to believe, that the indisposition greater or less of the five persons employed in nursing or attending upon Mr. N. was referable to a morbid effluvium. Vigilance and anxiety, however, were also present, and in the case of the nurse, who was most under the influence of these predisposing circumstances, the disease went a fatal length; but the others appear to have been either differently or very slightly affected, which

* The circumstance of its being the left thumb, adds strongly to the probability of its being occasioned by puncture.

would scarcely have been the case had any specific contagion been generated.

Heginbotham's case Of the nature of Heginbotham's case no doubt can, I think, be reasonably entertained. An abraded surface imbued with decomposed animal matter is followed by shivering, pain of the head and limbs, and vomiting, with flushed face, and pulse of 120. By the operation of medicine these symptoms are abated, but on the fourth day there is soreness in the top of the shoulder, and fulness in the axilla, and on the day following, the breast becomes swollen and efflorescent. The fever returns, the symptoms are those of general increased excitement, with an augmentation of the local pain, swelling, and redness. To this succeeds delirium, which is followed by prostration and coma, and death on the tenth day. Let it be remarked that in the short interval between the attack and his dissolution, the scratch suppurated, and that the absorbents of the limb were unaffected throughout. The former circumstance shews that the scratch had been irritated, and in an active state; the latter that the track of the poison may escape observation.

Mr. Graves's case. Mr. Graves's case, faithfully detailed by an intimate friend and fellow-student who never quitted him, presents some remarkable features. No mention is made of inflammation of the wound or absorbents of the arm. On the third day he is attacked with smart fever, and soreness of the breast and axilla, incoherence and increasing irritation on the fifth, and on the seventh, raving delirium. Vomiting and hiccough, almost incessant, now add to his sufferings, with increasing pain of the breast and

arm-pit, and on the ninth, great soreness is complained of along the opposite arm and leg. The symptoms continuing with every indication of excessive debility, on the twelfth day a blush attended with soreness appeared on the right fore-arm, and on the thirteenth he died, exhausted.

After death the absorbents of both extremities are found to have undergone an inflammatory thickening, and some purulent secretion is discovered in their track. It is difficult to reconcile with these appearances, the late and very slight and partial appearance of absorbent inflammation. From the diffusion of inflammation through the absorbents of both limbs it follows that the entire lymphatic system was affected, a change which must be ascribed to the morbid state of the circulating fluids, like the farcy of the horse.

Mr. Archer's case. The case of Mr. Archer I well remember, having attended him with Sir A. Cooper. Neither the wound nor the arm were inflamed, though the former, insignificant as it appeared, was painful. The pain in the axilla, which was much swollen, was excruciating on the evening of the third day. The pectoral fulness appeared on the fourth; and on the fifth, there was a mental confusion approaching to low delirium. On the seventh, delirium and insensibility alternated; then followed the chilliness and hectic irritation attending obscure suppuration. On the twelfth, deep and fixed pain in the left side was increased by cough and full inspiration; and on the sixteenth the system was additionally sunk by profuse diarrhæa. A copious purulent discharge was obtained on the seventeenth, by an incision made at a venture, without any relief to the symptoms; and

on the nineteenth another discharge, as copious as the former, followed a puncture at some little distance from the first. It was only by the aid of much support from wine and opium that the system held out till suppuration had taken place. The diarrhæa was a symptom of breaking up, it was never afterwards controlled, and at length purulent matter was discharged from the bowels.

Cases of Messrs. Delph and Smartt.

The cases of Messrs. Delph and Smartt, originating at the same time from the same source, are deeply interesting. Mr. Delph's wounds with the point of the scalpel did not inflame; Mr. Smartt's wound, which was a deep puncture with the needle, inflamed, and formed a small circumscribed abscess, which ran its course in about three weeks. In both the fever assumed the typhoid type, and the local action showed itself upon different and remote parts of the body on the same side with the wounded limb, in extensively diffused suppuration of the cellular membrane.

All these cases exhibit strong excitement in the commencement, and early and rapid prostration. In none is any marked or permanent affection of the absorbent vessels apparent during life, yet the pain, fulness, and other signs of cutaneous or cellular inflammation of the arm, axilla or pectoral region, are one or all present. In all the brain and nervous system sympathise quickly and deeply; in some the stomach and diaphragm are affected, and not in others. In one case the local inflammatory disposition is stronger than in another. It is by no means to be supposed that the causes which act in aggravation of common inflammation are suspended in cases of poison, when inflammation is once set up. There

may be therefore more or less of acuteness and strength in the local action, according to the habit of the subject and the circumstances of the injury, as the nervous excitement may be more or less rapid and considerable in different individuals, under similar degrees of intensity of the poison. In drawing the line, therefore, between the simple and the specific action, we must bear in mind that to a certain extent they necessarily co-exist, and this adds considerably to the difficulty of the distinction. Inflammation, by whatever cause excited, is still the same in its natural history, though it may affect different textures and assume different appearances under the various circumstances of its origin; and the rate of its progress may be subject to as much diversity. It can only be by ascertaining some peculiar and determinate character, resulting from the association of the local with the constitutional action, that we can hope to arrive at a diagnosis of these cases sufficiently accurate to open up the important question of treatment.

The following case, for which I am indebted to Dr. Spurgin of Guildford Street, displays well the minor degrees of irritation, local and constitutional, to which cooks and others, in handling putrid animal matters with chapped and scratched fingers, are exposed. The inflammation, which is attended by occasional exacerbations to intensity, of throbbing pain, is of the erythematous species, appears in patches, and, though subject to shift its position, does not quit the vicinity of the wound. It seldom advances to suppuration. The health and spirits suffer a material temporary depression.

"On the 4th of December, 1823, a cook-maid, æt. 35, of an unhealthy appearance, though free from in-

disposition, was practising herself on a stale hare, for the purpose of learning the mode of boning them, in spite of being strongly cautioned against it. A few days afterwards, two slight scratches, which she remembers to have received at that time, and to which she paid no attention, began to inflame; one was situated on the back part of the fore-finger, between the second and third joints, and the other over the middle joint of the ring-finger of the left hand. This inflammation was accompanied with a dull pain and feeling of numbness, and an occasional darting pain, along the inside of the fore-arm; this induced her to apply a poultice, and to take some aperient medicine, and a warm drink at night, by which she was so much relieved as to discontinue the poultice the following morning; but in the course of two days the same symptoms recurred, and as it was mentioned to me in a cursory manner, I advised her to foment as well as poultice, and to take ten grains of compound extract of colocynth, with five grains of extract of hyoscyamus, at bed-time.

"The next day (the 11th) I prescribed two scruples of cinchona and one of dried subcarbonate of soda three times a day, with a view to allay or counteract that constitutional irritation or peculiar state of body, which seems to render one person more liable to suffer a diseased action from the cause above mentioned than another; but this wished-for effect was not obtained, for in the evening of the 12th she was attacked with most severe pain at the point of the fore-finger, which throbbed so violently, as to give her the sensation of its being about to burst at every pulsation, and she shortly afterwards came to request me to cut open the part. I could not perceive any pulsation, nor indeed any enlargement of

that part, but I made an incision lengthways of the finger, about three quarters of an inch: the blood which came away had more the appearance of sanies than any thing else. The relief she experienced was almost immediate, and after taking ten drops of laudanum, and renewing the poultice, she passed a comfortable night.

"The next morning she was free from pain, but had no appetite; her tongue, presented two brownish streaks on a white ground, and was more dry than natural; there was great dejection of spirits and languor, with a weak and unsteady pulse; I therefore ordered her to take a tea-cupful of the compound decoction of sarsaparilla every four hours; this causing nausea, however, and loathing of stomach, was soon discontinued.

"13th. The pain returned; it was of a more pricking kind, deeper seated, and shooting through the second joint of the ring, and third of the fore-finger; the inflamed parts were much darker than common, and the inflammation was becoming more extensive. Five leeches were applied directly upon the inflamed points, and the subsequent bleeding was encouraged: this was followed by a complete cessation of the pain, inflammation, and immobility of the fingers; the arm, likewise, which was previously swelled and painful, more especially along the course of the absorbents and veins (symptomatic;) on its inner side, became free. In the mean time, the liq. ammon. acet. with camphor mixture, tinct. hyoscyam. and tinct. calumb. was prescribed.

"14th. The pain and inflammation returned as before, and several leeches were applied in the course of the day, wherever the pain seemed to be concentrated; a small pustule with a hardened base appeared just above the wrist, but was not painful.

"Fomentations and poultices were employed constantly during the 15th.

"16th. She had but little rest the two preceding nights; last night she took twelve drops of laudanum; in the forenoon a throbbing pain attacked the palm of her hand, near to the ring-finger, and a pricking sensation extended through the joint to the back of the hand. Four leeches were applied to the latter place, whilst an incision was made through the hard skin of the former: by these means the inflammation was again removed. Her constitutional derangement and general debility seemed, however, on the whole increased, more especially the depression of spirits and anxiety. The mixture was continued, as, to use her own expression, 'it comforted her,' In the afternoon, the inflammation returned, but was removed by leeches.

"17th. The repetition of leeches was required this morning, but having an opportunity of sending her into the country a few miles, she set off at noon, with an injunction to have recourse to leeches as before, and to take twelve or fifteen drops of diluted sulphuric acid every five hours in some water.

"22d. All affection of the hand has disappeared, and her appetite and strength are improving rapidly."

Remarks. This narrative brings several parallel instances to my remembrance.

That these cases have the specific character I think there can be no doubt. The circumscribed sphere of the morbid action may be due to the very superficial injury inflicted, and consequently the imperfect exposure of an absorbing surface; or to the mere application of the matter to such surface in place of its introduction by inoculation; from either

of which causes it might result, that the quantity of matter absorbed was so minute, or its virulence so modified, as to expend itself upon the parts contiguous to the wound, thus operating as a strictly local poison. It is conformable to observation that the action of many poisons upon the living body is potent in proportion to their concentration and quantity. Finally, its circumscribed operation might be referred to the action of putrescent matter as an irritant exclusively, and not by absorption. It is possible that a specific irritant may produce upon the part, effects similar in character to those which follow upon its absorption into the circulation.

The cases which I shall next adduce are a class of more frequent occurrence, and, on the whole, of less alarming severity. Although presenting very diverse phenomena, they are, I believe, generally but not universally considered to owe their origin to a similar cause with the foregoing. It is of importance to examine and decide this question. Dr. Gordon, of Finsbury Square, obligingly presented me with the following valuable and interesting case.

Case of Mr. Clifton, surgeon, of Islington. "Mr. Clifton, of Islington, aged 37, scratched his thumb with a needle whilst engaged in sewing up a body he had examined. The patient, a female, had died of peritoneal disease under ordinary circumstances, and the scratch was too slight to attract attention or indicate the application of any remedy: nor did Mr. C. experience any effect from it throughout the evening, during which he was actively engaged in speaking in a large assembly.

"He was awakened at three o'clock the next morning, September 12th, with excruciating pain in the thumb, extending along the fore-arm and shooting into the axilla. Although accustomed to pain,

and enabled by constitution to endure it, he described the agony he experienced as surpassing any idea he had previously formed of suffering. I first saw him at one o'clock in the afternoon of the same day, and found the local symptoms much aggravated; the thumb and fore-arm tense and swollen; there was hardness perceptible in the course of the absorbents, but no redness. The hand and arm communicated a burning heat to the touch, while the rest of the body was rather below the average temperature. The constitutional symptoms were very striking. On entering the room, having no previous knowledge of the case, the first view of the patient brought to my recollection the symptoms of hydrophobia. Although naturally a man of a very firm and calm disposition (and in the present instance perfectly collected and even cheerful,) his whole appearance was that of extraordinary anxiety. He seemed sensible of the least noise, and disturbed by even the breathing of surrounding persons. The countenance, which in health is full and dark, was shrunk, haggard, and cadaverous. He complained of much headache and sensibility to light, with an intolerable sense of oppression on his chest. The tongue was loaded; there was nausea but no vomiting. He sat in bed supporting the arm, and whilst conversing calmly he occasionally sprang out of bed, apparently unconscious of what he did. (Mr. C. has since explained that this was the result of pain, and of a resolution to suppress complaint as much as possible.) The skin was contracted and shrunk; but there was neither shivering nor rigor. The pulse was in an extraordinary degree full and hard, and about 120 in the minute. His constitution was generally speaking good, and he had enjoyed as much

health as is compatible with the discharge of extensive professional duties. He had taken a large dose of calomel in the morning, by which the bowels had been freely opened. He was immediately bled to ℥xxx; some febrifuge and aperient medicine was given, and cooling lotions were applied to the arm, with a poultice to the thumb. He was much relieved by the bleeding, and the pulse fell to 80, although after the faintness had subsided it had not lost any of its volume or hardness. The blood was not buffy and the crassamentum was very soft.

"13th. He had passed a sleepless night, and suffered dreadfully from pain, but the constitutional symptoms were much mitigated, the pulse being 90 and softer. The hand and arm were much swollen; red lines were perceptible in the course of the absorbents, and there was some pain in the axilla, but it did not extend to the pectoral muscle, nor was there any erysipelatous blush on the skin. He appeared much sunk in every respect, and complained greatly of his head. The cold applications had somewhat relieved the tension, but as they produced a sense of chilliness, warm fomentations were substituted, and when the heat excited by these became disagreeable, the cold applications were renewed. Leeches and cold applications were directed to be applied to the temples, and the other medicines were continued.

"14th. The appearance of the patient was considerably improved. He had lost much of that cadaverous look alluded to, but he had suffered dreadfully from pain and want of sleep. The pain in the axilla had decreased, and the red lines had become fainter, but the hand and arm were more swelled. He described the pain as deep-seated, and convey-

ing to him the impression of a tight and very painful bandage compressing the internal muscles; arising, probably, from the highly inflamed state of the fascia of the fore-arm. The pulse was hard and full, 100 in a minute. He was bled to ℥ xij, and leeches were applied in great number to the arm. The blood was much buffed. The leeches afforded temporary relief to the local as the bleeding did to the constitutional symptoms, but he became much worse in the evening, when there was a return of the worst constitutional symptoms. The pulse not so full, but 130, hard and wiry, and he complained of overwhelming oppression in the chest and head. He was bled to ℥ xvi; leeches and purgatives were continued. This bleeding immediately relieved the oppression of the chest, as well as the extreme irritability, which pervaded the whole system, and which the patient described as more intolerable than even the pain.

"On the 15th, we considered him in a very precarious state. His head was relieved, but with the exception of this one symptom, he was much worse. He had again passed the night without sleep, and in the greatest agony. The pulse was 120, hard, wiry, and hurried. A very careful examination of the hand was now made, but not the slightest trace of deep-seated matter could be felt. Neither had there been any thing like rigor or shivering. At the consultation, however, the presence of matter in the thumb was inferred from the following circumstances: 1st, from the great probability that the part where diseased action was first assumed would be most likely to yield such a result, seeing that in the introduction of most animal poisons, Nature seems to make an effort to resist it; 2d, from the continuance of violent fever after the progress of the local disease towards the

axilla had been arrested; 3d, from the peculiar nature of the fever itself, assuming no fixed type, being easily subdued by active treatment for a short period, and then again rapidly resuming its virulent form. In pursuance of these views an incision was made along the hand, but only blood issued. The thumb was then laid open to the bone along its whole extent, and about a tea-spoonful of matter flowed from the point originally punctured. The matter was quite healthy, and the relief was instantaneous. The hand was buried in a poultice, and shortly afterwards he fell asleep. But in a few hours he was disturbed by hemorrhage from the hand, and he lost upwards of ℥xxx before it could be stopped, which was effected by means of compression. After the faintness occasioned by the loss of blood had subsided, the pulse rose to 120, became full and hard, and the deep-seated pain in the arm returned. Leeches were applied along the affected parts as often as the paroxysms of pain returned, and they were the only application that gave relief. In this way about 140 were applied from Sunday to Tuesday. Putting a few on at a time and quickly renewing them seemed to afford more benefit than the simultaneous application of a great number. In the intervals various applications were tried for the arm. The vapour of warm water and hops, &c. gave momentary ease, but we could only depend on the leeches.

"On the evening of Tuesday, the 16th, a sudden alteration took place. I was with him at the moment, and nothing could be more striking. The countenance became cold and cadaverous, and he threw himself back on his bed, abandoning the sitting posture, which was the only one he had hitherto been able to bear. He sighed frequently, tossed his

arms about the bed, and rolled from side to side. The pulse rose to 140, became soft and compressible, but there was no diminution of pain. The symptoms appearing to me now more those of irritation than inflammation, I gave him twenty-five drops of Battley's solution of opium, and subsequently fifteen more. I may here observe that he had not been able to take opium in any form, and even hyoscyamus disagreed violently with him, for on the second day, his pulse having been reduced by the bleeding, and suffering much from pain, I gave him five grains, which instantly affected his head and increased his restlessness. In the present instance, given just at the moment its exhibition was indicated, it was attended with the happiest effect, and he enjoyed some hours of refreshing sleep. The application of leeches was only necessary once or twice more, for though some pain remained, and the hand continued swelled, he gradually improved in health and strength. The pulse continued steadily at 100 for some time, but it was gradually reduced, and the puffiness and swelling of the arm were diminished by active purging. As soon as this was effected, friction and bandaging were employed with great benefit, and he slowly but effectually recovered the use of his hand. The wound healed very readily by the first intention, and although the fibres of the muscles forming the ball of the thumb, were transversely and completely divided, the flexor and other muscles, in the course of some months, recovered their wonted action. The nerve which supplies the middle finger having been divided, the finger remained for a time benumbed, but this also completely regained its nervous power. It is right to mention that during the whole of this af-

flicting malady, the patient retained his consciousness and self-possession."

Case of Mr. Brayne, student of medicine.

"Mr. N. R. Brayne,* æt. 22, in the course of his professional studies during the summer of 1820 became, from dissecting in hot weather, the subject of severe diarrhæa and an eruption on the face. The latter occupied the seat, and possessed the characteristics rather of sycosis menti than a proper pustular disease. Medicine being of little or no service to him during his residence in London, a trial of the sea was deemed necessary, from which he returned after eleven days, much improved in his general health, with the eruption nearly well. On the 7th of November he resumed his occupations in the dissecting-room, in which he spent most of his time. About a month subsequent to this (December 9th,) he was pricked by a pair of common forceps in the fore-finger of his right hand, while examining the body of a man who died the day before in St. Thomas's Hospital, from extensive psoas abscess, and diseased dorsal vertebræ, which succeeded to an accident. On the evening of the same day the finger was considerably inflamed, for which leeches, fomentations, and poultices were applied.

"On the following day (December 10th) the axillary glands of the same side became enlarged, but no affection of the absorbents was perceptible. His nights were tolerable, but considerable fever and irritation came on, together with vertigo and headache. Brisk purgatives, numerous leeches to the finger and axilla, with fomentations and poultices were directed. It was sometimes thought that the headache was in-

* Now surgeon of Banbury, Oxon.

creased when the purgatives operated most. After a week passed in this manner, the finger appeared quite well, but the axillary glands were slowly advancing towards suppuration. The pulse was generally about 100, and somewhat sharp; the headache, at one time better, and at an another worse, had now concentrated itself at the upper part of the left transverse ridge of the occipital bone, and sometimes extended along the basis cranii towards the orbits. It was occasionally very intense, and more particularly on attempts at motion, which were performed in the most slow and cautious manner, the hands being generally applied to steady the part affected. Under these circumstances, having been hitherto confined to his room, and feeling much debilitated, he put himself into a stage coach on the 11th day after the accident, and went into the country a distance of seventy-five miles, supposing better air and diet most essential to his recovery.

"For the first few days after his arrival at home he seemed to be gaining ground. Pulse about 100, rather small. Tongue white, but yet some inclination to food. Bowels open. Urine very high colored, with a slight dysuria. Sleep a good deal disturbed by dreaming. The axilla was poulticed, and discharged considerably, a thick and healthy pus. It is worthy of remark that he had become exceedingly irritable and impatient, manifestations directly opposite to his natural temper and manners. On the 8th day after his journey he found his head so much better, though the axilla continued inflamed and discharging, that he partook with his friends of a more liberal diet than had been heretofore allowed him, and in the evening exerted himself much in conversation. This was followed by a restless night, and

on the next day the pain of the occiput was worse than ever. It was for the most part aggravated by the erect, and alleviated by the recumbent posture. There was not much pain in the axilla, except when the arm was raised, or the integuments covering the surrounding muscles were too roughly handled. The pulse now rose to 104, and he began to perspire profusely in the night. The bowels were kept open by moderate aperients, and little else was done in the way of medicine. He had frequent calls to void urine, particularly in the night, the few last drops of which escaped him involuntarily. He had scarcely complained of any thing like chilliness or shivering during his illness. The skin during the day was nearly of a natural temperature; in the early part of the night it was hot and dry. He seldom complained of thirst.

"On the 22d day from the accident, after a bad night, in which he had been occasionally incoherent, great stupor and insensibility to external impressions were added to his other symptoms, and continued to increase during the day. In the evening, therefore, the scalp being observed to be much hotter than natural, the pulse 110, with throbbing of the temporal arteries, a more foul tongue, and urine exceedingly high colored, the head was shaved, and a dozen and a half of leeches applied to the left temple, and afterwards an evaporating lotion to the scalp. These measures somewhat relieved the state of oppression, but on the succeeding day the pain of the occiput sometimes rose to such a degree as, to use his own expression, "seemed to threaten the wreck of his intellect." During the two subsequent days he took several doses of calomel and opium, but the pain of the head continued much as usual, and as the dis-

charge from the axilla seemed to be augmented by it, it was discontinued. He was rapidly losing flesh, and, almost despairing of relief, began to be very dejected.

"The formidable nature of these symptoms seemed to render it not improbable that some organic change was going on within the cranium, and therefore saline medicines with calomel and antimony were chiefly prescribed, with the occasional use of a sedative dose of tinct. of hyoscyamus. A strict antiphlogistic diet was observed.

"On the 26th day of the disease, the other symptoms being nearly as before, he complained of great tenderness and pain about the circumference of both patellæ, much increased by motion or the slightest pressure. It was chiefly seated on the outer edge, over which was discovered a slight blush of inflammation. This new symptom not being found after twenty-four hours to be productive of any alleviation of the affection of the head, some leeches were applied to each knee, and on the following afternoon all trace of disorder in these parts was gone, and the joints had recovered their usual power of easy motion.

"On the night of the 28th day after the injury, he took a pill composed of two grains of calomel, five of Dover's powder, and five of rhubarb. He slept better after it, and complained less of his head than usual, but was the next day very drowsy. It moved the bowels freely, and for the first time the urine passed in the night was less high colored, though it had several times before been perfectly natural in the day. The pill was not repeated until bed-time, and though he did not sleep so well, he was more capable of moving, and with less apprehension. The

discharge from the axilla had been reduced, but was again augmented since the exhibition of the calomel, and a slight blush of the surface was observed upon the inner side of the upper arm. A small blister was applied over the seat of the pain at the occiput. During the next four days the pill was continued, night and morning, and he drank a pint of decoct. sarsæ. comp. during each day. Under this plan the pain of the head gradually were away, he became less irritable, the pulse decreased in frequency, and his appetite improved. The perspirations at night were still very profuse, and of a strong and penetrating odor. At the same time the urine, except now and then, when the head was affected, gradually resumed its natural color and appearance. Two or three sinuses formed down the arm and towards the pectoral muscle, and therefore the poultice was exchanged for simple dressing, a compress and a roller; by means of which, in about a week, the axilla, save a slight induration, was quite healed. The pain of the occiput had daily diminished, as well as the perspirations, which were no longer offensive, and by the time of the complete restoration of the movements of the arm, neither were at all complained of. His health and strength rapidly returned, and by the first week of February he considered himself perfectly restored."

Case of Mr. H. Slight, student of medicine. Mr. H. Slight, while dissecting the body of a negro on the 16th of December, accidentally wounded the second finger of the right hand with the point of the knife. A little blood escaped from the wound. Nitric acid was applied. No inconvenience was felt for some days, and Mr. S. continued his dissection.

In the afternoon of the 20th, severe pain was experienced above the elbow, which increased on pressure. He suffered much from head-ache, attended with chills, loss of appetite, and general constitutional disorder. On the evening of that day, the pain in the head was much increased, and during the night a severe febrile attack was experienced; the pulse was full and strong, with much heat of skin. These paroxysms recurred every four hours. He took a saline purgative draught every six hours, and a sudorific in the interval. By this treatment, conjoined with a low diet, the symptoms considerably abated.

22d and 23d. Although the violence of the symptoms was much mitigated, severe pain continued in the arm attended by occasional rigors and head-ache.

24th. The constitutional symptoms returned. On examination of the finger, a collection of matter was discovered at the part punctured. A free incision was made, and a poultice applied. The arm was swelled in a trifling degree, and painful on pressure, but no inflamed absorbent could be discovered, nor any gland in the axilla enlarged. The incision afforded some relief to the other symptoms.

On the 26th, Mr. S. left town, still experiencing much pain from the shoulder to the elbow. The arm was fomented with hot water. The pain was much increased during the following days, and the febrile commotion became very distressing, the temperature rising much above the natural standard; the pulse full and hard. This was followed, on the nights of the 4th and 5th of January, by profuse perspiration, and a feeling of extreme languor and debility. The bowels were kept open by small doses of Epsom salts. There was great irritability of the nervous

system, and the temper was ruffled by the slightest occurrences. The night sweats were profuse, attended by almost constant watchfulness. The sulphuric acid in bark infusion, was taken every four hours.

7th. Debility extreme. The glands in the axilla appeared somewhat enlarged, though the pain was principally referred to the arm. An oatmeal poultice was ordered to the axilla, and fomentations twice a day. A more generous diet was advised, the bark to be continued, and three or four glasses of port wine daily The exhibition of wine produced excessive irritability both of mind and body, head-ache, and a sensation of spasmodic twitchings of all the voluntary muscles, amounting almost to a state of delirium tremens. Its use was therefore discontinued, and porter in effervescence with animal food allowed, and half a grain of opium given three times a day. As however this produced but little sleep, though it alleviated in a great degree the excessive irritation, a full dose of laudanum (130 drops) was taken at bedtime, and with the best possible effect of lessening the head-ache without increasing perspiration. The poultice in the axilla was continued; the wound in the finger was now quite healed. The stomach became affected with nausea and vomiting, and the bowels, generally costive, were acted upon by the mildest medicines.

26th. By this time the debility was extreme; the patient was unable to stand, and his emaciation rendered it necessary to pad the shoulders and hips to prevent ulceration. The stomach still continued very irritable; vomiting occurring frequently during the day.

30th. A suppuration in the axilla appeared fully established. An incision was made into the abscess,

and a pint of highly offensive green matter was evacuated. The poultice was ordered to be continued twice a day, and at each dressing a large quantity of matter was discharged. The abscess shewed no inclination to adhesive inflammation, but continued to spread in the direction of the pectoral muscle, and also across the scapula, burrowing among the muscles. During the succeeding fortnight, several spicula of bone were discharged, which were considered to be exfoliations from the fourth or fifth rib, there being much pain felt in the situation of these bones. The matter gradually decreased in quantity for a fortnight, when nausea and vomiting recurred. A second collection of matter was formed so low on the breast that another opening became necessary about an inch below the nipple, and from this a large quantity of matter was also discharged. The patient was at this time in a state of the utmost debility, although the night sweats were lessened. Much inflammation ensued on the second incision, and within forty-eight hours, the abscess, the parietes of which could not be felt by the probe, became closed by adhesive inflammation; and no untoward symptom supervening, Mr. S. gradually recovered his health, though the arm continued long afterwards painful.

Case of Mr. Wansbrough, surgeon. On the 28th of June, 1822, Mr. Wansbrough assisted a medical friend to examine the body of a female who died of diseased ovaria. The body was offensive from putrefaction. After the dissection he washed his hands with alcohol.

On the morning of the same day, when pulling a rose, a thorn had entered the inner part of the first joint of the right fore-finger. The wound was very trifling, and he took no notice of the occurrence.

Within thirty hours after the dissection he felt pain in the part where the thorn had entered, and on examining the joint it exhibited a slight blush of inflammation. The pain increasing, Mr. W. extracted the thorn, which was so small that he could scarcely perceive it on the point of the probe. This was at six o'clock; the pain increased till eleven, when he applied a poultice, and went to bed.

On the morning of the 30th, Mr. W. was awakened by the pain in the finger, which had now extended to the last joint, and was attended with much swelling. Suspecting the cause, he applied a hot poultice of bread and water over the whole hand. The pain rapidly increased, till it became excruciating. The swelling extended over the hand, the back of which was like a boxing glove, and highly inflamed; the finger was twice its natural size, and the skin distended almost to bursting. The wrist and fore-arm were beginning to partake of the inflammation, and inflamed absorbents were clearly seen on both sides of the arm, as far as the elbow. The fingers were extended to the utmost. A dozen leeches were applied to the back of the hand, and when they fell off, the arm and hand were immersed in water as hot as it could be borne. The whole hand and wrist were afterwards covered with a large poultice. During nine successive days and nights, fomentations and poultices were applied, and leeches every third day. There was great derangement of the nervous system; the powers of the stomach were wholly suspended; the tongue was covered with a thick white coat; and the countenance exhibited the utmost distress. Arrow-root, tea, and tapioca were taken by table-spoonfuls at a time. Wine disagreed at first, but after a long period of abstinence during which the patient

appeared to be sinking fast, it was again had recourse to, and was fortunately retained. Medicine was rejected, except calomel. This acted on the bowels, and kept them in an open state without producing ptyalism.

On the second day, an incision was made along the whole length of the fore-finger, in the hope that by lessening the tension of the integuments it would afford relief. A copious flow of blood followed the operation, but without any abatement of the pain. The constitutional irritation was increased by it.

On the third day a slight fluctuation on the outer side of the fore-finger was felt; a lancet was introduced and a little lymph exuded, but without abatement of the pain. The inflammation of the absorbents was relieved by the application of the liq. ammon. acet. lotion; it never extended above the elbow.

On the sixth day an abscess was opened which pointed on the inside of the fore-finger; it yielded in the whole an ounce of pus. A tent was introduced, but was withdrawn on account of the irritation it occasioned. The wound soon closed, and on the eighth day a second abscess was opened between the joints of the fore and middle fingers, which was found to extend to the wrist.

