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OUTLINES OF PATHOLOGY

AND

PRACTICE OF MEDICINE.

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AND

PRACTICE OF MEDICINE.

BY

WILLIAM PULTENEY ALISON,

M.D., F.R.S.E.,

FELLOW AND LATE PRESIDENT OF THE ROYAL COLLEGE OF PHYSICIANS, EDINBURGH, AND OF THE MEDICO-CHIRURGICAL SOCIETY, EDINBURGH; HONORARY FELLOW OF THE KING'S AND QUEEN'S COLLEGE OF PHYSICIANS OF IRELAND, AND OF THE ROYAL MEDICAL SOCIETY, EDINBURGH; PROFESSOR OF THE PRACTICE OF MEDICINE IN THE UNIVERSITY OF EDINBURGH, AND ONE OF THE PHYSICIANS IN ORDINARY TO HER MAJESTY FOR SCOTLAND.

WILLIAM BLACKWOOD AND SONS, EDINBURGH,
AND 22 PALL-MALL, LONDON.

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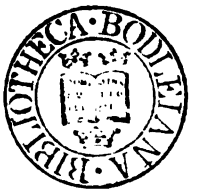

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PREFACE.

In attempting to compress, within the limits of a Text-book for Lectures, the facts which seem to me best ascertained in regard to the nature, progress, and symptoms of Diseases, and the effects of Remedies upon them, it has been my object to simplify, as far as possible, both the diagnostic marks of Diseases, and the practical rules for their treatment,—dwelling only upon those, an accurate knowledge of which may be acquired without much difficulty, and on which it has appeared to me, in practice, that we can rely with most confidence. I have endeavoured to connect these practical rules and directions with as full a statement as the limits of such a work will permit, of the grounds of those *opinions*, in regard to the causes, the intimate nature, and fatal tendency of Diseases, which seem to me, in the present state of our knowledge, to be supported by the best evidence; because notwithstanding all that has been said,

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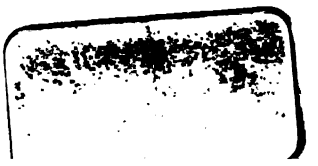

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OUTLINES OF PATHOLOGY

AND

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PART I.

PRELIMINARY OBSERVATIONS.

As the object of Physiology is to deliver the history and explanation of all the phenomena by which the living body is distinguished from the dead, so the object of Pathology is to describe and explain all the phenomena by which the diseased states of the living body differ from the healthy; and we call all states of the living body diseased, in which there are such deviations from its natural condition as cause suffering or inconvenience, or endanger life.

A slight attention to this subject is sufficient to shew, that there are many facts in regard to the operation of external causes on the human body, and the modes of diseased action assumed by its different organs, which could not possibly have been inferred from our knowledge of the structure and healthy action of parts, which

are made known to us only by observation of the diseased conditions of the body themselves, and can only be properly generalized by an induction strictly confined to this department of knowledge.

The fewer and more comprehensive these ultimate facts or laws in this department of nature, the more successful must the induction be regarded; and some of them have been already so far ascertained, as to enable us to treat the subject in some measure *synthetically*.

The simplest exemplification of these ultimate facts in Pathology is to be found in cases of sudden death, and in the action of violent injuries, and we, therefore, premise a short account of different fatal injuries, to discussions on the pathology of the different diseases.

CHAPTER I.

OF CASES OF SUDDEN OR VIOLENT DEATH.

The operation of all causes of sudden or violent death may be referred ultimately to two modes of injury, which are in some cases perfectly distinct, although in others they are evidently blended. We cannot, indeed, arrange the causes of violent death strictly according to these differences in the mode of their action, because the same causes appear to act, under different circumstances, sometimes chiefly in the one way, and at other times in the other; but we can point out that their fatal effects are always produced, either by their *directly depressing or suspending the vital action of the organs of circulation*, —or else, by their *obstructing the arterialization of the blood*, and therefore, according to principles known in Physiology, *arresting the circulation at the lungs*.

We know farther, that the first effect, or what may be called in general *death by Syncope*, or beginning at the Heart, may be produced in two ways: 1. By a cause acting on the system, as a concussion or shock, depressing the vital powers by which the blood is moved; 2. By abstraction, sudden or gradual, of the vital stimulus; —and that the second effect may be produced also in two ways, 1. By injury of the Nervous System, arresting respiration by causing insensibility, *i. e.* producing *death by Coma*, or beginning at the Brain; and, 2. By

direct impediment to the access of air to the lungs, producing what is strictly called *death by Asphyxia*, or beginning at the Lungs.

To these principles we can ascribe the known effects of the following kinds of injury; and having illustrated these, we may afterwards refer to them with advantage, as the facts most analogous to the changes that constitute disease, and especially to those circumstances of disease which are immediately dangerous to life.

I. It is to be expected, from what we know of the functions of the *Nervous System*, that Injuries affecting it should impair, more or less completely, the sensations, the mental powers, and the voluntary motions; but they become dangerous to life only in the ways already specified, inasmuch as they affect the fundamental function of Circulation, either directly, or through the intervention of the Respiration.

1. The most violent injuries, affecting the Nervous System, suddenly arrest, or greatly impair, the motion of the blood in all parts of the body, *i. e.* they produce a state of Syncope or faintness; the heart's action either suddenly ceasing, or becoming very feeble; the pulse small, or imperceptible, and the surface cold, often damp; at the same time that sensation and voluntary motion are suspended. This direct effect on the circulation of violent injuries of the brain was overlooked by BICHAT, but is well illustrated by Dr WILSON PHILIP; and has long been known to practical men, as constituting the most characteristic part of the first symptoms of general Concussion of the brain, as distinguished from more partial Compression of it.

The experiments of LEGALLOIS and Dr WILSON

PHILIP farther shew, that this effect on the heart's actions, and on the motion of the blood in the capillaries, may result from injury of any part of the brain or spinal cord, if it extend to large portions of the nervous matter; and many examples inform us, that when concussion is general over the whole system, it is frequently fatal, in this way, without any visible disorganization being produced.

After death from affection of the nervous system, thus directly influencing circulation, the heart is sometimes found, especially in the most sudden cases, quite empty of blood (the cause of which appearance is doubtful); in other cases distended, but with no decided difference as to the quantity of blood in its right and left sides.

In cases of this kind, it is not quite certain that the fatal depression of the vis vitæ in the circulating system is the effect of an impression made on the nervous system; and some have supposed, that such injuries are fatal by a *direct* effect on the circulation in the smaller arteries, checking it so completely, as to throw a burden on the heart which it is unable to overcome. But the effects of violent injuries confined to the brain or spinal cord, as in the experiments of WILSON PHILIP and LEGALLOIS, are just similar to those of a general concussion; mental causes, of powerful operation, which certainly act through the nervous system, have the same effect; partial although violent injury of other textures has no such effect; nor does such an effect result from suddenly stopping the flow of blood in large arteries by ligatures, or by amputation of a large limb; and therefore it is highly probable, that general concussion of the body does act, as is generally thought, on the vascular system through the intervention of the nervous;

and this is one of the facts included under the general principle in Physiology, that the nervous system, although not necessarily concerned in the functions of organic life, is yet so connected with them, that, by certain changes in it, any of these functions may be variously altered, or even totally suspended.

There is great variety as to the amount of injury which will produce, in different individuals of the human species, the sedative effect on the circulation now in question; and as to the duration and termination of that sedative effect, which sometimes abates quickly, and sometimes gradually increases till it is fatal, some hours after the injury.

There appears to be a variety also in the part of the circulation chiefly affected by such injuries. In some instances the circulation on the surface appears peculiarly affected, and the heat of the surface is reduced much more than in others, where the heart's action is equally depressed. In experiments by CHOSSAT, the heart's action was for some time little affected by certain injuries of the brain, which checked the circulation in the capillaries so completely, as to suspend the secretions and the evolution of heat. When the spinal cord has been severely injured in the human body, below the neck, the circulation in the capillaries has generally appeared, for some time, more affected than the heart's action, although it is by gradual failure of the circulation that such cases are ultimately fatal.

There is also great variety in the alterations of the functions of the Nervous System itself, which result from such injuries, and accompany or succeed the sedative effect on the circulation. In some cases the coma is long continued and profound, in others slight and

transient; in some cases it is attended by much convulsion, in others by little or none; in some cases it is succeeded by much headach, or by general or partial amentia or delirium, or by incessant nausea and vomiting; and in others by none of these. And it is certain that all these varieties in the symptoms, in such cases, may be independent of any perceptible alteration of the structure of the nervous system.*

This primary effect on the circulation, of extensive injury of the Nervous System, is seldom the immediate object of practice, because if not immediately fatal, it is usually followed by symptoms of inflammation, against which the chief remedies must be directed; but in few cases, the danger from the first effect of the concussion may be properly averted by internal and external stimuli, cautiously used.

It is an important observation, that when injuries that have affected the Nervous System, and through it the circulation, in the manner now stated, are not quickly fatal, but are followed by the slower processes, to be afterwards described, of inflammation and fever, the progress of these is frequently modified by the preceding or accompanying state of the system, likewise consequent on the injuries; and that in these circumstances fever is apt to assume the form to be afterwards described as *typhoid*, and inflammation to terminate rapidly in gangrene.† How far these facts should be relied on, as indicating the true pathology of Typhoid Fever, is still doubtful; but it is certain that, in these circumstances, the practice afterwards to be considered as suited to typhoid fever is admissible, and sometimes decidedly beneficial.

* See BRODIE, Medico-Chirurgical Transactions, vol. xiv.

† See particularly TRAVERS on Constitutional Irritation.

2. A slighter, and especially a more partial injury of the Brain, or upper part of the Spinal Cord, if its action be of sufficient intensity and duration, often produces death in a totally different way, viz. by Coma or stupor, —"superstite actione cordis et arteriarum." The essential peculiarity of this kind of fatal effect of an injury of the Nervous System is, that Respiration takes place imperfectly, and ultimately is suspended, probably by reason of the defect of sensation; and in the cases which are characteristic examples of this mode of death, the Circulation, and sometimes the animal heat, not only continue entire up to the moment when the last breath is drawn, but even survive the respiration for a short time; during which time, of course, venous blood moves along the arteries; but the venous blood, according to the general law established in the Physiology of Respiration, soon ceases to make its way through the capillaries of the lungs, and the circulation is therefore soon brought to a stand.

The experiments of many physiologists shew, that it is in this way only that death is produced when the spinal cord is cut in the upper part of the neck, or the head cut off, without violent hæmorrhage, and without any large portion of the brain or spinal cord being crushed.

The most common injuries of the Nervous System which cause death, thus preceded by Coma, are those in which there is partial compression of the nervous matter, as by depressed bone, or effused blood, pus, or serum; but it is in the same way that death is often produced by disorganizations of the brain, which do not necessarily imply compression of its substance; and also by certain poisons, the effect of which on its functions does not appear to depend on alteration of the pressure on it; and

it is therefore incorrect to speak generally of such symptoms as indications of pressure on the brain.

We know from Physiology, that the part of the Nervous System which must be specially affected in these cases, where the failure of respiration is the immediate cause of death, must be at the sides of the medulla oblongata; but the part visibly injured is often considerably distant from this.

There is very great variety as to the duration and degree of the insensibility, which precedes the failure of respiration in such cases of injury of the Nervous System; and as to the other affections, either of the brain and nerves, or of other organs, which may precede or attend that insensibility, such as headach, delirium, somnolency, spasms, palsy, dilated or contracted pupil, preternaturally slow, or frequent, or irregular pulse, &c. Even the function of respiration itself is variously affected in different cases of the kind, being sometimes hurried and imperfect, and in other cases unnaturally slow and deep, for some time before it is finally suppressed. After the death thus produced by injuries of the Nervous System, just as after death by asphyxia, we find, as might be expected, the blood accumulated chiefly in the lungs, pulmonary artery, right side of the heart, and great veins.

The state of Coma, succeeding to injuries of the Nervous System, with or without those accompaniments, is often successfully treated by depleting remedies, and strictly antiphlogistic regimen, when depending on increased determination of blood to the brain and its membranes, or on inflammation there; and, in a few cases, by surgical operation, when it can be ascertained to depend on mechanical compression.

These two modes in which injuries of the Nervous System may cause death, though perfectly distinct in some cases, are evidently combined in others; the same cause both instantly weakening the circulation and likewise deadening the sensibility, so as gradually to suppress the respiration. And there are many cases of injury of the head, where insensibility and faintness from the concussion immediately succeed the accident, but quickly abate, and are succeeded after an interval by insensibility with full pulse, and death in the way of coma; which may then be confidently ascribed to compression of the brain by effused blood or serum.

There are various causes, physical and mental, which affect the Nervous System, nearly in the manner of a Concussion, and are apt to produce a similar depressing, and sometimes dangerous, effect on the circulation, and the operation of which is illustrated by the facts now stated, as to the effects of mechanical injuries. They usually cause vertigo, tinnitus aurium, confusion of thought, and then often an instantaneous loss of sense, intellect, and voluntary power, constituting what is called a complete fit of Syncope. One of these is, a sudden *diminution* of the pressure, to which the brain and spinal cord had been previously subjected. Thus, when a depressed piece of bone, or a coagulum of blood, or a quantity of serum, which had long rested on a portion of the brain, has been removed, insensibility, and along with it sudden feebleness of circulation, have often ensued. When a large bloodvessel has given way in the head, and poured blood into the ventricles (implying, in the first instance, a sudden diminution of the pressure on a part of the nervous matter), a similar result has often been observed; and been followed by a partial re-

covery of sense, and of pulse, and then by gradual accession of fatal coma, as the effused blood has increased in quantity, and compressed the brain around it.* The sudden attack of insensibility, and sudden depression of the heart's action, which may often be determined by the erect posture during bloodletting, or by rapidly removing the fluid of ascites without substituting artificial compression, must likewise be ascribed to sudden diminution of the pressure on the brain, acting like a concussion; and is illustrated by the attacks of syncope, with suspension, or great diminution, of the motion of the heart, which are often produced by rising suddenly after long stooping.

The secondary action, or reaction on the heart, of suddenly diminished pressure on the brain (even of such diminished pressure as results from previously weakened action of the heart itself), is illustrated by the well-known effect of the erect posture as a cause, and of the horizontal position as a remedy for Syncope,—not only for the affection of the Nervous System, but for the enfeebled action of the heart;—and illustrates in its turn the influence of all those causes of syncope which act primarily on the nervous system.

One of these causes, which many persons have thought adequate to produce such an effect on the Nervous System as shall act as a concussion, is the impression made by a cannon ball, or other large substance passing with immense velocity close to the head.

A cause certainly adequate to produce fatal depression of the heart's action, and which no doubt acts through the Nervous System in like manner as a con-

* See ABERCROMBIE on Diseases of Brain and Spinal Cord, p. 228. *et seq.*

cussion of the brain, is a violent blow on the abdomen, especially on the epigastrium, which has been supposed to act immediately on the great semilunar ganglion. A draught of cold water taken when the body is heated and exhausted by fatigue, has in some cases been instantaneously fatal in the same manner; and the concussion from a violent and extensive wound of any part of the abdomen is usually fatal in the same rapid way, independently of hæmorrhage, and before there is time for inflammation to be established. These facts are important, as illustrating the more gradual, but very dangerous depression of the power of the heart, which is seen even in the earlier stages of inflammation, and other acute diseases, of the abdominal viscera.

Violent injuries of various other parts of the body, especially if inflicted on a person of weakly habit, and in whom the nervous system is in a state of unnatural excitability (as from the habitual use of opium or spirits), may equally act on the footing of a concussion; either causing sudden death, or so depressing the actions of the vascular system, as to give the typhoid form to the fever, and the gangrenous tendency to the inflammation, which are to result. This has been observed from severe surgical operations, and from extensive lacerated wounds, and bad compound fractures of various parts, even although there had been no general concussion of the body, nor insensibility immediately after the injury.*

In the cases last mentioned, it can hardly be doubted that the violence, or peculiar nature of the Sensation, which attends the injury, is the intervening link through which the vital action of the heart is sympathetically

* See TRAVERS on Constitutional Irritation.

affected; and accordingly, we have many facts to prove, that various violent or overpowering Sensations, intense Pain, or the sudden transition from pain to ease, and likewise certain mental Emotions or Passions, as Joy, Grief, Anger, Fear, when acting in the utmost intensity, affect the circulating system just as a concussion does, and sometimes with fatal effect,—especially when they take place in persons in a state of unusual weakness or exhaustion.

These facts do not establish, as CULLEN and others supposed, a necessary *dependence* of the heart's action on the Brain,—a supposition which is inconsistent with facts now known in Physiology. They only concur with other facts in proving, that the heart's action is subject to an influence or control, from certain changes in the Nervous System, probably especially from changes which extend over the whole of that system, and which act at a peculiar advantage on the heart, as an organ connected, by the ganglionic nerves, with all parts of the cerebro-spinal axis.*

Many of the stimulating remedies which are useful in Syncope, or in diseases threatening to end in fatal syncope, act obviously through the Nervous System on the heart. But two of the most active of these remedies, the affusion of cold water on the face and neck, and the application of stimuli to the nostrils, seem to have a peculiar mode of action, viz. exciting the act of Respiration, and thereby determining to the heart a larger quantity of its appropriate stimulus, arterial blood.

II. The effect of very intense *Heat*, applied to a pretty large surface of the body, as in an extensive burn,

* See Outlines of Physiology, p. 275.

or to the whole body, as in the case of a *coup de soleil*, is also quite similar to that of concussion; there is often insensibility, and always, when the case threatens the most immediate danger, there is the characteristic depression of the heart's action; and when recoveries take place from the state of collapse (as it has been called) immediately succeeding such injury in its extreme degree, it is often under the use of stimulating remedies.*

But intense heat of the sun, in other circumstances,—especially, as it would seem, if acting more gradually on a stronger habit of body, and when there has been less exhaustion by muscular exercise,—has often produced a state of insensibility, in which the pulse has been fuller than natural, and the vessels of the head unnaturally turgid, and which has either been fatal in the way of coma, as above explained, or been relieved by copious evacuations, and cold applications; and the same cause has often produced other diseased conditions connected with a derangement of the action of vessels of the head.† In this case, the most injurious effect of the heat is evidently on the vascular system, exciting the action of the heart, and probably expanding the blood in the vessels; and the brain suffers probably from increased compression by the blood; whereas in the former case, the first and chief effect of the heat appears to be on the nervous system, and the heart suffers from the violent impression made there.

* See TRAVERS, l. c.

† See MITCHELL in Edinburgh Medical and Surgical Journal, 1828.

III. It appears from experiments on animals, by FONTANA, HUNTER, and BRODIE, and also from cases observed in the human body,* that the effect of *Lightning* or Electricity, when acting with the utmost intensity, is likewise similar to concussion, depressing or even extinguishing the vital action in the vascular system, at the same time that it causes insensibility; but that when acting in a less intense degree, it produces insensibility without any such immediate sedative effect on the circulation,—that this appears often to be connected with turgescence of the vessels of the head, and probably expansion of their contents;—and that it may terminate in death by coma, or be followed by partial and more permanent injury of some of the functions of the brain and nerves,—or may be effectually relieved by depleting remedies.

IV. The effects of *Cold* on the body are remarkably various, according to circumstances, which demand attention. They depend, not so much on the degree of cold that is applied to the body, nor even on the degree to which the body is actually cooled,—as on the rapidity of the change, and probably on the intensity of the Sensation thus excited. Thus it was found by CHOSSAT, that the temperature to which the bodies of animals killed by cold had been reduced before they died, was considerably various, and always higher, as the reduction of temperature had been more rapid, and therefore more injurious. And the degree of effect of any cold

* See, *e. g.* PARKINSON, in Memoirs of Medical Society in London, vol. ii.; and MACAULAY, in Edinburgh Medico-Chirurgical Transactions, vol. ii.

applied to the living body has always been observed to be greater, as the sensation it excites is the more intense and the more lasting; and therefore to be increased by all circumstances, either of the body which undergoes the exposure, or of the degree and mode of the application of the cold, by which the intensity and duration of the sensation are increased.

When cold is applied in such circumstances as to take full effect on the body, it has been commonly stated that it becomes dangerous by inducing stupor, and ultimately death in the way of coma. This effect of cold has certainly often been observed, and has sometimes been preceded by delirium, has sometimes been attended by hæmorrhage from the nostrils or ears, and has been found on dissection, connected with considerable serous effusion in the head. It is therefore probably in a great measure dependent on the greatly diminished flow of blood to the surface and extremities, and proportionally increased flow to the brain. Persons recovering, by assiduous application of heat, from this state of stupor, produced by cold, have continued comatose for hours after the circulation in their extremities has been well restored.*

But in those who become comatose from cold, the heart's action is at the same time enfeebled; and it appears distinctly, from experiments on animals, and observations on the human body, that the most intense cold may be fatal in the same way as a concussion, by a direct depressing effect on the circulation; in which case, of course, respiration continues up to the moment when the heart's action ceases,—the heart is found motionless, and with arterial blood in its left cavities im-

* See *e. g.* KELLIE, in Edinburgh Medical Journal, vol. i. p. 304.

mediately after death,—and the artificial respiration is quite ineffectual in prolonging life*.

In all cases, cold acts as a sedative power on the capillary circulation on the surface†, and Dr Edwards found that its repeated or long continued application has a peculiar effect in depressing the power of subsequently generating heat. In some instances of frost-bite this effect is so powerful on the parts to which it is chiefly applied, as to put a final stop to all vital action in them, even when the system at large does not materially suffer; and in many cases, the sedative effect on the vital actions of frost-bitten parts is such, that the inflammation (which is excited in a greater or less degree by the return of heat to such limbs) shews evident marks of deficient reaction, and tends rapidly to gangrene.

But such effects of intense cold on the vital actions of *individual parts*, must be carefully distinguished from the case of cold acting as a powerful sedative on the *whole system;* because in the first of these cases, when the general circulation is strong, the chief danger is from the inflammation, which is the direct consequence of the restoration of the circulation and natural heat of the part; and this is chiefly to be moderated by causing that restoration to take place very gradually, therefore chiefly by cold applications tending to retard it; whereas when the vital power of the whole system has been depressed, there is no such risk of local injury from the

* See CHOSSAT, Mém. sur l'influence du Système nerveux sur a Chaleur Animale, p. 8.

† BEAUPRE' on the Effects of Cold, translated by CLENDINNING, p. 131.

restoration of temperature, and external heat and other stimuli may be much more freely applied.

V. In regard to the action of Poisons on the animal economy, there are several questions of much importance, to which it is the more necessary to advert, as these phenomena are more analogous to the changes which take place in some of the most malignant diseases, than any others to which we can refer for illustration of those diseases.

1. It has been long a subject of inquiry, whether it is essential to the action of poisons, that they should be absorbed into the circulation, and carried with the blood over different parts of the system; or whether their action may be on the nerves of the parts to which they are directly applied, and the affection of the organs more necessary to life be produced sympathetically.

That the peculiar agency, and even the fatal effect of some poisons, may be produced in this last way, appears distinctly,—

a. From the very great rapidity of the action, *e. g.* of the oil of bitter almonds, and still more, of the hydrocyanic acid, the application of which to the tongue of an animal, has been followed by death within eight, five, or even three seconds; certainly before it can have reached the heart in the way of absorption and transmission along the vessels, on which organ its fatal effect, in such cases, is nevertheless mainly exerted.

b. From the suddenly fatal effect of concentrated acids and alkalies taken into the stomach, which disorganize the mucous membrane there so completely that they cannot be absorbed from it; but when in that concentrated

state produce death much more rapidly than they do, when so far diluted that their absorption is easy.*

c. From the effect of many poisons, such as Opium, Belladonna, Aconite, Hydrocyanic Acid, having often been observed to take place, chiefly in parts in the neighbourhood of that to which they are applied, and not merely in the course of the blood passing thence to the heart.

d. Perhaps also, from the effect of a poison lodged in the stomach, having often been observed very rapidly to abate, as soon as it was discharged by vomiting.

But there is abundant evidence, that in a great majority of cases of poisoning, the effect produced is subsequent to the absorption of the poison into the blood, and to its transport, in the blood, from the point where it is applied, to other parts of the system.

The numerous experiments of FONTANA, MONRO, BRODIE, MAGENDIE, FODERA, CHRISTISON, COINDET, and BARRY, leave no room for doubt, that poisons inserted into wounds, or laid in contact with internal membranes, are quickly absorbed into the blood; that the passage of the venous blood, from that point towards the heart, is in most cases the only condition essential to their action; and that such a diminution of atmospheric pressure on the surface where they are placed, as shall prevent their absorption, will also prevent, or even suspend, their action.

But it is not so clear, to what distance from the point of its application a poison must be transported by the blood, in order to produce its full effect. The experiments of Dr ADDISON and Mr MORGAN have shewn,

* CHRISTISON on Poisons, p. 6..

that a poison introduced into a large vein will act, notwithstanding that its direct access to the heart is obstructed,—that a poison introduced into the femoral artery will act as rapidly as one introduced into the jugular vein, or carotid artery;—and again, that when the blood from the carotid artery of one dog is sent to the brain of another, a poison may be applied to a wound in the first dog, and take full effect on him, without affecting the second. But these results do not seem sufficient to authorize the conclusion which they have been thought to support,—that the sole direct action of poisons is on the nerves of the vessels, and their action on the brain or heart only sympathetic.* It still appears much more probable, that the greater part of the effect of poisons, which have been absorbed into the blood, is consequent on their direct application to the more important vital organs.

Some poisons taken into the blood have been detected there, and the action of some has been observed to be attended by a change of the sensible qualities of the blood; and especially by a diminution or loss of its coagulating property; but many act fully without altering its sensible qualities; when these are altered, it is doubtful how far the alteration is connected with the action of the poisons on the living solids; and the loss of coagulating power is so often seen in cases of sudden death, that of itself it gives no information as to the immediate cause of death.

* The last experiment gives no information as to the mode in which poisons circulating in the blood affect the body. Experiments by VERNIERE (Journal des Progrès des Sciences Medicales, t. iii.) shew, that blood *strongly* impregnated with a poison, may be transfused from one animal to another, and produce its usual deleterious effects.

It is important to keep these cautions in mind when we apply the analogy of poisons to the elucidation of malignant diseases. They shew that although the blood be changed by the agency of the causes of these diseases, it does not necessarily follow that the obvious change in it is concerned in producing the most essential symptoms, or the fatal event.

2. Another question which has been started on this subject is, whether the action of a poison, that has been absorbed into the blood, on the circulation itself, is to be ascribed to its direct contact with the heart and vessels, or in a great measure to an influence transmitted to them from the nervous system, which it must necessarily also pervade. On this point all that can be stated is, that we have clear evidence of the noxious effect of many poisons on moving solids to which they are directly applied (*e. g.* on those of the fibres of the heart or intestines with which they are laid in contact), or even on vegetables; but nevertheless, as we have seen that the action of all parts of the circulating system in animals is subjected to an influence or control, from changes taking place in their nervous system, it is quite possible, that the agency of poisons, circulating in the blood, on muscular organs, and especially on the circulation, may be in part consequent on the impression which they make on the brain and nerves. And the *order of the symptoms* in the case of some such poisons, as the oxalic acid, would seem to denote that the primary effect is on the brain and spinal cord, and that the heart suffers secondarily.

3. The action of the different mortal poisons clearly

exemplifies two of the modes in which it has been stated, that sudden death may be produced, *i. e.* the death by Coma, and the death by Syncope. Some poisons appear to act peculiarly on the lungs, but the only case in which they produce sudden death strictly in the way of Asphyxia, is that where certain gases, such as carbonic acid in full quantity, excite violent spasm at the glottis.

a. Those which are called the Narcotic poisons, affect especially the nervous system; and when acting in full force, produce the state of Coma, and death strictly in the way of coma, already described, the circulation continuing, sometimes even tolerably strong, after the last breath is drawn, and then coming to a stand, because the respiratory movements are suspended, and the blood continuing venous, soon stagnates in the vessels of the lungs.

This ultimate effect of these poisons is preceded in different cases, just as the ultimate fatal effect of injuries of the brain is, by various affections of the nervous system, Delirium, Convulsions, Vertigo, loss of different external senses, &c.; or it may take place gradually, without any of these. After it, the blood is found accumulated in the great veins, and on the right side of the heart, and the left is nearly empty.

That this is the immediate cause of death in such cases, appears most clearly from the experiments of Sir B. BRODIE;* in which the circulation was maintained by artificial respiration, after the natural respiration had been suspended by the action of such poisons, until the impression which they had made on the nervous system had subsided, and the sensibility, and therefore the natu-

* Phil. Trans. 1812.

ral respiration, were restored; and the animals recovered from apparent, and what would otherwise have been real death.

It is thus that, according to these experiments, alcohol, the essential oil of almonds, and tobacco, the juice of the aconite, and the woorara poison, produce death; and the same is evidently the full and perfect action of opium, hyoscyamus, camphor, conium, and other medical agents commonly called Narcotics.

But although the chief agency of these poisons is on the sensorium, *i. e.* on the brain, yet it is to be observed, that they all appear more or less to weaken, and often irretrievably depress the action of the heart likewise, and not merely by reason of their effect on respiration. And although there is one case on record,* where the fatal effect of opium on the human body was arrested by the artificial respiration, after the natural had failed; yet, in general, the pulse becomes so feeble, the skin so cold, and the vital actions in the capillary vessels are evidently so much impaired, under the influence of large doses of opium, before the respiration comes to a stand, that there is little ground for expecting that their fatal effect can often be arrested, even by this means, at so late a period.

b. There are other poisons, the fatal effect of which is evidently exerted on the heart only, and which cause death merely by Syncope,—preceded by feebleness and often irregularity of pulse, by coldness, tremors, and failure of muscular power, and often by rigors, nausea, and vomiting, or by convulsions, as happens in many other cases of syncope. The unequivocal indications of

* London Medical Observations and Inquiries, vol. vi.

this kind of death are, that the respiration continues as long as the action of the heart; and that the heart is therefore found, immediately after death, motionless, unexcitable by stimuli, and filled with venous blood on the right side, and arterial on the left, as in a living animal. It was thus that in the experiments of BRODIE, death was produced by the upas antiar, and by the infusion of tobacco; and the fatal effect of full doses of hydrocyanic acid, digitalis, strychnia, oxalic acid, arsenic, preparations of antimony, and of baryta, various animal poisons, &c., appears to be of the same kind, although these poisons have a more complex operation, and affect a greater variety of organs.

c. There are some vegetable, and many mineral poisons, which excite Inflammation, chiefly in the mucous membrane of the primæ viæ, but in some instances in other parts; and the symptoms of these inflammations (although rarely the sole effect of the poisons) blend themselves with those which proceed from the direct agency of the poisons on the nervous or vascular system, and in some instances the inflammation excited causes death, in modes to be afterwards considered. It is thus that many metallic, and some saline and earthy substances, and the different vegetable and animal earths, are dangerous or fatal.

d. In some cases the effects of poisons introduced into the system take place slowly, and last much longer, and are usually regarded simply as diseases, sometimes not to be distinguished from diseases which may be excited by other means, and implying a similar danger; as when arsenic produces epilepsy, lead colic and palsy, when the ergot of rye causes a peculiar kind of inflammation of the limbs, ending in dry gangrene, or different kinds of vegetables or fish, urticaria.

The Gases which act as poisons illustrate sufficiently these different modes of action; chlorine, or nitric or muriatic acid gases, producing bronchial inflammation; carbonic acid, or pure oxygen, acting as a narcotic; and air itself, if introduced into the blood in any quantity, suspending the circulation, by the very peculiar manner in which it affects, and quickly stops, the actions of the heart.

But although these different kinds of injurious or fatal action of poisons may be clearly distinguished, yet it is impossible to classify poisons strictly by their mode of action, because it is certain that the agency of almost all poisons is complex; and that according to varieties of the dose, or mode of preparation, the same poison, on different occasions, may cause death in different ways, oxalic acid, *e. g.* in full doses, acting directly on the heart, but in smaller doses chiefly on the nervous system; the essential oil of tobacco acting strictly as a narcotic, while the infusion of the leaves affects the system chiefly by its powerful sedative effect on the heart; and arsenic, when taken in large quantity, producing its fatal effect on the heart, before there is time for the inflammation to be established, which constitutes the chief danger to be apprehended from smaller doses of the same poison.

These statements are sufficient to illustrate the various intentions, with which our scientific knowledge of the action of poisons demands that remedies should be applied to that action, and which may be thus enumerated: 1. The expulsion of the poison from the body by emetics or mechanical means. 2. The protection of the mucous membrane by diluents and demulcents. 3. The

use of chemical antidotes, as of albumen for corrosive sublimate, acids for alkalies, even ammonia for hydrocyanic acid, &c. 4. The use of various stimuli, acting on the nervous system, for narcotics. 5. The use of stimuli for the nauseating poisons, such as digitalis for tobacco. 6. The use of antiphlogistic and anodyne remedies for the irritant poisons.

VI. In regard to the effects of dangerous or fatal *Hæmorrhage* in the living body, the following seem the most important facts.

1. When the hæmorrhage is very gradual, all the indications of failure of the circulation may come on,—the feebleness of muscular action,—the paleness and collapse of the countenance,—the coldness beginning at the extremities,—the cold sweat beginning on the face,—and the pulse may become imperceptible, without the senses, or the intellect, being impaired; and a slightly laborious or heaving respiration may be almost the only indication of injury of the nervous system up to the moment of death. Such perfect endurance of the functions of the nervous system, attending irretrievable depression of the powers of the circulation, is still more remarkably seen in some fatal diseases, where the heart's powers are depressed sympathetically in consequence of disease of other parts, than in cases of hæmorrhage where the vital stimulus is gradually withdrawn.

2. A more sudden and violent hæmorrhage affects the nervous system much more speedily, just as we have already seen, than any other means of suddenly diminishing the pressure, to which the brain had been subjected, does;—and the impression thus made in the brain *re-*

acts on the heart after the manner of a concussion, and causes its action to fail much sooner than it would have done, merely by reason of the loss of blood. It is only in this way that we can explain the fact, that in bleeding from a large orifice, and in the erect posture, not only sensation, and the other functions of the brain are sooner suspended, but *the heart's own actions fail*, with much less loss of blood than when the orifice is smaller, and the patient lies horizontally, so that the diminution of the pressure on the brain is less, and more gradual.

In this manner death may be produced, certainly in much less time, and probably with less loss of blood, than by a more gradual hæmorrhage; and in such a case, the greater affection of the nervous system is shewn, sometimes by transient delirium, often by nausea and vomiting, and very generally by insensibility, and by more or less of spasms or convulsion, often repeatedly occurring before death. These two distinct varieties of the violent death by syncope, are important to be remembered in speculations on the fatal tendency of several diseases.

3. The loss of blood, especially if frequently repeated, has, on many constitutions, especially in women and children, a subsequent effect, which could not have been anticipated *à priori*, of increasing the excitability of the vascular system (whether by reason of the impression made on the nervous system or not is doubtful), and so leading to a state of the system described as Reaction after the loss of blood, or as Prostration with Excitement; in which, especially if any cause of febrile excitement at the same time exist, there is a fallacious

degree of strength and frequency of the heart's action, when the other vital actions are feebly performed, and farther evacuation is dangerous.*

All these dangerous effects by hæmorrhage may, in some instances, be averted, by the prudent use of stimuli, and of nourishment; and the transfusion of healthy blood (of the same species of animal), into the bloodvessels, may be effectual in arresting the fatal effect of hæmorrhage, not only when the power of the heart is rapidly sinking, but even after the heart's actions have come to a stand from this cause, but probably only within a few seconds after that time.†

VII. In the case of death by *Fasting*, more or less of inflammation of mucous membranes is always excited, apparently by reason of the deficiency of the natural protecting mucus; and probably in connexion with this inflammation a febrile action is established, which renders the case more complex than it would have been, if all the symptoms had depended simply on the gradually diminishing quantity of blood. Nevertheless, gradually increasing debility of the circulation, and of all functions dependent thereon, and consequent extreme emaciation, characterize this mode of death. Ultimately even the function of absorption is nearly suspended. The appearances after death formerly noticed,‡ observed in a body

* See BURN's Principles of Midwifery, p. 243. ARMSTRONG on Typhus, &c. p. 548. PARRY on the Arterial Pulse, Exp. 27. MARSHALL HALL on the Effects of Loss of Blood, p. 28. TRAVERS on Constitutional Irritation, p. 501.

† See BLUNDELL, Researches, &c.

‡ Physiology, p. 178.

free from other marks of disease, are nearly characteristic of this cause of death.

The duration of life in such cases is very various, as might naturally be expected, when it is remembered, 1. That a degree of febrile action is excited, the intensity of which will necessarily be very different in different constitutions; and, 2. That different living bodies are habitually dependent in very different degrees on the alternate vital actions of nutrition and absorption: Accordingly, in general, fasting is best borne by those in whom these vital actions have been long languid; and in some such cases it has certainly been borne for a period many times as long as that which has been fatal in others.

The depressed state of the function of absorption itself, after long continued fasting, is probably the reason why in such circumstances it has been found injurious to give large quantities of nourishment; and frequent and small supplies have appeared more useful.

VIII. It is unnecessary to enlarge on the phenomena of death by Asphyxia, or beginning at the lungs, whether by strangulation, suffocation, drowning, confinement in a gas that is not poisonous, but contains no oxygen, exposure of the surface of the lungs to the atmosphere, pressure on their surface, as by certain mechanical injuries of the thorax, occlusion of their cells, or any other mode of obstructing the access of air to the blood of the pulmonary artery, while the other organs essential to life are uninjured. In all these cases there is a hurried and laborious action of the muscles of respiration, and more or less of lividity; then insensibility with spasms, believed to depend on the contact of venous blood, which

has passed slowly and unchanged through the lungs, with the brain and nerves; the respiratory efforts become irregular and then cease; and on examination immediately after this, the heart is found still contracting, but its left side nearly empty, and the blood accumulated on its right side and in the lungs; implying, that although some blood is transmitted unchanged to the left side of the heart, and thence sent over the body, yet it makes its way slowly and imperfectly through the capillaries of the lungs, and at length stagnates there, when it is not arterialized.

This accumulation on the right side of the heart is especially observed, when death has been produced most slowly in this way, because then there is time for much of the blood from the body at large to reach the heart, before the final stop to its passage through the lungs.

It is important to remember the occurrence of insensibility, and often of spasms, before the circulation comes to a stand, or is even very much weakened, as illustrating what happens in many diseases affecting the functions of the lungs.

It is important to remember also, that the circulation comes to a stand before the heart has lost its power, as this is the foundation for the practice by which resuscitation from apparent death of this kind has often been accomplished, even some minutes after pulsation has ceased. Of that practice, notwithstanding some difficulties that have been started on the subject, it may still be maintained that the artificial respiration is the most essential part;—the other remedies being various modes of applying internal and external stimuli.

It may easily be believed, from what has been stated, that after such resuscitation, distress, and even danger,

may result from the congested state of the lungs, and therefore that bloodletting may be useful in such cases, even before the circulation and animal heat are effectually restored in the extremities.

The tendency to a fatal termination in the different diseases, and in different stages or circumstances of the same, is very different, and often complex; but is always susceptible of illustration by reference to the simpler cases of violent death now considered. And it is of especial importance to keep in mind these different modes of fatal termination in those diseases (such as Fever) which admit of the greatest variety, in which different dangers threaten on different occasions, and in which various kinds of treatment are recommended; because it is only by anticipating the kind of fatal termination which is most probable in each case, that we can expect to be guided to a rational and scientific selection of remedies.

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CHAPTER II.

OF DISEASES IN GENERAL—THEIR FATAL TERMINATIONS, OR SPONTANEOUS DECLINE.

Those conditions of the animal economy to which we give the name of Diseases, differ from the effects of violent or fatal injuries, chiefly in the following circumstances:—*First*, That they frequently originate without any obvious exciting cause; *secondly*, That they are not uniformly excited, where the causes to which we ascribe them are applied; and, *thirdly*, That they always consist of certain series and successions of changes, usually first shewing themselves some time after their exciting causes have been applied, and always lasting long after that application has ceased.

It is necessary here, first, to attend to the distinction between the strictly scientific or pathological, and the nosological meaning of the term Disease. According to the first meaning, the term is applied to any such *alteration of vital actions* going on within the body, as causes suffering or danger; and the name of any individual disease is applied as accurately as possible to the primary and fundamental change, from which the other changes and all the symptoms naturally follow, either according to the Laws of Physiology, or according to principles which are ascertained in the Science of Pathology itself. According to the second meaning, the term is applied to a particular *set of symptoms*, occurring so similarly in different individuals, that they are judged

to characterise a single diseased condition of the body, independently of any speculation as to the nature of that condition.

In this strictly nosological view of diseases, symptoms are carefully observed and compared,—whether uneasy sensations,—or alterations of the sensible qualities of the living body,—or of the functions of its different parts; certain combinations and successions of these, frequently occurring together, are formed into Genera, and then by a farther selection of the most general and characteristic, and exclusion of the more special and variable, these are arranged in orders or Classes, still without reference to the nature of the actions producing them. This process of classification was very properly begun, and carried to a certain degree of perfection, for practical purposes, before any considerable progress had been made either in Physiology or Pathology. But this mode of proceeding is never found sufficient as a guide for practice. By such arbitrary rules, cases are brought together, which appear distinctly, from their progress, and from the appearances on dissection, to be essentially different, and to demand different treatment; and again, cases are widely separated which depend on the same fundamental diseased action. Accordingly, it is very often found in practice, that the nature of the most urgent symptoms (ascertained, or even conjectured), is of much more importance, as guiding the use of remedies, than the mere names of diseases.

The practice of medicine, therefore, never was conducted on the strictly empirical plan, *i. e.* without any reference to Pathology; and as this latter science makes progress, the characters of diseases, to which practitioners refer, are gradually accommodated to it, so that the no-

sological characters in use, and the pathological distinctions of diseases, approach nearer to one another.

We have no reason to think, however, that these will ever completely coincide; because the true Pathology of many cases of disease, even when well understood, becomes obvious only in their advanced stage, or even after death; and farther, because under the varying circumstances of different individual cases, the same fundamental lesion may lead to results so different, and so important, as to demand, for practical purposes, distinct names; and conversely, different fundamental lesions may make themselves known by appearances so exactly similar, that we cannot, in practice, give them different names. Thus, the same diseased state of the arteries may make itself obvious, in different persons, by Palpitation, by Dyspnœa, by neuralgic pains of the chest, by Apoplexy, or by Dropsy; and again the characteristic symptoms of Apoplexy, Palsy, Epilepsy, Jaundice, Dropsy, &c., may require us to give those names to many individual cases, although we know, from Pathology, that these states are only to be regarded as symptoms, and that each of them may occur in the course of different morbid actions, of which the origin and course are perfectly distinct. Even the state of Fever requires often to be recognized and named, while it is still uncertain to what kind of diseased action, or to what head of a nosology, it ought to be referred.

A little farther consideration shews, that there are many combinations and successions of symptoms, which it is practically important to study, but which are quite distinct from those on which any arrangements of diseases are founded. Such are those which we express by the terms Tendency to Syncope, Comatose tendency, Ty-

phoid tendency, Inflammatory tendency, Scrofulous diathesis, Putrescent diathesis, Hæmorrhagic diathesis, Nervous irritability, &c.—conditions of the body which may be accurately distinguished, but each of which is often observed in the course of many different diseases.

In fact, Nature does not present us, in almost any case, with Diseases—whether distinguished by their symptoms or their intimate nature—as clearly defined and separated from each other, as the genera and species of plants or animals; but with deviations from the natural state, graduating into one another by insensible degrees (somewhat as mineralogical specimens of the compound rocks do), and admitting of useful comparison with one another, not simply because recognised as identical, but because judged to resemble one another strongly in their most important characters.

It does not therefore appear possible, either to have a perfect Nosology, or to supersede the arrangements of nosology, by a strictly pathological classification of diseases; but those arrangements must necessarily be modified from time to time, and made to conform as accurately as possible to the results of scientific inquiries into the essential nature of morbid actions.

We arrange the cases of disease which present themselves to our view, according to the symptoms which appear to characterize them most generally, soonest, and most decidedly; but in making the arrangement, we keep constantly in view the real nature, so far as ascertained, of the diseased actions themselves; and we admit that all these distinctions are to a certain degree arbitrary, and not uniformly observed by Nature. Nevertheless, the following distinctions appear of primary importance.

I. All diseases may be arranged as Febrile and Non-Febrile (which latter term is more strictly applicable than Chronic.)

Of Febrile diseases the great division is into, 1. Inflammatory diseases or Phlegmasiæ; and,

2. Fevers properly so called.

Of Inflammatory Diseases, in all parts of the body, there are two great divisions—

(*a.*) Into Acute and Chronic.

(*b.*) Into Simple and Specific.

We arrange the Inflammatory diseases, simply according to the parts of the system in which they are primarily and chiefly seated, into Inflammations of the Brain, Nervous System, and Organs of Sense—of the Air-passages and Lungs—of the Heart and Bloodvessels—of the Digestive Organs—of the Urinary and Genital Organs—of the Integuments—and of the Organs of Locomotion. While considering these, we might proceed, in connexion with the chronic form of each, to treat of the non-febrile diseases of the same parts or organs; but it appears, on the whole, more important to treat next of the other great class of Febrile diseases.

The Fevers, resulting from morbific Poisons, we divide into—

(*a.*) Intermittent and Remittent.

(*b.*) Continued.

(*c.*) Eruptive. And in regard to each of these, we recognise farther distinctions, less accurately defined, but highly important, into

Inflammatory and Typhoid; and into

Simple and Complicated, *i. e.* complicated with local inflammations not essential to their nature.

II. Resuming, then, the arrangement of the parts and organs which we had adopted in the Inflammations, we study the Non-Febrile diseases which are primarily or chiefly seated in each of them. And among these we can point out peculiar distinctions as important as those drawn in the other classes. These are the distinctions of Functional and Organic diseases; the latter term being applicable only when, in consequence of previous diseased actions, an obvious change of some tissue, implying permanent derangement of function, has taken place in some part of the living frame;—and again the distinction of simply organic and Malignant disease, the latter term being applied when not only the organized structure has undergone a change, but a matter foreign to the healthy condition of the body has been introduced into it, the formation of which is often rapidly extended.

Our knowledge of the real nature of the changes on which all these manifestations of disease depend, is, of course, derived partly from observation of the symptoms which shew themselves during life, and reflection on the import of these symptoms, as made known to us by Physiology; and partly also from the morbid appearances, or alterations of structure apparent in the dead body, which are the effects of the diseased actions, and which often satisfactorily explain their fatal termination.

We may observe, however, that the organic changes of structure apparent in the dead body after disease (and which are subject to less variety, and more easily described and arranged than the symptoms of diseases), have been regarded too exclusively by some as the only sure basis of all pathological discussions; and the accurate description and arrangement of these have been

thought to be the main object of Pathology, which is thus rendered nearly a synonymous term with Morbid Anatomy.

The following considerations seem sufficient to shew, on the other hand, that the study of organic lesions, although an essential, can form but a small part of a rational and useful system of Pathology.

1. There are very numerous cases, arranged into different genera of disease, some of them important, and even rapidly fatal, *e. g.* different forms of fever, certain cases of apoplexy, and of syncope, tetanus, &c. which do not uniformly or necessarily leave behind them, so far as is yet known, any alteration of textures, or other change, perceptible to the anatomist; the Pathology of which diseases, therefore, although it may derive assistance from, cannot possibly be founded on, the knowledge of morbid appearances.

2. In many cases of disease, where decided alterations of structure are found after death, these cannot be connected with the fatal event, and do not furnish a rational explanation of it, without reference to general facts or principles, known to us simply by the previous observation of disease, and by generalization of facts which that study presents. It is only by such observation that we learn, that a certain amount of inflammation on the peritoænum furnishes an adequate explanation of fatal depression of the heart's action; or even, that a certain extent of ulceration of the lungs is sufficient to explain a wasting hectic fever.* In such cases, it is obvious

* Jouent-elles un rôle important dans l'economie animale, les membranes sereuses qui tapissent quelques visceres? Leur lesion traumatique est-elle immediatement mortelle, comme l'est, par example, celle de quelques parties de l'encephale? Certainement non;

that the laws, according to which such lesions become injurious or fatal, as they cannot be deduced from the study of the lesions themselves, demand a separate investigation.

3. Even in those cases where the morbid structures that are ascertained to exist before death, or found after death, easily and satisfactorily explain the symptoms in the latter stages of the disease and the death of the patient, it is obvious that these alterations of structure must themselves have resulted from *previous diseased actions*, *i. e.* that every disease must necessarily have been one of *function*, before it could become one of *structure*. The main object of inquiry is into the essential conditions and intimate nature of these diseased actions; and although all the information we can acquire in regard to them is necessarily limited, and liable to various sources of fallacy, yet the study of the diseased structures, which are their effect and indication, has little value, either with a view to Pathology or to Practice, except in so far as it tends to give some insight into the nature of the diseased actions themselves.

These considerations are sufficient to shew that Pa-

et pourtant voyez les suites qu'entraine leur inflammation. Serait ce l'injection de leurs capillaires qui aurait donné la mort? Serait ce la couche de lymphe coagulable qui tapisse la surface lisse de ces membranes? Qui le croira? Il y a donc encore autre chose dans ces cas que ce qui tombe sous les yeux. Il y a, independamment des elemens materiels, un agent vital à signaler et etudier. Et neanmoins que trouve t'on dans les ouvrages d'anatomie pathologiques d'ailleurs si justement estimés? Les recherches les plus precieuses sur l'etat des tissus, l'examen le plus scrupuleux de leurs proprietés physiques et chimiques, le rapprochement le plus exact des phenomenes de la maladie avec les alterations organiques; mais peu de considerations physiologiques sur la pathogenie de ces derniers. Or, il est très essentiel de s'occuper de ces considerations, à fin de donner à tous ces travaux le complement qui leur manque.—Lobstein, Traité d'Anatomie Pathologique, liv. i. § 299.

thology, or the study of diseases, cannot be made to assume the form of a science, without careful investigation, and reference to general laws; 1. Of those morbid actions which produce no lesions of structure; 2. Of those which precede, and cause such lesions; and, 3. Of those which are produced by, and succeed such lesions, or attend their formation.

In fact, neither the study of Physiology, the study of symptoms as they appear during life, nor the study of organic lesions discoverable after death, is sufficient in itself to enable us to deliver the history and explanation of the phenomena of disease; but information from all these sources must be collected and combined for this purpose.

In the last result, all the diseased actions now enumerated may probably be ascribed to changes in those Vital Affinities, by which the minutest particles of animal bodies, both solid and fluid, are continually actuated during life, and by which the fundamental functions of assimilation and nutrition are regulated. The function of circulation and all the obvious "moving powers of the animal economy" are, in general, affected only secondarily, as a result of those primary changes, sometimes partial, and sometimes more general, in the vital affinities. It seems to be well ascertained, that in connection with these changes in the affinities subsisting among the minutest particles of the living solids and fluids, there are peculiar Attractions and Repulsions by which, rather than by any affection of the contractile powers of the living solids, many of the obvious changes in the distribution of the blood occurring in disease are determined.*

* This doctrine has been represented as hypothetical, but is gradually making its way, as the intimate nature of diseased actions

The numerous and careful microscopical observations lately made on the minute structure of animal substances in health and disease afford a prospect of more precise information than we have yet had, as to the intimate nature of diseased actions. But all such information will necessarily be imperfect, until we shall attain to the knowledge of some of those laws, by which the chemical affinities of the component parts of living bodies are continually modified during the living state, and the formation of those compounds, which are peculiar to living bodies, is determined.

But there are two practically important points to be studied in regard to all these kinds of diseased actions, *first*, The modes of fatal termination to which they tend, and, *secondly*, The provisions of Nature for their spontaneous decline,—concerning which we have much more satisfactory information than concerning their intimate nature.

The tendencies of different diseased actions to their different fatal terminations are obviously susceptible of il-

is made out by the aid of the microscope. "The changes constantly going on in the blood are attended with variations in the capabilities of the corpuscles for Endosmose, and in their attractions and repulsions. These appear to be the cause of the variations which are constantly occurring in the capillary circulation. The force of the heart alone, and not any action of the capillaries, determines the general passage of the blood from the arteries into the veins, but it is to the attractions and repulsions of the corpuscles that the varied peculiar movements of the blood in the capillaries are owing. In considering the circulation through the capillaries, in short, it is always to be remembered that the blood is not a mere inert fluid, but one containing in suspension innumerable organized and living corpuscles endowed with peculiar attractions and repulsions."—WHARTON JONES in British and Foreign Med. Review, vol. xiv. p. 600.

lustration (as already observed) by reference to the simpler cases of sudden and violent death already considered; and it is of the utmost importance, in all truly scientific practice, to keep them constantly in view: but it is always to be observed, that, in the course of the same disease, and even at different periods of the same case, death may be threatened in very different ways. This is especially remarkable in regard to the strictly febrile diseases.

Generally speaking, in the most rapid or acute diseases of different parts (especially internal parts) of the body, whether febrile or not, death is threatened in like manner as by mechanical injury of the same parts; and it is very often sufficiently explained by the injury done to the structure, and consequent interruption of the function of the part. Thus, in the acute diseases of the Head, we are threatened with the fatal termination by Coma, in those of the Chest by Asphyxia, and in those of the Abdomen by Syncope (or sympathetic affection of the heart), just as in injuries of these divisions of the body. In the more chronic diseases of the same parts, death is produced in a more complex manner, partly by the disturbance of the function of the part, but partly also by the constitutional disturbance, *i. e.* by the disorder of the general function of assimilation, or by the exhausting evacuations, consequent on the continuance of the local diseased action, rather than on its local results; and illustrated by the effects of starvation, or of hæmorrhage, rather than of more violent injuries.

In the case of certain local diseases, particularly of the Liver and Kidneys, a very peculiar mode of fatal termination is sometimes observed, in consequence of the local disease leading to retention of the natural excretions, and thereby affecting the system as a narcotic

poison. And it is also certain, that death from any of the strictly febrile diseases, and from certain of the inflammations which we term specific, is owing, in part, sometimes almost entirely, to the influence of causes which affect peculiarly the fluids of the body, without altering the structure of any of its solid parts, and produce changes analogous in the most important respects to the agency of poisons on the animal economy.

It is also easy to understand, that, in the course of diseases, both acute and chronic, complications of different kinds of morbid action, and of morbid changes in different parts of the body, often take place; sometimes from accidental causes, but frequently also in consequence of known laws, whereby the living actions of different parts of the body are connected together; and that death is therefore often owing to a combination of different causes, the operation of each of which may be accurately observed, although its exact amount may not be easily assigned. The history of Dropsy, in connection with organic diseases of different internal parts, furnishes continual illustrations of this observation.

The tendency of most diseases, both acute and chronic, to a spontaneous favourable termination, has been so often and so distinctly observed, as to have suggested the doctrine of a Vis Naturæ Medicatrix constantly resident in the living body. This term is decidedly objectionable, as implying either mere fanciful speculation,—or the substitution of the final for the physical cause of changes observed in the body. But it is of the highest importance both to know the fact, and to understand the mode, of such salutary changes gradually and spontaneously taking place in the course of diseases; and the following

may be stated as the chief principles to which such changes are to be ascribed.

1. The effects of some of the external causes of disease are naturally transient, and the diseased action, kept up only by the action of that cause, subsides soon after its discontinuance. This is especially the case with disorders primarily affecting the circulation of the blood in the larger vessels, and its distribution to different parts of the body; and with those in which the nervous actions are at fault, as affected, *e. g.* by muscular exertion, by mental emotion, even by the sensations of heat and cold under certain circumstances, &c., independently either of inflammation or organic disease. Again, the substances strictly called Poisons, of the vegetable and animal kingdom, if not taken in excessive quantity, and many injurious substances taken into the stomach, are decomposed in the system, and expelled with the different excretions, and their noxious effects then disappear.

2. In the greater number of cases, where the remote causes of disease have been applied, or the strictly *morbific* poisons been imbibed, the diseased action thus set up continues long after the causes are withdrawn, but is nevertheless essentially temporary. As we know that all vital action is but of limited duration in any structure in which it resides, and that a general law of *intermittence* of action, or alternation of activity with repose, applies to all the changes going on in the healthy state of muscles and nerves, as well as in the diseased actions peculiar to these parts, we cannot be surprised to find, that other and more obscure morbid actions should be subject to a similar law; and in fact, we cannot attribute to any other cause (*i. e.* we cannot refer to any

other more general fact) the spontaneous decline either of the local changes which constitute inflammation, or of the more general changes which produce idiopathic fever; or the slower and less complete, but still perceptible remissions of the morbid actions often observed in chronic and even in organic diseases.

3. In the case of local injury done by diseased actions in different parts of the body, we can often point out more precisely, the provisions of nature for repairing the injury, or remedying its effects. Thus the tendency of inflammation to *deposition* of *organizable lymph*, is the main part of those provisions of nature, by which most hæmorrhages are stopped, and the injury which might be done to parts of the body, either by the causes exciting inflammation, or by certain results of the inflammation itself, and particularly by the formation of pus, is prevented or repaired. Again, the *liquefaction* of the products of inflammation into purulent matter, which may be discharged from the body, and the *absorption* of a great part of all the inflammatory effusions after the process of inflammation is over, are changes essential to the restoration of the healthy state of parts. In the case of mortification or sloughing, all these provisions are successively required for the recovery from the lesion that has taken place.

Another provision by which the injury done to individual parts of the body, both by inflammation and other diseases, is obviated in various cases, is the obstruction to the circulation through them, and the increased flow to, and increased development of, neighbouring or corresponding parts, by which the place of the injured organ is supplied.

The state of hypertrophy into which the heart and

other muscular organs are brought, by the existence of any cause which obstructs the result of their natural action, is another provision by which the injurious effects of very common diseases are lessened or retarded. And we are by no means entitled to set aside the supposition of many pathologists, that the state which we call Febrile Reaction, is a provision by which the organs of circulation are excited to resist the noxious effects of causes which would otherwise irretrievably depress their action, in like manner as the state of hypertrophy is that, in which the heart permanently reacts against causes which would otherwise arrest the flow of the blood.

All these are proofs (similar to many which we meet with in Physiology), not of a peculiar healing or conservative power being lodged in animal bodies, but of the general laws of the animal economy being so instituted, that many causes of injury, which would otherwise be fatal, are resisted and overcome.

The knowledge of these salutary provisions of nature, of the circumstances in which they are to be expected, and the conditions essential to their taking effect, is of course of the utmost importance, both as to Prognosis and Practice.

CHAPTER III.

OF THE REMOTE CAUSES OF DISEASES IN GENERAL, AND THE MEANS OF THEIR PREVENTION.

THE living body assumes, in many cases, different kinds of diseased action,—varying remarkably in different periods of life,—without any apparent or known cause; but in the greater number of cases, it is generally believed, that certain circumstances in the situation or condition of patients, before diseases appear, can be assigned with confidence as their causes. The efficacy of these, however, is seldom established in any other way than simply by the observation, that persons known to be exposed to their influence, become afflicted with certain diseases in a proportion very much greater than those who are not known to be so exposed.

This kind of evidence is in many individual cases very liable to fallacy, in consequence of the great variety of the circumstances, capable of affecting health, in which individuals are placed, and of the difficulty of varying these, so as to obtain such observations, in the way of induction, or exclusion, as shall be decisive as to the efficacy of each. Hence the importance of the observations, intended to illustrate this matter, being as extensively multiplied as possible; and hence also the peculiar value, with a view to the investigation of the causes of diseases, of observations made on large and organized bodies of men, as in the experience of military and naval prac-

titioners. All the circumstances of the whole number of men, whose diseases are there observed, are in many respects exactly alike; they are accurately known to the observer, and are indeed often to a certain degree at his disposal; they are often suddenly changed, and when changed as to one portion of the individuals under observation, they are often unchanged as to another; and therefore, the conditions necessary to obtaining an *experimentum crucis* as to the efficacy of an alleged cause of disease, are more frequently in the power of such an observer, than of one who is conversant only with civil life.

But when the necessary precautions, as to the multiplication of facts, and the exclusion of circumstances foreign to the result in question, are observed, the efficacy of the remote causes of disease may often be determined statistically, and with absolute certainty; and the knowledge thus acquired, as leading directly to the prevention of disease, is often of the greatest importance, especially with a view to regulations of Medical Police. And if the human race be destined, in future ages, to possess greater wisdom and happiness in this state of existence than at present, the value of this knowledge may be expected to increase in the progress of time; because there are many diseases which the experience of ages has brought only partially within the power of medicine, but the causes of which are known, and under certain circumstances may be avoided; and the conditions necessary for avoiding them are in a great measure in the power of communities, though at present beyond the power of many of the individuals composing these.

There are, indeed, various cases, of frequent occurrence, in which the study of the Remote Causes of Disease is as practically important as any thing that can be learnt as

to their history, or the effects of remedies upon them. This is particularly true of Epidemic Diseases, and of diseases to which a tendency is given by irremediable constitutional infirmities.

Under the head of Remote Causes of Disease, we include not only causes acting externally to the body, but also circumstances in the condition of the body itself, previous to the attack of disease in question, which are believed to assist in exciting it; and of the mode of operation of these last, we have often more satisfactory information than of external causes. Some general observations on this subject will put it in a clearer point of view, than more detached and incidental statements in delivering the history of diseases would do, and will save repetition in future.

The Remote causes of disease are commonly divided into Predisponent and Exciting, the former of which have been long in operation before the disease appears, the latter immediately precede its appearance. It is impossible to distinguish them accurately in all cases; but nevertheless, this distinction, and especially the very frequent concurrence of causes of both kinds in producing disease, must be carefully kept in mind. This, indeed, may almost be inferred from the general fact formerly stated, that the operation of causes of disease is never quite uniform, and often subject to very great varieties.

Thus, the hereditary nature of certain diseases (*i. e.* the peculiar tendency or disposition to them given by hereditary descent) is well ascertained; but some occasional external cause very generally excites the disease, to which there is this predisposition; and those who attend only to the obvious operation of the exciting cause, are apt in this and other instances to overlook the evi-

dence by which the efficacy of the predisponent is established.

Again, unless we attend to the very frequent concurrence of different causes in producing disease, we may readily misapprehend the evidence of the efficacy of a powerful exciting cause, as cold, contagion, or malaria, if we shall see it repeatedly applied to persons not predisposed to suffer from its effects, and taking effect only on those in whom its operation is aided by some latent predisposition, or some concurrent and accessory cause. Both these errors have very often occurred in medical inquiries as to the remote causes of disease, and the means of preventing them.

I. The following may be stated as the chief Predisponent Causes of disease, that is, the circumstances to which we can in general refer the tendency observed in certain individuals, more than in others, to fall into disease on the application of the exciting causes, to be afterwards enumerated.

1. The transmission of the tendency to certain diseases from parents to children, is only part of the general fact of the influence of the constitutional peculiarities of parents on their offspring.* But there are certain kinds of diseased action where this *predisposition from hereditary constitution* has been peculiarly observed; these are, certain well-marked varieties of inflammation, termed the Scrofulous and the Gouty,—certain kinds of morbid formations, especially the scrofulous tubercles,—and certain forms of diseases of the Nervous System, Asthma, Epilepsy, and Mania. Of these, the scrofulous affec-

* Physiology, p. 307.

tions only are in a few instances *congenital*, as well as hereditary; and the appearance of the others is frequently determined more by the application, and often the concurrence, of other causes, than by the circumstance of hereditary predisposition in those who possess it. There are many other diseased states, however, even disorders of Nutrition or Secretion, or of the general function of Assimilation, often distinctly observed to be hereditary, *e. g.* diseases of the large arteries, with all their different consequences, Gravel, and Diabetes.*

Although we have no means of correcting this original predisposition, the knowledge of the fact is of great value to such persons, as shewing the importance of avoiding, or fortifying the constitution against, the application of exciting causes, which very often co-operate with that tendency to produce disease.

2. There are many causes very often observed to predispose to disease, which may be ranked together, as their obvious effect on the system is very much alike. They tend, whether acting singly or several in conjunction, to *enfeeble the vascular action in the body*, and perhaps especially that in the extreme capillaries; and at the same time, they *render the nervous system more susceptible* of impressions from without. Thus they dispose the body to suffer, and especially the vascular action to become disordered, from the application of exciting causes, either of acute or chronic disease, which might be otherwise innoxious. But it does not appear that these predisposing causes of themselves determine either the kind or the seat of the diseased action which is to ensue:—they are often observed to pre-

* See HOLLAND'S Medical Notes and Reflections, chap. ii

cede, and believed to assist in producing, very different kinds of diseased action, which may be seated in different textures or organs, according to the original or acquired peculiarities of individual constitutions. These may be divided into causes of deficient excitement, and causes of excessive or exhausting excitement.

Of the first kind are,

(*a.*) Imperfect nourishment.

(*b.*) Deficiency of the natural stimuli of pure air, and of muscular exercise.

(*c.*) Long-continued cold, not sufficiently counteracted by artificial warmth or muscular exercise.

(*d.*) Excessive and repeated evacuations, either of blood or of the serous part of the blood.

(*e.*) Depressing passions of the mind, especially those which are of the longest continuance.

(*f.*) Previous debilitating disease, whether acute or chronic.

Of the second kind are,

(*g.*) Excessive exertion, mental or bodily, with deficiency of the natural relaxation of sleep.

(*h.*) Long-continued heat, with little of the invigorating influence of occasional reduction of temperature.

(*i.*) Intemperance, *i. e.* the frequent use of strong liquors, in such quantity, that their first or exciting effect on vital action is more than counterbalanced by their more permanent depressing effect.

Ample experience, not only of what occurs within the observation of individuals, but more especially that which is afforded by statistical returns,—of the amount of disease and mortality in great towns, and chiefly in the worst aired parts of towns, as compared with agricultural districts;—in seasons of scarcity as compared with

seasons of plenty;—among the most indigent classes of society, as compared with those in comfortable circumstances;—among the poorest inhabitants of hot or very cold climates, in circumstances where persons who have been more habitually protected from the extremes of temperature retain their health;—among convalescents from acute diseases, as compared with persons previously healthy;—among the intemperate as compared with the sober;—in beaten armies, or among depressed and disheartened individuals, as compared with victorious armies, or more fortunate and flourishing members of society,—establishes beyond all doubt the efficacy of these various debilitating causes, in augmenting the amount and fatality of disease; and, of course, establishes also the importance of a truly Tonic Regimen (of which, nourishing diet, pure air, habitual exercise, mental excitement, and the occasional prudent application of cold, are the essential parts), in fortifying the constitution against many kinds of disease. The mode of life of the most destitute of our species is, in all the respects above stated, much more weakening than that of those who are more comfortably situated; and accordingly, it appears certain, that no circumstance in the condition of mankind so uniformly increases mortality as destitution, particularly in large towns.*

Some of the causes above enumerated peculiarly affect particular organs,—as heat the liver, and mucous membrane of the bowels, excessive mental exertion the brain, violent mental emotion the heart, &c.—and dispose them more than other parts to suffer from the applica-

* See particularly Report of Villermé on the Mortality of the different Arrondissemens of Paris.—Archives de Med., 1825.

tion of exciting causes of disease. Others of the causes in question have a peculiar tendency to produce certain kinds of inflammation, as the air of low, damp, and crowded habitations, to determine the scrofulous form of inflammation.

But there is no one organ or texture which is uniformly affected, nor any one kind of diseased action which is uniformly excited, by any of these causes. Their general effect is, to dispose the body to suffer from the application of the exciting causes of inflammation, or of other acute diseases; and farther, especially when they are long applied, to dispose the body to those kinds of chronic disease which commence by the deposition from the bloodvessels, in different parts of the system, of minute whitish granules, bearing more or less resemblance to the products of inflammation.

3. Again, there are certain diseases to which a tendency seems evidently to be given by a state of *general Plethora*, depending on full living and deficiency of regular exercise. This is perhaps more strictly true of Gout than of any other inflammatory disease, and of Apoplexy, than of any other disease unconnected with inflammation. There are others which, if not necessarily connected with general plethora, are evidently in a great measure dependent on partial plethora, *i. e.* increased flow of blood to, or retarded return from, individual parts of the body; either occurring before they first shew themselves, or manifestly facilitating their recurrence. Thus all secreting parts, at a time when their secretions are peculiarly abundant, are unusually apt to have disease excited in them. Indeed it is by producing a state of partial plethora that several causes already mentioned, and others to be mentioned immediately, as predisposing

to diseases of individual organs, seem evidently to produce that effect.

A state of partial plethora, although it may be combined with a weak state of vascular action over the body, can seldom be effectually obviated without such evacuations and low diet as may reduce and keep down the whole quantity of blood in the system.

Those whose knowledge of diseases is chiefly taken from examinations after death, as they generally find sufficient lesions of individual organs to explain the symptoms and event, see little of the evidence which establishes the importance of general and local plethora as a cause of disease; but those who are accustomed to trace the whole progress of individual cases, and observe the effects of remedies and regimen on them, have ample grounds for the belief that plethora, general and partial, is one of the most frequent, and often the most remediable, of the causes to which attacks, and still more frequently recurrences, of various local diseases, whether inflammatory, hæmorrhagic, or more chronic, may be traced.