On the tenth day another large abscess was opened, and about six ounces of pus discharged. It comprised almost the whole hand; the matter had insinuated itself beneath the palmar fascia, and a sinus existed from the tips of the fingers to the ulnar ligament. A considerable mitigation of suffering followed the operation; the poultice was changed the next day for the saturnine lotion, applied at a tepid, and afterwards at a lower temperature. In four and twen-

ty hours the powers of the stomach returned for the first time during ten days. The patient was much exhausted by pain and watchfulness, and having been very faint, a little wine was administered, which procured him a refreshing sleep of some hours' duration; the first he had enjoyed since the commencement of his illness. In a few days, Mr. W. was well enough to be moved to the coast, where he speedily recovered his health. Mr. W. had but a very inconsiderable degree of fever throughout this attack.*

Mr. W. Percivall, now veterinary surgeon to the Royal Horse Infirmary at Woolwich, favored me with the annexed report of his case.

Case of Mr. Percivall, student of medicine. "About three, p. m. of the 14th January, 1820, I punctured both thumbs, and the middle and fore fingers of my right hand, in sowing up the abdomen of a woman who had died of peritonitis. I washed my hands thoroughly on the spot, and again before dinner, and went to a ball in the evening. I mention this to show that I took no heed of the accident at this time.

"15th. About eight. a. m. I was awoke by an acute burning pain in the punctured parts, with my axillary glands on both sides as large as filberds, and very sore on pressure or motion. Being fully sensible of the nature of my case, but perhaps considerably overrating the danger of it, my mind took instant alarm, from which I could never afterwards divest it. I took immediately some calomel and colocynth pills; and applied a poultice to my right hand, which was the more painful of the two. Soon after I had a shi-

* Abridged from the London Medical Repository for May, 1823.

vering fit, followed by heat of body and acceleration of pulse, probably in part occasioned by the perturbed state of my mind. In the evening, with the consent and advice of Mr. Travers, for whom I was then dressing, I left town for Shooter's Hill.

"17th. Small abscesses had formed where my thumbs were pricked, and the pain and inflammation in them were much abated. All my suffering was now centered in the point (the part punctured) of the middle finger of my right hand. The finger itself was hot, tense, and swollen, and exceedingly painful; the whole hand was unnaturally hot and tender, and two or three faint waving red lines were seen upon the muscular part of the fore-arm. Mr. Travers saw me and ordered purgatives; leeches, fomentations, and poultice to the hand; and a roller wetted with liq. plumb. acet. dil. to the arm.

"After a day or two the leeching was again had recourse to, in consequence of the daily progress the disease was making in the hand. As soon as any thing like fluctuation could be perceived, a lancet was directed through the injured part and thrust down to the flexor tendon; a drop or two of pus escaped, but no very striking relief followed.

"One night, a few days after, when the whole hand had become not only the seat of constant throbbing pain, but, from discoloration and extreme tumefaction, quite a terror to me when the poultice was removed, it was resolved to bandage it up with white wash, and discontinue the poultice. The next morning, I felt a numbness in the point of the finger. I expressed my apprehensions that it was dead, but those around me, I believe, thought otherwise. The second or third day afterwards, the nail separated, the cuticle peeled off, and exposed the last phalanx in a mor-

tified state. In about another week, the second phalanx commenced sloughing off at the joint. The skin of it had ulcerated through, and the ligaments were slowly undergoing the same process, when Mr. Travers visited me and amputated the part. At the same time, the palm, which was under-run by pus, was laid open throughout its whole length. Nothing worth recording occurred afterwards. My hand progressively amended, and my general health, which had not been greatly reduced, was speedily restored by gentle exercise in the air. For some time after the parts were healed, I had but a very imperfect use of my hand, in consequence of extensive adhesions among the flexor tendons in the palm. By continual exercise of it, however, in a variety of ways, it has regained its functions so completely that I now feel no inconvenience."

Remarks. Mr. Clifton. I visited Mr. Clifton while yet confined to his bed, and after a full narration of the then recent circumstances of the case, I expressed, as I now do, my belief that it was a case of simple irritation. The disturbance of the nervous system it is true was unusually great, but the rapidity and obscurity of the suppuration, the unrelievable confinement of the matter, and the aggravation of acute inflammation from this cause, sufficiently explain the overwhelming pain, and thence the whole train of symptoms. The case was most judiciously treated, and reflects great credit upon his medical attendants. It must be obvious to the reader that Mr. C. more than once owed his life to the lancet.

Mr. Brayne. Mr. Brayne was my dresser, and previous to quitting London was under my care. I did not

then consider it a specific case, and the history, so ably reported by his brother, Mr. Thomas Brayne, confirms my opinion that the disease was one of simple irritation affecting a delicate and previously disordered system. The narrative in detail affords a valuable specimen of the complication and diffusedness of the aches and pains which occasionally supervene upon severe local irritation, and the alarm which they excite by their utter intractableness to medicine, and their semblance of being more than functional.

Mr. Slight. Of the same class I consider Mr. Slight's case, although, as may be said of the others, this was not the opinion generally entertained. This gentleman prosecuted his dissection, and was not indisposed until the fourth day. He was then attacked with pain above the elbow, and fever symptomatic of suppuration. At the interval of three weeks from the injury, the axillary glands were enlarged; and at the expiration of another three weeks, they suppurated copiously. In the mean time the symptoms of irritation, viz. head-ache, vigilance, muscular twitchings, and irritability of stomach continued, and in a state of extreme hectic debility and emaciation from prolonged suffering and profuse perspiration, it is not surprising that the abscess was not circumscribed, but had extended itself both on the front and back of the chest. The constitutional disorder corresponded to, and was symptomatic of the state and progress of the local irritation.

Mr. Wansborough. Mr. Wansborough's case differed only in this from Mr. Clifton's—that the suppuration was originally cellular and fascial, instead of being

within the theca of the flexor tendon. Hence the difference in severity of constitutional symptoms.

Mr. Percivall. Mr. Percivall's case exhibits a different, but not very uncommon termination of the same species of injury. I am, at the time of writing this, attending a young practitioner for a sudden gangrene of the last joint of the thumb, from a slight puncture at the root of the nail received in dissection three weeks ago.

The cases of Messrs. Clifton, Wansborough, and Percivall, exhibit in different degrees the simple acute irritation, those of Messrs. Brayne and Slight, the chronic, and therefore more complicated irritation, attending upon suppuration.

If the further consideration of this subject, the voluminous evidence which I have already adduced, and that which I have yet to offer should appear tedious, I must plead in apology the embarrassment arising out of the mass of hitherto unarranged materials which it is essential to investigate in order to form a correct judgment; the intricacy, and above all, the vital importance of the questions which they involve.

Cases of Messrs. Hutchinson and Egan. The case of Mr. Hutchinson related, with that of Mr. Dease, by Dr. Colles, in the second volume of the Dublin Hospital Reports, I consider an unequivocal example of absorption. The milky vesicle upon the site of the wound, the intense pain in the shoulder, the extensive erythema on the right side of the trunk, together with the extreme dejection of spirits, and constitutional suffering, are truly diagnostic. Mr. Egan's case, described in the same paper,

I reject—not because I doubt that much variety may exist in the seat and character of the local action, but because neither the constitutional nor local symptoms were characteristic; they were in fact such as a simple local irritant was both competent and likely to produce, viz. erysipelatous redness of the wounded thumb, pain passing up the arm, an enlarged gland at the edge of the pectoral muscle, with the deep-seated abscess of the axilla, and symptomatic fever of suppuration.

Dr. Duncan, Junr.'s cases. A large, and in some respects very valuable collection of cases has lately been given to the public by Dr. Duncan, jun., in the first volume of the Transactions of the Medico-Chirurgical Society of Edinburgh, under the title of "Cases of diffuse Cellular Inflammation."* I entirely coincide in the learned author's statement that this "is the most frequent form of that severe and often fatal affection, which occurs from the application of the fluids of a dead human body to a wound or abraded surface."

Of the cases communicated by Dr. Duncan, those of Messrs. Blyth and Young, and Mr. Hersey, appear to have been well marked instances of absorption.†

* Dr. Duncan, I may observe by the way, appears to me to have generalized too much, and to be equally in error in his supposition that cellular inflammation, as constituting a distinct form of disease, has been altogether overlooked by practical observers, as in classing all the cases which he has narrated under the same head, as specimens of this affection.

† The following extracts are so strikingly illustrative of the affection that I cannot forbear citing them.

"In each," speaking of Messrs. Blyth and Young, "there was slight abrasion on one finger, but when accurately examined there

The cases of Dr. Dewar and Mr. Cumming bear a considerable analogy to each other, especially in the

was no inflammation nor any appearance indicating a poisoned wound. There was not the slightest trace of an inflamed absorbent or vein from the finger to the axilla. In the axilla of both gentlemen was the first appearance of a morbid state. In both, the glands were enlarged, and there was exceedingly painful generally diffused swelling with considerable redness from the axilla up along the neck, and for several inches downward along the side. The swollen part did not pit on pressure, but gave an obscure sense of fluctuation, which was well characterized by Mr. Lizars, by the term 'boggy.' At my request Mr. Lizars plunged a lancet into the swelling on Mr. B.'s side, about an inch and a half below the axilla, but nothing at that time was discharged from the wound but a little blood."

"An abscess was now found extending downwards as far as the os ilium, and nearly to the pubes. To allow a free exit to the pus, several punctures were made at the most depending points, and to preserve a free communication between them, a probe was occasionally introduced at the upper orifice and brought out at those below. For many days there continued a very copious discharge of purulent matter, at last accompanied by considerable flakes of a substance not unlike a skein of thread, which we considered to be disorganized cellular membrane."

Mr. Young when convalescent of this malady died of a sudden attack of pleuritis: the following is taken from the notes of the examination. "An incision was first made from the clavicle to the crest of the os ilium, and another crossing it to the axilla; when the subcutaneous cellular substance appeared in some places distended with serum, especially about the loins, while in others it was turgid with purulent matter which was most conspicuous over the pectoralis major. On prosecuting the dissection the whole cellular substance of the side from the axilla down to the os ilium, and from the spine to the sternum, was more or less purulent; the cellular sheaths of the latissimus dorsi, serratus major anticus, pectoralis major and minor muscles, were all purulent; and even the prolongations of the cellular membrane, which divide the muscles into their different fasciculi, were equally purulent. Between the two pectoral muscles and beneath the minor, the infiltration of the cellular substance with purulent matter was very conspicuous. The carne-

remarkable circumstance of inflammation commencing in the left, and afterwards appearing, as by metastasis, in the arm of the right side, and there reach-

ous fibres of these muscles had in general lost their cohesion, and were of a dirty yellow colour."

"The cellular substance of the arm was every where healthy, and there was not the slightest vestige of disease in the fore arm, nor could any connexion be traced between the abrasion on the finger and the morbid parts."

In Mr. Hersey's case a pustule appeared where the puncture was made; on the 3d day the arm was much swollen and had an erysipelatous blush—no distinct trace of inflamed lymphatics could be perceived extending along the fore arm, nor any tumefaction or pain of the glands of the axilla.

8th day. "Several vesicles, some of an oblong, others of a more circular shape appeared to-day on the back of the fore arm, below the elbow, and along the outer and inner side of the arm above the joint, the smallest of which is about the size of a sixpence, elevated, and the longest from two to three inches in length. Some are filled with transparent serum, and others with a thin fluid, but of a dark colour. The erysipelatous inflammation encircling these vesicles has assumed a dusky hue, which extends over the greater part of the arm from above the wrist, and upwards over the shoulder, but becomes gradually fainter as it recedes from the bases of these vesicles."

9th day. "Inflammatory hue, deepening in tint, extends over the deltoid muscle, and from the breast backwards over the shoulder. The region of the deltoid is also occupied by vesicles similar to those already described, varying in size, and filled with a dark serous fluid. Some of the vesicles on the arm were opened, and some have burst."

10th day. "Most of the vesicles have burst, and have discharged such quantities of fluid as to penetrate the bed, and run upon the floor."

Early on the 11th morning he died.

This case presents an unusual combination with the other signs of the malady, of erysipelas affecting the arm, owing in part probably to position, the patient having continued in business when he was very unfit to be out of his bed, even until the 5th day. The pustule on the wound and the existence of vesicles encircled by an

ing its greatest degree of severity.* The suppuration appears to have been secondary upon the constitutional disorder. Whether a consequence of fever, or the result of a poison absorbed, is a question which I do not feel competent to decide. Notwithstanding the probability from the circumstances of their origin that they were genuine instances of absorption, the details do not furnish to my mind satisfactory evidence of the fact. The spontaneous attack of deep-seated suppurative inflammation on the right arm, at an interval of about six days from the injury, real or supposed, was marked in both cases by a retrocession of the primary affection in the left.

In the first of the cases communicated to Dr. Duncan by Dr. Barlow of Bath, the characteristic signs of absorption are wanting, and the existence of general tumefaction of the arm, with inflammation of the lymphatics and cellular substance, and deep-seated suppuration, render its specific character very questionable. The second of these cases, so far as the paucity of detail permits of an opinion, appears to have been genuine.

Mr. Whitelaw's case (10.) resembles that of Mr. Slight, page 209 of this Essay, but was undoubtedly more severe. Dr. Hennen, jun.'s case of axillary abscess from dissecting the same subject with Mr. Hersey, Mrs. Edie's from a pin-scratch in washing a towel employed in the dissection in which Mr. Cumming met with his fatal accident, cases 16 and 17,

erysipelatous blush, which became fainter as it receded from their bases, are characteristic, together with the constitutional disorder, of specific irritation.

* See case of Mr. Graves, p. 217.

18, 19 and 20, which are the remaining cases of wounds in dissection given by Dr. Duncan, and case 21, "from a prick with a fleshhook," are neither of them in my opinion cases of absorption.* All these I consider as properly classing in this respect with the last five cases which I laid before the reader. But, it may be asked by those who incline to a contrary opinion, may not a difference in the quality of the poison, or in the susceptibility of the individual, account for the difference in the phenomena which ensue?

Different quality of poison, or suceptibility of individuals?

I believe that the difference in quality may explain the greater or less severity, but not the difference of phenomena. If of two individuals injured in dissecting the same subject, the case of one present the symptoms of absorption, and the other not—as for example, Mr. Dease and Mr. Egan, Mr. Hersey and Dr Hennen—I infer that the one absorbs the poison, and the other escapes it. The cases of Mr. Blyth and Mr. Young, Mr. Delph and Mr. Smartt dissecting the same subjects, were affected with symptoms precisely similar, each to the other. The absorption or non-absorption may be determined by accident, the clean or the foul instrument, &c. or it may be referred to the second head of the ques-

* Mrs. Edie's was a true paronychia or suppuration within the flexor theca. Messrs. W. D. and A. B. students of medicine, were cases of ordinary absorbent and glandular inflammation. Mr. Burton's was a suppurative erysipelas of the arm artificially induced, viz. by the ligature. Mr. Lizars's pupils were affected with fascial inflammation and abscess of the hand. Mrs. Hodge's case was an acute cellular and absorbent inflammation of the arm and axilla, such as has been often known to follow a lacerated wound of the finger or thumb.

tion, viz. the difference in susceptibility. The frequent exposure of some individuals to this and other poisons with perfect impunity is a matter of notoriety, and this may explain why the specific disease is not set up, when that which results from simple irritation is—and in truth the greater susceptibility of local irritation and inflammation may be a condition coupled with insusceptibility of absorption, and afford in some measure a safeguard to the constitution. Thus, if the poison operate as a chemical irritant upon the part, and this inflame, whatever mischief extends to the system is referable to symptomatic irritation; but if it find a quiet and ready entrance into the system as by an open door, the system is alarmed first, and the local consequences are displayed at a distance from the seat of injury. To what causes this susceptibility is to be referred, or to what extent it operates we are ignorant, and whether the nature of the wound affording a facility for absorption in the one case, and not in the other, be the real explanation; however the fact is undeniable. But this theory of susceptibility supposes no difference in the phenomena characteristic of absorption, but refers the difference in symptoms to the fact of non-absorption. In severity the symptoms of both specific and simple wounds undoubtedly vary; those however of the former less than of the latter. The appearance of vesicles or pustules, or the contrary; the affection of the opposite limb or side of the body, or the definitive boundary of the action by the median line; the rapidity and vehemence with which the symptoms of pain and cerebral disorder are manifested, or the reverse, indicate different degrees of severity. Compare the cases of Dr. Pett and Mr. Dease with those of Messrs. Delph and Smartt. Whether it be to local circumstances

or constitutional peculiarity that some individuals owe their security in situations of exposure, I imagine that if the poison be once admitted into the circulating system, none are exempt from its effects.

Different species of poison? But it may be further asked—since we admit that the poison absorbed from dead animal bodies varies in degree—may it not also vary, like the morbid poisons, in kind, and hence the difference in phenomena attending upon wounds in dissection be explained? For example, in some cases only, are pustules, pimples, or vesicles found in one or more parts. In some the absorbent glandular system is chiefly affected, in others the cellular; in some the wound inflames, and inflammation spreads along the limb from the wound; in others the wound can scarcely be said to inflame, but the inflammation is acute at the opposite extremity of the limb, or courses over the trunk of the body; in some the primary inflammation is altogether insignificant, the pain and general disorder of the system enduring and most severe, and after a continuance of many weeks of extreme debility and emaciation a deep chronic abscess presents, and proves critical of the malady. Lastly, in other cases the inflammation subsiding favorably in the injured extremity, appears within a few hours in that of the opposite side, and terminates in deep and extensive suppuration, or gangrenous erysipelas. It would appear on the above hypothesis, that one form of the poison irritated upon contact and provoked resistance to its admission, that is, inflammation in all the parts through which it passed; and that another, by its silent and uninterrupted entrance, and instant admixture with the mass of blood,

exhibited on the contrary its characteristic effects at other and remote parts of the system.

Insufficient to explain difference of phenomena.

The following objection to admitting the cases in question to be instances of absorption appears to me to be decisive; they differ in no important respect from simple injuries with clean instruments; from abrasion and bruise, or inflammation of the cutis even without læsion. From such causes inflamed absorbents and their glands, and continuous cellular inflammation and suppuration are constantly arising, and there is no evidence to prove that continuous inflammation ever arises from the passage of poisons into the mass of blood. On the other hand, distant, diffuse and superficial cellular inflammation is certainly not an effect of simple injury, but this is the prevailing characteristic of the local action in the most urgent and fatal cases. Now although it is in the highest degree probable that the poison varying in intensity should occasion a more or less severe disease, as we see in the cases related, it is as improbable that the character of the specific action should be subject to variety: in a word, it is improbable that the effects of the poison, quasi poison, should be at one time such as we have described, and at another such as are liable to be produced and frequently are produced by simple causes of irritation.

Difference in severity admitted without inferring absorption.

Are the cases then of non-absorption to be regarded simply as results of mechanical injury, and would the subjects of them have been liable to be affected by similar consequences from similar injuries inflicted with clean instruments, in pure air and wholesome occupations?

I think I have drawn a line of distinction broad enough to be easily recognised, even by a superficial observer, between the cases of absorption and of non-absorption. If therefore the consequences of the wounds from dissection are more serious than such as result from ordinary clean wounds, and which I am disposed to believe they often are, the difference must be attributed to some peculiarity attending them, local or constitutional. It is not necessary that a local irritant, acting chemically, should be received into the mass of blood to produce extraordinary local excitement. The matter of gonorrhea is commonly a more severe local irritant than the matter of syphilis; and various substances employed in surgery, which furnish no evidence of their absorption, exemplify the same fact. The constitutional excitement is in these cases the legitimate consequence of the inflammation produced by the local irritant, and is either slight or severe according to the seat, nature and degree of such inflammation. The chemical, therefore, are to be regarded as operating on the same principle upon the constitution as the mechanical irritants, where their tendency is to produce high local inflammation; and their action being not dissimilar, it is probable that they act in concert, and that the irritation of an acrimonious substance, superadded to that of a penetrating wound, may determine the extraordinary activity and extent of the local inflammation, and by consequence of the constitutional disorder. I conclude that it is therefore probable that the irritation in some of these cases, though strictly local, is in its nature such as to act upon the constitution with greater severity than that of similar clean wounds.

Peculiar irritability. Many persons have been disposed to refer the severity of the inflammation attendant upon these wounds to a peculiar irritability of constitution. This when present must have a prejudicial influence, but the case too frequently occurs in the absence of such predisposition. The frequency of exposure to such injuries in dissection must be taken into account. It is well known that a large proportion of the students who meet with these accidents regard them as productive of no inconvenience in their own persons, and although we have no means of estimating the number of those who escape, we have reason to believe it greatly exceeds that of the sufferers. My experience as regards these cases does not lead me to attach more weight to this opinion than belongs to its general application.

Constitutional affection more severe. I consider the constitutional state in the cases of absorption to be as much more severe than that which prevails in a large proportion of the cases of simple irritation, as the local is less so. The latter present the fever symptomatic of local irritation, or the fever of suppuration, acute or chronic. It takes its form and pressure from the local inflammation. If it be more violent in the first, or more protracted and exhausting in the second stage, it is nevertheless such in character as we are accustomed to see in local inflammations which have a different origin, and we treat it on the same principle. The former, if I judge rightly, is a constitutional before it is, openly at least, a local disease. It may even destroy without exhibiting, if we except pain, a local sign; the local sign may be either scarcely developed, or, on the contrary, may have approached a favorable termination, when the system exhibits symp-

toms of dissolution. There are however some cases of simple irritation, of not very rare occurrence, viz. the cases of true paronychia, or acute suppuration within the sheath of the flexor tendon, in which the general and high excitement of the nervous system is so sudden and peculiar,* that we cannot be surprised where other circumstances favor the conclusion, to find such instances recorded as cases of a poison absorbed. And as respects the constitutional phenomena, they might merit to be so regarded; for there is little, if any difference to be recognized between them in the acuteness of the suffering, the high nervous excitement, and the suddenness of the collapse.†

Remoteness of the inflammation from the injury. In reference to the cases of absorption, the question naturally recurs.‡ why, if the poison is conveyed into the circulating system, the first evidence of its introduction should be furnished at a distance from the part injured, while that part escapes with impunity? I admit the importance and difficulty of this question, and offer the following solution of it.

A slight and soft fulness of one or more glands, and tenderness in the course of the absorbents is the result of mere irritation, and occurs therefore as readily in simple as in poisoned wounds.§

* Case of Mr. Clifton, p. 199.

† The móre invariable and severe attack of rigor in the cases of absorption deserves to be noted. In those of simple origin it is often wanting.

‡ See page 147.

§ The cordy hardness (adhesive inflammation of the coats) of the absorbents, which is not peculiar to the morbid poisons, is a gradual process, and only occurs after the primary irritation has been long established.

The fact of the intermediate part being unaffected in acute inflammation and abscess of the glands, in which the absorbents of the part irritated terminate, is seen every day in the sympathetic bubo attendant upon gonorrhea, and sores of the penis, mammæ and fingers.

The virulent and irritating quality of a poison not formed by a specific inflammation and secretion of the part, as the morbid poisons, but introduced, ready made, as I might say, into the system, as that of decomposed animal matter, discovers itself by the same signs, but greatly augmented in rapidity and intensity, as regards constitutional excitement and pain, and with this remarkable difference—that the seat and extent of the pain and inflammation are invariably diffused instead of the contrary.*

Arrest of the poison by the axillary glands. The arrest of the poison of animal matter in the first stage of its progress by the axillary glands, determines the original focus of the inflammation and pain: these glands irritated by the contact of the noxious fluid, become congested, and partially obstruct its transmission into the circulation. The cellular tissue in part forming, imbedding and connecting them, inflames, and the puffy swelling denoting, first, serous effusion into the cellular membrane, and afterwards, by an erythematous blush, an inflammatory secretion in that texture, extends from the axilla to the pectoral and sub-scapular regions. The pain affecting the top of the shoulder, subclavian and pectoral regions, is explain-

* The tendency to diffused erythematous inflammation from the absorption of animal poisons is exhibited in the stings and bites of insects, and the effects of certain animal substances taken into the stomach.

ed by the distribution of the muscular twigs of the thoracic, supra and infra-scapular and circumflex nerves of the contiguous axillary plexus. If this theory be correct, the invariable locality of the primary inflammation, as well as the mere and transient irritation (if any) of the absorbents, is explained. If the poison so insidiously entered the system and mingled with the mass of blood as to excite no primary irritation, the natural sign of resistance to its admission, it would be difficult to assign a reason why its effects should have this or indeed any local manifestation. It is well known that a ligature on the limb will prevent the effect of the viper's poison on the system, and that violent erysipelatous inflammation ensues, as in the case of Mr. Butler, related by Dr. Duncan. The lymphatic glands act as a natural but unfortunately ineffectual barrier to the passage of the poison; effects not very dissimilar to those of the mechanical impediment, are produced in their immediate vicinity, and are most conspicuously apparent in parts where the connecting membrane is disposed in greatest abundance and laxity of texture. But although the irritant has this local manifestation, its passage is impeded only, not prevented, and the constitution therefore frequently exhibits disturbance sooner than the part, which in the instance related, p. 141, proved destructive, even before any visible sign of inflammation appeared.

Site of secondary inflammations. The occasional determination of inflammation on the opposite side of the trunk or opposite extremity, in the second instance, is not altogether peculiar to cases of specific irritation, nor common in these. It appears in some cases to be re-

ferable to a casual irritation of the part,* but in others no probable cause of local congestion appears, nor does it admit of explanation on the ground of a proper nervous sympathy. The sympathy of continuity and that which prevails throughout the whole expansion of the same texture, as the lymphatic and cellular, may explain the extension of a diseased action, but not the affections, partial and remote, to which I refer. Neither does the impregnation of the circulating blood with the matter of poison assist to remove the difficulty. But the insulated patches of the erratic erysipelas, the abscesses forming at the subsidence of fever, which have been called critical, nay, the local determination of inflammation in general, for which no cause appears, are points equally unintelligible, except on the hypothesis of a local irritation and congestion, not obvious to our senses. I believe, in the cases of absorption, the cellular texture in the immediate neighbourhood of lymphatic glands, superficial or deep-seated, to be, on the principle above stated, the chief seat of the secondary inflammations.

Condition of remaining animalization? of incipient decomposition? of putrefaction?

In the cases in which the admission of a poison is undisputed, two or three obvious inquiries arise. Is the frequent fatality of these injuries to be ascribed to the condition of remaining animalization which has hitherto resisted the operation of external agents? or to such an alteration in the quality of the animal fluids by the incipient process of decomposition as merely divests them of the properties of living matter? or to a state of putrefaction so advanced, as to be actively disengaging

* See page 187.

new and deleterious compounds? Our knowledge of this subject is not sufficiently advanced to enable us to answer this question satisfactorily. The larger proportion of genuine cases of the disease have their origin from dissections of bodies recently dead under inflammation, by which an abundant secretion of morbid fluids is accumulated,* and in which the thoracic and abdominal viscera are examined and handled.

But a single strongly marked exception is sufficient to shew that no condition of the dead subject is exclusively prejudicial, and of the cases above cited, nearly as many had their origin from the dissection of stale bodies, i. e. such as had been buried, as of recent subjects. We have the vesicle or the pustule ensuing in both cases, viz. from protracted dissection for demonstration (Mr. Dease, Mr. Hutchinson;) and from recent examination (Mr. Newby, Mr. Hersey.) If, as is probable, at the moment of expiring vital influence, or of de-animalization, new combinations give birth to a specific matter of contagion, it is to be presumed that the ultimate state of dissolution and decay, which we term putrefaction, so alters its quality, as to neutralize and render it inert. And it is in conformity with observation that actual putrescency is in some degree a security from the effects of this species of injury. Putrid matters act as a strictly local poison: they irritate and inflame the part wounded and its immediate vicinity, and the constitution is in proportion protected.

* If the dissection be performed before the body has entirely parted with its warmth, a faint and peculiarly oppressive odor is emitted, which is disagreeable, not to say revolting, even to persons habituated to dissection, and which not unfrequently creates nausea.

We know that vegetables undergo certain chemical changes, or form new compounds at the expiration of life, prior to those which take place in their state of ultimate decay. Luminous animals cease to emit light when putrefaction commences and not before, and on the other hand there are animal and vegetable matters which become luminous in a state of rottenness. Chemical observation and analysis directed to the subject would, and probably one day will throw light upon the fact, that the first changes which take place in the animal body, after the utter extinction of the vital influence, produce a fluid more deleterious in its effects upon the living body, than any which succeed it, and will also determine whether the fluids generated by disease when undergoing these changes possess more or less of this property. Pathologists in the mean time may be well employed in determining the importance due to the habit of the individual affected, to the nature of the wound, the fatal disease, acute or chronic, of the subject, and the varying rate of decomposition in the interval which has elapsed since death, from circumstances operating before as well as after death.* Hitherto observations are not sufficiently multiplied to warrant more than the general conclusion that the disease bearing a specific character may be derived from absorption of the fluids of both fresh and stale bodies.

Is a specific contagion ever communicated from the subject?

Another inquiry is, if any specific contagious disease be capable of being communicated after death, as erysipelas, with which Mr.

* "Faith, if he be not rotten before he die (as we have many pocky corses now-a-days that will scarce hold the laying in) he will last you some eight year," &c.—Clown in Hamlet.

Newby was supposed to be affected, small-pox, or lues? Although I assent to the opinion that erysipelas is in some circumstances contagious;* a question so subtle as to be still coram judice, as regards the living subject, is not likely to be decided by an appeal to the much more limited experience of the profession in its properties after death. It is probable, indeed scarcely doubtful, that a pustular or vesicular disease like small or cow-pox, retains for some time after death the property of communicating the local poison, by reason of the favorable circumstances in which for a given time the virus is preserved. Students dissecting small-pox subjects have had variolous pustules of a spurious description form upon their wounded fingers. This is common; but I never knew an instance in which the constitutional disease was communicated. The effectiveness of the living poison, preserved for many months by exclusion of the atmosphere, is obviously a distinct fact, and in no degree bears upon this question.

A specific morbid secretion, as that of lues, is capable of transmitting the constitutional disease from one living system to another. I was acquainted with an accoucheur who, while troubled with a sore finger, delivered a woman affected with a venereal ulcer of the vagina, and in consequence became the subject of ulcer, eruptions and nodes, bearing the characters of syphilis, and which were only cured by a full course of mercury. Bodies used for dissection are, with few exceptions, in a morbid condition, and although I have known instances of wounds re-

Morbid secretions lose their activity in death.

* See Dr. Wells's observations in the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge.—Vol. ii. art. 17.

ceived in the dissection of poxed and cancerous subjects in the stage of ulceration, I never knew nor heard of a case in which venereal or carcinomatous symptoms succeeded to such casualties. If the simple morbid secretions of living bodies were capable of acting as poisons, surgeons would be occasionally subject to peculiar diseases from this source as well as from dissection; and if the morbid poisons were transferable as such from the dead to the living, the fact could not have escaped observation.

Poison of glanders retains its properties after passing through the human system.

Veterinary surgeons receive the poisons of glanders both from the living and dead animal by inoculating chaps and punctures, for the matter secreted in the cellular abscesses of persons so affected is capable of producing glanders, when introduced into the system of the horse or ass by inoculation. This is sufficient to shew that the specific property of the poison is retained in its passage through the human system, but there is no evidence of its acting on the human body otherwise than as the poison of dead animal bodies. The matter absorbed from the living animal affected indeed in a remarkable instance, which I shall presently detail, the glands at the angle of the jaw, and the mucous membrane of the nares, which are the proper seat of glanders in the horse and ass. This was, however, in common with a similar affection of the same texture in other parts of the body. The following is an abridged statement of the unfortunate case of Mr. Turner, a student at the Veterinary College.

Case of Mr. Turner.

Mr. Turner, a veterinary student, injured his finger in examining the head of a horse

which had died of glanders. An ulcer followed, with inflammation of the absorbents and cellular membrane of the hand, and symptomatic fever. After some days an abscess formed in the opposite arm, and another on the lower part of the back. Matter taken from the abscess of the arm was sent to Mr. Coleman, who inoculated an ass with it, and produced fatal glanders.

Mr. Turner's health was seriously affected; he became hectic, and was sent to Brighton for the benefit of sailing and tepid bathing. Subsequently an abscess formed in his lungs, another in the kidney, and after his return to his residence at Croydon, at the expiration of several months, abscesses formed successively upon each knee joint. From the last, matter was taken for the purpose of inoculating an ass, which died in eleven days, glandered. A short time afterwards Mr. Turner also died.

My friend Mr. Coleman, to whom I applied for further particulars of the experiments made in this interesting case, favored me with the following letter.

"Veterinary College, 8th August, 1823.

"DEAR SIR,

"In compliance with your wishes I will endeavour to state the principal facts of Mr. Turner's case. From dissecting the head of a horse that had been destroyed by glanders, Mr. T. received a small wound on his hand, which in a few days produced pain and inflammation of the superficial absorbents.

"These local irritations soon ceased, but the absorbents of the opposite arm became affected, which seemed to demonstrate that some poison had been absorbed. Abscesses were formed at different parts

of the body, and from one of them I inoculated an ass, which ended in farcy and glanders, and death; and Mr. J. Turner, at a subsequent period, inoculated other asses from the same source with a similar result. It may be proper however to remark, that Mr. Turner had no symptoms whatever of glanders, or any affection of any kind of the head, nor did the local disease of the arm exactly resemble farcy, although the matter from the different abscesses contained its original virulence unaltered.

"You know that the seat of acute glanders in horses and asses is the secreting membrane of the nostrils, and that in farcy the superficial not the deeper seated absorbents are affected. The matter of both diseases in quality is the same. We can procure glanders from farcy matter, and farcy from glandered matter; and yet it appears that in the human subject, although susceptible of irritation from glanders and farcy matter, and capable of secreting a large quantity of the same poison, the seat and form of the disease are generally dissimilar. As far as my experience goes, the nostrils of the human subject are not susceptible of glandered ulceration or inflammation. In Mr. Turner's case, the superficial absorbents and cellular membrane were the only parts affected; but in other instances I have seen the superficial absorbents go on to suppuration and ulceration between the valves of the absorbents, in consequence of local irritation and the contact of farcy and glandered matter, corresponding in a great degree to the same disease in horses. From these facts, and many medical students falling a sacrifice to irritation from wounds in dissection, I have been led to believe that in such cases absorption of some poi-

son frequently takes place. I am aware of the fact, that simple wounds with clean instruments sometimes occasion irritation of the absorbents, but I apprehend it will be found that butchers and other persons in the habit of cutting animal substances in a fresh state, are by no means equally liable to constitutional or even local irritation in the same degree as medical students. I have further to add, that I think it highly probable, that in all contagious constitutional diseases, such as small-pox, measles, lues, cow-pock, hooping cough, and perhaps from absorption of putrid matter, and other animal poisons, the whole of the blood is contaminated. In acute glanders the blood is undoubtedly affected. I have produced the disease, by first removing the healthy blood from an ass until the animal was nearly exhausted, and then transfusing from a glandered horse blood from the carotid artery into the jugular vein of the ass. The glanders in the ass was rapid in its progress and violent in degree; and from this animal by inoculation, I afterwards produced both farcy and glanders. The facts mentioned by Mr. John Hunter to shew that the blood is not infected can be readily explained. The blood, although it may possess materials to irritate certain parts, may not irritate all parts. Calomel may inflame the salivary glands, and increase their secretion, but produces no increase of the semen or synovia. Turpentine may stimulate the kidney to secrete more urine, but has no effect on other glands, although absorbed and circulating with the blood. Most parts of every animal have probably some peculiar susceptibility, and non-susceptibility; so that the same cause will produce different effects. I have enclosed some experiments made by Mr. J.

Turner on matter taken from his brother when he removed from the Veterinary College to Croydon.

"I remain, dear SIR,

"Yours very truly,

"EDWARD COLEMAN."

"Benjamin Travers, Esq."

"Croydon, Sept. 12, 1817.

"SIR,

"ACCORDING to your request I herewith send you the particulars of the experiment upon an ass with the matter you took from my brother; to which I add another instance, where I have applied the matter from another abscess under similar circumstances, and with the same result.

First experiment. "Inoculation of an ass with matter from an abscess taken from Mr. William Turner, Aug. 4th, 1817.

"A healthy ass was procured, about one year old, and inoculated in the following manner the next day, Aug. 5th, 1817.

"Incisions made in the skin covering the maxillary gland with a lancet dipped in the virus, and the virus rubbed into the incisions. In the same way in the skin at the margin of the nostrils, and the matter rubbed upon the schneiderian membrane.

"Sensible effect produced the second day afterwards, the maxillary gland being very tender to the touch, but no other symptom.

"3d day—The maxillary gland enlarged and more tender; some appearance of discharge from the nostrils.

"4th day—An absorbent vessel inflamed and enlarged, extending from the maxillary gland across

the cheek, exactly resembling a farcy cord in the horse; discharge from both nostrils; appetite defective.

" 5th day—Discharge from the nose increased, some noise in respiration; appetite very bad; pulse 90.

" 6th day—Quick respiration; pulse 100; lameness with one hind leg, an absorbent vessel inside the thigh inflamed and enlarged; complete farcy. No virus was applied to this part at the time of inoculation, nor any where but to the head.

" 7th day—Another enlargement of the farcy kind upon the stifle of the same leg.

" 8th day—An increase of all the symptoms; considerable difficulty of breathing, and the animal much distressed.

" Continued in this state, eating very little food, till the 12th day after the inoculation, when he died.

" The maxillary gland did not increase in size after the 4th day, and did not suppurate, but remained indurated, as is the case in glanders in the horse.

" On examination of the diseased thigh after death, a great number of the absorbent vessels contained pus.

Second experiment. " Another ass inoculated August 20, 1817.

" This subject was about one year and a half old, very healthy, and remarkably strong. The matter was applied in the same way as to the other; to the head only.

" On the 3d day after the inoculation, the maxillary gland was enlarged, and the lip swollen at the part where the virus was applied.

" 5th day—Several small pustules on the lip.

"6th day—Some discharge from the nostrils.

"7th day—Appetite impaired, restlessness, and pulse quick.

"8th day—Very lame with one hind leg, and a tumor inside the thigh in the direction of the absorbents.

"10th day—Lame with the other leg, and the absorbents inflamed.

"12th day—Several tumors in both thighs, difficult respiration, and considerable discharge from the nose.

"13th day—The ulceration of the lip so much increased, that a large portion of it sloughed off; pulse very quick, and no appetite.

"14th day—The animal died. Was not dissected on account of the danger of infection.

"It may be proper to observe, that I applied the matter to this animal in the first instance in the way I have described without any effect, but the failure is easily accounted for. The matter had been removed several days before the subject could be procured, was during a part of that time exposed to the air, and was rather deficient in quantity.

"I am, Sir,

"Your most obedient Servant,

"James Turner,

"Veterinary Surgeon."

"Edward Coleman, Esq."

I shall further detain the reader by the brief notice of two cases in which the poison was absorbed from the living animal.

The following is a communication from Mr. Nallen, Veterinary Surgeon, of Kidderminster.

Case of Mr. Nallen. "I had occasion to administer a ball to a horse affected with glanders. At the time there was a slight abrasion of the skin on the joint of my thumb, which I supposed became inoculated from coming in contact with some of the discharge from the horse's nostrils, for in a few days it became a painful sore, the inflammation having a very unhealthy appearance; the sore was poulticed, and in a day or two an eschar was formed, on removing which an ulcer was exposed, having several small pits or cells containing a thin semi-transparent fluid; this sore was followed by many others of a similar description, affecting chiefly the hand, the glands of the axilla, the nates, and the neighbourhood of the knee-joint. This took place on one side, the other arm and leg not being affected. The irritation I presume from so many sores, affected my general health considerably, with loss of appetite, &c. My medical attendant prescribed the blue pill and the use of the warm bath, which I continued for several weeks, until having occasion to go to town I consulted some of the first medical men, who recommended me to drink the decoction of sarsaparilla. I took it for about a month: after that time no more ulcers appeared, those already existing assumed a healthy appearance and healed quickly, and from that time to this I have had no return of the disease.

The following case I put down from the man's verbal report.

Case of Lambert. Nimrod Lambert, a healthy hackney coachman, æt. 32, in January 1822, infected a chap on the inside of the right thumb by inserting it into the nostril of a glandered horse, to pull off a scab.

He remembered to have afterwards wiped the thumb with a wisp of hay. In the space of six hours he was seized with violent pain and swelling of the thumb; it inflamed rapidly; upon which he applied a poultice to it, and took some salts. On the third day he was suddenly taken ill whilst driving, with cold shivers and giddiness, and states that he entirely lost the use of his limbs for seven hours. At this time his arm pained him much all the way up, and on the following day it was streaked with red lines, and excessively swollen. The armpit was also much swollen and tender. In the evening of the fourth day he was carried to Guy's Hospital, where he lay during twenty-four weeks. Superficial collections of matter formed successively in the course of the absorbents. The corresponding portions of the integument sloughed, leaving extensive ulcers which discharged an unhealthy and fetid matter. The glands at either angle of the lower jaw, and those of each groin became swollen, and he was much afflicted with pain between the eyes and down the nose, and exulcerations of the membrana narium attended with discharge.

During the progress of the local disease he had much constitutional illness. He totally lost his appetite, and was oppressed with nausea; complained of severe pains with swimming in the head, and occasionally wandered in mind. He had also much pain through the whole course of the spine, especially in the region of the kidneys. His urine was thick, discolored, and fetid; his motions were slimy and purulent. Expecting to die, he quitted the hospital and lay at home the remainder of the twelvemonth, in a state of great emaciation from the continued discharge of his sores, his inablility to take

food and to procure any refreshing sleep, even with the assistance of opiates, which he took habitually.

Despairing of aid from the profession, he applied to an experienced female practitioner, who administered a decoction of herbs which he invariably vomited, but to which he nevertheless ascribed his recovery. At the end of the twelvemonth his health gradually returned, the arm began to heal, and he became comparatively hearty, and resumed his occupation though with much inconvenience, owing to the distortion of his hand by the retraction of the thumb and fore-finger in the cicatrization of a long line of abscesses, reaching to the middle of his upper arm. After six weeks this cicatrix ulcerated afresh, and healed slowly. He is still subject to wandering pains in the head, both sides of the neck, loins, and groins; is not so strong nor so fleshy as formerly, but has a good appetite. He has a great heaviness and disposition to sleep during the day; and at the end of two years and a half from the breaking out of the disease, considers his constitution broken, and despairs of being ever again the man he was.

I was informed, that an ass inoculated with the matter of this man's sores by Mr. Sewell, died glandered.

In comparing Mr. Nallen's and Lambert's cases we must observe, that though the poison imbibed from the living animal acts with very different degrees of severity, yet that the symptoms to which it gives rise are similar; and upon a review of the three, the reader cannot fail to perceive some points of analogy between the effects produced by the absorption of glandered matter and of the fluids of the

human body after death.* Mr. Coleman, impressed by this circumstance, appears to think that a poison is absorbed in human dissection, the result of diseased actions in the living subject. To this opinion I object, 1st. that the disease in question has been known to arise from the examination of the bodies of persons who have died suddenly and in health, in consequence of surgical operations, as the Cesarean section; and has been most commonly produced from the dissection of subjects who have died of non-contagious diseases: 2d. that the disease bears a common character, differing only in the degree of severity, whatever may have been the malady of which the subject died.

Poison generated after death.

From the uniformity of the symptoms produced in the cases which afford any evidence of absorption, I am disposed to conclude that the poison is generated after death, and pertains to the process of decomposition in its early stage; it is highly

* I think there can be no difficulty in admitting in either of these cases that a poison was imbibed, but the evidence gives no ground for the conclusion that it was a morbid poison, as regards its operation on the human subject.

No proofs can be more conclusive than those which the professor adduces, of the contagious poison in question affecting the mass of blood and producing its fatal effects through this medium, to wit, the production of the disease in one animal by inoculation with the matter of secretion, and in another by transfusion into its veins of the fluid from which such secretion is formed.

The intervention of an animal of a different species, preserving the contagious quality in its morbid secretion, yet insusceptible of the specific disease, is truly extraordinary. It would be desirable to ascertain if the blood of a man secreting matter capable of producing glanders, would, if transfused into the veins of the horse, produce the disease in that animal. The condition above stated by no means authorises this conclusion.

probable however, that the irritating qualities and intensity of the poison and the rapidity of its developement may be influenced by the more or less morbid condition of the body at the moment of death, as undoubtedly the process of decomposition is influenced by these circumstances.

Charbon or pustule maligne, a distinct disease.

In the cases of disease produced by contact with the flesh or blood of diseased animals, as those of the butchers of the Hotel des Invalides and others related in the Memoirs of the Academy of Sciences by Morand,* the symptoms are altogether different from such as follow wounds in dissection; viz. erysipelas gangrenosum, enormous emphysematous swellings, livid pustules and tumors terminating rapidly in gangrene and death. In truth I can discover no analogy between the disease which follows wounds in dissection and that which is described by various writers as having occurred at several periods in the different countries of Europe, and in the Islands of Grenada and Bardadoes, in the West Indies, from eating of the flesh, and in some instances by contact with the flesh, blood, or secretions of horned animals, which have perished of a contagious murrain.

I shall not stop to enquire whether one or more diseases have been derived from these sources, a question of considerable interest, and for which the difference prevailing in the statements of ancient and modern writers, affords sufficient reason; but content myself with quoting the opinion of the late learned and ingenious Dr. Chisholm on this point, from whose report of the disease which appeared in

* Hist. de l'Acad. Roy. des Sciences, an. 1766.

Grenada, in the year 1783,* I am led to believe that it was essentially the Pustule maligne described by MM. Enaux and Chaussier.† "There can be little doubt," says this Author, "that the contagious distemper among the horned cattle, in the South and North of France, of Holland, of Denmark, Sweden, and of Great Britain, was the same disease; the Pestis Bovilla of Sauvages, the Contagiosa Epidemia of Rammazzini, the Maladie Epizootique of D'Azyr, and the disease I have described of Grenada."‡

It appears that the murrain among cattle is not communicable to man, nor plague among men to brute animals. But when man partakes of the flesh of animals, which have been destroyed by a pestilential disease; or on the other hand, carnivorous quadrupeds during the existence of a pestilential epidemic, plague for example, feed on the bodies of men destroyed by the pestilence, they reciprocally fall victims, not to the contagion in either case, for the disease is not propagated from one species of animal to another, but "to the action of a peculiar poison, evolved in their stomachs from the morbid flesh."

The disease inflicted by absorption of the poison of dead animal bodies, is analogous to these, in that the poison is derived from the individual body—that it terminates in the individual affected—that it pos-

* On the Lues Bovina Intertropica, and the Consequences thereof, with Remarks. By C. Chisholm, M.D. F R.S. Edin. Med. and Surg. Journ. Vol. VI.

† Methode de traiter les Morsures des Animaux enragés, &c. &c. Dijon. 1785.

‡ The simultaneous occurrence of acute contagious diseases in the human subject, as the cynanche maligna, &c., with the Pestis Boum, has been more than once noticed, and would make it appear probable that both are to be referred to the same epidemic condition of the atmosphere.

sesses no quality of the disease, whether contagious or otherwise of which the animal died.*

The following is an interesting communication addressed to me on this subject by Dr. Farre.

"Not long before the death of Mr. E. I left the hospitals, and engaged exclusively in operative surgery at Barbadoes. This occupation afforded me the opportunity of observing the effects of a singular disease, the "Pestis Bovilla," which produces in the human body, feeding on cattle suffering under this murrain, a particularly malignant carbuncle. This is also produced by the contact of the fluids of the diseased animal and even by the rudest form of dissection, a fact more to our purpose, and offered to you on the testimony of the late Mr Dudley Wade, at that time a resident surgeon in Barbadoes, but subsequently in Berbice; and who had attended as fatal a form of the disease in a white, who simply flayed the animal, as in the blacks who clandestinely partook of its flesh. He attended, as he informed me, fifteen cases of this malignant disease about the years 1795 and 1796, when it prevailed on some of the estates under his care. In the beginning of May 1796, Mr. Wade recommended to my care two negro men on Dotton's estate, who were affected with this disease, and at the same time informed me, that of the various methods of treatment which he had tried, none had proved so successful as the early excision of the carbuncle. In the patients whom I visited the carbuncles had precisely the same character. Each

* That is, if we speak unqualifiedly, as regards a foreign species; for it appears from the experiments above related, that the morbid secretion of the man inoculated with the matter of glanders is capable of reproducing the disease in the horse, the species in which it was generated.

consisted of a double circle, one within the other of flattened confluent vesicles, and the centre of the inner circle indented and perforated emitted a serous fluid. The exterior of both was tumid; only one carbuncle was found on each patient, on the back of the hand of one negro, on the shoulder of the other. In the latter the constitutional disturbance had commenced, the irritative fever was considerable, and his danger great. In the former the irritative fever had not commenced, but the glands in the axilla of the diseased arm were inflamed. They both recovered under the use of opium, wine, and bark, but chiefly I believe from the excision of the carbuncle. In the worst case of the two the cellular membrane under the carbuncle was discolored, and in the operation I dissected the portion of the trapezius which I had exposed, as clean as I would have done in the dissecting room. The suppurative process took place with a rapidity greater than I expected, and the constitutional symptoms, which were very alarming, gradually declined. In the milder case, although the axilla was inflamed, the constitutional symptoms were arrested by the same treatment, and did not subsequently appear. Both men were charged with having exhumated an animal which had died of Pestis Bovilla. I inferred from the single carbuncle in each, its rise and progress, and particularly from the arrest of the constitutional symptoms, that it was the result of inoculation; and I dwell chiefly on this circumstance, because this form of malignant carbuncle affords a remarkable illustration of the possibility of the morbid fluids exciting after death by inoculation, morbid actions fatal to the individual and yet not contagious."

Is the constitutional disorder diagnostic? Another important inquiry is the following; is there any thing in the character of the constitutional disorder which distinguishes the case of specific from that of simple irritation?

I think not; and I rest this opinion on experience of the uncertainty of older observers of disease than myself. Even the local malady in addition, exhibited abstractedly from the circumstances of its origin, would throw little light upon the real nature of the case into minds which had not been especially directed to it. The disease has been mistaken for pneumonia, erysipelas, and acute rheumatism. The fact is, that the constitutional disorder arises from the operation of the poison, as an irritant on the nervous system, and not from the inflammatory action which we see. This is but a symptom, not invariably present, and always comparatively insufficient to account for the constitutional excitement. But inflammation is capable of acting as an irritant of the nervous system, nearly, if not quite as powerful as the poison; and the irregularity and vehemence of the constitutional disorder are occasionally as great in the cases, of non-absorption. The following case which occurred very recently may serve as an example.

Case of Mrs. C. Mrs. C., aged 40, of healthy but irritable constitution, mother of a family, and suckling a child of seven months, complained to her apothecary, Mr. Anderson, of Fleet Street, of a pain and redness as she thought rheumatic, of the knuckle of the middle finger of her right hand, with slight febrile indisposition. On Tuesday, the 12th of October, she took a dose of opening medicine, applied the dilute Goulard lotion to the knuckle, and on the following day was free from pain. On Thursday the 14th, the

pain had returned and extended up the arm, affecting the whole side of the neck, and the tip of the ear, and was attended with a sense of heat. A slight and recent wound was now noticed in front of the metacarpus a little above the joint, and she expressed a fear that she had poisoned it. She was quite ignorant how the wound was occasioned. There was a slight fulness and tenderness on pressure above the clavicle, but there was no inflammatory appearance either at this part or on the hand or arm. Her pulse and skin indicated fever, and she took a brisk purgative draught. During the night she got out of bed in a fit of delirium, but it subsided before morning. On Friday she was still feverish, and complained much of head-ache. The pain above the axilla was relieved, but there was still a slight puffiness of that part. The purgative was repeated, and she afterwards took salines, and at night a blister was applied behind each ear. Saturday: appeared and felt better, fever less, owing to a free perspiration. She complained of her sleepless nights. At 12 o'clock p. m. she became highly delirious. Mr. Anderson gave her a camphor and opium draught, and she soon became tranquil, but got no sleep. On Sunday violent delirium returned, and Dr. Babington was requested to visit her. Her delirium was maniacal, and continued during the night. In the morning a fulness and tension over the flexor tendon of the middle finger was observed, and I was desired to see her. When I arrived she was talking irrationally, and incessantly, and had a wild expression. Her pulse was very quick, contracted and a little irregular. There was neither absorbent nor glandular inflammation, nor any cutaneous blush, but a little more fulness from the elbow upwards and about the subclavian region than on the

opposite side. I laid open the theca of the flexor tendons from the second joint to the metacarpus, so as to expose the tendons; about a tea-spoonful of healthy pus issued. Twenty ounces of blood were drawn from her arm, and the hand fomented with hot water and covered with a poultice. Ten grains of calomel were given, and some hours afterwards an injection of Epsom salts with tincture of jalap. No observable change followed the loss of blood. In the evening the delirium continued, but was less violent. The bowels had been but little moved. The blood drawn in the morning was buffed and slightly cupped. An antimonial draught containing forty drops of laudanum was given at bed-time.

Monday, Oct. 19. No rest; talkative delirium unabated throughout the night. The head was shaved, and the poll covered with a blister. A pill of five grains of calomel was directed immediately, and a solution containing two drachms of Epsom salts every two hours. In the evening the delirium was increased; the pulse very rapid; the bowels had been freely moved; skin dry. Twelve ounces of blood were drawn from the arm, which occasioned a sensible depression. A draught containing five grains of extract of hyoscyamus, and one drachm of tincture of opium was given at bed-time. The fore arm showed two or three faint lines of inflamed absorbents, it was a little puffed, and evidently tender when grasped. The wound in the finger discharged copiously on pressure, and the finger and palm were free from swelling.

Tuesday, 20th Oct.—It was reported that she had been more tranquil, and the extract of hyoscyamus was directed to be repeated in camphor mixture every fourth hour. Two dozen of leeches were laid

upon the arm and bled freely. In the evening the excitement was evidently lessened. Pulse fuller and softer, though as frequent as before. A grain of opium with five grains of calomel were given at bed time, which had the effect of procuring five hours sleep.

21st October.—She was composed and partially rational, though now sinking into an opposite state, being affected with great lowness and hysterical sobbing. Pulse very rapid and feeble. Took twenty-five min. of tincture of opium in camphor mixture at bed time.

22d.—Had passed a quiet but sleepless night; talked much and incoherently, but her manner was subdued and countenance sunk. Has profuse sweating, and complains of extreme lowness. A draught of bark and sulphuric acid every fourth hour, and the anodyne draught repeated at bed-time.

From this day to Monday the 25th, there was a gradual, though very decided improvement in the symptoms, in proof of which Dr. Babington proposed to discontinue his daily attendance. The pulse continued invariably 130 and upwards. The skin was moist, she was very droughty; took much liquid nourishment. Mind unsteady but always over-agitated, and at times much depressed; seems to suffer from extreme nervous debility; fancies she cannot swallow, and cannot void urine. Some extract of bark and a few drops of tincture of opium were added to the draught, and a moderate quantity of wine was allowed. The anodyne at night was withdrawn: on the Wednesday the wine was also withdrawn, as it appeared to over-stimulate.

In the afternoon of Thursday the 28th, the patient was seized with a most severe rigor, which lasted upwards of an hour, and this was followed by profuse

colliquative sweating. On the following morning the rigor returned with nearly equal severity, and the countenance, pulse, and general powers of the system, became exceedingly altered. A state of extreme lowness and diminished sensibility followed, with frequent convulsive twitchings of the muscles of the face, inability to project the tongue, difficulty in swallowing, articulation, &c. In this state she lingered until the Sunday following, when she died at nine a. m.*

* The maid-servant who fomented Mrs. C.'s hand on the evening of the third day after the incision of the finger, complained of pain and tension of the tip of the fore-finger of the right hand. She had neither wound nor scratch of any kind. Acute fascial inflammation of all the fingers, back of the hand and fore-arm, followed ; and several abscesses were formed which required free incisions. A large collection of matter took place upon the extensor muscles at the back of the fore-arm, and a smaller one in the situation of the lymphatic gland, above the inner condyle of the humerus. The fever of suppuration was protracted, she had much pain in the occiput, much restlessness, and slight delirium. As the hand and arm recovered she was attacked with very severe pain, and an equal and extreme tumefaction and excessive tension of the lower limb, from the hip to the sole of the foot, first affecting the same, and afterwards the opposite side. There was no disposition to suppurative inflammation in the lower limbs. The affection resembled most that of the phlegmasia dolens, except in its extreme and unyielding tension. By free, general and repeated blood-letting in the outset, and early and free openings of the abscesses, she recovered under the ordinary anti-febrile treatment, but not until she had been reduced to a state of extreme prostration, by an illness of nearly three months' duration.

The laundress employed to wash Mrs. C.'s sheets, which she received as taken from her bed on Tuesday the 26th of October, had no sooner opened and immersed them in water, than she was overpowered by an effluvium which she described as peculiarly offensive and instantly complained of a most severe darting pain in the axilla and shoulder. Nausea and faintness followed, and in the evening, she had a rigor which lasted for three hours. In the morning she

It should be observed that the wound in the finger continued to discharge freely, the integument of the palm of the hand was collapsed and wrinkled, and she bore pressure upon it without pain.

was much fevered, and on the two succeeding nights violently delirious. The pain she now complained of affected the outer side of the upper arm, from the elbow to the shoulder, but there was neither swelling nor redness of this part. On the succeeding Saturday the pain shifted to the axilla and pectoral region, and two days afterwards a deep pectoral abscess presented itself. Her case was treated as one of typhus fever by her medical attendant. When I visited her on Sunday the 7th of November, she was in a state of exhaustion from pain and long continued vigilance ; an abscess which, though deep and extensive, was circumscribed, pointed above the left mamma, I opened it and discharged several ounces of healthy pus. She recovered after a tedious confinement, during which she continued to suffer severe pain along the extensor muscles of the arm.

The coincidences of the servant's and laundress's illnesses were remarkable, so much so, that although these cases bore, especially that of the latter, a very remote and partial analogy to that of their mistress, I confess myself disposed to believe that they were not mere coincidences. For example, the incessant steeping of the hand in hot fomentations was sufficient to render the skin preternaturally irritable, and the frequent contact in this state with the matter of a sore, might have irritated sufficiently for the production of common whitloe, a disease in many cases of seemingly spontaneous origin. The rapid diffusion of the inflammation over the fascia of the hand is accounted for by the circumstance first mentioned. The laundress's case appears to have been fever excited by the effluvium of morbid secretions. The cause and locality of the pain and of the abscess, which proved critical of the febrile action, I am entirely unable to explain. In neither this nor the former case was there any breach of the integument by which absorption could be facilitated. The laundress was attacked at one and the same instant with nausea and faintness from the stench, and with acute lancinating pain, from the handling of the linen ; a woman who was present told me that she turned as pale as death, and resting her extended hand against the wall, exclaimed in agony, " oh God! my arm," within two minutes of unfolding the sheets. This was surely the operation of a subtle

Examination of the arm. Examination of the arm twenty-four hours after death. The right upper arm was visibly swollen. On measuring it opposite the insertion of the deltoid its circumference was one inch greater than that of the left—above the elbow half an inch—below the elbow there was no difference between the arms. The subclavian space on the left side was also a little tumid. The common theca of the flexor tendons, from the second phalanx of the middle finger to the base of the metacarpal bone, was sloughy, and contained some sanio-purulent matter; opposite the wound, the tendons were completely separated by the sloughing process, and above this lay exposed, but unchanged in appearance and texture. The other thecæ and parts of the metarcarpus, muscles, vessels, and nerves were healthy. The annular ligament and common fascia of the fore-arm appeared perfectly healthy. This being divided, the muscles were carefully separated from each other, in order to trace their tendons; and opening the proper fascial sheath of the sublimis perforatus, about an inch above the ligamentum carpi, a tea-spoonful or thereabouts of recent and healthy pus issued. The tendon was fresh and glistening. The matter was not in communication with the tendon of the flexor profundus, but distinctly confined by the proper sheath of the flexor sublimis. Opposite the elbow and above it, the connecting cellular membrane between the integument and common fascia was loaded with a straw colored serum. The deep humeral and axillary veins were plugged

poison on the nervous system. It could only be through this medium that it could operate so instantaneously. Much anxiety of mind prevailed and might have predisposed her to be severely affected, as she considered her livelihood involved in the issue of Mrs. C.'s illness.

with a firm and tenacious coagulum which extended into their branches. This gave a cord-like fulness which could be felt in their course during life. The coats of the humeral vein were somewhat thickened. The arteries and smaller veins, and venæ comites and nerves were all carefully examined, and presented no morbid appearance. The inspection of the viscera was positively prohibited.