4. A frequent predisposing cause of local disease, which may be said to act by causing or facilitating partial plethora, is *Previous Disease*, and especially previous inflammation, of the same organ, even although it may have been at some distance of time, and may have left no organic lesion. There is a similar tendency in diseases primarily seated in the nervous system, to facilitate their own recurrence. This is one of the circumstances by which the seat of the diseased action, that may be caused by any accidental excitement, is most frequently determined.

5. Organic disease, or *morbid alteration of structure*,

already existing in the body, although in an inert state, and causing little uneasiness, very often acts as an important predisposing cause of other diseases, which might otherwise have been avoided; and that in three distinct ways.

First, The existence of certain organic diseases, probably by reason of the quantity of blood directed upon them, and the consequent deficiency of the supply of blood to other parts of the body, appears frequently to dispose the whole system, in like manner as other debilitating causes, to suffer from the application of cold, contagion, or other causes of acute disease, more readily than it otherwise might have done. It is probably on the same principle that pregnancy and lactation render the body peculiarly liable to the acute diseases resulting from such causes. This holds especially of such organic diseases as are rapidly increasing in size, and certainly does not hold of all organic diseases. Those which are attended with a continual febrile or excited state of the circulation (*i. e.* Phthisis), appear rather to fortify the body against the attacks, at least of contagious diseases, than to predispose to them.

Secondly, Organic diseases already existing in the body, by confining the circulation in the parts that are still healthy, and often by obstructing the circulation, first in their own neighbourhood, and afterwards in more distant parts, naturally and materially favour local congestions of blood; thereby disordering the functions of parts not themselves organically diseased, and frequently leading either to inflammations, serous effusions, or fresh solid deposits from the blood, according to the texture and vital properties of the organs where this local plethora is established; in the production or renewal of all

which secondary affections, however, external exciting causes may very often be observed to operate.

This is especially observed in tracing the consequences of organic disease primarily seated in the heart, lungs, or liver; and those who are aware of the predisposition to disease of other parts, given by such organic lesions, may often, by proper regimen and remedies, prevent the application, or even avert the effects, of those exciting causes to which such consequences are often immediately owing.

Thirdly, Certain kinds of organic disease (such, *e. g.* as scrofulous tubercles, or tumours composed of the "encephaloid matter)," already existing in the body, give a peculiar tendency to the reproduction of the same kind of morbid texture in any part of the body, where disease may be excited; the cause of which tendency will be afterwards discussed.

II. It is especially on those who are predisposed to disease, either generally or more partially, in some of the ways now mentioned, that the different Exciting Causes of disease act with full effect.

There are many cases, however, in which diseases are gradually formed in the human body, under the influence of the predisposing causes above stated, without any exciting cause being observed to operate. And there is hardly any exciting cause of disease that acts with uniformity or absolute certainty, even on constitutions apparently predisposed.

There is obviously an essential distinction between those exciting causes of disease which consist in the application, under peculiar circumstances, to the human body, of *agents to which it is often and necessarily exposed*

in all parts of the world, and those which result from the application of *peculiar poisons*, of local and temporary existence only. And it is of the more importance to attend to this, because there is an equally important distinction as to the kinds of diseased action which are found to be excited in the body by causes of these different kinds.

This is the same distinction as is drawn by statistical writers between *sporadic* diseases, and *plagues* or epidemics.

1. The following are the chief agents referable to the *first* of these heads, and which are found to act as exciting causes of disease; many of which need only be stated, in order that the means of avoiding them may become obvious.

a. Mechanical Injury, or chemical irritation, which, in a certain degree of intensity, infallibly excite inflammation, and when acting in co-operation with some of the predisposing causes above stated, excite either inflammation of a peculiar character, such as the gouty or the scrofulous; or else, if their application be long continued, some kind of chronic organic disease.

b. Muscular Exertion, hurrying the movement of the blood, and often more particularly disordering it, by reason of such efforts of straining, affecting the respiratory motions, as impede the return of the venous blood, especially from the head, and so favour local plethora.

c. Mental Emotion, or acute Sensation, sometimes suddenly affecting the actions of the heart, sometimes augmenting the flow of blood to the head, and sometimes more gradually modifying secretions, especially those of the alimentary canal.

d. Such Excess, or intemperance in eating or drink-

ing, as may either injure the secretions of the stomach and bowels, or so stimulate the circulation, as to determine local congestions of blood in any part that may be predisposed to that state.

e. The sudden Suppression of accustomed evacuations, tending to a state of plethora, which will especially affect any organ that may be predisposed.

f. Such an amount of Evacuation from the body, as may suddenly depress the heart's action, or materially influence the functions of the Nervous System.

g. External Heat, in such a degree, as either to irritate the part to which it is directly applied, or to impress the nervous system violently, or to stimulate the general circulation and favour local congestions.

h. External Cold, applied in such circumstances as powerfully to affect the Nervous System, or to disorder the circulation.

In regard to this last, which is the most frequent and powerful of this kind of exciting causes, it is to be observed, that Cold seldom acts as more than a predisposing cause of disease on the *external parts* directly exposed to it; any diseased action which these parts assume being in general directly excited by the subsequent restoration of temperature. It is in *internal parts*, the temperature of which is probably hardly affected, that cold is most apt directly to excite disease.

The Sensation of Cold which is excited appears, according to physiological principles, to be the connecting link between the cause applied externally, and the morbid action which it may excite in the interior of the body; and the more acute, and more lasting, that this sensation is, the greater will be the effects resulting from it.

To this simple principle we can refer many facts, which are important to be known, as to the agency of Cold in exciting disease.

It seems to be established in Physiology, that the degree of effect produced on Sensation, or on other vital actions, in the healthy state, of either Heat or Cold, is by any given degree proportioned, not so much to the actual temperature that is applied, as to the amount and rapidity of change of temperature, effected by its application; and the same holds of the morbific effects of these agents. Thus the natural temperature of the body, applied suddenly to a part previously long chilled by frost, produces just the same local effects as the temperature of 212°, on a part not previously cooled.

In like manner, the effect of cold in producing internal disease is increased by previously heating the body, and still more remarkably by all the other circumstances stated above as weakening the circulation; because, when the body is under the influence of these causes, the lost heat is slowly and imperfectly restored, and the sensation heightened and prolonged. It is greater, for the same reason, when the cold is applied by a draft or a current of air, or by wet clothes, which rapidly carry off the heat of the body; and it is greater when the cold is applied to the extremities, as the parts where the circulation is most languid. But in the circumstance of moisture, and perhaps in other occasional qualities of cold air, there seems to be a peculiarity not yet understood, as to the power of exciting inflammation.

It is probably owing chiefly to a languid state of the circulation during Sleep, and consequent deficient power of generating heat on the surface of the body, increasing and prolonging the sensation of cold applied at that time,

that the system is then peculiarly apt to suffer from the application of cold.

On the other hand, the injurious effect of cold is lessened or prevented by such a vigorous state of the circulation as counteracts its effect on the temperature of the surface, or quickly restores the temperature that is lost, —therefore, by exercise, taken after the cold is applied, and by febrile excitement of the circulation, at least by such febrile heat as is attended with full strong pulse and dry skin; it is lessened remarkably by such intense occupation of mind, as limits the intensity and duration of the sensation resulting from it; and it is lessened by such habitual exposure to variations of temperature, as blunts somewhat the sensibility of the surface, and excites and strengthens the capillary circulation there, according to principles known in Physiology.

2. Of those exciting causes of disease, which act, often with extreme virulence, and on great numbers of the human race, but only at certain times and at certain places, we may first notice those which are ascertained to consist in the introduction, by the *primæ viæ*, of substances acting as poisons on the system, although so slowly, that their effects are usually ranked among diseases, not as examples of poisoning. The prevention of these diseases, by avoiding the introduction of these substances into the system, is therefore regarded as matter of certainty.

Thus, the symptoms of Scurvy, depending on a peculiar alteration of the blood, are ascertained to proceed from the long-continued use of innutritious, and especially of salted, aliments; a peculiar form of external

inflammation, tending rapidly to Gangrene, has been distinctly traced to the use of wheat or rye infected with the parasitical plant called the Ergot; it has lately been ascertained, that somewhat similar affections, which have been endemic in some parts of Germany, depend on some of the ingredients used in making cheese and sausages, which are there common articles of diet; a peculiar variety of Colic, and such an alteration of the nutrition of muscles as produces a certain form of Palsy, are the well known effects of the poison of lead slowly introduced into the body; certain varieties of inflammation of the skin are produced by some vegetables, and by some species of fish, acting as poisons; and that peculiar form of mental derangement to which we give the name of Delirium Tremens, is an effect produced, on certain constitutions, and in certain circumstances, by alcohol previously introduced, in frequent doses and at short intervals, into the blood.

It is important to observe, that in all these cases, the efficacy of the alleged exciting causes is ascertained, not by the affection of all who are exposed to them (for none of them act with unerring certainty), but by the affection of a certain number only of those persons, and by the immunity of all who are certainly known to avoid them.

There are more topical diseases known to be *endemic* in certain localities (*i. e.* to prevail pretty uniformly and exclusively in these), which are also generally believed to depend on certain substances taken into the body, and operating injuriously on certain organs or textures, although their nature, and the mode of their introduction, have not yet been so clearly detected, *e. g.*

the Bronchocele, in some hilly countries, or on the banks of certain rivers, the Cretinism of the Alps, the Guinea-worm of some parts of Africa and India, the Elephantiasis of Egypt, the Pellagra of Lombardy, &c.

Again, there are other diseases of much greater importance, because, at certain times, much more generally and fatally prevalent, which we ascribe with equal confidence to the operation of certain Specific Poisons; although these are imperceptible to our senses, and known to us only by their effects on the human body; and although the mode of their introduction into the body (by the absorbent surface of the lungs) is only matter of presumption, not of actual observation. These poisons are distinguished by the name of *morbific*, because their effects are well marked diseases, *i. e.* successions of morbid changes, not uniformly succeeding them, beginning some time after they are applied, and going on long after their application is over.

These are the diseases which prevail *epidemically*, *i. e.* in certain districts or countries, and at certain times only, while other countries, and the same at other times, are quite free from them.

The mere fact of a disease (clearly distinguished from all others) being absolutely unknown for a great length of time, in any large community, and prevailing extensively in another in a similar climate, or in the same community at another time, is enough to shew that it has a local and temporary cause; and that all reference of its origin to such exciting causes only as were treated under the last head (and which must inevitably be applied to many persons in a very large community, even

within a limited period of time), must be totally unavailing.

Such a disease may always be suspected to proceed from a Poison somehow introduced into the body, and experience teaches us, that the origin of that poison is generally to be looked for in one of two sources,—either in certain effluvia apparently arising from the earth, or in exhalations from the bodies of persons previously affected with the same diseases; *i. e.* that these diseases usually arise either from a *Malaria* or a *Contagion*.

At the same time it must be allowed, that there are diseases which occasionally prevail much more extensively than usual, and take nearly the form of epidemics, but do not appear, from the mode of their extension, either to be confined to limited districts, or to be propagated solely or chiefly by contagion. Of this we have examples, in certain seasons, in Erysipelas and in Dysentery, and, according to the opinion of many, in epidemic Cholera. It appears well ascertained that all these shew a certain degree of contagious property, but their extension does not appear to be exclusively owing to this property. It is commonly referred to the rather vague principle of peculiar constitutions of the atmosphere; but it is very doubtful whether this term be correctly applied.

The following are the facts observed as to the extension of an epidemic disease, which lead us to believe that it arises from a Malaria, or emanation from certain portions of the earth's surface.

1. Such a disease is found to prevail within certain limits only, all persons who avoid these localities escaping the disease, although in all other respects similarly circumstanced to those who become affected.

2. The districts infected with such a disease are, in some respects at least, similar to one another, in the different parts of the world where they are found.

3. No precautions for the separation of the sick from the healthy, within these districts, appear to have any effect in limiting the extension of the disease; but the removal of the inhabitants, both sick and healthy, to other districts, appears obviously to arrest, in a great measure, the extension of the disease among them; and is unattended with any injury to the health of those with whom they are associated after their removal.

It is by facts of this kind that we are assured, that some kind of subtile matter arising from certain parts of the earth's surface, especially from parts of it on which water has stagnated, and from which it has gradually evaporated, is the cause of Intermitting and Remitting Fevers; which vary remarkably in different seasons and climates, and at different elevations above the level of the sea, but still retain the same general characters.

It does not appear, on careful inquiry, at least in Scotland or Ireland, that there is any evidence of this description to shew that the Continued Fever of this climate can be produced by a Malaria; and the effect of putrid effluvia, and bad draining and ventilation, in favouring the diffusion of that disease, is easily explained by the depressing effect, already noticed, of vitiated air on the human system, by the other circumstances of the inhabitants of such places, and by the concentration of contagion necessarily occurring in such situations.

Whether the putrefaction of animal and vegetable matter is a condition essential to the generation of this Malaria, or what other conditions are really necessary,

is much more doubtful; but it is certain that the conditions which are essential, belong to the localities which are thus affected, not to their inhabitants; and it will afterwards appear that the laws of its development and diffusion are to a certain degree ascertained; that its development may be in a great measure prevented by certain means, particularly draining and cultivation; and that its effects may be frequently avoided by availing ourselves of certain peculiarities in its diffusion, *e. g.* its being absorbed by water, attaching itself to trees, being dissipated by the heat of the sun, and diminishing in virulence at a certain elevation above the level of the sea.

Again, the following facts, when carefully observed, as to the mode of extension of other epidemic diseases, especially if observed about the time of their commencement, when they are not yet generally diffused, leave no room for doubt, that they propagate themselves by Contagion, or in consequence of exhalations or secretions from the bodies of persons already affected with them, being somehow introduced into the bodies of those who become affected in their turn.

1. Successions of cases, of the diseases in question, are observed within narrow limits, both of space and time; first in one situation, and afterwards in others; while other districts, similarly circumstanced, and fully inhabited, are wholly unaffected.

2. On inquiring into the circumstances of these successions of cases, we find them, although, for reasons already given, most apt to occur in certain places, yet by no means confined to one description of locality; and occurring in situations which vary irregularly with the

different returns of the disease, instead of remaining nearly fixed, as is the case in regard to malarious districts.

3. There is very frequently, in such cases, evidence of importation into the affected districts, *i. e.* the first patient in the succession is found to have had intercourse with persons who have had the same disease, or recently recovered from the same disease elsewhere;—either directly, or through the intervention of substances, to which exhalations from sick persons may easily attach themselves.

4. Within the district where the disease exists, those persons who have earliest and closest intercourse with the sick, are observed to be first and chiefly affected.

5. Absolute seclusion from all intercourse with the persons or houses affected, produces complete immunity to whole families, to the inmates of barracks, schools, workhouses, or hospitals, even in the midst of the infected districts.

6. When the sick are carefully separated from the healthy in the beginning of the disease, and all substances, to which exhalations arising from them can have attached themselves, are purified, the extension of the disease, even within the infected districts, is obviously diminished, or even entirely stopped.

Observations of these different classes are so many different ways of establishing the general propositions,—1. That those who are known to have had intercourse with the sick, are affected with one of these diseases in a proportion very much greater than others; and, 2. That no other common circumstance, but that of intercourse with the sick, can be ascertained to exist in the case of most of the persons who are affected, and not to exist in

the case of the much greater number who escape. And when these propositions are established, especially in the case of a disease which has recently invaded a large community, and affected only a small portion thereof, a calculation of chances puts beyond all doubt the efficacy of the circumstance of intercourse with the sick, in determining the attacks of the disease; and shews, that all other means of prevention, as to those diseases, must be held as subordinate to the grand object of preventing such intercourse.

All other considerations are perfectly irrelevant as to the question of the contagious nature of a disease, but those which bear on the evidence of the propositions stated above. For example, the escape of great numbers of those who have intercourse with the sick, is no evidence of the disease not being contagious, if it be ascertained,—1. That the disease is one of local and temporary existence only; and, 2. That of those known to have had intercourse with the sick, the proportion who take the disease is very much greater than that of those in whose cases such intercourse cannot be traced. These points being ascertained, the escape of numbers, who have intercourse with the sick, becomes only evidence of what was formerly observed, that this and all other, strictly *morbific* poisons, take effect only on certain constitutions.

It is on evidence of the kind above stated, that we ascribe more or less of a contagious property to various febrile diseases,—the Continued Fever of this climate, and probably a continued fever occasionally prevailing in hot climates,—Small-pox, Chicken-pox, Measles, Scarlatina, Plague, Erysipelas, Dysentery, Influenza; and the same evidence will be found to extend to the epi-

demic Cholera;* although there are certainly anomalies as to the propagation, as well as the symptoms, of that singular disease.

It is by similar evidence that we are assured of the contagious property of scabies, syphilis, gonorrhœa, and purulent ophthalmia. The accuracy of the conclusion is confirmed in the case of several of the febrile diseases, as well as of those chronic diseases, by the effect of inoculation. The very peculiar contagious poison by which hydrophobia is excited, has never been observed to be communicated otherwise than by inoculation.

But in ascribing a contagious property to a disease, we must be careful not to consider it as ascertained, that contagion is its only exciting cause. There is good reason to believe, that several of the diseases now mentioned originate occasionally, at the present day, from unknown causes, and perhaps extend themselves in an unknown way, besides being propagated by contagion; and it is still doubtful whether the remittent fevers, originating in malaria, may not occasionally, and under certain circumstances, spread by contagion.

Some special facts, that have been ascertained in regard to malaria and contagion, will be more properly stated as part of the history of the diseases which they excite; but it is important to state here some general laws in regard to the whole of this class of the exciting causes of disease, several of which have an obvious practical application, as suggesting means of prevention, or indeed are made known only by the ascertained efficacy of such means. The knowledge of all these laws

* See Dr Simpson's paper on the Cholera in Scotland.—Edinburgh Medical and Surgical Journal, vol. xlix.

is necessary, in order to enable us to form a sound judgment, and to correct partial and erroneous views, of the efficacy of any particular means of prevention which may be recommended.

1. It is a well-ascertained fact, that the morbific effect of these poisons is remarkably increased by debility and inanition, and diminished by fulness and excitement, of the vascular system; and this gives good reason to believe that their action is consequent on their absorption into the blood; because it is known in Physiology, that by these circumstances absorption is remarkably increased and diminished.*

2. None of them act with uniformity, epidemic fevers of all kinds, and all contagious diseases, varying extremely in character, in prevalence, and in malignity, at different times, and for reasons which are very imperfectly known.

This difference is evidently in part owing to the concurrence, or absence, of some of the predisposing causes of disease above stated, especially of impure air, imperfect nourishment, and mental depression, long-continued heat or cold; but there are many examples of such difference in the extension, and in the character of different epidemics, or of the same at different periods of its progress, which we can ascribe only to variations in the nature and virulence of the morbific poisons themselves.

3. None of them act with unerring certainty; some persons escaping, even when such diseases are most prevalent and malignant, and in circumstances in which the greatest number suffer.

* See Physiology, p. 67.

4. Both malaria and contagion are very often aided in their effect, not only by predisposing causes, preparing the body for their reception, but by exciting causes, concurring with them, and determining attacks of disease, which might probably otherwise have been avoided. Thus during an epidemic fever, so many attacks immediately succeed exposure to cold, that many pathologists have thought this a sufficient exciting cause of that disease; and in the malarious countries, so many agues are contracted apparently by exposure to cold, or intemperance, that some have represented the malaria as the predisponent, and cold or disordered stomach as the common exciting cause of ague. In like manner, scurvy, although the specific effect of salted aliments, is very generally observed to be essentially aided and promoted by cold, by intemperance, and by mental depression.

It is probably to the frequent concurrence of other exciting causes with malaria or contagion, in producing epidemic fevers, that we should ascribe the remarkable fact, that when such epidemics are most prevalent, most other diseases nearly disappear; the poison already imbibed into the human system, determining the excitation of its own peculiar effect, on the application of any one of the common exciting causes of disease, rather than of the other diseases, which at other times might result from that application.

It appears, therefore, that the agency of what are strictly called morbific poisons, differs from the agency of what are more commonly called poisons, in being much more dependent on contingencies, both previous and subsequent to their introduction into the body; and this fact, which could not have been antici-

pated *à priori*, but seems well ascertained, enables us to understand that in certain cases, even after the diseases resulting from these agents have shewn themselves, they may be not only conducted to a favourable termination, but successfully *arrested* in their course.

5. In all the febrile diseases which are of local and temporary existence, and result from the operation of these poisons, there may be observed, at least when they appear in their most virulent form, a peculiarity of symptoms, and a kind of danger, hardly to be dreaded in diseases excited only by such causes as are of more general and permanent existence. This peculiarity may be said to consist in a general depression of vital action, and peculiarly of the functions of the Nervous System, with an alteration of the vital properties of the blood, and is denoted by the appearance of more or less of the symptoms, which have the name of *typhoid*.

6. In regard to all these diseases, consequent on the introduction of Specific Poisons into the system, this remarkable fact may be observed, that the tendency to them is remarkably altered by their being once excited. The Intermittent Fever, from malaria, is more easily excited, after having once existed, but in a somewhat milder form; and its most malignant form seldom attacks any individual twice. All the diseases resulting from specific contagions (if we except Erysipelas) are less easily excited when they have once been suffered; and in the case of the Contagious Exanthemata, this diminution of disposition to the disease goes almost the length of absolute immunity. In the case of small-pox, it has been now completely ascertained, that the contagious poison undergoes a change, by being transmitted through the body of another animal, whereby

the disease is rendered infinitely milder (taking the form of cow-pox) in the human subject; and that this mild form of the disease gives security to most persons against the virulent form; and when it does not give complete protection, mitigates any subsequent attack so generally and so decidedly, as to afford the most effectual antidote to disease of which we have any example in Medicine.

CHAPTER IV.

OF THE ACTION OF REMEDIES IN GENERAL, AND THE EVIDENCE OF THEIR EFFICACY.

It seems important to premise some general observations on the difficulty of judging of the real influence of remedies over diseases, and on the proper means of surmounting those difficulties, before giving a general sketch of the resources of medical practice.

Several causes may be pointed out as very frequently misleading us in our estimate of the power of remedies over disease.

1. The natural tendency of most kinds of diseased action to spontaneous abatement, to which the action of almost all remedies is subservient, but which is very frequently mistaken for the effects of remedies used.

2. The unobserved action of other circumstances in the situation of patients, besides the use of any remedy of which the value is attempted to be established, *e. g.* of the antiphlogistic regimen, when depleting remedies are used, or of change of season or of situation, when tonic remedies are used.

3. The extreme diversity of cases to which the same name, and even the same pathological description is correctly applied, as to extent, or intensity, or malignity, and therefore as to the result to be expected, even when no remedies are used.

4. The diversity of constitutions, in which the same kind of diseased action may be excited, and the difference of result thence to be anticipated, under any practice that may be employed.

These peculiarities attending the observation of the effects of remedies necessarily vary the conditions of each individual case, in which such observations are made, and make it impossible for us to vary them artificially, so as to have a complete *experimentum crucis* as to the effect of any remedy. They not only vitiate many inferences as to the good effects of alleged remedies, but often blind us to the injurious effects which they may produce in the course of diseases. The same difficulties do not attend the observation of the effects of remedies intended only for the attainment of one great object of medical practice,—palliating symptoms in cases which are regarded as hopeless; but even in these cases it is often very difficult to judge how far temporary alleviation is purchased at the cost of subsequent aggravation.

While these circumstances greatly embarrass all conclusions that can be drawn as to the efficacy of remedies, it is also to be remembered, that certain obvious moral causes naturally lead most men, in cases of doubt, to exaggerate, rather than undervalue, the importance of their own interference with the natural course of diseases.

The means which naturally suggest themselves as fitted for guiding our judgment under these difficulties, as to the safety and utility of remedies, and which have been adopted with more or less success in all ages, are the following:—

1. We multiply as much as possible the observations of individual cases to which any particular remedy is

applied, noting as carefully as possible all the varying circumstances of these cases, so as to obtain *statistical* evidence as to the efficacy of the remedy, and the influence of other causes simultaneously applied, too extensive to be vitiated by accidental contingencies.

If all alleged remedies had been *specifics*, *i. e.* supposed to exert a direct power over diseased actions, not referable to any more general principle, or if the same disease had followed the same course in all persons, we could have obtained statistical information as to their efficacy in this way, equally certain as the statistical evidence we have of the power of the exciting causes of any disease; but when it is considered that the great majority of remedies have certainly no specific power, and that their action is believed to be only subservient and auxiliary to the provisions of nature for the spontaneous decline of diseases, and to be dependent on the influence which they exert over the functions of the body in health; that they are useful, therefore, only in certain periods and circumstances of the diseases to which they are applicable; and that the natural course of these diseases is exceedingly various, and liable to alteration, as already observed, by different causes, both internal and external to the body, many of which are extremely obscure, and beyond our controul;—we can easily perceive that the application of statistics to the influence of these remedies on disease, must be liable to great ambiguity; and that the application of other species of evidence, for practical purposes, is really necessary.

2. We, therefore, watch the progress of the symptoms, after the application of the remedy, in individual cases, and observe whether there is such alteration in these, when compared with the usual progress of the

disease, as gives us reason to believe that the natural process for the restoration of health is promoted.

3. But again, adverting to the statements already made, as to the great variety in the extent and intensity, and natural progress, of different cases which are referred to the same place in the nosology, we can easily perceive, that the mere observation of external symptoms, without reference to the real nature of the internal changes producing them, will not sufficiently inform us how far the remedies used really exert a beneficial effect on morbid changes. We find it necessary, therefore, not with the view of applying reasoning *à priori*, but in the view of availing ourselves of all the facts known by experience which illustrate the subject, to inquire into the intimate nature, or pathology, of the diseases thus treated, and endeavour to ascertain whether the changes actually going on within the living body, are such as it is reasonable to think that the remedy in question can directly or indirectly modify or controul.

4. This makes it necessary to inquire farther into the real nature of the change which that remedy can effect on the body, *i. e.* as to its mode of operation, which necessarily requires our inquiring into what has been called its "physiological action," or the mode in which it affects the healthy body; from the knowledge of which, compared, with our knowledge of morbid actions themselves, we can frequently draw an inference, with more or less confidence, as to its real efficacy in averting morbid changes, or promoting their favourable termination.

Being thus led to see the importance of scientific or theoretical knowledge, in regard to the real action of remedies on the living body, we observe, that almost all

those on which we can place any reliance in practice, are referable, according to what we believe to be the mode of their action, to one or other of the following classes.

In a very few instances only, we can ascribe to certain remedies a *specific* power, known only by experience, and apparently unconnected with any sensible effect, of counteracting certain morbid actions, and so preventing their injurious effects. The best example is the power of Cinchona, or its alkaloid, Quinine, over Intermittent Fevers. The effect of certain remedies, usually called Alteratives, on the results of certain specific inflammations; of Mercury on Syphilitic inflammation, and its consequences, and, as many believe, on various other inflammations; of Sulphur on Scabies; of Colchicum on rheumatic or gouty inflammation; of Iodine, or Sarsaparilla, and other vegetables, on certain forms of inflammation in the periosteum and skin; although less powerful, may likewise be called specific in the present state of our knowledge; although it may be inferred with probability, that the action of some of these remedies may be referred to other heads presently to be mentioned.

The beneficial action of all other remedies, besides these specifics, in diseases which admit of cure, is only auxiliary to the provisions of nature for the spontaneous cure of diseases; although incapable of arresting the course of morbid actions, they can frequently modify them, and counteract those changes which, in the circumstances of individual cases of disease, are most immediately dangerous. We can have no doubt, that in this way they frequently save life, and generally, when prudently used, place the body in circumstances more favourable to the spontaneous decline of diseases. This

is done by an influence on the body during the diseased states, which we think capable of explanation by what we know of the operation of these agents on the healthy body.

Of these we may make an arrangement according as they act, as far as we can judge, primarily and chiefly, 1. On the fundamental function of Circulation; 2. On the Secretions and Excretions; 3. On the Nutrition, particularly of those parts which are themselves the product of disease; 4. On the composition and qualities of the blood; 5. On the functions of the Nervous System.

I. The following are the means we possess of directly influencing the actions of the heart, and the flow of blood through all parts of the body at once. Some of these act by being taken into the blood and circulating with it through the body; others seem to produce their effect by making certain impressions on the Nervous System, whereby, as various facts in Physiology instruct us, the actions of the heart and the flow of blood through the smaller vessels may be influenced.

1. Stimulants, either taken into the circulation, as wine, alkohol, ammonia, or applied in various ways to the sensitive parts of the Nervous System, as external heat, various irritating applications to the surface of the body, and especially such as excite the respiratory muscles, and thereby cause the arterialization of an increased quantity of blood; all which excite and invigorate for a time the action of the heart, and are therefore often of essential service in those circumstances of very various diseases (both acute and chronic), in which death is threatened simply by Asthenia. The effect of these is

always transient, and very often followed by more or less of depression, partly to be ascribed to the mere circumstance of increased action, but chiefly to be regarded as an ulterior, although variable, effect of stimulating medicines themselves, such as alkohol or æther.

It is generally thought that the stimulating effect of wine is less transient, and followed by less depression, than of other substances of this class, and that by giving it in small and frequently repeated doses during acute diseases attended with much debility, any injurious depressing effect may be avoided until the period of these diseases is over.

The most powerful of all strictly stimulant remedies, unfortunately applicable in a few cases only, is the transfusion of blood into the veins; and along with it we may include, from what has been seen in some cases of malignant Cholera, the saline injections into the veins.

2. Tonics, which are thought to act in like manner, some directly, others through the medium of the Nervous System on the heart's actions and the circulation generally, with less activity, but with more permanent exciting effect, and which are, of course, chiefly applicable to the case of chronic diseases, or to the last stages of the acute.

There is no doubt of the effect of a Tonic Regimen,—of nourishing *diet*, active *exercise*, free exposure to *pure air*, the regulated application of *cold*, and *mental interest* and excitement,—on the circulation, and all its subordinate functions; nor of the value of these expedients alone, or in combination with other remedies, demanded on other accounts, in the treatment of many diseases. The most important and most permanent effect of such expedients, however, is certainly in part,

and we have not the means of judging how far, referable to an alteration and improvement of the state of the vital affinities existing in the living body, and not merely to any increase of the contractile power of its moving parts. The influence of any medicines specifically to strengthen the general circulation, has been doubted; and the doubt is sufficient to shew, that the efficacy of any medicines of this class is but slight; but various local applications, stimulant and astringent, have a certain degree of strengthening effect on the circulation at the parts to which they are applied.

3. The opposite, depressing, or *sedative* effect on the circulation, is exerted by certain medicines, chiefly of the nauseating kind, as by Tartar Emetic, Digitalis, and Colchicum. It is still doubtful whether these possess any peculiar sedative or antiphlogistic effect distinguishable from that depressing influence which always attends nausea; but it is certain, that, in certain circumstances of disease, these are a resource of very considerable value. A more powerful sedative effect is produced by the external application of cold of a certain duration and intensity; and this expedient is in some circumstances, both of local and general disease, very useful; but as its effect, within the limits that are safe, is always transient, and as caution is necessary to prevent its acting as an exciting cause of other diseases, this power is not so often usefully employed as a sedative agent as might be expected.

Various local applications have a sedative, cooling, soothing, or astringent effect, on the capillary circulation of the parts to which they are chiefly applied.

4. An obvious permanent and important sedative effect on the whole system is produced by what is termed the

Antiphlogistic Regimen, of which the essential parts are Low Diet, Rest, and Quiet; which is "proper to be employed during the greater part of all inflammatory and febrile diseases," and frequently in other diseases likewise, although with modifications to be afterwards considered.

5. The most powerful, and therefore most beneficial, agent of this description, is Bloodletting, the good effects of which may be referred to the following heads:—

1. It weakens the action of the heart, and therefore the force with which the blood is moved in all parts of the circulation.

2. By lessening the whole quantity of the blood, it lessens the intensity of diseased actions of various kinds, particularly inflammatory action, kept up by the flow of blood to individual parts of the body.

3. It causes a temporary but important *derivation* of blood from other parts, to that whence the blood issues.

4. It promotes the action of those remedies which increase the secretions and excretions, or removes a cause (viz. fulness of the bloodvessels, and vigorous circulation through them) which opposes their operation.

Experience shews, that the remedy is most important, with these intentions, in cases of local diseased action (chiefly, but not exclusively, inflammatory) which are attended by, and apparently act as the causes of, general disturbance and excitement of the circulation,—and in the early stages of these, before the disorganization consequent on these morbid actions has made progress; and that the less complicated the local disease, and the more healthy the previous condition of the body, the better the prospect of good effect from the remedy;—that it is less effectual when the previous state of the system is not vigorous, or the disease complicated;—and becomes use-

less or injurious in the ulterior stages of these diseases, when disorganization has been effected; and again, that in diseases of the general system, excited by the morbific poisons, although the circulation is much accelerated and excited, the greatest danger, in the advanced stages, is not dependent on that condition of the circulation; and is in most cases, and in most epidemics, very liable to aggravation by such loss of blood in the early stages as materially weakens the system.

II. Of remedies acting chiefly on the Secretions and Excretions, the most generally useful are those which (although taken into the circulation very generally before they affect the system) produce their chief effects on the stomach and bowels, *i. e.* the Emetics and Purgatives; and the following may be stated as the beneficial modes in which they affect the system.

1. They relieve it of the presence of foreign matters (or matters exterior to the circulation, and destined only to expulsion from the body), the effect of which, primarily on the mucous membrane of the Primæ Viæ, but affecting sympathetically various other parts, is a cause of some, and an aggravation of many more, diseases, both acute and chronic. The Carminatives, the Antacids, and Anthelmintics, may be said to be subsidiary means of attaining this object, and to be useful in this way.

2. They diminish, in a considerable degree, the quantity of the circulating fluids,—draining off much of the serous part of the blood, and probably suspending, for a time, the process of assimilation, by which the waste of the animal matters of the blood is continually supplied,—and thus they weaken the circulation in all parts.

3. They alter materially the distribution of blood in the body; and the purgatives, in particular, have a powerful and often very useful effect as *derivants*, from the head and upper parts of the body.

4. All such medicines increase the flow of the secreted fluids of the intestines, particularly of the Bile, and some of them are believed to have a peculiar power of increasing and improving this secretion, and are hence called Cholagogues, or more generally, Alteratives. It is reasonable to suppose that such a power exists in a certain degree, particularly in the preparations of Mercury; but its extent has certainly been much exaggerated, and the secretion of the bile, when vitiated, may be gradually improved by the continued use, probably of any purgatives, in moderate doses. In this way, such medicines cause the expulsion from the body of matters which would otherwise be retained, either in the blood, or in the biliary ducts, and would act more or less powerfully as poisons.

5. By diminishing the quantity of the serous part of the blood, they certainly stimulate the action of Absorption in all parts of the body, especially of any fluid effusions. This object is more safely and beneficially attained by the Purgatives; and this and other means of promoting certain excretions are the most effectual, if not the only true, sorbefacients.

6. They promote the discharge of other excretions, *e. g.* the previous use of purgatives often apparently promotes the action of diuretics, and the action of vomiting more remarkably, although temporarily, facilitates that of expectorants and of sudorifics.

Those beneficial effects are attended, in some instances, or even superseded, by certain inconveniences or dan-

gers; thus the altered determination of blood, by the act of vomiting, is sometimes injurious in affections of the head, and the debilitating effect of repeated purgatives is often injurious,—perhaps especially in diseases of the chest.

The means which we possess of increasing the other Excretions from the body, are of more limited application, but in certain cases are of signal efficacy. The occurrence of Sweating, in the course of acute diseases, is much more frequently a sign than a cause, of abatement of the morbid action, and when so, is hardly to be promoted, and not to be imitated by art; but in certain of the inflammatory diseases, especially of the muscles and joints, and of the mucous membranes, it may be produced pretty certainly by certain medicines and regimen, and may be signally useful; and the benefit derived from many medicines, both vegetable and mineral, in affections of the skin, and from the various kinds of tepid and warm bathing, on many diseases, is certainly much connected with, if not wholly dependent on, their permanent diaphoretic effect.

The use of Diuretics is nearly confined to the attainment of a single object, but one which is often of the most essential importance, viz. the consequent increase of the absorption of extra-vascular serum in dropsical cases. The use of Expectorants is more frequently demanded, but the efficacy of the means in our power of promoting this excretion, either by the nauseating or the more stimulating expectorants, is less decided. The use of Errhines and Sialogogues is very limited; but the different expedients which are called Emmenagogues, are not only frequently demanded, but often seem decidedly effectual.

Another class of remedies may be said to act by establishing new excretions from the body, viz. the Counter Irritants,—the effect of some of which is rapid and transient, that of others slow and permanent; both, when prudently and judiciously employed, are found to be the most useful *derivants* of the blood from parts where certain kinds of diseased action are going on.

There are means in our power, often essentially useful, of attaining the very opposite object to that for which these evacuant remedies are designed, viz. the Astringents, by which (partly, as we believe, by a power exerted even on dead animal matter, but chiefly by an agency on the living solids, often much aided by opiates) excessive evacuations, of blood itself, or of any of the excretions, are restrained, and the debility, or threatening of death by Asthenia thence resulting, in the course of various diseases, both acute and chronic, may be averted. Caution is required in the use of these, as of all other powerful remedies, particularly in the early stage of diseases, in which excessive excretions occur, lest they should occasion an injurious retention of matter destined only to excretion, and more or less of the Antiphlogistic treatment, is very often properly premised to their use; but there are many cases of diseases, in which astringents are of the highest importance; and we have a tolerably distinct knowledge of the different means of this kind, which are suited to the discharges from different parts of the body, *e. g.* from the lungs, from the bowels, the bladder, or uterus.

III. The remedies which are thought to exert a peculiar power over the amount and nature of the products of Nutrition, and particularly over the formation of

morbid growths, are sometimes called Alteratives; but as the chief object of practice, in regard to morbid growths, is to restrain their formation, or cause their reabsorption, *i. e.* to excite the action of absorption, which always accompanies the vital act of Nutrition in animal bodies, they are more strictly called Deobstruents. But we must admit, that it is much easier, in practice, to perceive the circumstances in which these remedies are indicated, than to find effectual means of fulfilling the indication.

The important distinction to be kept in mind here is, between the morbid growths, which consist only of materials naturally existing in the blood, and in the solid textures of the body, and those which are *heterologous* deposits, foreign to the healthy condition of the body. When swellings consist only of the first kind of matter, there is always a strong tendency to their absorption, as soon as the morbid action producing them has subsided, and the stronger, as the system is the more healthy. Such absorption, in these circumstances, is facilitated by the proper means of correcting any deviation, of whatever kind, from the healthy state of the body, and often especially by what we have described as the Tonic Regimen; and several medicines, *e. g.* Mercury and Iodine, appears certainly to possess a power in promoting this action, although of the degree of that power, exerted, as it usually is, only in circumstances where Nature is already employed in the work of absorption, it is very difficult to judge. But when heterologous deposits have once occurred, their complete reabsorption is probably beyond the reach of any provisions which the living body possesses; although even then such means as are effectual in really invigorating the system, restoring

the more natural condition of the vital affinities existing among the constituents of the blood and the animal textures, may certainly restrain their farther development, and even, as we have good reason to think, determine ultimately the reabsorption of a part of their substance. Of this we have unequivocal evidence when tubercles have been deposited in early life, when the general health has improved, and the vestiges of these tubercles been found subsequently, nearly converted into earthy matter. But we have no reason to believe that any medicines possess any specific power of exciting absorption of such matters.

There are some instances, both in medical and surgical practice, where the morbid nutrition of small parts of the body may be corrected in a much more effectual and summary manner, viz. by destruction of the part in which the diseased action is going on, followed by a healthy state of nutrition in the neighbouring parts, and thereby obliteration of the disease,—as in the healing of inveterate ulcers after application of caustic, or the destruction of parts in which the Hospital Gangrene has appeared.

IV. It is almost certain, that no remedies which promote absorption can do so by any change they can produce in the contractile power of the vessels through which the absorption takes place, and we have every reason to believe, that it is only by a change in the vital attractions and mutual affinities of the constituents of the blood and the textures in any part of the body, that an increase of the absorption there can be effected. All truly deobstruent remedies, therefore, and, indeed, all that affect the nutrition and secretions in the body, may

be believed to act primarily, at least in part, on the Blood,—not, however, primarily or chiefly on its chemical composition, but on its vital properties.

But there are other remedies which are thought to exert a peculiar power exclusively on the blood, particularly increasing the quantity, or stimulating the vital powers, of that portion of the blood which in the living body possesses the properties of Fibrin; and on the vital powers of which portion the very existence of the natural circulation in the capillaries appears distinctly, from some of the experiments of Magendie, to depend. It is thus that we believe fresh vegetable food, and vegetable acids, to act in correcting the morbid state of the blood in Scurvy; or animal food to a certain extent in Diabetes; and it is thus also that different saline substances, Ammonia, the Chlorates, &c., are thought by many to act (although with a much less certain and less powerful influence) on the peculiar condition of the blood in typhoid fever, and other strictly febrile or exanthematous diseases, in Purpura and malignant Cholera.

It is obvious that the great desideratum in Therapeutics at present is, to establish the laws according to which the vital affinities of the minute particles of the blood and the living solids may be altered by the agency of remedies; and that when this is done, most of the remedies which we now describe, somewhat vaguely, as stimulating secretions, excretions, absorption, &c., or even as specifics, will be regarded as acting primarily on the blood, and on the vital changes which are continually going on in its substance, and which are essential to its healthy constitution.

V. The agency of the last class of remedies which

we have to notice is better understood, not indeed in its own nature, but in the effects by which it is made manifest, viz. that of the remedies which specifically affect the Nervous System. Of these the most important are the Narcotics, *i. e.* such doses of different narcotic poisons as are found by experience to act only as soporifics and anodynes, and which are, from those powers, among the most important resources of medicine. These are always attended with inconveniences, and particularly with this, that the quantity of them required to be taken to produce the desired effect on the nervous system is, by reason of a well-known law of nervous actions, subject to continual, and, in some instances, almost indefinite increase; but in many cases of disease—particularly of incurable disease—this inconvenience, when weighed against the sufferings which such remedies can relieve, does by no means justify the discontinuance, or even intermission, of their use.

Besides the Narcotics, other medicines, such as æther, assafœtida, &c., which make a strong temporary impression on the Nervous System, have a certain degree of efficacy as Antispasmodics; there are certain means, such as Galvanism, and small doses of Nux Vomica, which act peculiarly as Stimulants to the Nervous System; there are others, commonly called Tonics, such as the preparations of bark and steel, and other metallic preparations, which have in many instances a remarkable effect in diminishing the tendency to those disorders, whether painful or spasmodic, which are of remitting character, and which seem to depend exclusively on disordered action of the nervous matter;—and it seems highly probable, that many of the medicines, or other expedients, which are generally called Stomachics, *i. e.*

thought to improve the appetite and digestion, affect especially those actions in the Nervous System, which form an essential part of the process by which the gastric juice is evolved.

It is obvious that our judgment of the probable course and termination of any disease, *i. e.* our Prognosis in any case, necessarily requires a knowledge, both of the nature, and usual progress, and consequences, of the morbid action going on, and likewise of the efficacy, and the applicability to that case, of the resources of the Art of Medicine now enumerated.

END OF PART I.

OUTLINES OF PATHOLOGY

AND

PRACTICE OF MEDICINE.

PART II.

OF FEBRILE DISEASES.

ARRANGING the whole subject as far as possible, *synthetically*, or systematically, *i. e.* beginning by an exposition of those principles which appear to be the most general results of the observation of facts in this department of Nature, we here treat of all those Diseases, which, when occurring in their most perfect or best marked form, are attended with the symptoms of Fever, as characterized by the comprehensive definition of Cullen,—"Post horrorem, pulsus frequens, calor major, plures functiones læsæ, viribus præsertim artuum imminutis." These we believe to be essentially distinct from a number of other diseased states of the body, which, even in their most exquisite form, do not present that peculiar combination and succession of symptoms; and this distinction, notwithstanding the obscurity that still exists

as to the essential nature of Febrile action, we think, practically important; admitting, however, that those diseased states of the body, which, in their perfect form, are always attended with fever, present themselves likewise under various circumstances, to be afterwards described, without the accompaniment of febrile symptoms, or with an imperfect form of them, and so may be said to graduate insensibly into non-febrile diseases.

Of the Febrile Diseases, we make two great divisions; the Inflammations, where we believe the febrile symptoms to be dependent on, or essentially connected with, certain local changes that are going on in the circulation and nutrition of individual parts of the body,—and the Fevers properly so called, where we believe both the general febrile symptoms, and any local changes which occur, to be the effects of a general change, involving the whole mass of blood (whether it originates there or not), and most generally depending on the introduction into the blood of some kind of morbific poison.

Of these great classes of Febrile disease, we think it important to consider the Inflammations first, because the inflammatory diseases are the result of causes of more uniform operation; and because much of what is to be said, especially of the more complex and dangerous forms of the strictly febrile diseases, must necessarily bear reference to what has been ascertained of the history and progress of inflammations, and of the effects of remedies upon them.

DIVISION I.

OF INFLAMMATORY DISEASES.

Still proceeding synthetically, we state first the most general principles that have been ascertained as to that kind of diseased action which we term Inflammation, in whatever part of the body it may occur, and afterwards treat of the Inflammations of individual parts. And although the Pathology of Inflammation is still imperfect, it is so far advanced that it will answer better to state what is known of the essential nature of the process itself, and of its various consequences, in connexion with the account of its symptoms and external effects, than to treat formally of the proximate cause of Inflammation, after having traced its whole history as made known by symptoms and ultimate results.

CHAPTER I.

OF INFLAMMATION IN GENERAL.

SECT. I.—*Of the Primary and Characteristic Phenomena of Inflammation.*

THE term Inflammation—derived from *inflammo*, to burn, and suggested probably in the early ages of medicine by an erroneous idea of the nature of the changes which it denotes—has yet been employed, in all ages, as a short and significant expression for a combination and succession of phenomena, regarded as among the most frequent and most important of any with which the physician or surgeon is conversant; phenomena consequent on every mechanical injury applied to the living body, and frequently excited, in a greater or less degree, by many of the noxious agents to which we give the name of poison, and by almost every other influence or external cause which is capable of injuriously affecting it.

The effects of the morbid changes thus denoted, varying remarkably in different cases and in different parts of the body, resemble, and therefore illustrate, and very often combine themselves with, all other modes of diseased action of which the living body is susceptible; under favourable circumstances, inflammation is more completely under the control of remedies than any other diseased state; and yet we know that it is concerned in producing a very large part of the mortality in all parts of the

world. It is therefore, on all accounts, the kind of diseased action which it is the most important for the Pathologist to study. And it has been generally agreed, that the most distinctive marks by which this diseased state in any part of the human body, or of the most analogous animals, can be recognised, are those employed for that purpose at least so long ago as the time of Celsus, viz. the combination of *pain*, *swelling*, *heat*, and *redness*, in any one part of the body.

It has been objected, however, to the whole doctrine of inflammation as usually delivered, and the very use of the term, that the phenomena included under this term have been inaccurately and imperfectly generalised, and the term itself so vaguely applied, as to have injured the progress of science.*

But the proper conclusion to be drawn from the exposition of these errors is, not that the term inflammation should be abandoned, or that the numerous and accurate observations, comparisons, and inferences, made and confirmed by so many medical observers on the diseases

* "Crée dans l'enfance de la science, cette expression toute métaphorique était destinée à représenter un état morbide dans lequel les parties semblent bruler, s'enflammer, &c. Reçu dans le langage, sans qu'aucune idée précise lui ait jamais été attachée, sous le triple rapport des symptomes qui l'annoncent, des lésions qui la caractérisent, et de sa nature intime, l'expression *inflammation* est devenue une expression tellement vague, son interprétation est tellement arbitraire, qu'elle a réellement perdue toute valeur; elle est comme une vieille monnaie sans empreinte, qui doit être mise hors de cours, car elle ne causerait qu'erreur et confusion." (Andral, *Prècis d'Anat. Pathol.* tom. i. p. 9.) Nous sommes loin de nier l'existence des phénomènes dites inflammatoires, mais nous ne pouvons pas accepter la dénomination consacrée." (Magendie, *Leçons sur les Phénomènes Physiques de la Vie*, tom. iii. p. 383.) "On finit un livre entier de toutes les idées que représente le mot inflammation, car il est synonyme du mot maladie." (*Ib.* p. 445.)

which they have termed inflammatory, should be in any degree neglected; but only that the phenomena, whether in the living or dead body, to which this name is to be given, should be more strictly defined, the varieties of which they appear susceptible more carefully described, and the connection between these local changes and the concomitant constitutional derangements more clearly ascertained, than has often been done.

In order to give the requisite precision to the general notion of Inflammation, as a local change of the condition of any part of the body, it seems only necessary to include in it, besides the pain, swelling, heat, and redness, the tendency always observed, even when the changes in question are of short duration, to *Effusion* from the bloodvessels of some new products; speedily assuming, in most instances, the form either of coagulable lymph or of pus.* It is true, that there may be inflammation either of so slight intensity, or so short duration, as never to shew these, its usual consequences; but we may lay it down as a rule, never to apply the term except in cases where we are satisfied that the tendency to these effusions exists, and that, if they do not appear, it is only because of the minute scale, or the rapid abatement, of the diseased action. A peculiar *perversion of nutrition, or of secretion*, we may hold to be essential to the very existence of inflammation; and all descriptions, and all attempts at explanation of the

* The "*nisus* aut ad suppurationem aut ad gangrænam," is set down by Frank as one of the essential characters of inflammation. Of these it seems unnecessary here to specify the last termination, inasmuch as it probably never takes place until other characteristic effusions have already fixed the character of the diseased state.

changes to which the term is applied, if they do not include this their most essential peculiarity, we must regard as necessarily and fundamentally defective. It is true, that the various effects which we ascribe to inflammation, adhesion, suppuration, ulceration, gangrene, are very different from one another, and that we cannot satisfactorily point out the cause, or even the mode, by which each is effected; but we may be fully assured, from ample observation, that all these occur as effects of an inflammatory action, originally of the same kind; we can go a certain length in pointing out the conditions under which each of these results takes place; and we may refer to these as general and established facts, in many pathological discussions, on more obscure phenomena.

We may therefore begin this subject by briefly enumerating the *local changes*, and the principal varieties of these, which are observed in any part of the body during the progress of what we call the state of inflammation—including, in this enumeration, both those changes which are on so small a scale as to be visible only under the microscope (which, of course, have only been satisfactorily seen in the translucent parts of animals), and those which make themselves obvious to the unassisted senses, and are seen in all the textures.

Immediately after the application of a stimulus which is capable of exciting inflammation—especially if it be one which acts on a large surface, as alkohol applied to a membrane—a constricted state of the small vessels of the part, and an accelerated flow of blood through them, have been distinctly seen by various observers; but this state is of short duration, and during it the characteristic

marks of inflammation are not perceived. After a time, varying from a few minutes to some hours from the first application of the exciting cause, the opposite change in the condition of the small bloodvessels is observed; they become enlarged and distended; the movement in those most affected is slower than before; there is often absolute stagnation for a time, and often *oscillation*, in different portions of them, and the globules of the blood which they contain are found to coalesce into irregular masses, in which their individual forms are no longer recognised. This is the condition of those parts in which the redness and swelling are the most intense. In the neighbourhood the vessels are likewise enlarged, while the flow through them is more rapid than natural. Over the whole surface, and especially where the movement of the blood is retarded, many small vessels become obvious, which were not previously seen. This is no doubt chiefly owing to the reception of the globules of the blood into vessels previously admitting only its colourless liquid; but several observers think they have distinctly observed the formation of new vessels, by globules escaping from the vessels and making tracks for themselves in the surrounding textures. It does not appear that either acceleration or retardation of the flow of blood is essential to the state of inflammation; and although the latter state is always predominant in the parts most severely affected, yet, partly in consequence of the accelerated flow in the neighbouring vessels, and partly of the increased quantity of blood received, more than compensating for its slower progress through the most diseased part, the whole quantity of blood returned by the veins, from an inflamed part (as in the case of the hand)

is found to be greater, and, when the inflammation is severe, to be three or four times greater than that returned, within the same time, by the veins of the opposite sound organ.

Within a time, which is likewise various, but often very short, from the beginning of these changes, the characteristic Effusions of inflammation begin to shew themselves, chiefly, perhaps solely, in those parts where the flow of blood is retarded; first, the surrounding textures are loaded with a serous fluid; but gradually changes take place in this fluid, which indicate that other constituents of the blood have exuded from the vessels; part of the fluid effused assumes a gelatinous consistence, and forms flakes or layers, which gradually become solid. In the semifluid matter first effused, according to Gendrin and others, small globules, thought to be decolorised globules of the blood, may often be perceived; the matter effused certainly, in part, aggregates together into somewhat irregular, but nearly spherical masses, larger than the globules of the blood, to which the names "Globules of Inflammation," and "Exudation Globules," have been applied; and in many cases globules of pus, known by their larger size and freer motion on one another, and, when observed in mass, by their yellow colour, soon appear in this effused matter; and it assumes, more or less rapidly, and more or less generally, the form of purulent matter.

When the inflammation occurs in serous or mucous membranes, the first effusions from the bloodvessels go only to increase, and probably attenuate, the natural exudations from these surfaces; but as the inflammation advances, the fluid thrown out becomes always, as in

other parts, of thicker consistence, as well as more copious than natural, and often more or less distinctly purulent.

Along with the semifluid lymph effused in the earlier stage of inflammation, there is often extravasation of the colouring matter of the blood, and sometimes of entire blood; but most of the inflammatory exudation, in the cases to which we give the name of simple or healthy inflammation, soon acquires, in most textures, the appearance of the coagulable lymph or fibrin, such as constitutes the buffy coat of inflamed blood. In this effused coagulable lymph it is very generally observed that canals are gradually formed, into which some of the capillaries of the inflamed texture soon effuse blood; these canals are, in the first instance, of larger calibre than the vessels which supply them, but soon contract and assume the appearance of vessels (chiefly of veins, when the inflammation is of healthy character), in which the motion of the blood goes on as in the vessels of other parts of the body, and by means of which this new texture of the body becomes liable to nutrition and absorption, like any of the pre-existing textures. It is thus that the permanent Adhesion of inflamed surfaces, and the closing of wounds, whether by the first intention (as it is called), or by granulation, is effected; and that inflammation, within due limits, becomes the grand agent in repairing injuries attended with loss of substance.

On the other hand, the inflammatory effusions are always liable, in a greater or less degree, to the vital action of Absorption; which, although very beneficial in the first instance, and indeed essential to the final disappearance of the disease, very often, in the more advanced stages, extends irregularly to the surrounding

textures, and goes on to an extent which is not required for any useful purpose; and it is in this way, chiefly, that inflammation becomes a cause of that irregular breach of substance in the solids of the body to which we give the name of Ulceration.

Lastly, when the inflammation, and more or less of consequent effusion, have lasted some time in any texture, it often happens that the parts chiefly affected gradually lose their sensibility, change their colour to grey, purple, or black, become soft and flaccid, and ultimately putrid, their circulation gradually ceasing, and all their vital properties being extinguished. This is the termination in Gangrene or mortification, often attended by suppuration and ulceration along the edge of the mortified part, which effects its separation from the living by the process called sloughing; while in other cases (as in what has been called traumatic gangrene) no such process is established to limit the extension of the gangrene, and it is arrested only by the death of the patient.

These obvious changes are attended with less striking, but equally characteristic, alterations in the blood which passes through the inflamed parts. As the globules coalesce into irregular masses, much of their colouring matter has seemed to some to separate from them (*Gendrin*); as the liquor sanguinis, or clear fluid of the blood, exudes from the vessels, it comes forth more loaded with fibrin than natural, so as to deposit much of it in the solid form, when at rest; and this effused fibrin has certainly a peculiar firmness of aggregation, for when it exudes on the inner surface of bloodvessels where a current is going on, although fluid in the first instance, it is not carried off by the stream, but "concretes upon, and furs over, the inside of the vessel." (*Hunter.*)

And again, when a portion of lung is hepatized, or rendered impervious to air by this effused lymph, its specific gravity is rendered distinctly greater than when it is condensed by effusion of blood only, as in the case of apoplexy of the lung, or in that of the "peripneumonie des agonisaus,"—resulting only from the subsidence of the blood to the lowest portions of the lungs, when the heart's action has been much enfeebled, and the arterialization of the blood somewhat obstructed. And as much of the effused fluid often gradually takes the form of purulent matter, the same change has been distinctly observed to take place on portions of the blood contained in the inflamed vessels themselves. (*Gendrin —Gulliver.*)

These local changes are always observed to extend more or less from the point where they commence, before subsiding there. This extension takes place in a much greater degree in some varieties of inflammation (to be afterwards mentioned) than in others; but in all cases two important observations may be made on the extension of inflammation: 1. That it is more apt to take place along the texture where it originates, than to cross from one texture to another; and, 2. That it usually takes place from the original point, as from a centre, in all directions, not following the course either of vessels or nerves, and often passing from one portion of a membrane (as the pleura or peritoneum) to another portion lying contiguous to it, although the vessels and nerves of this portion arise from a distinct source.

The symptoms usually and justly regarded as the most characteristic of the early stage of inflammation, the pain, swelling, heat, and redness, are by no means concomitants of the whole progress which we have now

sketched. The two latter often disappear long before the diseased actions are over; and the pain is not only usually absent in the inflammation of certain textures, such as the mucous membranes and the parenchymatous viscera, but is necessarily and entirely absent in certain cases of inflammation, which nevertheless run through the whole course which we have described; viz. in those inflammations which succeed the division of the sensitive nerves of the eye, or of the lungs, or which affect the mucous membrane of the urinary passages in complete anæsthesia of the lower parts of the body. Nevertheless, in the natural state, pain readily increased by pressure on any part within reach of the finger, is very generally a most important diagnostic mark of inflammation.

While these local changes are going on to any considerable extent in any part of the body, the functions of that part, and often of neighbouring parts, or of parts connected in function with it, are very generally and considerably altered, although with varieties which will require more special consideration afterwards. Farther, a general or constitutional derangement, in a healthy constitution, almost uniformly attends them; and this is indicated in two ways.

First, the blood over the whole system gradually assumes that change which is expressed by the term sizy, or shews the buffy coat when coagulating; by which we mean that its fibrin and its colouring matter have a tendency to separate from one another when the former becomes concrete; the cause of which tendency we leave doubtful for the present, only observing, that it does not depend on any alteration of the time

requisite for coagulation, being observed under great varieties of the time during which the progress of coagulation goes on. In cases of intense or violent inflammation, two other changes are distinctly observed on the fibrin of the blood, besides its increased tendency to separation from the colouring matter: *first*, that its proportion to the other constituents of the blood is gradually and often greatly increased; and, *secondly*, that the aggregation of its own particles during the coagulation is increased, so that the coagulum formed becomes preternaturally firm or contracted. According to the recent observations of Andral, the proportion of the Fibrin to the other constituents of the blood is always increased when the buffy coat shews itself; but this is certainly not the whole change, on this portion of the blood, which then takes place. The *increased aggregation* of the fibrin which separates from the colouring matter (varying remarkably even when the quantity of the separating fibrin is nearly alike) and the tendency to lateral separation of the colouring and colourless parts of the blood, seen even in very thin films of sizy blood (as noticed particularly by Schræder), are characteristic changes which cannot be explained by the increased proportion of the fibrin.

According to Gulliver and others, globules of pus, or nearly resembling and easily transformed into them, are found in the blood in inflammatory diseases long prior to the deposition of pus from the vessels, or even in cases where no such effusion ever takes place; and it seems certain that there is a tendency to aggregation of globules (whether coloured or colourless) in the blood, not confined to the vessels where the inflammation resides. These changes on the blood out of the body are

not yet fully elucidated; they seem to be liable to some variety, and are always gradual, so that they are in general hardly perceptible in blood drawn very early in inflammatory diseases. It is probable, from the microscopical observations already stated, but not fully ascertained, that these changes are wrought on the blood only in the course of its progress through the vessels which are the seat of the inflammation.

Secondly, In consequence of the existence of local inflammation in any part of the body for a certain length of time, that affection of the whole system to which we give the name of Constitutional Fever is very generally excited, liable to great variations, which will be afterwards considered,—commencing by sense of coldness, rigors, and lassitude, which are followed by increased frequency and generally increased strength of pulse, increased heat of skin, and the other symptoms of febrile excitement or Reaction,—particularly headache, restlessness, hurried breathing, and general soreness or uneasiness, denoting a disordered state of the Nervous System,—attended with thirst and anorexia, and usually with a white but moist tongue, costiveness and scanty high-coloured urine, and dryness of the skin, denoting deficiency of various secretions. This inflammatory form of Fever or Synocha is farther marked by the absence of certain symptoms which distinguish the different forms of what we call Idiopathic fever,—particularly by the absence of any specific eruption on the skin, or of any of the indications of the dissolved or putrescent state of the blood (petechiæ, &c.); and again by the absence, during the greatest violence of the disease, of those peculiar signs of derangement of the nervous system, to which we give the name of ty-

phoid (the peculiarly overpowering "depressio febrilis" and muscular debility, muttering delirium, subsultus tendinum and other spasms, stupor, &c.); which form a prominent part of the character of the strictly febrile diseases, but not of the simply inflammatory, excepting in cases where the nervous system itself has been inflamed or injured.

Of the local changes which constitute inflammation, there are, strictly speaking, only two terminations,—the one by resolution, or gradual abatement of the disordered state of the circulation, and return to its previous condition; and the other by death of the part: the former of which appears, on microscopical examination, to consist essentially in the gradual renewal of movement in the stagnating blood, the separation of its globules, which had previously seemed to coalesce, and the return of the distended vessels to their former caliber; the latter, to consist in absolute cessation of movement in the blood, and then rapid putrefaction, both of the blood stagnating in the vessels, and the recent effusions. But from what has been said, it will be at once understood that, before inflammation can be resolved, there may in many instances be such an amount and continuance of fluid effusions, or such alteration of the structure, or derangement of the functions of the solids, or such affection of the system at large, as may be either permanently injurious, or immediately fatal; and that the study of the different modes of fatal termination of inflammatory diseases, of which we shall presently speak, may be prosecuted successfully, and with great practical advantage, even while the intimate nature of inflammation itself is still imperfectly understood.

SECT. II.—*Of the present state of our knowledge of the essential nature of Inflammation.*

Having offered this general sketch of the various phenomena to which the name of Inflammation, or inflammatory action, is given, we may next, before going farther into details, proceed to inquire, how far the present state of our knowledge enables us to form an opinion of the intimate nature, or proximate cause, as it has been termed, of this deviation from the natural condition of living parts. That any explanation of these phenomena should be very general, and leave much unexplained, is no more than we must expect when we remember, that all explanation is founded on comparison, and that the phenomena in nature which can be brought into comparison with the changes in inflamed parts are neither numerous nor well understood. Certain principles, however, of essential importance in this inquiry may be laid down with confidence.

I. It has been generally thought in this country, at least since the time of HUNTER and CULLEN, that any such fundamental morbid changes as have now been enumerated, must depend on alteration of the *vital* powers or endowments of the body, and that no satisfactory explanation of them, on simply mechanical or chemical principles, or by any combination of the two, is to be expected. It has indeed been attempted, of late years, in France to resolve all the phenomena of inflammation into the mechanical and chemical effects of ob-

struction of the capillaries;* but this will be generally regarded in this country as a step backwards, not forwards, in pathology. Considering inflammation as a condition of the living body, in which an alteration of secretion and nutrition, as well as of the capillary circulation, is essentially concerned, we may apply to it the language of MAGENDIE himself on the physiology of these functions:—"Sans doute il se passe au sein des vaisseaux capillaires des phénomènes *que la physique ne saurait expliquer:* sans cesse de nouveaux matériaux sont déposés et reposés dans la profondeur de nos tissus; c'est cet échange mutuel de molécules vivantes qui constitue l'acte important de nutrition. Qui pourrait se flatter de soulever le voile dont la nature se plait à envelopper ces mystérieuses fonctions?" (*Op. cit.* tom. ii. p. 134.) And it is important to state briefly the considerations which seem clearly to indicate, that mere mechanical obstruction in the capillaries, and mere chemical changes on the blood, whether preceding or following that obstruction, cannot suffice for the explanation of the phenomena of inflammation, as understood in our time, any more than when the theory of obstructed vessels, as laid down by BOERHAAVE, was opposed and refuted by CULLEN.

1. If the mere circumstance of obstruction of the

* "L'irritation et l'inflammation artificiales sont tout simplement des resultats mécaniques." (MAGENDIE, Leçons sur les Phenomenes Physiques de la Vie, tom. iii. p. 433.) "Inflammation diffère de la congestion en ce, que, dans celle ci, il n'y a que dilatation des capillaires sans obstruction ni rupture de leurs parois." (Ib. p. 426.). And again,—"L'élévation de température de la partie inflammé rend très bien compte de ces transformations chimiques qu' eprouve le sang dont la marche a été accidentalement suspendue." (Ib. p. 433.)

capillaries, and arrest of the circulation at a small spot, were an adequate cause of inflammation, extending, as we so often see it do, to a distance in all directions from the part injured, we ought to have inflammation in every case of such obstruction, *e. g.* where a vessel is tied or otherwise obstructed, so as to lead to very unusual distension, first of the larger vessels communicating with it, and then of the small capillaries into which they ultimately divide; which we know not to be the case. It may be said, that it is only obstruction of acpillaries themselves that can thus derange the capillary circulation; but it is easy to produce examples to shew, that there may be much obstruction of capillaries without inflammation, and that when inflammation is excited by any cause which obstructs the capillaries, its extent and intensity bear no fixed proportion to the degree of obstruction in which it originates. Thus, it is stated by MAGENDIE (tom. iii. p. 431), that the prick of a pin excites inflammation on a membrane, only when it causes effusion of blood, and so deranges the circulation in the capillaries. But we often see considerable effusions of blood on the tunica conjunctiva of the eye, which must obstruct many capillaries, but are nevertheless gradually absorbed, without exciting any inflammatory appearance or effusion around them; while, on the other hand, a prick of a needle causing little hæmorrhage, or a grain of sand producing none, may excite violent inflammation, the extent and intensity of which will depend on various conditions, quite unconnected with the original derangement of the capillary circulation. In every case of apoplexy of the lung, there must be absolute obstruction of very numerous capillaries; but in many such cases there is no inflammation

excited around the blood effused; and in equally numerous cases there is extensive inflammation of the lungs, when the existence of any cause capable, on merely mechanical principles, of obstructing the capillaries, is, to say the least, quite hypothetical. Nay, it appears from many experiments of MAGENDIE himself, as well as others, that the circulation may be obstructed in the capillaries to such a degree as to cause death of the part, without inflammation necessarily preceding it; for by injecting animal charcoal into the crural artery of a dog, so as to choke up the capillaries, he found that he could produce complete death and putrefaction of the limb within forty-eight hours, and he sets aside, with good reason, the idea of this gangrene being the result of inflammation running into that termination within that time. (Tom. iii. p. 395.)

Again, while in these cases there is obstruction without inflammation, we can give instances, on the other hand, of bloodvessels in a state of inflammation where there can be no obstruction. Indeed two facts of this kind, already stated as to inflammation, seem to be quite beyond the reach of the mechanical explanation, viz. the doubled or tripled quantity of blood *transmitted through* an inflamed limb in a given time, and the extension of inflammation from one fold of the membrane to another lying contiguous to it, but *fed by other vessels*, —from the pleura pulmonalis to the pleura costalis, from the mucous membrane of the gums to that of the cheek, &c.

2. Even if it were proved that the chief symptoms of inflammation are merely the mechanical results of obstruction of the circulation in the capillaries, we

should not be entitled to deny the intervention of the vital properties of the part in producing the phenomena, unless we could explain, on mechanical principles, how that obstruction of the capillaries is brought about. Now, how can we conceive that the merely mechanical action of a grain of sand, or of a still more minute particle of the matter of gonorrhœa, on the conjunctiva of the eye, should so obstruct the capillary circulation there, as to cause all the congestion and effusion which are seen in acute ophthalmia, while it produces no such effect on the living membrane of the mouth, or of any part of the alimentary canal? Still more, how can we conceive that cold applied to the surface of the body should, on merely mechanical principles, determine an extensive, permanent, and fatal obstruction of the capillaries, in one distant internal organ only?