Remarks. The circumstances of this case I thought sufficiently remarkable to lay them before the reader. If Mrs. C. had absorbed a poison, how was it received? She was never engaged in culinary operations, the wound was a mere scratch, and she was quite unconscious how she had received it, most probably from a pin. I repeatedly and carefully examined the axilla, shoulder, and corresponding side of the chest. It was not at any time inflamed; yet a little fulness was visible below the clavicle on that side, and pressure upon that part gave her uneasiness. The sudden maniacal attack supervening upon a moderate degree of fever, and this ushered in by pain extending from the inflamed knuckle to the tip of the ear, and affecting the whole side of the neck, certainly warranted the belief that the mischief originated in the finger, and the escape of pus upon exposing the flexor tendon accounts to my mind for both symptoms. The difference in severity of constitutional irritation from matter forming under the common fascia, as in what I call fascial abscess, and forming within the proper sheath of a tendon, is not unfrequently the difference of life and death. The former case is the common whitloe, this is the paronychia gravis. The occurrence of the former is as thirty at least to one of the latter. There is no degree of constitutional

excitement, however vehement, to which the confinement of matter within the proper sheath of a tendon is not adequate. I have known it to produce, in one case, maniacal delirium; in another, fatal tetanus; and in the case mentioned at page 25, such was the previous exhaustion, that the simple operation of slitting up the sheath proved fatal. In the absence therefore of another cause of constitutional disorder, as well as of the appearances indicating absorption, and the discovery of this sufficient one, in the case of Mrs., C. as in that of Mr. Clifton, of which the fatal result was narrowly prevented, I rest satisfied with the conclusion that no poison was absorbed. The primary action, viz. that which takes place upon the wound is strictly local, and subject to be varied by the circumstances under which it is set up*. The secondary is constitutional, and presents therefore a remarkable uniformity. In the case above related, the second concealed suppuration†—of which the severe rigor four days before the patient's death created instant suspicion, although we were unable to discover its seat—overpowered her remaining strength, and was marked by symptoms, owing to the altered state of the system, the very reverse of those which announced the first, viz. sinking, colliquative sweats, subsultus, coma, and insensibility. Mrs. C. was an unfavorable subject for acute disease, for not

* The confinement of matter beneath the extensor tendon was associated with the characteristic signs of absorption in Mr. C.'s case, page 252, in which the erythema of the trunk was strongly marked. In the case of Mr. Smartt, we have the same indication of poison with circumscribed cellular abscess at the seat of the wound, and in Dr. Pett's case with gangrene of the finger; but this, there is every reason to believe, was artificially produced.

† This was equally confined with the first and in the same texture, but separated from it by the annular ligament.

to dwell upon the delicacy of the puerperal condition in any stage, and the sudden arrest of a profuse habitual secretion, she was a person of a highly irritable temperament.

Second case of Mr. Delph. Mr. Delph, whose case is given at p. 179, had the misfortune to meet with a similar accident in the summer of 1824. The following is his account of the latter injury, which I introduce for the purpose of shewing a marked distinction between them, characteristic of the difference between the simple and the specific injury. I have assumed that of 1817 to be a case of poisoned wound; the last attack, although originating in dissection, might have equally followed from a wound with a clean instrument: it was the acute inflammation of the absorbents. The constitutional irritation in one case was commencing and gradually increasing with the local inflammation, and was no more than it plainly accounted for, either in form or severity. In the other it set in after a lapse of forty hours, with symptoms of constitutional disturbance of alarming severity; and to this succeeded a diffuse inflammation peculiar in kind, at a distance from the seat of the injury.

"On the 6th of May, in examining twenty-four hours after death the body of a child who had died of croup after measles, I punctured my left thumb whilst stitching the integuments of the chest. The puncture was about midway between the quick of the nail and first joint, and penetrated to the bone. I immediately felt acute pain, and recollecting what I had suffered from the same cause seven years ago, washed my hands repeatedly in water and kept myself as quiet as my professional duties would admit. During the remainder of that day I felt much pain and throb-

bing in the thumb, which in the evening became lancinating and more severe. I took some brisk aperient medicine and kept a cold lotion to the part affected, but experiencing no diminution of the pain, passed a very disturbed night, and was alarmed in the morning at the appearance of the thumb, which was now much swollen, and presented a deep blush of inflammation as far as the second phalanx. Twenty-four hours had now elapsed, the pain was excessive. I smothered the part with leeches, and immersed it in a poultice well supported in a sling. In this state I visited several patients, but the severity of the pain compelled me to desist. By your advice I took a full dose of calomel followed by a cathartic draught, which operated powerfully during the ensuing night. My mind was tranquillized by your assurance that I was labouring under simple inflammation. On the second morning, forty-eight hours after the accident, the absorbents were affected to the axilla, and the whole arm was tense and painful. I now applied twelve leeches to the thumb and encouraged the bleeding, which was very copious. I had one or two slight rigors, and felt a good deal depressed without any abatement of pain. On again visiting you, you directed me to be blooded to syncope, which followed after thirty-five ounces had been drawn. From that moment I became, by comparison, easy; a decided alteration was manifest in the appearance of the arm, the pain ceased, except in the thumb, which remained swelled and painful for several days, but by the constant application of poultices, suppurated in the punctured part, and healed kindly in about a fortnight.

"In my former unfortunate accident you will remember, that the scratch in my finger was not noticed

until it became inflamed, about sixteen hours after the accident, when I experienced some shooting pain in the part. At forty hours after the accident I had one of the most tremendous shivering fits I ever witnessed, which was succeeded by others, at regular intervals of fifteen minutes. These were followed by delirium and other symptoms of alarming constitutional excitement. Though the arm and hand became swollen, there was no blush to be seen on the integument, nor any indication of inflammation of the absorbent vessels; the integuments of the same side of the trunk, from the spine to the linea alba, took on the same swollen appearance with the arm; this was followed by erysipelas and diffused abscesses, which continued to form over different parts of the body for a period of three years, and at times rendered my existence miserable."

Pathological relation between the cases of simple and poisoned wound.

The occasional approximation of the constitutional symptoms in the two classes of cases, naturally leads to the belief that there is nothing in the nature of the malady which puts it beyond the pale of medical treatment in one case more than in the other. The difference amounts to this, that the poison is in one case the irritant, in the other the inflammation. In either case the local action may constitute so much of the disease as to demand vigilant treatment; but in the former, the disorder arises from the admission of the poison into the circulation, and in most instances the local action is insignificant, except as it demonstrates the existence and activity of the poison. To take up the local disease in this case as especially important, is to begin at the wrong end. The terms "poison" and "specific" have been somehow supposed to convey a mys-

terious import of incurableness, and we are apt to conclude that our labour is vain and to yield the contest in despair, when conclusive evidence of absorption is at hand. Nothing can be more contrary to reason than this impression. If a common pathological character, viz. that of over-excitement of the nervous system, be established, the constitutional treatment of the cases will be similar. The difference in rapidity of development, in vehemence of action, must be met by a corresponding activity of treatment. If the pain anticipate other signs of inflammation, if the excitement be so intense and the depression of the nervous system follow so close upon the stage of excitement, as either to disguise the former or abridge it of its ordinary limit; we must not suffer ourselves to be betrayed into a hypothetical belief that the operation of the poison contra-indicates the employment of those measures, which have been found efficacious in proportion as they have been early resorted to, in cases to which these bear a strong and obvious analogy. We know that the effects of powerful poisons that are not directly subversive of the organization necessary to life may be overcome; that in many cases in which their agency upon the system has been developed it has been neutralized; that it is by the extraordinary operation of common principles that they destroy. There is nothing in the nature of irritation induced by specific agents, as the saliva of the poisonous snake or of the rabid dog, which warrants a belief that it resists the operation of remedies, provided the activity of the poison be not such as cuts off opportunity, by a sudden arrest of the functions of life. It stands, in fact, on the same ground as irritation from other and simple causes, as from mechanical injury. If from the

moment of the shock re-action fail, the injury is in its nature fatal from the complete paralysis of the nervous system; but where this is not the case, as in many instances of direct irritation, it is not, and in those of reflected irritation it cannot be, we are as little entitled to conclude that a disease is in its nature incurable, as that it is so, because we are not in possession of a remedy.

Mr. Brodie in a beautiful experiment demonstrated the recoverableness of life from the destructive action of poisons, by the power of maintaining it until the proper effects of the poison ceased;* and cases are well authenticated of human recovery from the sedative influence to the last extremity of noxious gases and deleterious substances admitted into the circulation, both by the stomach and the veins. The well known experiment of Bichat, which many years ago, with the rest of his experiments, I repeated, shewing the baneful effect of an injection of venous blood into the carotid arteries, and its removal by the injection of arterial even after a repeated injection of the venous, which otherwise proved invariably fatal, affords a striking illustration of the same fact. But the effect of very gentle alteratives, as they might be termed, of the cerebral circulation, to preserve life when trembling in the balance, in the extreme states of excitement and depression, is continually seen in practice. The following may serve as a familiar instance.

Case. I was called a few weeks ago to an infant of nine months, the subject of very extensive burn three

* From the essential oil of almonds in one instance, and the Woorara in another. Vide Phil. Trans. Part I. 1811 and 1812.

days before, whose state of exhaustion was extreme, and considered to be as it appeared, hopeless. The infant was without a pulse at the wrist, cold, sunk, and wan. I directed a tea-spoonful of brandy with three of gruel to be given every half hour until it warmed. This was strictly followed,—the infant revived, and the attendants, encouraged by the manifest improvement, persevered beyond the point prescribed. It became flushed, and when I again visited it the next day, had fallen into the state of apoplectic coma with sonorous breathing, having a fully dilated and motionless pupil. I immediately gave two grains of calomel, with directions to repeat the dose in four hours if it had not operated, and applied a leech to each temple, which bled freely. On the succeeding morning, I had the satisfaction to find the infant in the best possible state, with a steady circulation and lively expression, and from this time it went on without any relapse through the healing process, to complete recovery.

Such instances are not unfrequent, though they too often pass unimproved.

Effects of vegetable and mineral poisons on the system.

THE amplitude of the details which I have laid before the reader on the subject of this section, precludes the consideration of the effects of certain vegetable and mineral substances upon the system, which serve materially to illustrate the obscure pathology of irritation.

Some poisons evidently act upon the nervous system exclusively; that is, the phenomena to which they give origin indicate the extraordinary derange-

ment or suspension of the nervous influence alone—and in this way prove destructive. Others, in addition to a powerful action on the nervous system, whether of excitement or depression, produce intense inflammation of the parts with which they are placed in contact, or chemically disorganise those parts.

Those of the first class have no tendency to inflame; those of the second sometimes destroy before inflammation is set up, and therefore independent of it, but more frequently they destroy through the medium of inflammation, or irreparable læsion. The one is a simple and direct, the other an indirect and mixed action on the nervous system.

There are again other poisons which, when accumulated in the system, give origin to certain constitutional diseases that prove slowly destructive to life; these illustrate the reflected irritation. The concentration, quantity, &c. of the deleterious substance, and the variations in susceptibility, and general tone of the nervous system in different individuals, modify the phenomena of many poisons. It is on this account that their accurate classification is a subject of almost insuperable difficulty, because the effects of the same poisons are liable to be varied by circumstances. But the operation of all agrees in this, that directly or indirectly they destroy by irritation. The most serious effect even of those which tend towards inflammation is the primary one on the nervous system: for with inflammation, however set up, and the irritation thence ensuing, we can grapple more successfully than with the state of pure nervous irritation; over this we have little control, because, if continued, it implies a fatal deficiency of power. Now the presence of inflammation is an indication of

power, and implies that the nervous system is unexhausted, for it is essential to its phenomena. Pain and fever, for example, are incompatible with the state of extreme prostration. A person suffering acute pain is in no danger of syncope. The pulse of real fever does not exceed a certain limit, and that consists with the property of distinctness. When it is innumerable, and from that cause indistinct, it ceases to be fever; it is a powerless automatic action, and has neither the characteristics of heat of surface nor obstruction of the general secretory system. The secretions are disturbed and vitiated in the highest degree, which is the peculiar effect of irritation—but not generally so deficient as the contrary. Nervous power is essential to inflammation, and therefore irritation, when it depends on inflammation, and has only a sympathetic existence, is a better and more hopeful state than when it exists per se.

Whether the inflammation precede or follow the disorder of the nervous system, the reciprocal fitness of similar modes of treatment in both cases is a point less open to question, than the time suited to their employment. If the state of prostration without reaction or with excitement ensue, as the consequence of a poison received into the system, the case will in its material features resemble those of direct irritation produced by the severest forms of chemical and mechanical injury, as burns and complicated læsions.

CHAPTER IV.

RECAPITULATION.

In bringing the histories which occupy the preceding section under my reader's notice, I have been somewhat diverted from my original object, in the hope of obtaining a just and useful distinction between the cases which owe their origin to the absorption of animal poison, and those of more frequent occurrence, which I conceive to have a simpler origin. For this digression, and especially for the redundancy (as it may appear) of materials employed in it, I should feel that any less apology than the real and great importance of the question in a practical view was insufficient.

From a revision of the contents of the last chapter it appears, that affections of the sensory, as acute bodily pain or mental anxiety, co-operating with local injury—a burn or a bruise—a laceration or a fracture—an operation or an inflammation—a hemorrhagy or a wasting suppuration—a poison permeating the body—are so many mischiefs severally competent to produce states of the system which have a very indistinct relation to that of fever, and over which the remedies usually resorted to in fever have no control.

Remote relation to fever.

The phenomena of fever, strictly so called, are sufficiently distinguished by their production in repeated paroxysms, more or less distinct,

and the conformity existing between these paroxysms, in their several stages, with the state of the capillary circulation and the general secretory function. That some identical phenomena appear in fever and irritation is undeniable; but the combination in fever presents a result totally dissimilar.

When fever is symptomatic of local inflammation, its character corresponds to the boldness and activity of the inflammation, as in pleurisy or peritonitis, or to its insidiousness of commencement and slowness of developement, as in scrofula. The predominant disorder of the nervous system, which characterizes irritation, appears to destroy the sympathy and consent, the revolution and duration of actions constituting the paroxysms and types of fever, and referred to the struggles of a vis medicatrix. This fact is exemplified in the state denominated febrile irritation, which is symptomatic of minor injuries, and in the irregular train of symptoms which accompany disorganizing inflammation. In all fevers the nervous system is more or less involved, but for the most part secondarily or as a consequence, if we except the case of phrenitis; whereas in irritation from local injuries of a severe description, this system is first, and so affected, as apparently to prevent the formation of fever, and to present a series of symptoms sui generis.

Sympathetic irritation. The slightest cognizable forms of constitutional irritation are among those trivial but common ailments which, characterized by languor and uneasiness rather than real indisposition, are commonly regarded as hypochondriacal. I believe that these affections originate in a morbid sympathy with some local and temporary irritation. Indeed

we have often the proof of this, the cause of irritation being obvious; nor does it invalidate this opinion, that some persons are constitutionally prone, and others indisposed to these temporary derangements; that a copious biliary excretion, or an imperious exertion, mental or physical, is often sufficient to remove them.* With this brief mention of such ailments I content myself; but should have felt it an omission not to notice them, as legitimate, however trifling forms of constitutional irritation.

Symptomatic irritation. That more important form of constitutional irritation which, though existing in various degrees, is still so modified and proportioned to the principal morbid condition of which it is symptomatic, as neither to attract nor to merit the especial notice of the pathologist, may and ought to be considered as in the main subservient to the purpose of restoration. It is only in its excess and insubordination, or its deficiency in such degree as to indicate an apathetic torpor, that anomaly consists. The present inquiry limits itself strictly to the consideration of such extreme and overbearing derangements of the nervous system, ensuing upon injuries which leave the vital organs untouched, as have been exemplified in the preceding pages. I shall be acquitted, I trust, of the Utopian notion that many of these under favor of any circumstances are remediable; or that an expectation that they will ever prove so, has led me to dwell upon such of them, as seem to shut out all prospect of relief from any means within the compass of human skill. We may freely admit,

* "Some hilly walks—all exercise—
Fling but a stone, the giant dies." THE SPLEEN.

and no reproach to the art, the utter hopelessness of the state of direct and extreme prostration which sometimes ensues upon injuries not in their nature and condition mortal, as demonstrated by many precedents of recovery from severer injuries where such a state has not supervened. But it is useful, beyond our power of appreciating the utility, to study the phenomena of diseases over which we have no control, as it is essential to our better acquaintance with them, and with those which present brighter prospects; and it is impossible in our art, as in others, to predetermine the line beyond which a right understanding of theory, and a consequent right application of principles may not enable us to push our triumphs. I shall now shortly recapitulate the leading points of the evidence presented to the reader in the preceding chapters.

Career of symptoms. In the fatal cases of "Burn" it will be seen that the state of prostration was consentaneous with the infliction of the injury; the period of survival varying from eight to fifty-eight hours, and inflammation had no share in the results.

In the fatal cases of complicated injury, under the heads "Fractures," &c. and "Operations for recent injuries," there is some variety as regards the accession of the symptoms of prostration. Four days is the extreme period to which life was prolonged. The results in these cases were also independent of inflammation.

The fatal cases of lithotomy, mentioned under the head "Operations for chronic diseases," were too rapid for inflammation to have any share in the results. Indeed none of the symptoms proper to the operation were present.

The third section, which treats of "Inflammation ensuing upon injuries and operations," presents these symptoms setting in at a variable but considerably later period, as was to be expected, the inflammation standing in the relation of exciting cause.

In the fourth section on "Hemorrhage and colliquative Suppuration" the symptoms of prostration take a measure strictly according to the exciting cause—more rapid if from hemorrhage or its consequences, erysipelas or gangrene; slower if from wasting suppuration.

Under the head "Poison" I have included cases which, from their origin and circumstances, bear an ambiguous character, and which have been generally classed with those distinctly referable to this source of irritation. My motive in doing so was more forcibly to illustrate by comparison and contrast the points of distinction between the genuine and the spurious cases. In those, as I consider, cases of absorption, which terminated fatally, the appearance of the symptoms was alike early and the career rapid;* whilst those which recovered strongly resembled each other in the protracted disorder, local and constitutional, which supervened.† On the other hand in those cases in which the symptoms are referred to the character of the injury and not to the poison absorbed, all the variety which might be expected is observable, in the accession, extent, and duration of the symptoms, according to the situation and severity of the local mischief.‡ These therefore properly belong in my arrangement to the third section:

* Dr. Pett's, Mr. Dease's, Mr. Newby's, &c.

† Messrs. Delph's and Smartt's.

‡ Messrs. Clifton's, Brayne's, Slight's, &c.

viz. Inflammation ensuing upon injuries and operations.

I should thus epitomize the symptoms indicating the two forms of prostration:

Prostration pure. 1. Prostration without re-action is marked by universal pallor and contraction of surface, shuddering, very small and rapid pulse, astoundment of the mental faculties, generally a dilated pupil, shortened respiration, dryness of the tongue and fauces; indistinctness, and at length cessation of the pulse at the wrist, stupor, oppressed and noisy respiration, coldness of the feet and hands, involuntary twitchings, relaxation of the sphincters, confirmed insensibility, stertor, and death.

and mixed. 2. Prostration with excitement is marked by the signs of languor and stupor or drowsiness in the commencement,* to which, after a variable interval, succeed rigor, precordial anxiety, restlessness, jactitation; a rapid and bounding pulse, oppressed respiration with frequent attempts to sigh, flushed countenance, contracted pupil, dry heat of skin, parching thirst, rejection of liquids taken into the stomach, incoherence and wildness of expression, sometimes amounting to fierce delirium. This state is succeeded by exhaustion marked by somnolency, a profuse chilly and clammy sweat, a haggard and livid aspect, a small irregular or fluttering pulse, innumerably

* These like other of the symptoms enumerated, are of course, subject to exception. Hours have sometimes passed away without the occurren[illegible] of an alarming symptom, in which case a severe rigor, or [illegible]al at short intervals, generally open the attack; in other ins[illegible]es this symptom is wanting.

rapid, panting respiration, passive convulsions, hiccup, and subsultus, the stupor and stertor of apoplexy, and death.

Varieties. These are outlines of the general character of the two forms. A variety of the first which I have seen, is little more than a state of continued languor and faintness, with coldness and sleepiness verging on deliquium, the pulse and breathing almost imperceptible to the nicest observation, terminated by convulsions.

Of the second, alternated with the state of coma, convulsive paroxysms, in which the features undergo the contortion and fixedness of epilepsy, vehement maniacal ravings, and impotent attempts to rise from bed, with an incessant muttering and repetition of broken phrases relating to the occupation of the individual, and terminating in exhaustion.

Re-action partial or complete. These are the extreme states. Instead of the continuance and fatal increase of the symptoms of prostration, they may gradually give place to a partial and defective re-action, protracting life, but faintly improving the prospect of restoration, which remains doubtful for several days in succession: or on the contrary, an efficient and healthy degree of re-action may be quickly established, consequent upon symptoms threatening the most unfavourable issue. This uncertainty of termination is remarkable, and serves to shew how much the event is to be ascribed to the continued operation of the irritant, to the continued sense of injury, if I may so express it, which the constitution feels in one case and not, or more than, in another.

Again and again I have left the bedsides of patients brought into the hospital pulseless and apparently moribund without any external injury, having suffered falls or blows so serious as to have induced the state of prostration to this alarming extent, and have found them on the succeeding day, to my great surprise, restored to the tone and tranquillity, comparatively speaking, of health. Re-action has in these cases been spontaneous, or nearly so, although gradual enough to occupy a period of many hours. Such patients have been supposed to labor under ruptures of the viscera, or large blood vessels, and the state of prostration in an aggravated form, to have been induced by the complication of the injury with internal hemorrhagy; and it has been only by the gradual return of healthy circulation, freedom of respiration, and correspondent sensations of relief, that this supposition has been corrected. Now had such persons suffered topical injuries of a severe though reparable description, it is to my mind more than probable that re-action would have failed altogether; but had it by favour of circumstances been established, it is at least equally probable that it would have taken the form of excitement.

In other cases, days have elapsed before a perfect re-action and complete relief have been obtained, marking the most intense degree of shock in the abstract, and showing that complicated causes operate to render it destructive.

The fact above stated also demonstrates how secondary changes, as for example inflammation, or drain from excessive suppuration, coming on the back of injury or operation, although such cases are diluted through a longer interval of time, and subject to va-

rious modifications from the circumstances under which they are set up, produce a state of constitution so analogous in its essential characters as to admit of being comprehended in the same class.

In a large proportion of the graver accidents, the constitution recovers slowly from the impression made at the moment of the injury; the re-action is either deficient or in excess; and this is additionally demonstrated by the unfavourable changes which take place in the condition of the part.

To conclude, the great mark of distinction between the cases of local injury which proceed steadily forward to convalescence, and those which place the life of the patient in peril, is the degree of implication of the nervous system. It is not well that this system should be unaffected, but the contrary. I have already adverted to that mode of irritation inseparable from any and every disease, which I consider to be neither more nor less than an extraordinary sympathy, rousing the powers of the system to a due resistance or exertion, and thus directly or indirectly promoting the process of recovery.

The diversity of the modes of injury by which irritation is set up can excite no surprise, if we consider the universal and predominant influence of the system in which it has its seat. I believe the constitution is affected by the same species of malady in the various cases above related, because I find similar effects succeeding to circumstances which appear adequate to produce them. Whether they are operations of nature or of art, internal or external, mechanical or chemical, whether they prove destructive in ten hours or ten days, if the disorder differ only in its degree of severity, and consequently

its progress and duration, the propriety of such an arrangement, and I may add, the advantage, are obvious.

Some of the cases related in the fourth section may be thought to belong to the division "Reflected Irritation,"* in which the symptoms were rather arising out of the state of constitution which the original injury had left behind it, than directly emanating from that injury. I have before observed that the line of division is in a measure arbitrary, because if protracted in the transition from one to the other state, the cases must of necessity present a mixed character.

It being admitted then that from a variety of causes, for I have only selected some examples, that state of constitutional disorder is produced, which in its presence or absence, its excess or limitation, constitutes the distinctive feature between security and danger, I shall endeavour to trace its origin, and thus to clear the way for a practical consideration of the subject.

* Case of Mr. Brayne, p. 205. in particular.

CHAPTER V.

THEORY OF IRRITATION.

SECTION I.

RECIPROCAL RELATION OF THE VITAL FUNCTIONS.

The experiments which have been made during the last twenty years with the view of developing the special influence of the several parts of the nervous mass over the properties and functions of the parts to which they are distributed, and in particular over the heart and circulation, are in the highest degree interesting, and have together contributed important information on the most abstruse and inaccessible subject in physiological science.

The views opened by Bichat of the semi-distinct animal and organic lives, and of the relations of the vital organs to each other, appear to have furnished a clue which the physiologists of our time have prosecuted to these novel and interesting results.

Brodie, incidentally to other subjects of inquiry; Le Gallois and his reporters of the French Institute; Philip; Fleurens and his reporter, Cuvier; Rolando and Majendie, Bell, and Mayo, are those to whose labors and ingenuity I particularly refer.

The innumerable fancies which writers of a much earlier as well as of a recent date, have indulged on the special and particular functions of the several parts of the brain; the speculations on the ultimate nervous structure; and the hypothesis to explain

what the French physiologists term "innervation," or the nature and operation of the nervous agent, are little worthy of examination in a practical work. Some of the experiments of Dr. Philip, and the several well known collateral evidences of analogy between the nervous and the galvanic influence, go far towards the presumption of their identity. But the knowledge of an instrument, which serves as a conductor of nervous power, makes feeble approximation to a solution of the problem of life and living actions.

"Nos latet," says Baglivi, "æternumque latebit minima illa ac subtilis—non solum a sensibus, sed ab humanæ mentis acie prorsus remota—corporis viventis partium textura."*

Caution to pathologists. Although the mode of analysis which has been successfully employed to explain the functions of certain parts of the brain and spinal marrow, and the properties of the nerves emanating therefrom,—of which some appear to serve as distinct conductors of sensation, others of motion, voluntary or involuntary, and others as subservient to one of these functions exclusively—is amply entitled to consideration in a physiological inquiry: it is rather calculated to serve as a basis for more extended researches in that department, than as a guide to our pathological reasonings; at least we should reason cautiously from data so obtained. To what a monstrous solecism in pathology would the doctrine lead, that the heart is independent of the brain, because its action continues for a period after the brain and spine are removed, or that the muscular action is a

* Baglivi Opera, Lugd. 1710. Cap. II. Sec. v.

distinct and inherent property of that texture, independent of the nervous, which is only one of its stimuli! The observations continually furnished by accident and disease are safer guides to students of pathology. Facts of every day's occurrence speak a language far more intelligible and explicit than that which is extorted by artificial and unavoidably imperfect contrivances. I do not mean to deprecate experiment, far from it, but to warn pathologists from applying results obtained by partial observations, made upon subjects in full health and vigor, to the explanation of the complicated phenomena of disease.

Supremacy of the brain. No result has yet appeared to invalidate the fundamental truth, that the brain in totality holds in dependence, immediate or intermediate, all the phenomena of life. That it is not only the organ of intellect, of sensation and volition, but the source of instinctive and of involuntary actions; so that its influence maintains the processes of circulation and respiration, and all their dependencies. With the immediate functions of life, the central and best protected portion of the cerebral mass, including the tubercula quadrigemina and medulla oblongata, appears to hold the most intimate connection.* This

* "C'est tout-à-fait dans le haut de la moëlle alongée a l'endroit où les tubercules quadrijumeaux lui adhèrent, que cesse cette faculté de recevoir et de propager d'une part l'irritation, et de l'autre la douleur. C'est à cet endroit au moins que doivent arriver les sensations pour être percues; c'est de là au moins que doivent partir les ordres de la volonté; ainsi la continuité de l'organe nerveux, depuis cet endroit jusqu'aux parties, est necessaire à l'exécution des mouvemens spontanés, à la perception des impressions, soit intérieures, soit extérieures." Rapport fait à l'Académie des Sciences, &c. &c. par M. le baron Cuvier.

is demonstrated equally by experiment and accidental injury.

It is admitted I believe by all, that if the influence of the brain is not continually necessary to the action of the heart, it at least determines the measure and duration of that action. The following are some of Dr. Philip's conclusions from his experiments.

That the nervous influence is capable of acting upon the heart as a stimulus or a sedative, the latter, "not the result of the excess of stimulus, but like excitement, the direct operation of the agent."

"That the brain and spinal marrow act each of them directly on the heart, as well as on the muscles of voluntary motion."

"That the heart obeys a much less powerful stimulus, applied to the brain and spinal marrow, than the muscles of voluntary motion do."

"That after all, stimuli applied to the brain and spinal marrow fail to excite the muscles of voluntary motion, both mechanical and chemical stimuli so applied, excite the heart."

"That the differences in the effects of stimuli applied to the brain and spinal marrow, are referable to a law, viz.: "that the heart is excited by stimuli applied to any considerable part of the brain or spinal marrow, while the muscles of voluntary motion are only excited by intense stimuli applied to certain small parts of these organs."*

Superior contractility of involuntary muscles

It is evident that the involuntary muscles are endowed with a power of contractility superior to the voluntary; but that they possess this power,

* Experimental Inquiry into the Laws of the Vital Functions. Chap. xxi.

independent of the nerves distributed to them, being nevertheless subject in a higher degree than the voluntary to excitation by stimuli applied to their nerves—nay, that contractility is a distinct and specific principle independent of any mode of sensation,* is a proposition to which I confess myself unable to assent. When we find a voluntary and involuntary muscle, differing as they do in the nature, measure, and duration of their ordinary actions, differing also in the size, number, and arrangement of their nerves, and especially in the possession of a distinct apparatus, as the ganglia†—affected, though in unequal degrees, by the same stimuli applied to their fibres or their nerves, affected also in unequal degrees by their separation from the trunk of the nervous system—is it not more philosophical to suppose that they derive their principle of action from the same source, modified by their respective necessities and provisions, than to suppose two distinct principles? Would it not have infinitely surprised us to find, that the heart, which acts without a pause through a century, and a

* This seems to be the conclusion to which the Hallerian controversy has settled down since the experiments of Dr. Philip and others, on the powers and properties of the nervous system. For a neat and perspicuous summary of the arguments employed by the contending disciples of Haller and Whytt, and of the state of modern opinions relative to the subject of this section, see the first volume of Dr. Bostock's "Elements of Physiology," a work of much research and ability.

† It has always appeared to me a well-founded conjecture that the apparatus of the ganglia, which, according to Scarpa, are only plexuses, confers upon the involuntary muscles that temporary independence of the sensorial system during life, which obviates the fatality of every casual syncope, renders natural death a gradual process, and maintains for a period the actions of the heart after sudden death, whether apparent only or real.

muscle of volition, which is fatigued by an hour's exertion, presented no variety in their nervous endowment? The brain is the source of volition, and if we take away the brain, the voluntary muscle is deprived of the stimulus of volition. It has a remnant of irritability, and continues for a time to obey mechanical or chemical stimuli; but as might be expected, is sooner exhausted than the involuntary muscle, subjected under similar circumstances to these stimuli. The involuntary muscle is not in this case entirely deprived of its proper stimulus, but it also has parted with the ultimate source of its irritability, the constant influence of which is necessary to the continuance of its ordinary actions. Whatever be the explanation of the fact, that the heart retains not simply its contractility, but its regular series of actions, after its connection with the brain and spine is cut off;* after it is deprived not only of the stimulus of arterial blood, but of that derived from any con-

* The excitability of the heart by stimuli after sudden and lingering, or violent and natural death, would present very different evidence of its comparative power. In an asphyxiated animal the ventricles cease acting in about 15 minutes, and their actions sensibly decline, becoming weaker and weaker, before half that period has expired. For a considerably longer time the voluntary muscles are excitable by stimuli, and after this is past for a yet longer time the auricles act spontaneously. I wished to ascertain the relative duration of excitability of the voluntary muscles by stimuli, and of the auricles of the heart; and, at my request, the following experiment was made by my friend Mr. Herbert Mayo, whose accuracy is beyond question or compliment.

EXPERIMENT.

Cat killed by hanging, opened about three minutes after apparent death.

tained fluid whatever—for when its cavities have been injected with warm water, and this has been care-

Heart.	Minutes.	Voluntary Muscles.
Auricles and ventricles act regularly	2	
The ventricles act faintly, the auricles vigorously, but occasionally intermit for several seconds.	6	
The ventricles cease acting....	15	For several minutes the muscles of the chest and of the thigh have been quivering, and they act on pinching their nerves.
	18	The quivering has ceased, and pinching the nerves produces no effect.
	20	Salt sprinkled upon the voluntary muscles renews their quivering.
	45	The quivering has entirely ceased.
Up to this time the auricles have been acting occasionally, sometimes more, sometimes less vigorously, with intervals between every two or three beats, latterly, of two or three minutes. On touching either auricle both resume a succession of beats nearly synchronous	112	Rigidity commencing.
No difference observed.....	135	Rigidity increased.
The auricles act from time to time spontaneously, and whenever they are touched with the forceps	150	
The auricles still act together when one is pressed with the forceps	160	
The auricles still contract spontaneously, but at long intervals and very feebly	240	
		The rigidity was not complete till a later period.

Thus it appears that the auricles of the heart act spontaneously, though at long and irregular intervals, for a period of four hours after the cessation of respiration; one hour and a half after the cessation of excitability in the voluntary muscles, and nearly half an hour after the commencement of stiffening in the latter.

fully expressed, these actions continue*—we know that a violent læsion, rupture, or concussion of the cranial extremity of the spinal medulla, that a solution of opium applied either to the surface of the heart or the brain, or an infusion of tobacco injected into the rectum, are all capable of instantly arresting the heart's action, and that it is in these several cases therefore, as when influenced by certain violent passions of the mind, under the direct control of the system of which it is by some said to be independent.

We ought to regard the action of the heart as a proof of its irritability tantamount only to the excitableness of the voluntary muscle, for uninterrupted action is the habitual state of the former, whereas that of the latter is repose, and the state of action occasional, as when subject to the influence of volition or other stimuli. If then we limit our view of their comparative irritability to the spontaneous and regular actions of the heart in totality, and the contractility of the voluntary muscles, we shall find that they very nearly correspond—i.e. that the latter cease to be excitable at about the same period that the ventricles cease to act.

Influence of habit. What is there more extraordinary in the continuance of the habitual actions of the heart for a quarter of an hour after sudden death, than in the automatic motions of persons in whom sensation and volition are suddenly suspended?† We refer the

* Mayo's Anat. and Physiol. Comment. Part I. p. 16.

† I remember, when a student, being present at the taking up of a young gentleman who had fallen through several floors, and deeply driven in the os frontis, by which a considerable portion of brain

latter to the influence of habit. Let the same argument be applied to the former: what comparison is there between the strength of the impression derived from the habitual action of any voluntary muscle, and of the heart? With respect to the excited motions, they become weaker as they are repeated, and it is certain that the active principle is exhausted by the repetition of stimulus, although not in the same ratio as that of the voluntary muscles. Under the circumstances of continued vigilance, extreme fatigue, mental anxiety, and others, by which the fountain of nervous power is over-taxed, it is indisputable that the actions of the heart become, like those of other muscles, feeble and unsteady.

It seems to me unwarrantable to conclude from the results of experiment or from mal-formations, which demonstrate that the instant and active function of the brain is not necessary to the circulation, that the nervous system is therefore not indispensable to life. Such experiments and observations appear to me to lead to the very opposite conclusion.

Sensitive impressions excite involuntary actions. The irritability of a part conveys to my mind the idea of a sensitive impression and a consequent action. Such impression and action may be strictly local, i. e. not reported to the common sensory, and under ordinary circumstances,

was extruded at the wound of the scalp. I assisted in undressing and putting him to bed, and it was curious to observe how, although utterly deprived of consciousness, he made obvious though unavailing efforts to aid us in getting him into bed, and thrust his arm mechanically into the sleeve of a clean shirt, after his hand had been placed in the opening of the sleeve. This was seen by Sir Charles Blicke, and Sir A. Cooper, who were called to the accident. He lived only a few hours.

this is the case as regards the involuntary muscular system. The exaltation of this impression under extraordinary circumstances, and its propagation to the brain constituting a sensation, occasions an interference, greater or less, with the habitual actions of parts not subject to the will. Thus extraordinary sensations disturb the habitual action of the heart, liver, bowels, and other viscera. I can see no inconsistency in this explanation of the habitual excitement of the involuntary actions by local and unconscious impressions, with the theory of the universal instrumentality of the nervous system, and it accords with the separableness, to a certain extent and no more, of an involuntary organ, as the heart, from the system at large, without arrest of its ordinary functions.* There is sufficient reason to believe that the system of involuntary nerves is so far independent of the brain, that the ordinary sensitive impressions and actions of the viscera are direct, and not transmitted or performed through its medium. So much may be inferred from their temporary existence in acephali, their correctness in the states of infancy and sleep, and coma, and from the analogy of certain direct habitual actions of voluntary muscles after their separation from the nervous centre, produced by mechanical excitement.† The infinite degrees, varieties, and fluctuations of natural sensation, obvious to our experience, give additional support to the theory of an instinctive or proper sensibility of those parts to their proper stimuli, which are endowed with a power of acting independent of the will.

* Especially in sudden and violent death, in which case alone the protraction of the heart's motions has been satisfactorily ascertained.

† Mayo's Comment. Part II. p. 19.

Arguments drawn from the prior demonstration of the punctum saliens, as the first visible motion in the chick; from the comparative anatomy of the lowest classes of animals, which exhibits in some the deficiency of one, and in others of both systems, are of no real validity as regards the respective pre-eminence of the brain and heart. And the same may be said of those taken from hydrocephalic and other subjects of disease, and of injury with compression or loss of substance of divers parts of the brain or spinal chord, knowing as we do under what changes stealthily conducted a vegetative existence may be for a time maintained.

Nervous function alone, inimitable. The mechanism of circulation precludes the possibility of wounding or abstracting the heart without destroying life. This is maintained, however, under great impediments to circulation from malformations and morbid changes of texture: and the lungs and brain are still further encroached upon by diseases, while life yet lingers on. Life, as we well know, may be so deteriorated as scarcely to deserve the name, or to be any thing but a blessing to its possessor; and such a mode of life the mechanical function of circulation, with a very imperfect innervation, a very imperfect, or scarce any change in the blood, is sufficient to uphold for a limited period. The circulation being a mechanical, is an imitable function; so also is the respiratory, but not so the nervous; and because we can protract the heart's beat by inflating and exhausting the lungs, but have no direct means of keeping the brain at work, which processes are therefore as well performed after its removal, we infer that the brain as a vital organ is secondary in importance.

There has been much fallacy, as it appears to me, in Bichat's and other estimates of the comparative influences of the vital functions upon each other; but admitting their general accuracy, to what inference do they lead? Not to that of the independence of either, but the contrary, viz. the inseparable connection and dependence of each upon the other. In fine, the alliance between the nervous and vascular systems is such as renders it impossible for either to be affected in any serious degree, exclusively. If the nervous element be essential to muscular action, the presence of blood fitted to supply that element is essential to the nervous; and if it be illusory to conceive the case of separation or insulation of one from the other, and on the other hand, reasoning in a circle, to refer the energy of each to the other reciprocally; without going into the question of primordial priority, it may be that one only is specifically constituted to receive and transmit impressions, both from within and from without, thus establishing the relation of all parts of the system with each other, and of the whole with the material world; and this being unequivocally the case of the nervous system, it must be regarded as that which presides over the vital functions, and through the medium of which they are prompted, regulated and harmonized.

SECTION II.

DERANGEMENTS OF THE NERVOUS SYSTEM, PHYSICAL AND FUNCTIONAL.

The phenomena of diseases of the brain and spine illustrate the effects produced by physical interrup-

tion or annihilation of the nervous influence on the system at large: those of chronic diseases of parts which have no special connection with the brain and spine, also frequently exhibit the effects of disturbed or diminished nervous influence, as regards not only sensation and volition, but the involuntary actions.

The suspension or derangement of the function of an organ, from whatever cause, is followed by consequences apportioned in seriousness to its degree, and the importance of the organ in the economy; those of the liver, kidney, or an organ of sense, are generally of subordinate importance to those of the brain, heart, or lungs. All organs are subject to be affected by remote morbid actions through the medium of the brain; and this, being the source and centre of sympathy, is especially liable to be itself affected in its function both by external and internal causes. Many and various instances of the first are enumerated in the preceding chapters; the innumerable modifications of hysteria are examples of the second.

Frequent instances of sudden death, consequent upon injuries which leave no trace of their destructive operation upon the texture of the vital organs; other instances of death after the lapse of a few hours or days, and some even of weeks from the injury, admit of no other explanation according in any degree with the history and symptoms of the malady, than a suspension or failure of the nervous power. Between those which are of short duration and certain physical injuries of the brain, there is a considerable though not a strict analogy: whereas those which are protracted are characterised by symptoms of exhaustion more nearly resembling such as attend upon

changes of structure, in organs auxiliary to the support and preservation of life.

Universality of nervous system, and sympathy. The universal diffusion of the nervous system and its universal sympathy must be borne in mind in considering these cases. We can, with certain precautions, take away limbs with impunity; but we cannot, while a limb or a muscle remains part and parcel of the system, divide its nerves without injuring its vitality, or irritate them without disturbing that principle at its source. And whether an injury is inflicted on the head or on the extremities; whether its effects are propagated from the brain to the limbs, or, vice versa, from these to the brain, does not materially affect the construction of these cases. When a man is killed outright, as by a blow in fighting received either on the head or the pit of the stomach, and no appearance, upon careful inspection of the body, presents itself to unfold the mystery of his dissolution, a case which now and then happens, shall we say that it is physical concussion which destroys? We know that very intense concussions, such, for example, as lock up the faculties of sense and motion for many hours, are not only recovered from, but are oftener fatal in the after-stages than the first. When the physical injury of the brain extends its fatal operation to the vital functions, appearances are not wanting to explain the case.

An amaurosis, or a partial muscular palsy, as of an extremity, or of one side of the face, or of the urinary bladder, does not interfere with life. It will not be doubted that many instances occur in which anatomy discovers no solution of the question why or from what cause they occurred, and that occasion-

ally these affections are removed, and the faculties of the parts restored. If we suppose the brain, or the respiratory muscles, or the heart, to be thus affected with a paralysis or suspension of function, death is not difficult to be accounted for. Nature has as much as possible provided, by placing these functions beyond the empire of the will, and rendering them in a great measure independent of moral influences, as well as in their security of position, against their structural disorders. Not only are they liable however to casualities and diseases in common with all parts, but so strict is their mutual alliance and their intermediate relation to life, and all the subsidiary operations of the system, that the severe casualities and diseases of parts remote from them, and only linked by the common bond of universal sympathy which is indispensable to the perfection of animal existence, approach in effect to such disorders of these organs themselves; in other words, the functional derangement of the organs of life is an ordinary consequence of injuries and diseases of structure in remote parts. It has been observed by pathologists that morbid alterations of structure in organs, being gradually progressive impediments to action, create less disturbance and are marked by less urgent symptoms of distress, than many functional disorders of the same parts.* The unimpaired structure of the vital organ, and the circuitous or reflex operation of the remote injury or disease upon its function, is what, I conceive, explains this hyperbolic character. The general tumultuous agitation, the rapid transition or confused intermixture of symptoms distinguishing the

* Of no organ is this more remarkably the case than the heart.

state of prostration with excitement, is to be thus explained.

First evident impression is on the heart. It being admitted that injuries and operations are occasionally fatal, which have no relation of contiguity to the vital organs, by inducing certain trains of symptoms which obviously belong to the nervous system, it remains to be inquired, on what principle and in what manner they act destructively. The first and most palable evidence of impression is that upon the heart. Every thing denotes diminished energy of circulation. In addition to a small and very feeble pulse, we have languor, if not stupor, paleness, chilliness, &c. The nervous influence is capable of acting directly upon the heart either as a stimulus or a sedative. There is no other medium by which an impression, external or internal, can be transmitted. The vital organs are most deeply affected by impressions made over a large surface. Under the permanent depression, as under the privation of the whole nervous function, the properties of sensation and volition, of irritability, and of involuntary motion, cease in succession. The blood, however prepared, connot excite the heart to action, nor the atmospheric air the organ of respiration, if that irritability or appetency, if I may so express it, which renders them respectively susceptible of and obedient to these stimuli, be exhausted or destroyed.

Distinction between direct and indirect or sympathetic affections. The direct injury of an organ affects its functions secondarily. That which is indirect or communicated through the medium of sympathy acts first upon the function. Paralysis of the bladder succeeds to a violent blow upon the loins,

or the abdomen, but it also frequently succeeds to the removal of a tumor, or to the infliction of a blow, or a spreading inflammation upon any part of the body. In the same way that in the latter case the muscles which empty the bladder are paralysed, it now and then happens that the muscles of respiration or circulation are similarly affected. Thus a patient has sometimes died upon the table prior to the commencement of an operation, as in the case mentioned at page 23. In other rare instances he has expired suddenly, during or immediately after the conclusion of an operation, as I have myself witnessed.* This is a case of syncope from paralysis or spasm of the heart: and I know no other mode of explaining the fatal cases of syncope anginosa, in the examination of which no change has been detected in the condition of the coronary arteries or of the valves, or of any part of the texture of the organ, of which I have seen two marked instances.

Physical and functional injury of the brain compared.

The effect of physical concussion is a suspension more or less complete of the faculties of sense and volition; this distinguishes it from the state of shock in which only a transient and slight stupor occurs; but the difference is not so important as it appears to be, for the suspension of sense and motion is not the source of danger. Suspension of these faculties arises also from compression of the brain, but its signification is in this case infinitely less important; it has been known to endure for a twelvemonth and the person has recovered. Whereas in concussion its termination is fatal, if it continue

* Vide page 25.

only a few days. Not that mere suspension is more dangerous in one case than in the other, but as it refers to the cause and the probable consequence. When it follows upon concussion, it is the shock of the whole nervous organ, which, being uncovered, speedily lapses into annihilation of function; whereas, ensuing upon compression, it is a partial injury arising from a palpable mechanical condition, and amounting to temporary interruption only. The former represents the overwhelming extent, the latter the defined situation and character of the mischief. The chance of re-action, I need scarcely observe is, cæteris paribus, less in such a concussion—if it take place, the danger of its proving destructive much greater. I am in both cases supposing these injuries single and in extreme, and limiting my view to the first effects of the injury; when re-action is established and inflammation ensues, the original condition is modified. Neither compression nor læsion is necessary to the fatility of concussion, but it rarely happens that pure concussion induces a complete and continued suspension of the senses and voluntary motions. It is generally complicated in this case with extravasation, or læsion of the brain, or its membranes, or both.

It may seem paradoxical to say, that by an injury which has locked up the functions of an organ, the system is preserved from worse consequences; but it is unquestionable that a complete suspension of the sensitive and voluntary powers, when unconnected with læsion of the brain, is a more favourable condition than the state of prostration from shock, indicating a depression of nervous power, so extreme as not to admit of the restitution of healthy actions to sound

organs, or inducing that train of deranged actions and that preternatural mobility of the nervous system which makes it its own prey.* In this point of view, the blow which operates through the medium of sympathy is as serious as that which falls directly upon the organ; and although the complete suspension gives alarming evidence of the violence which must have produced the physical concussion, the interruption and derangement of the general nervous function indicating a different origin, is, for the reason just assigned, a state of paramount danger.

If the state of prostration from shock does not present the extreme signs of physical injuries of the brain, as loss of consciousness, abolition of voluntary motion, fixedness of the pupil, nor in all cases the irritability of the stomach, nor the peculiar alterations of the pulse characteristic of some injuries of this organ, it must be recollected, that both the existence and the degree of these symptoms are subject to much variety in the several injuries of the head, and that they are evidences of certain contingent mechanical conditions, either of which may exist independent of

* The difference in respect of the instant effects of injuries happening to persons in a state of unconsciousness from inebriation, sleep, and other causes, is well known, and furnishes an indirect illustration of my meaning. Of two aëronauts who lately fell, owing to the sudden collapse of their balloon, from an elevation of more than a mile in the atmosphere; one was taken up quite dead, the other in a state of syncope, from which she gradually recovered, unconscious of what had befallen her. Although the dead person had fractured his breast-bone by striking the bough of a tree, he had sustained no mechanical injury sufficient to explain his death. His companion had fainted away from terror at his ejaculations prior to their fall, which was the last circumstance she recollected, and her swoon covering the interval of their descent, in all probability preserved her life.

injury, rather than criteria of the peculiar deranged actions induced by the injury. Let us inquire then what essential difference there is in the principle upon which the pure concussion following a blow on the head, and the state of prostration induced by the crushing of one of the lower limbs, operates to prove destructive. We are in truth not acquainted with the essential nature of the injury which we term concussion. Some are of opinion that it is never, when assuming a permanent form, uncombined with cerebral læsion, interstitial or superficial, or effusion; and that to a certain extent it is always complicated with compression, is evident from the symptoms common to these injuries, even when most distinct, and the states of congestive and serous apoplexy. Admitting however that concussion is sufficiently distinguished from laceration, from pressure, &c. to warrant the definition usually given of it by writers and teachers, we are unable to discover the points of distinction between that which affects the cranial or the spinal portion exclusively, and that which, by the diffusedness and severity of the shock, may be supposed to affect both, viz. the entire nervous organ. Still less are we enabled to discriminate the effects of the physical injury from those which belong to the sympathetic or functional: or to say in what degree they co-exist, or how far the physical injury of one part may induce the functional disorder of the remainder. Further, we are unable to explain why in one case sensation and volition only are suppressed, and in an other irritability and involuntary action; which is in fact the difference between vital and non-vital injuries. Physical concussion however, cerebral or spinal, by which I mean the result of mechanical force directly applied, if not at once fatal, offers, upon the whole, a fairer

chance of re-action and recovery than the state of extreme prostration following an injury, in which no violence whatever has been done to the brain. Such is the effect of the abruptness, breadth, and weight of the impression in shock, though operating at a distance from the nervous centre. It begins, like powerful emotions of the mind and other sympathetic affections, by embarrassing the function; and the function in this case embarrassed is properly the vital, being that of the involuntary nervous system.

Our total ignorance of the nervous agent, its nature and action.

To describe more particularly the mode in which the nervous agent is affected in its physical and functional derangements,* and thus to present the synthetical proof of their analogy, would presuppose a knowledge of the nervous agent, of which, both as to its nature and mode of action, we are absolutely and entirely ignorant. But we entertain no doubt of the fatality of apoplectic coma, or of phrensy, although we see both states unattended by any other evidence than that which is present in concussion and in shock, viz. a plethora of the cerebral vessels. We are also satisfied to assign as a cause of the most violent convulsions, the irritation produced by an indigestible mass in the stomach, or the resistance which nature opposes to herself in the operation of cutting a tooth. And the same may be said of all the morbid phenomena of the nervous system, and they are many, about which we are perfectly agreed as to cause and effect; although resting solely for the accuracy of the conclusion upon our reiterated experience of their association, and unable to ex-

* The brain after fatal concussion and shock exhibits appearances of congestion nearly, if not precisely, similar.

plain upon any known or admitted principle the manner in which such causes operate and such effects are produced. But if it be admitted that an impression of a certain kind upon the stomach, or upon the gum, will produce fatal convulsions without a vestige of physical injury to the structure of the brain, there is surely no difficulty in also admitting that such states as I have described to follow distant injuries, as well as the phenomena of paralysis, spasms, &c. are symptomatic, in numberless instances, of suspended or deranged nervous action, equally independent of any permanent change in the structure of the organ. I admit, that the altered action of the heart and vessels of circulation forms the most prominent feature in these cases; but this altered action, like that of the respiratory organ, is due to a primary change in that of the nervous function, the effect of which is universal, though especially manifested in the heart; that organ which is most easily excited or depressed by the operation, stimulant or sedative, of the nervous influence, and whose actions cease only with life.

The physical injuries of the brain or spine destroy on the same principal as other injuries.

Injuries and diseases of the brain and spine, which occasion or induce an irreparable alteration of texture, destroy on the same principle as those of other organs and parts of the body. The fatal effect is more immediate, and otherwise varied according to the situation, nature, and extent of the mischief. The vital functions may be, but by no means always are, directly embarrassed in these cases. M. Quesnay relates a case in his valuable Memoir,* in which a fracture of the basis cranii had existed three months before the patient's

* Mémoires de l'Academie de Chirurgie, Tome I. 4to. p. 191.

death, in which interval no change indicating an attempt at reparation had taken place. The patient was seized, some time after the injury, with startings, to which succeeded symptoms of exhaustion and total loss of intellect. It is not uncommon to see patients survive the injury of broken spine for three weeks and upwards.

I have known a man die after a period of four months from the injury, from a fall upon the curbstone, of a suppuration on the dura mater, not exceeding a halfcrown-piece in diameter; another from a tumor as big as a pigeon's egg, formed on the surface of the left hemisphere of the cerebrum, after a blow with a brickbat received six months before.

In the injuries of the head there is so much characteristic disorder of the nervous system, as to lead us to a discovery of the seat of the injury, though the history had been concealed from us, as actually happened in the first of the cases just referred to; and in the broken back, the loss of sensation and motion below a defined line is especially diagnostic. But though in these and a great many similar cases the heart's action, the respiration, temperature, secretions, &c. are only gradually affected, it cannot be doubted either that these gradual changes are consequential upon the derangement of the nervous function, or that death is their necessary and inevitable termination. If the cervical spine be broken adjoining the cranial portion or above the origin of the phrenic nerves, death is instantaneous by reason of the palsy of the respiratory muscles; but though more protracted, it is an event equally certain whatever part of the spine is broken.* The question may

* I say this with confidence, because I have satisfied myself that the nature of this injury has been generally misconceived. It is a veritable transverse fracture or disruption of the medulla, present-

be asked, why it should be so; what is the theory of death in these cases? The permanent interruption or solution of continuity, so situated as not to arrest the vital functions, operates reflectedly, i. e. through the medium of the auxiliary functions upon these, and that event is brought about in five, ten or fifteen days which, in the first case, takes place in as many minutes. The parts below the injury, deprived of nervous energy, stagnate in their functions; the capillary circulation and secretions fail, the action of the atmosphere on the surface, of the urine on the bladder, the fæces on the alimentary canal, is, or would shortly become injurious, for such parts so circumstanced lose their protecting irritability, and tonicity of texture. Chemical changes take place of those heretofore subjected to the vital powers, and an universal congestion, inflation, and atony possess the palsied mass, until, partly by mechanical impediment, but chiefly by continued and excessive disor-

ing, on laying open the sheath, a distinct solution of continuity, the fissure or interspace exhibiting, in the first instance, broken down medullary substance mingled with coagula of blood; and if the injury be less recent, a process resembling ulceration. The theca discovers no sign of mischief in a flexure sufficient to break or partially dislocate the vertebræ, and rupture the medulla. Compression, which, from its analogy to the case of cerebral compression, surgeons have concluded to be the cause, seldom exists. Before I ascertained the fact to be as I have above stated, I was surprised to find these symptoms terminating fatally in cases of such partial injury to the bony canal as to present neither a vestige of stricture, nor sign of alteration in the position, direction and appearance of the cord. The mischief is inflicted at the moment in which the injury is received, and is neither perpetuated nor aggravated by any encroachment on the bony canal; consequently the proposal to relieve it by the trephine proceeds, if this statement be of general application, upon an erroneous conception of its nature.

dered sympathy, the vital powers are exhausted.* In the same manner as we now and then see a dry gangrene of a limb from ossification of its vessels, or a preternatural growth, as a large exostosis or tumor, deprived of nourishment, gradually wear out the principle of life, this perfect paraplegia proves destructive. If sensation remain, the voluntary powers may be dispensed with, as we see in daily instances, because that modification of it which serves as the leader and director of the involuntary actions remains, but with this goes the susceptibility of parts to their proper stimuli, and consequently their capacity for their proper actions. This, therefore, like the cases of fractured basis and of chronic injuries of the brain and other viscera, is an example of death from irritation. Indeed the instances might be so extended as to comprehend chronic diseases in general, excepting those which by their nature and situation anticipated the period of exhaustion by a sudden crisis. Some injuries interfere with the intellectual powers, some with sensation and voluntary motion, some with the nutritive, others with the excretory function, which is an appendage to the nutritive. Certain modes and combinations of these have the effect of arresting the involuntary actions as determinately, if not as rapidly, as those injuries which bear directly upon the vital functions of circulation or respiration. The progress of such cases to their termination varies according to the function primarily impaired, the mode and degree of its impairment,

* In this case, as in a crowd of others, the powers of the mind are unaffected. And in those in which volition is suspended, if we may judge from the occasional violence of the convulsive actions of muscles habitually subject to volition, the same inference is warranted as regards the muscular power.

and the vivacity of the sympathy existing between it and the functions of life; but while duration alone aggravates the burthen, sleep, appetite, digestion, exercise, and all the modes of recruital necessary to the vigor of the nervous system are withdrawn, and the continuance of this state of irritation operates as an indirect but sure sedative upon the heart itself.

Having now explained my views of the reciprocal relation of the vital functions, and of the manner and order in which they are affected by injuries not implicating the vital organs, I shall proceed to consider the practical bearings of this important subject.

CHAPTER VI.

ON THE PATHOLOGY AND TREATMENT OF DIRECT CONSTITUTIONAL IRRITATION.

SECTION I.

ON THE STATE OF PROSTRATION WITHOUT RE-ACTION.

Although the fact of death ensuing upon injuries of parts not essential to life, even when unattended by hemorrhage, and upon operations not usually esteemed hazardous, has not escaped observation; writers and teachers seem to have contented themselves with the bare statement of it, either from an impression

that being an equivalent in effect to death on the spot, or being due to an idiosyncrasy moral or physical, the further consideration of the subject in a practical view was unavailing.

Mr. Hunter has the following remarks: "I have seen a man die almost immediately upon the loss of a testicle. I have seen convulsions immediately attend the operation for the hydrocele, so that I have almost despaired of recovery.

"The loss of a limb above the knee is more than many can bear, the cutting for the stone where it breaks, and may be an hour in extracting, is also more than many can bear. We cannot bear to lose much brain.

"Nature requires to feel the injury, for where after a considerable operation, there is rather a weak, quiet pulse, often with a nervous oppression, with a seeming difficulty of breathing and loathing of food, the patient is in a dangerous way. Fever shews powers of resistance, the other symptoms shew weakness, sinking under the injury.

"It would seem as if simple irritation in a part was capable of affecting the whole nervous system. A sudden alteration, a sudden call, or a sudden and universal irritation upon the constitution will, I imagine, produce immediate weakness; for every new action in a constitution must produce or tend to produce a weakness in that function; the effects of which will vary according to the necessity and state of the constitution. There are sometimes constitutional symptoms or universal sympathies which arise immediately out of the act of violence itself, and which are often dangerous. Loss of blood may be reckoned one cause which will bring on all kinds of constitutional weakness, or violence alone, which

will, without loss of blood, produce immediate fatal effects."*

Mr. Abernethy observes—"The effects that result from the sympathy of the whole constitution with local disorder, vary greatly both in nature and degree. Sometimes the brain is the part chiefly affected: on these occasions the nervous energy appears to be much impaired, and in some instances of this description the patient gradually sinks, little fever or re-action of the constitution being observed."†

Sir Astley Cooper says—"The most severe injuries, by shock to the nervous system, cause death without re-action."‡ He adds two examples, one of a crushed knee, and the other of a scald of the lower extremities, fatal in eight hours.

"The sensorial power," says Dr. Philip, reasoning from experiment, "may be so impressed as instantly to destroy all the functions."§

There is reason to believe that a regular series of impressions and actions maintained between the nervous and muscular systems is indispensable to animal existence, and that an interruption, derangement, or suspension of these is occasionally the result of a sudden and violent shock, mental or corporeal, or of the two combined, which is fatal or recoverable according to the greater or less intensity of the shock, and the permanency of the condition from which it originated.

* Treatise on the Blood and Inflammation, Ch. IV. Sect. VI.

† On the Constitutional Origin and Treatment of Local Diseases, p. 8.

‡ Lectures on the Principles and Practice of Surgery, Lect. I. By Frederick Tyrrell, Esquire, Surgeon to St. Thomas's Hospital. &c. &c.

§ Experimental Enquiry.

I have called this state 'prostration,' because the term is descriptive without involving an hypothesis to explain it. It is a state not actually amounting to, but threatening or nearly approaching a cessation of vital action. Whether it be the direct result of the shock, or of an exhaustive effort of nature to meet the emergency—as those persons may suppose who look instinctively for a final cause, and resolve every action into a salutiferous or restorative operation—I will not presume to decide; but it would be utterly subversive of my notion of the case to suppose that nature is in a condition to make any arrangement for her own relief.