3. If these difficulties were got over, it still remains to be shewn, on mechanical principles, how the obstruction of the capillaries can produce the most characteristic of the phenomena of inflammation, *i. e.* the effusion from the vessels, not merely of serum as in dropsy, or of blood as in hæmorrhage, but of the *liquor sanguinis*, holding in solution a *much larger proportion of fibrin* than in other parts of the body:—how this effused fibrin can first shew an unnatural degree of aggregation and density, and afterwards become vascular and organized; and how the properties of the whole blood, the relation of its colouring matter to its fibrin, and even the relative proportion of its constituent parts, can become altered, apparently by passing through the vessels of the inflamed part. Any account of the phenomena in question, which does not touch these charac-

teristic changes, may be an explanation of swelling and redness, but is no explanation of inflammation.*

4. If we suppose the mechanical explanation of the origin and progress of inflammation to be satisfactory, no explanation is attempted, nor is it easy to perceive how any can be given, of the gradual decline, which is equally a part of the history of the disease, as it is of all excitement or increase of action that is strictly *vital.* Why should the globules of the blood, when they have coalesced and stagnated, and filled and distended the capillaries, gradually separate, and get into motion again; and why should the capillaries shrink to their former dimensions? If it be said, that the increased impulse *à tergo* forces forwards the stagnating blood, the obvious answer is, that the resolution of the inflammation is greatly promoted by the loss of blood, and by weakening the heart's action, *i. e.* by lessening the impulse *à tergo.*

If, again, it be said that the capillary vessels, after a time, regain their power of contracting on and propelling the blood, the answer is, that the vessels in question possess so little contractile power, that even in their undisturbed state they are dependent, as MAGENDIE

* MAGENDIE himself observes, quite correctly, as to the coagulation of the blood, "La véritable cause de ce phénomène doit être cherchée dans l'absence du contact entre le liquide et les parois de ses tuyaux. Qu'elle est donc cette harmonie si parfaite dont le dérangement entraine de si graves conséquences? Je l'ignore. *Elle dure avec la vie et s' éteint avec elle.*" (Tom. iii. p. 257.) This is asserting that the coagulation of the blood is a vital phenomenon. And if so, is it not almost self-evident, that when we find the coagulating part of the blood so much altered, in its proportion to the other parts of the blood, and in properties, as it is in inflammation, the process by which that alteration is effected must be likewise a vital one?

has shewn, on the coagulating property of the blood itself for any power which they possess of retaining it within their own area.

5. Even if we suppose, that all the phenomena of one form of inflammation can be explained on the simply mechanical principle of obstruction of the capillaries, the theory will still be quite insufficient if it does not extend to the varied forms of which the same general series of phenomena is susceptible, *e. g.* on the skin; the rapid extension of the disease in one case, and its limitation in another; its early maturity and decline in one case, and its obstinate persistence in another; its resulting in the effusion of serum almost without fibrin in one case, of plastic lymph, which quickly becomes vascular, in another, and of purulent matter only, incapable of organization, in another,—all being products foreign to the usual condition of the part inflamed, and incapable of being formed otherwise than by a mysterious agency of living textures.

It will be observed, that these considerations are all founded, not on speculation, but on observed facts, at least equally well ascertained, and equally guarded from fallacies, as any that can be observed in experiments on animals. To leave them out of view, in forming an opinion of the nature of inflammation, is to reject, not the aid of hypothesis, but the evidence of facts. We do not say that we explain these facts by saying that inflammation is a vital phenomenon, of which the explanation must be sought only in the laws of life; but we make the first step to the proper explanation, when we place the phenomenon in its proper class among the subjects of human knowledge; and from the facts now stated we infer, with perfect confidence, that any mechani-

cal explanation of the kind in question can only reach a part, and not the most characteristic part, of the phenomena of inflammation; and that, in this as in other instances, all attempts to resolve the most essential changes which go on in the living body, into the laws of dead matter, "can only tend to perpetuate false views in physiology, and to draw us off from the proper point of view, in which the actions of living bodies should be regarded."

II. The next question is one on which there is more difference of opinion among British pathologists. It is, whether the phenomena of inflammation can be explained by alteration of the *vital powers of the vessels* in which the blood moves, or whether they must be chiefly referred to alteration of *other powers, influencing the condition and the motion of the blood* in the living body, but independent of any contractions of living solids?

In considering this question, we may first state, that if inflammation depend only on alteration of the vital power of contracting solids, these solids must be the vessels, to the exclusion of the heart, all the characteristic phenomena being often observed when the heart's action is unchanged; and we may next affirm, that the only vital properties which experiments authorize us to ascribe to any vessels is the power of Tonicity, as defined and illustrated by Parry, which mainly co-operates with and augments the effect of their elasticity, causing them to contract when emptied of blood, and to remain contracted for life; and which seems to be itself augmented on certain occasions, as is shewn by their contracting on a stimulus, and remaining contracted until the effect of

the stimulus is over, or is counteracted by some other cause.

It is quite obvious, that any *increased* exertion of this power in the arteries, particularly if commencing in the capillaries and extending backwards, must impede and obstruct the passage of the blood : simple and decisive experiments were performed by Hales and by Wedemeyer, in which stimulating liquids were injected into arteries, and, following the course of the circulation, must have exerted their chief effect on the smaller branches of these vessels, and were found to be transmitted into the veins much more slowly than the blood itself, or mild liquids injected into the arteries.

As we have stated that one of the leading phenomena of inflammation is an increase, not only of the quantity of blood in the small vessels of the whole part affected, but of the quantity transmitted *through* them in a given time into the veins, there is a manifest presumption, that the general condition of the vessels concerned in inflammation must be the reverse of that state of permanent tension, which a stimulus acting on living arteries is found to produce. Accordingly it has been long known, that the capillary vessels, and small arteries of an inflamed part, appear under the microscope distended and motionless.

We need not enter on the question, whether the smallest capillaries of most textures of the body have any contractile coats at all ; but it is quite certain, that when they are in this distended state, there can be no spasm or contraction exerted by such coats as they possess, capable of maintaining the distended state of the vessels behind them. And in a series of observations made in

Edinburgh on the arteries leading to inflamed limbs in horses, at different parts of their course, and at different periods of the inflammation, it always appeared that these vessels possessed *less* of the only vital power which experiments authorize us to ascribe to them,—that they had less power to propel their contents, and contracted less, at the moment of death,—than those of the opposite sound limbs. (*Transactions of British Association*, 1834–5.)

It may be a question, whether this general state of relaxation and distension, which appears clearly to be the condition of all the vessels connected with an inflamed part, is or is not the effect of an increased exercise of their tonic power of contraction in the very commencement of the diseased state. Into this we need not enter. We consider it as certain, that during the whole time when inflammation, and effusion consequent on it, are most distinctly going on, the condition of all the vessels leading to and passing through the inflamed part, is one not of constriction but of relaxation; and the question before us is narrowed to this,—Does that state of relaxation afford a sufficient explanation of the changes which take place in inflamed parts?

Now, it may be admitted that a general relaxation of the arteries and capillaries of any part of the body, giving increased effect to the impulse from the heart, is an adequate cause for the increased transmission through the vessels of that part, for the apparently increased action of the arteries leading to it, and the increased propulsion of blood from them when they are punctured. But it seems absolutely impossible, that the single cause thus assigned should embrace the two opposite phenomena which are presented by the blood in the vessels of

an inflamed part,—viz. the increased velocity and increased transmission of blood in these vessels on the whole, and the retarded motion or absolute stagnation in those points where the inflammation is at its height. On the supposition, that the only truly propelling power acting on the blood is the heart, and that increased local determinations of blood depend only on local diminution of the resistance offered by the bloodvessels, we can understand that where this resistance is much diminished, the blood should pass through in increased quantity; but we cannot understand that where this resistance is least of all—where the vessels are absolutely passive,—there the opposite change should take place, and the blood cease to pass through at all. If the heart's action is rendered more efficient in one set of vessels by a diminution of their own tonic power of contraction, we cannot possibly admit that it can be rendered altogether inefficient in another set of vessels, merely by a farther diminution of that same power; nor indeed will the total loss of that tonic power enable us in the slightest degree to comprehend this total loss of efficiency of the heart's actions, and consequent stagnation of the blood.*

But if we cannot ascribe the changes in the *motion* of the blood in inflammation to alteration of the contractile power of the vessels, still less can we ascribe to that cause the other changes essential to the state of inflammation—the effusion from the bloodvessels of the liquor

* We speak here of inflammation occurring, as it so often does, without previous obvious mechanical obstruction to the flow of blood through the capillaries, or any impediment to that flow, but that which results from the existence of the inflammation itself, and forms one of its own phenomena.

sanguinis with an increased proportion of fibrin, the consolidation and organization of that effusion,—the conversion of part of the constituents of the blood stagnating in the part, both in the vessels and out of them, into the new secretion, or rather excretion, which we call purulent matter,—in short, any of those characteristic phenomena by which alone we distinguish inflammation from local terminations and congestions of blood, constantly occurring in the system, but consistent with health, or even necessary to life.

We may observe in particular, that two distinct and apparently opposite changes are distinctly referable, in different cases, to inflammation as their cause—extravasation of certain matters, and ulcerative absorption of others. On the supposition, that the power moving the blood through an inflamed part is simply the impulse from the heart, more or less altered by passing along the arteries, and modified in its effect at the part in question only by mechanical causes, especially by some obstruction in the capillaries, we can understand that when the impulse is greater than natural, extravasation should take place, and that when it is less than natural, there should be unwonted absorption. But this theory is perfectly inadequate to embrace the opposite phenomena, viz. rapid inflammatory extravasation when the impulse is feebler than natural, and rapid ulceration when it is stronger than natural. Yet experience shews, that both these phenomena occur frequently, as effects of inflammation,—the former *(e. g.)* in cases of diffuse inflammation of the cellular substance or of the peritoneum, in the nearly latent pleurisies succeeding fever or small-pox, &c.; the latter in cases of phagedenic ulceration. It is quite certain that neither the amount of effusion nor the amount of absorption, consequent on inflamma-

tion, bears any fixed relation to the degree of impulse with which the blood is sent through the inflamed parts.

Neither can any conceivable alteration of the vital contractile powers of arteries explain the essential distinctions of different cases of inflammation on the skin—the erythematic, scaly, vesicular, pustular, &c., varieties, very often depending, as we know, on differences, not in the constitution of the patients, but in the cause of the disease.

We are thus led, by ascertained facts, and, as we believe, irresistible inferences from these, to the conclusion, that inflammation and its effects are inexplicable by any alteration of the contractile power of the living solids concerned in it; and necessarily imply an alteration of vital properties, by which the constitution of the blood, its relations to the surrounding textures, and its movement through them, are determined, but which are quite distinct from any contractions of living solids. That such living properties exist, that they effect the changes taking place at *insensible distances* among the particles of the blood, and that they are altered in inflammation, will hardly be denied by any pathologist. That they are capable of affecting the *visible* motion of the blood, will appear a rash assertion only to those who have not accustomed themselves to consider the evidence by which it is supported.

In fact, inflammation is only one of a number of cases, of constant occurrence in the animal economy, where some peculiar cause (commonly, but vaguely, called a stimulus) is applied to the capillary vessels of one part of the body, and determines an increased flow of blood towards, and increased transmission through that part, *i. e.* the opposite effect to that which experiments on the application of stimuli to arteries would lead us to expect.

Whether we apply to such cases the adage, "Ubi stimulus ibi fluxus," or use the term "adfluxion," or "movement of turgescence," or "solicitation of fluids," or speak of a vital erection of vessels, they all present a phenomenon which must be studied and understood, before an accurate notion can be formed of many leading facts in the history of the living body, in health and disease. When air is admitted into the cells of the lungs, when food is received into the stomach, when a strong impression is made, or sensation excited in any organ of sense, when an embryo begins to grow in the uterus,—this increased flow into those capillary vessels where these causes act, is immediately perceived, and is essential to the important changes which follow; one result of which changes, in several of these cases, is an alteration of the constitution of the blood itself. In all these instances, as well as in that of inflammation, it is impossible to ascribe to the stimulus, which produces what we call the increased action of the part, any power of exciting the only vital power (that of tonic contraction) which the bloodvessels of that part possess; on the contrary, we might be disposed to ascribe the determination of blood to the impression made at the extremities of the vessels, causing relaxation of them, and thus giving increased effect to the impulse from the heart; but this theory is at once checked by two simple considerations; *first*, that a stimulus, such as air, applied to any single vessel or set of vessels, causes constriction, and should therefore impede the transmission of these fluids, instead of promoting it; and, *secondly*, that in extending our views to other living beings, we find precisely similar "movements of turgescence" excited by similar impressions on capillary vessels, in the lowest

animals, and in the whole vegetable kingdom, where there is no heart, and where the existence of any cause of motion, acting on the principle of impulse from behind on the moving fluids, has never yet been proved. These facts afford a strong presumption, that in all these cases the impressions made on the capillaries, and on the blood contained in them, solicit the flow through them on the principle of *a vital attraction of the blood*, rather than of relaxation of the vessels.

It would be out of place here to go into details on the other phenomena of living bodies by which this conclusion may be supported; but we may briefly state the following grounds for the belief, that the fluids in living bodies are subject to a cause of motion, peculiar to the living state, but independent of any impulse, or change of impulse, from living solids:—

1. The movements of the sap in vegetables are equally essential to their life, and minister to the same functions of nutrition and secretion as in animals, yet no contractions of solids by which this motion can be explained have been detected; and, in the cases where the cause of the motion of the sap has been most carefully investigated, it seems well ascertained that no such contraction exists. The observations of Du Trochet seem clearly to prove, that the power of imbibing fluids resides in the spongioles at the ends of the roots of vegetables, and that its exercise is unattended with any movement of the substance of these spongioles. And in the case of the Chara, and other cellular plants, where the motion of the globules contained in the sap is so easily perceived, it seems nearly ascertained, particularly by the most recent observations of the same author (*Ann. des Sciences Naturelles*), that the cause of the motion of the

fluid resides, indeed, in the granular matter which lines certain portions of the sides of the elongated cells composing the plant, but that the power which this matter exerts is of the nature of attraction and repulsion, certainly not of contraction and impulse.

2. The same observation applies, in all probability, to the very similar movements of fluids in various of the lowest of the animals—in sponges, in the polypes called tubularia and sertularia, and in many animals, considerably higher in the scale, in which the circulation is wholly or partially of the kind called *diffused*, *i. e.* not confined to vessels. That the movement in some of these cases may be attended by, or even dependent on, the impulse of *ciliæ*, is very possible; but the case of the sponge and the chara are sufficient to shew, that certain forms of living matter can impress a regular progressive motion on fluids independently of such impulse; and the latter case (as lately explained by Du Trochet) may even induce us to suppose, that the power of contraction resident in living solids is only a particular mode of exertion of those vital powers of attraction and repulsion which subsist both in certain portions of all living textures, and likewise in the "chair coulant" of living fluids.

3. In the commencement of the existence of all animals, as certain definite forms are assumed by the germinal membrane and the semifluid granular matter in contact with it; so certain definite moving powers must not only have been exerted before the existence of heart, or arteries, or blood, or of any texture capable of contraction, but must have been the essential cause of the existence of all these things; and, at a considerably later period of the existence of the embryo of vertebrated animals, there is no moving power, acting in the way of

contraction and impulse, to which we can ascribe that continued entrance of the fluids contained in the uterus into the filaments of the spongy chorion, which is essential to the growth of the whole ovum.

4. At all the later periods of the existence of the higher animals, there is one set of vessels contained in them, into which fluids are introduced, and in which fluids are moved, steadily and forcibly, in a manner wholly inexplicable by any power of contraction which experiments authorize us to ascribe to the vascular coats, viz., the absorbent vessels, which are now generally believed to have no open mouths, and in which no contractile powers have ever been detected, except such as we have ascribed to arteries, and any exercise of which, as in the case of the arteries, would necessarily *retard* the passage of a fluid.

5. While it seems perfectly ascertained that the exercise of the only vital power of contraction resident in arteries must be an additional impediment, instead of an auxiliary, to the heart's action in keeping up the circulation, it has long been observed, that the various obstacles opposed to the motion of the blood through the small arteries, and the very moderate degree of pressure, by which (as Sir C. Bell justly observed) the impulse of the blood in the larger arteries may be arrested, render it highly probable that some auxiliary power cooperates with the *vis à tergo* to maintain the flow through the capillaries. And this probability becomes almost a certainty when we advert to the effect of a ligature on a large artery, which uniformly leads to distension, not of the obstructed artery, but only of the collateral branches, and to shrinking and collapse of the portion of artery which intervenes between the ligature and the

last branches *above* it,—the blood gradually deserting the trunk of the artery, and entering those branches only, by which it can be conveyed to capillaries where vital actions are in progress. This desertion of the portion of an artery above an obstruction, and seeming preference of anastomosing branches, is not only ascertained by subsequent examination of the state of the parts in such cases, but has been witnessed on a small scale under the microscope by Haller and other observers.*

6. A very careful microscopical inspection of the phenomena of the capillary circulation led Haller long ago to the conclusion, that it is "de toute nécessité" to admit the existence of a cause of motion there, to which he gave the name of Attraction, independent of the contractions of the heart or bloodvessels. This conclusion has been adopted by most subsequent microscopical observers in Germany, and although it has been opposed by the authority of Magendie and of Poiseuille in France, yet it may be confidently asserted, that no satisfactory explanation has been given, on any other principle, of some of the facts on which it is rested.†

* We lay no stress on the instances on record, of the fœtus coming to a considerable size without a heart, because we have no well authenticated case, in which such a fœtus has existed alone in the womb, *i. e.* in circumstances precluding the possibility of the circulation being maintained by help of the contractions of the heart of a true fœtus; but it is right to mention, that cases of the kind have occurred, in which competent observers have doubted that any such assistance was given to the circulation in a fœtus without a heart. (See Graves, in *Dublin Journal.*)

† We may mention, in particular, the observations of Haller on blood escaping from vessels between the layers of a living membrane, and nevertheless pursuing its course in a regular stream for a time, even against the influence of gravity; and his observations on the

7. Physiologists are now generally agreed, that the phenomena of the coagulation of the blood, and the varieties to which that process is liable, imply the existence of certain living properties or powers in the fibrin, and particularly of a peculiar attraction or tendency to aggregation in the particles of that substance, under certain circumstances. And of the importance of this living property to the circulation of the blood, we are well assured by the recent and important experiments of MAGENDIE, in which it appeared, that when the blood is in a great measure deprived of its fibrin, or when the coagulating property of that constituent of the blood is destroyed by the addition of alkali, the circulation in the capillaries can no longer be maintained; —this preternaturally fluid blood (although hardly, if at all, inferior in density to healthy blood) being extravasated from them in various parts of the body, and particularly in the lungs, nearly as it is in many cases of malignant fevers. Now,—knowing, as we thus do, that the presence and the coagulating property of the

regular oscillations of globules in limited portions of small vessels. On this last phenomenon Poiseuille asserts, and Magendie agrees with him, that it is to be ascribed to the impulse of the heart's action, and the resistance of the bloodvessels (even although taking place in vessels the coats of which are not seen to contact, and which are not seen to communicate with any of the larger vessels) *because it is found to be synchronous with the heart's action.* (Magendie, *Leçons, &c.* tom iii. p. 275.) But this explanation is wholly inapplicable to the case, repeatedly noticed by Haller, by Kaltenbrunner, and others, in which these regular oscillations go on, particularly in the neighbourhood of inflamed parts, *long after the heart is at rest, or has been cut out of the body.* (See Haller, *Mém. sur le Mouvement du Sang*, Exp. 222, et seq.; Kaltenbrunner, in *Journal de Physiologie*, tom. viii.)

fibrin constitute the power, by which the blood is retained in the vessels in the natural state of the circulation,—when we meet with a case where the blood in one portion of the body undergoes such a change, that the quantity of its animal matter taking the form of fibrin, and the tendency to aggregation of this matter are increased, should we not expect to find the blood accumulate in that part of the body;—coming under the influence of a peculiarly augmented principle of attraction there, equally as we know that, when the heart's action is very feeble, it will come under the influence of the principle of gravitation in any part of the body?

From all these facts we think ourselves justified in inferring, that inflammation consists essentially in a local increase of a vital property of attraction existing among the particles of the blood, and between them and the surrounding textures, and with which other vital properties are connected, and simultaneously excited. That the proximate cause of inflammation, although affecting the constitution of the blood, does not reside in blood only, but primarily in the agency on the blood of the solids through which it passes in the capillary vessels, appears clearly from the limitation of the disease, to a certain locality in the body, from the fact of its easy reproduction, for a long time, or for life, in the vessels which have once been the seat of it,—and from other facts to be mentioned as to inflammatory effusions. In the blood itself, the increased attraction seems to take place, both among the particles of the fibrin which, in union with the serum, constitute the liquor sanguinis in the living vessels, and in those particles, of nearly similar matter, which constitute the bodies of the globules;

the increased aggregation of both, and increasing number of the former, being characteristic of inflamed blood.

The increased flow to the inflamed part, and probably the gradual relaxation of the vessels leading to it, are the consequence of these alterations, just as the acceleration of the flow of blood through the lungs, on the admission of air there, is the consequence of the changes, partly chemical but partly vital, thereby brought on the blood; or as the increased flow to the uterus during gestation, to the stomach during digestion, or to any secreting organ to which a stimulus is applied, is the consequence, not the cause, of the vital changes to which the blood in these organs is subjected on such occasions. When the vital properties of the blood and its relations to the living solids shall have been more carefully scrutinized, this proposition will acquire more precision; but even at present it is obvious that we assert nothing which is not susceptible of demonstration, in asserting, that such a vital power of attraction or aggregation among certain particles of the blood exists in the natural state; that it is the cause of the coagulation of the blood, *i. e.* that it is the cause of any portion of the constituents of the blood taking the form of fibrin; that it is concerned in regulating the circulation in the capillaries; and that it is materially augmented in an inflamed part,—as appears both from the larger quantity of the blood which takes the form of fibrin, and from the greater aggregation of the fibrin itself, both in the blood in the vessels and in the matter extravasated there. And thus it appears sufficiently ascertained, that the afflux of blood to the inflamed part, its stagnation there, and the most important of the changes which it undergoes, are included in

this general proposition, that the fibrin contained in the blood in that part of the body, is affected, during the state of inflammation, with the same change of property to which, when we see it in the fibrin that constitutes the bulk of muscular fibres, we give the name of rigidity or Tonic Spasm.

Having dwelt so long on the intimate nature of inflammation itself, we may state in a few words all that is known of the nature of the changes already described in general terms as its *natural effects*. These effects must be regarded, indeed, at present, as nearly ultimate facts in pathology, and we have already referred to them as illustrating the nature of the change from which they result. Instead of attempting an explanation of them, pathologists are more disposed to refer to them as principles, serving to explain other and less familiar phenomena; but much may be done to make our knowledge of the real nature of these effects more minute and precise.

When we see the lymph thrown out of vessels in the state of inflammation, gradually become concrete, take the form of flakes, and then of membrane, and then form elongated cells into which the blood of the neighbouring textures is received, and in which it continues its motion, we can say in general terms, that this lymph exhibits vital properties similar to those by which the original organization of the germinal membrane of the egg is determined. But it is important to observe two things; *first*, that this vital property resides peculiarly, if not exclusively, in that effusion which takes place from the vessels during inflammation, and even during inflammation of a particular character and in a particular stage.

For, notwithstanding some doubts which have been expressed on the subject, it seems nearly ascertained, that neither blood itself, nor any other effusion from uninflamed vessels, nor purulent matter, nor the effusions from certain varieties of inflammation (*e. g.* scrofulous or erysipelatous) are capable of thus becoming vascular and organized. And the useful purposes which inflammation serves in the animal economy depend essentially on this, that it is the process by which portions of the blood are thus prepared for the vital changes by which they are to close wounds, and repair breaches of texture.

Secondly, It is to be observed, that the property of *plasticity* is communicated to the effused fibrin by the agency of the neighbouring living solids. It is obvious that the particles of effused fluid which are farthest from the solid inflamed textures, are those which shew least of this property, and most easily degenerate into pus; and this difference has been distinctly observed under the microscope. "The fibrin, as it coagulates on the raw surface, forms exudation globules (or 'globules of inflammation'), or *cytoblasts*, many of which cohere in layers, and compose the false membrane. The layers of globules in immediate contact with the living tissues become cells, which then undergo transformation, according to the nature of the texture to be reproduced." (Gerber's General Anatomy, p. 9, and fig. 102-3, 205, 219, 243.) There is some difference among microscopical observers as to the questions, whether any globules analogous to these exist in healthy blood; whether they increase in number merely by contact with living solids in the healthy state; and whether, by means of them, adhesion may be effected between cut surfaces independently of inflammation; but there seems to be no

doubt of the number of these globules or corpuscles being first greatly multiplied, and then becoming the scene of other vital changes, in the immediate vicinity of inflamed surfaces. Ib., pp. 29, 30, 34, 35, 83, 84.

Again, when we see the yellow globules of pus gradually mixing with the other exudations in an inflamed part, and often aggregating together towards the centre of these effusions, we see that another vital change, besides the deposition from the bloodvessels of an unusual quantity of one of the natural constituents of the blood, —that a new secretion, or rather excretion, because destined to discharge from the body—is established. The observation of Mr Hunter, that in external parts this effect of inflammation is favoured by exposure to air, and the effusion of plastic lymph by seclusion from air, is one circumstance clearly affecting the formation of this product. Another circumstance, which seems evidently to favour the formation of purulent rather than of plastic matter, out of the deposits from the blood, is a certain distance from the inflamed surface, implying that the vital influence which passes from the solids to the fluids concerned in the process must be weakened in intensity. "The exudation globules, which lie beyond the vivifying influence of the surface of the wound, and exposed to the action of external agencies, cannot long retain their vitality; forsaken, as it were, by the organizing principle, they begin to degenerate in their organization, and to suffer changes in their chemical constitution; while those that continue in immediate contact with the living structures advance in their organization." (*Gerber*, p. 90.) "The enveloping membranes of the cytoblasts which are remote from the surface of the wound crack, the masses into which they divide become

granules; the nucleus splits into granules; and the cytoblast membrane is transformed into a pus membrane, which is now foreign to the organism." (*Gerber*, p. 113, and fig. 96 and 206.) It is farther to be observed, that, according to the observations of Gendrin, the formation of pus takes place within the vessels of an inflamed part, as well as in the matter which escapes from them; that, according to Andral, matter apparently purulent has been found within the coagula in the large vessels or heart, when there has been no abscess or suppurating surface in the body; that, according to Mr Gulliver, when inflammation has lasted some time in any important organ, globules of pus, or rather of softened fibrin, ready to pass into the condition of pus, may be recognised in the blood (*Phil. Trans.* 1838); and again, that a small quantity of pus, whether in the blood, or in a serous cavity, acts like a leaven, and speedily leads to the production of a great deal more. (*Gulliver in Translation of Gerber*, p. 104.)

Mr Hunter puts the question, "What is the use of the secretion of pus?" and confesses himself unable to answer it. We may approximate, at least, to an answer by observing, that all living action, without exception, is probably attended with diminution or loss of vitality in the acting particles, and thereby ultimately leads to the formation of fluids, which, if retained in the living body, act as poisons. The locally increased and altered living action of inflammation, when of a certain duration, and in a certain lower grade of intensity, or at a certain distance from the living influence of the existing solids, is subjected to the same law, and can only terminate favourably by the expulsion of the excretion which is thus formed. We shall afterwards see, that it is at all events

a fact, that, whenever purulent matter is directly mixed with the blood, it acts on the system as a poison; and that its very rapid formation is characteristic of a specific form of inflammation, attended with depression of vital power.

When we see an ulcerated surface extending itself around an inflamed and suppurating part, we can only say, that, in consequence of the continuance of inflammation, in many instances in consequence of pressure or of continued external irritation, maintaining and extending the local inflammation—the vital process of absorption, always usefully active where inflammatory effusions are of some standing, has extended to a part of the previously existing textures.

Mr Hunter shewed that there may be great effusion of pus without any ulceration; and again, that there may be much breach of substance and change of form in the solids of the body by absorption, as from pressure, without effusion of pus; and hence he inferred, that the loss of substance in ulceration is always to be ascribed to absorption only,—never in any degree to solution of the solids in the pus or ichor of the sore. But Mr Key has made it probable that this inference was too hasty, and that a solution, at least partial, of solids in extravasated fluid, does in general precede their absorption (*Med. Chir. Trans.* vols. xviii. and xix.); and this indeed, according to Dr Prout, would seem to be a preliminary condition to all absorption of portions of the living body itself, whether in the living or dead state.

The agents employed in this absorption are now generally believed to be the veins, at least as much as the lymphatic vessels; but according to the most recent anatomical researches, both these sets of vessels are filled

in the same way, viz. by lateral transudation. The commencement of ulceration, as an effect of inflammation, implies merely that the *attraction* by which extravascular matters are constantly taken into the small veins preponderates over that by which portions of the blood pass out of the capillaries. Some observations of Mr Key seem to shew distinctly, that, by this attraction, part of a living texture may be made to enter the vessels of a membrane lying contiguous to that texture, but supplied with blood from a different source. (*Med. Chir. Trans, loc. cit.*)

Lastly, When we see mortification and sloughing succeed after a time to the previous changes in inflamed parts, we can do no more than state the fact, that the excitement and change of vital properties in the stagnating blood, and in the textures in which it stagnates, are naturally succeeded, after a certain time, by the loss of all vital properties. It has been thought, that this is sufficiently explained by the mere circumstance of absolute stagnation of the blood necessarily arresting all the living functions, and thereby allowing of putrefaction, first in the blood, and afterwards in the surrounding textures; but it is very doubtful whether this explanation is sufficient. It is true that, in the experiments of Cruveilhier and Magendie, the injection into an artery of a living animal, of mercury or charcoal, or various other substances which, when they arrive in the capillaries, choke them up and arrest the circulation, was followed by rapid gangrene of the limb,—complete, in one of the experiments of Magendie, in forty-eight hours after the injection. And it is also true, that gangrene occurs as a consequence of inflammation chiefly in those cases in which the general circulation is so en-

feebled, that absolute stagnation of the blood in the inflamed parts may be supposed to be much more easily produced than in the natural state. But we see, every day, in cases of ligatures applied to the larger arteries, or of obstructions from various causes occurring there, just as in the case of aneurisms,—and we know in experiments, where portions of blood have been inclosed between ligatures on the vessels of living animals,—that the blood in the larger vessels may stagnate and remain perfectly at rest for a long time without putrefying, and therefore we cannot regard its stagnation in the small capillaries as a sufficient cause for its putrefying so rapidly as it does in many cases of gangrene. And in attending to cases of inflammation running to gangrene, we may often see this event take place where there is neither such extreme depression of the circulation, nor such intensity or endurance of the inflammation, as to entitle us to suppose that the blood is more completely or longer stagnant in the inflamed part than in other cases where no such result follows. We may conclude, therefore, that the death of the blood, and of the textures surrounding the blood, in inflamed parts, is an effect, at least in part, of the previous changes of them during the state of inflammation,—not merely of the cessation of movement;—and that, in the experiments above noticed, the rapid accession of gangrene ought to be ascribed, not merely to the circulation being stopped in the capillaries, but to the minute structure of the blood being injured by the mechanical means employed, and its vitality therefore quickly destroyed.

The loss of vitality in an inflamed part has been properly compared to the loss of vital power in a muscular

part violently exercised, where, according to the usual but metaphorical expression, the irritability has been exhausted, and where, we have reason to believe, that a certain portion of the muscular substance has been disorganised, and its absorption, with a view to expulsion by the excretions, rendered necessary. The explanation thus attempted is not sufficient, because we cannot assert that the tendency of inflammation to gangrene bears proportion to any observed increase of vital properties of inflamed parts, in the earlier stages of the disease. But it is to be observed, that, in the greater number of cases, where we see gangrene succeed to inflammation, either the inflammation is of a specific character and attended with typhoid fever, and peculiar depression of vital powers (as in plague, cynanche maligna, the bad form of measles, or small-pox, or erysipelas, &c.), or it coexists with another disease, or with the influence of some other agent on the body, as when it attends continued fever, or succeeds to the effect of a violent concussion (constituting the traumatic gangrene), or occurs as a sequela of some of the contagious febrile diseases, or as an accompaniment of some debilitating chronic disease, as palsy, dropsy, or scurvy, or as, in part, an effect of inflamed or diseased arteries. In all such cases, the concurrence, with the inflammation, of a peculiar influence weakening the circulation, may be recognised; and in several of these it is pretty certain that this debilitating influence acts, not merely by enfeebling the solids by which the blood is propelled, but by modifying the constitution of the blood itself, and rendering it more prone to death and to putrefaction, than it otherwise would be.

The excitement of general fever by local inflammation must also be regarded as a general fact in pathology, more susceptible of application to the account we are to give of other facts, than of explanation in itself. Yet there are some principles in this fundamental department of pathology which may be stated with confidence, and which it is of importance to keep in mind.

1. We may set aside entirely the supposed intervention of a vis naturæ medicatrix in this as in all other cases where we attempt to give an account of the diseased conditions of the body;—not because there are not many of them, in which a wise and benevolent design may distinctly be traced, but because the reference to this design does not explain *how*, but only *why*, any particular changes happen. It is an introduction of final causes, into an investigation of which the object is the determination of physical causes only; and the speculation is rejected, not as false or unphilosophical, but simply as misplaced.

2. We may set aside also the idea of the general febrile reaction being really effectual in resolving the local inflammation, because we know that the resolution of the inflammation often takes place when the violence of the fever is over; and is often obviously promoted by means which greatly lessen the action of the heart.

3. We cannot give an opinion with equal confidence as to the notion of a spasm of the extreme vessels being excited, when fever supervenes on local inflammation: we know that, during the greater part of inflammation, the condition of all the vessels of the affected part is one of relaxation and weakness, not of constriction, and we must regard it as doubtful whether the true capil-

laries, in any texture, are capable of spasm. But many observers agree, that an unusual constriction of the vessels of a part becoming inflamed may be perceived when the disease is beginning, and the notion of Hoffmann and Cullen, as to the extension of this preliminary state of the vessels over the system at large, is a plausible conjecture. It is at all events certain, that the phenomena which were considered by them as indicating spasm of the extreme vessels,—the cause of coldness in the outset,—the diminution of excretions by the skin, the bowels, and the kidneys, as well as of the secretions employed in digestion, and the suspension of the function of nutrition,—are real and important: they indicate that many of the vital actions going on in the capillary vessels are deficient during the febrile state; they justify the inference that the blood in this state does not circulate so freely, through many of the small capillaries, as in the healthy state, and probably is returned in larger quantity to the heart by the larger of those small arteries which communicate with veins; * and this temporarily obstructed state of the capillary vessels may certainly be regarded as an adequate cause of the temporarily increased action of the heart during fever; just as a permanently obstructed condition of the

* It was ingeniously suggested by the late Dr Fletcher, that if all inflammations commence, as microscopical observations seem to shew that some of them do, by constriction of the vessels immediately concerned, we have only to suppose this condition extended to the small vessels generally to produce that state of the capillaries which seems characteristic of fever; and which, over the system at large, may very well be supposed to co-exist with the subsequently relaxed and distended condition of the vessels actually inflamed. (See *Fletcher's Pathology*. Edin. 1842.)

aorta is universally regarded as an adequate explanation of the permanently excited action, and ultimately of the hypertrophy of the heart, in chronic disease.

But two questions, neither of which we have any reason to suppose insoluble, remain for solution, before we can give a satisfactory account of the febrile state, as excited by inflammation:—1*st*, Whether the deficient condition of the vital actions in the capillaries is owing merely to a general constriction of the smaller arteries, or whether the *auxiliary vital powers*, which we believe to influence very much the fluids in the capillaries, are here primarily deranged; and, 2*dly*, Whether the general derangement of the vital actions in the capillaries over the body is to be ascribed to the change on the *blood* in inflammation, or whether an influence of the *nervous system* is essentially concerned in producing it. It may be stated, that the presumption is strongly in favour of the latter of both these alternatives. It appears pretty certain, that the great increase of vital action among the particles of the blood at the inflamed part, is attended with a diminution in those actions which result from vital affinities in other parts of the body. And it is at least highly probable, that the impression produced on the Nervous System, by the existence of this diseased state in one part of the body, is an important agent in the transmission of morbid change to other parts; just as it is in the highest degree probable, that it is through the intervention of a change in the Nervous System that cold applied externally to a distant part, or to the whole surface, comes to act as the exciting cause of inflammation in a single internal organ. And in the case of inflammation attended with spasm of the inflamed part (*e. g.* of Asthma attending Bronchitis), while we are certain that the

spasm is a nervous affection, we can hardly doubt that the two simultaneous diseased actions in the same part are excited through the same agent. But, in the absence of absolutely decisive evidence, we refrain from speculating farther on these points.

SECT. III.—*Of the Remote Causes of Inflammation.*

AFTER what has been already said of the causes of disease in general, it is unnecessary to enlarge on this part of the subject, but it is necessary to state which of the causes formerly enumerated have a peculiar or specific effect in producing inflammation.

Inflammation is hardly ever directly excited merely by muscular exertion, by external heat (unless in such intensity as to be a local irritant), by mental emotion, by such intemperance in eating or drinking as hurries the movement of the blood, or by such evacuations, or such suppression of previous evacuations, as alter the quantity, or even the composition of the blood; although it is often aggravated or renewed by such causes. But it is excited by mechanical or chemical irritation (including Heat) applied to the part itself which inflames; it is excited by Cold, applied generally, or to parts distant from those that inflame; and by certain poisons, and certain contagions, such as arsenic or mercury, bitter almonds, the virus of small-pox, which are believed to be taken into the blood, and to visit all parts of the system, but affect in this manner only certain textures, chiefly the skin, the mucous membranes, and certain glands. And there is always ground for inferring the action of some peculiar or special cause,

if any other but an inflammatory disease is produced by these means.

Of these exciting causes, no one acts with such certainty and rapidity, as the contact with any serous, cellular, or synovial membrane, of substances which continually pass over the mucous surfaces, with the effect only of exciting the due secretion of the protecting mucus,—air, food, bile, urine, in fact any substance foreign to the system, or which is elaborated in it only for the purpose of excretion.

It will afterwards appear, that poisons formed in the course of inflammatory diseases themselves, and circulating in the blood, may excite inflammation of peculiar character, in other parts of the body. And it has been rightly stated, as a mark of distinction of those inflammatory diseases, the cause of which thus exists in the circulating fluid, that they are apt to attack the two sides of the body indiscriminately, or corresponding parts (as the kidneys), simultaneously and similarly.

In the natural actions of the intestinal canal, especially when excited, and in its relations to the containing parts, there are special causes for certain accidents, often acting as causes of fatal inflammation there, viz. Hernia and Intussusception.

There is a class of causes which may be said to act on the footing of local irritants in exciting inflammation, but which are applied, not to the parts that become actually inflamed, but to others in their immediate neighbourhood, or peculiarly connected with them. Thus various local chronic diseases, a carious tooth, a diseased vertebra, or joint, a strictured urethra, are very generally connected with repeated attacks of inflammation and suppuration in the adjoining soft textures; and

inflammation, going to ulceration, on any membrane, is very often attended, especially in young persons, with inflammation of the nearest lymphatic glands.

And again, injuries of certain nerves are followed by inflammation in the parts which they supply. Of this the best examples are the effect of section of the 5th and 8th nerve, on the eye and bronchiæ, and the effect of section or destruction of the spinal cord on the mucous membrane of the urethra and bladder. In these cases, it would seem that the immediate effect of the loss of power in the sensitive nerve, is the great diminution of the mucous secretion, which is habitually regulated by sensation, and that the strictly exciting cause of the inflammation is the stimulus of the air, and of the urine, acting on a membrane deprived of its protecting mucus. We see also, in various cases of Palsy, and occasionally of Neuralgia, that when the sensitive nerves of any external part have lost their power, or been much injured in their functions, inflammation of the parts they supply, from various causes, is apt to come on; just as it is apt to come upon a part of which the circulation has been much enfeebled, as by disease of the arteries, and in both cases is very apt to go to gangrene. It may be conjectured, that it is because, in the natural state, the capillary circulation in all external parts, is much excited and maintained by their sensations and sensitive nerves, and therefore is enfeebled by loss of sensation, that inflammation of this form is so apt to attack palsied parts; and if this be the true explanation, the injury of nerves becomes only the *predisponent* cause of the inflammation that follows it. But as we are sure that the exciting causes of internal inflammations act through nerves, we must regard it as quite possible, that

injuries of nerves may act as strictly *exciting* causes of inflammation in the parts they supply.

It is always to be remembered, however, that there are many cases of inflammation for which no adequate exciting cause can be detected.

The tendency to inflammation is not in general given by Plethora (although the gouty inflammation occurs, at first, almost solely in plethoric habits), nor by habitual excitement of the vascular system. On the contrary, there are none who resist the influence of the exciting causes of inflammation so well, as those in whom the blood is abundant, and the vascular system vigorous. But the tendency to inflammation is remarkably given by all permanent causes of Debility,—by imperfect nourishment, impure air, long continued heat or cold, excessive evacuations, mental depression, excessive exertions, and intemperance. Of the numbers who fall into disease, as above stated, under the influence of these causes, a very large proportion are always found to have contracted different forms of inflammation.*

The *seat* of the inflammation, which may be produced by the concurrence of any causes which do not act as local irritants, is determined in many cases by some assignable circumstances of predisposition, affecting particular organs, which were formerly mentioned, —by various causes of local plethora or increased action, —by heat acting on the liver and bowels, or cold acting on the air-passages; by any causes exciting the secretions of individual secreting organs more than of others,

* "Les Pleurisies les plus graves sont ces des sujets les plus debiles, des cachectiques, des hommes affaibles per des exces quelconques, par la syphilis, la goutte, le scorbat, le cancer, et surtout par l'age." —(Laennec.)

as of the stomach and bowels during digestion, or of the breasts during lactation; by organic diseases confining or obstructing the circulation in particular organs or textures; or by previous inflammation facilitating local congestion in the same parts as had formerly suffered.

Lastly, the *kind* of inflammation excited on any occasion in the body is very often observed to be determined in one of three distinct ways, *First*, By predisposing causes previously acting on the body. Thus there is a hereditary tendency, often much increased by full living, which disposes to Gout, in circumstances where otherwise a different inflammatory disease might have been excited; there is also a hereditary tendency, often aggravated by imperfect nourishment, by inadequate protection from cold, and by residence in vitiated air, which disposes to Scrofulous affections, rather than to other forms of inflammation; there is a peculiarity of habit, often resulting from habitual intemperance, which seems to predispose remarkably, in internal parts, to chronic inflammation, and to slow effusion of solid lymph and induration of textures. *Secondly*, The kind of inflammation is often determined by a specific property in the exciting cause, —thus, that which is excited by heat acting on the surface of the body is specifically different from that which is excited there by bruises or wounds. And the inflammation excited by each of the contagious poisons, by gonorrhœa or syphilis, by smallpox, measles, or scarlatina, erysipelas, plague, &c., has always something peculiar and *specific* in its own course, in its local effects, and in the nature and progress of the accompanying constitutional symptoms. *Thirdly*, When inflammation exists in one part of the body, and is excited by any

cause in another part, its progress and effects in this last are apparently much modified by its previous effects in the part first affected, as might be expected from what was said of the gradual alteration of the blood in the course of inflammation. Thus the effect of rheumatic inflammation in the heart, or of the secondary inflammation, connected with inflamed veins, on any internal part which may become affected in such a case, is rapid and *peculiar*.

The importance of the knowledge of these facts, as instructing us how inflammations may be avoided, or what form of inflammation may be apprehended, in individual cases, requires no illustration. And the influence of a truly Tonic Regimen, in protecting against inflammatory disease, is easily proved by statistical facts, of the kind formerly considered.

SECT. IV.—*Of the Local Effects, and Anatomical Characters, of Inflammation.*

IN strict language, there are only two terminations of the state of inflammation in any part of the body, viz., that by Resolution, or return of the circulation there to its previous condition, and that by Mortification, or death of the part. But it has been already stated, that different effusions from the inflamed vessels take place in almost every case of inflammation; these effusions very often continue, and sometimes become the seat of farther morbid changes, after the inflammation has subsided or been resolved; and hence, these effects of inflammation have often been called terminations of it; although most generally the resolution of the inflammation does not

take place till some time after these effects have appeared.

I. In regard to the termination of inflammation by resolution (which term is applied whenever the effusions from inflammation are so slight and transient as to cause little or no inconvenience and demand no treatment), several facts demand attention.

1. In all parts of the body, and whatever other consequences may result from inflammation, the spontaneous tendency to this termination is strongly marked; although the time within which this tendency begins to shew itself, may vary from a few hours to many days or weeks, according to the intensity of the inflammation, and according to various circumstances which will be stated under the head of Varieties of Inflammation.

2. When inflammation is established at any part of the body, it very generally extends itself more or less to the neighbouring parts, before subsiding; and frequently the decline of the inflammation, in the part first affected, is followed by an extension of it in the surrounding parts. This extension is more obvious in some varieties of inflammation, to be afterwards described, than in others. The extension of inflammation takes place more rapidly along any one texture, than from one texture to another immediately adjoining; *e. g.* more readily along the peritonæum, or mucous membrane of the bowels, than from either of these to the other; more readily along the membrane lining the bronchiæ, or along the pleuræ, than from the bronchiæ to the substance of the lungs, or from the pleura costalis outwards; but intense inflammation may spread rapidly through various textures.

It is very remarkable, that in spreading over a single

texture, such as the peritonæum covering folds of intestine, inflammation evidently extends itself, not only along continuous surfaces, but to surfaces adjoining to, or in contact with, that first affected, although not continuous with it, or united with it by any material bond of union. These facts as to the extension of inflammation are important on many accounts, and among others because they illustrate to a certain degree what is seen as to the extension of others, and especially of what we call malignant diseases.

3. In some inflammatory diseases there is a peculiar tendency of distant parts (generally, however, consisting of the same or similar textures) to become inflamed, and run the usual course of inflammation successively, as in Gout, Rheumatism, Cynanche tonsillaris, or inflammation of the Testes.

4. In a few cases we observe a sudden and unusual resolution of inflammation in a part first affected, followed immediately by its appearance in a distant part, to which the term *metastasis* is properly applied. This occurs chiefly, perhaps exclusively, in the case of those inflammations which we shall afterwards describe as *specific*, *i. e.* as presenting decided marks of distinction, from the inflammations seen in other instances in the same parts or textures, *e. g.* in Gout, Rheumatism, Erysipelas, Gonorrhœa, Cynanche parotidæa.

II. The first effect of inflammation in any texture, often perceptible in the living body, and more generally in the dead body, is Congestion of blood in the small vessels, with some effusion of the serous part of the blood. Where the symptoms of inflammation, during life, have been well marked, these appearances may in

some cases be all that may be found after death. But if no farther effects of inflammation are observed, these are not sufficient of themselves to entitle us to affirm that the part has been inflamed; as is sufficiently proved by the acknowledged difficulty of judging, from such appearances only, even of the congestions of blood having taken place at any distance of time before death.

There is probably a distinction between any appearances resulting from mere congestion of blood, and those of genuine inflammation in its early stage, in the colour of the affected parts, which in the latter case is more florid; but this difference is to be depended on only if the parts are examined within a very short time after death.

The very early effusion of serum from inflammation is most distinctly seen in certain cases of inflammation affecting the skin, and in the inflammation of serous and synovial membranes, and of the substance of the lungs, where it takes place almost from the very commencement. The same effusion takes place behind the mucous membrane of the air passages, in cases of œdema of the glottis, consequent on inflammation there, and to the same cause we must ascribe the increased quantity, diminished consistency, and altered qualities, of the secretion of the mucous membranes soon after the commencement of inflammation in them; and the diminished cohesion, or softening, from incipient inflammation, in these membranes, and in most of the parenchymatous viscera,—the brain, liver, or kidneys. When muscular fibres are themselves affected with inflammation (which is not a common case), this softening and consequent loss of power seems to be the chief alteration effected on them. Part of the swelling in inflammation of the cellular texture is owing to the same effusion, and there

are some cases in which œdema, extending to some distance from the inflamed part, is consequent on inflammation of the cellular texture. But the serous effusions of the first stage of true inflammation are *more limited in extent* than dropsical effusions, and are quickly followed by other exudations. No great extent of dropsical effusion is ever the effect of local inflammation only; although we shall afterwards find that different inflammatory diseases, by the obstructions to the free movement of the blood which they ultimately produce or aggravate, frequently assist in the production of dropsy.

III. As inflammation advances, the fluid effused from the vessels becomes of a thicker or more gelatinous consistence, and there is soon a distinct effusion of the coagulable lymph of the blood, characterizing the *Adhesive stage* of the inflammation.

This effect of inflammation is most distinctly seen in the formation of adventitious membranes, which are frequently found on the free surface of the serous membranes when inflamed, and by which the opposing parts of that surface, in the thorax or abdomen, are often united. But a similar deposit is often seen on the surface of the skin, from intense inflammation and vesication, and often likewise succeeds inflammation of the mucous membranes in some parts of the body, as in the larynx and trachea in croup, or in parts of the great intestines in dysentery. It is by a similar exudation of coagulable lymph on the surface, or into the interstices of textures, that either the membranes already mentioned, or the fibrous or synovial membranes, become thickened and corrugated; that the cornea becomes white and opaque, or the iris partially loaded, discoloured

and irregular; that the cellular substance in any part becomes dense and hard, in common phlegmonous inflammation, and in many cases of the erythematic also; that the spongy texture of the lungs becomes mottled with reddish or whitish granulations, in what is usually called hepatisation from peripneumony; and that enlargement and condensation of other of the parenchymatous viscera result from their inflammation, and precede the other consequences of that process. Where the bloodvessels or valves connected with them are themselves inflamed, a similar exudation thickens their coats, and often lines part of their inner surface, and obstructs the flow of blood along them. And in all textures, when ruptured or lacerated, this kind of effusion, consequent on the inflammation excited, is the most essential step towards the reparation of the injury. This change depends on the increasing proportion of the liquor sanguinis which takes the form of Fibrin, and in this fibrinous effusion are there detected what have been called numerous Exudation Globules, or Globules of Inflammation, larger and less regular than the globules of the blood, and many of which become afterwards germinating cells or cystoblasts, and are the seat of a vital act of nutrition, often going on for a long time. (See Gerber, translated by Gulliver, p. 79, *et seq.*)

The lymph thrown out is probably always at first fluid, and is soft and flocculent for some time, but the serous part of the effusion is soon absorbed, and, if the inflammation proceeds no farther than this stage, the fibrin effused becomes gradually of firmer consistence, and soon shrinks remarkably in bulk. From this cause, there is frequently much hardening of various parts of the body, as of the skin and other membranes, and of

different viscera, consequent on their inflammation, after it has lasted some time, and especially when it has not been very intense. Muscular fibres acquire a greater firmness and rigidity, and even an increase of bulk, from inflammation of adjoining membranes; but this is a peculiar effect, probably depending on a different principle, viz., that of hypertrophy, resulting from the increased action to which they are then excited.

In some cases, much of the colouring matter of the blood is thrown out with the coagulable lymph on inflamed surfaces. This takes place especially in the cells of the lungs in peripneumony, on the serous membranes of the chest in certain pleurisies, and on the mucous membrane of the great intestines in dysentery. And in most cases, when the effusion of lymph has been considerable, reddish striæ are seen in it after a time; and these subsequently assume the appearance of small vessels, stretching across the effused lymph, generally in a pretty straight direction, containing fluid blood, and communicating freely with the vessels of the textures originally inflamed. The power of forming these vessels in the lymph effused, is the vital property to which the term *plasticity* has been applied. When this is the case, the matter effused has the appearance and properties of condensed cellular substance, so that the ultimate result of this *adhesive inflammation* is to make this addition to the organized textures of the body.

There is very great variety in the length of time requisite for these effects of inflammation to take place. There are many instances of intense inflammation, in which much solid lymph is thrown out, within thirty-six hours from the commencement of inflammation; and cases have been quoted, in which it was thought that

the vascular organization of such lymph has been effected within that time, but in general it would seem that several days are necessary for this last process.

It is by this inflammatory exudation of matter endowed with peculiar vital properties, and by the subsequent organization of this lymph, that the permanent adhesion of surfaces which have been inflamed is effected,—that parts, recently removed from the living body, may be reunited to any surface which is in the requisite stage of inflammation,—that permanent additions are often made, by attacks of inflammation, to the thickness or bulk of membranes and other textures, and that wounds are healed, and ulcers filled up, and all breaches of texture permanently repaired; a part of the matter which is effused in these last cases gradually assuming the appearance and properties of the texture which has been removed. The conditions most favourable to this effect of inflammation, are a moderate degree of inflammation, a medium degree of vigour of vascular action, seclusion from air, and the absence of all other irritations.

Coagula of entire blood, effused on living parts, have appeared in some cases to become vascular and organized, but certainly are in general easily absorbed again, and do not undergo that change nearly so readily as the effusions of lymph from inflammation.

Various facts prove, not only in the case of injury of bone, but likewise of some of the soft textures (as the skin and mucous membranes), that the matter which thus assumes the properties, and repairs the losses of the texture that has been injured, is thrown out not only by the vessels of that texture itself, but likewise in part by those of adjoining textures, which have taken on this

form of inflammation. In cases of disease it probably often happens, that the matter thus thrown out by inflammation, instead of assimilating itself to the texture which has been injured, either acquires the properties of other textures, or degenerates into structures which differ from any found in the healthy body.

IV. The next effect of inflammation is Suppuration or the effusion of Pus, which is at once distinguished by its opacity, fluidity, and yellowish-white colour, and appears, on minute examination, to contain great numbers of globules, somewhat larger than those of the blood, and shewing as little tendency to cohere together as those of the blood in the living body do.

In some instances, pus gradually mixes itself with the effusion of serum in inflamed parts, without other change; but most generally, the formation of pus is preceded both by effusion of serum and of coagulable lymph; and the purulent effusion is bounded, beneficially as regards the life of the body, and more or less definitely, by the lymph thrown out around it, so that if the abscess forming be near the surface, fluctuation becomes perceptible in it; as in the case of common abscesses in the cellular membrane, where the pus is formed in the centre of the part previously hardened by effused lymph; or in the case of pustular eruptions (such as smallpox) on the skin, which are set on a hardened base, formed chiefly by effused lymph.

In the advanced stages of inflammation of the skin, cellular membrane, fibrous and synovial membranes, serous membranes of the head, chest or abdomen, parenchymatous viscera, and bloodvessels, effusions of pus are very generally found mixed with the adhesive lymph

that has been thrown out, but in very various modes and proportions in different cases, and in inflammation of different textures. On the skin and serous membranes it is often thrown out for a length of time, and in much larger quantity than the lymph; in the substance of the viscera it is formed more sparingly, and when formed, seems to distend and narrow the cysts of lymph by which it is surrounded more gradually. In the cellular texture of the lungs it is seldom formed, in consequence of active inflammation, in circumscribed abscesses, but is gradually infiltrated or diffused through the whole inflamed part. On the mucous membranes of the air-passages (including the tunica conjunctiva of the eye), and urinary passages only, it is frequently effused and mixed with the other secretions of the parts, even from simple or healthy inflammation, without any previous distinct exudation of plastic lymph. In all other textures, when the effusion from inflammation is puriform only, it may probably be concluded that the inflammation is of a peculiar or specific character.

The length of time requisite for inflammation to last before pus is distinctly formed, varies from a few hours (in the case of the urethra) to several weeks. The length of time that suppuration, once established, may continue in a part, is still more various; and the intensity of the inflammatory symptoms that may precede or accompany the suppuration, bears no fixed proportion to its amount or duration.

When the formation of pus ceases, in a circumscribed abscess, the cavity is gradually filled up, partly by the surrounding parts that had been compressed regaining their previous form and bulk, and partly by the organization and subsequent contraction of portions of the

lymph thrown out along with or after the pus, and which take the form of granulations.

The effusions of adhesive plastic lymph, and of fluid pus, from inflammation, are very distinct in their progress and effects, but in their origin it is obvious that they are very closely allied. In cases of pleurisy or peritonitis, detached flakes of lymph, mingling with the serous effusion, appear to constitute the first step to the formation of pus; and in rapidly fatal cases of various inflammatory diseases, the glutinous exudation that is found, often appears to be intermediate betwixt lymph and pus. On the surface of the body, it has already been observed that the character of the inflammatory exudation is much determined by the circumstance of exposure to the air; the same surface which throws out pus when exposed, forming plastic lymph when it is protected from the air, and acquires, apparently, a higher degree of vitality from the influence of the living and inflamed textures with which it is in contact. And the same influence of exposure to air, in promoting the formation of pus, may be observed in comparing the effect of inflammation of the free surface of the mucous membrane of the urethra, in gonorrhœa, with that of the attached surface of the same membrane, which causes exudation of lymph, and so leads to stricture. So also that inflammation of the pleura, which is consequent on admission of air into the cavity of the chest, leads, more surely than any other, to copious purulent effusion, or empyema; and in the later stages of pneumonia, if the patient live so long, much of the lymph thrown out into the air-cells appears to be converted into pus, constituting the purulent infiltration which has been described as the *third* effect of inflammation there.

In those instances, and in those parts, in which the effusion of pus is not distinctly bounded and circumscribed by effused lymph, its effect is naturally to soften the textures in which it occurs, as is seen especially in the purulent infiltration of the lungs, and in the yellow softening of the brain; sometimes, also, in purulent infiltration into the subcutaneous cellular membrane, or into that which unites the coats of the intestines. Such changes are generally the effect of a longer continuance of inflammation, than the softening or serous infiltration only; but they denote a shorter and more violent inflammatory action than the chronic induration of textures by effused lymph, already mentioned. That both the softening, with infiltration of reddish or brownish serum, and the softening with infiltration of yellowish or greenish pus, in nervous matter, are effects of inflammation, appears most evidently from this, that they may clearly and speedily result from mechanical injury.

V. The inflammatory effusions, and especially that of pus, are always attended with more or less of *Absorption*, first of the serum originally effused, and afterwards of the lymph which surrounds and limits the suppuration, and of part of the purulent matter itself. The maturation of a pustule of smallpox, or other cutaneous suppuration, and the enlargement of the cavity of an abscess, and its progress towards the surface of the body (the intervening textures, and ultimately the skin, disappearing to make way for it), sufficiently illustrate the amount of absorption which necessarily attends this effect of inflammation. But very frequently the absorption, both of the lymph effused, and of the surrounding textures, that coexists with the advanced stages of inflam-

mation, takes place in a greater degree, and more irregularly, than is requisite for any useful purpose, and the process is then said to be attended by Ulceration.

The destruction of the solids of the body by ulceration takes place with very different rapidity in different textures, and in different circumstances; and it is always obvious, that the intensity of the preceding inflammation, and the extent of the other effects resulting from it, are by no means the only conditions which determine the degree of the ulceration. It is common on the surface of the body, both in the skin and cellular membrane, and common in the mucous membrane of the alimentary canal,—including the fauces. It is common also in bones, and in cartilages that have had osseous matter morbidly deposited in them by an inflammatory action; in the lungs, and in the inner membrane of arteries; but it is not so clearly the effect of mere inflammation and suppuration in these cases. It takes place, in all parts of the body, more readily in solids recently formed by inflammatory exudation, than in any of the original textures. There are some textures, again, which seldom ulcerate, and often resist and limit the extension of that process; particularly the fibrous texture in all its forms, the serous membranes, and the outer coat of arteries. These peculiarities are often observed, and have important consequences in disease.

The occurrence of ulceration in consequence of inflammation, is very often determined by causes which are sufficiently understood, especially by such as stimulate and irritate parts already inflamed (as is done by the continued contact of any foreign body); and such as enfeeble the circulation, either generally or locally, before and during the excitement of inflammation. There are

certain specific kinds of inflammation, to be mentioned afterwards, in which the tendency to ulceration is greater, and more uniform, than in simple inflammation.

As ulceration, consequent on inflammation, is very generally preceded by effusion of plastic lymph, so it is attended by more or less of that effusion which forms the little vascular and organized eminences, called Granulations. When, therefore, inflammation has advanced to this stage, it has established three vital processes, which go on simultaneously, and all of which are new to the part that has become inflamed,—the exudation of plastic lymph, the effusion of pus, and the ulcerative absorption. By the irregular growth of the granulations, and the irregular or varying extent of the ulcerative absorption, the surface of an ulcer is necessarily rendered uneven; and ultimately the healing of the ulcer is effected by the process of exudation and organization of lymph prevailing over the contrary process of destruction of solids.

The degree in which these opposite processes shew themselves, either over the surface or in any part of the ulcer, admits of great variety. When the wasting by ulcerative absorption is most rapid, and there is little or no renovation of solid matter, the ulcer is said to be *phagedænic;* when the ulceration is attended with partial mortification, portions of the solid textures separating entire from the rest, the case is one of *sloughing* ulcer; when the process goes on slowly, the lymph thrown out at the base and around the edge of the ulcer becomes hardened, and the granulations on its surface are deficient, and the ulcer is said to be *callous*, or indolent; and again, when the granulations are larger and softer than usual, and require to be repressed, in order that

the healing of the sore may be effected, we have the variety called the *fungous* ulcer. All these varieties may occur in ulceration following the usual and simple form of inflammation.

It is in vain to attempt to ascribe any of these processes, consequent on inflammation, to any mode of exertion of the contractile power of the vessels, by which the blood is brought to the inflamed parts. They must all be referred, as the healthy actions of Nutrition and Secretion must, to the influence of certain attractions and repulsions peculiar to living matter, and which actuate at once the vessels, the textures in which they are placed, and the blood which they contain.

There is a very important difference between the morbid actions of Suppuration and Ulceration, once fairly established, and the morbid action of Inflammation not yet advanced beyond the earlier effusions of serum and lymph, as to the degree in which these actions depend on the quantity of blood that visits the parts affected;—the process of inflammation, in its earlier stages, being very certainly restrained or arrested by diminution in that quantity; whereas the loss of blood, although it often prevents the extension of suppuration and ulceration to parts not yet affected, is generally found ineffectual in checking the formation of pus, where that has been already established; and is often, as may be judged from what has been said as to granulations, unfavourable to the healing of ulcers.

There are a few cases where inflammation (*e. g.* of the testis, or of muscular fibres), after it has caused some effusion of lymph, is followed, not by the ulcerative absorption now considered, but by a simple increase of the natural absorption of the part, producing mere wasting.

VI. The termination of inflammation in Gangrene, and then in complete Sphacelus, or in Mortification, is denoted by the part inflamed becoming gradually cold and insensible, and the circulation in it ceasing. This change generally takes place in the parts that had been most inflamed, while the surrounding parts are still in a state of active inflammation. It is usually attended with softness and flaccidity of the affected parts, with a gradual change of colour to purple and then to black, and ultimately with putrescence and a cadaverous smell. But in some cases, chiefly of slow progress, as in the gangrene from the use of diseased grain, the parts affected are hard and dry, and hardly become putrid; and in many cases mortification, especially when partial, is unattended with blackness. Gangrene on the surface of the body often takes place in connexion with serous effusion, and the vesicles formed are then coloured purple or black.

Mortification is observed in consequence of inflammation frequently in the different textures on the surface of the body, and in the mucous membrane of the alimentary canal, occasionally in the serous membrane of the abdomen, and in the substance of the lungs; rarely in other internal organs, excepting in cases of inflammation from injury. Mortification of the bones, either in the partial form termed Exfoliation, or in the more general form called Necrosis, is a common effect of inflammation, especially about the central parts of the long bones; but the whole process is very slow in that texture.

This effect of inflammation is much less uniform, in any texture, than the others, occurring in very various degrees, and at very various periods, from the commence-

ment of the disease, in different cases; and hence there is a manifest presumption that its occurrence is determined by other conditions in the state of the patient, besides the existence or the intensity of the inflammation. Accordingly, various causes have been observed to increase remarkably in the disposition to this effect, —the general tendency of all which may be said to be, to weaken the circulation in the affected part.

Thus inflammation, *e. g.* that from the irritation of a blister, at a distance from the heart, is more apt to run to gangrene in a feeble habit, than on the chest. The depending position of a part, impeding the action of blood from it; a ligature compressing the veins leading from it, or a fibrous membrane firmly enveloping it, may give the tendency to gangrene from its inflammation; and the same tendency is often observed, if the arteries leading to a part are so injured by disease as to become rigid, and unable to maintain a vigorous circulation through it.

The inflammation excited by a violent stroke or injury, by heat, by cold, by electricity, and by certain poisons (particularly animal poisons), is very apt to go to gangrene, if these causes, at the same time that they excited the inflammation, have had the effect of manifestly weakening the circulation; as in what has been called traumatic gangrene succeeding violent concussions, in severe burns, or frost-bite, in the bites of venomous serpents, and in the effects of some poisoned wounds received in dissection. In like manner, any inflammation, external or internal, which may attend or immediately succeed a contagious febrile disease, where the circulation is much weakened,—typhoid fever, small-pox, scarlatina, or measles, the worst forms of erysipelas or dy-

sentery, the yellow-fever, or the plague,—is more apt than other inflammations to run to gangrene. The same is true of inflammation on the surface of the body co-existing with dropsy or with palsy, when (although from different causes) the circulation there is feeble.

Inflammation affecting the stomach and intestines has more tendency to gangrene than in any other internal part; and this co-exists with the peculiar depression of the circulation, which characterizes the fever attending inflammation of these parts.

In some instances, the tendency to this termination of inflammation would seem to depend on no other cause than unusual intensity of the inflammation, as in the case of the Egyptian or gonorrhœal ophthalmia, tending to sloughing of the cornea, or of unusually violent or imprudently aggravated syphilitic inflammation of the genitals; but it is seldom that extensive gangrene can be referred to this cause only.

When Gangrene has commenced in any part, it must be expected to extend somewhat, and sometimes it spreads very rapidly, especially when the body is under the influence of a powerful cause of weakness or depression. But in more favourable cases, a line is gradually formed along or around the parts in the state of gangrene, which feels hard, and is in a state of adhesive inflammation. At this line there is an effusion, first of serum, then of pus, and ulceration is established, by which a fissure is formed between the living and dead parts, and the latter are loosened and detached. Thus the adhesive inflammation, followed by suppuration and ulceration, sets bounds to the extension of gangrene. The adhesive inflammation extends to the vessels of the part, which are closed by lymph effused from their

coats at the point of separation of the living matter from the dead; and it is to this circumstance, rather than to the coagulation of the blood which stagnates in the vessels, that we must ascribe the frequent separation of large sloughs, without hæmorrhage from the divided arteries.

SECT. V.—*Of the Symptoms, Local and General, resulting from these Effects of Inflammation.*

THESE may be arranged in a general view, according as they are local, distant, or general, over the body.

It is unnecessary to treat of the local symptoms of inflammation of external parts,—whether of the true skin, where the redness as well as the pain, heat, and swelling, are obvious, and where the effusions or other results of inflammation take place under the eye of the observer; or of the cellular or other textures immediately beneath the skin, where the redness only is concealed from the eye, and where the effusions of serum and of lymph, and the gradual formation of pus, may in general be easily detected by the touch;—or of the bones, the muscles or fasciæ, the joints or bursæ, where the peculiar form of the swelling, attended by heat and pain, and the kind of pressure, or of attempted motion, by which the pain is most distinctly excited, in general sufficiently indicate both the existence of inflammation and the texture chiefly affected. It is in the interior of the great cavities of the body that we have the greatest difficulty in detecting the seat, and sometimes even in recognising the existence of inflammation; yet, by care-

ful observation, in great majority of cases not only the existence of inflammation and the organ affected, but even the texture in which the inflammation is chiefly seated, may be distinctly made out.

The symptoms on which our attention is fixed by the definition of internal inflammation given by Cullen, the concurrence of *fever with fixed pain in some internal part, and deranged function of some internal organ*, demand the most careful study. They are of themselves sufficient to guide the practice, and very frequently do guide it almost exclusively, in the early and most remediable part of those diseases, which are more under the control of remedies than any others that come under the care of the medical practitioner: but, as each disease advances, more precise information as to its seat may very generally be obtained, and is not only satisfactory to the practitioner, but often important as regulating the details of practice.

In such investigations the pain, although often the most urgent symptom, and sometimes very characteristic, is in general, with a view to diagnosis, the least important part of the combination of symptoms. It is usually acute in the inflammation of the serous membranes, but comparatively slight, or only occasionally felt, when the mucous membranes (particularly in the thorax), or when the substance of the viscera, the brain, lungs, heart or great vessels, liver or kidneys, are inflamed. And the pains felt either from slight inflammation of the parietes of the chest or abdomen, or from internal diseases not inflammatory, are not only equally or more intense than those of active inflammation, but in some constitutions are attended with very considerable

febrile symptoms, as we see continually in the headachs and in the neuralgic pains, internal and external, of irritable subjects.

The local symptoms which give us the most precise information are not only those which indicate *derangement of the functions* of parts, but partly also those which indicate *alteration of the sensible qualities*, or *perceptible actions*, of internal parts, as modified by inflammation and by effusions; and it is in detecting alterations of this last kind that the greatest improvements have lately been effected, particularly by the French pathologists. These have been called by some the physical signs of disease, but this restricted use of the term physical is obviously liable to objection, and has not become general. Thus inflammation of the heart, or large arteries, not only produces palpitation—strong and sometimes irregular pulsation—but alters the sounds heard in the situation of the heart either on percussion or auscultation, or both; and in this way we can often distinguish inflammation and effusion on the pericardium from that on the inner membrane lining the heart, arteries, and valves. Again, inflammations of all the different textures contained in the lungs cause hurried breathing and dyspnœa; but the motions of the chest, and the sounds perceived in it on percussion, breathing or coughing, are essentially different, according as the pleura, substance of the lungs, or bronchiæ, are chiefly affected; and these differences are of much practical importance.

Inflammation of the mucous membrane of the bowels is not only attended with occasional pain and with a loose state of the bowels, but also (if the great intestine is affected) with the excretion of altered mucus, often mixed with blood, distinctly characterizing its

nature. A similar observation applies to the inflammation of the bronchiæ and cells of the lungs. And it has only lately been ascertained that a particular form of inflammation of the kidneys, even when unattended with pain, shews itself unequivocally by rapidly increasing albuminous impregnation of the urine, which is of low specific gravity. It may easily be understood that inflammation of the brain will cause less alteration of the sensible qualities of any part of the body than that of almost any other organ, but the alterations in the condition of the eyes, and of the countenance generally, which often attend it, are nearly of this character.

Although Cullen's diagnostic mark, the "læsa partis internæ functio," is very generally applicable to internal inflammation (as we see in impatience of light from inflamed eyes, deficiency of smell from inflamed nostrils, various forms of delirium, or stupor, or spasm, from inflamed brain, in the "vox rauca" and "tussis clangosa" from inflamed larynx, dyspnœa from inflamed lungs, vomiting of ingesta from inflamed stomach, costiveness or diarrhœa from inflamed bowels according to the membrane chiefly affected, dysuria from inflamed bladder, &c.),—yet it is very important to remember, that, in the case of those organs, the whole of which are not necessarily concerned in the performance of their assigned functions, inflammation may affect a part, while the function may be still so well performed by the rest, as to prevent any outward indication of disorder. It is thus that we may have partial inflammation of the lungs without obvious dyspnœa, especially when the whole quantity of blood requiring to be arterialized in the lungs is less than natural,—and therefore *latent* in-

flammation of the lungs in feeble habits. So also the liver may be partially inflamed, while a sufficiency of healthy bile is thrown off by the sound portions; indeed, it must be admitted, that both in acute and chronic cases any indications that we have of altered function of the liver are exceedingly uncertain. And thus, also, inflammations of portions of the brain may take place, while all the functions dependent on that organ appear to be well performed by the remaining sound parts—a fact which has certainly not been allowed its due weight in some speculations on the uses of individual portions of the brain.

Next, there may be symptoms in parts distinct from, although *adjoining* to those actually inflamed, clearly indicating the seat of internal inflammations. This is sufficiently illustrated by the effect of inflamed tonsils, or inflamed larynx, in making deglutition difficult; or the very characteristic effect of inflamed peritoneum, in checking the descent of the diaphragm, and making the respiration *thoracic.*

But the most numerous of the symptoms shewing themselves in distant parts in consequence of internal inflammation, and often giving much assistance in characterizing these inflammations, are those usually called *sympathetic phenomena*, and of these there are two distinct classes, the sympathetic sensations and sympathetic actions.

The first of these are cases where, in consequence of inflammation in some internal part, pain is felt, distinctly referred to some external part—generally referable to known nervous communications of the two, and illustrated by the pains felt at the extremities of a nerve on irritation of its trunk. Of this kind are the pain of the

right shoulder attending inflammation of the liver or diaphragm, pain at the point of the urethra attending inflammation of the bladder, pain at the knee attending inflammation of the hip joint, pain stretching round the thorax or abdomen attending inflammation of the spinal cord, pain down the spine or in various limbs attending inflammation of the brain.

Again, when we see vomiting attendant on inflammation of the brain, stomach, liver, bowels, uterus, or bladder, the *action* of the diaphragm and abdominal muscles is called sympathetic, and is often a guide in the diagnosis of the disease. It depends on what has been lately and reasonably termed a reflex action of the medulla oblongata and spinal cord, with which the sensation of nausea is connected, certainly as a general accompaniment, probably as a link in the chain of causation. And it is in the same manner that inflammation of the mucous membrane of the air passages causes cough, that of the mucous membrane of the colon, or rectum, causes tenesmus, and that of the mucous membrane of the bladder causes strangury; the actions of various and even distant muscles, in all these cases, being only an excessive degree of those sympathetic actions which are naturally linked with the healthy irritation, and with the excited sensations, of those mucous membranes, for the useful purpose of the expulsion from the body of the excretions that pass off from those mucous surfaces.

As to the general fever which co-exists with these local symptoms in cases of internal inflammation, the following observations are important.

1. Although in the case of simple and healthy inflammation we are accustomed to regard the constitutional fever as the effect of the local inflammation, still cases

are not wanting where the febrile attack, originating, *e. g.*, from cold, distinctly precedes any local symptoms, and has been thought to contribute to their production. This is most observable in some cases of cynanche tonsillaris and inflamed mamma, where the organ that becomes inflamed is so situated, that if its inflammation had really preceded the febrile attacks, it seems difficult to understand how it could have escaped notice.

2. In the more common case, where the symptoms of the local inflammation exist in a slight degree for some time before the general fever declares itself, the first constitutional symptoms sometimes take place very gradually and insidiously; but in many cases there is a sudden and well-marked attack of rigors, which it is always very important to mark, because the sooner thereafter that the vigorous antiphlogistic measures are employed, the more confidence we may have in their efficacy.

3. In early life, and in persons of sanguine temperament or excitable habit, the degree of febrile reaction which will attend any given extent of inflammation is much greater than in advanced life, or in persons of feeble habit or more phlegmatic temperament; and in the former case, the febrile symptoms may often be observed to continue for a few days, after the most urgent at least of the local symptoms have ceased, and when no farther active treatment is required to cause its decline. On the other hand, a rapid and decided abatement of all the symptoms of the constitutional fever attending inflammation is always of great importance, and warrants a favourable prognosis, even although it be observed that the inflammation spreads, and the inflammatory effusions increase, for a time, after that change.

This fact may be particularly remarked in some cases of pleurisy and pneumonia, and corresponds to what we see in cases of external inflammation, but has not been allowed due weight in recent speculations regarding the power of antiphlogistic remedies.

4. Even in the same persons, the degree of febrile reaction consequent on inflammation seems to vary remarkably according to the seat of the inflammation, and is therefore by no means in uniform proportion to its extent. Inflammation of the tonsils is attended, in many persons, with a higher degree of fever, in proportion to its extent, than probably that of any other organ; and the inflammation of the serous and synovial membranes is usually attended with more fever than that of equal importance in the mucous membranes, or parenchymatous viscera.

5. Although the state of the circulation which attends simple or healthy inflammation in its early stage is that which is strictly called inflammatory fever, and which is chiefly characterized by firm and full pulse, and enduring heat of skin, not easily reduced by evacuations, yet there are some instances of remarkable modification of this febrile state. The fever which attends inflammation of the stomach and intestines is characterized in most cases by an early and often rapid depression of the heart's action, strongly resembling, and evidently illustrated by, the strongly sedative, sometimes quickly fatal, effect produced on the heart's action by violent injuries of the abdomen. An effect somewhat similar results, in many cases, from inflammation of the kidneys, uterus, bladder, and larger joints; and, in all these cases, the peculiar sensation (a combination of nausea with pain) attending the inflammation, may be

reasonably regarded as the medium of transmission of this peculiar sedative influence to the heart.

Again, if the system has been strongly affected by some other influence, either previously to, or simultaneously with, the excitement of inflammation, the fever attending that inflammation is often remarkably modified, and may take very much the typhoid form. This is especially observed in the case of inflammation attacking a constitution in which the nervous system has been habitually influenced by peculiar stimuli, such as alcohol taken in excess; also in the case of inflammation from an injury which gives a violent shock or concussion, and permanently enfeebles the heart's action; and in the case of inflammation attended with the introduction of peculiar animal poisons into the system, which will be afterwards more particularly noticed.

6. When the different *effects* of inflammation already stated have taken place to any considerable extent in any organ, it must be expected that the symptoms of the general fever attending them will undergo a change; and this change of the general symptoms is always very important to be marked, as it generally demands a material alteration of the remedies employed. The nature of the change is different according to the organ affected: in some cases, as in acute abdominal inflammation, and also, although at a later period, in acute pneumonia or bronchitis, it is mere depression of the strength of the heart's action; in the case of inflammation in the brain, or at the heart, there is a more peculiar alteration of the heart's action, it becomes slow, or irregular, or preternaturally strong. But the most striking and most general is the transition of the inflammatory fever to the form of hectic, which most generally attends the processes of suppuration and ulceration. This often begins by

rigors, and is marked by evening exacerbations (sometimes two in the day), and by morning sweats with abatement, but not perfect solution, of the fever,—by a slight degree only of the thirst, anorexia, or disorder of the organic functions, usual in fevers,—by the absence, until the very last stage, of delirium, or other derangements of the nervous system,—by the long continuance of the febrile state, and progressive emaciation and debility,—and, towards the end of most fatal cases, by diarrhœa, and a florid, often aphthous, state of the mouth and throat, often connected with ulceration of the mucous membrane of the bowels, chiefly of the ilium. These affections of the mucous membrane seem very similar to those which are so apt to attend insensibility of certain mucous membranes from palsy or lesion of nerves. This state of hectic fever is much more distinctly marked in young and irritable constitutions than in others, and in such constitutions is the result of various other long continued diseased actions besides suppuration.

It has been often stated, that a sudden sinking of the pulse, coldness of the skin, and collapse of the features, succeeding to inflammatory disease, are an effect and an indication of gangrene. But in some cases of inflammation, particularly in external parts, gangrene takes place where there is no such sinking of the circulation; and in many cases of inflammation in all parts, *e. g.* in the lungs or bronchiæ, but more particularly of abdominal inflammation, this sinking takes place and is fatal, without gangrene shewing itself. Such a state of the circulation, following inflammation, therefore, is to be considered as a frequent attendant, and often as part of the cause of gangrene; but not as its effect, nor necessarily as its indication.

In some cases of inflammation the change which takes

place in the febrile symptoms in the advanced stage of the disease, when the inflammatory effusions have made some progress, is different, *e. g.* in inflammation of veins, the fever usually takes gradually the form of typhus. But in every case where we have any manifest *alteration* of the general febrile symptoms, combined with persistence of the local symptoms, whether these last indicate deranged functions, or altered sensible qualities of parts, we must regard the period as one of great importance both as to the prognosis and the practice; indicating generally a state of matters in which the active antiphlogistic treatment is no longer advisable.

SECT. VI.—*Of the varieties of Inflammation.*

ALTHOUGH there are many variations in the progress of inflammation, in different instances, which cannot be reduced to any general heads; yet it is also ascertained that there are varieties which admit of being classified and generalized, and the causes of which can be assigned; and these are of such importance as to demand a separate consideration.

I. After the statements already made, it is unnecessary to dwell on differences among inflammations which are dependent on the *texture affected; i. e.* differences in inflammations proceeding from the same cause, especially from cold, and affecting different textures.

It is sufficient to observe, that inflammation in cellular substance, and in the parenchymatous viscera, is generally attended with less intense fever, and with less pain (unless the inflamed parts are so situated that their dis-

tention is prevented), than that in serous membranes, and that it is generally more limited in extent, and tends more surely to the formation of circumscribed abscesses; —that the inflammation of the true skin is rapid in its progress, and tends especially to effusion of serum betwixt it and the cuticle, *i. e.* to vesication, as is seen in blistering, and in the effect of burns, or of mechanical pressure, affecting this texture only;—that the acute inflammation of serous membranes is that which spreads the most rapidly, and excites the most pain and fever, tending first to the effusion of serum and lymph, and less certainly to that of pus; and in all parts of the body, inflammation of these membranes possesses these general characters;—that inflammation of the mucous membranes varies more in different parts of the body, but, in general, is attended with less pain or fever, spreads less rapidly and extensively, and tends first and chiefly to increase and alteration of their own secretions; in some parts also, especially in the stomach and intestines, to ulceration.

Again, inflammation of the investing membrane of bones, and other fibrous membranes and cartilages, has, in general, less tendency to effusion of pus than in many other parts; it is slower in its progress, and tends especially to effusion of solid lymph, often afterwards undergoing conversion into bone, and to various alterations of the nutrition of the bones, to which many of these membranes are attached. Inflammation of bones themselves, and of cartilages, has also peculiar characters, particularly in the tendency to the formation of fresh bone, on the one hand, and to ulceration or sloughing (*i. e.* caries and necrosis), on the other.

When rheumatic inflammation (which has certain

specific peculiarities not at present in our view) attacks different textures, it is obvious that the results to which it leads are determined by the nature of these textures, —the synovial membranes pouring out fluid effusion only, the sheaths of the tendons, and the pericardium, if it be affected, often acquiring a lining of solid lymph, the bones acquiring an increase of solid matter, by which they are enlarged and distorted, and the muscular fibres undergoing no decided change but that of loss of substance and of power; this last is indeed a texture, from the nutrient vessels of which inflammatory effusions perhaps never take place.

II. Besides these differences, dependent on the texture affected, there are others, of great importance, referable to two heads, *first*, in the intensity or duration of the symptoms; *secondly*, in the organic changes to which the process leads.

There are, *first*, cases not uncommon, of inflammation occurring in a *latent* form, *i. e.* producing its usual effects on the textures concerned, with so little of the usual symptoms, as not to be recognised, without very unusual care and attention, during life.

The absence of the usual inflammatory fever, in such cases, is generally to be ascribed to the want of what is usually called Mobility or Excitability of the system, probably both of the nervous and vascular organs. A difference in this respect is remarkably observed in the black and white varieties of our race; it is observed between aged and young subjects, and to a certain degree between persons of the lower and higher ranks.

The absence of the usual local symptoms may very generally be ascribed to one of two causes, either a state

of debility and anæmia, in which less than the usual quantity of blood visits the inflamed parts, or a state of insensibility, in which all uneasy sensations are much blunted. The first case is exemplified frequently in convalescents from febrile diseases; the second in the later stage of these diseases.

There are varieties in the degree of intensity and rapidity of progress of inflammations in all parts of the body, which cannot be strictly defined, but are expressed by the terms Acute, Subacute, and Chronic. It is right to distinguish the second as well as the third of these varieties from active and intense inflammation, because there are cases which are rapid in their progress, sometimes even pretty extensive, but never attain any great intensity, nor require very powerful remedies to control them. Many such occur in various parts of the body, sometimes idiopathically, sometimes in combination, either with acute febrile disease (idiopathic Fever or Exanthemata), or with chronic disease, functional or organic; and have had the epithet Subacute applied to them with more propriety than Chronic.

The term Chronic is properly applied to those inflammations which tend to the same consequences, and, in many instances, infer the same danger as the acute, but run their course much more slowly, and generally with less urgent symptoms. It seems necessary to make a deduction from cases which have been described as of this kind, because many such had not been seen by the describers at the commencement of the inflammatory symptoms, and may therefore have been cases of the effects, or sequelæ of acute inflammation inadequately treated, rather than examples of chronic inflammation. It is proper also to exclude, at present, from chronic

inflammations, cases where adventitious textures are formed, distinct from the ordinary products of inflammation, although there be much difficulty in distinguishing these forms of disease by their symptoms. But setting aside all such ambiguous cases, there remain a large number, where the usual results of inflammation, especially effusion of grey or yellowish lymph, and consequent induration of textures, or effusion of pus (*e. g.* into the sac of the pleura) have certainly taken place slowly and gradually, and often with symptoms, obvious indeed, but chronic rather than acute,—the local affection being for a long time more obvious than the constitutional, and the latter consisting more in debility and emaciation than in febrile action.

Such Chronic Inflammations are chiefly seen in debilitated habits, but it were a fatal error to suppose that such subjects are not likewise very liable to attacks of acute inflammation. It may perhaps be stated as a general fact, that on membranes chronic inflammation leads more to effusion of pus, and in the interior of viscera more to thickening and induration.

The other varieties of inflammation are those to which we give the name of Specific, because the effects which they produce are specifically distinct from those which result from the more usual, or what we term Healthy Inflammations of the same parts. This peculiarity of effect of the process implies the existence of some peculiar cause affecting the constitution, which may be either, as already observed, in the previous circumstances of the patient, or in the nature of the specific cause of the inflammation. But in both cases we have good reason to think, that the peculiarity of the effect of the inflam-

mation depends on a deviation from the natural state of the vital properties of the blood.

III. There is a well marked and important difference between the form of inflammation called Phlegmonous and that called Erythematic, in external parts. The Erythematic Inflammation is characterized, 1. By its tendency to spread along the surface of the body, often subsiding at one part as it extends to another; 2. By its colour, which is of a less vivid red than other external inflammations; 3. By its producing vesication of the surface, but little or no effusion of solid lymph; 4. In many cases by the form of the accompanying fever,—bearing no proportion to, and apparently not depending on, the extent or intensity of the inflammation,—generally commencing in those severe cases, to which the name Erysipelas is given, one, two, or even three days, before the inflammation shews itself,—being sometimes dangerous or fatal when the inflammation is slight,—and very often shewing, throughout its course, more prostration of strength, more tendency to delirium or stupor, more dryness of tongue, and evidence of diminished secretion over the body, *i. e.* a more typhoid form, than the fever that is simply symptomatic of inflammation does.

In all these respects, this form of inflammation may be said to be *specific*. It differs from that which may be excited, at pleasure, by mechanical or chemical irritation of the surface of the body, although it often supervenes on injuries so excited. The body here appears to be under the influence of a cause, which gives a peculiarity to the inflammation, and often likewise to the kind of febrile action; and when the fever distinctly precedes the inflammation by one or two days, the case

is justly held to bear as much analogy to the febrile exanthematous diseases, to be afterwards considered, as to the inflammations.

Accordingly, although the danger in this form of inflammation sometimes depends merely on the extent of the local changes, and is to be obviated by moderating or repressing these, yet it sometimes depends obviously on the typhoid form, and especially on the depressing influence of the constitutional fever, and cannot be inferred from observation of the local inflammation, nor be averted by remedies applied to that part of the disease.

So decided a deviation from the more usual form of inflammation of the surface of the body, may be suspected to depend on an external cause of local and temporary existence, rather than on causes of general operation; but the conditions necessary to the existence or effect of this cause have not been fully ascertained. The Erysipelas has been observed to prevail most in confined and ill-aired situations, and to occur most commonly in persons in whom the digestive organs are disordered, or the general health otherwise impaired; but it certainly cannot be referred simply to any of these circumstances as its cause. At certain times and places it prevails much more extensively than at others; and at these it is certainly sometimes propagated by contagion,—in some instances by inoculation, and perhaps by this last cause more generally than is usually supposed, because, where prevalent in any situation, it is found to attack almost exclusively those in whom the cuticle has been penetrated or removed, by puncture, incision, injury, or blister,—a fact which suggests obvious precautionary measures of prevention.

The term Phlegmonous is applied chiefly to that inflammation of external parts which ends in the formation of circumscribed abscesses formed by dense lymph; but it is also applied to any external inflammation which does not produce vesication, nor spread rapidly along the surface.

The Erythematic Inflammation is certainly not peculiar to the skin. In many cases it is seen to affect the mucous membrane of the nose, mouth, fauces and larynx, simultaneously with the skin of the face and neck, and to preserve its appropriate characters in these situations. In some instances it affects the fibrous membranes, especially the pericranium. It very often affects the cellular texture, immediately beneath the portions of skin which it occupies, and produces effects similar to what it does on the surface, effusion first of bloody serum, and then of pus, which is in general imperfectly, or not at all, bounded by effused lymph.

Again, there is good evidence, that at least in one of the internal serous membranes, viz. the peritoneum, inflammation occasionally presents very nearly the same characters as Erysipelas on the skin, tending to effusion of bloody serum, of a whitish milky fluid, or of more perfect pus, with little or no exudation of plastic lymph. The diffuse or Erythematic inflammation in all these parts, may prevail epidemically, involve peculiar dangers, and demand peculiar treatment, to be noticed afterwards.

IV. Besides the Erythematic, there are various other forms of inflammation affecting the skin, and tending to various effects there, which are easily distinguished from the inflammation that is excitable at pleasure by irrita-

tion, from the erythematic form above described, and from each other, and which will demand consideration afterwards.

There is no reason to think that inflammations of internal parts take place in equally numerous and definite varieties, as those on the skin; but the Aphthæ, or whitish crusts often occurring in children idiopathically, and in adults in the course of different weakening diseases, on the mucous membrane of the mouth and fauces, are an example, similar to most of the cutaneous diseases, of slight inflammation followed by peculiar and long-continued effects; and there is one form of inflammation of the mucous membrane of the fauces, almost equally well defined as any of the distinct cutaneous affections, and sometimes prevailing almost epidemically, —that to which the term "Diphtherite" has been applied by Bretonneaux and others, of which the chief characters are, the rapid formation of flocculent aphthous crusts, often extending into the larynx, and sometimes down the œsophagus, with little intensity of previous inflammation, and with fever, slight in the commencement, and afterwards generally typhoid. The peculiar inflammation, beginning at parts of the gums, tending to rapid ulceration, and frequently to rapid and extensive gangrene, which occurs not unfrequently in weakly children, and has been described under the name of the Cancrum Oris, is another example of a specific inflammation, beginning in the mucous membrane of the mouth.

Whether there is any thing equally peculiar or specific, in the exudation, and subsequent ulceration, on the mucous membrane of the intestines, which often takes place in the course of continued fever (and has been

called Dothinenterite, or in that which characterizes Dysentery, is not so clearly ascertained.

V. There are three distinct varieties of Inflammation, strictly called Specific, each of which affects a variety of textures,—the Rheumatic, the Gouty, and the Syphilitic.

The distinctive characters of the Rheumatic Inflammation may be stated to be, 1. That it affects different parts, and, in general, even different textures, within a short time, viz. certain fibrous membranes, probably muscular fibres, synovial membranes, often portions of the bones, and sometimes certain internal membranes, especially the pericardium, and membrane lining the interior of the heart. 2. That it shifts from one to another of these more rapidly, and more frequently, than any other inflammation does, insomuch that its rapid recession at one part of the body is rather a reason for expecting its appearance in another, than any security against its farther progress. 3. That, when existing alone, it never leads to suppuration nor ulceration, but to serous effusion into the articular cavities, to thickening and induration of fibrous membranes, and remarkably to effusion of solid lymph on the surface of the pericardium, or on the internal membrane of the heart, when these are affected. From these peculiarities, it may be suspected that there is something peculiar in the state of the blood in Rheumatic Inflammation; and it has been generally observed, that the fibrin of the blood in violent cases of Acute Rheumatism, is very abundant, and its separation from the colouring matter very complete.

The Gouty Inflammation, which affects the same textures as the Articular Rheumatism, differs from it

chiefly, 1. In affecting a much smaller number of joints in one paroxysm, and these generally the smaller joints of the extremities. 2. In being very generally preceded by disorders of the stomach, and often alternating with violent affections of the stomach, sometimes inflammatory, often apparently neuralgic. 3. In being one of the diseases to which a portion of mankind only is in any circumstances liable, and in its occurrence being very often traced, partly to hereditary predisposition, and partly to particular diet and mode of life. 4. When it lasts long, in leading to the effusion of the peculiar tumours called Chalkstones, which consist chiefly of lithate of soda.

The same matter having been lately found in the enlargements of bones consequent on Rheumatism, we see more distinctly than formerly the intimate relation of the two diseases.

From the whole history of these diseases, especially from this last fact, and from the frequent connexion of gout with gravelly deposits in the urine, it is pretty obvious that one condition necessary to the establishment of these kinds of inflammation is, a morbid matter, or an excess of matter destined to excretion, elaborated in the system, and circulating in the blood.

All that need be stated here as to the Syphilitic Inflammation, a variety undoubtedly depending on a peculiar morbid matter applied to the surface, and then multiplying in the system and circulating in the blood, is what follows.

1. It affects peculiarly the skin of the genital organs, the lymphatic glands in their neighbourhood, the mucous membrane of the fauces, the skin generally, the iris of the eye, and the periosteum and bones, at the parts where these are densest.

2. It is everywhere of a chronic character, and tends

to peculiar consequences—in the lymphatic glands, to suppuration and then ulceration; in the skin, to various, but perhaps most frequently to scaly exudations, and often subsequently to ulceration; in the iris, to simple effusion of lymph; in the skin of the genitals and of the fauces, very certainly to ulceration (which ulceration, in the best marked and most severe cases, is characterized by the deep excavation and hardened base); in the bones, to irregular deposition, constituting nodes, and often to concomitant absorption, constituting Caries.

It may be added, that the Syphilitic Inflammation and Ulceration are peculiarly under the influence, in most cases, of Mercury acting specifically upon them; but it certainly cannot be maintained, as was formerly done, that any form of syphilitic ulceration is absolutely devoid of the disposition to heal, where mercury is not used.

It is very important to bear in mind, that syphilitic inflammation is often combined with, or passes into the form of, simple acute inflammation of the same parts, and often also it appears to be combined with scrofulous inflammation. Independently of such combinations, there are many varieties in the appearance and progress of the affections resulting from impure sexual intercourse, such as those designated by the names pseudo-syphilis, syphiloid disease, phagedœnic, pustular, vesicular, or tubercular venereal disease; but whether these varieties are to be ascribed to different specific poisons acting on the body, or to peculiarities of constitution, is still doubtful.

The poison of Gonorrhœa acts as a cause of specific inflammation in the mucous membrane of the urethra and tunica conjunctiva of the eye, which is characterized by rapid extension along the membrane, by copious effusion, which soon becomes puriform and capable of propa-

gating the disease, and by great thickening of the membrane, but, on the former part at least, by total absence of tendency to ulceration.

The action of Mercury on the body is a specific cause of inflammation in the salivary glands,—of inflammation, aphthous exudation, and superficial ulceration in the mucous membrane of the mouth and fauces, and sometimes in the great intestines;—and in certain persons, of a peculiar vesicular eruption on the skin. It seems also to be a frequent cause of aggravation of inflammation, whether simple, scrofulous, or in some instances even syphilitic, in various parts of the body; but it can hardly be said to act *per se* as a sufficient cause of inflammation in other situations than those mentioned.

VI. The form of Inflammation which is termed Scrofulous demands a somewhat more detailed notice.

"The term Scrofula is used by medical writers in two senses; *first*, to express the existence of a disease which possesses certain distinctive characters in whatever part it may be seated; *secondly*, to indicate a disposition, diathesis, or state, which *predisposes* some part of the body or other to become affected with such disease." *

Scrofulous disease is most generally and distinctly characterised, either by a peculiar variety or modification of inflammation, and of suppuration and ulceration consequent thereon, easily recognised when the affection is seated externally, and known to present the same characters in internal parts; or else, by the formation and subsequent changes of those tumours, or adventitious textures, in various parts of the body, which are called

* Thomson on Inflammation.

Scrofulous Tubercles. The connexion which exists between the scrofulous inflammation and the deposition and growth of these tubercles, will be considered presently.

There are some kinds of disorganization or organic disease, distinct from either of the kinds of diseased action above mentioned, to which the term scrofulous is likewise commonly and correctly applied, but which generally coexist with indications, either of the scrofulous inflammation, or of the scrofulous tubercles.

The term Scrofulous Diathesis is applied to that peculiarity of general habit, which appears to furnish the great predisposition to these kinds of diseased action; it being well ascertained that it is only a portion of mankind that, under ordinary circumstances of exposure to the causes of disease, becomes affected in this way.

The marks by which we distinguish the form of Inflammation denominated Scrofulous, are less peculiar and characteristic, than those which distinguish the erythematic, or other specific inflammations; but where the whole course of the affection is observed, the distinction from simple or healthy inflammation becomes obvious. The common affection of external lymphatic glands is perhaps the best example. The pain and heat are not great, the colour is often nearly unchanged for a long time, and then is somewhat livid or bluish, the progress is remarkably slow, and is little influenced by remedies. But besides these, which may be said to denote only chronic inflammation, there is a more decided peculiarity in the suppuration, which generally follows such inflammation, lasting longer than in ordinary cases,—in the discharge being more serous, but usually mixed with fragments of *curdy* matter,—in ulceration very generally

succeeding, and in the ulcers being indolent, shewing little disposition to heal, and often degenerating into fistulæ.

The following may be stated as the distinctive characters (known from the examination of many different bodies, in which they exist in different stages of progress) of Scrofulous Tubercles; which, however, admit of considerable variety, both as to the mode of their deposition, and the changes they afterwards undergo.

They are at first very minute, soft, or of nearly gelatinous consistence, of a greyish colour, and of a somewhat opaline lustre, have more or less of the rounded form, and are very often set together in clusters on the membranes, or in the textures, where they are formed (Tubercules miliaires.)

They afterwards enlarge considerably, several of them generally coalesce into one irregular mass, and they become opaque, yellowish, and of the consistence of soft cheese (Tubercules crus.) These tubercular masses then frequently soften, first in their centres, and degenerate into a purulent fluid, having more or less the character of scrofulous pus above described, some fragments of the solid tubercular matter floating in the fluid without becoming themselves liquid. But although many tubercular masses are thus converted into ulcers, there are others which gradually harden into cartilaginous, and then into earthy concretions, and remain in an inert state for a very long time. The ulcers shew very little disposition to heal, but when they are not very numerous the discharge from them gradually abates, and they may become small fistulous cavities free from all diseased action.

Appearances of simple inflammation are very often

found around these tubercles, many of which may be judged from various circumstances to be posterior to them in date, and may be ascribed in part to the irritation resulting from them.

Although they undergo various changes in the interior of their substance, at different periods after their deposition commences, it does not appear from injections, that tubercles are themselves provided with vessels, and hence they have been called a morbid secretion, perhaps more properly than an adventitious texture. When the tubercular deposition is far advanced, the vessels of the parts affected are much obstructed, by the disease extending to their coats, the quantity of the blood sent through those parts is much diminished, and the whole circulation in the neighbourhood much altered.*

These appearances are found in very different parts of the body,—according to the observations of LAENNEC nearly in the following order of frequency. The lungs, the lymphatic glands, the liver, the prostate gland, the mucous membrane of the bowels, the pleura and peritoneum, the testis and its appendages, the spleen, the heart, the uterus, the brain and cerebellum, the bones, and lastly, adventitious or morbid textures, with the peculiar matter of which they are not unfrequently mixed. Of these parts, the lymphatic glands and the highest portions of the lungs are those in which tubercles most frequently originate; and it is important to observe, that these are parts in which the capillary circulation must necessarily be very slow.

When tubercles exist in any part in considerable num-

* See SCHRÆDER VAN DER KOLK, Observationes, &c. p. 75 and 85.

bers, they are very generally attended by much debility and emaciation, and, in young persons especially, by frequency of pulse; but the other symptoms connected with them must be expected to vary extremely, according to the organs in which they are formed, or the functions of which they impede,—according to the presence or absence of concomitant inflammation,—and according to the changes which they themselves undergo. When they exist in those parts in which they generally suppurate, as in the lungs, and in the intestines and mesenteric glands, they are generally attended with hectic fever; but this is by no means a general fact.

The following affections, often seen in connection with scrofulous inflammation, or with tubercles, may be stated as perhaps equally characteristic of the scrofulous habit.

1. The slow phagedœnic ulceration of the nares called Lupus.

2. The conversion of the synovial membrane of joints into a brownish pulpy matter, seen in the most distinct cases of White Swelling.*

3. Ulceration of the cartilages of the joints without distinct previous inflammation of the synovial membrane.†

4. The formation of those tumours which have the name of Encephaloid substance, or Fungus Hæmatodes, which may exist in various parts of the body, and which are of softer consistence, are found in larger masses, and grow much more rapidly, than the scrofulous tubercles.

In applying the general term Scrofulous to the different affections now noticed, we do not, of course, mean to assert, that they are essentially of the same nature,

* See BRODIE on Diseases of the Joints. † Id.

although a general resemblance may be traced among them. But we are induced to give this general name to all these affections, in consequence of our knowing by ample experience, 1. That they all occur very frequently in persons in whom certain peculiarities of constitution, independent of actual disease, may be observed; 2. That two or more of them very often succeed one another in the same individual; 3. That they all occur remarkably in different individuals of the same families, while other families are exempt; 4. That they are all induced or aggravated, and again may be confidently believed to be averted or mitigated, by the same or similar causes.

No word would convey the same important meaning which this term Scrofula does, which should be confined to affections precisely of the same kind; because what we wish to do, in using the term, is to mark the connexion that subsists between different diseased actions, which appear, from their history, to depend on the same peculiarity of constitution, and therefore ultimately on the same general causes, and which may often be prevented or alleviated by the same general measures.

Neither is it meant, in referring these different affections to the Scrofulous habit or Diathesis, as their great predisposing cause,—to assert either that every inflammation in such a habit must be of the scrofulous character, or that none but persons previously of that habit, are susceptible of scrofulous disease. We know that healthy inflammation, shewing no unusual or specific character, may exist, under a certain degree of excitement, in a person already suffering under scrofulous disease; as we see in the healing of many wounds in such persons, and in many cases of occasional or *intercurrent* inflammation, occurring in the course of tubercular dis-

eases. And we know, that in certain circumstances (*e. g.* under the influence of long-continued cold, and deficient nourishment, coupled with long-continued local irritation) scrofulous disease may be excited in constitutions previously quite healthy and robust.

Nevertheless, it is important both to mark the indications, and to generalize, as far as possible, what experience has established as to the cause, of that habit of body, in which the different scrofulous affections are most apt to occur, and most to be dreaded.

The chief mark of the scrofulous habit, in persons not yet affected with any disease, is a certain soft, flaccid habit of body, and especially a remarkable softness of skin, observed in persons in whom such a texture of the skin is not to be expected. The complexion is usually pale, with frequently a clear circumscribed redness in the cheek; and this colour is easily changed to purple or livid by cold. The eye has often a peculiar pearly lustre. The senses are usually acute, and the mental powers of observation and apprehension peculiarly active, so that children of this habit shew, in general, a precocity of intellect. The scrofulous tendency is perhaps more frequently and decidedly seen in those who have fair or red hair, and blue eyes, than in others; but is common in dark-complexioned persons also.

In many cases it is more decidedly shewn by slight diseases, or the effects of injuries, before any serious disease is contracted;—by the enlarged glands in the neck and groins, the tumid upper lip, the chronic inflammation of the alæ nasi and membrane of the nostrils,—the chronic ophthalmia tarsi, or the strumous inflammation of the tunica conjunctiva of the eye, lasting long, with

little heat or redness, but much impatience of light, and a peculiar tendency to the formation of small pustules; and also remarkably by the slow healing of slight wounds, the somewhat livid and chronic inflammation, and often the unhealthy suppuration, that succeed them. Those children that have the softness and consequent distortion of the bones, enlarged joints, and other marks of Rickets, are also very frequently, if not necessarily, prone to scrofulous disease.

The following are the principal facts that have been ascertained, as to the causes by which the Scrofulous Diathesis, or liability to scrofulous disease, is produced.

They may all be ranked together as causes of debility, acting permanently, or habitually for a length of time, although not so powerfully as to produce sudden or violent effects.

1. The tendency is decidedly *hereditary*,—*i. e.* those whose progenitors have shewn marks of scrofulous disease, become affected in this way in much larger proportion than others; although it is very seldom that tubercles, or other scrofulous affections, are *congenital*. Feebleness of habit in parents, even independently of actual scrofulous disease in them, appears evidently to dispose to scrofula in their offspring.

2. Although not so exclusively confined to one period of life, as has been stated by some, scrofulous diseases are much more frequent in childhood and youth, *i. e.* between the ages of two and three, and thirty or thirty-five, than at any subsequent period.

3. Although a diet almost entirely vegetable is often found sufficient, when other circumstances are favourable, for the formation of a vigorous habit of body, yet it may

be confidently stated, that *a low diet* habitually taken during youth and in health, disposes to scrofulous disease more than a fuller diet does.

4. The scrofulous diathesis is remarkably increased by the influence of *cold and wet*, acting for a length of time on the living body; as is shewn by the much greater prevalence of such diseases in the temperate or cold climates, than in those where any applications of cold are comparatively transient,—and also, by the greater frequency of such affections in winter, and especially in spring, than in summer and autumn, in this climate.

It is, however, a mistake to suppose, that the tendency to scrofulous disease cannot be formed in hot climates. The long-continued application of heat, in early life, is weakening, and therefore favourable to the formation of the scrofulous habit; and it is found by experience, that the natives of those climates, both white and black, are peculiarly liable to scrofulous diseases when they come to the colder climates; from which it obviously follows, that the rarity of scrofulous disease in the warmer regions of the globe, is the effect of exemption from its great *external* cause,—from cold of sufficient intensity, and more especially of sufficient endurance; and not the effect of absence of the *internal* predisposition to such disease, in the inhabitants of those regions.

Hence, although it is often of real importance to remove young persons, evidently of scrofulous habit, from a colder to a warmer climate, at the period of life when scrofulous disease is most apt to occur, in order that the excitation of the disease at that period may be avoided; yet it is a mistake to suppose, that this measure furnishes any security against scrofulous disease in future,

if they shall return to their native climate, and be there fully exposed to the causes of such disease.

Children brought up in the colder climates, if of healthy constitution, well fed, and duly protected from the excessive or long-continued application of cold, acquire a decidedly stronger habit of body, from the habitual stimulating effect of alternations of temperature, than those whose other circumstances are equally favourable, but who are never exposed to such alternations; and therefore resist scrofulous disease (*e. g.* Phthisis) when the latter would fall into it; and the natives of the colder climates, therefore, while they are more frequently exposed to the external cause of scrofula, have also at their command more effectual means, if duly and cautiously employed, for fortifying the constitution against it.

Perhaps it may also be stated, that the exemption of the inhabitants of hot climates, is rather from the scrofulous diseases of particular organs (especially the external parts and the lungs) than from scrofulous disease in general; for the chronic diseases of the Liver and Bowels, so common in hot climates, approach very nearly, in their first origin, to the distinctly scrofulous affections.

5. The formation of the scrofulous habit is probably more influenced by mode of life, especially in early youth, than either by hereditary taint or by climate.

It is hardly possible to observe separately the effect on the animal economy, of deficiency of exercise and deficiency of fresh air, these two causes being very generally applied together, and often in connexion with imperfect nourishment. But it is perfectly ascertained, on an extensive scale, in regard to the inhabitants of large

and crowded cities, as compared with the rural population of the same climate, *first*, that their mortality is very much greater, especially in early life, and the probability of life very much less (the difference being, in some cases, as 45 or 50 to 5, or even to 3); and, *secondly*, That of this great early mortality in large towns, a very large proportion, generally a majority of the whole,* is caused by scrofulous disease. And from these two facts, it evidently follows, that deficiency of fresh air and of exercise, are among the most powerful, and the most important, because often the most remediable, of the causes from which the scrofulous diathesis arises.

6. It has also been frequently observed, although the observations have not been on so large a scale, and therefore the conclusion is not so completely established, that the inhabitants of low moist situations are more liable, *cæteris paribus*, to scrofulous disease, than the inhabitants of higher and more airy districts.

7. The tendency to scrofulous disease is remarkably increased by habitual mental languor and depression, as it is counteracted by mental excitement and habitual pleasing emotions.†

8. This tendency is increased by the debility succeeding great evacuations, and especially by that which succeeds acute diseases, as fevers, or the exanthemata, or the febrile state excited by mercury.

9. It is increased by any such causes as habitually impair the digestion, and counteracted by such means as

* See a paper on Scrofulous Diseases by the author, in Edinburgh Medico-Chirurgical Transactions, vol. i.

† See a striking example in the inhabitants of a nunnery, living under unusual restraints, stated by Laennec, Ausc. Mediat. t. i. p. 647.

are effectual in restoring the more natural state of the digestive organs, and thereby the general strength.

The effect of all the causes now enumerated is, to give a tendency to inflammation, however excited, to assume the peculiar chronic form above described, and likewise to predispose to the deposition, in various parts of the body, of the substances described as Scrofulous Tubercles, and which are the origin and foundation of the most formidable scrofulous diseases.

Now, it is obviously of the utmost importance, to ascertain whether, or how far, the deposition of tubercles is itself an effect of inflammatory action. If these deposits can be assimilated to the lymph effused by inflammation, their pathology will be so far elucidated, and one important means of restraining their formation be clearly indicated. And, on the other hand, in so far as we can ascertain that their formation differs from the simple effects of inflammation, we must regard the remedies for inflammation as inadequate or improper in the view of checking that formation.

That the deposition of tubercles may be, and often is, the result of an action, to which it would be absurd to give any other name than Inflammation, appears to be sufficiently demonstrated by the following facts.

1. Their formation may be determined in various instances by the application of the same causes which excite inflammation. This is most unequivocally shewn by experiments on animals, *e. g.* those of Flourens on ducklings and chickens,* which, by being kept in a temperature somewhat less cold and more varied than that which excited acute pneumonic inflammation, were sub-

* Annales des Sciences Naturelles, 1828.

jected to a disease of the lungs, having the essential characters of scrofulous phthisis; and those of Moulin, Saunders, Cruveilhier, Kay, and others,* in which substances, at least closely resembling scrofulous tubercles, and in some instances running nearly the usual course of these, were formed, in consequence of particular modes of mechanical irritation, as by mercury dropt into the trachea, and acting in small quantities, but permanently, on the minute vessels of the lungs.

When we compare the results of such experiments with the well-ascertained fact, that masons, miners, needle-grinders, and other artificers, who are necessarily in the habit of very frequently inhaling irritating particles, are peculiarly liable to scrofulous phthisis, we cannot doubt that this peculiarity is to be ascribed to the habitual mechanical irritation; and it is reasonable to infer, that what is so easily excited by mechanical irritation of a living part, in a previously healthy animal, must be a product of inflammation.

Again, there are many instances of strictly scrofulous local disease excited manifestly by more serious local injuries, and in which it appears ultimately that the deposition of tubercles had been the origin of the mischief.

2. Cases occasionally occur, independent of mechanical injury, when we are very certain that the symptoms attending the first formation of tubercles are observed,—especially the cases where this deposition is much more general than usual, and fatal much more quickly, and where they are found in great numbers, very small, and all about the same size, implying simultaneous and recent deposition; and in such cases, the remote causes,

* See Cullen's First Lines, with Appendix by Gregory, vol. i. p. 590.

symptoms, and progress of the disease are very generally found to be just those of inflammation of the same parts, of somewhat slower progress than is usual.*

3. The examination of the morbid parts in cases where we see tubercles in their early stages, often shews scofulous tubercles not only coexisting with, but graduating by insensible degrees into, usual and acknowledged effects of inflammation,—such as flakes of lymph on membranes, or granulations formed by lymph effused into cellular texture; and the substance which has the form of incipient tubercles, so precisely similar to that which is thus irregularly diffused, that we cannot ascribe to them a different mode or period of formation. This intimate blending of tubercular deposits with inflammatory effusion, and distinct transition by insensible degrees, of the one into the other, is often seen on the serous membranes of the head, chest, or abdomen, on the mucous membrane of the bowels, and in the interior of the lungs or liver. The tubercular matter in the lungs is often, as Laennec states, *infiltrated* into the cellular texture, and when so, it is impossible to draw a distinct line of demarcation between it and the grey hepatization of the lungs.

4. Although the changes which tubercles undergo after they have been deposited, are generally much slower than, and sometimes materially different from, those which take place in decidedly inflammatory effusions, yet in many cases they resemble those changes in their essential characters; and in the case of children, in particular (where their course is always more rapid than in adults), they are sometimes hardly to be distinguished from small abscesses, resulting from the usual causes of

* See the papers in Edinburgh Medico-Chirurgical Transactions, already quoted, vols. i. and iii.

inflammation, gradually enlarging, then softening, and ultimately discharging purulent matter.

From these facts, it seems reasonable to infer, that in certain constitutions, tubercles and all their consequences are direct effects of inflammatory action, and may be prevented if that action be arrested or subdued.

But, on the other hand, it is plain, that there must be an essential peculiarity in the nature of the morbid action by which tubercles are formed, from these two leading facts in their history, which distinguish them from the ordinary effects of inflammation; 1*st*, That they are originally deposited in minute but separate globules; and, 2*dly*, That when deposited, instead of being very liable to absorption (as the lymph effused by healthy inflammation is), they continue to grow, when there is no indication of inflammation around them, and even when the whole quantity of blood supplying the parts where they exist is much diminished. And the history of many cases informs us, that when this constitutional peculiarity is very strong, little or no inflammatory action is necessary to determine the deposition of tubercles; but that they will be formed wherever there is any congestion of blood, and sometimes where there is no vestige of previous disturbance of the circulation.

This tubercular diathesis may be reasonably supposed to depend, in part, at least, on a peculiarity in the condition of the blood; and it is very important to observe, that it appears to be manifestly increased (as was observed in regard to the purulent diathesis) by tubercular disease already existing in any part of the body; fresh deposits taking place, often in various parts, more frequently, and with much less evidence of previous disease,

in cases where tubercles already exist in numbers in one organ (*e. g.* in the lungs), than in any other cases.

The most leading fact that has been observed, as to the essential nature of tubercular deposits, and their difference from the more diffused organizable lymph thrown out by healthy inflammation, is that stated by Gendrin,* that when examined by the microscope in their earliest stages, and in their distinct form, they never shew any of those bodies which he supposed to be decolorized globules of the blood, which can be detected in the fibrinous effusions from healthy inflammation. Hence probably it is, that they do not form layers or flakes, as the latter substance does, in consequence of the peculiar mode of aggregation of its globules into fibres; but that they gather into little separate spherical masses, under the influence of gravitation, as any other viscid fluid does, when slowly poured out in thin films, or narrow lines. Hence, also, in all probability, their incapacity of acquiring vascular organization.

All that is known of the conditions under which scrofulous tubercles usually originate, may perhaps be comprised in the proposition, That the blood is unusually serous, which implies that its vitality is of a lower grade than natural, because it is by a vital act only that the liquor sanguinis is divided into serum and fibrin;—that from the same cause, its motion is languid in numerous small capillaries, and partial exudations of its albuminous portion are apt to take place, and cohere together into minute spherical masses, which are destitute of the power of acquiring an organized structure themselves,

* Hist. Anat. des Inflammations, t. ii. p. 595.

but grow by attracting to themselves fresh matter from the vessels; and that this exudation, although not absolutely dependent on, is much promoted by, congestion of blood, or inflammation, tending, by reason of the peculiarity of the blood to this kind of effect, in the parts where it takes place.

All these statements, made in the first edition of this work, are substantially confirmed by subsequent microscopical observations, especially the following:—"Albuminous or unorganized tubercles (which with great propriety are called Scrofulous Tubercles) can only be produced from exudations abounding in albumen, poor in fibrin. They consist almost entirely of *granules*, from the $\frac{1}{1000}$th to the $\frac{1}{300}$th of a Paris line in diameter (*i. e.* generally much smaller than the globules of the blood), but with this granular matter, nucleoli, nuclei, or cells, are mingled in quantity bearing relation to the amount of fibrin which the exuded fluid contained." (*Gerber, loc. cit.* p. 305-6.) "Granular matter is the most prevalent ingredient of tubercles, almost always mixed with the other constituents, and frequently forming nearly the entire mass of caseous tubercles." "Corpuscles, more or less globular, or oval, are seen in them, but the granular matter preponderates as the tubercular mass increases. Cells may be recognised in the miliary tubercles, but as they increase in size the well-marked and complete cells disappear. Tubercles appear to differ essentially from the plastic exudations, inasmuch as the cells of the latter not only grow into a higher organization, but increase in number towards the centre; in other words, plastic matter has an inherent power of multiplying and evolving organic germs; but tubercle has no such power; for

it would appear that its primitive cells can only retrograde and degenerate." (*Gulliver, in App. to Gerber*, p. 87, and figs. 252-5, and 270-71.)

As we now know, that the peculiar properties of fibrin are necessary to retain the blood in the capillary vessels, we can easily understand, that exudation of the albuminous granular matter, constituting most part of tubercles, should more easily take place from blood "poor in fibrin," than the exudation of fibrinous effusion from more healthy blood.

Hence the practical objects in cases of Scrofulous disease may be stated to be, *first*, To improve this morbidly defective state of vitality in the blood; *secondly*, To avoid causes of congestion of blood or inflammation in such subjects; *thirdly*, When inflammation occurs, to restrain it by early but moderate antiphlogistic treatment.

SECT. VII.—*Of the modes of fatal termination of Inflammatory Diseases.*

In order that the Pathology of this or any other diseased state may be satisfactory, and susceptible of useful practical application, it is evidently necessary that we should understand, not only the changes that take place in the organs affected, and the way in which they are effected, but also the manner in which these influence the actions of the system at large, and ultimately extinguish life.

It is to be observed, however, that none of the fatal terminations of inflammation are inevitable; when the effects which lead to them have already commenced,

there are still provisions of nature by which all of them may be arrested; it is by the degree, not by the mere existence of these effects, that the fatal event is always determined.

I. Inflammation is sometimes quickly fatal, independently of any alteration in the texture of the inflamed part, simply by the gradual depression of the powers of the circulation which attends it, and which may be called a strictly sympathetic effect. The case of inflammation of the Peritoneum is the best example of this danger. The effects of this inflammation, perceptible on dissection, bear no fixed proportion to the intensity or rapidity of the symptoms; and the disorganization which is found, effusion of serum, of lymph, or of pus, thickening of the membrane, even gangrene of the membrane (which is more rarely found), although they may explain torpor of the intestines, afford no explanation of the gradual but rapid depression and ultimate extinction of the heart's action, and consequent coldness of the surface; otherwise than by reference to the principle already explained, that any violent injury of the abdomen, by virtue probably of the intense and peculiar sensation it excites, acts as a powerful sedative on the heart.

It is in this manner almost exclusively that inflammation of this part produces death, and it affords the best example of death beginning at the heart, and uncomplicated with simultaneous affection of the brain, which occurs in any disease.

Inflammation of the Mucous Membrane of the great intestines, producing the symptoms of Dysentery, whether going on to ulceration or not, is almost always attended with more or less of the sedative effect on the circulation,

which is so strikingly exemplified in the Peritonitis; and this is apparently the chief reason of dysentery having been ranked with putrid, rather than inflammatory diseases, by the older pathologists.

Inflammations of the kidneys, bladder, uterus, and larger joints, may be fatal on the same principle, without any such visible effect resulting from them, as can impair the functions of the organs essential to life, and before there is time for any exhausting process of suppuration or ulceration to be established. And although inflammation of the liver generally leads to decided disorganization before it is fatal, yet it may often be doubted, whether the change effected on that organ is adequate to explain the course of the symptoms, and the fatal event, otherwise than on the same principle.

II. Inflammation is sometimes fatal by reason of the Serous Effusions consequent on it, impeding and obstructing the functions of parts essential to life. This may happen especially in three situations. 1. When inflammation of the brain, marked by the symptoms of phrenitis or acute hydrocephalus, leads to such effusion into the ventricles of the brain as causes fatal Coma. 2. When inflammation of the mucous membrane of the larynx produces œdema of the glottis, and consequent Strangulation. 3. In the rare case, where inflammation, attacking both lungs at once, is fatal in its earliest stage, before any other consequence than serous effusion into the cells of the lungs has taken place, but that has been so general as to disqualify the lungs for their function, and cause death by Asphyxia.

In all these cases there is a difficulty in assigning inflammation as the cause of death, where nothing but se-

rous effusion is found on dissection; nor are we justified in doing so, merely from the appearances in the dead body. In merely chronic cases, great effusion into these parts may take place independently of inflammation; and in the case of effusion within the cranium, not only when the sutures yield and the head is gradually enlarged, but when there is no such enlargement, we know, that the greatest accumulations of serum, and distention of the ventricles, are exceedingly slow in their progress; and are unattended, at least during most of their progress, with inflammatory symptoms during life, or any decisive indications of inflammation after death.

It is therefore always by a comparison of the serous effusion found in the parts above mentioned after death, with the causes, duration, and progress of the symptoms before death, that we judge such effusions to be inflammatory. When we find, *e. g.* such effusion into the ventricles of the brain, as, if taking place within a few days, must necessarily imply much pressure on the brain, and explain a fatal coma, equally as effused blood or depressed bone does,—preceded by violent symptoms of a few days' duration,—and these symptoms just the same as are seen in other cases, where, on dissection, not only serum, but pus and lymph are found effused on the brain,—we cannot hesitate about regarding the serous effusion also as a result of inflammatory action. And in fact, in many of the cases to be mentioned under the next head, where lymph or pus are effused into the brain, air-passages, or lungs, the fatal coma or asphyxia cannot be ascribed to them alone, but must be held to be in part the effect of the concomitant effusion of serum.

III. In many cases, inflammation within the Head or

Chest, has such distinct and unequivocal effects as satisfactorily explain death by Coma or by Asphyxia.

1. The different forms of inflammatory effusion on the surface or in the substance of the brain, whether attended with bloody effusion into the substance, or serous effusion into the ventricles or not, are held to be sufficient to explain not only convulsions, delirium or palsy, but stupor and death. For although it be true, as formerly stated, that these and other injuries of the nervous matter, superior to the medulla oblongata, do not necessarily imply any such consequences; and although the inflammatory action which produces these effects may take place with very various degrees of rapidity, and be attended with a considerable variety of symptoms; yet it is evident that when it does take place rapidly, it must naturally make such an impression on the substance of the brain, and such a change on the circulation there, to some distance from its own seat, as may effectually disqualify it for its function. And it is known by sufficient experience, that when the general symptoms of inflammation, and the particular symptoms of derangement of the functions of the brain, have occurred with violence, and advanced rapidly to coma and death, these appearances, and these only, have often been found on dissection.

Induration of portions of the brain from inflammation is sometimes likewise the chief cause, which appears on dissection for fatal coma; but the progress of such cases is generally so slow, that they are to be regarded rather as on the footing of organic diseases connected with alteration of the nutrition of these parts, than as the results of inflammation simply.

2. When the Pericardium is inflamed, there often re-

sults such an effusion of serum loaded with flakes of lymph,—or of soft but concrete lymph almost without serum,—or subsequently of purulent matter, as necessarily impedes and alters, and within a time admitting of great variety (from forty-eight hours to several weeks), finally suppresses the action of the heart. But as, in such cases, the functions of other parts, and especially of the lungs, naturally suffer likewise, the death from this cause seldom takes place so distinctly and simply in the way of Syncope, as in other cases of inflammatory diseases already noticed, where the affection of the heart is truly sympathetic.

3. When the mucous membrane of the Larynx and Trachea is severely inflamed, there is always reason to apprehend rapidly fatal Asphyxia, either from an effusion of lymph forming a preternatural membrane, obstructing the glottis, and sometimes stretching down to the bronchiæ (which occurs chiefly, though not exclusively, in young children), or from effusion of pus behind the membrane at the glottis, or even from mere inflammatory thickening of the membrane (with or without the serous infiltration already noticed) at that, which is the narrowest part of the large air-passage; and similar results occur in some instances from inflammation and suppuration of neighbouring parts, pressing directly or indirectly on the rima glottidis.

4. When the lining membrane of the Bronchiæ is inflamed, an increased secretion of mucus, often changing gradually to the puriform appearance, necessarily results; and although this may go to a great extent and last very long without danger, yet it becomes certainly dangerous, and may even cause rapidly fatal asphyxia, by the obstruction it gives to the access of the air to the

blood, in two cases,—*first*, when it occurs in a feeble habit,—as in the very old or the very young, or in the course of weakening diseases, when expectoration is difficult and imperfect; and, *secondly*, when it occurs (as seldom happens in idiopathic cases) generally in both lungs, and extends every where to the minute branches of the bronchiæ.

5. When the substance of the Lungs is extensively inflamed, the effusion into the air-cells of lymph, more or less coloured by the red matter of the blood, and tending more or less rapidly to conversion into purulent matter, must be expected to cause such impediment to the arterialization of the blood, as to threaten death by asphyxia within a few days.

6. When the Pleura is inflamed pretty generally on one side of the chest, it often happens that the fluid effused into its sac, and which gradually assumes the character of pus, becomes so abundant as to compress the lung of that side to such a degree (although with very various rapidity), as to disqualify it for its function, and threaten death by asphyxia.

In both these last cases there is a difficulty as to the reference of death to the inflammatory effusion compressing or obliterating the cellular structure of the lungs, from the observation of the great variety in the amount of effusion found after death in different individual cases; the portion of the lungs left fit for their functions being in some cases much smaller than in others,—whereas the danger from this cause might, on first consideration of the subject, seem to be just in proportion to the amount of obstruction of the air-cells.

But this difficulty is removed if we attend to the following considerations; *first*, that in cases where the

whole quantity of blood in the body is less than usual, there is less occasion for a large amount of healthy lung to arterialize this blood, than when the full quantity of blood circulates in the vessels; *secondly*, that when a portion of lung is *gradually* rendered unfit for its office, the blood of the pulmonary artery, as injections demonstrate, is gradually diverted from the diseased portion, and directed to the healthy parts;* *thirdly*, that in many cases the effects of peripneumony and pleurisy, now in question, are combined, either with each other, or with other causes of asphyxia already mentioned.

Indeed several of the different causes of the fatal termination of inflammatory disease of which we now treat, are often and very variously combined in different individual cases.

IV. There are cases in which inflammation is fatal, apparently by reason of some part of the effusions to which it gives rise, being mixed with the blood, and acting on the footing of a Poison. Thus, when inflammation is excited in a spot on the surface, by the application of a specific poison, as by a wound in dissection, it is speedily attended by the formation of a similar poison, which is evidently absorbed, and excites fresh inflammation in the line of its passage into the mass of the blood; but this inflammation is attended by a peculiar *typhoid* fever, in which the heart's action is rapidly depressed, which bears no fixed proportion to the extent or intensity of the inflammation itself, and by which death may take place without visible injury of any vital organ; sometimes before the inflammation has ad-

* See Schraeder Van der Kolk, Observations Anat. Pathol. p. 66.

vanced beyond its first stage,* and generally long before it has gone so far as in the more usual inflammations of the same parts.

Again, in the case of inflammation of the lining membrane of a Vein, it is very often observed that the accompanying fever soon takes a similar typhoid form, often with vomiting and purging, always with a feeble or depressed state of the heart's action, as well as derangement of the nervous system. In many such cases, this typhoid form of the fever, rather than any effect which we can ascribe to the inflammation itself, appears to lead to the fatal termination; in like manner, as a similar combination of typhoid symptoms does, when occurring idiopathically, or as a part of a malignant contagious febrile disease: and this peculiarity of inflammation of this part has been ascribed to the necessary admixture of much of the inflammatory effusion with the circulating blood, with more probability than to any other cause.

V. In many cases, the fatal termination of inflammatory diseases cannot be ascribed to any mechanical or even vital agency of products of the local disease, but is effected by gradual exhaustion of the vital powers during the processes of Suppuration, and of Ulceration or Sloughing, when a new excretion is established from the body, and at the same time the processes of digestion and assimilation are greatly deranged by the constitutional fever. In such cases, death takes place rather by syncope than by coma or asphyxia; but often after so slow a process as to resemble more the death by fast-

* See Travers on Constitutional Irritation.

ing than that by concussion, or by any injury directly depressing the heart's action. Extensive suppuration in any part of the body is sometimes followed also by rapid secondary inflammation and effusion of pus in internal organs, chiefly the lungs and liver, causing death, as primary inflammation of the same parts would do. This is chiefly to be apprehended in two cases, 1. When a vein has been inflamed at the part; and, 2. When a long suppurating surface has been removed by amputation, and there has been little purulent discharge from the wound inflicted. The febrile symptoms attending suppuration and ulceration have usually the form of hectic; those which attend gangrene are more rapid in their progress, and more typhoid in their character; but it has been already observed, that these last are very generally to be ascribed, in part, to some other cause, acting simultaneously with the inflammation, and depressing the vital power.

It is by the gradual exhaustion consequent on the concomitant fever, rather than by local changes, that inflammation of the surface of the body, of the extremities, and organs of locomotion, is dangerous or fatal; and the danger attending inflammation and suppuration of some internal viscera, as the liver, spleen, kidneys, and mucous membranes of the intestines, is generally of the same slow gradual kind.

VI. Inflammation often leads, more indirectly, to a fatal termination, by gradually passing into, or blending itself with, other modes of diseased action, which demand future consideration, and aggravating the danger to which they may respectively give rise. Local inflammations of certain parts, and of a peculiar character,

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very often attend both idiopathic fever and febrile exanthemata, and constitute great part of the danger of these diseases; and it is generally allowed that inflammatory action sometimes gives origin to, and often combines itself with, almost all the chronic diseases to which the living body is subject at various periods of their progress, and especially with those which imply the greatest danger, viz. those which consist in perversion of the nutrition, and increase of the exhalations of various textures, or what are usually called Organic Diseases, and Dropsies; and the combination is frequently fatal, where either affection existing separately might subside, or pass into a more inert or less dangerous form. This kind of danger is, of course to be apprehended chiefly when the causes of inflammation are applied, either simultaneously with those of other diseases, or to persons in whom chronic diseases, or a strong predisposition to them, already exist.

As we know that the products of unequivocal inflammation admit of considerable variety, and that lymph, effused by inflammation, may subsequently undergo conversion into various kinds of substance, it is evident that any kind of adventitious texture that may be formed in the body may originate in inflammatory action, and that it is possible for inflammation to give rise to every kind of organic disease. But on the other hand, as we know that the lymph which is thrown out by simple and healthy inflammation remains for an indefinite time quite inert, and undergoes gradual absorption, after that inflammation has subsided, it is clear that some additional morbific cause acts, whenever inflammatory effusions change their form, and especially when they increase in bulk, after that period; and many observa-

tions shew, that, where such morbific cause exists, very little inflammatory action is required to give origin or continuance to the growth of adventitious textures, and the phenomena of organic disease.

SECT. VIII.—*Of the Treatment of Inflammation.*

WE here state, first, the essential parts of the antiphlogistic treatment, by which the course of inflammation, if early opposed, may in most cases be so modified as to be divested of danger, and in all cases be moderated or restrained; and afterwards the limitations and modifications of this kind of treatment, which are demanded by various contingencies in the course of inflammatory diseases.

We speak first of the antiphlogistic treatment proper to be adopted, to a greater or less extent, in the early stage of all cases of simple or healthy inflammation, occurring in a sound constitution, and attended with constitutional fever. This kind of treatment consists of two parts, the Antiphlogistic Regimen and Remedies.

The object of the antiphlogistic *regimen* is simply to remove every excitement or irritation which may augment either the strength or frequency of the heart's action, or promote the flow of blood towards the affected part; it being perfectly ascertained by experience, and indeed easily understood, whatever doubts we may entertain as to the rationale of inflammation, that when that state exists in a constitution otherwise healthy, it is aggravated by whatever promotes and accelerates the flow of blood to the affected part.

Hence the strict antiphlogistic regimen consists essentially of three parts, *low diet*, *rest*, and *quietude*. The abstraction, in the most urgent cases, of all solid aliments, in all cases, of animal food, and the denial of all fermented or spirituous liquors, imply a gradual diminution of the quantity of the blood, and the removal of stimuli, by which the heart's actions are obviously and strongly excited. The cessation of all vigorous or sustained muscular movement likewise removes a cause by which the circulation is often powerfully excited. The effect of muscular exertion on the heart's action does not seem to be satisfactorily explained by the mere acceleration of the flow towards the heart by the veins; and is probably chiefly dependent on the principle stated by Müller, that the contractions of the heart, although not excitable directly by the will, are liable to affection by those changes in the nervous system, which attend efforts of volition acting on the voluntary muscles which have their nerves from the same branches as the heart;—as is undoubtedly the case in regard to the iris, not moveable by the will, but moving in concert with the recti muscles of the eye when strongly excited through the third pair. The exclusion of all sudden and strong impressions on the organs of sense, secures the body against a set of irritating causes, which act primarily on the nervous system, but always more or less excite the vascular system likewise, and very frequently, by preventing sleep, manifestly aggravate the fever which is consequent on inflammation.

With the same general intention, various more particular precautions are of importance in the inflammation of individual organs;—in all cases, the removal of any

exciting cause of inflammation which can be detected, —the horizontal position and absolute rest of an inflamed limb, to retard the afflux of blood to, and favour the reflux from, the part affected,—the erect posture, when the head, or any part of it, is inflamed; the prohibition of all efforts of voice when the lungs or other organs of respiration are inflamed; the contact of soft substances only with inflamed portions of the surface; the injunction of darkness and silence in inflammations of the eye and ear, &c. Under these precautions, the body in general, and the affected parts in particular, are placed in circumstances the most favourable to the gradual and spontaneous decline of inflammation.

Of the antiphlogistic *remedies*, which next demand consideration in all cases of inflammation, the only one on which absolute reliance can be placed is Bloodletting, and there is no other remedy for any other kind of diseased action, which can be put in competition with this in efficacy or importance.

The efficacy of bloodletting in lessening the extent and intensity, and often virtually arresting the progress of inflammation, would appear to depend on two principles, which it is important to consider separately, to which indeed the powers of all other antiphlogistic remedies may be ascribed,—*first*, that it weakens the heart's action; and, *secondly*, that it causes a derivation of blood from the affected parts. In both ways it diminishes the quantity of living matter in which the peculiar changes comprised under the term inflammation are going on; and whatever be the precise nature of these changes, as it is certain that the blood is an agent essentially concerned in them, it is easy to understand that the greater the quantity of blood sent to the affect-

ed parts in a given time, the greater amount of these changes, and particularly the greater quantity of effusion from the vessels (with which we have seen that the danger of most inflammatory diseases is very much connected) will take place.

1. That the heart's action should be weakened by the abstraction of the stimulus, by which its motion is habitually excited and maintained, is quite in conformity with all that we see of the effect of loss of blood in the healthy state, and with the general doctrine of Irritability as laid down by Haller. It is not necessary in every case of inflammatory disease, nor even in every case of such disease where the heart's action is morbidly excited, to resort to this remedy; because there are many such cases, where the history of the disease that exists is well known, and no danger is to be apprehended from allowing the inflammation to run its course, under the proper regimen, and spontaneously decline; and there are many others, which are complex cases, and where the local inflammation is not to be regarded as the chief danger. But in all those cases where not only the heart's action is increased, the pulse morbidly frequent, or strong, or both,—but where we are satisfied that this increased action is connected with, or maintains and aggravates, a local inflammation, threatening, in some of the modes already considered, the life of the patient,—such bloodletting as may impair the power of the heart is the appropriate and effectual remedy; and in all cases occurring in patients beyond the age of three or four (below which age leeches are to be regarded as a general evacuation), the simple and effectual mode of bloodletting is by venesection.

The effect of this remedy on the heart's action is by no means exclusively produced, by withdrawing a part of the stimulus of blood, habitually acting on the heart. The difference, daily observed, of the effect of bloodletting in the erect and the horizontal posture, clearly shews that the loss of blood may powerfully affect the heart through the intervention of the central portions of the nervous system, probably of the medulla oblongata especially, although in common language, we speak of this effect being produced through the brain. The proof of this is, that when blood is drawn in the erect posture, so that the influence of gravitation co-operates with that of the operation in weakening the flow of blood to the head, not only are the sensations and consciousness of the patient,—*i. e.* the functions of the brain and medulla oblongata,—much sooner affected, but the heart's own action is much sooner impaired, than when the same quantity is taken from a patient lying horizontally. A most remarkable diminution of the frequency of the pulsations is thus very frequently effected, the pulse falling, for example, from 120 to 60 in a minute, at the same time that faintness and transient insensibility are produced. This plainly implies that the sudden diminution of the pressure of the circulating blood on the brain and medulla oblongata has acted or reacted on the heart,—in a way perfectly illustrated by many other facts by the failure of the heart's action, often seen to have been produced by taking off the pressure of depressed bone, or effused blood, or effused serum (as in tapping hydrocephalic children), to which the brain had previously been accustomed;—by drawing off the serum of ascites, and so diminishing the pressure on the

branches of the abdominal aorta, promoting the flow there, and proportionally lessening that towards the head,—or more simply by merely assuming the erect posture suddenly after long stooping. The decided impression made on the heart's action in all these cases by sudden *diminution* of the pressure of the blood on the brain and medulla oblongata, is in fact very analogous to that produced by a sudden concussion, in cases of injury, or sudden *increase* of the pressure on these parts, in experiments on animals.