What are the means by which we can hope to rally the flagging power, and restore the natural harmonies of the system? The state of the circulation inferred from the pulse, complexion, breathing, and temperature, is our chief, if not our only guide. If the shock be unattended by hemorrhage, and as the argument supposes, by lesion of any vital organ, immediate or accessary, cordial drinks, as spirituous and vinous liquors and compounds, and what are called diffusible stimuli, as ammonia, æther, camphor, &c. with the aromatic distilled waters, and warm and gentle stimulating enemas are the most obvious internal remedies. Externally, the stimulus of artificial heat applied to the pit of the stomach and extremities, as by fomentations; and camphorated and spirituous embrocations, or gentle frictions where the state of parts permits, are the usual means resorted to of exciting the sentient extremities of nerves, and inviting the capillary circulation.

If any advantage be gained by these means, it becomes necessary to substitute some light aliment for the dram, as gruel, yolk of egg, arrow-root or sago,

or to join them, as in jelly, or either of the above substances, with wine or brandy.

Indication twofold. We have two points especially to bear in mind, first, maintaining action, secondly, not forcing action.

The first requires the incessant observation of the surgeon. No nurse can be qualified to superintend, or at least to direct the administration of the stimulus. It is the devotion of a few hours to the life of a fellow-creature. The duty may be divided. The happy effects resulting in numerous instances from perseverance in the process of recovering a drowned person, although a shorter and less delicate process, hold out strong encouragement in these cases. When syncope is overcome, the system, it is true, rights of itself: the phenomena, however, of syncope and shock, allowing for the difference of duration, bear a considerable analogy; it is in their causes that they differ, as I shall presently shew.

Purgative medicine ought not, in my judgment, to be given until the circulation is restored and pretty steady—then a spoonful of castor oil may suffice. It is idly premature to talk about the secretions. Medicines directed to this object cannot act beneficially in such a state of the nervous system, if, as I much doubt, they act at all. It is besides of importance to avoid putting any thing into the stomach but what is essential to support the faultering action of the heart and diaphragm. Since it is upon the stomach we place our chief reliance, we should endeavour by every means to keep it in temper.

If we neglect to supply stimulus, when called for, the spark of life goes out. The signs of its indication must therefore be vigilantly observed. We are

maintaining action upon inadequate power, in the hope that the natural resources may come to our relief, and that we may gradually diminish stimulus and increase nutriment, which is our only method of raising power to a balance with action.

2d. The respondence of the circulating forces to an increased supply of stimulus, must serve as a caution against over-supply. Since power is deficient, we must carefully husband our only resource, and not waste it in inordinate action. When the signs of re-action are manifested, its excess is much to be apprehended, if such re-action has been obtained by over-stimulation.

Excessive re-action, so induced, is 'prostration with excitement' in its most perilous form. When such a state is the original form of the malady, it is probably less dangerous, because in this case the inequality between power and action is less.

Cerebral influence in prostration. The degree of cerebral affection, independent of any direct injury of the brain, varies so much as to influence materially the symptoms of prostration. The mental faculties are more clouded and stupified, the respiration is more difficult, and the temperature of the surface sinks in proportion as the cerebral influence is diminished. The muscles are subject to spasmodic and convulsive actions, and the pulse to irregularity and intermissions, in proportion as the cerebrum is, or becomes affected. The 'frissonement,' which ordinarily accompanies shock is distinct from rigor.* It is a cerebral affection like

* The distinct origin of tremor from mental and physical impressions is familiarly known. "You tremble, Sir," said a bye-stander tauntingly to one of the unfortunate victims of the Revolution, on his way to the guillotine. "True friend," he replied, "but it is from cold, not fear."

the shudder produced by certain acutely painful impressions of the mind or organs of sense. It is not always present, and sometimes wanting where the temperature, to which it seems to have no reference is to our sensations reduced. On the other hand, I have often seen it without any sensible coldness of surface.

It is only at the moment of its occurrence that the direct injury of the brain is liable to assume the common characters of prostration, which are in no wise to be regarded as proper and legitimate signs of cerebral mischief. The stupor, convulsions, and delirium, which characterise injuries of the head by their appearance after an interval in which re-action has been fully established, assume a pathological character very different from those identical symptoms occurring at the moment of injury. But if after an injury unattended by hemorrhage, in which the head has suffered no direct mischief, the surface retain its natural warmth, and the pulse and the breathing be oppressed, and there be present stupor, convulsion, and inaction of the pupil; blood should be taken in such quantity as to relieve congestion, and its effect upon the symptoms duly noticed. If on the other hand stupor and convulsion be accompanied by a contracted and cold surface, and a thready or intermitting pulse,—I have repeatedly seen both states—the cordial is the proper remedy. Greater freedom of circulation, and a consequent diminution of the stupor and convulsion will be found to follow both one and the other practice, as it is judiciously resorted to.

Blood-letting upon injuries. The custom of letting blood indiscriminately after accidents is so irrational, that the

authority of long-established custom forms no excuse for it. Prophylactic blood-lettings may be proper in certain cases, as in threatened apoplexy, or where a hemorrhagic disposition prevails in parturient women, &c.; but they are seldom admissible where injuries have been inflicted. I have seen a practitioner tie up the arm of a person to bleed him after a fall, in a pale cold stun, in which the pulse could scarcely be felt at the wrist. I have known operators permit a large artery to bleed before tying it, in amputations unexpectedly performed on very robust subjects. It is easy to see the motive of such operators, but it is an erroneous pathology, and a dangerous practice; the effects attending upon loss of blood are peculiar, and the reduction of strength by these means has no analogy whatever to that which is brought about by chronic disease, and renders the effects of operations less formidable.

Whether the congestion of the cerebral circulation in prostration proceeds from deficient action or determination, the tendency of opium is to increase the congestion; opium, therefore, appears to me to be inadmissible.

In the above observations I have referred to the state of prostration without re-action, from whatever cause proceeding, for in such a case it were frivolous to refine upon the diversities of treatment which in a more advanced stage, as when re-action is established, a reference to the circumstances of the injury or operation might suggest.*

* The cases of prostration without re-action are those under the head of 'Burns,' except the two last; of Bryan, p. 121, and Dodd, p. 124; of Lithotomy, p. 135, et seq.

Treatment of burns. Burns and scalds are unattended with hemorrhage. No species of injury exhibits the symptoms of prostration in a more marked degree than these, when of a severe description. The remedy upon which I rely in burns inducing this state, is brandy in gruel, in the proportion of one part of the former to two of the latter. This is administered in doses of a table-spoonful or two at short intervals, until we obtain a sufficient distinctness and fulness of the pulse at the wrist, with a corresponding improvement of complexion and temperature of the surface. The bowels should be simply kept unloaded by means of castor oil or common injections. If there be much stupor, and the bowels have been previously costive, I prefer to give ten or fifteen grains of the compound calomel and scammony powder. The use of opium, a remedy still generally employed on account of the patient's sufferings, I have abandoned, being convinced by experience, that in small doses it is inefficacious, and in large ones injurious. I have before observed, that pain is a good symptom in burns. I need scarcely observe that the exhibition of the stimulus requires unceasing and judicious attention; it must be intermitted, if the pulse become bounding, and the patient flush. Nevertheless in deep and very extensive burns of adult subjects, I have frequently found it necessary to persevere in its use for a week or ten days at lengthening intervals; occasionally intermitting, and always gradually withdrawing it. Not only has the partial remission of this plan been in some instances imperative, when re-action was permanently established, but symptoms of the head or chest have made their appearance which required blood-letting, either topical or general; and a

smart purge of calomel and scammony I have found on such occasions very useful. In deep burns the external remedy which I prefer is the turpentine and olive-oil liniment, or turpentine and cetaceous ointment, upon the principle, though not exactly the plan, recommended by Dr. Kentish of Newcastle, and subject, after suppuration commences, to such changes as the state of the surface may require. This appears to me to coincide advantageously with the internal use of the stimulant. The lime-water and milk liniment, and when suppuration has become abundant, the calamine or chalk powder lightly strewed over the whole surface, and defended by the same or simple ointment thinly spread on linen, is the local treatment which I adopt in superficial burns.

Upon the whole, the results of the stimulant treatment of burns, which I have more strictly pursued since my attention has been directed to the subject of this Essay, have proved highly satisfactory.

Epitome of shock. A fit of syncope and the recovery from it present an epitome of the phenomena of shock; the representation, it is true, appears exaggerated, its access being more abrupt, its progress more rapid, and its events altogether crowded and condensed into a shorter interval of time. The heart is affected with tremor, and although it does not cease to act, acts so unavailingly that the cerebral circulation is nearly arrested, and the current of life seems at its last ebb. As the heart and vessels of circulation recover their action, and the mental faculties begin to be restored, a momentary hallucination or delirium comes over the patient, not unfrequently accompanied with violence, to which succeeds a subdued rigor, and this is followed by a

warm glow, then a gentle moisture of the surface, and a calm but somewhat oppressive languor. The causes which lead to this are not more different from each other in various cases, than from those which give origin to the state of prostration; and circumstances are not wanting to explain the suspension more or less of the senses and intellectual faculties and voluntary powers in the fainting fit, and its non-occurrence in ordinary instances of shock, without injury to the stated analogy between the cases. If we would allow to a sudden and artificial irritation, the gradations between the extreme states of excitement and depression which we allow to that which is the result of inflammatory and other diseased actions, it would not be difficult to explain all the varieties of sensorial and nervous affection, from a slight stupor to a profound coma, from simple incoherence to active delirium, from a momentary sinking to the fatal syncope which sometimes succeeds to injury.

To pursue the illustration.—It is upon the brain in both cases that the first impression is made, and to its influence upon the organs of circulation and respiration, that the phenomena which differ in degree and duration more than in kind, are to be ascribed. Syncope following a slight injury is very common and very unimportant; syncope following a severe injury, not attended by hemorrhage, is rare, and in the highest degree dangerous. In the first instance the shock is partial, slight and evanescent; in the latter it is extended, deep, and permanent.

The order of the train of symptoms in the two cases being similar, and the rapidity of the crisis in the syncope, the main distinction; are we to infer that the same principles of treatment are applicable, and that similar means may be employed with a like

prospect of success? The principles will be the same, and the means not essentially different, but the probable results admit of no parallel or comparison. This is to be explained by the difference of circumstances which have operated to produce the two states, and not the difference in kind of the effects produced; for as I have stated, shock sometimes assumes the form of syncope, and when it does so, generally proves fatal; whereas from a slight cause, a fainting fit is not attended with danger.

Symptoms analyzed. I shall now shortly analyze the symptoms of prostration.

Nausea.—The stomach is affected with nausea and loathing of food by any sudden depression of nervous energy. We see this effect continually in health from sudden affliction, &c. The effect is too instantaneous to be attributed to a deficiency of secretion, even where hunger had not previously existed. I believe it is such a direct loss of tone, I would say of erethism, in the sentient extremities of the mucous surface, as we see a sick stomach, and other causes, produce upon those of the cutaneous surface. The want, that is, disappointment of food, palls and often destroys appetite. Taking food frequently creates it.* Suppressed or depraved sensation is one of the most immediate and remarkable effects of irritation. It is probable that a similar morbid sympathy to that which suddenly unfits the mind for thought, or the body for exertion, is the cause of that disgust in the stomach which constitutes nausea.

Nausea is not only an ordinary consequence, but

* "L'appetit vient en mangeant."

a never-failing cause of nervous depression. The universal sympathy is in no organ more strongly exemplified than in the stomach, as is proved by the instant nausea preceding faintness from remote and transitory causes. The effects of its disorder are more rapidly and sensibly diffused over the system than those produced by the disorder of any other organ, as is seen in the direct debility of the nervous, vascular, and muscular systems ensuing upon sea qualms, and the introduction into the stomach of nauseating medicine and indigestible food. Hence the stomach has been named the centre of sympathy. While the state of nausea continues urgent, no effective re-action can take place. Vomiting is its relief, and is to the oppressed stomach what rigor is to the oppressed heart. The system, after one full vomiting, experiences a lithesomeness as after the removal of an intolerable burthen; but if the unnatural action be renewed, and become habitual, it is as much a sign as a cause of exhaustion.

Vomiting.—In muscular organs morbid sympathy shews itself in extraordinary action. Thus we explain palpitation, hiccup, vomiting, dysphagia, dysuria, cramp, and spasm. The change which a great and sudden depression of nervous energy works in the quantity and quality of the secretions, has undoubtedly a share in provoking the act of vomiting. It would appear that a regurgitation of bile, and its overflow upon the stomach, takes place in these cases as a consequence of the first debilitated, and afterwards deranged or inverted muscular action of the stomach and intestines. Vomiting may be concomitant with a constipated or a lax state of bowels. If it should be attended with constipation, stimulant drastic ene-

mas should be exhibited. If with a free state approaching to looseness, a full opiate enema should be given; and in most cases five or ten grains of calomel with one or more of opium prove advantageous in this state, if retained. A spoonful only of fluid, as brandy and water, or strong tea, or coffee, should be taken by the mouth, and that seldom. A bladder of hot water, a mustard cataplasm, or a blister, should be applied to the pit of the stomach. The more immediate operation of the two former renders them preferable in urgent cases. I have known the calomel and opium pill, and the injection, both cathartic and opiate, selected according to circumstances, stop urgent vomiting, where effervescent saline draughts, acids, alkalies, antispasmodics, cordials, and in short, every liquid had been rejected from the stomach.

Hiccup.—Hiccup, a more advanced and decided symptom of prostration, is a spasmodic affection of the diaphragm, probably from a contiguous sympathy with the stomach. We see it generally, but not always connected with the irritability which gives rise to vomiting, and both symptoms with a flatulent state of the small intestines, I believe, invariably. Intestinal obstruction, of which vomiting and hiccup are symptomatic when arising from a mechanical cause, operates, though in a different manner and degree, to produce these symptoms in prostration, whether directly induced by shock, or indirectly by gangrene, or typhus fever. These enfeeble almost to paralysis the proper muscular motion of the intestines, and thus give rise to excessive flatulent distention. Hiccup is a symptom very variable in its occurrence: sometimes, though not frequently, appearing early,

and occasioning great distress from its violence, shaking the whole frame, its sonorousness, such that it may be heard on another floor of the house, and its unintermission, preventing the patient's slumber. When of this aggravated character, I have not known it arrested, scarcely alleviated, by any remedy. Its continuance seems to depend, like that of vomiting, on the absolute exhaustion of nervous energy, the presence of which, be it remembered, is as necessary to repose as to action—to control as to incite.

Rigor.—Rigor is the most uniform announcement of re-action, though by no means peculiar to this state. It is attendant upon local irritation under a great variety of forms, and is the first sign of common febrile excitement. It is a sympathy of the circulating with the sensorial organ—of the heart with the brain. The propelling power of the heart is so languid that the venous trunks become loaded to congestion, while the capillary circulation seems to be at a stand-still. Cold air, cold and moisture especially, induce rigor, acting from the surface upon the interior. Whatever depresses the nervous energy so much as to affect the equal and uniform distribution of the blood, may be said to act from the interior, as fever, fear, or shock. Rigor therefore, is a symptom of more or less importance in exact proportion to the cause operating to produce it. Arising from a local inflammatory action, as that of suppuration, it is more important than from a temporary exposure to cold or moisture, which does not go the length of producing fever. Arising from a direct nervous impression as syncope, or the prostration which is characteristic of severe irritation, it is most important as the harbinger of returning animation and action, if it do not

by its violence and duration, destroy re-action, or render it in turn excessive and exhaustive. Where no previous sign of constitutional indisposition has been manifested, it is commonly the forerunner of a permanent morbid action of the constitution sympathetic with some, perhaps concealed, local irritation. But although rigor has its origin in the enfeebled action of the heart, and the unequal distribution of the blood, I believe that the phenomenon would not take place if the heart were not instinctively roused to an inordinate activity, in order to overcome the gradually accumulated obstacles opposed to the circulation. The struggle between the heart and the capillaries constitutes the rigor. As the former overcomes the latter, and the balance of circulation is restored, the rigor subsides. Its temporary existence, severity, and periodic return in ague, give it the appearance of a spasmodic condition. It is partially relieved or abridged by external warmth, and internal stimuli. In fever and inflammatory diseases, the duration and intensity of the rigor augurs a probable correspondence of severity in the ensuing stage; but in irritation a hot stage is either very transient or imperfectly formed, or altogether passed over, flushes and partial sweats succeeding to the rigor.

OF PROSTRATION WITH EXCITEMENT, AND EXCESSIVE RE-ACTION.

Re-action may be gradual, and restorative of a tranquil and natural state of the system, as exemplified in an ordinary fainting fit; or it may be irregular and violent; in fact an action unsupported by sufficient power to maintain and carry it through; and in this case the state of exhaustion into which the patient lapses, quickly terminates life. Symptoms of excite-

ment are intermingled with those of an opposite description, an effect sometimes attributable to the over stimulation of the system. The sudden accession, the imperfect developement, not less than the abrupt termination of the symptoms, broadly distinguish this ephemeral excitement from that of continued irritation, and evince that the former, like the lighting up which often precedes natural dissolution, is a genuine feature of that state of universal atony of the nervous system, subject to preternatural excitation, which I have termed 'prostration with excitement'.* This partial re-action is distinguished by its short livedness and the non-attainment of a permanent condition, from that in which re-action being complete, the more determined and durable character of the symptoms which supervene implies, that it is the result of a positive and continued irritation,† either in itself or in its effects. In the former case (i. e. in itself) the irritation is direct, as after a wound, fracture, or operation, active hemorrhage, or acute poison; in the second (i. e. in its effects) reflected, as in the healing or actually cicatrized state of a wound, or a cachexia ensuing upon a local injury, a passive, or small and frequently recurring hemorrhage, or a chronic poison, which has entered or has been generated in the system.

Treatment of prostration with excitement.

The name which I have given to this state sufficiently conveys my opinion that it is based in debility. The energies of the system are diminished in proportion as the actions

* Of this kind were the cases communicated by Mr. Soden, pages 64 and 82.

† See cases, pages 63 and 93, and the cases generally under the head "Inflammation following Injuries and Operations."

are increased in cases of excessive re-action. It is a question worthy of our most serious and undivided attention, whether we are in possession of any means of moderating excessive, that is, exhaustive re-action, and of tranquillizing the nervous system, at a time when the greatest disparity exists between power and action. The heart is rather thrilling than fairly pulsating; its semi-contractions are innumerably rapid; the expression is by turns excited and oppressed, wild and comatose; the breathing short, and wanting the relief of sighs. A continued exertion of reason cannot be maintained, and after a correct reply or remark, the patient wanders into irrationality. The confusion arising from the rapid alternation of symptoms usually denoting contrary states of the system, and the urgent conviction that death must speedily ensue if this tempest be not assuaged, perplex the judgment of the practitioner. After repeatedly witnessing the total inadequacy of remedies employed under the sanction, and in deference to the axioms of schools and school authorities, I must be permitted to remark that in such a crisis, experimental measures supported by any fair hypothesis should be encouraged rather than met by special objections. If re-action become excessive, and the case assume the character of high excitement, the shaved scalp should be frequently bathed with a cold spirit lotion, a large blister should be applied to the nape of the neck, and the bowels should be cleared with pills of calomel and jalap, or scammony, or, if medicine be rejected from the stomach, by stimulant and purgative injections. The propriety of following up this practice, should it be productive of temporary benefit, is a question of the last importance, for such a

state is extremely precarious, and often shifts suddenly into that of sinking.

For the most part medicine taken into the stomach, if it be not rejected, appears to me to be inert. This organ is not in a state to act upon its contents. Pills are thrown up unaltered an hour or more after they have been swallowed. I prefer in such a case to leave the stomach to itself, and give medicine in the way of lavement. The main question is—should opium be administered in this state? I have seen the highest degree of symptomatic delirium yield to an injection containing three drachms of tincture of opium, repeated after four hours; and by a solution of three grains of the extract in a quarter of a pint of gruel, so exhibited and repeated in the state of incoherent wandering, the mind rendered permanently clear and calm, with a corresponding improvement of other symptoms. In whatever way administered, it is only in full doses that this remedy is admissible in the high excitement of irritation; for larger will be required in such a state to affect, much less to control the nervous system. If it succeed in doing this, its employment is attended with the happiest effects. In the low muttering delirium which accompanies sinking, the frequent repetition of a small dose of opium, as a pill containing a quarter of a grain every second hour, is decidedly beneficial, as I have seen in many instances.

The virtues of other sedatives are in my observation pretty correctly appreciated. There is, however, one deserving of particular mention, both as an adjunct to opium, and the best substitute when this is inadmissible. I mean the extract of henbane.* As

* In the ruffled states of the system generally, but especially in the over-active state of the vascular system, there is a charm in the

an anti-irritant it should be given in doses of three to five grains every third or second hour.

SECTION II.

OF CONSTITUTIONAL IRRITATION FROM INJURIES AND OPERATIONS.

Mr. Hunter observes,—"the constitutional symptoms arising from local complaint may be divided into three, the immediate, indefinite and remote." The immediate is the symptomatic or sympathetic fever, the second are nervous affections, and the third is the hectic. "The secondary are not so determined as to time. I have called them nervous, though not strictly so in every case, because more variety of affections are produced than from any cause I know; yet these affections seem all to have more connection with the nervous than the vascular system, and are generally excited by the particular tendency or susceptibility of different constitutions."†

Mr. Abernethy, eminent alike for the sagacity, soundness and clearness of his views as a pathologist, to whom the profession and the public are indebted for the improvement, I might almost say for the introduction, of medical surgery, distinguishes the fever which attends upon injuries into the sympathetic in-

operation of henbane, altogether peculiar. It is feeble as an anodyne, feebler as a soporfic; but not "poppy nor mandragora" soothe and still so unexceptionably as henbane.

† "A man shall have a very bad compound fracture of his leg; the first constitutional symptoms shall have been violent, but all shall appear to have been got the better of, and there shall be hopes

flammatory, the hectic, and the sympathetic typhoid, or irritative fever. "The fevers," he says, "produced by local disease, are the very identical fevers which physicians meet with where there is no external injury." "Local disease, injury, or irritation may induce, as its immediate consequence, pain, sickness, fainting, rigor, convulsions, delirium, and tetanus. These nervous affections have the natural priority."

"It may be a fit subject for inquiry," says Mr. Abernethy, "whether it be possible for particular organs to become affected otherwise than through the medium of the nervous system in general. Though some instances of sympathy are strange and perhaps inexplicable, there are strong reasons for believing that the inflammatory fever, the state of vigilance and delirium, convulsions and tetanus, which arise in consequence of injuries of the limbs, are produced by irritation imparted to the brain, which, by a kind of reflected operation, occasions a greater disorder of some of the organs of the body than of others, and thus gives a character and denomination to the dis-

of recovery; when suddenly he shall be attacked with a shivering fit, which shall not perform all its actions: viz. shall not produce the hot fit and sweat, but shall continue a kind of irregular hot fit, attended with loss of appetite, quick, low pulse, eyes sunk, and the person shall die in a few days. Or he shall go into the common diseased symptoms of the second stage, viz. the nervous, with many of its effects as the tetanus, and dissolution shall also be a consequence. Or if the local disease does not and cannot heal, and is such as to affect the constitution, it then brings on the hectic, and sooner or later dissolution takes place; for the hectic is an action of disease, and of a particular kind; but dissolution is giving way to disease of every kind, therefore has no determined form arising from the nature of the preceding disease."—Treatise on the Blood and Inflammation.

ease."—"It is most probably the disorders of the brain which affect the stomach; but the re-action of the latter affection is liable to increase and maintain the former, by which it had itself been produced."*

The irritative fever Mr. Abernethy regards as a necessary consequence of the local disease; so that unless this can be altered, we can have no hope of amending the constitutional symptoms.

Attention to the regulation of the bowels, cordials, medicines which impart strength, and opium to allay the prevailing excitement, constitute the treatment which he recommends. Of drastic and forcing purgatives he disapproves, and expresses a doubt, to my mind very natural, whether purgative medicines in this disease act beneficially; whether the return of the secretions to a healthy state is not owing to a change in the action of the nervous system.

Sir Astley Cooper's first lecture contains several valuable examples of the phenomena of irritation. He observes, "Injuries producing fatal consequences destroy life in three different modes. 1. When slight, by keeping up a continued constitutional irritation, they gradually wear out the system. 2. When more severe, they destroy by occasioning excess of action. 3. The most severe, by shock to the nervous system, cause death without re-action." The rationale and the treatment of irritation as given by Sir Astley Cooper, are precisely the same as of inflammation—both being considered as directly co-operating in the restorative process.†

* Surgical Works, Vol. I. 'On the Constitutional Origin and Treatment of Local Diseases.'

† "When a part of the body receives an injury, the nerves convey a knowledge of it to the important organs, as the spinal marrow,

Irritation distinct from fever.

I am far from presuming to gainsay these authorities—but I am disposed to consider apart from fever or constitutional inflammation the nervous affections,* to regard them as a distinct order of morbid actions occasionally ensuing upon injuries, upon inflammation, upon the exhaustion attending loss of blood, and upon the admission of noxious matters into the circulation. I do not mean to say that such actions originate exclusively from these sources, but I select these as presenting prominent examples. Neither would I say that they may not be combined with febrile action: but if this be the case, they so far pervert or suppress the symptoms of fever, as to present a very striking exception to Mr. Abernethy's observation, that sympathetic fevers are indistinguishable from those not depending on injury. It will not, I think, be denied by experienced surgeons, that there is a large, and very important class of cases, in which neither the assemblage of symptoms nor

brain, heart, stomach, &c.; nature immediately commences the restorative process by stopping all the customary secretions; the various outlets being thus closed, the blood collects in quantities in the heart and large vessels, which propel it with unusual force to the injured part; giving rise to inflammation in whatever form can best accomplish the desired effect. This is an illustration of the manner in which nature contends for a cure, &c."—"There are two means of reducing irritation: first, by restoring the secretions of the different organs, and by thus opening the outlets, lessen fever."—"The second mode of relieving irritation is by allaying the excitement of the nervous system."—Sir Astley Cooper's Lectures on the Principles and Practice of Surgery, Lec. I. By Frederick Tyrrell, Esq. Surgeon to St. Thomas's Hospital, &c.

* I do not include among the nervous affections which directly ensue upon injury or inflammation, the traumatic tetanus, because I consider it to be not only a secondary but proper constitutional action, although grafted upon the local injury, which I therefore designate by the term "reflected irritation." See page 39.

the periodical exacerbations and remissions constituting fever, are present, and which if we treat them in deference to the rules laid down for the treatment of fever, utterly disappoint and mock our efforts. Of these some never arrive at inflammation, others, owing to the shock which the constitution has sustained, sink almost as soon as inflammation is established, from incapacity to maintain it. Some, as Mr. Hunter has observed, go on well, and when we are no longer in apprehension for the part, the constitution, exhausted by the reparative effort, can go no further, and suddenly collapses; whilst others, displaying from the commencement symptoms of high but irregular excitement, betray in every change, local and constitutional, an excessive and destructive re-action. The first stage of constitutional irritation ensuing upon injury or inflammation, by no means exhibits that provident faculty of nature which is so much insisted upon: for the tumult of the system, proceeding from the sympathy of the whole with a part, is a state with which restorative action is wholly incompatible. The first stage of local irritation or inflammation illustrates this fact. The actions which ensue aggravate the mischief rather than tend to its relief, insomuch that we have often more concern about what is to follow than about what is past, and would gladly compromise for a result. Nevertheless it is not inconsistent to regard the processes, of which these form essential preliminaries, as serving a salutary purpose. But assuredly the first actions both of the constitution and the part, are those of angry disturbance; and our first business is to compose and allay them. Having fortunately succeeded in this, the actions which require for their institution

and maintenance an unusual but not unhealthy vigor, commence as a natural consequence.

Of the particular tendency of injuries affecting different parts, and of the different modes of injury to set up irritation of the constitution, I have already spoken. Profuse hemorrhage, the implication of many textures in a wound, the extensive detachment of cellular connections, wounds of joints and tendinous structures, and the comminution of bone, are the most unfavourable circumstances attending injuries, in reference to the constitution.

Immediate operation identified with injury.

The removal of a mutilated limb, provided the interval of time be so short as to identify the operation with the injury, anticipates, or at least infinitely diminishes constitutional irritation. I have instanced cases in which fatal irritation has ensued upon amputation for recent injury. They are rare; it would be easy to adduce numerous instances leading to an opposite conclusion. The lapse of a considerable interval in which the system either continues prostrate, or, having in part recovered, acquires a morbid irritability, is exceedingly prejudicial. Natural constitution, health, and habit have an undoubted influence in these cases, but this is neither so common nor considerable as to countervail the arguments in favour of an immediate operation. The expediency of sacrificing or saving a limb is another question, upon the merits of which, by the way, since it hinges on individual circumstances, I do not see how any abstract opinion can be delivered. But respectable authorities have recommended the delay of an operation, on the ground that a certain inurance to confinement and suffering, and the establishment of a suppurative process, by gradually

conducting the constitution into a state resembling that of chronic disease, was eminently more favourable. This reasoning is altogether fallacious; the shock of the injury covers and identifies with itself that of the operation promptly performed. On the contrary, the continued irritation of the injury infinitely augments the first danger, and the state desired and promised never arrives in a vast majority of cases.*

Deficient and excessive re-action equally indicate weakness.

The treatment of deficient re-action and of that which is excessive, resulting from injury or operation, prior to the commencement of inflammation, should adapt itself to the symptoms present in the two states, with this general qualification, that both are evidences of deficient power, and that existing circumstances are often sufficient to create the diversity in the order of symptoms. Thus, hemorrhage determines the one or the other according to its extent. We find the one commonly passing into the other state; and we discover, where in the absence of hemorrhage the former prevails, that the person has been habitually addicted to abuses of constitution; and where the latter, that some strong point of aggravation of the injury, or some extraordinary mental impression explains its predominance. This, it cannot be denied, has often a marked influence—a maniacal tendency for example,† or even a high degree of irritability. The boy Bryan, whose

* See the excellent observations on this subject of Mr. Pott, in his 'Remarks on Fractures and Dislocations,' Works, Vol. I. and 'On the Necessity and Propriety of the Operation of Amputation in certain Cases,' &c. Vol. III.