This sudden and peculiar effect of bloodletting on the heart's action, being produced through the intervention of the nervous system, is of course liable to modification from the condition of that part of the living body; and it is a just and important observation of Dr Marshall Hall, that the effect of bloodletting in the erect posture often gives an indication of the cases in which the full use of the remedy is likely to be important; because, in many diseases, not strictly or solely inflammatory, but apparently demanding loss of blood, *e. g.* in many neuralgic cases, and more remarkably in the beginning of continued fever, when large bloodletting is likely to be injurious, faintness is very easily produced in this way; whereas, in strictly inflammatory cases, really requiring much loss of blood, a large quantity may usually be taken in the erect posture without faintness. It is not, however, to be inferred from this, that blood should always be taken in the erect posture. The effect of the impression communicated to the heart through the nervous system is certainly not so permanent as that which is produced simply by the abstraction of the vital stimulus; and some persons, even under strictly inflammatory disease, become faint from the loss of blood in

the erect posture, before as much is taken as can produce a permanent effect on their disease; and it is therefore often advisable, when the existence of inflammation of healthy character is early and clearly ascertained, to bleed with precaution, rather to retard or prevent, than encourage, the approach of fainting.

2. The effect of bloodletting in causing *derivation* from parts actually inflamed to other parts of the body, has not been studied with so much care as might have been expected from the pains bestowed on it by Haller. Whether this effect is, as he thought he had ascertained, inexplicable on merely mechanical principles, or whether, as Magendie and Poiseuille assert, it is merely the effect of the contractile power of the vessels, and the forced state of distension in which they exist during life, causing a flow to any point where an opening is made, it is quite certain that a movement in that direction is immediately perceived in all the small vessels which can be brought under the field of the microscope, on a puncture being made in any one of them; and, in Haller's observations it distinctly appeared that this movement often inverted the natural course of the circulation, and often extended to portions of blood which were stagnating in vessels, and caused globules to separate and become distinct which had previously combined into irregular masses. This being so, it cannot be doubted that similar changes must be effected, in a greater or less degree, on the blood stagnating in inflamed parts, when an exit is given to the blood from other parts of the circulating system, whether by general or local bloodletting. And it does not seem possible to understand on what other principle than this, bloodletting can be useful, as it undoubtedly is in cer-

tain cases of inflammation, chiefly abdominal, where the pulse is smaller and even feebler than natural, but becomes fuller and stronger,—or in others (chiefly of the head, sometimes of the abdomen likewise) where it is slower than natural, small and sharp, and becomes more frequent and fuller, after the evacuation.

It may be supposed that the chief effect of local bloodletting is in general of this last kind, and that the chief effect of general bloodletting is on the heart's action; and it is certain that local bloodletting, by cupping or leeches, is often effectual in those inflammations, generally of subacute character, which are unattended with disturbance of the general circulation; and that it is in cases of well-marked local inflammation, attended and supported by general fever, that the power of general bloodletting is most distinctly seen. In such cases, however, the local remedy is very generally found, after the force of the inflammatory fever has been somewhat broken, a most useful auxiliary to the other.

No proposition in medical science is more certain, and certainly no one is more practically important, than that which regards the power of large and repeated bloodletting to arrest the progress of inflammation in its early stage, before any great amount of effusion has taken place,—and to cause many cases of it to terminate favourably by resolution, with such slight effusion only as is afterwards easily absorbed; which would otherwise have gone on to extensive and probably fatal disorganization of the different kinds above mentioned. Indeed, it has been stated, and probably with truth, in relation to healthy inflammation occurring in a sound constitution, and unattended with mechanical injury to

the parts concerned, that "every constitution which is capable of having such inflammation excited in it, is capable also of bearing the evacuations, chiefly of blood, by which that inflammation may be subdued."*

It may here be asked, How does it happen that some practitioners and teachers of medicine express themselves so doubtfully as to its usefulness, even in diseases distinctly inflammatory, and place more confidence in remedies which are here stated as of very subordinate importance? And again, if so effectual a remedy for inflammation exists, how does it happen that so great a portion of the mortality in all parts of the world depends on inflammatory diseases? To the first objection, the proper answer is, that many medical men of high and deserved eminence have few opportunities of witnessing and estimating the effects of the remedy in the early stage of violent inflammatory diseases. A physician whose practice lies chiefly among the higher ranks of society in a great town,—a consulting physician, who is called in by well-informed general practitioners, only in cases of unusual difficulty, and generally of some standing,—an hospital physician, who sees the diseases of the poor only in that advanced stage when they are willing to leave home (particularly if there are well-conducted dispensaries in the neighbourhood)—has few opportunities of judging of the power of bloodletting over the symptoms of inflammation, general and local, if employed within forty-eight hours after a sudden and violent attack in a healthy constitution. In civil hospitals, particularly, although inflammatory diseases are often seen, they are very frequently in those circumstances,

* Bateman.

either as to the stage of their progress, or as to complication, in which, if recovery can take place, it must be chiefly the work of nature, and often incomplete. To the second objection, what has now been stated as to the period of inflammatory disease at which patients often come under treatment, is of itself almost a sufficient answer; but a farther and still more satisfactory answer is to be found in what has been already stated as to the frequent deflection of inflammatory disease from the simple and healthy type, on which bloodletting exerts its most beneficial effect, and on its frequent complication with other diseased states, either immediately preceding it or accompanying it, and altering and augmenting the danger to be expected from it.

The abatement of all the most urgent symptoms of inflammation produced by bloodletting is often very striking. The relief to dyspnœa and to palpitation, if either of these forms part of the symptoms of the disease, is in general the most immediate, and is that which it is most important to observe at the very time of the operation; because if not effected then, it is hardly to be expected afterwards. The relief to pain, especially in the head, is likewise often very rapid, but in other cases takes place more gradually, and is nevertheless equally complete within a few hours after the operation: many other uneasy feelings—heat, restlessness, thirst, anxiety, are often speedily relieved. But the advantage which is chiefly looked for, and regarded as the most decisive and the best security for all others, is that which is effected on the state of the pulse; and the change which is chiefly to be hoped for in it is, that it should become softer or more compressible. If it at the same time becomes less frequent, the

advantage is more decided; but there are many cases, particularly in feeble subjects, where bloodletting is used with good effect, although the pulse, for a time, becomes more frequent, and at the same time softer, after the operation.

One effect of bloodletting in inflammatory diseases is well ascertained, so far understood, and practically very important, viz. that by lessening that morbid impetus of the blood by which, during the state of inflammatory fever, the natural excretions are apparently impeded, and at the same time, by promoting absorption into the blood, it favours the effect of all other evacuating remedies, intended to act on the excretions of individual parts of the system. Hence it was judiciously laid down by Hoffmann as a general truism regarding this remedy, "Post venesectionem sæpe excretiones salutares sanguinis, imo alvi, sudoris, urinæ vacuationes, meliùs et liberiùs quam ante eam succedunt."

In judging of the effects of bloodletting on inflammation, it is important to observe, that the remedy may be highly beneficial, even in cases where the inflammation may extend, or the effusions consequent on it increase, after its use. It may often be observed in cases of pneumonia, that after full bleeding, the fever subsides, and the breathing is considerably relieved, but nevertheless the indications by auscultation and percussion, of the extension of the effusion in the lungs and pleura continue for some days. But if the febrile symptoms do not return, and the breathing continues easy, it may nevertheless be confidently predicted, that, under proper management, and in a sound constitution, the case will terminate favourably, and the effusions gradually disappear, by absorption and by expectoration. In such cases it seems

quite reasonable to infer that the intensity of the inflammation and the quantity, probably also the density, of the effused fluids, are restrained by the bleeding, and the latter kept within the limits which the natural action of absorption can remove; and from what we may often observe of the progress of erysipelas on the skin, in the more inflammatory cases of that disease, which are moderated and prevented from extending inwards to the cellular membrane, although not prevented from spreading along the surface, by bloodletting and analogous remedies, we may feel warranted in adopting this conclusion. But this consideration seems to have been in some measure neglected by Laennec and others in France, whose attention has been fixed on the physical indications of effusion and disorganization of the lungs, and whose estimate of the value of bloodletting in inflammations within the chest is much lower than that which most practitioners in this country have been led, from their observation of such diseases, to adopt. It is in a few cases only that bloodletting can be said (even on a general view of the symptoms) to *cut short* inflammation; the more usual effect to be hoped for, is more correctly expressed by saying, that it *disposes it to a favourable termination.*

While such benefits are to be derived from the prudent use of bloodletting in the strictly inflammatory diseases, and in their early stage, it is equally certain that in diseases not strictly of that type, and in the advanced stages even of the best marked inflammations, it may either aggravate and prolong the disease, or even rapidly determine its fatal event; and nothing, therefore, can be more important than the diagnosis of the truly inflammatory diseases, of the very various intensity with which

they attack different persons, and of the degree of lesion of structure which may in any individual case have been already effected by them.

The symptoms by which such distinctions are to be established belong, of course, to individual diseases to be afterwards noticed; but there are two symptoms common to all inflammatory complaints, and often guiding in a great degree the use of bloodletting, on which a few observations may be made; these are the state of the pulse, and the state of the blood, in inflammatory diseases.

In inflammatory diseases, the pulse may very often be distinctly observed not only to be *more frequent*, but also to be *fuller*, *i. e.* to cover a larger surface of the finger, and give the sensation of a greater expansion on each systole of the heart,—to be *firmer* or *stronger*, *i. e.* to be less compressible,—and to be *sharper*, *i. e.* each of its pulsations to take place more suddenly than in health; and when bloodletting takes a favourable effect in these diseases, or when they are spontaneously subsiding, it may be observed to become not only less frequent, but also smaller, more compressible, and softer. In general, it may be stated, that the more distinctly all these deviations from the natural state of the pulse can be observed in inflammatory diseases, we have the more confidence in bloodletting as the appropriate remedy; and that hardly any case of inflammatory disease demanding the remedy occurs, in which a deviation from the natural state in one or other of these particulars is not sufficiently obvious. But there are many cases of active inflammation admitting of the most essential benefit from bloodletting, in which one or more of the peculiarities here stated are absent. In one stage of inflam-

mation within the cranium we have very often the slow but firm and sharp pulse, observed also in certain cases of inflammation within the abdomen; and in many cases of peritonitis and enteritis we have the frequent but small pulse, sometimes not distinctly harder or less compressible than in the natural state. It is also to be remembered, that in youth the pulse is easily excited to a state differing from the natural in all the particulars above noticed, in the early part of febrile complaints which are not inflammatory; and again, that in old age, when the arteries have lost somewhat of their elastic power, and transmit impressions from the heart, with less modification than in the natural state, particularly if the heart is at the same time affected with any degree of hypertrophy, the pulse is generally fuller, firmer, and stronger, or even sharper, than in the natural state.

In regard to the buffy coat in the blood, there are occasional anomalies which are not yet understood; but the general fact is, that, when inflammation is intense, there is not only a thick but a firm or contracted layer of coagulable lymph on the top of the crassamentum, implying that the particles of the fibrin have not only separated more completely from the colouring matter, and generally increased in number, in proportion to the other constituents, but aggregated together more closely, —or probably have continued longer under the influence of that vital property of attraction among themselves on which coagulation depends, than is usual. The formation of a thick but loose and flocculent buffy coat is often observed in complex cases, as in typhoid fever, combined with local inflammation; implying apparently that, although the separation of the fibrin from the colouring matter is complete, the vital property of attraction in its

own particles is soon extinguished, and this gives much less encouragement to the repetition of bloodletting.

If, as is most probable, the blood acquires this change of property by passing through the vessels of the inflamed part, it is easy to understand that, for some time after even intense inflammation has set in, the buffy coat will be slight or even imperceptible; and again, that when inflammation of some standing is declining, or still more, when it has passed into the stage of suppuration or ulceration, the buffy coat will still be found in perfection; and therefore, that its absence or slight degree in the early stage of inflammation is no reasonable objection to bloodletting; and that its presence in the advanced stage (especially if suppuration is going on) is no indication for the remedy; which are accordingly approved practical observations.

The quantity of blood which should be taken in a case of well-marked inflammation, seen in its early stage, should never be prescribed beforehand, the only sure rule being to continue the loss of blood until either the pulse is affected, or giddiness and faintness are felt, or the local symptoms are decidedly relieved. Dr Cullen's statement, that for an adult, previously in ordinary health, any thing below 12 oz. is to be regarded as a small bleeding, and any thing above 16 as a large one, may be held to be a fair average. From strong full-blooded men, distinctly affected with inflammation, from 25 to 35 oz. may often be taken with signally good effect. A single bleeding, even although carried to syncope, is seldom sufficient to control a well-marked internal inflammation; and Sydenham's estimate of 45 oz. as the average quantity requisite to meet the danger of a decided pleurisy, is not excessive. Dr Clark's statement

as to young children, that 3 oz. are a full bleeding from a child of one year, but that 2½ or 2 more may be taken at that age within a day or two, and even repeated in obstinate cases, may likewise be quoted as a judicious one. Three leeches, bleeding well, are a full bleeding for a child of one year, at least of the average strength of those brought up in great towns; and if one is added for each year of the child's age up to five, a fair number for a single evacuation may be obtained. Beyond this age, in strictly inflammatory cases, bleeding at the arm is certainly to be preferred.

There are a certain number of cases in which the symptoms of inflammation in its early stage, both local and general, either continue more obstinately, or occur more frequently, than usual, and in these it is of much importance to be aware how far the remedy may sometimes be carried with good effect. There are various cases on record of pneumonia beginning with unusual intensity, in which 70 or 80 oz. within 12 hours, or 100 within 24, even in a few instances within 12, have been taken with success, and in some of these farther bloodletting was necessary before the disease finally subsided. On occasion of repeated occurrence of the disease, nearly 400 oz. have been taken from a patient within three months, and in the end he recovered perfectly. Mr Cline had a case of concussion of the brain in St Thomas's Hospital, in which 320 oz. were taken within three weeks, with success.

It would be absurd to quote such cases as models for general imitation; a great majority of patients, in the most decidedly inflammatory diseases, would certainly sink under a much less active treatment, or pass into a state obviously forbidding the use of the lancet; but

when we meet with cases where the early symptoms of inflammation resist obstinately, or recur frequently, it is of the utmost importance to know how far the ordinary remedies may be carried, under prudent management, with success.

The question of the comparative usefulness of general and local bloodletting in internal inflammations is not easily decided, but fortunately, in each individual case of severity, it is quite possible to try both, and be guided by the effect observed. No doubt can be entertained as to the importance of local bleedings succeeding venesection, in all inflammatory diseases where the symptoms do not speedily yield to the lancet; but in a case of decided idiopathic internal inflammation, attended with general fever, it may be confidently stated that early, and if the symptoms continue, repeated, bleeding at the arm should certainly never be omitted; excepting only in the case of inflammation of the heart, supervening on rheumatism; in which case repeated local bleedings, chiefly by cupping, are attended with more satisfactory results than bleeding at the arm. And in the case of the pericarditis in particular, it is easy to understand that full general bleeding will be attended with a danger quite peculiar, from the pressure of the effused fluid on the surface of the heart being naturally most injurious when the blood distending its cavities is subjected to sudden and great diminution of quantity.

The dangers to be apprehended from excessive or injudicious bloodletting, especially from the frequent repetition of the remedy, form a subject of great practical importance, of which a general outline may be here given.

The danger of immediate death from the hæmorrhage,

in the hands of an attentive practitioner, may be regarded as trifling, there being always some warning, from the first symptoms of syncope, with or without spasms, of the time when it is prudent to stop a single bloodletting; and generally such indications of general debility and of enfeebled circulation, from the compressibility of the pulse, coolness of the skin, paleness of the lips, and deficiency of mucous secretions, particularly dryness of the tongue, as sufficiently inform us when the repetition of the remedy has become a matter of doubt at least, if not absolutely inadmissible. But it must be allowed that there are many cases in which the system is powerfully affected by loss of blood, in which the repetition of the remedy is dangerous, if not immediately, at least in its ultimate result in the disease; and in which, nevertheless, there is a fallacious degree of fulness and even strength of the pulse, and a combination of symptoms which to those unaccustomed to observe them might seem to denote determination to the head, perhaps inflammation of the brain, and to demand farther loss of blood.

Of the possibility of this fallacious fulness and even sharpness of the pulse (generally a somewhat tremulous and easily compressed, but nevertheless sharp pulse, according to the notion formerly explained as being annexed to this last term), some of the experiments of Dr Parry on animals killed by repeated bleedings, and in which the pulse was "full and bounding" almost to the moment of death, afford unequivocal proof. And many practical observations by Rush, Armstrong, Marshall Hall, Travers, and others, illustrate this "reaction after the loss of blood;" which may perhaps be most correctly described as a modification of the inflammatory fever, produced in a great measure by the loss of blood, and

persisting after the local inflammation has subsided, or passed into a state no longer demanding evacuation. This peculiar febrile state is marked by the frequent, full, vibrating, or sharp, but easily compressed pulse, with heat of skin, generally, however, not persistent if the bedclothes are removed from the part felt,—generally with sense of palpitation and of throbbing in the head, and tinnitus aurium; sometimes impatience of light and sound;—the symptoms aggravated, and vertigo produced by the erect posture; the face and lips pale, and all muscular motion difficult and generally tremulous. This state occurs chiefly in females of irritable constitution; and is best relieved by alternation of laxatives and opiates, often with the cautious use of wine, ammonia, or other stimuli. Where it coexists, as occasionally happens, with still urgent symptoms of local inflammation, it presents a case of much difficulty, but in which, although blood may often still be taken locally, general bloodletting is certainly dangerous.

The idea of subsequent injury to the constitution, from the use of bloodletting, in inflammatory diseases, and particularly the idea of dropsy being thus produced, may in general be regarded as quite visionary. In persons liable to nervous affections, particularly to the various forms of hysteria, it is certainly true that an aggravation of that tendency is to be expected; which, however, will in general be only temporary, if the inflammation has been effectually subdued. One of the chief practical evils which is always to be apprehended from large and repeated bloodletting is, that it always increases the facility with which the surface of the body may be chilled, and therefore the liability to relapse, or to the excite-

ment of fresh inflammatory disease, perhaps of worse character, on any subsequent exposure to cold.

But the principal cautions which it is necessary to keep in mind, as to the use of bloodletting in inflammatory diseases, have reference, not simply to the subsequent effects of the evacuation on the system, but to the alteration to be expected from it on the progress of the existing disease; and in this view we must always carefully attend—1. To the *period of the disease* at which we are to use the remedy; 2. To the *kind* of the inflammation; and, 3. To the *complication* which may exist of inflammation with other diseases.

1. When we say that the period of the disease, even in cases of healthy inflammation, often decidedly contra-indicates, and still oftener makes us doubtful as to the result of bloodletting, we do not mean merely the number of days from the first decided attack of the disease (although that always demands attention); but we must attend particularly to the proofs of effusion or disorganization consequent on the inflammation, having already made such progress as to indicate that the alteration of structure already effected, rather than the alteration of action which leads to it, demands our chief attention. And, in general, as already remarked, this may be apprehended when we see a *manifest change in the constitutional or febrile symptoms*, attended with *continuance or increase of the local symptoms*. The time when this change of symptom takes place, is exceedingly various in all the inflammations, but it is to be looked for in all. If recovery is possible after this period, a long and slow process must be gone through before it can be perfected; and this will require a certain strength of vital

action, and may be frustrated by any means which further depress the vital powers; nay, it may, in many instances, be obviously promoted by means which excite the system generally, and stimulate and strengthen the circulation.

In many such cases, more definite information is attainable, particularly in the case of inflammation within the chest, whether affecting the bronchiæ, the substance of the lungs, the pleura, the pericardium, or inner membrane of the heart,—the indication given by examination of the chest and of the sputa, and by auscultation and percussion, prové the extent of effusion, and the degree in which the play of the lungs or heart is impeded by it; and these taken along with the state of the pulse, heat of skin, and general strength, may often enable us to speak with much confidence as to the question,—always presenting itself in the advanced stage of these diseases, —whether there is more danger from weakening the circulation by bloodletting, when such impediments to the action of parts within the chest already exist, and can only be remedied by a slow and natural process of absorption, or from allowing such inflammation as still exists to go on, unchecked by farther loss of blood.

2. That inflammation may exist of a nature not to be subdued, even to be aggravated, by bloodletting or other evacuations, is quite certain from such experiments as those of Magendie as to the eye, and of Gendrin as to the stomach; in which the kind of inflammation of mucous membrane formerly mentioned was brought on by inanition, and could only be relieved by fuller nourishment, restoring the strength of the circulation, and probably restoring to the mucous membrane its natural protecting mucus; and that the kind of inflammation which is recognised in a patient affords very often a reasonable

ground of objection to full bloodletting is sufficiently obvious when we attend to the known history of scrofulous, rheumatic, and gouty inflammation. In the first of these, it is true, that, on occasion of a recent inflammatory attack, when the symptoms approach most nearly to those of healthy inflammation, we have every reason to believe that bloodletting is often of the most essential importance, preventing aggravation of disease already existing, or arresting disease which would otherwise be established. But scrofulous inflammation is less under the influence of bloodletting than healthy inflammation; and scrofulous diseases occur chiefly in weakly persons, in those whose mode of life in early youth has been debilitating, and in those recently weakened by any considerable evacuations. Therefore, by full and repeated bloodletting in scrofulous cases, while we make little impression on the inflammation that exists, we incur a great risk of so far lowering the constitution as to make it more liable than previously to fresh attacks of inflammation, or to other scrofulous diseases, perhaps not inflammatory in their origin.

Again, the recorded experience of all ages informs us (whatever we may conjecture as to the explanation of the fact) that the inflammation both of rheumatism and of gout is very liable to metastasis, and that, although it may often be moderated (particularly the acute rheumatism in a healthy constitution) with very good effect by evacuations, yet it is by no means desirable that it should suddenly recede from the extremities; because if it does, inflammation in a more vital organ, or in the case of gout, a kind of internal neuralgia, even more immediately dangerous, is very likely to follow.

In the case of erysipelas, to a certain degree, and in

that of all the specific inflammations of the skin already noticed, in a much greater degree, the nature of the inflammation may also be urged as a reason against full bloodletting, and in favour of the strictly "expectant practice;" but these are cases, either of inflammation without fever, or of inflammation complicated with another and generally more formidable disease, falling therefore under the next head.

3. The complications of inflammation which often contra-indicate bloodletting, and always impose the necessity of caution in regard to it, are in a general view of two kinds; that with other febrile and particularly contagious diseases, and that with chronic and particularly organic diseases.

In regard to the complication of inflammation with idiopathic fever, or with the contagious exanthemata (in which we include erysipelas), the general principle is, that such inflammation, whether of the kind that is essential to and characteristic of the disease, or of that which is only an accidental concomitant, is never the sole, and seldom the chief, cause of danger. The body is under the influence of a poison, generally absorbed from without, which gives a peculiar character to the inflammation, and likewise excites a peculiar form of fever, often very dangerous when the inflammation, external or internal, is trifling. In the course of the disease, the poison, after being enormously multiplied, by some mysterious process, is expelled from the body. Whether the inflammation is part of the process by which this expulsion is effected, is indeed doubtful, but it is certain, that, in most of these diseases, the inflammation, at least that which is characteristic and pecu-

liar to the disease, cannot be prevented from running a certain course without imminent danger to life.

The danger in the course of these diseases depends often mainly on the depressing effect of the morbific poison, gradually influencing the system at large and especially the fundamental function of circulation, and producing typhoid fever; but it often depends on the combination of the depressing influence with inflammation, internal or external; and sometimes it depends so much on the intensity of the inflammation, and so little on any general depression of the powers of life, that the disease demands and bears evacuations nearly as in idiopathic inflammation. In judging of the degree in which the danger of individual cases depends on the one or other cause, there is of course much room for the exercise of judgment and discretion. Two general observations may be made, which are of great practical importance; 1. That in all such complex cases, where contra-indications exist, if bloodletting is to be practised (and in the accidentally concurrent inflammations in many cases of such diseases it is highly beneficial), it should be practised as early as possible, in order that it may be as small as possible; all experience informing us that a very moderate loss of blood in the early stage of inflammation will often produce much more effect on the extension and course of the disease than a much larger quantity at an advanced period. 2. That in the course of such diseases we are not to expect the symptoms of any concomitant local inflammation to abate entirely, while the fever lasts, and must be content with mitigation of their urgency.

There is another element which must always be

taken into consideration here, which is quite peculiar to such diseases, viz. the nature of the prevailing epidemic; for it is the general result of the observation of medical men in different ages, that, in different epidemics, the type of the same disease so far varies, that the local inflammation may be more frequent and dangerous in the generality of cases occurring in one, and the general typhoid state in those occurring in another. Thus it is the general result of the experience of most practitioners who have seen much of the epidemic fevers prevalent in Scotland from 1816 till 1820, and again of those prevalent since 1826,—that bloodletting was both more demanded, from the firmness of the pulse and the urgency of local symptoms, and better borne, at the former time; and that the danger much less frequently depended on mere depression of the circulation; and again, that, in the later epidemics, this last part of the symptoms has been much more generally urgent, the use of stimulants has often appeared much more important and beneficial; and that full bloodletting, even early in the disease, has often appeared to exert a very injurious influence over its subsequent progress. Similar observations have been made on different epidemic visitations of all the febrile and contagious diseases.

Of the caution in regard to bloodletting which is imposed by the presence of chronic, and especially of organic disease, we may merely enumerate the cases of inflammation of the lungs or bronchiæ combined with disease of the heart, or with previous long-continued asthma and its usual attendant, emphysema of the lungs: and again, of inflammation within the abdomen, whether of the serous or mucous membrane there, combined with organic disease of the liver. Such cases are

very common, and are very often farther complicated with dropsical effusion, partial or general. It is very important to be aware, and has been ascertained of late years more distinctly than formerly, that none of these complications ought to prohibit bloodletting when the inflammatory symptoms are recent, and the circulation tolerably firm and vigorous. But it is obvious that, in such cases, the system is permanently under the influence of a cause which prevents it from recovering its natural strength after any great evacuation, as it otherwise would do. And in several such cases, a more special cause of danger from much loss of blood may be pointed out, particularly in the cases of advanced pectoral disease, in which free expectoration is both difficult and necessary for recovery; and the cases of dropsical effusion, where a mechanical impediment exists either to free circulation or to the expansion of the lungs. It is obvious, from these considerations, that the time during which bloodletting can be beneficially employed in such diseases, must be very circumscribed; although it must be admitted, on the other hand, that some cases of all these occur, in which the strength of the circulation is such as to make it safe and beneficial at a much more advanced period than in others. The case of mechanical obstruction to the flow through the heart, from disease of its valves or of the aorta, unconnected with organic alteration either of the lungs or liver, is that in which the repeated loss of blood may generally be best borne.

Much has been said, in some systematic works, of age, sex, temperament, habit of body, habits of life, climate and season, as influencing the use of this remedy; but the fact is, that there is no age, no sex, tem-

perament or habit of body; no description of human beings, and no climate or season, in which bloodletting may not, on certain occasions, be performed with advantage,—nay, there is none in which its neglect may not be fatal. All that can be said on those heads is chiefly important as pointing out the circumstances in which the indications or contra-indications already stated are chiefly to be expected, but can hardly be said to establish any new rules.

In early life there is certainly ground for caution—first, because much febrile action may be excited even by slight inflammation, and secondly, because young children are easily depressed by *repeated* evacuations, perhaps especially of blood; and are apt to fall when so affected into the state described of late years, under the name of hydrencephaloid disease; in which stupor, with coldness of surface, feeble pulse, and vomiting, are the chief symptoms, and in which stimulants are often signally useful.

In very advanced life there is ground for caution, partly on account of the complication with alteration of structure, which may very often be suspected, even when it is not certainly known, and partly because the powers by which the capillary circulation is maintained, and the vital actions by which the blood is applied to its various useful purposes in the economy, lose much of their efficacy at this time, and the system, therefore, has usually not the same powers as previously of recovering from any debilitating cause.

In regard to sex, it is important to observe that in women, slight inflammatory attacks, with severe pain, and often with much fever, or severe neuralgic attacks, with threatening of inflammation in the spinal cord, in

the sides of the chest, and in the viscera of the abdomen and pelvis, often occur, and mislead young practitioners into the belief that violent and internal inflammation exists when it does not. But it is not less true that the most intense inflammations occur in them probably more frequently than in men; and it were a fatal error to suppose that the presence of nervous or hysterical symptoms implies the absence of serious inflammation.

In regard to climate, the most truly important observation seems to be, that in hot climates the progress of febrile and inflammatory diseases—at least on Europeans—is accelerated, and the time when bloodletting can be useful of course proportionally circumscribed.

The sanguine temperament is that in which the greatest intensity both of pain and of fever may be expected to attend a given amount of inflammation; and therefore, when we have urgent general symptoms attending local inflammation in persons of a temperament much removed from the sanguine (in the phlegmatic or melancholic), we have the more reason to suppose that the inflammation is intense; and if it be in the early stage, that full bloodletting is demanded. But it is of much more importance to observe the degree of strength of habit, than the temperament, in judging of the extent to which bloodletting may be carried. The inhabitants of large towns, partly on account of their more sedentary life, partly of the impure air which they habitually breathe, partly of their less regular mode of life, their more frequent mental anxieties and irritation, are of feebler habits; and all the cautions as to repeated loss of blood apply to them more than to country people. There are indeed many of them, in comfortable circum-

stances and of regular habits, who bear bleeding perfectly well; but there is a class, well described by Dr Armstrong, always numerous in large towns, whose subsistence is precarious, whose habits are irregular, and often dissipated, who are exceedingly prone to inflammation, but have it in a form modified by these circumstances, and especially by the habitual use of strong liquors. In many of these full bloodletting will produce fits of delirium tremens; in others it may affect variously the nervous system; and in all it must be expected to depress the circulation more permanently than in better constitutions. In all such cases, our main resource is the early detection of inflammatory disease, and the early, and because early, moderate, and yet effectual, use of bloodletting.

We may comprise in a few words all that need be stated in general terms as to the other classes of remedies to be employed in such cases.

1. When inflammation is near the surface of the body, we have a powerful means of repressing it in the application of Cold, which, by causing constriction of the dilating vessels, prevents those congestions and stagnations of blood which seem to be essential to the inflammatory effusions. The application of cold water to a burn, which has caused inflammation, and commencing vesication,—or to a bruise or sprain, affords unequivocal evidence of the power of this agent; but, in order that it may be effectual, it must be applied either uniformly, or very assiduously for many hours together, otherwise the inflammation will start again, as if with renewed vigour, on each cessation of the application, as long as the general strength of the circulation continues, and the remedy will, on the whole, rather retard than hasten

its decline; and it is difficult to do this without some risk of the injurious effects of cold. In those varieties of inflammation which have the natural tendency to shift their place, and especially to affect internal parts, it need hardly be said that this mode of repressing external inflammation is inadmissible. Although cold applications may be used in these when the circulation is firm and vigorous, it must be only with the intention of relieving the feelings of the patient,—not to such an extent as to affect materially the progress of the inflammation.

Of internal inflammations, that within the head is that in which the assiduous application of external cold has been most esteemed,—both in the way of frequent sponging or aspersion, and in that of occasional stronger affusions; but it is in cases of subacute inflammation, or determination approaching to the inflammatory state (as in the course of idiopathic fever), that it is most useful. Certainly, in cases of idiopathic inflammation, or of threatening hydrocephalus, it cannot be urged as superseding the active depleting measures. In some cases of peritoneal inflammation, the assiduous external application of cold is grateful to the patient, and probably may assist in restoring the natural state of the bowels; but the application must be strictly confined to the inflamed parts, and this is often difficult. This observation applies still more to the application of cold, practised occasionally on the Continent, hardly at all in this country, in cases of cynanche, especially of croup.

2. Of the various sedative medicines which, at different times, have been highly recommended as capable of controlling both the local and the general disorder in inflammatory diseases, we may assert in general, that no

one is generally thought in this country deserving of confidence which is not nauseating; and that the antiphlogistic effect, if not absolutely dependent on, seems very much connected with, the sensation of nausea, and accompanying depression of the heart's action. The effect of Digitalis in lowering the pulse is seldom to be obtained without its nauseating effect; and this can hardly be produced within so short a time as the progress of an acute disease demands, without danger of fatal syncope. Whatever may be the specific power of Colchicum over gouty inflammation, it is certainly not to be depended on as sensibly influencing simple, or even rheumatic inflammation, unless so used as to nauseate. Several high authorities on the Continent have expressed a confident opinion of the antiphlogistic virtue of Tartrate of antimony, when given in large quantity, after *tolerance* of the medicine has been established, and when it produces *no sensible effect*, being such as nearly to supersede the necessity of bloodletting; but such trials as have been made in this country have not established this principle to the satisfaction of the profession. Indeed, the effect of from a quarter of a grain to half a grain of tartar emetic every two hours during the time of waking, in cases even of well-marked internal inflammation, is distinctly nauseating, when blood has been previously freely drawn; and as the chief beneficial effects of the remedy, as auxiliary to bloodletting, have been observed in connection with the occasional fits of nausea, there has been no great anxiety to observe the effects of pushing the medicine further. The antimonial solution thus used, or some other nauseating medicine, is probably the most powerful auxiliary to bloodletting in the early stages of inflammations within the chest, especially in that of the

substance of the lungs; and it is a very powerful remedy, also, in those cases of affection of the brain, occurring in fever, in which there is high delirium and an approach to inflammation, though without nausea; but in the early stage of almost all cases of idiopathic inflammation in the head, as well as in the abdomen, there is so much nausea and vomiting as obviously to contra-indicate the remedy; and, in all cases, caution is requisite in its use, on account of its sometimes violent effects on the heart's action, and on the stomach and intestines.

3. The most frequently employed of all the auxiliaries to bloodletting are the various methods of *derivation*, of which purging, carried to the extent of considerable watery evacuation, is by far the most generally important. This is the main auxiliary to which we must trust in cases of inflammation within the head; and its use there is the more important, that (as Dr Abercrombie has stated) purgatives may be used fully, and sometimes most efficiently, after the symptoms of effusion consequent on inflammation in the brain, have come on, and when farther loss of blood is useless or even injurious. In inflammation within the chest, although occasional laxatives are proper in the view of lessening the general febrile state, they are of less essential importance; and when there is much expectoration in the later stages, it is generally, and probably justly, thought, that much purging may be injurious.

In inflammation of the intestines, both of the serous and mucous membranes, they were certainly much too generally employed in this country within these few years; but it is now more generally understood that, in reducing inflammation there, they are not only of little efficacy, but always of doubtful, and sometimes

of injurious, effect,—that procuring a regular action of the bowels is a secondary object, not to be directly urged until the inflammation has subsided; and that, even for attaining this object, the mildest laxatives and enemata, generally alternated with opiates, are the most appropriate means.

Vomiting appears to be an important auxiliary to bloodletting chiefly in cases of inflammation of the larynx, trachea, and bronchiæ, especially in children, where it seems to have a special effect, partly as an expectorant, and partly as an anti-spasmodic.

The effect of diaphoretics and sudorifics in inflammatory complaints is not easily referred to any fixed principle. In many of them, especially in thoracic inflammation, there is often full sweating without the least alleviation; and it is certainly highly inexpedient, in the height of any inflammatory disease, to urge the use of such sudorifics as produce a manifest previous excitement of the circulation. In the inflammatory diseases of children, in particular, the premature use of the warm bath is certainly often injurious. Yet there are cases of strictly inflammatory diseases, in their early stages, particularly of bronchitis, of dysentery, and of rheumatism, in which sweating, generally succeeding to moderate loss of blood, sustained sometimes for two or three days, and with proper precautions against subsequent exposure to cold, is signally beneficial; and it is perhaps more generally useful when the violence of internal inflammation has subsided.

The use of blisters and other counter-irritants is confined chiefly to peculiar circumstances of inflammatory complaints,—to the later stages of acute inflammation, when the excitement of the system has been so far re-

duced by bloodletting; to the cases of more chronic or subacute inflammation; *e. g.* to many cases of bronchitis and rheumatism especially of the synovial membranes; and again to the inflammation, and especially the slow scrofulous inflammation, of those textures where the whole progress of inflammation is slow; bones, cartilages, and ligaments. In many of these last cases, the issue or seton is the most suitable and effectual form of counter-irritation. In all forms, the degree of excitement they occasion in the first instance, is a serious objection, particularly in children, in whom also, the ulceration and sloughing, consequent on blisters, if applied only for a few hours, in a feeble habit or in a depressing disease, is often not only troublesome but dangerous.

4. Many practitioners in this country, since the time of Dr Hamilton of Lynn Regis, have been convinced that there is a peculiar or specific virtue in Mercury, affecting the mouth, and especially in the combination of calomel and opium, in arresting inflammation, and controlling the deposition of lymph from it; and that a power of this kind is exerted over the inflammation of the iris, and the effusion of lymph upon it, in many cases of that disease, no one can doubt. But that a similar power is exerted, in a degree adequate to the object required, in any inflammation of internal parts, is much more doubtful. That calomel and opium, used in moderation, is a useful medicine in many internal inflammations, is granted by all, because the soothing effects of the opium are often desirable, and the calomel is one of the simplest and most effectual means by which some of the injurious effects of opium may be corrected; but the main question, as regards any specific virtue of mercury,

is this—Do the symptoms of inflammatory diseases subside more rapidly, and more certainly, when the mercury has affected the mouth, than without that occurrence? and on this point observations are somewhat at variance. It may, however, certainly be stated in general terms, that the cases in which that combination has seemed most useful, have been most frequently those in which, the symptoms having subsided, it was withdrawn without the mouth being touched, and therefore without any proof being given of its specific virtue.

5. That Opium is an important and valuable auxiliary to bloodletting in abdominal inflammations, is a principle which seems firmly established by the practice of various physicians in this country. It appears that its value (except as a palliative to uneasy feelings) is nearly confined to the inflammations of the intestines, enteritis, and dysentery, and that it is important in them, not to diminish the quantity of blood which should be drawn to subdue the inflammation, but to relieve those very oppressive sensations which seem to be the connecting link between the inflammation in the intestines and the actions of the heart, and by which these actions are so often rapidly and irretrievably depressed. Under the full use of opium, after bleeding in these diseases, these feelings are often relieved, vomiting allayed, sleep procured (whether with or without sweating does not appear to be material), and the pulse is found to rise in strength; and if, as very generally happens in well-marked cases, the inflammatory symptoms recur, bloodletting may be repeated again and again, without symptoms of sinking. The disease is placed, as to its possible duration, and the effects of repeated bloodletting, more on a footing with inflammations of other parts, than it

is when this auxiliary is omitted. Under this treatment, it may be stated with confidence, that the success of treatment in these inflammations, when attended by the peculiar depression of the circulation, and when the inflammation is of the healthy character, as distinguished from the erythematic and often epidemic peritonitis, is very considerably greater than when opium is withheld.

6. There is yet another class of remedies of great and certain efficacy in certain circumstances of inflammatory diseases, although of course requiring much discrimination in their use, viz. the Stimulants. These are admissible, of course, only in the later stages, but sometimes sooner than the indications for local bloodletting, or the time of its useful employment, have ceased. They may be demanded by two distinct considerations: 1. By there being such indications of debility or deficient action in the pulse, skin, tongue, and voluntary muscles, as are in themselves very dangerous, and may render a local disease fatal, which might otherwise either have abated or passed into a chronic and comparatively inert state. 2. By certain consequences having already resulted from the inflammation, known to be irremediable for the time, but admitting of a subsequent slow process of cure by the provisions of nature, provided a certain amount of the vis vitæ in the system in general can be maintained for the requisite time.

Dr Abercrombie has shewn that the deadly paleness and coldness, with cessation of the pain, and sinking of the pulse, so often seen and so generally fatal in the last stage of enteritis, may in a few cases go off under the cautious but continued use of stimuli. There is no case in which more decided beneficial effects can be sometimes observed from stimuli, than the advanced stage

of bronchitis, when the breathing is very short and hurried, the mucous and subcrepitous rale general on both sides of the chest, the skin cool, and the pulse sinking. In some such cases, the breathing is relieved by full expectoration, obviously promoted by the stimuli; but in others it gradually improves as the pulse rises in strength, although the expectoration is scanty. These are even cases of the true peripneumony (no doubt partial) marked by the peculiar sputa, with the absence of respiration in the affected part of the chest,—neglected until their advanced stage,—attended with a similar depressed state of the circulation, and recovering (although with some permanent injury to the lungs) under the use of stimulants exclusively, taken in such quantity, and followed by so rapid abatement of the most distressing symptoms, that they could not be supposed to have exerted no influence on the disease.

Again, although there be no such immediately alarming symptoms, if bronchitis has produced general effusion into the bronchiæ (as in many advanced cases of asthma and of hooping-cough); if a portion of lung has been consolidated; if an extensive and probably partly puriform effusion from decided inflammation has taken place in the cavity of one side of the chest or abdomen; if an abscess has formed in the liver; if a portion of the mucous membrane of the intestines has been thickened by effused lymph, and then passed into ulceration; if a bone has become carious, a cartilage has ulcerated, or even a capsular ligament of a joint been much thickened by inflammatory deposits; if the cornea has been affected, first with pustules and then with ulcers, from the strumous form of ophthalmia,—whatever influence local remedies may or may not have on such lesions, it is certain

that a long process of absorption, of ulceration, of healing by granulations, &c. in these different cases, must be gone through; and that a certain degree of strength of habit is necessary, that these processes may go on favourably. We know, from experiments on animals, that inflammation, with all such consequences (*e. g.* in the eye), may be produced, if not merely by inanition, at least by causes acting on a very exhausted system, and producing this effect by reason of the exhaustion; and that all may be removed merely by giving sufficient nourishment; and therefore we can easily understand, what experience abundantly demonstrates, that not only the antiphlogistic remedies after a time must be discontinued, but the antiphlogistic regimen relaxed, even sometimes at the risk of temporary aggravation of part of the disease, in such cases; and that the best effects should result from the gradual introduction of a tonic regimen, from country air, exercise, moderate mental excitement, and a gradually improved diet. Such cases illustrate strongly the mischief which may be done by practising for the names of diseases; and forcibly remind us of the judicious aphorism of Boerhäave, "Nullum remedium in morbis cognovi, quin solo *tempestivo usu* tale fiat."

CHAPTER II.

OF INFLAMMATIONS OF THE AIR PASSAGES AND LUNGS.

We begin with the Inflammations in the trunk of the body, because the Pathology of these is important, as illustrating that of other parts, particularly the head.

Excluding the case of the Cynanche Maligna, which belongs clearly to the second great division of Febrile Diseases, we have to consider two frequent and important diseases depending on inflammation of the throat, the Cynanche Tonsillaris and Trachealis.

Sect. I.—*Of the Cynanche Tonsillaris.*

This disease is accurately described by Dr Cullen, as "membranam faucium mucosam, et præcipuæ tonsillas, tumore et rubore afficiens, cum febre *synocha*." The pain on deglutition is often intense, and shooting to the ear, and the deglutition difficult or imperfect; the voice is peculiarly altered by the swelling of the tonsils; the inflammation is attended with exudation of lymph, generally at the mouths of the orifices of the mucous glands, sometimes extending over the uvula, and part of the velum pendulum; but when the inflammation is strictly of the healthy character, this exudation very seldom goes farther, and the inflammation, beginning at

the tonsils, seldom passes into the larynx, even although the breathing becomes laboured and noisy from the swelling of the tonsils; there is external tenderness, but little or no swelling of the lymphatic glands beneath the angle of the jaw. By this mark, by the absence of any peculiar swelling or redness of the papillæ of the tongue, and by the absence, both of eruption on the skin, and of any unusual sickness or depression in the beginning, or typhoid symptoms in the progress of the concomitant fever, this disease is usually distinguished without difficulty from the Cynanche Maligna; and from incipient continued fever, or other strictly febrile diseases, which are frequently attended with inflammation of the fauces, it is distinguished in its early stage, chiefly by the swelling of the tonsils, and consequent difficulty of swallowing and affection of the voice, being much greater.

The fever attending this disease, is often much more intense than could be expected from the size of the organ inflamed, and may sometimes be distinctly observed to precede the local pain.

There are cases, simply inflammatory, in which the inflammation is more intense, and apparently deeper seated, affecting more of the sub-mucous cellular tissue than usual, and especially causing much swelling and tenderness of the back part of the tongue, attended with almost complete loss of the power of swallowing, and with salivation, and demanding more energetic treatment than is usually thought necessary.* But more frequently such urgent symptoms result from inflammation of a specific character,—sometimes from the

* See Craigie's Practice of Physic, vol. ii. p. 401.

diffuse inflammation of Erysipelas,—more frequently from that attending one form of the Cynanche Maligna.

This disease generally originates pretty distinctly in exposure to cold or wet, but is excited in young and irritable constitutions much more readily than in others, and in some individuals and families with remarkable facility.

In healthy persons, and under a moderately antiphlogistic regimen, this inflammation usually subsides in a very few days,—being protracted, however, some days longer in a small proportion, when it goes on to suppuration, and the discharge of purulent matter, always remarkably fetid. Even such a case is hardly ever dangerous, the opening of the abscess when the suppuration is complete gives immediate relief; but there are a few cases of inflammation of this healthy character, going to suppuration, but seated lower down the pharynx (C. pharyngæa) where the swelling and suppuration are so situated, and become so great, as to press on the glottis, and produce stridulous respiration, and may cause death by Asphyxia, as in croup.*

Although the disease in its simple form is generally at an end in a few days, yet even if originating in the usual way, it is apt to recur repeatedly, or become chronic and very troublesome or even dangerous, in several cases, which demand attention.

1. In some persons of somewhat feeble and languid habit, where the inflammation continues long, generally assuming a purplish colour, with little swelling, and little febrile reaction,—constituting what, in vulgar language, is called a relaxed sore throat.

* See, *e. g.*, Abercrombie in Edinburgh Medical and Surgical Journal, 1819.

2. In others, often stronger in appearance, but generally of scrofulous habit, where the tonsils remain long enlarged and hard, or even pass (particularly under repeated applications of cold and wet, or other irritations) into chronic ulceration.

3. In those who are infected with syphilis.

4. In those whose constitutions have been much affected by mercury.

The concurrence, either of syphilitic or mercurial affection, with the scrofulous habit, is the case in which inflammation of the throat, even if slight in the commencement, is most apt to pass into obstinate ulceration, extending to the velum and uvula, to the back of the pharynx, or to the cartilages of the larynx.

It is also to be observed, that an epidemic sore throat has occasionally prevailed in different situations, not corresponding to the character of the Cynanche Maligna, or Scarlatina, but much more dangerous than the common form of Cynanche Tonsillaris, for two reasons; *first*, because attended with more depression of strength, or typhoid fever; and, *secondly*, because tending to the effusion of a flocculent membrane on the tonsils and pharynx, sometimes extending down the œsophagus, and often down the larynx, where it produces the symptoms of croup. In this case the inflammation is obviously of a specific, and it may be said of an Erythematic character, and the causes of its occurrence and extension are as obscure as of the Erysipelas. To this form of the disease the term Diphtherite has been applied.

In all cases of the Cynanche Tonsillaris, and especially in cases where the chronic sequelæ, above noticed, are to be dreaded, the antiphlogistic regimen is to be enjoined, and the feelings of the patient may be re-

lieved, and probably the decline of the disease accelerated, or suppuration averted, by some of the antiphlogistic remedies; by repeated doses of such laxative medicine as may cause a decided *derivation* from the upper parts of the body, and by frequent doses of saline diaphoretics, or of preparations of antimony (even by full vomiting in the very beginning, as recommended by Cullen) where there is an obvious tendency to sweating. In cases which threaten to be unusually urgent, bloodletting, general or local (especially the former), may sometimes be very properly employed, and if used at all, in the view of arresting suppuration, or extension to the glottis, must be carried to an extent proportioned, not to the size of the organ inflamed, but to the violence of the inflammatory fever. When the inflammation in the throat is severe, but the fever not so high, early blistering the throat appears sometimes very effectual. During the height of the inflammation, gargling the throat is a precarious remedy, and frequently sipping demulcent or slightly astringent drinks, or inhaling the vapour of hot water, is usually better.

In some cases of unusually severe affection of the tongue, the assiduous use of very cold or iced water, has seemed decidedly beneficial.

When the inflammation is becoming chronic, astringent, and even stimulating gargles are of use; but more effectual local remedies are the insufflation of finely powdered alum, repeatedly in a day, or the application, once a day, or seldomer, of a strong solution of lunar caustic. In such cases there is often a feeble state of the general system, and a more tonic, although not stimulating regimen; and the use of Bitters, Quinine, and mineral acids, or of preparations of steel, is usually advised.

When the inflammation has passed into ulceration, and this shews no healing tendency, by far the most effectual local remedy is touching the ulcer, once in two or three days, with lunar caustic. In such cases it becomes a question,—according to the constitutional affection, which is judged to be the chief cause of the unfavourable progress of the local disease,—what remedy of the class of alteratives should be tried. In truly Syphilitic cases, in most constitutions, previously sound, and under precautions to avoid cold during and after it, a mild Mercurial course is more effectual than any thing else; and the same may be said of many cases of ulceration, threatening to affect the larynx, but which cannot be traced to syphilis as their origin; in those who have suffered from mercury, or are of scrofulous habit, Sarsaparilla, and other vegetable diaphoretics, and the preparations of Iodine, are the best auxiliaries to the cautious regimen and mild but nourishing diet, which are always advisable.

In cases which take the form of Diphtherite, it has been thought by some that the local applications already mentioned, of alum and of lunar caustic, have prevented the extension of the disease into the larynx; when the larynx has become affected, the remedies for the species next to be considered—among others calomel with opium, if early used—have sometimes seemed effectual; and in some such instances, where the state of the constitutional symptoms has apparently demanded the general remedies for typhoid fever, the disease has abated under their use; but the influence of no remedies over that form of the disease is either powerful or well ascertained.

Much may often be done to lessen the tendency to inflammation of the fauces (which generally abates

spontaneously as life advances) by the tonic regimen generally, and particularly by the habitual prudent application of Cold, locally or generally.

SECT. II.—*Of the Cynanche Laryngea and Trachealis.*

These two names denote in fact the same disease, known by the symptoms clearly laid down by Cullen—the "respiratio difficilis, inspiratio strepens, vox rauca, tussis clangosa," which, once fairly made objects of attention, can never be mistaken, and the concurrence of which with inflammatory fever, certainly indicates that the larynx and upper part of the trachea are affected with inflammation, threatening death by suffocation, and often going on to fatal termination within two, three, or four days.

The distinction of the two has been founded chiefly on these circumstances, that the Cynanche Trachealis, or Croup, which was first accurately described, is nearly confined to infants and young children,—that it is unattended with difficulty of swallowing,—and that it is fatal chiefly by the formation of an inflammatory exudation on the mucous membrane of the Larynx and Trachea; whereas the Cynanche Laryngea is described as attended with difficult deglutition (indeed often supervening on the C. Tonsillaris) as affecting adults, and as fatal by thickening of the membrane at the glottis, or by effusion of serum (or of pus) behind it, constituting the œdema glottidis,—not by the formation of a false membrane, nor by any change lower than the glottis. It is important to observe these distinctions, and particularly

to attend to the usual limitation of the dangerous result of the disease in adults, nearly to the glottis; but they are not so uniformly observed as to enable us to form separate species of the disease, as occurring in children and in adults.

It is important also to remember, that, in most cases, and particularly in children, this inflammation is only a part of a more general Bronchitis or catarrh, on the symptoms of which those of the Croup often gradually supervene, although in other cases the attack is sudden and violent.

The attacks of Dyspnœa in this disease are liable to obvious and sudden exacerbations and remissions, shewing that they depend in part on spasm, occasionally supervening on the inflammation. There are many cases in infants of purely spasmodic constriction of the glottis, and crowing respiration, chiefly observed after sleep, of short duration, unconnected with the other symptoms of croup, and which certainly depend on a peculiar irritation of the laryngeal nerves (recurrents); sometimes tumours compressing or stretching them, but which are not a febrile or inflammatory disease.

Although often extremely rapid in its progress, this disease sometimes assumes quite a chronic form, in consequence either of thickening of the membrane to a certain point, where it becomes stationary, or of the growth of tumours of various kinds (sometimes malignant) in connection with the inflammation, or of the formation and continuance of a false membrane in the larynx and trachea. In the last case it sometimes happens that after the inflammation has subsided, this membrane is separated and detached by expectoration.

This disease is generally produced by a combination

of cold with moisture, and is hence observed to be remarkably more frequent in low moist situations than in higher grounds, and in wet weather than very cold. It is more rapid in its progress, and more fatal,—probably because the false membrane forms more rapidly,—in very young than in older children, but is seldom seen in those that are still on the breast. The mortality from the disease in children under the age of five, has been stated, and probably not exaggerated, at 1 in 2.

It is remarkably prevalent in some families, more than others, and extremely apt to recur in the same individual; if the recurrence or relapse is within a very few days only, it is very often fatal; but if the patient fairly recovers the first time, the subsequent attacks are very generally milder.

The course of the disease is so rapid, and the amount of inflammatory effusion near the glottis, which may be fatal, is so small, that the antiphlogistic remedies in a well-marked case must be urged in rapid succession.

General bloodletting, particularly in adults, appears often to arrest the disease very satisfactorily, if employed within a few hours after the first marked attack; but at a later period it seems often nearly inefficacious. In young children, leeches act as a general evacuation, and are most conveniently applied to the feet. After the time for advantage from general bleeding is over, repeatedly leeching the larynx, in older children, or in adults, appears often decidedly beneficial: with this, and in cases of weakness, or when the fever is mild, without this, full vomiting, early brought on, and followed by full purging, is often effectual. Thus by Tartar Emetic, Ipecacuan, Jalap, and Calomel, given so as to ope-

rate both ways, and in quick succession, many are certainly saved. Great care to avoid cold during and after the operation of these medicines is very important, and the warm bath appears often a useful auxiliary.

In some cases, effectual relief follows immediately after full vomiting, and in these, it may be presumed, that the dyspnœa was in a great measure the effect of spasm of the muscles of the glottis. In the more severe cases, vomiting is usually, though not uniformly, produced with difficulty, and only by large doses of Emetics, and in these, more effectual relief follows the full operation of purgatives. In a few cases, when the dyspnœa continues, after these evacuations have been carried as far as the strength of the patient appears to admit, it abates under the use of repeated doses of Calomel with Opium; but whether any specific effect is produced in such cases by the Mercury, is doubtful. In such cases, there is usually no salivation; and when full salivation has taken place, it has often appeared useless. In advanced cases of this kind, when the pulse has become feeble, and the skin cool, wine in small quantities has appeared useful. Recoveries have taken place after a slight degree of lividity of the lips, and of intermission of the pulse, and of delirium or coma (as in other cases of approaching death by asphyxia) have taken place; but these symptoms are most generally fatal.

When such remedies have been fairly tried, and failed, Tracheotomy is the only remaining resource, and if to be tried, ought not to be delayed. In the case of children, this has hardly ever been successful, but in adults frequently. The reason obviously is, that in the former case, the inflammation very generally ex-

tends to the bronchiæ,—even the præternatural membrane sometimes reaches thus far, and much muco-purulent effusion exists in the smaller branches: whereas in adults, particularly in cases of a somewhat chronic character, the impediment to respiration in this disease is often nearly confined to the glottis. It must always be observed, that the effect of an artificial opening in the Trachea, which cannot be instinctively closed, as the glottis is, during a part of the act of coughing, and cannot therefore cause the requisite alternate compression and expansion of the air within the air passages, is to suppress expectoration more or less completely. By careful examination of the mode of breathing, and of the chest during breathing, and attention to the marks of the respiratory actions afterwards to be noticed, we can often judge pretty confidently whether the air which has got through the glottis passes freely into the air-cells, and expands the lungs, or whether it is much obstructed in its passage through the bronchiæ; and it is in the former case only, that we can hope for benefit from the operation.

The name *Cynanche Parotidæa* has been given to an inflammation affecting either the parotid glands, or the lymphatic glands in their immediate neighbourhood, attended with febrile symptoms, and spreading at times epidemically,—therefore no doubt of specific character,—which has generally appeared to be devoid of danger, but on which the curious observation has been repeatedly made, that the rapid abatement of the inflammation at this part has been followed by symptoms of inflammation at the testes, or at the mammæ, or by headache, delirium, convulsions, with or without scanty urine and

Anasarca. This observation has led to the belief that this Cynanche Parotidæa ought not to be interfered with farther than by the antiphlogistic regimen, and mild laxatives, and diaphoretics; and that more active depleting remedies should only be employed when such metastasis of inflammation to other parts shall have taken place. But the symptoms last mentioned, indicating acute disease of the brain, and of the kidneys, have been so often observed after the Cynanche maligna, as to warrant the suspicion, that the cases described as metastases of Cynanche Parotidæa, to those parts, were really examples of one form of that more dangerous disease.

SECT. III.—*Of the Bronchitis.*

It is now generally allowed, that the candid confession of Cullen, that our diagnostics do not serve to ascertain exactly the seat of the disease, when inflammation attacks the viscera of the thorax, or the membrane lining the interior of that cavity, need no longer be made; and although the same antiphlogistic treatment is in the first instance applicable to all, when occurring in their simple and acute form, yet there are varieties in the course to be expected, and in the application of remedies, which make it of the utmost importance to consider separately the inflammations of the bronchial membrane, of the substance of the lungs, of the pleura, and of the heart and pericardium.

We consider, under the head of Bronchitis, the cases described under the different names of Catarrhus, Bronchitis, Peripneumonia notha, and the varieties of these

enumerated by different authors; we have to notice the very frequent complication of this inflammation with Spasm, in Asthma and in Hooping-cough, and its frequent occurrence, with peculiar febrile symptoms, in the form of an Epidemic, to which the name Influenza is given; and to enumerate likewise the different diseases, febrile and non-febrile, of which inflammation of the Bronchiæ is either an essential constituent, or a frequent and important concomitant.

In its simplest and mildest form, this is perhaps the most frequent inflammatory disease produced by exposure to cold or wet, in the circumstances favouring the effect of these morbific causes, in this climate,—consisting essentially in inflammation commencing in the mucous membrane of the nose, and rapidly extending along the air-passages into the bronchiæ,—marked by Coryza,—often Epiphora, hoarseness, more or less of straitened respiration, and cough, at first dry, but soon attended with expectoration, which is mucous, sometimes scanty and viscid, sometimes copious and frothy, often gradually becoming puriform, but untinged with blood. With these symptoms there is general fever, usually rather slight, often much headache and pain felt in the chest, but chiefly or only on coughing, and referred to the centre of the chest rather than either side. On examination of the chest (if previously healthy), it is found to sound naturally on percussion, and to expand equally on inspiration on both sides, and the natural sound of respiration is heard pretty generally, although rendered harsher, and obscured in some parts by the admixture of "bronchial rales," which, however, in the early stage of most cases, are heard only partially, and only over the situation of some of the larger bronchiæ.

These are at first the dry rales—*sibilous* and *sonorous*, —or the "whistling, cooing, and snoring" sounds; afterwards the moist, *sub-crepitous* and *mucous* rales,— which convey the impression of air raising bubbles in a fluid as it passes along the tubes, and differ only as these bubbles are more numerous and smaller, or less numerous and larger;—the latter graduating into the *tracheal* rale of moribund persons.

If no cause of aggravation or renewal of the disease (particularly fresh exposure to cold, muscular exertion, full diet, or stimulating liquors) be applied, this inflammation usually subsides in a few days, the expectoration becoming more free, and the sputa somewhat thicker and more opaque, and examination of the chest shewing that the bronchial inflammation has travelled downwards to the minute branches only in a part of the lungs. But in many persons the complaint is very easily aggravated or renewed; and its importance depends essentially on two causes; *first*, Its tendency, especially in older persons, to assume the chronic form; and, *secondly*, Its frequent complication, at all ages, with more or less of spasmodic asthma, shewn by the frequent exacerbations of the dyspnœa, and by the wheezing sound (cum sibilo strepente) of the respiration during these.

These symptoms, as well as the peculiar sound, and long continuance of the fits of coughing in such persons, we have no doubt, depend on a spasmodic action of the bronchiæ, the muscularity of which has been lately well illustrated by the galvanic experiments of Dr Williams on the lungs of animals just killed. Indeed, it seems inevitable, from what we know of the Reflex Function of the spinal cord, that more or less of spasmodic action, both of these muscles and of the muscles moving the

chest in Respiration, should be excited by inflammation of this membrane; but in certain constitutions this spasmodic action, in both sets of muscles, as shewn by the dyspnœa and wheezing, and by the violent and long-continued fits of coughing, is greatly in excess.

Such distinctly spasmodic paroxysms most generally commence during or after the soundest sleep, and are often excited by some peculiar cause, such as disordered stomach, or muscular exertion; or by sudden changes of weather, or by certain states of the atmosphere, varying in different persons, dry and rare air in some, dense and moist in others,—more frequently by pure and cool air than by air loaded with smoke and carbonic acid.

These two peculiarities of this inflammation are very frequently seen in the same individual, and the tendency to both is remarkably observed to be hereditary.

It is in such persons also, that the disease sometimes puts on its more acute and violent form, *i. e.* the fever becoming high, the dyspnœa and noise of respiration urgent, and the natural respiratory murmur on both sides, and most parts, of the chest being much obscured by the rales, indicating that the inflammation has spread extensively on the membrane.

In such cases of violent Bronchitis, the diagnosis from Peripneumony, with or without Pleurisy, becomes important, and is generally marked pretty distinctly by the absence of pain on either side, or of any stain of blood in the sputa, by the sonorous respiration, and the bronchial rales, heard chiefly on expiration, and pretty uniformly on both sides of the chest, and by the expansion of both sides on inspiration, and the sound on percussion in both, continuing natural. The diagnosis is remark-

ably aided, likewise, by the frequent exacerbations and remissions of the dyspnœa, the former of which, in the cases where there is most of the spasm, take place chiefly in the morning after sleep,—in those where inflammation predominates, chiefly in the evenings,—the remissions being generally marked by free expectoration.

When neglected in the outset, or when occurring in a feeble habit, or complicated with previously existing organic disease, this acute Bronchitis is not unfrequently fatal. The fatal event is preceded, as may be gathered from what was formerly said, by increase of the dyspnœa, with failure of the circulation, soft, often irregular pulse, coldness, lividity, delirium or stupor;—as described in the accounts of the Peripneumonia notha and of the "Catarrhe Suffocant." And the appearances on dissection are characteristic,—the bronchial membrane red and thickened, the bronchiæ, especially the smaller branches, clogged with muco-purulent matter; the substance of the lungs, chiefly the depending portions, gorged with blood, and pouring out much serum when cut and pressed, but nowhere condensed so as to sink in water, nor mottled by exudation of solid lymph into the air-cells, as in hepatization of the lungs, nor coated on their surface by exudations of lymph.

It is always to be borne in mind that there is a danger attending the Bronchitis, from the obstruction of the blood descending from the head during the fits of coughing, particularly when these are violent. Hence arise the convulsion fits, often complicating the hooping-cough; and the severe headaches (introduced by Sydenham into his definition of Peripneumonia notha) and attacks of apoplexy or palsy, often seen as effects of this disease in old persons.

Passing, as it more generally does, into the chronic form, with little fever, but habitual cough and expectoration, sometimes of opaque mucus only, sometimes of perfect pus, sometimes without, but more frequently with, occasional recurrences of the spasmodic asthma, the Bronchitis demands careful attention on account of its consequences and complications.

1. Besides giving always a predisposition to more acute attacks of the same kind, it becomes complicated occasionally, although not nearly so often as might be expected, with the Peripneumony, next to be considered.

2. Perhaps more frequently it is complicated, especially in persons advanced in life, with hæmoptysis, and that state described as apoplexy of the lung, depending on effusion of entire blood into parts of its substance.

3. In young persons, if unusually violent, or frequently renewed, it sometimes becomes attended, not only with purulent expectoration, but with perfect hectic fever; and death may take place, after long emaciation, with external circumstances exactly resembling Phthisis, although no morbid deposition has taken place in the substance of the lungs.

4. The repeated recurrence of the disease, especially with asthmatic paroxysms, leads to the state called Emphysema Pulmonum, in which the septa of many of the minute air-cells are broken down, and they coalesce into larger irregular cavities,—air escapes into the cellular substance immediately beneath the pleura, and sometimes forms bullæ on its surface,—and the whole lung becomes more voluminous, of lower specific gravity, and, by reason of the enlargement of the cells, approximates to the structure of the lungs of reptiles; and is rendered unfit for the rapidity of mutual action of the

[illegible] which is requisite in warm-blooded animals [illegible] any excitement of the circulation. This state, therefore, necessarily implies habitual shortness of breath; and it is very often indicated, as an accompaniment and result of habitual bronchitis and asthma, by the unnaturally arched and very resonant chest, with faintness of the natural respiratory murmur, and constant admixture of the bronchial rales, chiefly in expiration. A certain degree of this change of the lungs, as Dr Lombard has shewn, takes place very frequently, and apparently from slight causes, in advanced life, when the texture of the lungs, particularly towards their external surface, becomes comparatively bloodless and brittle; but in younger persons it probably takes place only as a consequence of the bronchial inflammations connected with Spasm,—*i. e.* Asthma and Hooping-cough,—and in such subjects no doubt admits of spontaneous cure, when recurrence of the inflammation is prevented.

In cases of chronic Bronchitis, when fatal, we expect to find, on dissection, not only this condition of the lungs, and the muco-purulent effusion into the bronchiæ, but occasionally dilatation of the bronchiæ (chiefly, however, in parts previously condensed by inflammation), and very frequently serous effusion into the cells of the lungs.

5. Bronchitis and Asthma are not unfrequently complicated with tubercular deposition, and pass into regular Phthisis. This is generally recognised, after a time, not merely by the hectic fo[illegible] is an equivocal indication, as appears fr[illegible] already said), but by the indication[illegible] subsequent ulceration of the [illegible] afterwards described [illegible] guity, from

the rare occurrence of condensed lung and enlarged bronchiæ, independently of tubercles and ulcers.

6. After long-continued Bronchitis, with asthmatic paroxysms, and especially after emphysema of the lungs has resulted, there is necessarily an habitually slow movement of the blood through the lungs, from the impediments to that mutual action of the air and blood, which is known to be, in one way or other, an auxiliary cause of motion of the blood there. From this naturally result two consequences, both frequently very obvious, and of great importance in the advanced stages of these complaints;—in those strongly disposed to bronchitis, seen even in childhood, more frequently in advanced life;—enlargement and hypertrophy of the right side of the heart, known by pulsation at the Epigastrium, and sometimes in the jugular veins; and congestion, enlargement, and gradual change of the texture of the liver; particularly the granular degeneration of the liver, to be afterwards noticed, or in more unhealthy subjects other forms of organic disease. And in this state of the venous circulation, we can easily perceive that Dropsical effusion may be very readily produced, and especially that, as often happens, it may be repeatedly caused by fresh attacks of Bronchitis, hurrying the circulation, and farther impeding the arterialization and transmission of the blood in the lungs.

While habitual Bronchitis gives this natural predisposition to various organic lesions, it is easy to perceive that predisposition to the Bronchitis itself must naturally result from previously existing organic disease, [illegible] such as impedes the transmission of [illegible] left side of the heart; and therefore [illegible] nearly constant attendant on the most

common organic diseases of the heart, and that the concomitant paroxysms of asthma should be very readily excited in such persons.

The prognosis in cases of Bronchitis must, of course, depend partly on the violence, and particularly the general extension, throughout the lungs, of the inflammation; partly on the degree in which the constitution appears liable, from hereditary peculiarity, or from repeated recurrence, to the attacks of the disease; and partly on the degree of complication, in any individual case, with those accompaniments or consequences which have now been enumerated.

In the advanced stage, the worst symptoms are increasing dyspnœa, suppressed expectoration, and sinking circulation; and when delirium comes on, the case is almost uniformly hopeless.

Two contagious, but not eruptive diseases, consist essentially in Bronchitis, with certain accompaniments; and both the Prognosis and Practice in them are mainly regulated by the extent of the bronchial inflammation, viz. the Pertussis, usually seen in children, and the Influenza, often fatal to persons advanced in life. There is no doubt of the contagious property of Pertussis, although the fever does not shew, in that disease, any of the typhoid symptoms usually attending contagious febrile diseases, nor does it appear that the contagion attaches itself to fomites. The Influenza, or contagious Catarrh, has been often epidemic in modern Europe, and extends itself so rapidly, and affects such vast numbers of people within a very short time, that it has been reasonably suspected that its propagation depends on an "atmospheric influence," rather than on contagion. The danger in both these diseases depends mainly on

the extent of bronchial inflammation attending them, and perhaps the only peculiarities in their pathology which have a practical bearing, are the following :—

As to the Hooping-cough, it is necessarily an inflammation of many weeks' duration, of chronic character for the most part, but in its beginning acute, and afterwards easily aggravated into an acute form; and attended always with spasmodic action, which gradually becomes habitual, and like other spasms, may then be favourably affected by medicines acting on the nervous sytem, and by a change of scene and mode of life.

As to the Influenza, it is always attended by, or forms part of, a constitutional fever, of which a remarkable degree of debility is an essential part, and which, from that cause, although always of short duration, and hardly ever shewing strictly typhoid symptoms, is often very dangerous to old or feeble persons.

The danger of Hooping-cough often depends on Convulsions, occurring during or immediately after the fits of coughing, and may often be averted in such cases by early leeching and purging; excessive evacuations, however, in this, as in other spasmodic diseases, only aggravating the symptoms, particularly in the later stages. But many cases of the fatal termination of Hooping-cough, and probably almost all of Influenza, when uncomplicated, depend on muco-purulent effusion, extending downwards to the minutest branches of the bronchiæ, as is shewn in the advanced stage, by the general subcrepitous rale, chiefly in the lower and back part of both sides of the chest.

Again, Bronchitis is a very common complication of Continued Fever,—in which it appears as an accidental accompaniment, arising at any period of the disease;

and it is a uniform and essential constituent both of Small-Pox and Measles, and constitutes very often a great part of the danger of these diseases. But of these symptomatic cases of Bronchitis it will be necessary to treat more fully afterwards.

In the treatment of the intense Acute Bronchitis, whether attacking a person previously healthy, or supervening on other disease, or on the more chronic form, early general Bloodletting, and, in tolerably young and strong persons, repeated bloodletting, is often essentially important, giving relief in circumstances of distress which are beyond the reach of any other remedy. But it is often, especially if delayed for even a day or two, not observed to exert any such decided power over the disease; and in all cases it is to be expected that the disease will take the chronic form, and that this remedy will, after a time, become useless, or even injurious; because, in the advanced stages of the disease, when there is much accumulated mucus in the bronchiæ, and the pulse becomes feeble, the requisite expectoration is easily suppressed, dyspnœa aggravated, and probably serous effusion, particularly into the cells of the lungs, promoted by any powerfully weakening cause. These facts necessarily limit the use of general Bloodletting to the first few days of decided attacks or renewals of Bronchitis, when the febrile symptoms are recent, the pulse firm, and the fits of coughing excite pain of breast and head; and the age and previous diseased state of many patients limit it still farther. The local Bloodletting is often safe and beneficial when the general would be hazardous; and both are sometimes demanded by the effects above mentioned of the disease in the head, or by threatening of these,—pain, giddiness,

impaired vision, or flushing, when they would not be thought necessary on account of the pectoral disease itself. The effect of Blistering is often distinctly beneficial, but caution is required, particularly in young children of feeble habit, lest the blistered surface, particularly if the plaster has been applied more than a few hours, should ulcerate or even slough. Repeated Sinapisms, or rubefacient Liniments, assiduously applied, are of use.

Moderate purging, as part of the general antiphlogistic regimen, is proper; but there is a danger of the debility attending frequent and watery evacuations by stool diminishing the expectoration, the maintenance of which, in the later stages, is very important. But there are other remedies in the more chronic or advanced Bronchitis, whether idiopathic or symptomatic of the diseases mentioned above, the prudent use of which appears frequently to be very useful. These are,

1. Emetics, given repeatedly, particularly to young children, in whom their operation is very generally attended with a flow of attenuated mucus in the bronchiæ, facilitating expectoration. Where, however, there is fulness of blood, or obvious determination to the head, other evacuations, very often leeching, should precede the emetics, lest convulsions should take place under their action.

2. Expectorants, particularly, in the earlier stages, those which are nauseating,—antimonials in small, frequently-repeated doses, or, if these appear to depress the strength too much, small, frequently-repeated doses of Ipecacuan, in powder or wine, and the inhalation of the vapour of water; afterwards, when the strength is more impaired, and especially if there be dropsical ten-

dency, Squill, with Ammoniac, or other gum-resins, and preparations of Ammonia, seem more distinctly to promote expectoration.

3. In the more advanced stages, when there is little fever or pain, but much effusion into the bronchiæ, astringents, which seem to diminish that effusion, appear sometimes the most effectual remedies; sometimes the preparations of Lead, Zinc, or Alum; sometimes some of the bitters, such as Quinine, Quassia, Seneka, and the Mineral Acids; sometimes Cantharides or Copaiba, or other resins, or the inhalation of Chlorine gas, much diluted.

4. In combination, or alternated with these remedies, Opiates, almost from the beginning, but in general in small doses, lest they check expectoration, are temporarily palliative, and evidently conduce to the favourable termination; and when the Asthmatic tendency is obvious, and no acute febrile symptoms present, Æther, or the fumes of Stramonium, often decidedly assist the opiates.

5. In the advanced stages, when the pulse becomes feeble, and expectoration difficult, stimulants, particularly small frequent doses of Wine, Alkohol, and Ammonia, are not only admissible, but often signally beneficial.

Throughout almost the whole of the disease, warm clothing, a regulated temperature, as near to 60° of Fahrenheit as possible, and care to avoid all muscular exertion, and all causes that can hurry the respiration, are of the utmost importance, and deviations from these rules often decidedly injurious; but in the later stages, when the inflammatory tendency has subsided, when the breathing is not habitually difficult, and the

appetite returning, and especially if the complaint is partly spasmodic, exposure to the open air, even at a lower temperature, with exercise and change of scene, become often useful.

In some advanced cases, attended with the tendency to stupor, Blisters to the head, or other means of exciting the sensibility, are more effectual than any other remedies, particularly as expectorants; but this is more frequently observed in the Bronchitis symptomatic of the strictly febrile diseases, than in the idiopathic form.

SECT. IV.—*Of the Peripneumony.*

It is certain, that there are many cases of the Bronchitis lasting in the chronic form for years, and occasionally taking the acute form, in which the substance of the lungs is never inflamed; and cases of Peripneumony, in which the bronchiæ are unaffected, at least until the last period of the disease; but the combination of the two diseases is by no means so rare as has been stated,—and while many cases of the Peripneumony begin suddenly, with a well-marked febrile paroxysm, and without previous catarrh or bronchitis, many others supervene gradually on that disease, with slow aggravation of existing febrile symptoms and dyspnœa. The pathological distinction is obvious and important, but the Diagnosis, during life, at least in the early stage, is often difficult.

The Peripneumony occurs at all ages, but most frequently below the age of five, and above that of fifty. It seldom attacks both lungs at once, and probably never equally, and hence differences are usually perceptible in

the condition of the two sides of the chest, even early in this disease. The expansion of the affected side is somewhat less, and the sound on percussion gradually becomes dull (although both these symptoms are much less obvious than in the Pleurisy); and the sound of Respiration, as compared with the other side, becomes obscured or altered. It is obscured, by the admixture of the "*crepitous* rale," that modification of the moist rale (p. 264), in which the bullæ formed by the passage of air through the tubes appear to be most numerous and smallest; or it is altered to the character which is designated by the terms "harsh" and "bronchial," *i. e.* it conveys the impression of air passing along unyielding tubes (imitated, therefore, by blowing through the tube of the Stethoscope), rather than of air passing into and expanding a soft cellular texture. Ultimately, in some cases, it is altogether suppressed. It must be allowed, however, that the latter distinctions, particularly if rales are present, are often perceived with difficulty; and as to the crepitous rale, although very characteristic when distinctly heard, it is only observed in some cases, and seldom for many hours together.

Besides these changes in the respiratory sounds, there is also, when the lung becomes condensed by inflammation, a resonance of the voice at the part *(bronchophony)* often pretty extensive, such as, in the natural state, is not heard in the chest, or heard only over the largest bronchiæ,—chiefly under the right clavicle.

These alterations of the sounds in the chest, in cases of Peripneumony, are chiefly noticed over the middle and lower lobes of the lungs; the upper lobes, although by no means exempt from the disease, being less frequently the subjects of it.

In many cases the inflammation of the substance of the lungs extends to the Pleura pulmonalis, and even to the costalis; and then the disease is very generally farther marked by stitch in the side, by more decidedly imperfect expansion of the side in inspiration, and rapid suppression of the respiratory murmur.

In a large proportion of cases, the Peripneumony is farther indicated by characteristic changes in the sputa; they acquire increased tenacity and translucency (in the early stage), and they become *stained* (not *streaked*) with blood, whereby they acquire various unnatural colours, bright yellow or greenish, but more generally various shades of brownish-red or rust colour, gradually deepening as the disease advances.

These local symptoms of Peripneumony are attended with cough and dyspnœa, varying considerably in intensity, usually with some degree of obtuse pain of chest, and with fever often distinctly inflammatory, but not unfrequently assuming more of the typhoid type than that of any other idiopathic internal inflammation; the pulse is frequently soft, and there is much febrile oppression and muscular debility, even in some cases dry tongue, delirium, and subsultus tendinum, when the progress of the disease shews that there is no complication with truly typhoid or contagious fever.

We know that these symptoms attend the effusion, first of serum, but soon afterwards of much fibrin, into the pulmonary cells, and the gradual conversion of a portion of lung into the state of hepatization formerly described; that this takes place to very various extent, and with very various rapidity, probably most rapidly and extensively when this inflammation attacks persons in a feeble

air and blood which is requisite in warm-blooded animals, at least under any excitement of the circulation. This state, therefore, necessarily implies habitual shortness of breath; and it is very often indicated, as an accompaniment and result of habitual bronchitis and asthma, by the unnaturally arched and very resonant chest, with faintness of the natural respiratory murmur, and constant admixture of the bronchial rales, chiefly in expiration. A certain degree of this change of the lungs, as Dr Lombard has shewn, takes place very frequently, and apparently from slight causes, in advanced life, when the texture of the lungs, particularly towards their external surface, becomes comparatively bloodless and brittle; but in younger persons it probably takes place only as a consequence of the bronchial inflammations connected with Spasm,—*i. e.* Asthma and Hooping-cough,—and in such subjects no doubt admits of spontaneous cure, when recurrence of the inflammation is prevented.

In cases of chronic Bronchitis, when fatal, we expect to find, on dissection, not only this condition of the lungs, and the muco-purulent effusion into the bronchiæ, but occasionally dilatation of the bronchiæ (chiefly, however, in parts previously condensed by inflammation), and very frequently serous effusion into the cells of the lungs.

5. Bronchitis and Asthma are not unfrequently complicated with tubercular deposition, and pass into regular Phthisis. This is generally recognised, after a time, not merely by the hectic fever (which is an equivocal indication, as appears from what has been already said), but by the indications of consolidation and subsequent ulceration of the upper lobes of the lungs, to be afterwards described,—subject, however, to some ambiguity, from

But many cases are fatal while this process of restoration of the internal state of the lung by suppuration is making partial progress.

The recovery of a portion of inflamed lung, either by resolution, and, no doubt, absorption of part of the effused lymph, or through suppuration, is sometimes pretty distinctly indicated by the crepitous rale reappearing in a part where it had formerly been heard and disappeared, or where the sound of respiration had been bronchial, or been altogether suppressed.

In other cases, chiefly of slower progress, the portion of lung that has been condensed by inflammation becomes harder and drier, with a more uniformly grey colour; and the patient either dies when it is in this state, or recovers with a portion of lung permanently condensed, and impervious to air, which portion then acquires a dark colour from the usual black matter of the lungs, and sometimes, although rarely, passes into ulceration without any previous deposition of tubercles. When not ulcerating, such condensed portions of lungs cause necessarily permanent shortness of breath, and give a predisposition to other chronic diseases of the chest, and often to dropsy.

During the process of suppuration succeeding to Peripneumony, more or less of the febrile state generally continues, taking often somewhat of the form of Hectic; and if the fever has not subsided within three weeks after the commencement of the disease, it may always be apprehended that ulceration, sometimes without, but much more frequently with, tubercular deposition, is to result.

The tendency to Pneumonia is much greater in some individuals and families than others, and is greatly in-

common organic diseases of the heart, and that the concomitant paroxysms of asthma should be very readily excited in such persons.

The prognosis in cases of Bronchitis must, of course, depend partly on the violence, and particularly the general extension, throughout the lungs, of the inflammation; partly on the degree in which the constitution appears liable, from hereditary peculiarity, or from repeated recurrence, to the attacks of the disease; and partly on the degree of complication, in any individual case, with those accompaniments or consequences which have now been enumerated.

In the advanced stage, the worst symptoms are increasing dyspnœa, suppressed expectoration, and sinking circulation; and when delirium comes on, the case is almost uniformly hopeless.

Two contagious, but not eruptive diseases, consist essentially in Bronchitis, with certain accompaniments; and both the Prognosis and Practice in them are mainly regulated by the extent of the bronchial inflammation, viz. the Pertussis, usually seen in children, and the Influenza, often fatal to persons advanced in life. There is no doubt of the contagious property of Pertussis, although the fever does not shew, in that disease, any of the typhoid symptoms usually attending contagious febrile diseases, nor does it appear that the contagion attaches itself to fomites. The Influenza, or contagious Catarrh, has been often epidemic in modern Europe, and extends itself so rapidly, and affects such vast numbers of people within a very short time, that it has been reasonably suspected that its propagation depends on an "atmospheric influence," rather than on contagion. The danger in both these diseases depends mainly on

the extent of bronchial inflammation attending them, and perhaps the only peculiarities in their pathology which have a practical bearing, are the following :—

As to the Hooping-cough, it is necessarily an inflammation of many weeks' duration, of chronic character for the most part, but in its beginning acute, and afterwards easily aggravated into an acute form; and attended always with spasmodic action, which gradually becomes habitual, and like other spasms, may then be favourably affected by medicines acting on the nervous sytem, and by a change of scene and mode of life.

As to the Influenza, it is always attended by, or forms part of, a constitutional fever, of which a remarkable degree of debility is an essential part, and which, from that cause, although always of short duration, and hardly ever shewing strictly typhoid symptoms, is often very dangerous to old or feeble persons.

The danger of Hooping-cough often depends on Convulsions, occurring during or immediately after the fits of coughing, and may often be averted in such cases by early leeching and purging; excessive evacuations, however, in this, as in other spasmodic diseases, only aggravating the symptoms, particularly in the later stages. But many cases of the fatal termination of Hooping-cough, and probably almost all of Influenza, when uncomplicated, depend on muco-purulent effusion, extending downwards to the minutest branches of the bronchiæ, as is shewn in the advanced stage, by the general subcrepitous rale, chiefly in the lower and back part of both sides of the chest.

Again, Bronchitis is a very common complication of Continued Fever,—in which it appears as an accidental accompaniment, arising at any period of the disease;

questions; and while they are doubtful, that practice cannot be properly advised for general use in a case like this, where remedies of acknowledged power are recommended by all. When the pulse becomes feeble, and the skin cool, the Antimonials are contra-indicated in like manner as the loss of blood.

The continuance of the cough and dyspnœa, and increasing frequency of pulse, with other indications of enfeebled circulation, are the symptoms which chiefly presage the fatal event of the disease.

The chief use of Opium in this disease is where, after full bleeding and relief to the more urgent symptoms, the pulse continues frequent, with affection of the nervous system, restlessness, sleeplessness, even slight delirium—indicating a degree of the "Reaction after loss of blood," with cough and dyspnœa, of varying intensity, and which seem partly nervous or spasmodic. In such cases, sleep and relief to all these symptoms often succeed its use, cautiously repeated. The addition of Calomel, and of Ipecacuan, to correct its constipating effects, and to promote perspiration and expectoration, is right; but no reliance can be placed on the specific effect of Mercury in preventing or resolving the hepatization of lungs. When full expectoration is going on, its suppression by full doses of Opiates is always to be apprehended.

In many cases in the later stages, when the active inflammation has subsided, the expectoration is promoted, and the strength and general feelings of the patient are benefited by the use of small quantities of stimuli, particularly wine and the preparations of ammonia; and in a few cases, neglected in the commencement, and where the symptoms of the advanced stage (frequent and soft

pulse, dyspnœa, general mucous rales, and sputa deeply and darkly stained) are urgent, recoveries take place under the use of such stimulating remedies exclusively, —the inflammation having subsided spontaneously without extending over much of the lung.

Two peculiar forms of Pneumonia demand attention, rather, however, because they are cases in which we can hardly expect the ordinary remedies to be effectual, than because they admit of any successful peculiar treatment, viz. the case of inflammation going rapidly and surely to partial suppuration in the lungs, and the case of inflammation going to partial gangrene there. The first is always to be apprehended when symptoms of Peripneumony supervene on those of inflamed veins, or of suppuration in other parts of the body, *e. g.* after small-pox, and more especially after the amputation of a suppurating surface, when it may be concluded that purulent matter is circulating in large quantity in the blood. The second is almost exclusively observed in cases where the pneumonic inflammation is complicated with some other disease, acute or chronic, producing a feeble state of the circulation,—either the case just mentioned of previously existing suppuration, or typhoid fever, or some of the Exanthemata, or previous palsy, the action of mercury, &c. The presence of gangrene is denoted with certainty by the smell of the breath. We have reason to believe that recoveries have taken place from the advanced stage of affections of both these last kinds (when more partial than usual) under the cautious use of stimulants.

The frequent complication of one form of Pneumonia with continued fever, and some of the Exanthemata, will be considered afterwards.

SECT. V.—*Of Phthisis Pulmonalis.*

Without recurring to the question as to the *mode* of connection of Inflammation of the Lungs with Tubercles, we next state the *fact*, that all the indications, general and local, of Bronchitis, or of a sub-acute or somewhat chronic Peripneumony, affecting chiefly the upper lobes of the lungs, are very often found, in persons who have the predisposition to scrofulous disease, in connexion with scrofulous tubercles in these parts of the lungs, either previously existing, or deposited in consequence of these inflammations, or both; and that thus Phthisis Pulmonalis very frequently appears, in practice, as a consequence of these inflammatory diseases, usually, as might be expected from what was stated (at p. 201–2), of repeated attacks of them in their milder and more chronic form; and that attacks of "intercurrent inflammation" form part of its usual history, and are indicated by the usual appearances on dissection. We admit, at the same time, that Phthisis sometimes shews itself and makes progress (chiefly in those most strongly predisposed) without any indications of inflammation preceding or attending it.

We apprehend the accession of Phthisis, of course chiefly in persons with scrofulous taint, or in scrofulous families, and in those whose mode of life has placed them in circumstances formerly stated as leading to the development of the Tubercular Diathesis:—we suspect it when the pulse becomes frequent and soft, with little cough, little or no expectoration, and dyspnœa only felt on exertion,—when these symptoms continue and gradually increase with emaciation, and hectic accessions

gradually supervene; we have more fear of it if there be attacks of hæmoptysis, which is sometimes the first symptom that excites any alarm, and is more frequently seen to a considerable extent when tubercles are in their first stage, and the bloodvessels not yet obstructed by tubercular matter, than in the later stages of tubercular disease, when such obstruction has become general; and we are confirmed in our opinion when we find a part of the lungs—generally the upper part of one or both lobes—shewing the marks which we know to go along with incipient tubercles, but which are nearly the same as those of partial peripneumony and bronchitis, viz. more or less of dulness on percussion, and sometimes of imperfect expansion; faint, or harsh, or bronchial sound of respiration; more than usual of resonance of voice; the sound of the heart's action transmitted more distinctly than usual; and an obstinate sub-crepitous or mucous rale. If tubercles are merely disseminated through the pulmonary substance, we know that they may exist to a great extent without causing these symptoms; but as they are generally deposited in clusters which coalesce in the upper part of the lungs, before they appear lower down, we have very often these indications early in the disease.

If there be no indication of more general Bronchitis, or Asthma, or Pleurisy, we have the more reason, in such cases, to suspect the beginning of Phthisis. In some instances, after these first indications of Phthisis, there is an accession of more urgent dyspnœa, but with feeble pulse, and found to be peculiarly intractable; the symptoms take the form of Peripneumony, with less strength of pulse and heat of skin than usual, and lasting longer,—the patient dies asphyxiated,—and on dis-

section it appears either that Peripneumony has supervened on tubercles, or that an unusually great and uniform deposit of fresh tubercles has recurred, all of them appearing small and translucent, *i. e.* in their earliest stage (miliary tubercles).

More generally, the dyspnœa is less urgent, but the fever takes gradually the form of decided hectic, with night sweats, copious expectoration, partly puriform, often partly bloody, and partly consisting of fragments of tubercles, or even of earthy concretions (the remains of old tubercular deposits). We then expect to find the indications of ulceration, chiefly in the upper part of the lungs,—in the peculiar sound of respiration, the resonance of the voice, and especially the peculiar gurgling or clattering rale (gargouillement or rale caverneux) heard especially in the inspiration immediately succeeding a cough. This takes the place of the previous subcrepitous rale, and informs us, with almost absolute certainty, that an ulcerated cavity exists at the part.

The ulterior effects or attendants of Hectic Fever on the mucous membrane of the alimentary canal likewise shew themselves before the patient is exhausted,—the florid tongue, the slightly inflamed, often aphthous fauces, the diarrhœa, known by experience to be connected (at least when it has lasted some time) with tubercular deposition and ulceration in the mucous membrane of the bowels, and usually also with swelling and tubercular degeneration of some of the mesenteric glands.

In some instances, the ulceration of the lungs leads to perforation, and escape of air and of purulent matter into the sac of the Pleura, suddenly exciting the symptoms of Pleurisy, on which those of Empyema and Pneumo-Thorax supervene,—the difficulty of lying, usually

on the opposite side,—the unusual resonance on percussion in the greater part of that side of the chest, with dulness at a smaller part of it, and *absence of the respiratory murmur in both*,—the *metallic tinkling* heard in that side on breathing or coughing,—and the sound of *fluctuation* on succussion of the thorax,—all implying the presence, in the sac of the pleura on that side, both of air and liquid, usually purulent matter.

In a few instances, likewise, perforation succeeds the ulceration in some part of the alimentary canal, causing the symptoms of sudden and rapidly fatal Peritonitis (of which afterwards) to supervene on those of the colliquative Diarrhœa of Phthisis.

The duration of this progress is exceedingly various; in some instances, chiefly in children but likewise in adults, it may be gone through in a few weeks; in others, the symptoms, repeatedly abating and recurring, occupy several years. The disease may occur and even originate at all ages, but is somewhat more frequent, and the hectic fever attending it is best marked, between the ages of 18 and 35.

In some instances it is certain, that after the deposition of tubercles at the summit of the lungs has taken place, and some of them have coalesced and acquired some size, they become inert, and gradually harden into irregular earthy masses, no fresh deposition following. In a still smaller number of cases, it appears that ulcers already formed by the suppuration of tubercles, degenerate into fistulous sinuses connected with the bronchiæ, and do not extend. The almost universal fatality of the disease depends, not on the necessarily permanent or malignant character of ulcers of this description, but only on the fact, that tubercles, once deposited at this

part, are followed, almost universally, by successive fresh deposits in the middle and lower lobes of the lungs, which are to run the same course, to disqualify great part of the lungs for their office, and to be attended with such an exhausting process of Hectic Fever, as generally wears down the patient, and causes death by Asthenia rather than Asphyxia.

On dissection, it most generally appears that nearly three-fourths of the two lungs have become disorganized by tubercular deposits, by ulceration, and by hepatization. The ulcerations are chiefly at the upper part, the most recent—often still translucent,—tubercles at the lowest; and the condensation is partly by clusters of tubercles, partly by tubercular infiltration, partly by hepatization, the two last often hardly distinguishable. Such an extent of lung could not have been rendered useless without violent dyspnœa, but for two circumstances, which demand attention:—1. That the whole quantity of blood has been gradually much lessened; and, 2. That the blood entering the lungs has gradually deserted the diseased portions. It is usually found, also, that the Pleura pulmonalis and costalis, at the most affected parts of the lungs, are adherent by lymph, with or without tubercular deposits in it; that the liver is somewhat enlarged, granular or more frequently fatty; and more or less of the mucous membrane of the intestines (chiefly of the Ileum) affected in the ways above noticed. In many cases, especially in children, the portions of the bronchial and mesenteric glands corresponding to the diseased lungs and bowels are likewise tuberculated.

When this course of symptoms has begun, and the existence of condensation at the upper part of one or both lungs is ascertained, the case is to be regarded as

an object of palliative practice only; although, in the earliest stage, a hope may be entertained that, under practice hardly entitled to any other name than palliative, the farther deposition of tubercles may in a few cases be stopped, those already existing pass into an inert state, and the subsequent progress be arrested.

The most important measure that can be advised, in cases of threatened, suspected, or incipient Phthisis, is a change of climate; either the South of Europe, or Madeira, or strict confinement within doors, in an artificial climate, as near as possible to 60° of Fahrenheit, during at least six months of the year, in Britain. The advantage of the former plan is in the gentle exercise and mental excitement which may be secured by it, without risk of aggravation of the disease by cold. The inhalation of the vapour of tar, in the earlier stages, and of the chlorine gas, very much diluted, in the latter, seems in some instances useful. The other means of palliative treatment best recommended by experience, and by the careful use of which we may hope to see the progress of the disease retarded, the symptoms mitigated, and the ultimate exhaustion of the patient take place without intense suffering,—are the following.

1. Repeated but cautious use of the antiphlogistic remedies, small bleedings, purgatives, blisters, and other counter irritants, when the symptoms indicate attacks of "intercurrent inflammation."

2. Some of the expectorant remedies, mentioned under the head of Bronchitis.

3. Anodynes, especially opiates, in doses very gradually increased.

4. Bitters and Astringents, particularly the Mineral

Acids, the Acetate of Lead, and the vegetable astringents, to check the sweatings or the diarrhœa.

5. Constant warm clothing, and care to avoid cold or wet, and all exertions that hurry the breathing; but gentle exercise, when the strength permits, and the weather is mild and dry.

6. A diet, consisting of the lightest kinds of animal food, and the most nutritious (chiefly farinaceous) kinds of vegetable food; the proportion of the former varied from time to time, and a gradually increasing allowance of fermented liquor given, as the disease advances, and when the intercurrent inflammations abate.

SECT. VI.—*Of Pleurisy, Acute and Chronic.*

THE inflammation of the Pleura (in which the costal and pulmonic are very generally both involved) very often goes along with that of the subjacent portions of lung, but there are some cases of acute but partial, and many of more chronic Pleurisy, in which the substance of the lung appears, on subsequent examination, never to have been inflamed; and if condensed, to have been so only by supernatant effusion (*i. e.* as Laennec expressed it, to have been *caruified*, not hepatized.)

The symptoms of acute Pleurisy are simple, and nearly unequivocal, Fever, usually pretty high, Pain of side acute, and increased by inspiration, hardly either by pressure or motion, more or less of Dyspnœa, and within a day or two from the commencement of the pain, dulness on percussion at the affected part, faintness, and very soon suppression of the respiratory murmur at that

part, and obviously impeded expansion of the chest on that side,*—these symptoms depending on effusion of serum, or liquor sanguinis, with deposition of patches of false membrane, and flakes of lymph, on the serous membrane; which, after a time, extremely various in different cases, often passes into the form of pus. By these the case is in general easily distinguished from the Pleurodyne, or rheumatic stitch, and from thoracic Neuralgia.

When this effusion is unusually great, it causes distension of the whole side, and filling up of the intercostal spaces, most easily perceived when the thorax is examined from behind; and obviously displaces the heart.

Such large effusion is sometimes the result of acute Pleurisy, but more frequently of a subacute or more chronic form of the disease, in which the fever is slight, the pain little complained of, and the breathing, during the earlier stages, little affected, except on exertion.

In these cases, the lung of the affected side is often reduced to a small bulk, and pressed against the vertebræ, without being irretrievably condensed. The patient generally, but not uniformly, lies on the affected side.

The fluid effusion sometimes occupies the whole side of the chest, but sometimes it is confined by the effusion of solid lymph to portions, generally to the lower por-

* The Œsophony, or peculiar kind of resonance of the voice, distinguished by succeeding, by a short interval, to the sound as heard from the mouth, and by the altered, somewhat shrill and tremulous tone, is heard probably in no other case, than when a thin layer of serum intervenes between the ear and lung; but its occurrence and continuance are extremely uncertain; and the friction sound, heard occasionally when there is effusion of concrete lymph, is also of uncertain occurrence and duration.

tion of it. The pressure of the effused fluid on the lung of the affected side, causes such condensation of it, as very often to produce resonance of voice (Bronchophony) in the upper part of that side, which renders the symptoms somewhat ambiguous.

When the effusion has become great, especially, as we may suppose, when it is becoming purulent, the fever usually takes the form of Hectic, particularly in young persons.

This case of Empyema consequent on Pleurisy, without previous ulceration of the lung, is easily distinguished from the Empyema and Pneumothorax, consequent on a perforating ulcer, by the dulness extending over the whole side; and by there being no metallic tinkling, and no sound of fluctuation.

The symptoms of the acute Pleurisy are in general easily relieved by early bleeding, and other antiphlogistic remedies; but the local bleeding is here of greater importance, as auxiliary to the general, than in the Peripneumony. After the most urgent symptoms are relieved, the effusion may continue, and extend for a little; but in this case the spontaneous cure, by its absorption, may be confidently expected, and sometimes takes place in a few weeks, or even days.

But if the disease, although acute, has been neglected in the beginning, or if it has made progress in a chronic and insidious form, until the side has been somewhat distended, it may be found to shew very little tendency to absorption for months or years, and often becomes dangerous by gradual exhaustion of the strength, with hectic fever. In such cases, the effused lymph on the Pleura, in the end, generally ulcerates; the ulceration may extend *inwards* to the cells of the lungs, and the matter effused, and now become purulent, may make its

way inwardly to the bronchiæ, its expulsion by which has been often mistaken for the bursting of a vomica in the lungs; or it may extend *outwards*, through the Pleura costalis, to the cellular substance between the intercostal muscles, and under the integuments, where it forms an abscess, which may be opened, and by which the fluid within the chest may gradually be drained off.

It is obvious, therefore, that even when a large pleuritic effusion exists on one side of the chest, there are still two modes by which a spontaneous cure may be effected,—by gradual absorption of the effusion, or by its discharge externally, or through the lungs.

The operation of Paracentesis in such cases necessarily implies the admission of air into a cavity lined by a serous membrane, the protection of which by effused lymph is never certain; and it has been so seldom followed by recovery, that when there is no immediate threatening of death by asphyxia, the chance of spontaneous cure, in one or other of the ways now stated, under a careful regimen, is certainly better than that of recovery after the operation. It is only, therefore, in cases of such urgency, that this operation can be advised.

When it is not performed, the object of practice is to accelerate the absorption of the fluid effused, and watch for its accidental discharge in the ways above stated. Rest, confinement, and a low diet for some weeks, are always advisable; and it has often been thought, that, by blistering, by moderate purging, by a mild mercurial course, by the use of digitalis and other diuretics, and of preparations of Iodine, the absorption was accelerated; but all these have frequently been used without any obvious effect, even in cases where the absorption afterwards went on spontaneously and satisfactorily; and

therefore they should not be urged to the injury of the general health.

After a time, in such cases, the Tonic regimen becomes advisable, and recovery has obviously been accelerated by a somewhat fuller diet, a change of scene, and gentle exercise.

In whatever way the discharge of the effused fluid from the sac of the pleura takes place, it is followed by more or less of contraction of that side of the chest,—sometimes permanent, sometimes subsequently abating, according to the degree of injury which has been done to the lung, and the quantity of lymph thrown out on its surface.

There are undoubtedly cases of Pleurisy, of peculiar fatality, and little influenced by treatment, which depend, as has been already stated in regard to peripneumony, on the presence of Suppuration in other parts of the body, and of purulent matter in the circulating blood. There are similar cases also, seen distinctly in connection with epidemic Erysipelas: in both these the effusion is puriform, probably from the commencement; and there are cases, seen chiefly in hospitals, in convalescents from febrile diseases, and especially from small-pox, which would seem to be of the same specific and peculiarly intractable character.

CHAPTER III.

OF INFLAMMATIONS OF THE HEART AND BLOODVESSELS.

THE diagnosis of these inflammations, formerly very little understood, has been much studied of late years; and we have now little difficulty in recognising, in a great majority of cases, the existence of inflammation in these parts; but we cannot place such reliance on the diagnostic marks of the Pericarditis and Endocarditis, in their early stage, as to entitle us to treat of them separately; we know likewise, that they are often combined; and the pure Carditis, or inflammation of the muscular substance of the heart, probably never exists without one or other of them. It seems best, therefore, to treat of these inflammations together, first stating the symptoms which inform us that inflammation exists within the pericardium, and afterwards attending to the different effects of inflammation on the external and internal surfaces of the heart, and the marks by which, in the progress of the disease, the affections of these different parts may very frequently be distinguished.

The inflammations of the heart commence sometimes in a very acute form, with the usual symptoms of inflammatory fever; sometimes in a chronic and insidious form,—sometimes alone, very often combined either with other inflammations within the chest, or with Rheuma-

tism. The symptoms which may be said to be most characteristic are the following :—

1. Increased pulsation at the heart, felt by the patient, or obvious to the hand of the bystander, or both,—sometimes remarkably increased even by slight motion, probably always by exertion,—often causing a somewhat irregular or what has been called tumultuous heaving, —usually aggravated, and causing sudden starting when the patient is dropping asleep. With this, the pulse may be regular or irregular.

2. Pain in the situation of the heart, or in the left side of the chest, sometimes acute, often slight, almost always attended with tenderness at the epigastrium.

3. Dulness on percussion to the left of the sternum. (These two last symptoms are chiefly seen in the pericarditis.)

4. Dyspnœa, the respirations at first short and hurried rather than laboured; often attended with peculiar anxiety, generally aggravated even by slight motion, frequently in the advanced stages relieved only by sitting up or leaning forwards.

In some cases there is much cough, in some much vomiting, in some early delirium; but none of these are characteristic symptoms.

5. The sounds of the heart's action (in most, not all cases) variously altered, sometimes much fainter than natural; sometimes attended with unnatural sounds, of which one, the rubbing sound, or bruit de frottement, seems more general over the heart and nearer the ear, and denotes effusion into the pericardium,—another, the bellows sound, or bruit de soufflet, often more limited in extent and apparently deeper seated, denotes the Endocarditis, and diseased state, gene-

rally of the aortic valves. When these valves are diseased, the morbid sound may attend either of the natural sounds of the heart, as is easily understood from what is known of the cause of the sounds. When the mitral valve is diseased, if there be an unnatural sound, it will generally accompany the second natural sound, and be heard most distinctly over the ventricle.

6. In the latter case (of Endocarditis) the symptoms are soon found to vary remarkably, as the aortic or mitral valves are chiefly affected. In the former case, the pulse at the wrist is morbidly full and strong, and generally regular, or nearly so; and the aorta usually partaking of the disease, the pulsation in the subclavian arteries is soon found to be apparently much stronger than natural; in the latter case the pulse at the wrist is irregular, and neither corresponding in strength nor generally in number with the pulsations felt at the chest (some of the pulsations of the left ventricle causing only regurgitation into the auricle.)

7. In most cases, after some weeks, in some cases certainly within fourteen days from the attack of the disease, the heart has become enlarged, and its apex is felt below the sixth rib.

Of these symptoms the four first are practically the most important, as being earliest perceived, and sometimes denoting a stage of inflammation which admits of complete resolution. When these last some days without the others supervening, the case is probably the Pericarditis. The three last are more pathognomonic, but depend on changes which are in most cases irretrievable; and when observed, are almost always present for a long time, often for life.

The diseases which are most apt to become compli-

cated, either with the Pericarditis or the Endocarditis, soon after their attack, are Pneumonia or Bronchitis, and enlargement of the Liver; and Anasarca, with scanty urine, is a very frequent consequence of either combination.

When the case is Pericarditis only, there are material differences in the nature of the effusion into the sac of the Pericardium. In some cases it is chiefly fluid, and becomes partly, or almost entirely, purulent; and in these the strong pulsation at the sternum generally abates, and the pulse becomes more irregular; in others it is chiefly solid lymph, and in them the pulsation at the sternum and pulse at the wrist often continue long of morbid strength.

This last is the almost uniform result of Rheumatic inflammation of the heart, which occurs very frequently, sometimes as a metastasis of rheumatic inflammation receding from the limbs, sometimes as a translation of rheumatism, which continues to affect different parts of the limbs in succession. In the latter case, the affection of the heart is usually more gradual and insidious. The great effusion of solid lymph in such cases is apparently the effect of increased proportion of Fibrin in the blood.

The lymph that is thrown out on the Pericardium assumes generally a reticulated or fibrous aspect, and often quickly becomes organized, and forms permanent adhésions,—admitting, however, of very great diminution by subsequent absorption.

The inflammation of the inner membrane of the heart leads to deposition of patches of lymph on the inner surface both of the ventricles (chiefly the left) and of the aorta, and to shortening and thickening of the valves; and it is one mode—we do not say the only mode—in which

other organic changes, as described by Andral,* are gradually effected in the heart and aorta. This inflammation is probably more frequently of the chronic form than the other, and is certainly very often overlooked or neglected until its effects are irremediable. It often occurs also as an effect of Rheumatism, and sometimes at the same time as the Pericarditis.

These inflammations, and consequent lesions, at the heart and in the aorta, lay the foundation of many other diseases,—of various kinds of Aneurisms; of Apoplexy, Palsy, or Epilepsy; of Chronic Bronchitis and Asthma, Pneumonia, and Apoplexy of the Lungs; of Chronic Inflammation and Cirrhosis of the Liver, and of all

* 1. "A great number of the contractions of the different orifices of the heart take their rise from an inflammation, acute or chronic, of the membrane lining the cavities of that organ.

2. "This inflammation is the first cause of many enlargements of the heart.

3. "A great number of the cartilaginous and bony deposits in the aorta, many of the alterations which its middle coat undergoes, either in texture or properties, are the result of an inflammation of this artery.

4. "These different organic alterations of the aorta have a great share in the production of enlargements of the heart.

"We beg the reader not to extend our opinion beyond the limits within which we circumscribe it. We have not said that all ossifications of the internal membrane of the heart and arteries proceed from an inflammatory action; we believe that in old age the process of nutrition, in many fibrous or cartilaginous tissues, is modified in such a manner, that, without any morbid congestion of blood, these tissues become hard and ossified."—(ANDRAL, Clin. Med. t. iii. p. 468.) In like manner, we can have no doubt that other constitutional derangements, besides that proceeding from age, may so modify the condition of these textures, as to determine the appearance either of bone, or of other morbid deposits, either as a result of inflammation (particularly of chronic inflammation), or as a simple "perversion of nutrition," without previous inflammation.

forms of Dropsy; but they are only to be regarded as the great predisposing cause of all these; and exciting causes, which may be avoided, are very often concerned in producing or renewing these diseases in persons thus predisposed. The Hypertrophy of the Heart, chiefly of the left ventricle, seen so frequently in connection with the lesions now mentioned, is not to be regarded as a diseased state in itself, but as the consequence of these lesions; and as the provision of nature for carrying on the circulation effectually, notwithstanding the obstructions which they oppose, in different ways, to the flow of blood, chiefly through the left side of the heart and great vessels.

The danger attending these inflammations is often imminent, and is indicated by the degree of dyspnœa and anxiety, produced partly by the impeded state of the heart's action, partly by the concomitant affection of the lungs; and it is to be remembered, that, under the irritation produced by the inflammation on the membranes lining them, the muscular fibres of the heart are excited to a fallacious apparent strength of action, even when really enfeebled, either by evacuations, or, in a few cases, by extension of the inflammation to themselves, causing softening of their texture; and therefore that death may ensue from sudden and unexpected sinking. And when the disease has passed into its chronic form, the danger resulting from its various effects and complications is always attended with another, nearly peculiar to diseases of the heart, viz. that by sudden Syncope.

In the acute disease the antiphlogistic remedies are clearly demanded, and often partially successful, although the subsequent symptoms generally shew that some portion of the inflammatory exudation remains,

impeding more or less the free action of the heart, and flow of the blood. But the fact just stated enables us to understand, that large and repeated general bloodletting, particularly in the case of Pericarditis, when there is pressure from the effused fluid on the external surface of the heart, may irretrievably depress its actions, and aggravate the danger. Accordingly, it may be stated with confidence as the result of experience, that repeated (often many times repeated) local bloodlettings are more effectual than much general bleeding, in arresting the immediate danger, and probably diminishing the ulterior bad effects, of this inflammation. And this applies particularly to the case of Rheumatic Inflammation of the Heart, where the chance of subsequent translation or extension of the disease to the extremities seems to be much diminished by large and weakening loss of blood.

The danger of the acute form of the disease may be, in some measure, obviated likewise by strict antiphlogistic regimen, and by other antiphlogistic remedies; particularly by blistering, by purgatives and diaphoretics; in some cases by sedatives, such as Antimonials or Digitalis; and perhaps to a certain degree by Mercury, given (usually in the form of Calomel and Opium) so as to affect the mouth, in the hope that it may control the deposition, or promote the reabsorption, of lymph. But experience does not entitle us to place much reliance on this last expedient.

When the affection of the heart has passed into the more chronic form, or when, from peculiarity, and especially from debility of constitution, it has been always somewhat latent, we know from examination of fatal cases, that it may be attended with much general depression of vital action, more or less resembling typhoid

fever, while the symptoms at the heart itself are slight; and in cases of this kind wine and other stimulants may be cautiously given with good effect.

When the enlargement, and generally the hypertrophy of the heart, are obvious, and the obstruction to the flow of blood through it is indicated by palpitation and dyspnœa on exertion, by the morbidly strong or peculiarly irregular pulse above noticed, by starting from sleep (erroneously attributed by Cullen to Hydrothorax), often by difficulty of lying down, and usually by more or less of the morbid sounds attending the heart's action,—the permanent drain of an issue or seton has sometimes appeared useful; the effect of a continued course of mercury or iodine as an alterative may be tried, and in some cases the frequent use of Digitalis, or of Hydrocyanic acid, has seemed to calm the excited action: but the main object of practice in such cases is, to preserve the patient, by a careful regimen, from the exciting causes by which any of the ulterior consequences above stated may be determined; and when any of them shall appear, by appropriate evacuations, to which moderate but early bloodletting will generally be the most important preliminary, to moderate their attacks, and dispose them to a favourable termination.

The same diseased states, often resulting from chronic inflammation of the arteries, which, existing in the neighbourhood of the heart, produce the results now considered, frequently exist in the larger arteries of individual parts of the body, where they become known only by the non-febrile diseases to which they ultimately lead, of which the most important are, in the head,

Apoplexy and Palsy, or various alterations of the functions of the Brain and organs of Sense, sometimes resulting suddenly from rupture of vessels; sometimes more gradually from a disordered state of the circulation; and in the extremities, Gangrene, which sometimes results rapidly either from rupture of the internal coat of an artery (previously in a state of softening, probably the result of a peculiar inflammation), and obstruction of the course of that blood in it, or in a few cases from inflammation, attended with acute pain, and going rapidly to effusion and obstruction; in other cases this supervenes slowly on the morbid state of the circulation consequent on the diseased and inert condition of the arteries; perhaps rather on inflammation, very easily excited, and tending always to this termination, in parts where the circulation is so affected; and in both cases, when it has shewn itself, appears to admit of no other treatment than moderating the constitutional affection that is excited, and which is considerably various, sometimes inflammatory fever—sometimes distinctly typhoid —sometimes very slight, but long continued—often attended with much pain and restlessness, and remarkably benefited by frequent opiates; and promoting by gentle means the separation, sometimes effected by nature, of the mortified from the sound parts of such limbs.

Inflammation of the Veins is of more frequent occurrence, often resulting from injuries of different kinds, and perhaps, more frequently than is commonly supposed, originating spontaneously. It may often be known by the swelling, hardness, and tenderness of the vein, if within reach of the finger; but in many cases is attended with so much swelling of neighbouring parts, either

erythematic or anasarcous, as to be detected with difficulty. Hence it is often known, or suspected, chiefly from its effects. It causes rapid thickening of the coats of the vein, and inflammatory effusion into its interior, sometimes of lymph only, sometimes of pus; and the great difference of the progress of the disease, in different cases, seems to depend chiefly on the nature of this effusion.

It is certain that in some cases of Venous inflammation there is comparatively little either of constitutional disturbance or of danger; and that evacuations, at least repeated local bleedings, are well borne and obviously useful. In such cases, the chief result observed from it is painful œdema, or rather elastic swelling (dependent apparently on effusion of liquor sanguinis, not of serum only), in the parts beneath the affected portion of vein; and of this the most familiar examples are the Phlegmasia dolens of women after delivery, and the swelled leg occasionally seen after fever; but the same painful swelling of limbs occurs in various other cases, particularly in the lower limbs, in connection with various diseases of the Pelvis, or of the Groin, or idiopathically; and is benefited by the local bleeding, which is well borne, and may sometimes be carried to a great extent. In some such cases it has been ascertained, and in all such it is very probable that the effect of the inflammation is effusion of coagulable lymph only, obstructing the vein. There are some cases of this character which are followed by rapid inflammation of internal parts, likewise admitting of effectual relief from antiphlogistic treatment.

But in other cases, inflammation, even of a smaller vein, as that succeeding bloodletting, becomes immediately attended with extreme danger, of the kind for-

merly noticed, being followed by vomiting and purging in many cases, and by typhoid fever and rapid sinking; with or without another series of consequences, in themselves attended with much danger, viz. the secondary inflammation, and rapid purulent deposition, either in internal parts,—the lungs, the pleura, the liver, kidneys, even the eye, the brain, or heart,—or else in some of the joints. In such cases it is generally found, on dissection, that there is little or no effusion of lymph lining the inner membrane of the vein, but a little purulent matter is found in it; and from the history above given, there can be no reasonable doubt, that purulent matter formed in the vein, circulating in the blood, and acting as a poison, is the cause of the typhoid fever and of the secondary inflammations.

Such cases are often found in connection with erythematic or diffuse inflammation of the skin and cellular substance; and there can be little doubt that many such, at least, are cases of *specific* inflammation of the Veins—tending here, as in other parts, to fluid puriform effusions, rather than to exudation of plastic lymph.

These last cases admit of the antiphlogistic treatment only in their commencement; in their later stages the remedies for typhoid fever are demanded, but the chance of success from them is extremely small. But in the former class of cases, the repeated local bleeding, fomentations of the affected limbs, absolute rest in the recumbent position, and the general antiphlogistic treatment, at first, followed by blistering over the affected part, and gentle frictions, and the cautious use of Mercury and of Iodine, are often successful. Partial venous obstruction, however, very generally remains; and œdematous swell-

ing and ulcers of the limb are easily produced by exertion. The use of a bandage or laced stocking is often found beneficial; but caution is necessary as to thus forcing the blood against the obstructed portion of the vein, as long as inflammation still exists, or is easily re-excited in it.

CHAPTER IV.

OF INFLAMMATIONS OF THE VISCERA OF THE ABDOMEN AND PELVIS.

SOME of the diseases depending on inflammations of these parts may be confidently distinguished, but several of them are frequently combined, and the distinctions most satisfactorily observed are somewhat different from those which have been most generally described by authors.

SECT. I.—*Of Hepatitis, or Inflammation of the Liver.*

This disease occurs occasionally in the acute form, perhaps more frequently in the chronic form. In both forms it is more frequent in the warmer climates than with us. In both it may tend to suppuration; and of the more chronic form there is a very frequent termination in enlargement and induration, from which various important results may follow.

Cases corresponding in all respects to Dr Cullen's definition of the Hepatitis acuta, with high fever, painful swelling of the right hypochondrium, resembling pleurisy, increased by lying on the left side, pain of right shoulder, dyspnœa, dry cough, vomiting, and

hiccup, are not common; they depend on inflammation peculiarly affecting the peritoneal surface of the Liver or Diaphragm, and are sometimes hardly to be distinguished from inflammation of the lower part of the pleura of the right side; particularly as it sometimes happens that the inflamed liver does not project lower than usual in the hypochondrium, but extends upwards and encroaches on the cavity of the chest. Such cases are no doubt often successfully treated without the real seat of the inflammation being ascertained. The diagnosis of Hepatitis is the more difficult, as in many cases the flow of bile is not obviously changed from its natural state. But in most cases some of the symptoms above mentioned exist, and cause at least strong suspicion of the disease, both when in its acute and chronic form.

In some cases there is temporary jaundice with inflammation of the Liver, pointing out the seat of the disease when the pain in the side is little felt, but not necessarily indicating that the inflammation has been originally seated in the Liver, because the same symptoms may result from swelling of the Pancreas or other adjoining viscera (even the kidney) pressing on the bile-ducts; in some the hypochondrium is felt to be full, tender, and dull on percussion, although there is little complaint of pain; and it is important to remember, that in many cases in the warmer climates, and some in this climate, there is Diarrhœa or Dysentery in connexion with inflamed Liver.

It is important to remember also, that inflammation of the Liver, going to suppuration, is a common consequence of severe bodily injuries, especially, as has been repeatedly stated, of injuries of the head, even when there has been no obvious concussion of the whole body;

—and again, that the Liver is one of the organs in which secondary inflammations, going on rapidly to suppuration, have often occurred in connexion either with inflamed viscera, or with the removal of a large suppurating surface, and the presence, therefore, of purulent matter in the blood.

When inflammation of the Liver, whether attended by well marked symptoms or more latent, is going on to suppuration, the fever often takes the form of hectic; but in the more chronic cases, when a number of small abscesses are formed in the Liver, the hectic is often not observed, and the fever in the advanced stages takes the typhoid form.

There are many cases in which swelling and tenderness of the Liver, with some degree of fever, are obvious, which never tend to any other termination than chronic enlargement and induration of the Liver, with the formation of distinct tubercles, of different kinds, in some cases, and of granular degeneration, or Cirrhosis, in others. But there are other cases of still slower progress, in which these lesions of the Liver take place without any inflammatory symptoms ever shewing themselves. In such cases there are often various dyspeptic symptoms attending the disease of the liver; sometimes much vomiting, in other cases none,—sometimes complete anorexia, in other cases a morbidly keen appetite; often dryness of the tongue, and a very peculiar fetor of the breath; and usually either a defect or a morbid quality of bile in the stools; frequently there is discharge of blood by stool,—occasionally by vomiting; but in some instances we can hardly point out any other attendants than gradually increasing debility and emaciation, usually with a sallow complexion.

The chronic affections of the Liver exist occasionally in young persons, as scrofulous affections. In persons more advanced in life, the tendency to these is remarkably given by three causes,—by paroxysms of intermittent fever—by chronic disease of the lungs or heart, impeding the passage of the venous blood through the chest—and by indulgence in the use of spirits.

When inflammation of the Liver, whether in its more obvious or more latent form, has ended in suppuration, the abscess may make its way, with the aid of adhesions, either upwards into the cavity of the pleura, or downwards into the cavity of the abdomen, or outwardly at the hypochondrium, or between some of the false ribs, or into the cells of the lungs, or into the stomach or intestines; and there are many instances of recovery after the three last terminations, particularly after opening of the abscess which presents itself at the hypochondrium or side. The inflammation excited by the effusion of pus from this source on the serous membranes of the thorax or abdomen is probably always rapidly fatal.

When the acute Hepatitis is detected in its early stage, repeated general and local bloodletting, blistering, and purging, will probably often cause it to terminate by resolution. And this is one of the cases in which it has been so confidently asserted that the affection of the constitution by Mercury has a specific effect on the inflammation,—that it is always right, unless some peculiar objection to it exists, to give the patient the farther chance of benefit from that remedy, although it is certain that, in this climate, salivation has often been excited without apparent influence on the inflammation.

Even in the warm climates it seems to be admitted, that when the disease has lasted some time and passed

into suppuration, nothing is to be hoped from the specific effect of Mercury. In such cases, as in others, when extensive suppuration has taken place, maintaining the strength, and relieving the feelings of the patient by light nourishing diet, quinine and acids, and small quantities of fermented liquors, and by opiates alternated with mild laxatives, must be our chief resources until the place of discharge of the pus shall have shewn itself. In many such cases, however, death takes place by gradual exhaustion of the strength, without any discharge of the pus.

In cases of chronic enlargement of the liver, when the constitution seems sound, and we have reason to suppose that there is only congestion or chronic inflammation, or perhaps commencement of the granular degeneration, we may hope that a reduction of the swelling, and restoration of the more healthy condition of the gland, may be effected, chiefly by light diet, with little animal food, and no strong liquor—by mineral purging waters, or frequently repeated doses of any of the saline purgatives—by gentle exercise, and by a mild course of mercury; perhaps we may use with more confidence a long-continued course of Iodine or the Hydriodates, and nitric acid or different preparations of Chlorine. But when the constitution has been previously evidently impaired, or debility and emaciation are rapidly advancing, it is probable that the disease of the liver consists essentially in some kind of heterologous formation; and in that case, as we have no reason to think that absorption of these can be effected, more than palliative practice ought not to be attempted.

It is important to remember, that in the natural progress of the most common organic disease of the liver,

cirrhosis or granular degeneration, a diminution of size, with increasing irregularity of surface of the gland, usually succeeds its first enlargement, the disease apparently depending essentially on granular deposits on the prolongations of the capsule of Glisson throughout the substance of the gland, which gradually compress, and lead to absorption of, the glandular structure; therefore that reduction of a swelled liver, unless attended by decided improvement of the general health, may be quite fallacious. Such chronic disease of the liver is not unfrequently fatal, apparently by transference of the diseased state to the head, and supervening coma; which is easily understood when we perceive that Bile is retained in the blood, but is sometimes observed also without manifest symptoms of jaundice.

Enlargements of the Spleen frequently coexist with those of the liver, particularly in those who have suffered from Intermittent Fevers; or exist alone, sometimes for a great length of time. They are often connected with repeated fits of hæmatemesis. In these cases, the most important practical observation is, that preparations of Mercury are very apt to affect the system violently and injuriously; and that blisters, and frequently repeated laxatives, combined with bitters and preparations of Iron, have seemed the most useful remedies.

Change of scene and of climate are so frequently useful in such chronic affections, both of the Liver and Spleen, as to afford sufficient evidence that an effectual tonic regimen may determine the absorption of much of the matter by which such diseases are constituted.

Inflammation of the Pancreas, acute and chronic,

tending to nearly the same terminations as in the Liver, has been often observed on dissection, but seldom recognized during life with certainty, the symptoms having been neither uniform nor satisfactory. Pain, deep seated at the epigastrium, referred more frequently to the back than the upper part of the abdomen, sometimes with vomiting, with more or less of Fever, and without the characteristic symptoms of other abdominal inflammations, may excite suspicion of this seat of the disease, but demands no peculiarity of practice.

SECT. II.—*Of Peritonitis, or Inflammation of the Peritoneum.*

This inflammation is in general easily distinguished from that of other textures in the abdomen, but extends so generally over the peritoneal surfaces, that it is to no purpose to make species of it according to the different organs chiefly affected. It is known by general pain and tenderness of the abdomen, aggravated by inspiration, and causing the respiration to be strictly *thoracic*, with febrile symptoms, vomiting, often hiccup, and obstinately costive bowels. The pulse in general soon becomes small, or even weak; but this depression of the circulation is unattended by the other symptoms of typhoid fever; in most cases the abdomen becomes gradually distended with flatus in the intestines, the cause of which is not known, and the degree of which, at least in young persons, bears no fixed proportion to the danger of the disease.

These symptoms are in general sufficiently characteristic, but in women (in whom the disease is much

more frequent than in men), they are sometimes very exactly imitated, especially in irritable habits, in the course of painful affections which are neuralgic, not febrile nor inflammatory, and which can only be distinguished from acute inflammation by careful observation and attention to the previous history and constitution of the individuals. And there are cases of inflammation of the spinal cord, and likewise of the kidneys, where the symptoms, during great part of the disease, are very nearly the same.

Partial inflammations tending to suppuration (unless opposed by active treatment) in different parts immediately exterior to the Peritoneum, likewise occasionally cause symptoms almost exactly similar. Of such inflammations the most common seat is the cellular membrane immediately surrounding the cœcum.

The symptoms described as Peritonitis, are just similar to those which result from strangulated hernia; and inquiry into the possibility of this cause for them, should always precede all other measures.

The danger of the disease is denoted merely by failure of the circulation; the breathing becomes hurried only in the last stage, when the blood is stagnating in the lungs, from feebleness of the propelling power. The functions of the Brain are almost always entire to the last moment.

The duration of this inflammation is extremely various, the appearances on dissection necessarily various likewise. The most rapid cases are generally those which are excited by a perforating ulcer in the stomach, intestines, or gall-bladder, and effusion of their contents on the peritoneal surface; in which case the inflammation is sometimes fatal, by its depressing effect on

the circulation, before any exudation has taken place on the membranes. In other cases, even of the acute disease, tending merely to effusion of soft lymph, and of more or less of purulent matter, the disease may be prolonged for several weeks; between these extremes there are numerous intermediate cases; and the quantity of inflammatory effusion found after death, bears no fixed proportion to the duration of the case, nor to the urgency of the pain and fever.

The occurrence of gangrene, as a consequence of this inflammation, is not uncommon, but in the majority of fatal cases, although preceded by extreme feebleness and coldness of the surface, there is no gangrene.

What ought strictly to be called cases of the Chronic Peritonitis, are those which tend, not to effusion of preternatural membranes, nor of purulent matter, but to the thickened granular state of the membrane formerly noticed, with which thickening and shortening of the Omentum, are usually combined. In a majority of cases of this kind, there are tubercular deposits, or other heterologous accretions on the membrane, and frequently likewise in the mesenteric glands, and perhaps in other textures within the abdomen; and the connection of these with inflammation,—chiefly with repeated recurrences of inflammation,—seems to be exactly analogous to the connection of tubercular disease of the lungs with Pneumonia, although the tubercles within the abdomen, probably in consequence of not being exposed to the air, have no such tendency to suppuration and ulceration as those in the lungs. In some of these cases, the tubercles remain of small size, but the adhesions which they form materially derange the functions of the bowels, causing a very irregular state of the alvine evacuations;

and in some such cases, the muscular fibres of the intestines are found afterwards in a state of hypertrophy; but in other cases, especially in children, the tubercles attain gradually an enormous size, causing the disease described by Dr Baron, without materially deranging the actions of the bowels, or altering the subjacent textures.

In such chronic cases, the nature of the disease is generally shewn by the tenderness, enlargement, and hardening, and sometimes peculiarly *matted* feeling of the abdominal parietes; the general symptoms are very various, but always more or less analogous to those of the acute Peritonitis,—more partial, and less intense, than in that form, but repeatedly recurring.

It is farther to be observed, that the acute form of the disease is very often complicated with previous disease, which may have been slight, and shewn itself by no distinct indication, but may nevertheless be part of the cause of the excitement of the inflammation, and may be an impediment, or even an irremediable obstruction, to the abatement of the disease, and restoration of the natural action of the intestines. One frequent cause of this kind of complication is, adhesion from previous inflammation of the bowels themselves, or of the neighbouring viscera (*e. g.* the omentum, the appendix vermiformis, the ovaria, or ligaments of the uterus), and another is a recent intussusception from irregularly excited action of some part of the intestines, or a thickening and imperfect stricture of some part, or the pressure of an adjoining enlarged viscus, or morbid tumor. The possibility of acute Peritonitis being complicated with, and partly dependent on, some such permanent disease, as well as of its dependence on a perforating ulcer (which may have hardly caused any previous symptom) is al-

ways to be remembered, with a view to Prognosis and to Practice.

Even independently of such complication, the acute form of the disease is always to be regarded as very dangerous; the peculiar nauseating pain, and sickness, unless relieved within a very few days, may produce fatal depression of the heart's action; and the more chronic form of the disease, on account of the various complications above noticed, is very generally ultimately fatal.

Under early and active treatment, however, the acute form of the disease often subsides rapidly and perfectly; and even when some organic lesion exists, as its concomitant or consequence, if it is not one which necessarily obstructs the action of the intestine, the patient may be restored to tolerable health.

The only remedy on which reliance should be placed is full and repeated bloodletting, general and local,—the latter being most important in cases of the sub-acute or less urgent form; and the practical precept next in importance is, to refrain from the use of purgative medicines during the violence of the inflammation (which is often found either to excite urgent vomiting, and of course fail of effect, or to aggravate the pain without relieving the bowels), and trust the evacuation of the bowels only to enemata; of which the most powerful are, that consisting of four or even six pounds of pure warm water, and that consisting of a scruple or half a drachm of tobacco leaves, infused in four or six ounces of water, and given every hour or two until it operate. If these means, after full bleeding, fail of effect, the probability will always be very strong, that a mechanical impediment exists to the effectual action of the bowels, which

cannot be removed, and may be aggravated or increased to internal strangulation by the use of purgative medicine. But when the pain and sickness have considerably abated, the action of a mild laxative, securing complete evacuation of the canal, may be very useful.

When the patient, as often happens, does not rally from the peculiar depression of the disease after full bleeding, and the pain and sickness continue, essential advantage may certainly be derived from full and repeated doses of Opium, which in these circumstances will not be found to interfere with the evacuation of the bowels, and will give great relief to the patient; it is doubtful whether this practice can be said to have any directly beneficial effect on the inflammation, but it may be confidently said that under it the pulse will become fuller and firmer, and that a greater loss of blood, if required on account of the symptoms, will be borne without sinking, under this alternation of remedies, than if bleeding only is relied on.

Along with the Opium, Calomel may be given, in the view of guarding against constipation, and promoting perspiration, and many have thought the specific effect of Mercury beneficial; but it certainly ought not to be given in such large and repeated doses as may excite sudden and violent salivation, for such action of mercury has been repeatedly found to aggravate or renew the abdominal pain, at the same time exciting dysenteric symptoms, as dangerous as the original disease.

In the height of the inflammation, no other remedies are to be advised. Hot fomentations and the semicupium are probably better than blisters; but if the disease is becoming chronic, these are probably more important. When the most violent symptoms have abated,

there is often remitting pain, with some degree of distension, frequent and soft pulse, and other marks of great debility, for some time; and complete recovery may take place under small quantities of wine, along with alternation of mild laxatives, enemata and opiates, and perhaps occasional leeching. There are even a few cases (particularly some recorded by Dr Abercrombie) in which the full use of wine and other stimulants was successful, after the pain had wholly subsided, and the patient fallen into the state of extreme debility and coldness usually preceding death.

There are cases of obstinate obstruction of the bowels, with more or less of the symptoms of Peritonitis, but quite chronic, in which Mercury may be given gradually, and without risk of violent action; and in some such cases the constipation has yielded when salivation has been established.

But in cases of the chronic form of the disease, when, from examination of the abdomen, from the known constitution of the patient, or the degree of emaciation and debility, we have reason to believe that tubercular or other heterologous deposits exist, it is right to refrain from active interference, and confine the practice to the palliation of symptoms.

The Peritonitis is peculiarly apt to occur within a few days after parturition; and many such cases present no peculiarity of importance. They are usually attended with suppression of the lochial discharge, and with the usual inflammatory fever, and bear evacuations well. In some cases, however, it is certain that the inflammation at this time commences at the Uterus, and never extends over much of the peritoneal surface,—that the Fallopian tubes and inner membrane of the Uterus are

affected in some, the substance of the Uterus in others; and that, in connection with this uterine inflammation in some such cases, there is inflammation extending along the Uterine veins to the Iliac vein on one side, causing effusion of lymph in its interior, closing its area, and thereby producing that painful swelling of the limb to which the name Phlegmasia dolens has been given, and for which the only effectual remedy is the local bleeding over the affected vein.

Besides these, which may be thought to be healthy inflammations of the different textures connected with the uterus at this period, it is certain that, in the contagious disease called Puerperal fever, of which many wasting epidemics have been recorded, there is uniformly peritoneal inflammation, beginning at the Fallopian tubes and ovaria, and extending over the peritonæum;—that, in some cases, and in some of these epidemics, the inflammatory symptoms have been urgent, and the depleting remedies have been well borne, and been often successful; but that the appearances on dissection in the fatal cases, even of these epidemics, have been peculiar in this respect, that the inflammatory effusion has been unusually fluid, purulent, or serous mixed with pus, or resembling soap and water, and little or no *plastic* lymph, capable of forming adhesions, has been effused. The fever, even in such cases, often shews more distinctly *typhoid* symptoms, than in the usual cases of peritonitis. And in the most urgent and rapidly fatal cases of this kind, it is certain that the pain has very soon abated; the patient has sunk rapidly under all varieties of treatment; and on dissection, in those most rapidly fatal cases, there has been very little mark of inflammation. From all these circum-

stances we are assured, that, in these cases, there is a specific inflammation attending a contagious disease which results from a morbific poison; and experience farther shews, that this may very generally be avoided, by avoiding all intercourse during and after labour with any one who has been in contact with similar cases previously.

It is farther ascertained, that this *specific* inflammation, the peritoneum, is not confined to cases of this kind,—that it is occasionally seen in manifest connexion with epidemic, or frequently occurring erysipelas, or diffuse external inflammation,—that it may spread epidemically independently of parturition, especially in hospitals where erysipelas has prevailed, and that the best marked cases of it present always similar peculiarities in their history, to those by which the worst cases of external erysipelatous inflammation are distinguished, —viz. that they are attended by much depression of the circulation,—are little benefited by depleting remedies, —and shew, on dissection, fluid effusions almost exclusively;—while it is equally certain that the same contagion, acting on certain constitutions, may excite, whether internally or externally, inflammations in all respects of more healthy character.

Sect. III.—*Of Inflammation of the Mucous Membrane of the Stomach and Intestines.*

This inflammation presents itself in a great variety of forms, some of them often obscure.

A certain degree of inflammation of the mucous membrane of the stomach certainly takes place in many

cases of severe dyspepsia,—particularly, as Dr William Philip has shewn, in the advanced stages of dyspepsia. It may be relieved by bleeding, general or local, although, in many such cases, there are objections to large or repeated evacuations of blood, on account of the general habit of body. When occurring in connection with amenorrhoea, it is sometimes effectually relieved by hæmatemesis; and when not effectually opposed by remedies, it may go on to ulceration, and ultimately to perforation, without the symptoms ever having been urgent—the pain constant, or any well marked fever having been excited.

Acute inflammation of the mucous membrane of the stomach, except from acrid poisons, is very rare. There are, however, pretty numerous cases of pain felt in the situation of the Cardia or of the Pylorus, at the time of food entering the stomach, or about two hours after, and attended with more or less of the regurgitation or vomiting of food, which improve under the use of mercury, and which probably depend on chronic inflammation,—this being, as in other cases, one mode, and not the only mode, in which organic disease of these parts may be produced.

Inflammation of the mucous membrane of the Small Intestines occurs more frequently. It is the case designated (erroneously) by Cullen as Enteritis Erythematica; and is shewn by fever, with pain of abdomen, of varying intensity, with little or no tenderness, with much vomiting in some cases, but not uniform vomiting, and with a loose state of the bowels, generally without tenesmus, and without discharge either of blood or mucus. It is attended with much depression, with rapid emaciation, and frequently with tympanitic dis-

tension in its later stage. Its tendency is, first, to effusion of patches of lymph, sometimes pretty large shreds of false membrane, and then to ulceration, chiefly in the patches of mucous glands in the lower part of the Ileum. Such an inflammation, with more or less of these symptoms, occurs very often as an attendant of typhoid fever, and as such will be considered afterwards. Idiopathically it occurs occasionally, sometimes with so little fever or other symptoms (when the ulcers found are few), that it has led to perforation in persons not previously thought ill. It is most frequent in children and young persons, and in a sub-acute form, and in them seems to be the cause of the best marked cases of Febris Infantum Remittens; *i. e.* of frequently occurring irregular febrile attacks, with pains of the head and bowels, and an irregular, but, as the disease advances, generally loose state of the bowels. Such attacks are sometimes effectually relieved by purging, and would then seem to depend on irritation, from aliments, or from morbid secretions, acting on the mucous membrane; but when not speedily relieved in this way, they may always excite suspicion of this inflammation, and may be most frequently relieved by loss of blood, general or local, and by opiates in small doses, alternated with the mildest laxatives and antacids.

The use of the latter medicines, in such cases, must, of course, be regulated partly by the appearance of the stools; but the most important evils to be apprehended may take place, and the most useful practice be employed, where there are great varieties in this respect.

Such cases, in children, depending on more or less of inflammation in this membrane, are often distinguished with great difficulty from continued and contagious

fever, which is usually in them of mild character, and of somewhat remitting type; and they demand minute attention also on account of their tendency to pass into one or other of two very important diseases, the history and treatment of which will be considered afterwards—into Hydrocephalus, apparently by metastasis of the inflammation, or into Tabes Mesenterica, by reason of a connexion with deposition of tubercles (both in or behind the mucous membrane, and in the mesenteric glands), just similar to the connexion, formerly considered, of Pneumonic inflammation with Phthisis pulmonalis.

There is a case, not very uncommon in this country, of slight or transient pains of abdomen, attended with little fever, but with much nervous irritability, restlessness, and disturbed sleep, and with the discharge from the bowels of long shreds of lymph, grooving or marking the stools. Some cases of this kind probably go on to ulceration; but they often terminate favourably under the use of repeated local bleedings, blisters, the warm bath, diaphoretics, and opiates. When fatty concretions are discharged from the bowels, there is always reason to apprehend heterologous deposits, probably with ulceration.

But the case of Inflammation of the mucous membrane of the intestines most frequently demanding active treatment is the Dysentery,—*i. e.* febrile symptoms with pain, often very severe, but remitting, in the abdomen, tenesmus, and frequent scanty stools, bloody and mucous, "retentis fæcibus alvinis." In the most severe cases this is attended with vomiting, and sometimes with rapid sinking; in others it passes into a more chronic state, the fever takes somewhat of the typhoid form, and when the patient has become very feeble, the peculiari-

ties of the alvine discharges abate, and the flux becomes simple Diarrhœa. It is known that these symptoms depend on Inflammation running the course formerly described, and ending in ulceration, sometimes in partial gangrene, in the mucous membrane of the great intestines.