† See the cases of sprained Ancle Joints, p. 62, and of Lithotomy, p. 63.

case is related at p. 88, had been in the hospital six months before his death,* on account of a fractured arm, occasioned by his meeting in the passage leading to a slaughter shed, an over-driven ox. The boy's danger was so imminent, that he was considered fortunate to have escaped with his life, and his terror was so great that it had a serious effect upon his general health and spirits for a considerable time afterwards: his broken bone, however, had united well. When I learned these circumstances, I felt disposed to regard the extraordinary issue of his case, as the result of a preternatural irritability of system thus engendered, and I am still disposed to hold this opinion.

Operations for chronic diseases.

As regards operations for chronic disease, the presence or absence of visceral disorder, the habits of life and those of the malady—as for example, of air and exercise, or of rigid confinement, of taking opium† or cordials in any shape—are points for careful inquiry. The habits of long indisposition are fully as important to be known as the habits of health, perhaps more so. It is impossible for an operating surgeon to do justice to his patient or himself, who is indifferent to particulars of which his ignorance may be disadvantageous. As the most

* This ill-fated boy was admitted with a fracture of the cervix humeri on the 1st of January, and discharged the 11th of February; again admitted with a lacerated hand on the 29th of June, and died on the 1st of July of the same year, 1813.

† I have known a patient suddenly attacked with colliquative diarrhœa subsequent to an operation under which he sunk, from the discontinuance, it was supposed, of large doses of opium, which he had taken up to that time without the knowledge of the operating surgeon.

successful artists are studious of opportunities to become familiar with the expression which they are about to portray, a surgeon should apply himself to the character of the individual who is to be the subject of an important operation.* Such a method of proceeding will not only enable him to exercise a sound discretion in the selection of his cases, and the time and mode of his operation, but will bring him to the bed-side of his patient at its conclusion, on the vantage ground of mutual confidence. The practice of performing a serious operation, and leaving the after-treatment to others, has, in my knowledge, repeatedly proved disastrous. The medical treatment, a duty not less responsible than the operative, belongs to the surgeon, and indeed, to be employed merely as a handicraftsman, conveys an imputation at which the dignity of a scientific mind revolts.

SECTION III.

OF CONSTITUTIONAL IRRITATION FROM INFLAMMATION.

INFLAMMATION is strong and effective, or the contrary, as it is free from irritation or mixed with it. Sympathetic fever may be of the pure inflammatory character, bold and powerful, or it may be of a vacillating character. It may be sympathetic synochus, or sympathetic typhus. The latter, though it differs in character from the former, is still a mode of sympathetic fever, and hence it is treated, primarily at least, by medicines addressed particularly to the secreting

* Many points, minute in themselves, but important in the aggregate, are often best obtained from the patient's relatives.

organs. The irritation set up by inflammation has generally more or less of febrile action blended with it. But irritation, in my notion of the term, is not fever under any modification. Fever requires, and as Mr. Hunter justly observes, shews powers of resistance. In irritation we have no determinate or continued train of actions. It is "every thing by turns and nothing long." Teachers appear to me to confound irritation with inflammation or fever, and because they sometimes co-exist, to conclude they coincide. Irritation may be a symptom of fever, as fever may be an effect of irritation, but they are originally and essentially distinct forms of disease, and either may exist in the absence of the other.*

Sympathetic fever. Sympathetic fever is a healthy re-action of the constitution, without any impairment of its powers, such as they are, shown in the increased energy of the vascular system. If the natural powers of the constitution be deficient, the fever assumes the low or typhoid character, and in its progress gives out indications of the disturbance and distress of the nervous system from its inability to support the increased action of the vascular; but the nervous affections are secondary, strictly symptomatic of the fever, whatever be its origin, and therefore indistinguishable from those which attend upon low fever in the absence of injury.

* I am aware that in this remark I have to contend with the difficulty to which all writers on pathology and on many other subjects are exposed, arising from the vague and various meaning affixed to terms in common use, according to their vulgar acceptation. Thus if any reader should be startled at the idea of fever devoid of irritation, I trust to his discrimination and candour to do justice to my distinction between irritation as an archetype or original disease, and irritation as a symptom.

Irritation anticipates or arrests fever. In general, we have the sympathetic fever formed with a more or less exact correspondence to the occasion, according to the powers of the constitution; but in certain forms of injury, certain constitutions and modes of treatment, the inflammation is an irritant, and gives rise to a disordered action of the entire nervous system, which takes the precedence or the place of fever. Such a state of the system re-acts upon the part, and either checks or destroys the restoring process; while a state of exhaustion, or what Mr. Hunter calls "dissolution," abruptly closes the scene on the 5th, 10th, or 15th day.

Treatment of sympathetic fever. In the treatment of inflammatory fever ensuing upon complicated injury, the chief indication is to tranquillize action without materially diminishing power. We ought not to be alarmed at fever, but at the want of it. We ought not to use any rough and permanently depressing or debilitating means to put it down, neither blood-letting nor continued profuse purging and sweating. To moderate extraordinary action it is sufficient to keep up such a determination to the secreting organs, as prevents their becoming so obstructed as to increase fever. I am persuaded that practitioners are generally over anxious to cut short sympathetic febrile action, and treat fever from sudden and artificial, too much as they treat fever from gradual and natural causes. The great bearing of the constitution, under a sudden call upon its powers, is decidedly upon the nervous system. To a certain extent the existence of fever, for which an obvious and adequate cause appears, is less trying to that system than the employment of

such measures as are necessary to its sudden abridgment. For if the inflammatory action be marked and vigorous, the nervous, which supports it, is strong and inirritable, and the former cannot be suddenly pulled down without a serious encroachment upon the strength and steadiness of the latter.

I shall not be misunderstood to say that nature is to be left to herself: I say only that the less violent our measures of interference, the better. Nervous power is much more easily depressed than raised. Irritation is a very possible result of treatment as well as of malady, for by such means as too rapidly lower, we incur the danger of converting inflammation into irritation, and thus of destroying our only medium of recovery.

Danger of local irritants. An indication of equal importance, is to indulge to a certain extent the first actions of the part, by an easy position, and light and soothing applications. We should allow for the effects of local as well as of constitutional, re-action; the swelling and tension must not be aggravated and rendered a source of additional irritation, by nice adjustments and contrivances; undoubtedly calculated to secure the best possible results, provided we could overlook or command the intermediate changes.

The application of lint, moist or dry, to a fresh wound, quickly becomes an irritant, and adhesive plasters, circular bandages, and splints, applied as they too often are, while effusion is going on, operate as strictures and ligatures. Plugging a fresh wound to force suppuration, or strapping it to prevent that process, are equally liable to be followed by injurious consequences. The attempt to render complicated wounds simple by leaving them in the original close

dressings for many days in succession, has proved a common, and sometimes fatal mischief. I have seen more than one case in which the constitutional irritation arising suddenly, and proving fatal in a week from the injury, was distinctly referrible to a diffused erysipelas and gangrene, set up by such local irritation and stricture. A sufficient inspection of the part at intervals of two days, to satisfy an experienced eye of its well doing, may be accomplished, not only without detriment to the process of healing, but with manifest relief to the patient, and is a widely different thing from handling and disturbing the position of parts, against which I would be among the first to protest as uncalled for and injurious. Penetrating wounds attended with hemorrhage, and comminuted fractures with extensive injury of the soft parts, and in the vicinity of large joints, are especially the cases which present themselves to my mind in offering this remark.

After-processes of inflammation induce excessive re-action

The change which parts undergo in passing from a state of health to a state of sphacelus, is not greater nor more remarkable than that of the nervous system from a healthy condition to that of extreme prostration. It is often synchronous; in some instances the local change is not so rapid, in others it is more so. Ulceration and acute gangrene sometimes exhibit the state of excessive re-action, terminating in exhaustion. I attended a young West Indian lady who had a blister applied to the knee-joint for a strumous inflammation. It was purposely irritated to suppuration, with the intention of being kept open. The constitution being feeble, an ulcerative process supervened, and rapidly destroyed the integument of the joint even to the ligaments. Am-

monia and bark, wine and porter, and the most concentrated forms of animal nourishment, failed to support her. The same effects are sometimes witnessed after the application of blisters in weakly children. The cases of phagædena occasionally seen in our hospitals, especially in young prostitutes of delicate constitution, and rendered morbidly irritable by mercury and habitual dram drinking, present precisely the same form and fatal termination of constitutional irritation.*

Practical inference. The general inference which I would draw, relating to the treatment of sympathetic irritation, as compared with that of sympathetic fever, is as follows, viz. the symptoms of excitement belonging to the first, although resembling those of the second, are in point of fact allied to a powerless state of constitution, and will not bear to be treated after the same manner. Blood-letting, general and topical, and a forced increase of the secretions by active forms of medicine frequently repeated—the appropriate remedies for high inflammatory fever—are calculated to aggravate, in an alarming degree, the symptoms of irritation. In partial exception to this general observation, however, it sometimes happens that the effect of suspended biliary secretions is evidenced in an obstinate confinement of the

* In these cases I have tried in succession all the various remedial processes of which I had either information or experience. The result is, that although I could readily name half a dozen which have succeeded in as many cases, in allaying irritation and checking the destructive action, I should be at a loss to name one which had proved so successful upon repetition as to warrant any sanguine confidence in its efficacy. It has appeared to me that the stage at which the constitutional disease has arrived, determines the accessibleness of the system to medicine, or the contrary.

bowels, and in this case the relief of the symptoms is not obtained until copious bilious evacuations have been procured. The aloe or colocynth extract, or blue pill combined with calomel, and repeated as required, are the best medicines with which I am acquainted of relieving this state. Alcohol, ammonia, æther, camphor; opium and henbane; and bark in substance, decoction, and tincture, are the articles upon which, in the circumstances respectively indicating their use, I believe most reliance may be placed in the treatment of acute sympathetic irritation.

SECTION IV.

OF CONSTITUTIONAL IRRITATION FROM LOSS OF BLOOD.

Hemorrhage in itself is adequate to the production of prostration either pure or mixed. I am afraid it has not been uncommon for such a state to be produced by the intemperate use of the lancet, the judgment of the practitioner having been misled by the temporary relief obtained, even to the last, by the detraction of blood in acute diseases. A case of pneumonia not long since occurred, in which a stroke of palsy, fatal the same evening, took place in the act of blood-letting. This was mentioned to me by the apothecary who blooded the patient, by direction of the physician in attendance. Some persons cannot bear the loss of blood; it gives rise to prostration, attended with convulsions, in which the circulation fails so alarmingly as to require watching for several hours, and the repeated administration of stimulants to restore it. A very intelligent surgeon

in the neighbourhood of London, in bleeding a clergyman to the extent of twenty ounces, whose idiosyncrasy in this respect was not known, was compelled to remain with him during the whole of that day; and, notwithstanding frequent recourse to brandy, continued long apprehensive for the patient's life. He represented the convulsions, which returned in paroxysms, as resembling the puerperal in their severest form. There has been reason to believe that the blood lost in operations in which hemorrhage was unavoidable, has sometimes induced this state: this, however, in the present advanced state of surgery, is rare.

An interesting paper has just been published "On the Effects of Loss of Blood," by Dr. Marshall Hall of Nottingham,* which, for the general accuracy of its descriptions, and the reasoning by which they are illustrated, is in my view highly creditable to the author's talent as a pathologist.

After describing the phenomena of excessive re-action among the remote effects of repeated or protracted loss of blood, Dr. Hall says, "the symptoms of excessive re-action may gradually subside and leave the patient feeble, but with returning health, or they may yield to the state of sinking (pure prostration.) This term is adopted, not to express a state of negative weakness merely, which may continue long and terminate in eventual recovery; but to denote a state of positive and progressive failure of the vital powers, attended by its peculiar effects, and by a set of phenomena very different from those of exhaustion with re-action." "It would be difficult to offer any observations on the nature and cause

* Medico-Chirurgical Transactions, Vol. XIII. Part I.

of excessive re-action; but it is plain that the state of sinking involves a greatly impaired state of the functions of all the vital organs, and especially of the brain, from defective stimulus." "The state of sinking may indeed in certain points of view be compared with the state of the functions in apoplexy, and with the effects observed on abstracting the influence of the brain and spinal marrow, by dividing the eighth pair of nerves, or destroying the lower portion of the latter organ."

Excessive re-action induced by loss of blood.

Excessive re-action may subside, if the depressing cause be subdued or withdrawn; or it may become chronic and pass into the state of exhaustion, if the depressing cause be still in activity; or it may suddenly shift into that of sinking or pure prostration, if a pleurisy or a shattered limb, or any powerful irritant exist in conjunction with such a state of the system, however induced. Loss of blood acting singly, and in combination with the inflammation of an important organ, forms two distinct cases. Under inflammation, as Dr. Hall justly observes, the system bears the loss of blood with less risk of exhaustion than in health; under irritation, exhaustion is sooner induced than in health. But an unsubdued inflammation of an important organ becomes a cause of incessant and extreme irritation. In the case related by Dr. Hall,* the loss of blood might and probably would have been surmounted, had the occasion of it, inflammation of the pleura, been overcome. Mr. Hunter was accustomed to consider even the healing action, where the constitution had passed through the inflammatory fever, and seemed to be

* Case I.

capable of performing all its functions, in the light of an irritant; and the frequent occasion of that state which he termed "dissolution,"* or "giving way to disease of every kind."

Effects of hemorrhage. The effect of hemorrhage upon the nervous system is twofold; immediate and remote.

The *immediate* is syncope, and is in proportion to the suddenness rather than the quantity of the hemorrhage: hence the relative effect of the same loss in quantity is greater and more frequently fatal from the large trunks and near the heart, than from the small vessels and at a distance from it. The *remote* effect is to precipitate and contract the actions of the heart, and is in proportion to the quantity lost, as in frequently recurring hemorrhages or a slow protracted hemorrhage; and this effect as well as the former, depends upon such an atony, from deficient excitement, of the nervous system, as incapacitates it for maintaining the actions of the vascular.

Transfusion. If a single hemorrhage, as in the case mentioned at page 127, has been so considerable as to deprive the system of the material of nervous excitement and nutriment, the transfusion of a portion of human blood seems a fair and rational expedient, and it is clear from Dr. Blundell's experiments that a much smaller quantity supplied than that which has been lost, will suffice for this purpose.† But if the system be at the same time so depressed by shock, or previously so exhausted by hemorrhages or by

* See Case of Gurton, page 131.

† Researches, Physiological and Pathological. By James Blundell, M.D. Lecturer on Physiology and Midwifery at Guy's Hospital. 1825.

any chronic disease, that the loss of a moderate quantity of blood induces the state of pure prostration, it is extremely doubtful if a fresh supply would renovate its powers, or be attended by any beneficial effect. For I should say that hemorrhage, whether active or passive, destroys, not from absolute default of blood to carry on the circulation, but from the complete exhaustion of nervous energy. Such a result, we have seen may follow other circumstances as well as the loss of blood, but when this exists in addition, it extinguishes the chance of an effective re-action. The drain of an excessive suppuration following an injury tends indirectly to the production of the same state of nervous exhaustion as repeated hemorrhages.*

Treatment after loss of blood.

When prostration with deficient re-action is the result of hemorrhage, support by nutriment in the most assimilable forms, given in moderate quantities at short intervals, and by nutritive clysters, is the most important indication. To obtain the equal influence of the attenuated circulation and to tranquillize the nervous system, a pure and fresh atmosphere, the preservation of a natural and warm surface, the sedulous exclusion of every cause of excitement, and a very cautious use of vinous stimuli, the danger of serous effusion being much augmented in this case, are the only means left us to pursue.

* See Cases of Boulivant and Izzard, pages 134, 136.

SECTION V.

OF CONSTITUTIONAL IRRITATION FROM THE ABSORPTION OF ANIMAL POISON.

HAVING formerly fully entered into this branch of my subject, with the view of illustrating the diagnosis, I shall only briefly revert to this topic, and compress into as short a compass as possible the practical conclusions to which I have been conducted.

Of several reports of cases of this description which I have perused since my collection was printed, I will offer a comment upon two, viz. that of Dr. Bell, published by Dr. Butter in his "Treatise on the Plymouth Dock-Yard Disease," and that of Dr. Anthony Todd Thomson, published by himself in "The London Medical Repository for April 1825." And I select these the rather, because I consider them to be good specimens in contrast, of the specific and the simple irritation.

The case of Dr. Bell* parallels, except in dura-

* "Dr. James Bell, æt. 58, late Surgeon of his Majesty's Dock-yard at Devonport, rather stout, sometimes dyspeptic, but generally healthy:

"On the afternoon of Sunday, the 19th of September, 1824, attended the examination of Gregory Nicoll's body, and scratched his right fore finger over the extensor tendon on the last phalanx, when he was directing a pupil how to sew up the body, with a surgeon's needle, which had been previously used for that puspose. At this time the Doctor appeared in his usual state of health, and took no particular notice of the puncture or scratch so inflicted on his finger.

"On the following morning, September 20th, Dr. Bell attended the surgery at the accustomed hour of nine o'clock, and complained of feeling unwell. When washing his hands he first felt a smarting in the scratch over his right fore finger; whereupon he became

tion, with that of Mr. Dease, as Dr. Butter has shewn, and acquires, in a pathological view, a double inte-

shivered, and impressed with an idea that he had caught the disease, then prevailing among the mechanics of the Dock-yard, which disease had previously agitated his mind, and now made him very apprehensive for his safety. He remained, however, at the office about an hour and a half, and by that time the rigors and general indisposition had increased in such a degree as to produce considerable alarm. Pulse 96, and full. Bowels opened by an aperient, taken on the preceding evening. The wound on the finger was not inflamed. He was recommended to lose blood from the arm, and to take an emetic : to both of which propositions he had a great aversion, and made insuperable objections. He went to bed, however, before twelve o'clock at noon, and endeavoured to make himself sick by irritating the fauces with his fingers, and by drinking warm water. In the course of the day, his fever had increased, and a reaction or flushing followed the rigors. Dr. Dickson, Physician to the Royal Naval Hospital, at Stonehouse, and Dr. Yonge, of Plymouth, were consulted. He now consented to lose about sixteen ounces of blood from the left arm, by a small orifice, and to take the subjoined bolus :

R : Hydr : Submur : gr. v.
Pulv : Ant : gr. iv.
Confect : q : s : M :

which was to be followed by some of the cathartic mixture in the morning.

" 21st. Passed a restless night, with an increase of fever. Pulse 130, and full ; stomach very irritable ; nausea great ; tongue coated ; bowels open ; complains of pain and tenderness over his right pectoral muscle and shoulder, on which he cannot bear the least pressure ; but the wound on the right fore finger is not at all inflamed.

Rep. V : S : ad ℥ xxx.

Ordered effervescing draughts, with saline medicines, every second hour.

" Eight o'clock, P. M. No relief from the second bleeding. The blood was neither buffed nor cupped, the coagulum was rather firm. Speaks of a distressing pain about his sacrum and loins, with general lassitude and great weight, and evinces considerable anxiety. There still exists much soreness over the right pectoral

rest from the distinctive character which it preserves in the midst of epidemic erysipelas, attacking an unusually large proportion of the artificers of the Dock-yard, who had received the local hurts, more or less severe, to which these persons are liable.

muscle, and there is a great prostration of his muscular energies; but withal there is no head-ache. Pulse 130, and small.

Reptr. Bolus, et Contr. Haust : efferves : cum
Potassæ Nitratis gr. v. 3tiis horis.
Illinatur Linimt : Saponis in partes affectas.

" 22d. Symptoms all aggravated. Passed a sleepless and distressing night, owing to the excruciating pain in his back, but felt relief towards morning, from profuse perspirations. Still feels pain in his right shoulder, with inability to move the arm; complains of indistinct vision, and mistakes the distance when he attempts to take any thing. Nausea continues; pulse 130, and irregular.

Appr : Empl : Lyttæ Epigastrio
Medicament : Cont.

" 23d. Slept a little during the night; nausea alleviated, but not gone; back-ache mitigated; pulse very irregular, and frequent; articulation difficult; thoughts confused; no pain in any part but the pectoral muscle, when pressed upon; there is no redness nor visible sign of inflammation on the skin; the scratched part of the finger is neither inflamed nor swollen. He took camphorated mixture, with the nitrous spirit of æther, every two hours, and wine frequently.

" Towards evening his breathing became laborious, and delirium appeared.

Appr : Empl : Lyttæ suris et imo Colli.

" 24th. Became perfectly insensible during the night; pulse wavering, occasionally indistinct, and imperceptible; breathing laborious; stupor and coma present; the sphincters relaxed, and the discharges passed involuntarily; profuse perspiration towards morning when the breathing improved. Took four doses of the sulphate of quinine (℈ i.) without benefit. His deglutition was at last impeded, and a vacant stare occupied his countenance until seven o'clock on this evening, when he sunk without a struggle. Body not examined. " Remarks on Irritative Fever, commonly called the Plymouth Dock-yard Disease, &c. &c. By John Butter, M.D. F.R.S. &c. Devonport, 1825."

The Plymouth cases. It appears that out of fifteen cases of injuries of different severity, received between the 25th July and the 9th October, twelve proved fatal. "The number of wounds was not greater than usual during that period, (24th June to 31st December,) but the fatal results from such apparently trifling causes, were unprecedented." Of these twelve cases, half at least were instances of what I term "reflected irritation," to which division erysipelas for the most part belongs. The local disease, in most instances trifling, went on well, the constitution being unaffected; the subject, when the situation of the injury permitted, continuing at his usual employ for five, seven, eleven days, and even a month from the accident. Some of the wounds were steadily advancing towards a cure, others had in the interval healed; and the men, when reported ill, were supposed to labor under common inflammatory fever, and so treated, without reference to the local injury recently sustained.* Now, although I by no means disconnect the constitutional and local malady in such cases, nor believe that the former would have existed in the absence of the latter, I consider that the local pre-disposed only to the constitutional affection, and that the changes in the part were reflected from the system, which was influenced by other and incidental causes.

From these, and from the remaining five cases, that of Dr. Bell was prominently distinguished, although allied by the common symptoms of extreme constitutional irritation to the most rapidly destructive, in wanting altogether the external sign of diseased action. We have seen that this is not neces-

* Cases of Bate, Walkie, Taylor, Quick, Long, and Beer.

sary to the fatal operation of the poison.* It is probable that the local changes which appeared in Mr. Dease's case, on and after the fifth day, would also have appeared in Dr. Bell's, had they not been anticipated by his death.

Local signs practically important. "A disease," says Dr. Butter, "may be essentially the same, without, as with these (local) appearances, which can only be regarded as characters in forming nosological distinctions." I admit it; they are characters, however, of vast importance, inasmuch as they decide the relation between the local and constitutional disorder—as for example, whether the system is suffering from a collection of matter pent up in a tendinous theca, and is therefore asking for relief, or from the introduction of an animal poison, of which the vesicle on the wound, or the erythema contiguous to the line of absorption is a significant token.

Conclusions from Dr. Bell's case. The narrative of Dr. Bell's case confirms me in the belief, that he was the subject of a distinct and specific irritation, viz. that of a poison, of which, allowing for all mental and other influences, he would at any other time have been the subject; under similar circumstances, probably the victim.

If this opinion be correct, it follows that the local action proper to this state is an unessential feature of the disease with which we have to contend; the disease itself consisting in a direct prostration of the vital forces, marked by an excitement of the most transitory description, and rapidly terminating in collapse or exhaustion.

* Case of Mr. Elcock, page 141.

Dr. Thomson's case. A very interesting communication of his own case is made by Dr. A. Todd Thomson to the London Medical Repository for April 1825.* It occurred precisely in the same manner as the case of Mr. Delph, last related.† Active inflammation and suppuration of the puncture took place within twenty-four hours, and the rigors and other usual signs of symptomatic fever supervened. Like Mr. Delph, Dr. Thomson was unable to continue his visits, not from the pain in the finger, for this was never very severe, but from a sense of debility, which was excessive and overpowering, attended by laborious respiration, and an acute pain under the xiphoid cartilage, extending to a short distance along the sternum. He was treated upon the stimulant plan, (camphor and cayenne,) had the feet bathed with hot water, and after a full action of the bowels from calomel, followed by jalap and supertartrate of potass, the fever (pulse 130, with some delirium) subsided. The finger was inflamed, and pain extended from it along the arm, and was slightly felt in the axilla. By substituting James's powder and extract of henbane for the cayenne at night, sleep was procured, and by continuing the pills and the full action of the bowels, Dr. T. had so far recovered as to sit up, and take nourishment on the fifth day, and considered himself out of danger on the sixth. Now, the inflammatory action returned; it became painfully acute in the finger an inch above the wound. An incision to the bone was made in the sound phalanx, and although a very minute quantity of pus was discharged, the incision seems to have afforded complete relief, for

* "A Case of Irritative Fever arising from a scratch received in a morbid dissection," &c. &c.

† Second case of Mr. Delph, p. 261.

on the tenth day Dr. T. resumed his professional avocations.

Remarks. This is a very clear case of thecal puncture and inflammation going on to suppuration, in which the ordinary signs of constitutional irritation were modified by the existing state of health, which was considerably below the ordinary standard. The treatment appears to have been very judicious, and had the subject of the accident been in robust health, parî ratione, blood-letting would have been required. What in Mr. Delph's case a full venesection and purgatives did for him, the diffusible stimuli and purgatives did for Dr. Thomson. The diaphoretic and sedative medicines were calculated to be equally useful to both. The prevailing states of constitution, and probably the natural habits of the parties, were opposite, and the rate and extent of inflammation and the pain attending it differed accordingly. No person in his senses would think of taking blood from a person fainting in the midst of business, unable from weakness to ascend the stairs, with laboring respiration, vacillating and throbbing pulse, a pale and shrunk surface, and cold extremities. Of the virtues of cayenne or colchicum, as compared with ammonia, camphor, and opium in such a case, I am unable to speak, but that the principle upon which they were prescribed was correct, I think there can be no doubt: a comparison with the genuine cases of absorption will demonstrate that this was not one of that class, and a reference to some of the cases which I have related, of fascial and thecal inflammation, will sufficiently account for the impression made on the nervous system. But the case is extremely valuable, especially so for its clear and

able exposition, to illustrate the distinction which I have endeavoured to point out, and to confirm my opinion that the symptoms of extreme constitutional irritation arising from simple and specific causes are not in their nature distinguishable, without the aid of certain associations of local characters.

It is, therefore, I admit, from imperfect evidence that we decide the character of a case in which, as in that of Mr. Elcock and of Dr. Bell, the local signs are anticipated by the death of the patient.

I will trouble the reader with one additional case of very recent occurrence, of much practical value, as it illustrates more forcibly than any, the supervention of the specific upon the simple inflammation, and a variety of the former, probably, thence resulting.

Case. "A young gentleman of delicate and irritable habit, in opening the body of a man three hours after death, who had died of extravasation of urine, having grazed the point of the fore-finger of his right hand with the blade of his scalpel, immersed it in water, and then proceeded in the examination of the parts. In returning home he shivered, but the weather was very cold, (7th January 1826,) and he, subject of late to shiver almost daily on exposure to the air, regarded it as the effect of cold. At this time, and for some weeks preceding it, his bowels had been obstinately costive, and his stomach much disordered in consequence. He was, besides, an anxious and laborious student. Next day he complained of feeling unwell; he kept the finger immersed in cold water, and towards evening complained of a slight soreness along the radial side of the fore-arm. He took a calomel pill on going to bed, and some

aperient salts in the morning. He passed a restless night, and in the morning the absorbent vessels of the arm were raised and inflamed to within a hand's breadth of the axilla, where this appearance stopped abruptly. Although he had suffered no acute pain, the fore-finger was swollen, tense, and painful on pressure on the palmar side, and an incision was therefore made to the bone at the tip of the finger, which bled freely on immersion in hot water. He was at this time feeling and looking poorly, and had a small hurried pulse, with depression of strength and anxiety. The bowels having been imperfectly relieved, and the evacuations unhealthy and offensive, he took at night three grains of calomel, with a grain of opium, and followed it with a more active aperient in the morning.

On the third day, having passed a tolerable quiet night, and the bowels being freely opened, he took a draught of acetated ammonia, camphor mixture, and nitric æther in lieu of the aperient, and repeated the calomel and opium pill at bed-time. The hand and arm were freely bled with leeches and fomented.

On the fourth day symptoms were much as on the preceding, but he was considerably more sunk by continued nausea and frequent violent retching. Seven grains of the carbonate of ammonia and a few drops of laudanum were now added to the camphor draught, and five of the extract of henbane given at bed-time. The middle and ring finger and the palm and back of the hand, and a portion of the fore arm on the flexor side were superficially inflamed; the wounded finger had lost its tension and tenderness, and the absorbent lines had disappeared in a diffused swelling of the arm. The inflamed parts were bathed with a spirit-lotion.

Fifth day. The erythema had spread upon both sides of the fore arm and there was a patch of inflammation over the biceps. The general symptoms were the same, the stomach nauseated and very irritable, with occasional slight hiccup, and having taken a small allowance of wine at intervals he was a little flushed, and sometimes incoherent. The mind was evidently weakened and irritable.

Sixth day. The inflammation had extended to the neck and over a small part of the pectoral region. Large vesications appeared on the back of the elbow and hand, and clusters of small vesicles on other parts of the arm. Leeches were again applied to the inflamed surface. A pill of three grains of the carbonate of ammonia and one of extract of opium was directed to be taken hourly. The camphor draught continued, and the parts to be fomented with an embrocation of equal parts of spirits of camphor and tincture of opium.

Seventh day. Seemed more composed in mind after having taken three of the pills. The pulse 120, soft and powerless. Tongue hitherto clean, getting a brownish fur; skin perspirable. Had dosed a good deal. Hiccup had continued through the night with little intermission. The erythema fading upon the hand and arm was vivid upon the chest, and extended over the scapula to the spine. A pill of five grains of castor and a quarter of a grain of opium directed to be taken each hour, and a poultice besprinkled with tincture of opium applied to the pit of the stomach. Ammonia and camphor draught continued, and wine-whey given occasionally.

Eighth day. Is slightly under the influence of opium. Incoherent talking, between dosing and waking, ceases when he is quite roused. The hic-

cup continues, increases in strength, and evidently prevents his sleeping soundly. To take twenty drops of tinct. opii in a glass of red wine or of lemonade, according to circumstances, hourly.