In some cases the disease runs its course with great rapidity, and is fatal by rapid sinking, in like manner as the Peritonitis, when the only visible effect of the inflammation is effusion of lymph, in a somewhat tuberculated form, on the mucous membrane. More generally there is much irregular thickening, by organization of the lymph effused, and ulceration to a considerable extent, found on dissection, and the patient is much emaciated before death takes place.

This inflammation is most frequent in warm climates and seasons, when the secretions of the intestines have been long stimulated by heat, but is most generally excited by exposure to cold and wet. It has been thought to result from the action of a peculiar Malaria, generated in like manner as that which excites Intermittent Fever; and there is no good ground for doubting, that in certain circumstances, and in certain constitutions, it may spread by contagion. We have therefore reason to think, that the inflammation producing the symptoms of Dysentery is occasionally of a specific character; and when so, peculiarly dangerous; but we know that the disease is very often dangerous, particularly when it extends rapidly along the membrane, and is attended with much constitutional disturbance,—or, in warm climates, where complicated with disease of the liver,—although it may be only a healthy inflammation from cold.

Although there are many cases of bowel complaint in

this climate with dysenteric stools, which subside readily under the alternation of laxatives and opiates, without loss of blood, yet in a well marked case of dysentery we should regard bloodletting as clearly demanded, its early use highly important, and general bloodletting as usually preferable. Next to bloodletting (which should very often be repeated) opium in repeated doses, every three or four hours until the local symptoms abate, seems by far the most important remedy. The opium may be used alone, or combined with ipecacuanha, so as to produce sweating, or with acetate of lead, particularly if the discharge of blood is great. The evacuation of the bowels by laxatives during the violence of the inflammation may be most properly postponed; but it is clearly beneficial to alternate the opiates with laxatives as the disease goes on,—often repeatedly, when the quantity of feculent matter daily discharged is less than natural, and part of it scybalous. The mild laxatives, such as castor oil, solution of sulphate of magnesia with sulphuric acid, sulphur, bi-tartrate of potass, or rhubarb with calomel and ipecacuan, are usually quite sufficient for the purpose. In the advanced stages the quantity of feculent matter discharged usually shews that the laxatives are not required, and the opium in glyster or suppository is the most useful remedy.

In the greater number of cases seen in this country in proper time and uncomplicated, this practice is successful; and it seems obviously advisable not to use mercury so as to affect the mouth, because of the known risk of its exciting, especially if cold and wet be applied soon after it, an affection of the mucous membrane very similar to the dysentery itself. But there are a few cases in this climate, where dysenteric symp-

toms, especially in connection with enlargement of the liver, becoming chronic and intractable under other treatment, have yielded when the mouth has been affected with mercury; and we have many statements from the warmer climates, where mercury may be given more safely, to shew that the specific action of mercury appears to arrest the inflammation even in its acute stage. Whether this may be only in the case of a specific form of inflammation, is doubtful; but certainly it is not the general fact in this climate, that any such decided effect on the acute inflammation of dysentery results when the mouth is affected by mercury. On the contrary, an aggravation of the symptoms has certainly been sometimes observed.

Some cases of organic disease (*e. g.* Stricture) of the Intestines, appear from their symptoms to originate in inflammation of the mucous membrane, and are attended throughout with symptoms nearly resembling dysentery, but in others the symptoms begin more gradually and insidiously, and the appearances on dissection are clearly distinct from the effects of inflammation.

The convalescence from all inflammations of the intestinal mucous membrane always demands much attention, on account of the frequent tendency to relapse; to be guarded against only by constant warm clothing and other precautions against cold,—correcting immediately either costiveness or diarrhœa,—enjoining a very light diet at first, but gradually allowing a tonic diet and regimen, without permitting any excess.

SECT. IV.—*Of Nephritis, or Inflammation of the Kidneys, and of the other Urinary Organs.*

This disease is seldom seen in the form described by Cullen—affecting one kidney, and indicated by fever, pain stretching along the ureter in that side, frequent voiding of very high or very full coloured urine, retraction or pain of the testicle, and vomiting; but there are cases, both of inflammation of the substance of the kidney and of Pyelitis, or inflammation of the pelvis and ureters, of which the first symptoms are nearly those stated, and which terminate in suppuration of the substance of the kidney, in thickening of the membrane, effusion of pus, and of flocculent lymph upon it, or even in ulceration. In one variety of this inflammation, the ureter is obstructed, whether by the effects of the inflammation itself, or by a calculus impacted in it, or by pressure of some neighbouring part; and the upper part of the ureter, the pelvis and cavities being distended with purulent or sero-purulent fluid, the substance of the kidney is wasted by absorption, and it acquires the appearance of a number of cysts filled with that fluid.

In such cases, the symptoms are sometimes not distinguished during life from those of peritoneal inflammation; but there are generally means of distinguishing them on careful examination, chiefly in the pain and tenderness being more limited, the urine being often for a time either bloody or albuminous, and the action of the bowels less affected. Such cases, when unconnected with any permanent cause, are no doubt often successfully treated by antiphlogistic remedies, without their exact nature ever being ascertained.

It is important to remember that inflammation and suppuration of the kidneys, as well as of the lining membrane of the ureters and bladder, occur not unfrequently, without pain, in cases of injury of the spine, and palsy of all the lower part of the body.

But the more frequent cases of inflammation of the Kidneys are of more chronic character, tend to different terminations, and are distinguished by less violent, though not less characteristic symptoms, and are found generally to affect both kidneys alike. It has been stated lately by Rayer that alkaline urine, without obvious disease of the bladder, depends frequently on chronic inflammation of the kidneys; and it is now well ascertained, by the elaborate investigations of Dr Bright, confirmed and extended by others, that when the urine is albuminous (coagulable both by heat and acids), and at the same time of low specific gravity, the kidneys are always diseased, usually in the form described as Granular Degeneration, affecting their cortical substance, which admits of considerable variety of appearance, and in many cases is originally the result of inflammation; bearing apparently to healthy inflammation of the kidneys the same relation as the cirrhosis of the liver, or the atheromatous or osseous deposits on the lining membrane of the heart and aorta, or tubercles in the lungs, do to healthy inflammations of these organs;—*i. e.* frequently excited by that process, but always implying a peculiar predisposition, inherent in the blood, and when that predisposition is strongest, requiring little or no inflammatory action to excite them.

In some cases, the disease of the Kidneys, known by these marks, is attended with febrile symptoms, pains of

the back and abdomen, vomiting, and either rapid sinking (making the whole progress of the symptoms very similar to Peritonitis) or delirium, spasms and stupor, depending obviously on the retention and circulation of Urea in the blood, and tending to death in the way of Coma. Some of these cases are, and others are not, attended with Anasarca, and very scanty urine. In such rapidly fatal cases, the morbid granulated appearance of the Kidneys is usually found to be associated with enlargement and softening of their substance; in some instances even the vascularity, enlargement, and softening of the Kidneys have been found without any granular deposits. Such cases often occur in convalescents from Scarlatina; the symptoms of them may occur alone, or they may be attended with symptoms of inflammation in other parts, chiefly the head or chest; and when early recognised, they are frequently seen to subside completely under the full use of antiphlogistic remedies, and the urine gradually regains its natural qualities.

But when cases of disease of the Kidneys, known by those qualities of the urine, are not seen at their commencement, or when they commence unattended by febrile or inflammatory symptoms, the anti-phlogistic treatment is ineffectual in correcting their characteristic indications, although it may often be advisable on account of their complications. The most important facts ascertained as to the subsequent progress of cases in which this morbid state of the Kidneys exists, are the following.

1. That when the urine, although albuminous and of low specific gravity, is in quantity greater than natural (so that the usual amount of solid matter may pass off from the kidneys in a given time), the general health may

be tolerably good for a considerable number of years; although there is a liability to very various disease, making a very cautious regimen necessary.

2. That many such persons are found to be simultaneously affected with other diseases, chiefly of the liver or of the heart, which are originally of the same character, and which, of course, increase their liability to disease.

3. That such persons are very liable, particularly on exposure to cold, to attacks of Dropsy.

4. That they are also peculiarly liable (with or without such dropsical attacks) to sudden inflammation, especially of the chest.

5. That they are liable to organic diseases of the brain.

6. That many of them are subject to sickness and vomiting, independently of liver disease, and especially to diarrhœa; those who are subject to the diarrhœa being perhaps the least liable to the dropsical affections.

7. That when the quantity of urine becomes less (as very generally happens in the progress of such cases), and its specific gravity and the quantity of solid matter and even of albumen in it diminish at the same time, we must expect, not only that these complications will become more frequent and intractable, but that they will be attended with more or less of the characteristic effects of the presence of Urea in the nervous system, particularly drowsiness, spasms, indistinct vision, &c. and ultimately delirium and fatal stupor.

The tendency to so many and various other diseases, in connection with this disease of the Kidneys, is obviously very much dependent on the great alteration which has been ascertained to take place in the constitution of the blood during it, viz. diminution of the quantity, first

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of its albumen, and afterwards, to a much greater extent, of its colouring matter,—implying a corresponding debilitating effect on all vital action.—(See Christison on Granular Degeneration of the Kidneys.)

In a few cases the morbid condition of the Urine, after having been established, and after the antiphlogistic remedies, to the extent which the symptoms seemed to justify, have failed of effect upon it, has diminished or disappeared under other remedies,—the diaphoretic regimen and medicines in some cases, the tonic regimen and medicines in others, the use of Iodine or the Hydriodates, and even the cautious use of Mercury; but it is always to be observed, that Mercury is very apt to act violently and injuriously on the mouth and on the bowels in those who have this disease, and most generally fails of any good effect upon it, particularly when, as often happens, there are marks of the scrofulous habit in the patient.

The Dropsy which is connected with this disease of the kidneys, if uncomplicated with other organic disease, often disappears under the use of laxatives and diuretics, among which the Bi-Tartrate of Potass and Digitalis have appeared peculiarly successful. If the attacks of Dropsy are preceded or attended by any indications of inflammation, particularly in the chest, the effect of such remedies is very generally decidedly aided by Bloodletting.

The other complications of this disease require remedies to be applied to themselves, always with the caution, that the constitution is one in which organic disease exists, affecting an organ which is known to be connected, although in a way still obscure, with the assimilation of aliments. In the advanced stages, palliative treatment

only is admissible; the diarrhœa ought not to be suddenly arrested, and the course of the symptoms, when it is checked, should be carefully watched, because it is likely that much of the Urea (which is circulating in the blood) may be discharged in this way, and because those who have much of this, accompanied by the renal disease, have seldom much of the Comatose tendency. Under the use of Blisters and Purgatives, this latter termination of the disease seems sometimes to be averted for a considerable time.

The Cystitis, or inflammation of the mucous membrane of the bladder, is seen sometimes in the acute form; more frequently in the chronic; and is known by pain in the situation of the bladder; sometimes very violent; frequent and painful passing of urine, with straining,—exactly similar in pathology to the tenesmus from inflamed Rectum,—and the discharge of ropy mucus with the urine, which in the more chronic, or more advanced cases, becomes purulent; and this last discharge is converted so readily into Ammonia, that the urine is often alkaline when discharged. With those in severe and acute cases, there is general fever—general abdominal pain,—vomiting, and sometimes tenesmus.

This disease is most commonly combined with others which fall under the care of the surgeon,—Calculus, enlarged Prostate, Gonorrhœa or Strictures, — but may occur, and may go to ulceration, generally of fungous character, and be attended with copious hæmaturia, especially on exertion, although unconnected with any of those diseases. When uncomplicated, or demanding remedies for itself, independently of the peculiar treatment of these diseases, it is benefited by the

antiphlogistic remedies generally, especially by repeatedly leeching the perinæum—by rest, and the antiphlogistic regimen—by diluent and mucilaginous drinks—by the warm bath,—more generally by the frequent and often long continued use of opiates,—especially the opiate enema, and in the quite chronic state (that called Catarrhus Vesicæ), by astringents, particularly the Uva Ursi,—the Diosma,—the Pareira,—preparations of Iron,—the Turpentines and Copaiba, even the Cantharides.

It occurs frequently as an effect of Paraplegia, and then, of course, cannot require the anodynes, but may be partially benefited by the astringents.

SECT. V.—*Of Inflammation of the Uterus.*

The acute form of this inflammation has seldom been distinctly recognised, excepting in combination with the symptoms of Peritonitis, supervening generally on suppression of the Lochia soon after delivery, when it demands no peculiarity of practice. It has been supposed, in such cases, that when the fever takes a more typhoid form than usual, the substance of the uterus has been inflamed; but it has been already stated, that in one form of the peritoneal inflammation, both after delivery and at other times, the attending fever is in several respects typhoid, independently of any such combination.

It is certain that in most of the cases of inflamed veins, and white swelling of the limb after delivery, the inflammation has begun in the veins of the uterus, and extended along some of them to the iliac veins, even

when there have been no urgent symptoms at the uterus itself.

The cases of inflammation of this organ, which are more generally recognised, are the sub-acute and chronic inflammations,—of which a certain degree probably exists in every case where there is sudden and painful suppression of the menses; and of which there are some varieties, and several distinct terminations, although often distinguished with difficulty, either from that form of Neuralgia, called Irritable Uterus, on the one hand, or from incipient Scirrhus, or other organic disease, on the other.

Inflammation of this character may occur on the external surface of the Uterus, and adjoining portions of peritonæum only, without extending over the other peritoneal surfaces, or causing the usual symptoms of Peritonitis; and from the frequency of adhesions at these parts found on dissection, in patients who had never been treated for inflammatory complaints, we may suspect that this is a more frequent occurrence than it has been thought. It may occur in the muscular substance of the uterus, and lead to permanent enlargement; and it may occur on the internal surface, and lead, either to frequent purulent discharge, particularly at the menstrual periods, or to ulceration, independent of any scirrhus or other morbid deposit, at the Os Uteri; or to effusion of layers of fibrin on this surface, which may be thrown off repeatedly, or may accumulate in the interior, and be thrown off in mass. All these lesions are pretty frequent results of chronic inflammation here; the cause of which is exceedingly various, and the sympathetic pains, dyspeptic and hysterical affections attending these, equally various. Such inflammations may always

be suspected when, with some irregularity of menstruation, and some degree of fever,—certainly independently of conception, there is much of the bearing down pain, extending along the thighs, and some appearance either of coagula of blood, or fibrin, or of purulent matter, in the discharges. In many cases the nature of the disease may be more satisfactorily ascertained by examination by the Vagina; and by local bleedings, especially at the Os Uteri itself, blistering on the Sacrum, and other antiphlogistic treatment, it may be effectually relieved. But after a time, even in those strictly inflammatory cases, evacuations become unavailing, and astringent and anodyne applications, and a more tonic plan of treatment, become advisable. And it is always to be remembered, that in the Irritable Uterus, or Hysteralgia, there may be much and long-continued tenderness at the Os Uteri, with much sympathetic affection of other parts, and much loss of muscular strength, which does not go on either to ulceration, or enlargement, or change of texture, and is not benefited at all by evacuations, nor even by long-continued rest, but chiefly by anodynes, and a gently tonic plan of treatment.

CHAPTER V.

OF INFLAMMATIONS OF THE NERVOUS SYSTEM, AND ORGANS OF SENSE.

SECT. I.—*Of Inflammation of the Brain.*

THE acute form of Phrenitis seldom exhibits the set of symptoms which are enumerated by Cullen and other systematic authors—the intense headache, flushing of face and eyes, high delirium, and frequent and full pulse. These symptoms are, in fact, more severe in the beginning of some of the strictly febrile diseases, where they are frequently succeeded by others of a very different character, and which do not indicate any inflammation in the brain.

That there should be great difficulty in practice, in fixing on symptoms which clearly indicate inflammation within the cranium, is easily understood, when we consider what is known to us from the Anatomy of the parts, both in the sound and diseased state, and from their Physiology, viz. that inflammation there may attack very different textures, and with very various degrees of intensity and rapidity; and that the injury done, in any way, to any part of the nervous matter superior to the medulla oblongata, has no definite or

uniform effect on any of the functions which we ascribe to the nervous matter. From these considerations, it is natural to expect that both the febrile symptoms and the indications of disordered function of the parts of the nervous system will be very various, and that we must judge, in regard to inflammation in this part, even more than in others, by attention to the combination and succession of various symptoms, not by trusting to pathognomonics.

In the best marked cases of active inflammation within the cranium,—such as bear evacuations best, and are most generally and decidedly benefited by them when used early, and carried to a due degree,—the first symptoms are fever, of various degree, with sharp, shooting pain of head, impatience of light and sound, sickness and vomiting, and great aggravation of the uneasy feelings on assuming the erect posture. The pulse is firm, often peculiarly sharp, but seldom very frequent, and in some cases, almost from the beginning, it is slower than natural.

If these symptoms are not quickly relieved by remedies, one or more of the following soon shew themselves, marking more distinctly, although variously, that the texture of the brain, and of the organs of sense and voluntary motion, has been somewhere injured; delirium, generally attacking in sudden fits; or instead of delirium, partial and temporary loss of recollection; spasm, likewise usually sudden and violent; dilatation of pupil, squinting, or blindness, more or less complete; paralysis, generally partial, sometimes temporary; and drowsiness or coma, sometimes general and profound, sometimes incomplete, or graduating into mere absence of

mind, and inattention to surrounding objects. These symptoms are attended by characteristic, but somewhat various changes in the pulse, most generally by slowness or irregularity, followed by extreme rapidity.

The sudden attack, and frequently complete and even repeated abatement, of the delirium, spasms, and coma, are important as often contrasting remarkably with the more uniform course of those symptoms in idiopathic fever.

But there are many cases, some equally acute, others much more chronic, in which the symptoms deviate considerably and variously from this more perfect type, and are, in the earlier stage, much less easily recognised. The principal varieties met with may be referred to the following heads :—

1. In some cases the fever is more marked, and the local symptoms less urgent, than usual; there is no violence of pain, nor vomiting, nor sharp nor irregular pulse, and for some days the case resembles mild continued fever, until some of the indications of more severe, and generally more *partial*, affection of the functions of the brain than are usual in fever, shew themselves.

2. In others, in the beginning, the headache is more permanent and urgent, and hardly any febrile symptoms exist.

3. In others the first symptom that excites any attention is a general convulsion.

4. In others temporary delirium, or blindness, or partial palsy, appears as one of the first symptoms; and we know from dissections that either may appear as a result of inflammation in its first stage.

5. In others, especially in children, the disease comes

on, sometimes rapidly, sometimes very gradually, as a sequela of others—of chest affections, such as hooping-cough, of fever, of the febrile exanthemata, and perhaps still more frequently of the Febris Infantum Remittens; which last complication is the more important, as the disease is then often preceded by less exhaustion, and the antiphlogistic remedies may be safely and beneficially applied to the abdominal as well as the head symptoms.

6. In others the disease obviously supervenes on more chronic affection of the bones of the head.

It is probably a general fact, that the fever, pain, delirium, and general excitement, are more active in the early stages of inflammation, affecting the membranes than the substance of the brain; but to this there are certainly exceptions.

The Diagnosis of cases of Inflammation of the Brain is often difficult, at least in the earliest and most remediable stages, but may generally be made out, partly by attention to the particulars above noticed as to this inflammation, and partly by observing the absence of the peculiar symptoms of other febrile diseases, with which it might be confounded. For example: The neuralgic and hysterical pains of head which occur in some constitutions, are sometimes distinguished from this, or from other inflammations, with much difficulty, and only by attention to the marks of those constitutional and non-febrile diseases, and sometimes only by trial of the effects of remedies; for it must not be supposed, that those who are affected with Hysteria or Neuralgia are not susceptible of this or other inflammations.

It may generally be observed, that the cases which

are most insidious in their progress, and recognised with the greatest difficulty, are those in which the antiphlogistic treatment is least effectual.

The Hydrocephalus of children, as described by many practical authors, shews all the variety of symptoms above stated, which are very frequently fatal within two or three weeks. On dissection, the most uniform appearance is effusion of serum (deprived in a great measure of albumen) into the ventricles of the brain; generally attended by unusual dryness of the membranes on the surface, for which a reason sometimes appears in closing of the opening into the fourth ventricle by lymph. From this appearance, taken alone, we should not be entitled to infer that the disease had been inflammatory; but as we find, in a large proportion of cases, which during life have presented the symptoms under consideration, the unequivocal marks of inflammation co-existing with this effusion into the ventricles, and sometimes existing without it; and as we find, also, that the chief symptoms in these undoubtedly inflammatory cases, are just the same as in those which present, on dissection, the effusion only; we can have no reasonable doubt that the effusion, when preceded by those symptoms, is to be regarded as an effect of a diseased action either truly inflammatory, or so nearly resembling inflammation as to demand the same practical consideration. Nor is there any difficulty in understanding, that inflammatory effusion should be fatal in its earliest stage, and therefore without other indications of inflammation in the dead body, when it occurs in an organ where pressure from rapidly effused fluid is a sufficient cause (as Physiology instructs us) for fatal coma;—just as it is a sufficient cause for death

by asphyxia when occurring in the cells of both lungs at once, or behind the membrane of the glottis. It is likewise easy to understand, that in other cases, effusion into the ventricles may take place much more slowly, in connection with other kinds of diseased action, and that then, in accordance with principles known in Physiology, it may go to a great length, either without causing pressure at all on the substance of the brain, or without causing such rapid pressure as may materially injure any of its functions. This seems especially to occur in old persons; and in them the symptoms found in connection with the effusion into the ventricles are much more various than in young subjects.

The distinctly inflammatory appearances which are found within the cranium in a very large proportion of cases, of which the symptoms have been such as above noticed, are the following:—

1. Effusion of lymph, or of "concrete pus," on the membranes, most generally, as might be expected from its greater vascularity, on the pia mater.

2. The Ramollissement rouge, or softening with red colour, of a portion of the cerebral substance.

3. The Ramollissement jaune, or softening with diffuse purulent infiltration of some portion. These softenings are often attended with effusion of blood into the affected portion, which effusion has no doubt sometimes been the cause, but in many cases, we have reason to think, has been the effect, of the partial disorganization.

4. The formation of a circumscribed abscess in some part of the cerebral matter.

5. Induration, with increased vascularity of some portion.

cranium, causing various affections of Sense, Intellect, and voluntary Power,—and likewise in various disorders of those functions, not necessarily connected with organic disease—*e. g.* epilepsy, chorea, delirium tremens, mania,—attacks of inflammation of the brain, most generally chronic or subacute, take place in connection, sometimes with the commencement, sometimes with repeated aggravation, of those diseases; and therefore that the antiphlogistic regimen and remedies may frequently be employed, in the course of those diseases, with good effect. But the use of strong antiphlogistic remedies must be limited to the times, occurring occasionally in these complaints, when the circulation is strong, and more or less of the symptoms either of local inflammation or inflammatory fever are present; and when these are not present, those remedies may be hurtful; and even the antiphlogistic diet and regimen, particularly in the cases of strictly mental disease, may become useless or injurious. The treatment ought then to be adapted to the existing state of the functions of the brain, not to any action, of the nature of inflammation, which can be supposed to have produced that state.

It is even well known that in some cases of functional disease of the brain and nervous system, or in the most advanced stage of those which have been in the first instance inflammatory,—and where a certain degree of organic lesion exists,—the stimulating remedies may be decidedly useful, at least as the best auxiliaries to the treatment adapted to the disordered condition of the nervous system. The delirium tremens affords many examples illustrating this principle. But there are many cases of chronic disease of the nervous system in which loss of blood is injurious, but where the careful and judi-

The remote causes of this disease are very much those of inflammations in general: the scrofulous diathesis being the most important predisposition: and it is important to remember the frequent effect, in exciting it, of injuries of the head, even such as have apparently given little uneasiness,—of suppressed evacuations (*e. g.* of the Menses in women, or of that from Porrigo in children),—and of previous irritation and inflammation, particularly in the abdomen.

The Prognosis is always to be regarded as doubtful, and in all the more complex and insidious cases, or in cases which are not recognised, or neglected, in the commencement, as very unfavourable.

Many well marked cases, however, particularly those in which the early symptoms are the most distinct and characteristic, subside completely under active depletion; particularly full and repeated bloodletting and purging. The bleeding should be both general and local; but the former is by far the most important; and it may be laid down as a general rule, to trust no case to the local bleeding only beyond the age of five years. There are some cases, particularly in adults, in which the inflammation lasts very long, or returns very frequently, and ultimately abates completely, under repeated local or even general bleeding, without stupor, delirium or spasms, ever supervening; while, in others, those results of the disease shew themselves within a very few days.

The purgatives are by far the most important auxiliary; of these the croton oil is often the most convenient; and it is important to remember the observation of Dr Abercrombie, that he has seen more recoveries from bad symptoms of affection in the head under full purging, than any other treatment; implying, not that

cranium, causing various affections of Sense, Intellect, and voluntary Power,—and likewise in various disorders of those functions, not necessarily connected with organic disease—*e. g.* epilepsy, chorea, delirium tremens, mania,—attacks of inflammation of the brain, most generally chronic or subacute, take place in connection, sometimes with the commencement, sometimes with repeated aggravation, of those diseases; and therefore that the antiphlogistic regimen and remedies may frequently be employed, in the course of those diseases, with good effect. But the use of strong antiphlogistic remedies must be limited to the times, occurring occasionally in these complaints, when the circulation is strong, and more or less of the symptoms either of local inflammation or inflammatory fever are present; and when these are not present, those remedies may be hurtful; and even the antiphlogistic diet and regimen, particularly in the cases of strictly mental disease, may become useless or injurious. The treatment ought then to be adapted to the existing state of the functions of the brain, not to any action, of the nature of inflammation, which can be supposed to have produced that state.

It is even well known that in some cases of functional disease of the brain and nervous system, or in the most advanced stage of those which have been in the first instance inflammatory,—and where a certain degree of organic lesion exists,—the stimulating remedies may be decidedly useful, at least as the best auxiliaries to the treatment adapted to the disordered condition of the nervous system. The delirium tremens affords many examples illustrating this principle. But there are many cases of chronic disease of the nervous system in which loss of blood is injurious, but where the careful and judi-

sometimes decidedly useful when the symptoms become somewhat chronic, the febrile symptoms having abated. In the earlier stages shaving and applying cold assiduously to the head, with warm fomentation of the feet and legs, are the better practice.

In some cases sedative medicines, as digitalis, colchicum, and tartar emetic, have been thought useful auxiliaries; but the vomiting in the early stages generally contra-indicates these, and little reliance should be placed on them.

Opiates should be very generally avoided, although there are cases, where pain of head continues after the febrile symptoms have abated, and where there is no tendency to coma, in which they have seemed beneficial.

The rigid antiphlogistic regimen is very generally proper both during and for some time after the disease; but there are cases in which, after full evacuations, and reduction of the febrile state, headaches, or a tendency to stupor, abate under cautious stimulation.

The most important case of this kind is that to which the term Hydrocephaloid disease has been applied,—occurring in children,—where a marked tendency to stupor, generally much vomiting, sometimes dilatation, sometimes contraction, of the pupil, co-exist with coldness of the surface and a rather feeble pulse, and are found, on inquiry, to have come on after weakening causes, and especially after diarrhœa of some standing. In this case, small and frequent doses of wine, brandy, and ammonia, with opiates if the diarrhœa continue, and sometimes blistering the head, have been often found effectual.

It may be judged, from what has been said above, that in many cases of various organic disease within the

cranium, causing various affections of Sense, Intellect, and voluntary Power,—and likewise in various disorders of those functions, not necessarily connected with organic disease—*e. g.* epilepsy, chorea, delirium tremens, mania,—attacks of inflammation of the brain, most generally chronic or subacute, take place in connection, sometimes with the commencement, sometimes with repeated aggravation, of those diseases; and therefore that the antiphlogistic regimen and remedies may frequently be employed, in the course of those diseases, with good effect. But the use of strong antiphlogistic remedies must be limited to the times, occurring occasionally in these complaints, when the circulation is strong, and more or less of the symptoms either of local inflammation or inflammatory fever are present; and when these are not present, those remedies may be hurtful; and even the antiphlogistic diet and regimen, particularly in the cases of strictly mental disease, may become useless or injurious. The treatment ought then to be adapted to the existing state of the functions of the brain, not to any action, of the nature of inflammation, which can be supposed to have produced that state.

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cious use of purgatives, combined or alternated with the tonic plan of treatment, is successful.

SECT. II.—*Of Inflammation of the Spinal Cord.*

This inflammation may be expected to shew itself by fever, pain, and injury of the functions of the cord, *i. e.* of Sensation and voluntary or instinctive Motion, or of those actions to which the name of Reflex or Sympathetic has been given; and this accordingly has been observed, but with very great variety, no doubt depending on the varying acuteness and extent of the inflammation, and on its being seated, in some cases, chiefly or solely in the membranes (spinal meningitis); in others in the nervous matter (myelitis.) These varieties are such, and the inflammation of these textures is so often combined, that it is to no purpose to treat of them separately; but it may be stated, that more of palsy may be expected in the latter case, and more of pain and spasm, especially tetanic spasm, in the former.

The disease often proceeds from injuries affecting the spine; in other respects nothing peculiar has been ascertained in regard to its remote causes, except that a peculiar tendency to it has appeared to be given by venereal excesses.

There are all possible varieties as to the rapidity of the attack, the degree of febrile action attending it, and the intensity of the pain. Indeed in cases of pure myelitis, going on to palsy, there may be no pain whatever.

The pain is often hardly complained of in the back, but referred rather to the extremities of the nerves issu-

ing from the affected part of the cord, therefore to the limbs, to the sides, or abdomen; and frequently it is complained of chiefly as encircling the body like a tight ligature.

It is often subject to remarkable remissions. The pain is very generally attended and characterized by more or less of spasm, often brought on by motion, and taking generally somewhat of the form of tetanic rigidity. There is also very often tenderness at the affected part of the spine, dependent apparently on affection of those of the nerves there arising, which come soonest to the surface of the body. In some cases, where the membranes only are concerned, these symptoms, attended by much febrile action, more or less resembling the Hydrocephalus, are followed by coma and death, without any partial palsy shewing itself, but more frequently, especially when the substance of the cord is affected, they are followed by palsy of sense or motion, or both, usually of the lower limbs, chiefly or solely, with which, however, spasmodic action, and often tetanic spasms of the palsied limbs, are generally associated.

In some even acute cases the palsy is preceded by very little either of pain or fever; and its accession takes place sometimes rapidly, sometimes very slowly and insidiously.

The actions of Respiration are often variously affected, and in urgent cases the loss of power in those of the respiratory muscles which are moved by the dorsal portion of the cord, and its continuance in those which are moved by the phrenic and cervical nerves, are striking and characteristic.

The bowels are generally moved with difficulty; and the act of voiding the urine, in some cases, is much and

somewhat variously affected, there being generally retention in the first instance, followed by involuntary dribbling, and the urine becoming, after a time, ammoniacal and loaded with purulent matter, from the secondary inflammation of the mucous membrane formerly noticed.

In the more acute cases, gangrene of some of the palsied parts undergoing pressure, often comes on very rapidly.

The heart's action and circulation are often peculiarly affected, as might be expected from what is known of the effect of injuries of the spinal cord upon them. There is often strong pulsation at the heart, without corresponding strength of pulse at the wrist, and where the febrile symptoms have become typhoid, with much exhausting perspiration. In the most rapidly fatal cases, there is early and unexpected failure of the heart's power; and probably it is chiefly in consequence of the impression made directly on the circulation that well marked cases of this inflammation are very generally fatal, although with very various rapidity.

There are many cases, however, in which we have reason to think that this inflammation has occurred partially, and in a more chronic form, which terminate favourably; and this has been especially observed of these cases in which the functions of the bladder are little affected.

It is by this inflammation in a chronic form, supervening on the disease of the vertebræ, that caries and protrusion of any part of the spine are so often followed by Paraplegia.

The morbid appearances found after this inflammation are either effusion of lymph or pus between the mem-

branes of the cord, or softening or hardening, generally with discoloration, of the cord itself, similar to what is seen in the brain; the softening being generally, although not exclusively, the result of the more acute inflammation. In many cases, when symptoms of affection of the brain have occurred, there is effusion into the ventricles, and even lesion of the brain itself; and in many the inflammatory effusions are mixed with tubercular deposits, or with other forms of organic disease.

The fatality of the disease, in its acute form, has no doubt depended partly on the difficulty of recognising it in its earliest stage; but, on the other hand, it may be urged that this difficulty, as in the case of Hydrocephalus, is probably chiefly felt in cases where the constitution is unsound, and the effect of remedies is slight. In well-marked cases, and in healthy constitutions, the effect of early repeated bloodletting, general and local, has often been very decided. In all cases full and repeated purging is proper, and in the more chronic cases, either repeated blistering, or the counter-irritation of issues,—sometimes even the slighter or more superficial irritation of the Tartar Emetic or Croton oil,—has often appeared beneficial, and along with this some have thought they derived benefit from the use of Mercury to affect the system. In scrofulous habits this last remedy must be used with much caution.

In the later stages, and in the more chronic cases, a relaxation of the antiphlogistic regimen, and cautious use of the tonic plan, as to air, exercise, and diet, become often undoubtedly serviceable.

The difficulty in recognising, and therefore treating this disease, depends very much on the frequency of the

state to which the name of Spinal Irritation has lately been given, in which many of the symptoms of this inflammation are very exactly imitated—particularly the pain and tenderness over the vertebræ, and the pains of the chest, abdomen, or sides—sometimes the spasms, and even the partial palsy,—all of which, however, coexisting with various indications of nervous irritability, with Hysteria and Neuralgia, are known to exist independently of inflammation, and in constitutions likely to be injured by much loss of blood.

This state of the system is almost peculiar to women, especially to those in whom the menstrual discharge is suppressed, irregular, or excessive; and may in general be distinguished by attention to the history of the case, the known constitution of the patient, and the accompaniments of the pain. But it is farther to be observed, that severe and recent cases of that affection seem often connected with a subacute inflammation, and are benefited by at least local bleeding and counter-irritation. And it is farther to be kept in mind, that in cases which for a long time presented only the indications of Neuralgia and Hysteria, unequivocal indications of lesion of the spinal cord (such as we have reason to think must have been preceded by some form of inflammation) have frequently presented themselves.

SECT. III.—*Of Ophthalmia, or Inflammation of the Eyes.*

It is now generally agreed, that the distinction drawn by Cullen of the varieties of this inflammation, as affecting especially the membranes or the eyelids, is insuffi-

cient for practical purposes; and that the following distinctions demand careful study.

I. According to the precise *seat* of the disease; the inflammation chiefly affecting the Tunica Conjunctiva may be distinguished by the irregular tortuous appearance of the vascularity, by the most vascular part being moveable under the finger, by the pain being felt superficially and chiefly on moving the eyelids, and the discharge soon becoming opaque, glutinous, or even puriform; in the most violent cases by the great swelling of the Conjunctiva called Chemosis. The inflammation of the Sclerotica is distinguished by the enlarged vessels being deeper seated, less tortuous, most of them running parallel, and in a radiating form, to form a zone at the edge of the cornea; the pain deeper seated and extending more to the temple, around the eye, and often over the side of the face and head; with a less opaque and less glutinous discharge. The inflammation of the Cornea is shewn by specks of opacity, sometimes irregularity of surface, and partial vascularity. That of the Iris by the zone of enlarged vessels formed around the edge of the cornea, and dipping inwards towards the Iris, and more decidedly by its change of colour, diminished mobility, and irregularity from lymph effused upon it, even at an early period. That of the Retina, or other internal parts, by pain and impatience of light, without visible inflammation.

II. Again, as to the important distinctions which depend on the *cause* of the inflammation; the most common form depending only on cold, especially however applied after the heat and strong light of summer have com-

menced, is the inflammation of the Conjunctiva, or of the Sclerotica, what have been called the Catarrhal or Rheumatic Ophthalmia, or the combination of the two, which threatens the sense of sight only inasmuch as it leads to opacity of the cornea, generally preceded by the appearance of pustules there. If this inflammation occurs in a scrofulous habit, we have the Strumous form of inflammation of the eye-ball, most common in children, often combined with that of the eye-lids, but which is distinguished by the impatience of light, greater in proportion to the other symptoms, and particularly to the vascularity, than in any other form, and by the frequency either of pustules, or of general inflammation, of the cornea.

Again, when the inflammation is most distinctly connected with Rheumatism, it usually affects one eye only, is more distinctly remitting (the exacerbations at night) and attended with less affection of the conjunctiva, and with more pain and tenderness of the temple and cheek than in other cases.

From the syphilitic poison more frequently than from any other cause, but sometimes from other causes (as the use of mercury), and sometimes idiopathically, we meet with the Iritis, attended generally with frequent paroxysms of acute pain, and tending to injure or destroy sight, partly by reason of the lymph thrown out on the iris, and often forming adhesions between it and the lens,—partly, in many cases, by the accompanying affection of the retina, producing one form of Amaurosis.

The most violent form of the disease is the Purulent Ophthalmia, proceeding generally either from the infection from an eye similarly affected, or from the poison of gonorrhœa, attended with much of the chemosis, and apt to go on, in a very few days, to sloughing and destruc-

tion of the cornea,—the same result as follows more slowly, but still more surely, from that inflammation of the conjunctiva which results from palsy of the 5th nerve.

All forms of the disease are much more chronic in some cases than others, and the repetition of the remedies must be regulated by what is observed as to their course in this respect.

They may all derive great benefit, in the early stage, from bloodletting, and in severe cases, especially where there is well marked constitutional fever;—from general bloodletting, and from repeated purging and the strict antiphlogistic regimen; but the purulent ophthalmia is that in which the general bleeding must be carried farthest, and repeated most frequently and at shortest intervals, to avert the sloughing of the cornea, as indeed is generally indicated by the violence of the pain and fever. In this form especially, the nauseating doses of tartar emetic are found a useful auxiliary in restraining the vascular action and inflammation.

In all the forms, during the greatest violence of the inflammation, warm soothing applications, decoction of poppies, warm water, cream, and unctuous applications to the eyelids, give the most relief. When the pain is slight or its violence over, the astringent or even gently stimulating applications become useful; the solutions of alum, of acetate of lead, of sulphate of zinc, and weak solution of bi-chloride of mercury, are to be used as washes, or a stronger solution of the nitrate of silver or the vinum opii dropt occasionally into the eye; and the ointments applied to the eyelids, should contain a little of the mercurial salts.

In the rheumatic form, diaphoretics, opiates at night,—as some think calomel with opium,—blisters behind the

sometimes decidedly useful when the symptoms become somewhat chronic, the febrile symptoms having abated. In the earlier stages shaving and applying cold assiduously to the head, with warm fomentation of the feet and legs, are the better practice.

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Opiates should be very generally avoided, although there are cases, where pain of head continues after the febrile symptoms have abated, and where there is no tendency to coma, in which they have seemed beneficial.

The rigid antiphlogistic regimen is very generally proper both during and for some time after the disease; but there are cases in which, after full evacuations, and reduction of the febrile state, headaches, or a tendency to stupor, abate under cautious stimulation.

The most important case of this kind is that to which the term Hydrocephaloid disease has been applied,—occurring in children,—where a marked tendency to stupor, generally much vomiting, sometimes dilatation, sometimes contraction, of the pupil, co-exist with coldness of the surface and a rather feeble pulse, and are found, on inquiry, to have come on after weakening causes, and especially after diarrhœa of some standing. In this case, small and frequent doses of wine, brandy, and ammonia, with opiates if the diarrhœa continue, and sometimes blistering the head, have been often found effectual.

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through the head, with febrile symptoms, it should be met, in children above the age of five, or adults, by general bloodletting, which must sometimes, in adults, be carried to a great length before the symptoms are relieved.

In the chronic state, warm fomentations, protection from cold, keeping the bowels open, and careful watching for more acute symptoms, are the chief means to be employed; and the most important practical rule is, to be very cautious about the use of astringent applications,—suppression of the discharge having often been followed by an extension of the inflammation of the dura mater and brain.

CHAPTER VI.

OF INFLAMMATIONS OF THE ORGANS OF LOCOMOTION AND SUPPORT.

We place the inflammations of the voluntary Muscles and appendages, and of the Bones, Ligaments, Synovial, and Fibrous members together, as occurring very frequently in connection with each other, and obviously distinct from those of the viscera hitherto considered.

Sect. I.—*Of the Rheumatism.*

The peculiar kind of Inflammation which was noticed under this title (p. 182), occurs in two well known forms (graduating into one another, by insensible degrees), the Acute and Chronic, and is very generally immediately excited by cold, particularly applied after heat, although there is no doubt some previous peculiarity in the constitution, which disposes certain individuals to be affected in this way; and the tendency of the disease to affect so many distinct parts indiscriminately in quick succession, and the recent observation of the existence of Lithic Acid in effusions from rheumatic as well as gouty inflammations, may lead us to suspect that this peculiarity consists in the constitution of the blood.*

* See M'Leod on Rheumatism.

The Acute form of Rheumatism occurs chiefly in young persons, often in vigorous and plethoric habits, and is often attended with much fever, and very intense pain, aggravated by heat, especially at nights, and by any attempt at motion. Its violence may be much mitigated by treatment; but the duration of a well marked case is seldom less than six weeks, often, particularly in winter, it is protracted considerably longer; or if it abate sooner, a relapse is extremely probable. It usually affects some of the larger joints, in quick succession, and likewise muscular parts; and a distinction may be drawn, in many cases, as it affects the one or the other chiefly, between the Articular and the Muscular Rheumatism. In the joints it leads at first always to fluid effusion, sometimes mixed with lymph, (probably never, in truly rheumatic cases, with pus), on the synovial membrane, which, however, seldom becomes so great, in the course of the rheumatic fever, as when inflammation attacks single joints, and is fixed there for a long time. In cases of some duration, thickening of the synovial membranes and ligaments, and sometimes enlargements of the ends of the bones, are to be expected. Similar changes take place in the fasciæ and sheaths of the muscles from rheumatic inflammation; and when that is of long standing, it causes permanent weakness, and more or less of atrophy of the muscular fibres, but it seems rarely to lead to softening of the muscular fibres, and probably never, when uncomplicated, to suppuration in any part of the body.

There are many cases of the disease, to which the term Sub-Acute is properly applied, attended with some degree of fever, and often slight swelling, and with severe pain, aggravated at nights, but without the high

fever, intense pain, or frequent successive affection of different parts, of the acute disease. In several of these, the affection is limited for a considerable time to individual parts. This is seen often in one knee or one shoulder; in one side, causing the Pleurodyne; in the loins, causing Lumbago; in the hip-joint, causing Sciatica; in the temple, or side of the head, causing Hemicrania. In the two last cases, the nerves of the part may be often judged to be the chief seat of the pain, and the disease graduates into Neuralgia.

In women, more frequently than in men, the Acute or Sub-Acute Rheumatism, lasting longer than usual, leads often to permanent enlargement and distortion of the ends of the bones, causing Nodosity of the Joints, chiefly seen in the smaller joints (where it has been often called Rheumatic Gout), but sometimes also in the larger.

The strictly Chronic Rheumatism occurs in all the same parts as the Acute, and is distinguished by the absence of fever, and generally by swelling (the muscular parts being often much wasted), by the pain being aggravated by cold, and relieved by heat, and attended with much stiffness, and often coldness of the affected parts, and by its long and indefinite duration.

The Sub-Acute and Chronic forms of the disease are remarkably aggravated or renewed by cold, especially when combined with moisture, and may always be expected to abate greatly during the summer weather of this climate.

The disease, although often producing much suffering, and weakening the habit of body, is hardly ever attended with danger, excepting in the case, unfortunately not uncommon, of metastasis or extension of the in-

flammation to the heart, most commonly to the Pericardium, but frequently to the internal lining membrane, where it produces the symptoms and consequences of Pericarditis and Endocarditis, already stated. This is more frequently seen in the rheumatism of young than of older persons, and especially in those who have a peculiar liability to the disease, in whom it is probably most frequent in the second or third attack of the acute disease. The case of complete recession of the inflammation on the extremities, and sudden affection of the heart, is more immediately dangerous than that where the heart is affected more gradually and insidiously, in the course of transition of the disease from one part to another, without leaving the extremities.

The Acute Rheumatism cannot, probably, be much shortened in its duration by antiphlogistic remedies, and if it were so shortened in external parts, we have good reason to think that the risk of affection of the heart would be greatly increased. For although the translation to the heart has been observed to take place under all modes of treatment of the disease, yet it has been seen to follow large bleeding, and immediately consequent recession of the inflammation on the extremities, often enough and quickly enough to justify much apprehension of such a result, when the quantity of blood taken is so great as to produce a marked and immediate effect on the heart's actions. The general bleeding in the beginning of the disease should therefore only be employed, as Cullen advised, to the extent of taking off or diminishing the phlogistic diathesis; where there is a rather feeble pulse it may often be dispensed with; and local bleedings are of little use in the strictly acute form, unless the inflammation be fixed much longer than usual in a particular

joint. In most cases, however, one or two bleedings in the beginning, give much relief to the feelings, and obviously assist the effect of other remedies. Regular evacuation of the bowels is essentially necessary, and in some cases the full effect of purgatives seems distinctly beneficial, but frequently this only causes inconvenience.

In the view of further mitigating the violence of the disease, and probably often preventing its passing into an obstinate chronic form, the most important remedies are,—

1. The Antimonial Solution, given in the manner stated under the head of Pneumonia.

2. The Colchicum in powder, or in various solutions, in doses which cause slight nausea, repeated every four or six hours.

3. The Sudorifics, particularly Dover's Powder, with the sudorific regimen, so managed as to cause pretty copious sweating for thirty-six hours or longer. The saline diaphoretics are usually given at the same time with these medicines, and probably somewhat assist their operation.

It seems to be owing to peculiarity of constitution, that each of these remedies appears to be more distinctly effectual in some cases than in others; but none of these should be carried so far as to cause much weakness, as may be apprehended from the nauseating effect of antimony, or the purgative effect of colchicum, or the depressing effect of profuse sweating.

Along with the measures stated, the regular use of opiates, particularly of the preparations of Morphia, at night or oftener, is certainly advisable, and some relief is given by the opiate fomentations or frictions.

No reliance whatever can be placed on the specific

power of Mercury over this inflammation; and the full effect of mercury on the system during the disease may in many persons be injurious.

When the disease is in the subacute form, and limited to single parts, or remains in single parts after subsiding elsewhere, local bleedings and blisters have often singular efficacy in relieving it. The Sciatica, however, is the form of the disease over which these remedies have generally the least power.

"When the exacerbations of the disease are manifestly periodical, with considerable remissions interposed," Bark or the Sulphate of Quinine, in frequent doses in the intervals, is certainly very useful; but its peculiar utility seems to be confined (as long ago stated by Cullen) to cases of this kind.

In this, however, as in other inflammations, after the general fever has abated, but while some of the local symptoms continue, a relaxation of the antiphlogistic regimen, and the use of bitters and acids, particularly if there be, as often happens, much sweating, becomes useful, and in these circumstances the Quinine has often a good effect on the general health.

In the Chronic Rheumatism a great variety of medicines have been used, each of which has apparently a certain degree of power; but many cases resist all remedies, and either continue more or less for life, or abate spontaneously, particularly during fine weather, when no remedies are employed. Those most generally useful are,

1. The Sudorifics, used repeatedly, but not too long continued at one time.

2. The frequent use of the warm-bath, warm affusions, and the vapour-bath; likewise the sulphur vapour-bath.

These, however, must be discontinued if it be found, after a time, that there is much sweating without relief to the pains. The natural warm springs appear frequently more effectual than the use of water artificially heated, probably because admitting and inviting the use of a more truly tonic regimen along with them.

3. Constant warm clothing, the use of flannel and Chamois leather.

4. Frictions, with various stimulating and anodyne Embrocations, which promote the circulation in the affected limbs.

5. Different kinds of Counter-Irritation, repeated blistering in cases which take the subacute form; and in those where the pain is fixed long in one part, as in Sciatica, a more permanent drain by an issue, or the moxa; in some such cases approaching to neuralgia, also the Acupuncture has been distinctly useful, and in others the Galvanic stream.

6. The Vegetable diaphoretics, Sarsaparilla, Guaiac, &c.

7. Various medicines called Alteratives, because the mode of their action is uncertain. Thus Arsenic, in small doses, taken for a considerable time, has seemed useful to some, and the Hydriodate of Potass to a greater number, especially when the periosteum has been affected.

8. When the strength is tolerably entire, tepid or even cold bathing, during good weather, is often more useful than warm, no doubt because it is more effectual in stimulating and maintaining a vigorous circulation on the surface, and relieving internal parts.

9. Opiates must be given, sometimes in full quantity, when the pains are urgent, but may often be dispensed with when the pains are least felt at night; and neither

these nor any other remedy should be urged when it shall appear to injure the stomach and general health.

10. In the perfectly chronic state, and in a constitution originally good, much exercise, even such as causes much sweating and temporary increase of pain, is sometimes followed by decided remission of the symptoms.

SECT. II.—*Of the Gout.*

The very peculiar form of inflammation to which this name is given attacks only a certain portion of mankind, men much more than women, seldom before middle life, most frequently those who have a hereditary tendency to it; and almost exclusively those who have lived fully, taken little exercise, and much fermented liquors. Its attacks are therefore probably much connected with fulness of blood; but that there must be some peculiarity in the chemical constitution of the blood in this disease, appears most clearly, not only from the peculiarity of the deposition from the inflamed parts formerly noticed, but from the fact, that those who drink only distilled spirits, although living in other respects as similarly as possible, and although becoming plethoric, are affected in a proportion very much less than those who drink fermented liquors. On the other hand, those who drink fermented liquors to excess, as the London coalheavers, although in other respects, particularly as regards exercise, in circumstances generally favourable to avoiding the disease, are frequently affected by it. But we cannot doubt that the elaboration of the peculiar matter which we believe to exist in the blood in this disease, is dependent, not merely on the nature of the ingesta, but on the vital actions to which they are subjected.

In those predisposed by fulness of blood, by original constitution, and by the mode of life above stated, the disease is most generally immediately preceded by feelings of weakness and anorexia, sickness, acidity, pain or flatulence at stomach,—often traced either to errors in diet or venereal excesses. It seems to be often brought on by sprains or injuries, comparatively seldom by cold.

The first attack of the inflammation is very generally after the first sleep, when the other effects of fulness of blood are also chiefly observed, and the part first affected is generally at the very extremity of the circulation. When running its natural course, the inflammation usually continues some days, with morning remissions, at this part, and affects others before finally subsiding. The next attacks are at long intervals; but the disease is very apt to become habitual, and then to recur at shorter intervals, and from slighter causes,—to attack a variety of parts and especially larger joints,—often to leave concretions or chalk-stones, which lead to troublesome ulcers, and abate less completely,—and to become complicated with more permanent dyspepsia, and with various other complaints. It is very generally observed, in the paroxysms of the disease, that the urine is more loaded both with urea and the lithates than is usual; and it is known that a large proportion of those who are subject to Gravel are likewise Gouty; yet it is equally certain that many cases of each disease are quite unconnected with the other.

Two peculiarities have particularly been observed in such persons. 1. That sudden recession of the gouty inflammation in the extremities has often been quickly followed by violent pain at stomach, with sinking of the circulation, constituting the Retrocedent Gout. 2. That

sudden and violent internal inflammatory attacks, chiefly in the chest (sometimes complicated with Spasm), have often been observed in such persons, and found to alternate with the Gout in the extremities. Such cases have the name of Podagra aberrans, or misplaced Gout.

The knowledge of these facts has naturally led to a general unwillingness to interfere with the progress of the disease, farther than by the antiphlogistic regimen, and the mildest antiphlogistic remedies, at the time of the paroxysm; and to the use of various medicines during the intervals, to diminish the tendency to the disease.

Experience has however shewn, that although full bleeding and purging in the paroxysms of gout are attended with risk, yet by moderate evacuations, and especially by repeated doses of Colchicum, with antacids (or of different empirical medicines, the effects of which seem similar to those of Colchicum), many fits of the disease may be very much mitigated and shortened, without injury to the constitution, if the treatment during the intervals is judicious. The chief practical caution as to these medicines is, that if carried too far they cause excessive sickness, purging, and faintness, demanding stimulants and opiates.

But experience has also shewn, that neither by remedies used during the paroxysms, nor by any means,—such as various bitters and aromatics used during the intervals, and said to have this effect,—is it desirable to stop the fits of Gout and prevent their recurrence, while the same mode of life which led to their formation is continued; various internal diseases, chiefly of the chest or head, having then frequently taken their place.

But while the paroxysms are mitigated in the manner above stated, if at the same time a regimen is adopted, which gradually diminishes the tendency to the disease,

the health of persons beginning to be thus affected may often be satisfactorily restored.

Such a regimen must consist essentially of a diet chiefly vegetable, which shall not favour fulness of blood nor offend or oppress the stomach, with great moderation,—in some persons total abstinence,—as to strong liquors, and much habitual exercise, and other parts of the general tonic plan. Along with these, antacids, laxatives, and bitters, taken habitually for a great length of time, appear decidedly useful in warding off attacks of Gout; but whether they are so merely by preventing disorder at stomach, and consequent occasional weakness, or more directly by correcting the process of assimilation and modifying the nature of the blood, is still doubtful.

When the symptoms either of the retrocedent or misplaced Gout shew themselves, they must be treated as in persons not gouty, but with peculiar care and attention, on account of the sudden attacks both of inflammatory and of spasmodic or (more correctly) neuralgic complaints to which such persons are liable.

SECT. III.—*Of Inflammations of the Periosteum, Bones, and Joints.*

Cases of acute and healthy inflammation of these parts seldom occur, unless when caused by injuries,—with the exception of inflammations of the Synovial membrane of joints, or of Bursæ Mucosæ in the neighbourhood of joints, which not unfrequently occur from cold, or from slight mechanical injury, with only slight rheumatic affection of other parts. These are in ge-

neral easily distinguished by pain and swelling attacking simultaneously, and by the rapid distention of the joint by a fluid, which becomes obvious on careful inspection from the form and feeling of the swelling, and may in general be effectually relieved by absolute rest, repeated local bleedings (which must sometimes be carried to a great length), fomentations, and subsequently blisters,—often leaving behind them, however, thickening of the Synovial membrane and stiffness of the joints, admitting of subsequent relief from warm affusions and stimulating frictions.

It is probably almost exclusively in the case of inflammation of a vein, and secondary affection of the joints, that effusion of pus on the entire Synovial membrane ever takes place; but when that inflammation is neglected, or lasts longer than usual, especially if the constitution is scrofulous, exudations on the membrane ultimately pouring out pus, and ulceration of the cartilages, to be mentioned immediately, are to be apprehended.

Acute inflammation of the Periosteum occurs occasionally, particularly in young persons, probably oftener in scrofulous than sound constitutions; generally in combination either with symptoms resembling Rheumatism, or with Erythematic inflammation of the skin; which make its recognition in the early stage difficult; but it may be suspected from the seat and violence of the pain, and acute febrile symptoms. If not checked by early antiphlogistic treatment, the probability is, that it will lead to effusion of pus, often extensive, between the Periosteum and bone, and to consequent death and exfoliation, or in some instances, complete disorganization and softening, of the bone; with which abscesses

of the neighbouring soft parts are usually combined. If the swelling and tenderness along the bone can be distinctly perceived, and the general symptoms are so acute as to lead us to expect these consequences, and if the antiphlogistic treatment shall not be commenced early enough, or carried far enough, to arrest those terminations, the farther progress of the disease may sometimes be effectually arrested by incisions down to the bone, giving exit to purulent matter there effused, and limiting the extent of exfoliation; of this we have an example in the most severe form of Paronychia.

We see the Periostitis much more frequently in a sub-acute or chronic form, causing painful nodes usually on the cranium, on the sternum, or long bones of the extremities, most frequently in persons who have had Syphilis, or been affected with mercury, or both; but occasionally in persons who have suffered from neither of these causes. These are attended with very severe pains, chiefly in the night, and frequently go on, especially in scrofulous constitutions, to partial caries, and, when affecting the cranium, sometimes to inflammation of the dura mater,—effusion of pus there,—and abscesses in the neighbouring portions of brain; but they often abate completely under repeated local bleeding, blisters, opiates, and the persevering use either of the Sarsaparilla, or Hydriodate of Potass.

It is also certain, that in some of these persons, mercury given so as to affect the system, has been followed by rapid improvement of the disease; and when it is unusually rapid in its progress, particularly on the cranium, it is therefore often right to use this remedy, after such evacuations, as the febrile symptoms may seem to demand; but with these cautions,—*first*, that there are

some persons in whom no such beneficial effects are seen from it, and in whom perseverance in its use may be injurious in different ways; and, *secondly*, that even in those in whom it has seemed decidedly beneficial, the disease has often been observed to return, or appear at another part, very soon after it has been used; or other symptoms, partly referable to the effect of the mercury, especially various forms of scrofulous disease, have shewn themselves. It may be stated, therefore, that this remedy should only be used when we are sure of adherence to very cautious regimen, both during and after its use; and that we can generally rely on the permanence of any improvement that may be effected without the use of mercury, and especially by such remedies as Sarsaparilla and Hydriodate of Potass, under which the appetite very often improves, more than on such as is effected by its aid.

When the tendency to this chronic inflammation of the Periosteum and Bones is obstinate, a course of warm bathing,—free exposure to the open air in mild and dry weather, and such a tonic regimen as is adopted at the different natural hot springs and watering-places, become often very useful.

There are cases of Chronic Rheumatism and Periostitis, in persons previously healthy, in which the extremities of the bones become gradually enlarged and distorted, causing permanent lameness or immobility, in some instances even anchylosis, by very gradual perversion of nutrition of the Bones and Cartilages, and in which the body is gradually reduced to a state of hopeless debility and emaciation.

But the case of chronic disease of these textures themselves, commencing, or occasionally combined,

with inflammation, which most frequently occurs in practice, is the scrofulous affection, admitting of some variety in its course, but commencing generally by inflammation of chronic character, going on to ulceration of the cartilages, and to effusion of tubercular matter, and then to caries in the bones, of which the Morbus Coxarius, and the Morbus Dorsalis, are characteristic examples, both occurring chiefly in children and young persons of scrofulous parents and habit.

It would appear that when the articular cartilages are affected with this inflammation, and about to ulcerate, there is more pain than from disease commencing in the osseous matter. The pain is felt chiefly in the night, and for some time before any swelling or change of form shews itself; and is distinctly aggravated by pressing the ends of the bones against one another. The Morbus Coxarius is almost always easily known by this mark, and by the change afterwards gradually supervening on the form of the hip-joint—the nates becoming flatter and broader than on the other side—the limb being at first apparently longer than the other, in consequence of the pelvis becoming oblique by the patient instinctively resting on the sound limb,—and afterwards becoming truly shorter, by the absorption of part of the head of the bone, and often likewise by the diminished nutrition consequent on the limb being long kept at rest.

When scrofulous inflammation and tubercular deposition take place originally in the cancelli at the extremities of the long bones (*e. g.* at the knee or elbow-joint), there is comparatively little pain, until the form of the joint or bone has undergone much change, chiefly by enlargement of those extremities; but by this change of form, confined at first to the bones, such cases may in

general be distinguished from those swellings, likewise without pain, but of softer consistence, and altering entirely the form of the joint, in which the disease seems to depend essentially on a perversion of nutrition, without previous inflammation, of the synovial membrane or capsular ligament, and to which the name White Swelling is most properly restricted.

The Morbus Dorsalis is easily distinguished, soon after its commencement, by the protrusion of the spinous processes of those vertebræ of which the bodies have become softened by the scrofulous inflammation, which is always attended by deposition of soft lymph, or of tubercular matter, and by absorption of the earthy matter; and goes on ultimately to much destruction, by ulcerative absorption of the bodies of the vertebræ, and union by anchylosis of several of the bodies, thus greatly reduced in size.

These inflammations and scrofulous actions in bones and cartilages are always sooner or later attended by chronic inflammation, going to suppuration, of the adjoining soft parts; but in some cases these suppurations take place more rapidly and extensively, or at a greater distance from the affected bone, than in others, as in the most severe cases of Lumbar Abscess, connected with disease of the vertebræ.

All these affections, if remedies early used are ineffectual in checking them, must be expected to become attended with wasting and exhausting hectic fever. The Morbus Dorsalis is likewise very often attended with Paraplegia, depending not simply on the pressure of the diseased bone on the spinal cord, but generally on extension of inflammation, and consequent softening of the nervous matter.

The affection of the bones in Rickets is likewise to be regarded as a scrofulous affection; but it is a perversion of nutrition, unconnected with inflammation, general over the body, and easily distinguished from the partial and painful affection of the bones in the Morbus Dorsalis.

The lateral curve of the Spine is likewise easily distinguished from the Morbus Dorsalis, and found to depend on weakness and imperfect nutrition of the parts, but to be unconnected with inflammation, and often likewise unconnected with scrofulous disease.

For the local, scrofulous, and often inflammatory affections of bones and cartilages above mentioned, local bleedings in the commencement are sometimes useful, but the state of the constitution, and known slow progress of the disease to be expected, generally make it desirable to avoid much loss of blood; and the most important remedies for them are the Counter-Irritants, especially Issues or Setons, which give a full discharge. During their use, the diet should be nourishing, and such parts of the Tonic Regimen as are admissible without exercise, and in a feeble habit, particularly fresh air and moderate mental excitement, are very important; but rest of the part affected, and, when it is the spine, the recumbent posture, are necessary for a great length of time. In the advanced stage, however, the constitution suffers from confinement, and it becomes often advisable, after the counter-irritation has taken some effect on the disease, to adopt some such mode of exercise as may give least irritation to the affected part, even at the risk of some aggravation of the local symptoms. And it is by taking off the pressure of the body in the erect posture, from the affected vertebræ, and throwing it on the lower vertebræ which are sound, that

mechanical supports enable patients in the Morbus Dorsalis to take exercise without the aggravation which would otherwise result from it, and are chiefly useful.

The scrofulous diseases of the bones, and inflammation of neighbouring parts, often last long, and go to partial caries in the elbow and forearm, and admit of gradual and nearly spontaneous cure, when the strength of the constitution is well maintained; but the hectic fever attending such disease in the lower extremities, hip-joint, or spine, is often fatal. In those cases where amputation of a limb is resolved on as the best chance of preventing that termination, it is most important to keep in mind the fact stated as to deposits of purulent matter taking place in internal parts soon after an extensive suppurating surface has been removed; and the risk of this is probably diminished by such treatment of the stump as secures a free discharge from its surface for a considerable time.

CHAPTER VII.

OF INFLAMMATIONS OF THE INTEGUMENTS.

RESERVING for future consideration the true Exanthemata, or strictly eruptive Fevers (among which we include Erysipelas), and omitting those inflammations of the skin, which result immediately from injury, burn, or frostbite,—we have still a greater variety of diseased states of the integuments, originating in inflammatory action, than we believe to exist in any internal part. The classification of these by Willan, founded on the kind of effect which the inflammation produces in each, is generally allowed to be, so far as the distinction of the inflamed appearances in the skin is concerned, the most scientific; and the chief distinctions which he has drawn may be generally recognised, when the diseases are seen from their commencement and follow their usual course; but these distinctions are more numerous than can be generally and accurately observed; and much of the most important practice in these complaints is regulated by the state of the symptoms in other respects,—the kind and degree of fever or inflammation, the state of the stomach, &c.,—more than by the distinctive marks of the eruptions.

The most important distinctions among the inflamma-

tions, acute and chronic, to which the skin is subject, are the following.

1. An inflammation of the character called Erythematic (p. 178) not only occurs in connection with a peculiar fever, in the cases properly called Erysipelas, when the febrile symptoms are established before an inflammation shews itself; but is often excited by the usual causes of inflammation, acting on particular constitutions, and especially on certain parts of the body, as the skin of the face and scalp; and in such cases fever appears generally only as an effect of the inflammation which has been excited.

Such Erythematic inflammation extends rapidly over a considerable part of the skin, causing often vesications on the surface; and likewise extends inwards in many cases, so as to affect the cellular substance, and lead either to a diffuse purulent infiltration of this texture, or to the formation of tolerably distinct abscesses bounded by lymph; or in a few cases of slower progress, to great effusion of more solid lymph, which does not tend to suppuration, and is slowly and imperfectly reabsorbed, producing permanent enlargement of the limb. The observations of Dr Duncan and others have shewn that a Diffuse Inflammation of the subcutaneous, sometimes extending to the intermuscular cellular membrane, tending to purulent effusion, without limitation by coagulable lymph, occurs frequently, and at times epidemically, in connection with Erythematic inflammation, but often extends farther than the disease on the skin, and sometimes takes place without any cutaneous affection; that this diffuse inflammation frequently proceeds from a morbific poison, such as that introduced by a wound in dissection, or that which is

generated in the suppuration succeeding Erythematic inflammation itself; but that in some cases it seems to result from the usual causes of inflammation; that when it proceeds from a poisoned wound, it sometimes spreads gradually up the veins or lymphatics of the part, but often, and in the worst cases, affects the cellular membrane in a distant part (*e. g.* the axilla) without spreading along the surface towards it; that inflammation of the lymphatic glands is not observed in many of those most unfavourable cases; and that the fever attending such inflammation is exceedingly various, both in kind and intensity, often typhoid, and demands therefore much difference in the general treatment of different individual cases.

Some cases of cutaneous inflammation, attended with more or less of symptomatic fever, are more circumscribed in their extent, never affect the sub-cutaneous membrane, nor go to vesication, but run a pretty uniform course on the skin of many days' duration, changing colour remarkably to livid or rust colour before they subside;—such are the Erythema papulatum and nodosum, the latter of which is chiefly seen in women in connection with deficient menstruation.

The simple rose-coloured rash on the skin, generally combined with other cutaneous diseases, to which the name of Roseola is given, and the itchy eruption of inflamed spots, with whitish elevations on them, called Urticaria,—which occurs both in the acute and chronic form, the former almost always from some poisonous article of diet, and usually abates and recurs repeatedly,—are also examples of inflammation occurring on the skin, sometimes attended with much fever, but with so little of the characteristic effusions, as almost to

afford exceptions to the general principle stated, of such effusions being essential to inflammation. The same may be stated as to what are strictly called *papular* eruptions or pimples, which very seldom contain a fluid, and terminate only in scurf—such as the Strophulus of young children, and the Lichen and Prurigo of adults. In all these, however, a little inflammatory effusion shews itself in the scurf that succeeds the affection.

2. There are many cases of Inflammation of the Skin and sub-cutaneous cellular membrane, which have the character of Phlegmon, because going regularly to suppuration; but of these also there is much variety. Abscesses, acute and chronic, form immediately beneath the skin, in various parts,—often without obvious cause, —sometimes apparently from stimulation of the body, as by violent exercise. In certain constitutions, generally weak and irritable habits, the form of phlegmonous inflammation, called Carbuncle, takes place, distinguished by its slow progress, by the cellular substance beneath the inflamed part of the skin, being much hardened, and forming always a number of minute cells, into which the pus exudes, and by this diseased part of the cellular membrane uniformly sloughing, and requiring therefore incision, not merely puncture, for the thorough evacuation of the matter.

Another form of inflammation of the skin, tending more certainly and rapidly to Gangrene, and almost uniformly fatal, but otherwise resembling the Carbuncle, is that which results from the poison of Glanders, in any way applied to the human body, and which is attended with a deposition of peculiar Tubercles, in various external parts of the body; similar to those in which the disease originates in the horse.

When the suppurating portions of the skin are more

numerous and smaller, we have the affections, to which the names Ecthyma and Impetigo are applied, according as the pustules formed are more circular and acuminated, or flat and irregular, or we may have the contagious diseases, Scabies or Porrigo, the course of all which is exceedingly irregular, and generally protracted.

Some of those often chronic affections of the skin, to which the name of Tubercles is given by Willan, especially the Acne and the Sycosis, are also examples of pustular inflammation, with partial suppuration.

3. Again, there are many well marked cases of idiopathic inflammation of the skin, which go to vesication or effusion of serum only beneath the cuticle, not to suppuration; of these the best marked examples are, the Herpes, as in the case of the H. Zoster, or shingles, occurring chiefly in young persons, consisting of many small vesicles, set on a single inflamed base, running its course in a week or ten days,—and the Eczema, occurring chiefly in persons advanced in life, and of feeble general health, where the vesicles are much more minute, and the progress of the disease much longer, and more indefinite.

The large vesicles of Pemphigus, and the broad flat patches of Rupia, afterwards going to ulceration, or to the formation of large conical scabs, are other instances of vesicular cutaneous inflammations.