Ninth day. Countenance and powers quite sunk. Hiccup and continual rejection of fluids, without retching, most distressing. Bowels have been perfectly soluble from the third day of his illness. The mustard-plaster, the extract of belladonna smeared on the scrobiculus cordis, and swathing the trunk with a roller have had no effect to allay the hiccup. The arm, now devoid of cuticle from the number of vesications, which had broken and discharged copiously, was dressed with simple cerate. One grain of sulphate of quinine with extract of gentian, q. s. in a pill, to be taken hourly, and two grains of powdered opium in starch gruel as an enema every third hour, while the hiccup continues.

Tenth day. Hiccup much abated in violence. Pulse small, and very rapid. Skin clammy. Takes a little arrow-root and sherry wine occasionally. His mind is collected when awake, though feeble.

Eleventh day. Had sunk gradually since the last report, and died at an early hour of the morning.

Another gentleman in good health at the time, assisting at the same inspection, punctured his finger, The wound inflamed the same evening, but yielded to a poultice and a dose of opening medicine.

This case, as regards the secondary constitutional inflammation and the disorder of the system, its duration, &c. agrees strikingly with that of Mr. Hercey, related by Dr. Duncan, jun. The inflammation was in both seated upon, and ultimately diffused over the arm and shoulder; in both attended by numerous vesicles differing in size, shape, and transparency,

upon a deeply colored base. Two points of difference in Mr. H.'s case, are however important: 1st. a pustule formed upon the wound; 2d. the absence of inflammation of the absorbents.

I have given this case for the purpose of showing another instance of the combination of the simple and specific action, or, rather, how the latter may succeed to the former, and suspend it after an interval of two or three days. Notwithstanding the obviously unfavourable state of this young gentleman's habit for an inflammation of any kind, neither the local affection, nor that of the constitution, excited an apprehension until the erythema appeared.* The pain was never severe. The swelling of the finger was just sufficient to create an equal and not excessive tension, and the absorbent inflammation, though at first well marked, was no more than we continually see yield to a brisk purge or two, and rest and fomentation of the limb. The axillary glands were unaffected with swelling or pain. In this stage if any reasonable doubt of his well-doing could have been entertained, it must have been founded upon the absence of sympathetic inflammatory fever. Neither his pulse nor his suffering warranted the proposition to take blood generally, and although leeches were proposed on the first appearance of the inflamed absorbents, they were not then applied, as the affection of these vessels seemed to be purely the result of irritation.

The small vesicles which were very numerous, rapidly became confluent as the inflammation and

* In fact the poor young man was congratulating himself that the inflammation was confined to the absorbents, and had none of the character of erysipelas on the third day from the injury, only a few hours before the appearance of the latter.

swelling increased, and some had the appearance of large bullæ from the commencement.

The irritability of the stomach and diaphragm were the most distressing and unmitigable symptoms; the vomiting begun the day before, and the hiccup the day following the erythema.

Embarrassment of diagnosis from combination of symptoms.

The possible and not very unfrequent co-existence of the signs of simple inflammation, or in the commencement of these cases, their separate and exclusive appearance, renders the diagnosis embarrassing, and the additional circumstances of their having a common origin from dissection, and the constitutional symptoms being, in some instances, indistinguishable, greatly add to the embarrassment. At one time doubts existed as to the real nature of the case just detailed. They gave way however to the weight of evidence in favor of its specific origin. But the existence of a doubt confirms the important fact, that the state of constitution indicates a mode of treatment in all respects the same. The cases of simple inflammation in which the constitutional irritation approaches, much less equals that which is common to the specific, are rare; those which I have instanced were depending upon the strict confinement of matter by a theca or fascia; the cases given by Dr. Butter are examples of erysipelas, which were clearly depending upon the state of constitution produced by atmospheric, or at least external causes. The state of constitution so far modifies the effects of all injuries, that the earlier or later developement of symptoms, and the greater or less degree of excitement, are perhaps principally to be referred to the constitution of the individual who labors under the irritation of a poison.

A poison admitted by a wound or raw surface, and a poison admitted by the lungs, are equally excitants of a specific constitutional irritation; which shows itself in the latter case in a specific mode of inflammation, if the individual should unhappily become the subject of the slightest injury.* The distinction between the erythema of poison, and that mode of inflammation following a wound, appears to me to be this; that the first is distinct from the mechanical condition, the second grafted upon it. The first is the action of the poison viâ constitution, showing itself in one or more points upon the line of parts by which it has entered the system; and whether it take place in a visible shape or not, depends upon the intensity of the poison, the powers of the constitution, the duration of life, &c. The second is the conversion of the healthy into an unhealthy inflammation, depending either upon a peculiar local irritation, or upon the peculiar temperament or circumstances of the individual. Hence the analogy is so close between the cases of constitutional origin, direct and indirect, as in some rare instances to render the distinction, so far as the constitution alone is concerned, inappreciable; but upon the pathology and treatment this analogy reflects a valuable light, inasmuch as it warrants the inference that the resemblance is essential, and that a similar rationale, and by consequence a similar plan of treatment are to be adopted. Accordingly, the history of these cases and of the effects of different modes of treatment confirms the inferences, that they are accompanied by a remarkable depression of nervous energy, showing itself either in pure prostration or prostration with excitement, and

* Dr. Butter's cases.

exhaustion; that all reduction of power is a violation of the leading indication, and that the antiphlogistic measures adapted to simple inflammation and its sympathetic fever are therefore positively contra-indicated; that the action of the arterial system requires to be sustained in order to its being equalised; that pain and every incidental excitement is, if possible, to be assuaged, and repose, by whatever means, to be procured.

Fatality of these cases. A considerable number of these unfortunate cases have now been made public, and a large number it is probable, if not certain, have not been published. It is remarkable that of those which present the specific character, the instances of recovery have been very rare, I should think not more than one in seven, while of those blended and confounded with them of absorbent and glandular inflammation, including the cases of cellular and fascial inflammation, and of suppuration in veins and thecæ, the fatality is certainly not exceeding one in twenty.

Predisposition not necessary. I will not weary my reader by again discussing the question whether, a certain predisposition of the body is necessary for the production of this disease. For inflammation I should say certainly, and for the aggravation of the attendant sympathetic irritation—but not for the baneful operation of a poison once admitted into the system. Even in this case that the state of the health may modify results, I have admitted on the general principle—"valeat quantum valere debet," but it is insufficient to explain, to my mind, the frequent cases of no effects,

and of fatal effects, resulting from the wounds of two persons dissecting the same subject.

No virus secreted in the wound, except in the case of primary vesicle or pustule.

That the effect of the introduction of a virus, whether secreted by serous membranes under inflammation, or formed in all animal bodies during the first stage of decomposition, is local inflammation, and the production of a similar virus in the inflamed part, as Dr. Thomson thinks, appears to me a conclusion unwarranted by the majority of the cases which I select as examples of the specific disease. For in a few instances can the part wounded be said to undergo inflammation, at least sufficient for secretion; and the characteristic inflammation usually takes place at a greater distance of space, and at a shorter interval of time, than would, according to analogy and probability, happen, if the virus were a morbid poison elaborated in the wound. The case of a vesicle or pustule formed on the wound, is probably an exception to this remark.

Local diagnostic signs.

In no case that has fallen under my observation has the sign of pain more or less acute, and of fulness and tenderness on pressure of the breast or shoulder, been wanting. The erythema may not show itself until the fourth or fifth day, but it more frequently appears on the third. This is subject to more uncertainty as to its existence and more variety in its place and progress. It appears either on the pectoral, scapular, or iliac region, running towards the median line, and bounded by it.

It is not symptomatic of deep-seated inflammation, nor does the cellular membrane take on the full suppurative action, until the disease has attained con-

siderable duration, and then diffusedly. I regard this, including the stages of pain, puffiness, and efflorescence, with or without the vesicle, as the surest local and visible character of the disease. Its locality is in the first instance determined, by the passage of the irritant into the circulation, corresponding to that of the previous pain. As it becomes more completely a constitutional action, after the lapse of some days, it is subject to become erratic, and appear not only on the flank or loin on the same, but even on the opposite side of the trunk, or opposite limb, without any obvious cause of local irritation.

Of the varieties of the primary action which may be exhibited, I have before spoken, viz. vesicle or pustule, or abscess of the wound, whitlow, cellular or thecal, or gangrenous inflammation. The absorbent vessels and glands of the arm may also be inflamed, tumefied, and tender; on the other hand, these signs one or all, may be wanting.

The vesicular erythema, a variety of the former, and probably depending on the pre-occupation of the limb by simple continuous inflammation, as of the superficial absorbents, begins in the injured finger and extends to the next, the hand, fore-arm, elbow, and upper arm in succession. It may either be thus progressive and creep along the surface, the part first affected fading as the next is attacked, or isolated patches may appear on the elbow, biceps, deltoid, or pectoral, the interspace remaining clear; or these actions may be simultaneous in different parts of the limb. Ultimately, the whole arm and side of the trunk are involved in the disease. Sometimes the swollen surface presents numerous small elevations, described by Dr. Colles as to the eye like vesicles, but hard to the touch, resembling the cicatrices of a

part which had been scarified, when affected with swelling; at other times large and numerous small vesicles, some clear and others sanious.

I have called this inflammation by the term erythema, meaning thereby to designate by the simplest appellation, inflammation of the common integument. As puffiness and pain generally precede discoloration, it would appear that the cellular texture is first affected. Its ordinary termination is in diffused suppuration of the cellular membrane. The vesicular termination is a variety. To the term erysipelas I object, as undefined in its application, complicated with endless varieties, and a perplexing catalogue of different species, which seems to augment in the hands of every additional describer.

Local treatment. For the local treatment of wounds received in dissection, very different plans have been recommended—some advising incision, others a caustic acid or alkali; some cold and sedative washes, as goulard and opium; others stimulants, as ammonia, turpentine, or alcohol; others again a tepid fomentation and bread-poultice. I conclude it is to quicken and augment the suppurative action, that a stimulus is advised. Dr. Pett's case is a warning against the use of caustic after the setting in of inflammation and pain. It is plain that an escharotic should be applied, if at all, at the moment of the injury, in cases of such rapid absorption as these prove themselves to be; rapid at least as compared with the poison of hydrophobia, though slow compared with that of some of the Indian serpents.

Precautions. Since it cannot be known, at the moment of infliction, what may be the nature of the injury, it is

as little to be expected that young men will habitually apply a caustic, on the instant, as that they will smear their fingers with oil or pomatum, or clothe them with gloves before handling a body. Neither are such things, in my opinion, worthy of men in earnest in their pursuit; but I must take leave to deprecate the absurd and affected hardihood of persevering in dissection, and especially in visceral examinations, with recently cut or chapped fingers, affording every facility for absorption; and thus needlessly exposing themselves to the imminent risk of a disease from which so few, even of the most robust, escape with life.

When inflammation is set up sufficient to draw the patient's attention to the injury, the same simple and soothing applications which would be made to any inflamed part, are, in my belief, the most eligible. If much tension be present, emptying the vessels freely by a deep incision with a keen lancet, through the line of the wound, and then enveloping the part in a poultice, is a practice which I have commonly employed, and I have thought with advantage.

For the erythema of the arm or trunk, folds of linen moistened with the diluted liquor plumbi or liquor ammoniæ acetatis, are probably the best applications. Poultices oppress by their weight, irritate when they lose their moisture, and can seldom be borne, however well prepared. If, in protracted cases, the cellular membrane becomes much loaded, incisions are beneficial to quicken the slow and imperfect suppurative action. In Mr. Delph's case they were undoubtedly advantageous.

Constitutional treatment. It appears to me that no rules for constitutional treatment, to hold in all cases, can pos-

sibly be laid down; that we should err equally in uniformly prescribing a stimulant or a depressing treatment for these cases. The cause of irritation, the symptoms, and the habit and state of health must be referred to, and from the aggregate the inference must be formed. As regards the first, I feel warranted in saying, that the plan of early support formerly adopted in these cases of animal poison, under the notion, however erroneous, of a rapid putrescency of the fluids, is more consistent and rational than the antiphlogistic, which assimilates them to inflammation. Venesection, it is true, is one mode of relieving congestion; but a more pernicious one could not be devised, where the congestion is the obvious result of a sudden and extreme depression of nervous power. This practice may be said to have had a fair trial in the cases of Mr. Dease and Dr. Bell; in neither did it afford sensible relief, nor did the blood assume any character of inflammation.

Symptoms. Nevertheless if a case presented itself bearing the specific local character, in which acute pain was combined with steady, contracted pulse, and other signs of inflammatory excitement, I should consider the trial of copious blood-letting in the commencement indicated, nay called for; but I never met with such a case; and for pain upon a vacillating, throbbing, or faltering pulse, the experiment would be unwarrantable. Certain symptoms of depression, however, which are more of a moral than a physical cast, are sometimes sufficient to mask the actual energies of the system, as the full and swinging pulse, peculiar to irritation, deceives an inexperienced person with the idea of strength. Where the use of the lancet is prohibited, pain should, if

possible, be allayed by opium. It is of itself, as we have seen, a disease, capable of proving destructive.

Health and habit

Since the course and severity of specific as well as of simple inflammatory diseases, are liable to be influenced by the state of health and habit of the patient, these must have their due weight in determining the appropriate treatment.

General character the only safe guide.

I must refer my reader to the observations I before made upon the pathological relation between cases of simple and poisoned wound,* the tendency of which was to show that neither history nor preconceived opinions ought to countervail existing indications, and that we are warranted by an analogy of symptoms clearly made out in pursuing similar modes of treatment in both cases. When I speak of existing indications I do not mean to refer to this or that symptom, but to the assemblage; and it is the general character thence deduced that ought, in my judgment, to decide the treatment.

Single symptom often a fallacious criterion.

The impression arising from a belief that a solitary symptom is sufficient to constitute a guide, is a most mistaken one; for example, a rapid pulse, if frequency be considered an insuperable objection to tonics; a wandering or asthenic delirium, if, as is generally thought, it forbids the use of opium; a white-furred tongue, which I have heard intelligent physicians declare prohibitory to the exhibition of bark, &c. As to frequency of the pulse, it is oftener a sign of weakness than the opposite; and I know no period of acute irritation at which it would be

* See page 263, et seq.

possible to institute a tonic regimen, if this amount to a prohibition. In local inflammations, the benefit of astringent and tonic remedies is lost, if their use be deferred until the elevated sensibility of increased action has entirely subsided, and the action is becoming habitual to the part or chronic. And so it is with the constitutional excitement of irritation, which begins in weakness. It is the active and sensitive stage alone. upon which any favorable impression is to be made by medicine. I offer this observation to enforce the distinction between action as a sign of power, and action as a proof of weakness. Again, for the state of mild delirium, or rather the state of prostration, of which it is characteristic, my experience teaches me that opium, in certain proportions and combinations, oftener than any other medicine, affords a remedy. If a peculiar state of the tongue, whatever that may be, counter-indicates the early employment of bark and ammonia, it sets aside the remedies of which I entertain a higher opinion than of any, in the prostration of irritation from external causes.*

The proper treatment of the disease which I have described under the name of irritation, offers a yet

* As I have mentioned bark—in a firm belief of the virtues of which medicine I agree with Mr. Hunter, a belief founded on some experience—it is right to say that my mind is yet undecided on the actual and comparative merits, in the more urgent cases of this class, of the preparation lately imported from France, under the denomination of sulphate of quinine. It is the misfortune of every new remedy to be put upon the forlorn hope, and thus to encounter a very unfair mode of trial. Its efficacy in the cure of the ague appears to be satisfactorily established.

uncultivated, if not untrodden field for intelligent observers.

Clinical observation. The alliance between certain local changes and particular states of the constitution, is a study of the deepest interest, and furnishes us with a clue to the treatment which might otherwise be obscure. But as we cannot always have the advantage of this guide, we are by close and repeated observation to ascertain in what degree and manner the nervous system is implicated and affected, to separate the simulated from the real signs of inflammatory action, functional disorder from organic disease, and asthenic from sthenic excitement.

Morbid anatomy. Upon the great importance of anatomical examinations, not only to test the accuracy of our past opinions, but for the chance of obtaining some gleam of light to direct our future steps, I need not insist. It is in these cases most desirable, after the inspection of the parts affected, and the thoracic and abdominal viscera, that the entire trunk of the nervous system should be attentively examined; and the general distribution of the blood in both orders of vessels carefully noted.

To conclude: the general character of inflammation is power, that of irritation weakness; these may be more or less strongly marked in individual cases, and the symptoms must therefore guide the treatment, subject to the modification which the general character imposes. I am disposed to believe that a species of intellectual indolence, which too often leads us to receive rather than to reflect, and to persuade ourselves that things to a certain extent alike

and often connected, are in reality the same, has contributed to render our measures indecisive in these cases.

Inflammation and irritation, the phenomena of two systems so combined as not to admit of separation, are nevertheless to be viewed and considered somewhat distinctly in their pathological relations; and if I mistake not, such a course of observation will justify, as regards the latter, an earlier and freer use of the means best suited to support and renovate the powers of the nervous system, than is consistent with the prevailing practice.

APPENDIX.

No. I.

The authority of Dr. Farre as a pathologist is so eminent, that I thankfully embrace an opportunity of laying before my reader the result of his observations on the important subject of wounds received in dissection. It forms the remainder of the communication from which I formerly offered an extract.* The doctor, it will be seen, employs the term "erythema," in a generic sense.

"The absorbents are liable to an erythema from any wound, however slight, which so injures the cutis as not readily to admit of its healing by adhesive inflammation. The symptomatic fever attending this apparently trivial injury is irritative in a high degree, and its access is usually strongly marked by rigor. The red line or lines, which may be traced from an injured finger or toe to an inflamed gland in the axilla or inguen, gives us some faint notion of the impetuosity of the arterial action, which so minutely injects with red blood the colourless arteries that nourish the coats of an absorbent vessel.

"This disease, which I trace amongst my earliest recollections, long before I commenced the study of medicine, prevails much in warm climates not only as a symptomatic, but also as an idiopathic affection. Heat and moisture predispose to it, for I first observed it in Barbadoes in low and damp situations, especially near stagnant water. The coats of the absorbents if frequently inflamed lose their elastic power, and so dilate as to be incapable of performing their function, whilst the exhalent arteries effuse into the cellular membrane a morbid lymph which permanently enlarges the limb. Under any circumstances which depress the power of the arterial system, this lymphatic erythema is apt to supervene on the most superficial abrasion or wound of the cutis, simply from the injury, especially if it be a punctured wound.

* See page 250.

"This reference to an endemic disease of the absorbents in a warm climate which I have had the opportunity of observing, may perhaps be acceptable to you, as throwing a light upon the object of your inquiry respecting the dangers to which the practical and morbid anatomist is exposed even in the most temperate climates from the irritability of the absorbent system; especially if predisposition, arising from previous residence in a warm climate, or from being too much exposed to miasma or putrid effluvia, or from any organic or functional defect of the cardiac system, invite the erythema under slight injuries of the cutis, which the more vigorous arterial action of health would have healed by the adhesive or at least by a superficial suppurative process.

"The lymphatic erythema of temperate climates is far more dangerous than that of warm climates, and sometimes rapidly proves fatal, through the injury sustained by the cerebral system at the access of its irritative or symptomatic fever. I think that West Indians are more susceptible in Europe of the lymphatic erythema than Europeans, owing to a predisposition to the affection induced by climate; but an European by residence in a warm climate will also acquire this predisposition. A British merchant after long residence in the West Indies applied to me in London many years ago for prolapsus ani consequent on internal piles. I thought it necessary that a cluster of considerable size should be removed. The operation by excision was performed, and thrice repeated, the larger piles in the cluster being removed singly. After each operation sensations like those which are produced by electric sparks, were felt in the thigh of the corresponding side, inflamed absorbents were seen extending down the thigh from the groin, and an ephemeral fever, such as accompanies the disease in the West Indies, was manifested. It readily yielded to the ordinary practice in that climate of giving an opiate combined with an antimonial on the accession of the disease, and saline purgatives on the following morning.

"My late friend Mr. Saunders soon after he began to distinguish himself by his application to anatomy, was affected, in consequence of wounding his finger, with lymphatic erythema of the arm, to an extent which had nearly proved serious. He was preserved chiefly by very free local bleeding and fomentation. He rejected the advice, although offered by high authority, of treating his case, which was considered hopeless, by bark. I think that I have twice attended yourself with pretty severe attacks of lymphatic erythema in its most simple form, i. e. irritative from wound.

"From my own observations I am led to conclude that the majority of these accidents prove to be cases of simple irritation, and I am persuaded that they may in general be prevented by protection of the wounded surface.

"I believe that the lymphatic erythema may arise from constitutional predisposition independently of any fretting or mismanagement of the wound which excites it, and I think that those who are much engaged in anatomical pursuits ought not to reside in situations that are confined, or that are low and near the banks of large rivers.

"The application of morbid fluids or putrid matters to an abraded and punctured part, or even to the cutaneous and mucous surfaces of the body in general, may also induce diseases of a very serious kind, sometimes apparently allied to lymphatic erythema, at others to the effects of morbid poisons or to those continued fevers which begin with gastric derangement. From my own experience I am inclined to believe that the dangers of the dissecting-room may, in a great measure, be averted by the strictest attention to cleanliness, ventilation, and an open healthy residence.

"These remarks prepare me for the notice of a very serious disease, differing in many points from the lymphatic erythema before described, and which I have uniformly traced either to the dissecting-room, or to the examination of morbid bodies in private.

"The following case will sufficiently illustrate the ordinary train of symptoms of the disease which I am about to describe.

"In November 1823, Mr. S. a young gentleman from Barbadoes, a student of medicine, wounded with his forceps the cutis over one of his knuckles in his first dissection. On the second or third day after this accident the wound slightly suppurated and he felt a pain and stiffness in the axilla, which was soon followed by rigor, and a very high degree of irritative fever. At this period, November 30th, I saw him, and carefully examined the hand. The knuckle was nearly well, and no inflamed absorbents were, or had been apparent on the fore or upper arm.

"Although the irritative fever did not diminish during the first fortnight, notwithstanding means proportioned to his strength were used to diminish the force of the heart and arteries, yet no sensorial disturbance was manifested, as it usually is in the higher degrees of lymphatic erythema.

"On the 11th of December, I discovered a very extensive collection of puriform fluid under the latissimus dorsi. Sir Astley Cooper met me in consultation on the following day, and discharg-

ed the matter. The edge of the lattisimus dorsi so much confined the subsequent accumulations of puriform fluid, that it became necessary to enlarge the external orifice, which was done by Mr. Key.

"Although the immediate danger was now diminished, yet the case assumed so much of the hectic character, that for upwards of two months I despaired of his recovery, and three months had elapsed before the amendment was very decisive.

"During the whole of this period his pulse was remarkably quick, small, and irritable, and he became exceedingly emaciated, notwithstanding the greatest attention was paid to his regimen. His diseased arm remained rigid at the shoulder joint, and did not admit of any useful motion. He was treated in the beginning by the free application of leeches on the fore arm, and poultice on the wounded surface, and subsequently by the same means about the shoulder and axilla. He took chiefly mercurial purges and saline medicines during the acute stage, and the cinchona, with the mineral acids and occasional doses of rhubarb, and a generous diet, during the asthenic stage of the disease. The puriform collections occasioned him the protracted suffering which I have already noticed, and induced me to propose to Mr. Fernandez, who dressed him with the kindest professional care, to pass a seton through the most depending part of the diseased cellular membrane. It continued to discharge for a very long period, and although there was a subsequent collection of puriform fluid above, near the long head of the biceps, yet there was none below the seton. About this time the extract of sarsaparilla was freely given to him with much more apparent benefit than he derived from the cinchona. As soon as he was convalescent I sent him to Hastings, and I have lately seen him in perfect health, the use of his arm having been long since completely restored.

"A certain morbid appearance on the inoculated surface generally affords a precise diagnostic sign of a morbid poison; but although this local symptom, with the exception of the cases resulting from Pestis Bovilla, be wanting in the examples now adduced, yet rigor, pain in the axilla, irritative fever, and extensive puriform effusions into the cellular membrane of the muscles of the trunk, consequent on a wound which has been imbued with the morbid fluids of a subject under anatomical examination, are sufficiently uniform and determinate symptoms to induce me to think, that they are excited rather by a morbid fluid applied to the punctured or abraded

surface, than by the wound itself. For it seems to me that there are manifestly two species of erythema to which the morbid anatomist is exposed; one simply irritative from the wound, the lymphatic erythema, in which inflamed absorbents are seen under the skin; the other a cellular erythema, in which, although the first series of lymphatic glands inflame, as is usual in cases of morbid poison, yet inflamed absorbents are not apparent, or do not extend from the puncture to the inflamed lymphatic glands; but the cellular membrane contiguous to the inflamed lymphatic glands successively inflames through an indefinite portion of its surface, and becomes charged with a puriform effusion, without its being so distinctly bounded by coagulable lymph, as to acquire the characters which define phlegmon or common abscess.

"The cutis is unquestionably the proper seat of erythema, and it may be doubted whether lymphatic, venous, arterial, and cellular erythema, which may be considered as some of its species, are not usually excited by the previous erythema of the skin."

No. II.

The case of Mrs. P. given at page 252, has, I find, been shortly stated in the Medical and Physical Journal for February 1825, by Mr. Anderson her medical attendant. I should have noticed this document had I been aware of its existence when I drew up the case. I now refer to it because a circumstance is therein stated which I had omitted to mention, viz. that the lady was in the daily habit of dressing a strumous sore in the neck of one of her children. I attach no importance whatever to the fact.

No. III.

The following simple and ingenious argument was stated a short time since in conversation by Sir James Mackintosh, whose interest

in science is as ardent as universal. I requested him to put it on paper, and venture without apology to lay it before my reader.—

"The report of MM. Humboldt, Hallé, and Percy on some physiological experiments of M. Le Gallois, of which a translation is prefixed to Dr. Wilson Philip's late work on the vital functions, discusses the celebrated question—why certain muscular actions, though affected by the passions, are independent of volition.

"The most conspicuous of these actions are the movements of the heart, which may serve as a sufficient example of the whole. The heart is supplied with nerves which are in other cases the instruments of volition; it is often powerfully affected by pleasurable or painful emotions; it is probably influenced in some degree by the mere operation of the understanding; yet in the ordinary course of nature it is never subject to the power of will. What is the circumstance which deprives the mind of the power of quickening or retarding the action of the heart, as it quickens or retards that of the voluntary muscles?

"In this discussion it is tacitly assumed that the question is physiological or dependent for its answer on the laws of the animal frame. If it were so, I should not hazard an observation on it. But it seems to me at least doubtful whether it does not rather belong to the philosophy of the human mind.

"In order to make what follows more plain, it is convenient to premise a few words on will and desire. Some philosophers represent volition as the last desire or aversion which immediately precedes action. Others think it more exact to say that there is an exertion of a simple and undefinable mental power interposed between either desire or aversion and muscular action, which exertion the word 'volition' properly denotes. For the purpose of the present question this difference of opinion (if it be not rather a difference of language) is unimportant. For those who hold the first opinion must at least acknowledge that will and desire are sufficiently different to justify the distinction made in common language between them. If will be a species of desire, it is essentially different from all other desires. The object of what is commonly called desire is always some outward thing;—that of will is always an action of the man who wills. Desire seeks an end; will employs means. Desire pursues enjoyment; will exerts the bodily powers to obtain that enjoyment. In short a man desires to enjoy, but he wills to do it. He desires an apple which he sees hanging on a tree—he wills the succession of acts by which the apple is brought into contact with the palate. A man only wills to do that

which he believes he can do. Children are said to cry for the moon—unreasonable persons allow themselves to wish for, or desire objects which are altogether unattainable. Transient wishes of that kind often shoot across the mind of the wisest. But no creature wills an action which he does not think possible. Children learn gradually that by various movements of different parts of their body they may obtain objects of desire, or avoid those of aversion; they thus learn to will; they acquire a voluntary power of moving certain muscles. It does not seem to be so much the progress of strength, as of skill derived from experience, which enables a child at a certain age to stand and to walk. But no motion either of the heart, or of the stomach, or of any other internal organ, is ever discovered to any man by experience, to be the means of attaining an object of desire.

"We are taught by science that there are changes in the movements of these organs, but no such changes are revealed to us by sense. We infer them from appearances, but we never perceive and we cannot imagine them. We may sometimes perceive the effect of such movements, but we do not see the movements themselves. For that reason the mind never wills any action of these organs. It is not a just representation of facts to say, that their motions are not subject to will. The truth is, that no will is formed concerning them.

"With respect to the voluntary action, indeed, the mind does not *will* the contraction of certain muscles; the co-operation of which is known only to few, and at the moment of action thought of by none. But it *wills* a certain change in the posture of some bodily organ, which may be perceived and imagined, by which change some object is expected to be attained. Some muscular actions are voluntary, because knowing them to be the means of gratifying desire, we *will* their production. Others are involuntary, because not knowing them to be such instruments, we have no motive for volition about their motions.

"These notions, suggested by the perusal of the report on M. Le Gallois' experiments, I communicated to several of my medical friends, who seemed to think them apparently just. Since these communications, I find that the same explanation is less fully, but in substance is given by Dr. Wilson Philip himself, in the tenth chapter of his work. He too seems to think the explanation new. I am gratified by the concurrence of the judgment of so ingenious a man with mine.

"The difficulty which seems to be insuperable, if this question

be considered as anatomical, is that a communication for every purpose but that of will is kept up by nerves between the heart and the immediate instruments of the mind.

"It has been objected that there must be an organic difference between the nerves which supply the voluntary muscles and those which go to the vital organs, because the former are fatigued by long exertion, whereas the latter are not so by constant action. But wherever constant action is from any cause the habitual state of a muscle, no fatigue is produced by it, as appears in the voluntary muscles which contribute to respiration. Fatigue is produced only by an action greater or longer than that to which the muscle is accustomed, and when the heart is violently excited, a proportional exhaustion and feebleness are the consequence. The peculiar species of pain called weariness, does not indeed follow, but the general succession of exhaustion to more than usual excitement is the same.

"Every organic explanation of the involuntary motions assumes some circumstance in the structure of the brain or its appendages which is not proved by experience to be real. The best of them is therefore an hypothesis.

"The above attempt to refer the phenomena to the philosophy of mind requires no fact to be *presupposed*, and is founded solely on those facts of which we are conscious. It can only be objected to therefore on the ground of its inadequacy to explain the phenomena, and if it does explain them, it is a legitimate theory.

"J. MACKINTOSH."

"13th March, 1826."