4. A still more distinctly marked variety of the cutaneous inflammation, is the Lepra or Psoriasis, and here the peculiarity consists in the exudation on the surface being always dry and scaly. This kind of inflammation occurs in a certain habit of body only, which is sometimes hereditary, but which is often attended with good health in other respects; and it is excited at va-

rious periods of life, perhaps especially during youth, by various causes,—especially cold, or irritation and disorder of the stomach,—and often occurs without obvious cause,—abates spontaneously after very various periods, but is very apt to recur. The state called Ichthyosis, usually likewise a hereditary affection, is that in which the most completely scaly condition of the skin exists, but as a constitutional perversion of nutrition, at no time inflammatory.

It is farther to be observed, that the Syphilitic poison, varying continually in its action, either according to varieties of its own nature, or to peculiarities of constitution of the persons affected, or to both, excites several kinds of inflammation on the skin, generally resembling the Lepra, the Ecthyma, Impetigo or Rupia, and frequently going along with the syphilitic inflammation and ulceration of the throat, occasionally also with that of the Iris; and again, that in certain, although rare constitutions, Mercury acts as a cause of a more uniform cutaneous inflammation, of the nature of that to which the name of Eczema is applied, and which is often extremely obstinate.

All the forms of Chronic inflammation of the skin are of common occurrence, and very often cause long-continued sufferings; and in a few cases, of unusual extent or intensity, or when occurring in feeble constitutions, they may excite fatal constitutional irritation, with typhoid fever.

There are other distinctly marked cutaneous affections, which are quite chronic, and merely to be regarded as perversions of nutrition; but in regard to all the cases now enumerated, it may be affirmed, that they begin by inflammation, sometimes of such intensity, as

to be naturally associated with Fever; and that in their earliest stage, their progress may often be favourably influenced by the antiphlogistic regimen, in all its parts, and more or less of the antiphlogistic treatment.

In the strictly Erythematic Inflammation of the skin, and in the Diffuse Inflammation of Dr Duncan, associated or allied with it, early general bloodletting is certainly in many cases a very powerful remedy, nearly assisting or manifestly mitigating the inflammation. But there are many cases of these affections, chiefly those which result from specific poisons, in which the febrile symptoms from the first are typhoid, and the general treatment ought to be such as will be afterwards stated as proper in typhoid fever. As to the use of local bloodletting, there has been much difference of opinion. The free detraction of blood by punctures has often been followed by speedy reduction of the inflammation; but in some cases it has seemed unavailing, and in most cases there is no such danger from the intensity of the local inflammation, as to demand a severe remedy. The incisions are often useful in a more advanced stage of great pain and tension, when suppuration is approaching, or has begun,—but they are by no means to be relied on as preventing suppuration from proceeding; and much loss of blood in that stage may be immediately dangerous, if the symptoms are typhoid; and may greatly retard the convalescence in all cases.

Several of the strictly cutaneous diseases, particularly such as are known to have a long and indefinite course, the Lepra, the Eczema, the Impetigo, and the Syphilitic affections, when attended by more than usual of inflammation or fever, are likewise much benefited by general bloodletting; and most of them, by repeated

purging, particularly, as is generally thought, by some of the saline purgatives, combined with sulphur, small doses of antimony, or other diaphoretics.

In the case of those strictly cutaneous diseases, of this class, which are known to have a regular and pretty uniform course, such as the Erythema, or the Herpes, these means, with the mildest cooling, or slightly astringent applications externally, are the only practice required; the main use of external applications being apparently only exclusion of the air. The other expedients generally found useful in strictly cutaneous inflammations, when becoming more chronic, or repeatedly recurring, and following no definite course, are the following:—

1. Warm bathing, or frequent fomentation with hot water, especially when there are hard scales or scabs, with a dry rough state of the skin.

2. Various Diaphoretics,—Antimonials chiefly in those cases where there is some fever and firmness of pulse, more generally the vegetable diaphoretics, such as Sarsaparilla.

3. Various medicines, adapted to correcting disorder at stomach, especially Antacids and mild laxatives at first; and after a time, when the appetite and digestion are deficient, and the febrile state or inflammation have abated, bitter infusions, with mineral acids, or small doses of the preparations of steel.

4. Different medicines, which may be called Alteratives or Specifics; because the good effect which they seem to exert on the diseased actions on the skin, is not explained by any sensible effect they produce. Of these the most unequivocally effectual is Sulphur in Scabies: the next in efficacy is Mercury in Syphilitic

eruptions; of which, however, it is to be observed, that its effect seems remarkably various in different constitutions, and that when there is evidence of scrofulous affection, its efficacy is most doubtful, and the chance of its subsequently injuring the patient, especially if he is not well guarded against cold, is the greatest. Small and frequent doses of mercurial preparations seem also useful in several of these cutaneous diseases, especially the Impetigo; but their efficacy is not so decided as in the Syphilitic cases. The most useful of the other medicines, which may be called Alteratives, in these diseases, are the Sarsaparilla,—the Dulcamara,—the preparations of Iodine and of Arsenic,—the last especially, perhaps, in those attended with much itching,—the Psoriasis and Prurigo.

5. Different external applications, of which it may be said, in general, that, in the earliest stages, and in general, when the local symptoms are most inflammatory, the unctuous applications, merely excluding air, mild Liniments, oiled silk, or the soothing narcotic applications, made with Opium, Belladonna, or Dulcamara, —are the most advisable;—when there is less heat or pain, but more complaint of itching, some of the more stimulating saline or metallic preparations, especially the Chlorides, the mercurial preparations, or ointments containing Pitch, Sulphur, or Zinc, have a better effect; and when there is chronic ulceration, applications containing more distinctly astringent and stimulating substances,—preparations of Zinc—of Mercury—of Nitrate of Silver or Sulphate of Copper,—are found the most useful. As a general rule, in the chronic inflammations confined to the skin, although going to suppuration, poultices (unless occasionally and

for a short time) are not advisable; their ultimate effects being generally to extend and prolong the inflammation.

There is another state of the system, known by the appearances which it produces on the skin, which may be noticed here, especially as it is an occasional attendant of all kinds of inflammatory disease, — viz., the Hæmorrhagic Diathesis, known by the appearance of spots of Purpura; *i. e.* circumscribed, nearly circular, purple spots, changing colour gradually; in some cases approaching to black, on different parts of the skin. This kind of eruption is often attended with large or irregular spontaneous Ecchymoses or effusions of blood beneath the cuticle, or with such effusions produced by slight injuries,—also with bleeding at the gums, occasionally with bloody vomiting and diarrhœa, and, as is known by dissection, with effusions of blood on various internal viscera. In cases of this kind, blood drawn from the veins is usually found to coagulate very imperfectly, and uncontrollable hæmorrhage may follow from a slight wound.

This state shews itself in some cases without any inflammatory or febrile symptoms; but in many cases it appears, on careful examination, to be complicated with the symptoms of inflammation of some part, external or internal; and we have even sometimes reason to suspect, that the condition of the blood, thus denoted, is formed only during the continuance of the inflammation. A similar complication occurs occasionally in all the strictly febrile and exanthematous diseases, and may be easily distinguished, on careful examination, from the peculiar eruption of any of them. The causes are quite

unknown; and in particular, notwithstanding its close resemblance to the symptoms of Scurvy, it is certain that it often occurs in persons previously healthy and well fed.

The occurrence of these symptoms in combination with those of any inflammatory disease, necessarily increases the danger of it, or adds a risk of death occurring in a manner different from the usual course of the disease; *e. g.* by apoplexy, or effusion of blood on the mucous membrane of the intestines, or even into the thorax; but it has not appeared by experience, that this danger is nearly so great as that which attends the complication of the hæmorrhagic diathesis with the strictly febrile diseases, particularly the Smallpox. And experience has farther shewn, that when the symptoms of internal inflammation are well marked, they may be met by the usual Evacuations, Bloodletting and Purging (practised, of course, with the caution which the state of the circulation in other respects often demands in such cases), although the hæmorrhagic diathesis be present; and the peculiar condition of the blood has often been observed to improve at the same time that the other symptoms were relieved by these evacuations.

Various medicines have been employed, in the hope of directly diminishing or arresting the morbid condition of the blood, or the effusions from it in those cases, —particularly the metallic astringents,—the preparations of Lead, Zinc, and Copper,—the earthy and vegetable astringents; *e. g.* decoction of oak-bark and alum; the mineral acids; different preparations of Chlorine, and various neutral salts; perhaps the Sulphuric Acid and Sulphate of Soda have been as well

recommended as any others:—many cases are seen gradually to improve under such treatment; and the use of such medicines ought certainly not to be omitted; but from what we witness in other cases, and especially in the strictly febrile diseases, where this complication exists, we cannot place much reliance on the efficacy of any of those means.

PART II.

DIVISION II.

OF FEVERS PROPERLY SO CALLED.

CHAPTER I.

OF IDIOPATHIC FEVER.

THE combination and succession of symptoms, which we regard as characteristic of Fever, or febrile action, have been already described; and it has also been stated, that these symptoms, even as occurring in connexion with, and apparently in consequence of, inflammation, are liable to considerable variety, and particularly to two varieties, already designated as *inflammatory* and *typhoid;* of which the latter has this important peculiarity, that it may very generally be ascribed to the influence of some other cause affecting the constitution, besides the inflammation itself. We have now to treat of Fever (almost always more or less of this last character), as it frequently occurs, either without marks of local inflammation, or with so slight or so variable marks of that kind, that we judge it proper to consider it as quite independent of inflammation.

It is true, that there are eminent pathologists who

doubt of the existence of such Idiopathic Fever; believing all febrile action to be dependent on local irritation and inflammation; but we set aside that doctrine in the mean time, simply on the ground, that physicians have generally described fevers, of the kind now in question, as distinguishable by their symptoms and history, independently of all theory, from any of the certain and acknowledged effects of inflammation; and this being so, it is right to treat of the diseased states thus distinguished, in the first instance, separately; and afterwards to consider the *Theory* which would resolve the one into the other. And although the term Idiopathic Fever may appear too theoretical to be used in the first instance, yet it is hardly possible to substitute another; and if it be understood that it is at first used to designate peculiarities of symptoms, independently of all theory, it can hardly tend to mislead.

We set aside also, without hesitation, the objection that has been urged against the doctrine of Idiopathic Fever, that the term expresses only an abstraction, and therefore a nonentity; because what we mean to express by the term is not an *abstract* existence, as distinguished from individual *facts*, but a *general* change, or succession of changes, common to all the organs, and to almost all the textures of the body, as distinguished from all *partial* changes, and their effects.

There is a great and important distinction, both as to causes and symptoms, between the Intermitting and Remitting and the Continued Fevers; but there are so many points of similarity in their whole Pathology, and in some cases they graduate so imperceptibly into one another, that we shall save repetition by treating them together.

SECT. I.—*Of the Diagnostic Symptoms and Varieties of Idiopathic Fever.*

The peculiarities by which Idiopathic Fevers, according to this acceptation of the term, seem to be best distinguished, are the following.

I. There is the *negative* fact, that in many of the cases to which this name is given, the general febrile symptoms,—the chilliness and lassitude, the subsequent reaction, and often long-continued acceleration of pulse and heat of skin, the thirst, anorexia, various uneasy sensations, and derangement of all the functions of the body (whether functions of the vascular or nervous system),—are unattended during great part or the whole of their progress by any such local symptoms,—such fixed and permanent local uneasy feeling,—or such peculiar change of the sensible qualities—derangement of the functions of any one part of the body, as justifies the belief that any individual organ is inflamed. And if these observations be thought ambiguous, on account of the occasional occurrence of cases of latent inflammation, formerly mentioned, the absence of local inflammation, in many such cases, is farther attested by the fact, to be afterwards stated, that they sometimes terminate fatally, without any satisfactory evidence appearing, on dissection, of inflammation of any part of the body; and very generally with so slight appearances of that kind, as are inadequate to the explanation of the fatal event.

II. Besides this negative observation, which applies

only to a part of the cases thus named, there is the *positive* observation, applicable probably to all cases of idiopathic fever, although much more obvious in regard to some than others, that the *typhoid* symptoms, formerly shortly described (and which may always be held to imply the action on the system of some cause distinct from mere local inflammation), are distinctly to be perceived. These typhoid symptoms shew themselves in one or other, but generally in several, of the following ways.

1. In the state of the Circulation, the pulse having very generally, from the commencement, or early in the disease, less strength or resistance to compression than in the fever which usually accompanies simple and decided inflammation, at the same period after the attack.

2. In the state of the Secretions, which are more deranged, and generally more diminished, than in inflammatory fever; as is sufficiently obvious in the fur on the tongue, and the secretions of the mouth, becoming viscid, dry, and dark-coloured; in the more complete failure of appetite; and generally, after a short time, in the greater dryness of the surface of the body, attended in most cases by a more pungent, though less enduring, heat of the surface.

3. In the state of the Nervous System, the greater tendency to stupor or confusion of thought, generally to be detected even in the commencement, and very obvious in most cases throughout most of the disease, often shewing itself unequivocally in the later stages by the involuntary voiding of the excretions which are naturally under the restraint of the will; the greater weakness, vertigo, and faintness on attempting exertion, in the early part of the disease, attended generally with much

tenderness of surface and general soreness; the frequent tremors and subsultus tendinum, even when no exertion is made; the greater derangement of the external senses, particularly of that of Hearing; the greater tendency to delirium, as the disease advances, and the usually peculiar character of that delirium, which extends to all the trains of thought in the mind, is unattended with propensity to violence, and is more or less blended with, or graduates into, stupor, and hence is generally designated by the epithets low, muttering.

4. In the state of the Blood, which is probably always so far altered in its vital properties, in idiopathic fever, as to coagulate less firmly than usual, and in some cases loses the power of coagulation altogether; in connexion with which state we frequently observe more or less of the symptoms formerly called those of putrescency in fever, petechiæ or vibices, passive hæmorrhages, and gangrene from slight irritation.

5. These symptoms, and especially the indications of nervous affection, and of putrescent tendency, are very generally sufficient to distinguish idiopathic from any form of inflammatory fever; but in many cases there is a farther positive distinction in the appearance of peculiar or *specific inflammations of the skin*, subsequent to the attack of the fever, which take different forms,—essentially characterizing the fevers that are designated as eruptive or exanthematous,—often appearing also in the simple continued fever,—but never forming any part of the constitutional symptoms that result from local inflammation exclusively.

III. A most important part of the history of what we call idiopathic fever, distinguishing it from the acknow-

ledged effects of inflammation, is its much greater tendency to a *spontaneous favourable termination*. This is shewn in different ways. In many cases the febrile symptoms return at regular intervals of 24, 48, or 72 hours; and subside completely after a cold and hot fit of some hours' duration, by a spontaneous sweating,—constituting the *Intermitting* form of fever. In others there are equally distinct, but less perfect and less regular remissions of the symptoms, and the term applied is *Remittent* fever. And in the remaining or *Continued* form of Idiopathic Fever, although we can observe only slight and partial abatement of the symptoms at different hours of the day, we very often observe complete recovery from the most urgent and distressing symptoms, taking place spontaneously at various periods of the disease,—sometimes, in the fever of this country, as early as the 7th or even the 5th day; sometimes not until the 30th, or even 40th day, most generally between the 10th and 20th; sometimes very rapidly, and with evacuations (whether at regular or irregular times) evidently resembling the sweating stage of intermittents; sometimes gradually, and without any such critical evacuations; but under very various treatment,—often without the use of remedies,—and always with less assistance from remedies, and with much less risk of subsequent organic disease, than where recovery takes place from an equally disordered state of the system, consequent on decided internal inflammation.

IV. There is this farther leading peculiarity in the cases of febrile disease, to which we give the name of Idiopathic Fevers, that they are often absent for a length of time, even from large communities, and again

at other times, or in other districts, are extremely prevalent; and therefore evidently do not proceed merely from causes which are of general operation, as the exciting causes of inflammation are, but must necessarily result from causes of more local and temporary agency; and accordingly, we have good evidence, that all these idiopathic fevers either originate from a Malaria, or propagate themselves in part at least, and in certain circumstances, by Contagion.

By attention to these particulars in the history of many febrile disorders, even independently of attention to the results of practice, we are authorized to conclude, that they may be distinguished from the effects of simple inflammation, and belong to the class which we call, for the present, Idiopathic Fevers; and that the *onus probandi* rests with those who would attempt to assimilate them to, or resolve them into, the acknowledged effects of inflammation.

But these Idiopathic Fevers are liable to very considerable varieties; and, setting aside for the present the Eruptive Fevers, we may enumerate two distinct heads of these varieties; in the first of which the distinctions lie in the essential symptoms of the febrile action itself; in the second, in the indications of local and general inflammatory disease, which attend it frequently, although not uniformly, and therefore not necessarily.

I. 1. There is a form of fever, of rare occurrence, but of great pathological importance, which has been lately described under the title of *Congestive;* and although that term expresses what is probably a concomitant, rather than the cause of the peculiarity of the symptoms, yet it is perhaps better to endeavour to fix its meaning, than to substitute another.

In this variety of fever, the symptoms of the earliest, or cold stage, assume their highest degree of intensity; and feebleness of pulse, coldness of surface, muscular debility, and depression of all the functions of the nervous system, approaching, and sometimes amounting, to complete coma, are the leading symptoms. Spasms attend some cases of this kind, and vomiting attends others. Such cases occur now and then in epidemics of common continued fever, but are more frequent in the most malignant epidemic diseases, Plague, Yellow Fever, Cynanche maligna; and many cases of Epidemic Cholera are closely analogous to them. In all these cases, if this first and very dangerous effect of the remote cause of the disease is recovered from, it is usually succeeded by a distinct, but generally feeble, febrile reaction.

2. What is called the *Inflammatory* form of Idiopathic Fever, is the most widely different from the congestive form. In this case, the depression in the first or cold stage is the least, and the febrile reaction is the strongest, the pulse full, firm, and frequent, the skin hot and retentive of its increased temperature; the thirst intense, the urine generally high coloured, the face often flushed, and the febrile pains of head and other parts intense; the senses often preternaturally acute, and the delirium, if present, attended with increased rapidity of thought, and sometimes with violence.

In all cases of idiopathic fever, these symptoms, sooner or later, undergo a change, and pass into the typhoid form more or less completely; but the cases in which the symptoms now mentioned are the best marked, and last longest, and where the subsequent typhoid stage is the least obvious, have the general name of Inflammatory Fever.

3. On the other hand, the name of *Typhoid* Fever is given to those cases in which, after the febrile reaction has been established, the typhoid symptoms already enumerated,*—in the state of the circulation, of the secretions, of the nervous system, and of the blood, are earliest observed, and are most urgent.

The term Malignant, as applied to fevers, may be said to include the rare congestive, and the frequent typhoid fever; as applied to epidemics, to denote those in which cases of these two descriptions are the most frequent.

Under the general name of Typhoid Fevers, we may describe three subordinate varieties, which it is in some cases easy and important to distinguish; but which in most instances are blended together, or graduate into one another.

a. When the most obvious and urgent of the typhoid symptoms are those of mere debility of the vital actions,—soft compressible pulse, dry foul tongue and lips, deficient or easily depressed heat of the surface, and extreme muscular debility, shewn in the voice and attitude as well as in the muscular movements,—the name of "Fievre Adynamique" is given by recent French authors, and the term Low Fever is the most appropriate in our language.

b. When the most obvious and urgent of the typhoid symptoms are those indicating derangement of the functions of the Nervous System,—pervigilium, restlessness, tremors or spasms, deafness, contracted pupil, and other affections of the external senses, delirium, especially of the more active kind, and this afterwards subsiding into stupor—the case has been styled "Fievre Ataxique" by

* See p. 392.

the French, and is generally called Nervous or Brain Fever in this country. This form of fever is most remarkably seen in persons in whom the nervous system has been previously and habitually excited, either by voluntary muscular or mental exertion, or strong and lasting emotion,—or by the inordinate use of stimuli, such as alcohol.

c. When the most obvious of the typhoid symptoms are those denoting a dissolved state of the blood, petechiæ, passive hæmorrhages, gangrene from slight irritations, &c. the case has still among many the name of Putrid Fever.

All these varieties may be observed in cases where neither the symptoms before death, nor the appearances after death, give any clear indication of inflammation in any individual organ; and may be said therefore to be different forms of *Simple Fever.*

II. The more complex and most generally dangerous forms of fever, are those where the symptoms, especially of the typhoid fever, are combined, either from the first or during their progress, with such symptoms as indicate, with more or less certainty, local Inflammatory Action in some part of the body; and these are most simply divided into Fevers with affection of the head, chest, or abdomen.

It may be stated generally, that inflammations of certain organs in the body are very apt to combine themselves with general fever; but that the course of these inflammations is evidently modified; the fixed pains attending them are generally less acute; their other symptoms often become protracted, and remain nearly stationary for a longer time than in other cases; and they

tend, as will afterwards appear, to terminations which are in some respects peculiar. The *modifying* effect of fever on local inflammation, is seen where fever attacks a person in whom any cutaneous inflammation and effusion are going on; the appearance of which is usually much altered, and the discharge often suppressed during the febrile state.

1. It is obvious that many of the symptoms of affection of the brain which occur in fever, are the same as attend cases of unequivocal inflammation of the *Brain*, *e. g.* the headache, often violent; the impatience of light and sound; frequent nausea and vomiting; the indications of determination of blood to the head; the delirium, of various character, spasms of various muscles; and ultimately Coma. Such symptoms are perhaps chiefly seen in the fevers of the hottest weather of this climate, and in those of warmer climates. It is also certain, as will be stated afterwards, that unequivocal effects of inflammation have been occasionally found on dissection, after fatal fevers; that more or less effusion of serum within the cranium, which was described as the first effect of inflammation there, is common in such cases; and that the remedies for inflammation, early and prudently applied, have often appeared to relieve very considerably the symptoms of affection of the Nervous System occurring in fever; and therefore, although we shall afterwards see reason to believe that the affection of the brain in fever is by no means simply inflammatory, but partly dependent on another cause, yet we may consider it as ascertained, that a degree of inflammation within the cranium (generally best designated by the title of Subacute), does often accompany idiopathic fever; and is to be apprehended when the symptoms above men-

tioned are urgent, and when there appears to be danger of death strictly in the way of coma, rather than by reason of the circulation being enfeebled.

2. There are many cases of fever, especially in winter and spring, in which an inflammatory affection of the organs of *Respiration*, marked by cough, hurried or laborious, and sometimes stridulous breathing, and more or less of pain of chest, either accompanies the disease from the commencement, or supervenes during its progress; and in a number of these, it is obvious that death takes place, or is strongly threatened, by Asphyxia, from the embarrassed state of the respiration, rather than by Asthenia, from the weakened state of the circulation.

This affection of the chest, besides being attended with more or less of the typhoid symptoms, formerly mentioned, which make no part of the symptoms in ordinary cases of idiopathic bronchitis or pneumonia, has a course considerably different from those diseases. It is often of long duration, is apparently less under the influence of active remedies; and although it may be moderated or restrained, is seldom observed to subside completely, until the period of spontaneous abatement of the fever, which, in such cases, is often long protracted. The cough and dyspnœa are generally much more urgent symptoms in this combination of pectoral affection with fever, than the pain of chest; and the symptoms observed by auscultation and percussion, and the appearances on dissection, clearly indicate that the mucous membrane of the bronchiæ, and parts of the substance of the lungs, are very liable to inflammation, of a somewhat peculiar character, in the course of fever, but that inflammation of the serous membranes within the chest is very rare.

3. The affections of the abdominal viscera, frequently attending idiopathic fever, are somewhat various. An attack of jaundice, at least of yellowness of the skin, in the course of the disease, is frequent and very dangerous in the fevers of hot climates, and occurs occasionally in this. It is often attended with pain and tenderness in the situation of the liver, and such affection of the breathing, such nausea and vomiting, as usually attend inflammation of the liver; but in some cases, it is unattended with such symptoms. In some cases, it is unattended with the usual indications of jaundice in the stools and urine; and in general, it has appeared, on dissection, unconnected with any visible obstruction of the gall-ducts.

In other cases of fever, without jaundice, there is so much pain and tenderness in the situation of the stomach, and nausea and vomiting, increased by all ingesta, as to justify the belief of inflammation (generally subacute) in the stomach itself. These affections, both of the liver and stomach, in fever, if not early checked, are frequently followed by sudden increase of the symptoms of affection of the brain, and by rapidly advancing coma.

But the most common abdominal affection in fever, in this climate, is that in which the intestines are chiefly concerned, which comes on at different times, but chiefly, and with most danger, in the later stages; and this is marked sometimes by severe pain and tenderness, but in general chiefly by diarrhœa, seldom violent, but often obstinate; it is attended with occasional griping (often aggravated by ingesta), sometimes with scanty mucous and bloody stools and tenesmus, as in dysentery, but more frequently without such symptoms. It is often accompanied with gradually increasing tympanitic distention, and often occasions long protraction of the

typhoid febrile symptoms, in the course of which great emaciation, extreme debility, and often a peculiar dryness of the skin, are observed; and in a few cases it is followed, either by sudden exhausting hæmorrhage, or by a sudden attack of acute pain and tenderness of abdomen, with vomiting and rapid sinking.

It is well ascertained that such abdominal symptoms in fever depend very generally on inflammation of the mucous membrane, and especially of the mucous glands of the intestines; that this inflammation tends rapidly to ulceration; and that the attacks of sudden hæmorrhage or of acute pain and tenderness in the advanced stages of such cases, usually depend on erosion of blood-vessels, or perforation of the whole coats, and escape of the contents of the intestines into the cavity of the abdomen, in the course of that ulceration; but that inflammation commencing in, or confined to, the peritoneum, is equally rare in fever, as that of the serous membranes within the chest.

Besides these inflammatory appearances in internal parts, often found after fatal fevers, there are many cases of external inflammation going on to ulceration, and often to gangrene, which attend the later stages of fevers. These may often be ascribed to accidental irritation, such as pressure, or the dribbling of urine. They sometimes occur, especially in the extremities, without any assignable cause; but from the time and mode of their occurrence, are always regarded as effects or accompaniments of the fever.

The different local affections now described frequently succeed each other, or are combined, in the course of fever, in the same patient; and observation of the symp-

toms of the later stage of most fatal fevers, at least in this climate, sufficiently indicates that the danger most generally results from a *combination of one or more of these local affections* with the typhoid form of the fever, and especially with the enfeebled state of the circulation.

Whenever the symptoms of any local inflammation have combined themselves with those of general fever, it is to be apprehended that the fever will be much protracted; and in fact, it is frequently by the protraction of the case, rather than by the intensity of any local symptoms, that we are led to suspect the local diseases, of which the evidence may afterwards appear on dissection. There are also great varieties, not only in different individual cases, but in different epidemics, as to the average duration of the disease, and as to the intensity of the inflammatory, or the typhoid symptoms, the frequency of eruptions, or the indications of a diseased state of the blood,—which cannot be ascribed to the influence of any external causes, and must be held to denote varieties in the nature and virulence of the remote cause of the disease.

But although we consider it of real importance to mark these distinctions, both in the essential symptoms of Fever itself, and also in the concomitant local affections which distinguish individual cases, and sometimes epidemics, from each other, yet it appears equally certain, —from consideration of the nature of these distinctions, of the manner in which the varieties, thus marked, graduate into one another, or are blended together in the same cases, and by the many varieties which present themselves in the same epidemic, and in immediate connexion with each other,—that all the continued fe-

vers of this climate must be regarded as fundamentally the same disease.

The Intermitting and Remitting Fevers have obviously, from what was already said of their characteristic symptoms, as well as from their remote causes, peculiar characters, and may be regarded as varieties of a disease different from Continued Fever, although so closely allied to it, as to be properly included in the same genus. In the warmer climates, and especially in the lower grounds in these climates, the external cause of this disease acts with the greatest virulence; and in these, it is doubtful whether the continued fever of this climate really exists. But it is certain that the remittent fevers there, in their highest degree of intensity, have nearly the continued form; and they are then attended with great danger, and shew the following peculiarities:—1. That their whole progress is much more rapid than that of fevers in this climate; 2. That the symptoms denoting inflammation or an approach to inflammation of the brain are often more urgent, in the first instance, than here; and 3. That the symptoms of inflammation, or a state nearly resembling inflammation, of the liver and stomach, with or without the occurrence of jaundice, are more urgent, and much oftener appear concerned in the fatal event.

In different cases, and in different epidemics, of the fevers of hot climates, there is a variety as to these concomitant local symptoms; but it appears clearly that there is also a variety, in different seasons and situations in these climates, as to the intensity or malignity of the proper febrile symptoms; the depression of the vital

power in the circulating system, and the symptoms of dissolved state of the blood, shewing themselves much earlier, more extensively, and more intensely in some seasons than in others. When this is the case, the remissions are the least obvious, and it is on such occasions that a doubt still exists, whether the remittent fever does not acquire that most important property of the continued, the power of spreading by contagion.

In the colder climates, where fever from Malaria takes the intermitting form, they are distinguished from each other by the length of the intervals intervening between the attacks of rigors, which in the quotidians is about 24 hours, in the tertians 48, and in the quartans 72, often kept very exactly. Of these the quartans are generally seen only in cases of some standing, often complicated with organic disease, and are usually the most intractable. The intensity of the cold fit bears no regular proportion to the violence of the rest of the paroxysm, being greatest in the quartans, where the febrile reaction is generally the least. Under the treatment usually adopted, the disease is seldom in itself dangerous, although its complications and sequelæ, —chiefly chronic affections of the abdominal viscera,— often are. It is often found, however, exceedingly intractable, or apt to recur, as long as a patient lives in a country where the malaria exists.

It may be stated, in concluding this account of the symptoms and varieties of Fever, that after the febrile action has subsided, and the patient begun to become convalescent, he is left in a state of weakness and perhaps irritability, in which he is peculiarly liable to inflammatory attacks; the symptoms of which are often obscure, or nearly latent, and very easily confounded with those

of the preceding fever, insomuch that it is often difficult to judge, whether death is to be ascribed to fever, or to some of these its immediate consequences.

Scrofulous affections are likewise very apt to be excited by their usual causes, after the cessation of idiopathic fever; and various other organic diseases often take their origin at that time. In the case of intermitting fevers, and especially of those which are of long duration, and in which the cold stage is long and violent, enlargements of the liver and spleen are peculiarly apt to take place towards the close of the disease, or after its decline.

SECT. II.—*Of the Appearances on Dissection after Idiopathic Fevers.*

The first fact to be borne in mind in this part of the subject is the occasional entire absence, after fatal fever, of any appearances, which can be strictly called morbid; *i. e.* of any which are not frequently observed, in cases either of sudden and violent death, or of death from causes allowed to be unconnected, either with general febrile action, or with any symptoms of disease of the parts, where they are found. It may be allowed that this is a rare case; but it is not on that account the less pathologically important, and it is admitted by the most accurate morbid anatomists as an unequivocal result of their inquiries.

Next, it is to be observed, that the morbid appearances, found after fatal fevers, are often observed to be remarkably various, even in cases, the leading symptoms of which are nearly the same; and that they are

far from bearing any fixed proportion to the intensity of the symptoms of affection of the parts where they are found.

This may be ascribed in a great measure to the enfeebled state of the circulation at the time when these local affections take place, rendering them, as has been already stated, frequently *latent.*

In regard to the nature of the morbid appearances which are found after death by fever, it is to be observed, that they are almost uniformly indications of inflammation; but this inflammation is distinguished by two peculiarities, *first*, that it is seated very generally in certain textures only; and, *secondly*, that its effects are apparently more limited than in other cases, and in particular the effusions of coagulable lymph and of pus are found to a very small extent, in comparison with what is seen in idiopathic inflammation of the same parts. Indeed there are so many fatal cases of fever, attended with evident local affections, and shewing on dissection marks of local inflammation, in which no effusion of lymph or pus appears on dissection, that it may be suspected, in the comparatively few cases where considerable effusions of these kinds have been described, that they had resulted from simple inflammation immediately succeeding (as often happens) to the fever, rather than that they had taken place during the fever itself.

I. Within the cranium, the morbid appearances found after death from fever, are in by far the greater number of cases, confined to increase of the natural serous exhalation on the different surfaces, particularly in the ven-

of the preceding fever, insomuch that it is often difficult to judge, whether death is to be ascribed to fever, or to some of these its immediate consequences.

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II. The more complex and most generally dangerous forms of fever, are those where the symptoms, especially of the typhoid fever, are combined, either from the first or during their progress, with such symptoms as indicate, with more or less certainty, local Inflammatory Action in some part of the body; and these are most simply divided into Fevers with affection of the head, chest, or abdomen.

It may be stated generally, that inflammations of certain organs in the body are very apt to combine themselves with general fever; but that the course of these inflammations is evidently modified; the fixed pains attending them are generally less acute; their other symptoms often become protracted, and remain nearly stationary for a longer time than in other cases; and they

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1. It is obvious that many of the symptoms of affection of the brain which occur in fever, are the same as attend cases of unequivocal inflammation of the *Brain*, *e. g.* the headache, often violent; the impatience of light and sound; frequent nausea and vomiting; the indications of determination of blood to the head; the delirium, of various character, spasms of various muscles; and ultimately Coma. Such symptoms are perhaps chiefly seen in the fevers of the hottest weather of this climate, and in those of warmer climates. It is also certain, as will be stated afterwards, that unequivocal effects of inflammation have been occasionally found on dissection, after fatal fevers; that more or less effusion of serum within the cranium, which was described as the first effect of inflammation there, is common in such cases; and that the remedies for inflammation, early and prudently applied, have often appeared to relieve very considerably the symptoms of affection of the Nervous System occurring in fever; and therefore, although we shall afterwards see reason to believe that the affection of the brain in fever is by no means simply inflammatory, but partly dependent on another cause, yet we may consider it as ascertained, that a degree of inflammation within the cranium (generally best designated by the title of Subacute), does often accompany idiopathic fever; and is to be apprehended when the symptoms above men-

tioned are urgent, and when there appears to be danger of death strictly in the way of coma, rather than by reason of the circulation being enfeebled.

2. There are many cases of fever, especially in winter and spring, in which an inflammatory affection of the organs of *Respiration*, marked by cough, hurried or laborious, and sometimes stridulous breathing, and more or less of pain of chest, either accompanies the disease from the commencement, or supervenes during its progress; and in a number of these, it is obvious that death takes place, or is strongly threatened, by Asphyxia, from the embarrassed state of the respiration, rather than by Asthenia, from the weakened state of the circulation.

This affection of the chest, besides being attended with more or less of the typhoid symptoms, formerly mentioned, which make no part of the symptoms in ordinary cases of idiopathic bronchitis or pneumonia, has a course considerably different from those diseases. It is often of long duration, is apparently less under the influence of active remedies; and although it may be moderated or restrained, is seldom observed to subside completely, until the period of spontaneous abatement of the fever, which, in such cases, is often long protracted. The cough and dyspnœa are generally much more urgent symptoms in this combination of pectoral affection with fever, than the pain of chest; and the symptoms observed by auscultation and percussion, and the appearances on dissection, clearly indicate that the mucous membrane of the bronchiæ, and parts of the substance of the lungs, are very liable to inflammation, of a somewhat peculiar character, in the course of fever, but that inflammation of the serous membranes within the chest is very rare.

where the progress of the symptoms gives reason to believe that a simply inflammatory attack had supervened on fever already on the decline.

6. Probably the most characteristic appearance, usually to be observed in the Thorax after fever, is the morbid Fluidity of the Blood; sometimes this is complete, in the cases of most rapid progress; more generally there is partial coagulation and even decolorization, but to a small extent, in comparison of what is observed after most simply inflammatory, or even febrile diseases.

III. The alterations of the Liver found after fever, and which can be regarded as consequent on it, even where there has been yellowness of the skin, very seldom amount to more than partial enlargement and softening, and injection of minute vessels.

In the Yellow Fever, and in some cases at least of Jaundice during fever in this climate, it is well ascertained, by Louis and others, that neither obvious disease of the Liver, nor obstruction of the ducts, attends the disease, so that the case must be considered as Jaundice from non-elimination of Bile, analogous to the Ischuri Renalis, and in the former case, indeed, usually associated with great deficiency, or absolute suppression of urine.

In the Spleen, morbid softening is more common; and much but various alteration of the appearance of the bile, after fatal fevers, has been remarked by Andral and others, and is important to be noticed, as it may possibly be concerned in producing the affections of the intestines now to be mentioned.

The morbid appearances in the mucous membrane of

typhoid febrile symptoms, in the course of which great emaciation, extreme debility, and often a peculiar dryness of the skin, are observed; and in a few cases it is followed, either by sudden exhausting hæmorrhage, or by a sudden attack of acute pain and tenderness of abdomen, with vomiting and rapid sinking.

It is well ascertained that such abdominal symptoms in fever depend very generally on inflammation of the mucous membrane, and especially of the mucous glands of the intestines; that this inflammation tends rapidly to ulceration; and that the attacks of sudden hæmorrhage or of acute pain and tenderness in the advanced stages of such cases, usually depend on erosion of blood-vessels, or perforation of the whole coats, and escape of the contents of the intestines into the cavity of the abdomen, in the course of that ulceration; but that inflammation commencing in, or confined to, the peritoneum, is equally rare in fever, as that of the serous membranes within the chest.

Besides these inflammatory appearances in internal parts, often found after fatal fevers, there are many cases of external inflammation going on to ulceration, and often to gangrene, which attend the later stages of fevers. These may often be ascribed to accidental irritation, such as pressure, or the dribbling of urine. They sometimes occur, especially in the extremities, without any assignable cause; but from the time and mode of their occurrence, are always regarded as effects or accompaniments of the fever.

The different local affections now described frequently succeed each other, or are combined, in the course of fever, in the same patient; and observation of the symp-

toms of the later stage of most fatal fevers, at least in this climate, sufficiently indicates that the danger most generally results from a *combination of one or more of these local affections* with the typhoid form of the fever, and especially with the enfeebled state of the circulation.

Whenever the symptoms of any local inflammation have combined themselves with those of general fever, it is to be apprehended that the fever will be much protracted; and in fact, it is frequently by the protraction of the case, rather than by the intensity of any local symptoms, that we are led to suspect the local diseases, of which the evidence may afterwards appear on dissection. There are also great varieties, not only in different individual cases, but in different epidemics, as to the average duration of the disease, and as to the intensity of the inflammatory, or the typhoid symptoms, the frequency of eruptions, or the indications of a diseased state of the blood,—which cannot be ascribed to the influence of any external causes, and must be held to denote varieties in the nature and virulence of the remote cause of the disease.

But although we consider it of real importance to mark these distinctions, both in the essential symptoms of Fever itself, and also in the concomitant local affections which distinguish individual cases, and sometimes epidemics, from each other, yet it appears equally certain, —from consideration of the nature of these distinctions, of the manner in which the varieties, thus marked, graduate into one another, or are blended together in the same cases, and by the many varieties which present themselves in the same epidemic, and in immediate connexion with each other,—that all the continued fe-

tain number of cases, in which dissection shews that the ulceration has extended to vessels of such size as to give a copious discharge of blood; and others in which it has led to perforation of the whole coats of the intestines, escape of their contents, and consequent rapid and fatal inflammation of the peritoneum. These effects of the ulceration are almost always made known by the sudden attacks of hæmorrhage, or of violent pain and sinking, formerly mentioned; and these symptoms sometimes commence at so late a period after the febrile action has subsided, as to indicate that the fever is by no means necessarily coexistent with the formation or even the extension of these ulcers.

It is important to observe, that the external inflammations which often attend the later stages of fever, both those caused by irritation, such as pressure, and those which occur spontaneously, *e.g.* in the parotid glands, or in the feet and toes, are found to exhibit characters, during life, and after death, which distinguish them from the more usual inflammations of the same parts; they often tend to ulceration, and often to gangrene, but seldom to effusion of healthy pus, and hardly ever to the formation of granulations, while the general febrile action continues.

When pains are taken to distinguish the truly morbid appearances left by fever, from appearances (such as staining of the inner membrane of arteries, or of the mucous membrane of depending portions of bowels) which may be fairly ascribed to changes taking place after death, in a body where the coagulation of the blood is imperfect;—and likewise from the effects of inflammations often rapidly supervening during the convalescence from fever;—we shall not be authorized to

consider more phenomena than those now described, as certainly belonging to the former class. When the more chronic sequelæ of fever prove fatal, they leave a much greater variety of appearances behind them. In particular, when the enlargements of the liver and spleen, often consequent on Intermittent Fever, end in fatal chronic disease, the appearances usually found are just the same as are common, when there has been long-continued obstruction to the course of the venous blood in the thorax, and consequent congestion in these viscera;—viz. enlargement, hardening, increase of the whitish cellular substance in the parenchyma, or, as is now thought, in the fine membranous expansions, continuous with the capsule of Glisson, which extend throughout the substance of the liver,—and ultimately the development of granules or tubercles there. And the circumstances preceding the formation of such organic disease, in the case of long-continued intermittents (especially Quartans, where there have been frequent long cold stages, implying congestion of blood in the great veins, and at the same time febrile circulation), and, again, in cases of mechanical obstruction of the venous circulation,—mutually illustrate one another.

SECT. III.—*Of the Remote Causes of Idiopathic Fevers.*

Referring, first, in this part of the subject, to what has been already said (p. 61, *et seq.*), of the marks by which we can confidently distinguish a disease that results from some local and temporary cause, from one the causes of which are generally diffused, and pretty uni-

formly recurring,—we observe, that all Idiopathic Fevers, Intermittent, Continued, and Eruptive, appear evidently to belong chiefly, if not exclusively, to the former class; because they are all observed to prevail generally, and affect many persons in quick succession, in certain places, and at certain seasons; and are almost or entirely absent, for long periods, from other large communities, or from the same at other times.

It is to be remarked, however, that continued Fever is on a footing somewhat different, in this respect, from Intermittent Fever, and from most of the Eruptive Fevers, or Exanthemata; because although sometimes nearly absent, and not spreading epidemically, it cannot be ascertained to be ever completely absent, from any large community in this climate, for any considerable length of time; whereas the other diseases now mentioned, have been often known to be absent from whole kingdoms, and for centuries. This is a *prima facie* ground for suspecting, that the occurrence of this disease may be determined, on some occasions, by causes of more uniform and permanent existence than that from which it more generally proceeds; and accordingly, it will afterwards appear, that we have probable evidence of its occurring in certain circumstances, independently of the application of contagion.

Referring, again, to what was said before (p. 64, *et seq.*) of the marks by which an epidemic disease, depending on a cause which arises from the soil, or is generated in the atmosphere in particular situations, may be distinguished from one that is propagated by the intercourse of the sick with the healthy,—we assert with equal confidence, that Intermittent and Remittent fevers are in the former predicament, and Continued fever, and the

Eruptive fevers in the latter. The experience of very numerous observers since the time of Lancisi has shewn, that fevers of the former class prevail only in certain localities,—that these localities resemble one another in certain respects,—and that at a distance from these localities all manner of intercourse of the sick with the healthy may take place, without a fresh case of the disease shewing itself. On the other hand, we are equally assured by very extensive experience, that all the facts formerly referred to (p. 66, *et seq.*), as evidence of the occurrence of fresh cases of a disease being determined by the circumstance of intercourse with the sick, and being therefore referable to effluvia arising from the bodies of the sick,—are facts constantly observed as to the diffusion of continued fever, or of the eruptive fevers, through any community in which they become epidemic.

It remains for us to state here, what has been ascertained as to the conditions under which these agents, known to us only by their effects, but so powerful in their action on the human body, are developed; and as to the circumstances by which their activity is increased, and their effect on the living body variously modified.

I. The whole conditions necessary to the development of the Malaria which excites Intermittent and Remittent Fevers in many parts of the earth's surface, (and to so great an extent, that no other single cause of mortality perhaps acts with equal effect), are certainly not known; because the disease is found in some districts, where, judging from the analogy of others, it would not have been expected; and is absent from others, where all the conditions that are yet ascertained for its

development appear to exist; but what is usually observed is, that the districts infested by it are those where water has stagnated for some time, often months, on the earth's surface, and afterwards slowly evaporated under the heat of the sun; it is only after the evaporation is somewhat advanced that the disease shews itself; and it often continues long, and with great virulence, after the surface is perfectly dried. The putrefaction of animal or vegetable matter is, naturally, a very frequent concomitant of the process, by which the poison is thus developed; but the facts stated by Chisholm,* and Fergusson,† seem sufficient to shew that it is not an essential part of the process.

The following general facts appear so well established by observation, as to be correctly designated as laws regulating the agency of this poison; and the knowledge of these, as well as of the conditions of its development now stated, may often be effectual in preventing its ravages.

1. Its virulence appears to be nearly in proportion to the intensity of the heat, by which the surface emitting it has been dried. The Intermitting Fever of northern Europe, the Remitting Fever of the Mediterranean, and the Yellow Fever of the West Indies, are produced in circumstances in all respects similar, except as to the intensity of the heat; the worst fevers of the tropical climates are nearly confined to a moderate elevation above the level of the sea; and at the same time when they are prevailing in the low grounds, the common remittent fevers are often prevalent in the neighbourhood

* See Edin. Med. and Surg. Journal. vol. vi.

† On Marsh Poison. Edin. Phil. Trans. vol. ix.

of marshes a few hundred feet higher. The greater heat of certain seasons, and the more complete evaporation of stagnant water, seem to be powerful causes of the greater prevalence and malignity of fevers of this class; but it must be allowed that unusually virulent epidemics occasionally occur, for which no such known cause can be assigned.

2. The poison does not appear to diffuse itself readily through the air, nor to rise high above the surface emitting it; the inhabitants even of the ground-floor of a house in a malarious district being often affected in a much larger proportion than those of the upper stories.

3. Although the heat of the sun appears to be one of the conditions of the development of the poison, yet its immediate effect on the poison that has been already evolved, seems to be to dissipate and dilute it, for it is much more dangerous to visit the most malarious spots at night than at noon-day.

4. The poison appears evidently to be wafted along the earth's surface by winds; for the disease prevails much more, where the trade-winds blow, to the leeward than to the windward of marshes.

5. It appears to be absorbed or neutralized by passing over water,—ships having been observed to remain quite healthy within 1000 yards of shores, even to windward of them, where the disease was very prevalent.

6. It appears to attach itself particularly to spreading trees, on which account woods and groves are particularly dangerous in malarious countries; and again, when these intervene between a marsh and a town or village, they often appear to afford it protection.

7. Its development, or its virulence, appears to be much diminished by the cultivation and habitation of

waste lands, even although they be occasionally flooded; and it has often been found to increase suddenly and greatly, when fertile lands have been laid waste.

8. It affects very differently the permanent inhabitants and the occasional visitors of the districts where it exists; the former being generally weakly, imperfectly nourished, and short lived, but much less liable to the fever itself than the latter.

9. In the hot climates there is an equally striking difference between the white and black varieties of the human race as to their liability to the effect of the malaria; the blacks, even when healthy and robust, suffering from it comparatively little.

10. In all climates, this, like other causes of acute disease, acts with peculiar force on those whose bodily strength is at the time unusually depressed, whether by fatigue, intemperance, fasting, evacuations, or mental emotions; and whatever measures are effectual in permanently strengthening the system, are found the most useful in enabling it to resist this noxious influence.

11. In those who have certainly imbibed the poison producing these fevers, it appears very generally to *lie latent* for a considerable length of time before the effect results. In some cases, in this climate, it is quite certain that this latent period may not be less than nine months.

12. What was formerly said of the frequent *concurrence* of the more general causes of disease, such as cold, intemperance, or any cause disordering the stomach, with the special cause of certain diseases, is strictly applicable, as many observations prove, to the action of malaria in producing intermittent or remittent fevers; and by the application of such causes, intermitting fevers

are often reproduced, more or less perfectly, in persons who have previously suffered from them, but have not lately been exposed to the malaria.

In regard to the disputed question, Whether all the worst epidemic fevers of hot climates can be referred to the agency of this cause, or whether there exist occasionally in these climates fevers of peculiar malignity, which are propagated by Contagion,—it may be held to be established, that the cause of intermittent and remittent fevers does sometimes act with such intensity as to produce both a very unusual extension of disease, and all the worst symptoms, and the rapid and great mortality, of the most malignant form of fever; and farther, that in by far the greater number of cases,* where malignant epidemics, in the hot climates, have been supposed to be imported from a distance, their origin has really been proved to be indigenous; and must be ascribed, therefore, to the unusual efficiency of the causes of fever previously existing in the districts. There is good reason to believe also, that even the worst epidemic fevers of hot climates are always subjected to the same law as the common remittent fevers, of existing only within certain limits.

But from all this it does not necessarily follow, that the extension of these epidemic fevers, or even that their origin, in certain spots, may not be the effect of contagion: For although it may seem improbable, *a priori*, that a disease should spread in two distinct ways, and although we may not expect, that one which results from a cause existing in the atmosphere, should also be pro-

* See Chervin, Examen des Principes de l'Administration en Matiere Sanitaire. Paris, 1827.

pagated, in part, by communication between individuals, —yet no such speculative opinions can be allowed to invalidate the direct and obvious conclusion from facts (of which several have been recorded), which indicate that, in some of the places where these epidemic fevers have prevailed, those who have had close intercourse with the sick, have become themselves affected in a much larger proportion than others who, in all other respects, were similarly circumstanced.

II. In regard to Contagion as a cause of continued fever, we shall first state what has been ascertained of the laws according to which the propagation of fever, by contagion, takes place (and which are found to apply, in some measure, to the other febrile contagious diseases); and afterwards we shall consider the question, Whether another origin can, in any circumstances, be assigned for these diseases?

1. The extension of continued fever, in any community, is in general proportioned, as may naturally be expected, to the frequency and closeness of intercourse of the healthy with the sick, and therefore to the crowding, and deficient ventilation, of the rooms which they inhabit; but in different seasons, it takes place with very various rapidity, independently of the application of any causes which are known to affect it; and from this varying diffusibility, as well as from the varying character and malignity of the disease (already noticed), it may be inferred that the contagious poison itself, as developed in the human body, is liable, from time to time, to a certain degree of change.

2. The contagious matter, arising from the bodies of the sick, appears to be readily diffused through the air,

and to lose its poisonous quality by dilution; so that, at the distance of twenty or thirty yards, air which has passed over the bodies of persons ill of continued fever, is found to be innocuous. The contagious effluvia from smallpox, and perhaps still more from measles, appear to be more virulent than those from continued fever; and it would appear that the poison of the plague, as arising from the bodies of the sick, is confined within narrower limits than that of any of these diseases.

3. There is evidence, which to most inquirers has appeared satisfactory, of the contagious poison of continued fever (and of the eruptive fevers also), often attaching itself to fomites (clothes, furniture), &c. and acting on persons to whom it is thus applied at the end of weeks, or perhaps of months.

4. It seems certain, that the Contagious Poison producing any of these diseases, is rendered innocuous by a temperature of 120° of Fahrenheit.* It has been observed, that intense atmospherical heat (though considerably below this point) has repeatedly checked the diffusion of plague, and of small-pox; and the continued fever of this climate is very generally observed to abate in frequency in summer weather, and appears nearly incapable of spreading by contagion within the tropics.

5. Diseases proceeding from these contagious poisons differ from the fever excited by malaria in this important particular, that the susceptibility of them is much diminished by their being once excited in the system. This does not confer certain immunity in the case even of the eruptive fevers; and there are many cases of continued fever affecting the same person twice or even

* See Henry in Philosophical Magazine, 1832.

thrice; but there is certainly a great diminution of susceptibility in all these cases.

6. Young persons are certainly more susceptible of these contagious febrile diseases than persons advanced in life; but the symptoms are very generally worse, and the tendency to spontaneous recovery is much less strong, in advanced than in early life.

7. The susceptibility of the disease (in the case of continued fever in particular) is very much increased by many causes that depress the vis vitæ at the time, by fasting or low diet, by cold long applied, by foul or vitiated air, and by mental depression, timidity, or anxiety, as in the case of besieged cities, communities suffering peculiarly from famine and poverty, beaten armies (especially after the excitement of military operations is quite over); or in that of dispirited bodies of men for military or naval service, or of strangers from the country during their first residence in large towns.

8. After any of these poisons have been imbibed, they very generally lie latent in the constitution for a certain length of time, before producing their specific effects; and in the case of continued fever this time is so various, and the efficacy of concurrent and accessory causes (especially of exposure to cold) in exciting the disease, after the application of the contagion, is so obvious and striking, that it appears quite reasonable to suppose, that where these causes are carefully avoided, many cases of the disease, which would otherwise have occurred, may be averted.

9. Although it must always be remembered, that there are great varieties, both as to individual cases, and as to the general character of epidemics, for which we can assign no cause, yet various facts have been ascertained,

as to the effects of concurrent or accessory causes, in not merely favouring the accession, but determining the form or variety, of continued fever in individuals, particularly the following.

a. The Nervous or atactic form of fever (which is perhaps the most generally dangerous to adults in this country) is remarkably more frequent in those in whom the Nervous System has been recently much excited, as by much muscular exertion, by excessive study, by mental agitation or anxiety, by venereal excesses, or by intemperance, especially the use of strong liquors. In many of this last class, the nervous symptoms in fever take very much the form of the Delirium Tremens of drunkards.

b. The symptoms of fever are often modified by preceding disease, and especially, if there has been recently any local inflammation, the symptoms of that local disease are very often re-excited, although in a somewhat modified form. On the other hand, a chronic disease already existing, at least if it be one which is attended with febrile excitement (such as phthisis) seems to be to a certain degree (although not uniformly) a protection against attacks of fever.

c. The concomitant local affections, if not the proper symptoms of fever, are remarkably modified by the weather and season of the year, *i. e.* by the causes of local disease which are apt to take effect on the body along with, or after the application of, the poison. In winter and spring, the symptoms are stated to be generally more inflammatory, and the complication of fever with bronchitis or pneumonia is certainly more frequent; in autumn the concomitant affections of the stomach, and especially of the intestines, are chiefly observed.

Violent affection of the brain, in the more inflammatory form of fever, is remarkably observed in hot climates, and sometimes in the hottest season of this.

d. There is a remarkable difference in the most general form of fever, according as the patients are placed in cool well-aired rooms, or confined in a close warm and vitiated temperature. It is very doubtful whether the mortality is so much less in the former case, as has been represented by some; but in that case, the fever is generally less typhoid, and the danger more dependent on complication with local affections, and consequent protraction of the disease; and in the latter case the typhoid symptoms are more frequent and urgent, but the duration usually less.*

It has been already stated, that continued fever, although rare in some seasons, and prevailing epidemically in others, is still, to a greater or less extent, so much more uniformly present in every large community, than any of the other diseases, which we ascribe to a local and temporary cause, that we may reasonably suspect it to originate occasionally from some circumstances of more general and permanent existence. And in confirmation of this it may be observed, *first*, that continued fever often breaks out in situations where the application of the contagious poison, whether by persons or fomitis, not only cannot be traced, but appears improbable; and, *secondly*, that circumstances may be stated, in which the appearance of this disease, independently of any perceptible application of contagion, may be reckoned on, with almost absolute certainty; *e. g.* the combination of deficient nourishment, foul air, and mental depression, con-

* See Bateman on Contagious Fever, p. 135.

sequent on the reception of a beaten army into a small town, or on a large town long kept in a stage of siege, or on a scarcity befalling an already impoverished country. In these circumstances it appears highly probable, that the circumstances of predisposition above stated are adequate, not only to the extensive diffusion, but even to the generation in a few individuals, of the disease which is afterwards propagated by contagion. But to which of these circumstances of predisposition, the occasional spontaneous origin of the disease may with most probability be ascribed, is still uncertain. The vitiation of the atmosphere by putrescent animal or vegetable substances, or by crowded human beings, has been supposed to be a sufficient cause, and the former of these opinions has lately been much espoused in England; but so many instances have been collected by Dr Bancroft, Dr Chisholm, Parent Du-Chatelet, and others, of both these causes being fully applied without any such effect; and it is so easy to explain the frequency and peculiarly rapid diffusion of continued fever in the situations where such effluvia exist, by the concentration of the contagious poison, and the other circumstances and mode of life of the inhabitants; that we must set aside both hypotheses; and perhaps we may assert that long continued mental depression and anxiety, during youth especially, has been assigned with more probability than any other cause, for the spontaneous generation of continued fever.*

* See Cheyne and Marsh in Dublin Hospital Reports, vol. iv.

SECT. IV.—*Of the Pathology of Idiopathic Fevers, and of their Fatal Terminations.*

Referring to what was formerly said of the limitations which Nature imposes on all explanations of natural phenomena, we hold it to be unreasonable to expect, that we shall ever go far in explaining the peculiar phenomena of Fever; we look chiefly for the determination of ultimate facts or principles, relative to the action of its remote causes on the living body.

The first question here is, whether the term Idiopathic be in reality correctly applied, or whether we can explain all the phenomena that have been now described by reference to a principle already explained, viz. the effect of local Inflammation in exciting the constitutional fever which was described, and the known varieties of which were considered.

In treating of this question, we may, in the first place, refer to facts already stated, as to the history of fevers.

Taking for granted that what we have called Idiopathic Fevers may be distinguished, in almost all cases where their whole progress is observed, by the marks formerly enumerated (p. 391, *et seq.*), we regard all these circumstances in their history as affording very strong presumption, that they are specifically distinct from the strictly inflammatory diseases, and cannot be ascribed to inflammatory action as their cause. And the following considerations may be stated in farther confirmation of this doctrine.

I. The peculiarities of the occasional and local pro-

duction, and application to the living body, of the exciting causes of these fevers, and of the characteristic depressing agency on vital action, which attends them, evidently assimilate, in some degree, this form of disease to the agency of poisons. Now, it appears from what was stated formerly in regard to all such poisons as act gradually, and must be absorbed into the system before they take effect, that although they may excite local inflammation, yet they have always a *general* effect, and usually a depressing effect, on vital action, whether of the nervous or vascular system, independent of that local agency. From this there arises a manifest presumption that the agency of malaria and of contagion, in producing fever, will in like manner be, in part at least, exerted on the system at large, and independently of local inflammation, or mere alteration of the distribution of the blood.

II. Although it is admitted that appearances indicating inflammation are very frequently found after fatal fever, yet the facts already stated as to the morbid anatomy of fever justify our maintaining, *first*, That all such appearances are sometimes absent; *secondly*, That the indications of inflammation, found in the different parts above enumerated after fever, are very generally somewhat different from those which are found after inflammations of the same parts excited simply by cold, and unconnected with the peculiar symptoms of fever; which implies the action, in cases of fever, of a peculiar cause, distinct from inflammation; and, *thirdly*, That the appearances of inflammation, found after fever, are very often quite inadequate to explain the fatal event, on the principles formerly stated as to the fatal terminations of inflammatory diseases.

It is plain that, in order to prove that fever depends essentially on, and is fatal by reason of, the attendant inflammation, it is necessary to shew, not only that such attendant inflammation exists, but that its nature and situation are such as to obstruct some function necessary to life,—or at least such as are found, in other cases, incompatible with life. If, therefore, we find after fatal fever (characterized by typhoid symptoms), marks of inflammation in certain organs, but these in a degree much less than those which we are accustomed to find, where the same parts have been inflamed, but the characteristic typhoid symptoms not shewn themselves, we are not entitled to infer that the inflammation in the former case was the cause of death.

Now, the effects and indications of inflammation, found after fatal fevers, and already described, are generally *much less* than what we are accustomed to observe in those cases of inflammation of the same parts, which are unconnected with malaria or contagion, and unattended with typhoid symptoms; and frequently all that is seen indicates only congestion of blood, which can hardly be held to be a sufficient cause for death, if existing alone, anywhere but in the brain, or at the origins of the nerves.

Even, therefore, where the evidence of inflammation, or irregular distribution of blood, having existed during fever, is held to be decisive, the proof of these having existed to a degree which can be reasonably considered adequate to the explanation of the fatal event, is very often essentially defective.

III. Not only the fatal event, but the chief peculiarities of the symptoms, of the diseases described under the name of Idiopathic Fevers, are very often inadequately

explained by reference to any of the known phenomena and effects of inflammation.

The different authors who ascribe fevers to inflammation as their cause, are not agreed as to the organ in which that inflammation must reside; which circumstance is of itself a presumption against their common doctrine. But there is no locality which can be assigned to the inflammation attending fever, which can explain, by reference to the known effects of inflammation in other cases, many of the typhoid symptoms of fever.

The preternaturally fluid state of the blood, which is very often, although perhaps not uniformly observed, certainly cannot be explained thus. The enfeebled state of the circulation in typhoid fever has been thought by some to be sufficiently explained by the known sedative effect of inflammation of the intestines on the heart's actions; but, besides that there are many cases of truly adynamic fever, where no distinct traces of intestinal inflammation can be detected, the two cases are very different;—the depressed state of the circulation in cases of simply inflamed intestines being preceded by much more decided local symptoms than we see in fever, and being neither attended with the cutaneous heat of fever, nor with the eruption, nor with the foul dry tongue and lips of fever, nor with the nervous symptoms of fever, nor with the strong salutary tendency of fever. And although some of the symptoms produced by inflammation of the brain resemble the nervous symptoms of many cases of fever, yet in simply inflammatory cases, there are more sudden and violent attacks of pain,—there are very generally sickness and vomiting,—there is at one period of the disease slowness or irregularity of pulse,—the delirium is of a different character,—there is less

stupor in the early stages, and the stupor in the later stages is attended much more generally with dilated pupil, squint, blindness, or double vision, and is much more uniformly fatal, than in the fevers described as idiopathic.

Farther, the appearances indicating inflammation, which are found after death by fever, are in many cases observed to correspond, not to any of the symptoms of the earlier periods of the fever, but to symptoms which presented themselves only recently before death; so that the period of accession, as well as the nature and degree of the inflammation, that can be ascertained to exist during the fever, is inconsistent with the supposition of all the symptoms depending upon it.

In farther proof that the characteristic symptoms of fever are not explained by the inflammations which may accompany it, we should observe, that there are various cases, formerly noticed, besides that now in question, in which inflammation is attended with typhoid fever; *e.g.* the case of inflammation from an injury attended with violent concussion, the case of inflammation and purulent effusion in a vein, the case of inflammation from a poisoned wound, or from epidemic erysipelas, or other exanthematous disease, or puerperal fever; and in every one of these it is obvious that the system is subjected to the influence, not only of a local inflammation, but also of a cause acting generally on the body, as we suppose the poison of what we call Idiopathic Fever to do.

And if the local inflammation, which can be ascertained to take place during fever, is inadequate to explain the characteristic typhoid symptoms, it is equally in vain to seek an explanation of these symptoms, as some have done, in the mere circumstances of irregular distribution and congestion of blood.

Even the peculiarities of that form of fever which has been described under the name of *Congestive* (p. 395), are not to be explained by the mere circumstance of internal congestion, the existence of which, in the vessels, and especially in the veins of internal parts, in these circumstances is admitted. For although congestion or stagnation of blood within the cranium may be held to be a sufficient cause of stupor, yet we are so far from regarding congestion in the great veins leading to the heart as a sufficient cause for deficient action there, and consequent feeble pulse and cold skin, that we have already stated (see p. 138) the accumulation of blood in the great veins to be apparently the chief cause of the *increased* action of the heart, or the *reaction*, in the more usual form of fever. In the cases, therefore, where the congestion in the great veins fails to excite this reaction in the heart, some peculiar cause must have operated to prevent the heart from being unusually excited, by the application of the unusual quantity of its natural stimulus; *i. e.* the circumstance of unusually great and permanent congestion in the great veins, in the commencement of fever, is in all probability the effect, not the cause, of a peculiar sedative influence affecting the vascular system in these cases; such an influence naturally leading to accumulation of blood in the great veins, for the same reason that determines the accumulation there after death.

That congestion of blood in the great veins is not *per se* adequate to account for the phenomena of any form of fever, appears distinctly from the fact, that no form of fever follows the great congestion there in cases of suspended animation in syncope, or from extreme cold, or submersion in water.

IV. That what we called Idiopathic Fever cannot justly be regarded as the effect of the inflammations often attending it, appears farther from a very sufficient experience of the *juvantia* and *lædentia*, particularly from what is well ascertained of the effect of evacuations on the one hand, and of stimulating remedies on the other, in this disease, as compared with the diseases that are acknowledged to be simply inflammatory. For after making allowance for the sources of fallacy necessarily attending such observations, we may assert that experience has fully established the following points.

1. That in the strictly inflammatory diseases, evacuations of blood are of the utmost use in the early stages, all other remedies comparatively inefficient, and stimulant remedies decidedly hurtful in all but the latest stage.

2. That in the cases described as idiopathic fever, even although symptoms of local inflammation be present, the amount of evacuation which it is safe to practise on account of these is much less than in the former case; that its beneficial effect is less decided,—the local symptoms being seldom so effectually subdued, and the general, especially the typhoid symptoms, being seldom improved, and sometimes evidently aggravated by loss of blood; that the tendency to a spontaneous favourable termination is much stronger; and that even when indications of recent local inflammation exist, decided benefit may often be obtained from the use of stimulants, under which the pulse may improve, and the typhoid symptoms of general fever abate, without the local affection being materially or even perceptibly aggravated.

It is also ascertained by sufficient experience, that the inflammatory symptoms are more urgent, and evacuations in general much better borne in some epidemics of

continued fever; and that in others the indications of debility of the vascular system are more permanent, and stimulants more generally useful; while no such differences are observed as to the strictly inflammatory diseases in different seasons.

These statements seem sufficient to shew, that it is a limited and hasty view of the phenomena and history of Fevers, which has suggested the opinion of their being resolvable into the constitutional effects of the Inflammations, or local determinations and congestion of blood, which can be ascertained to attend them; and that we may now safely apply the term Idiopathic as expressing the belief of an essential distinction existing between these fevers, and those that were formerly described as resulting from local inflammation.

At the same time, the strong similarity or coincidence in many respects of the essential symptoms of the symptomatic and the idiopathic fever, must always be regarded as a leading fact in reference to the pathology of the latter.

But in idiopathic fever, not only is a diseased action excited throughout the system, similar to that which local inflammation can excite, but the system is at the same time under the influence of a cause, which acts on it nearly after the manner of a Poison; which we know, from the history of the disease, to be probably engendered occasionally within the system itself, but to be most frequently absorbed from without; and which takes effect, as poisons do, only for a time, and then loses its power. In regard to this morbific cause, which both excites and gives the peculiar character to the febrile actions, several questions present themselves.

I. It may be questioned whether the effect on the Nervous System, essential to fever, is produced directly by the external cause of fever, or whether that cause first works a change on the blood, and through its intervention affects the brain and nerves.

It is plain that the blood is changed, at least as to its power of coagulation, in most cases, and probably it may be so in all cases of idiopathic fever. But a similar change as to that property may be produced in it, by causes acting in the first instance on the Nervous System; and this fact, therefore, does not indicate the part of the system which is primarily affected in fever.

Reasons which appear, on first consideration of the subject, satisfactory, may be given against the supposition of many of the older pathologists, that fever essentially and exclusively *consists* in a certain change in the blood (quæ præsens morbum facit, sublata tollit, mutata mutat); in particular, two facts already stated, viz. 1. That after the morbific cause has been applied to the blood, it may depend, as we believe, on causes acting on the Nervous System only, whether or not it shall produce its specific effect; and, 2. That even after that specific effect has been produced, and the febrile actions begun, they may, in a few instances, be arrested by means (such as the cold affusion) which neither evacuate any part of the blood, nor alter its composition. But when it is distinctly understood that the change in the blood, believed to be morbific, is not in its chemical constitution simply, but in the vital qualities by which that constitution is constantly regulated and maintained, these facts have not the weight against the humoral pathology of fever, which has been ascribed to them.

At least it may be thought, that the remote cause of

fever does not produce its effect by merely once impressing the Nervous System, or other living solids; but that it must necessarily affect for a time the fluids of the body, and perhaps multiply itself in them, in order that it may take effect on the solids. And in favour of *this form* of the humoral pathology of fever, the following facts may be stated.

1. In a great majority of the cases in which we see typhoid fever, we are sure that some peculiar matter, generally absorbed from without, must be contained in the blood; as in the case of fever from malaria, from contagion (whether of simple fever or the eruptive fevers) from inflamed veins, from animal poisons introduced by wounds, or from suppression of the natural excretion at the kidneys. That this peculiar matter, or the blood altered by it, should act like a ferment, assimilating much of the circulating fluid to itself, in the former case equally as in the latter, is quite in accordance with what has been observed, when purulent matter has begun to form in the blood. See Gulliver's Translation of Gerber, p. 104.

2. In all cases of idiopathic fever, as well as of the eruptive fevers, an interval, which is variable and often long, necessarily elapses between the application of the morbific cause, and the development of the fever; which is easily understood on the supposition that a change is gradually wrought on the blood during that interval, but not on the supposition of the poison acting simply on the living solids.

3. In a great majority of cases of typhoid fever, we know that a matter, similar in its effects on the human system to that which excited the disease, is ultimately

evolved in large quantity from the blood, making the disease contagious; *i. e.* the morbific poison in one way or another is multiplied in the blood of the living body.

It has been naturally supposed by pathologists at different times, that the frequent and rapid abatement of fevers, after critical evacuations, is farther proof of the doctrine of their cause residing chiefly in the blood; and that this morbific cause is really carried off by these evacuations. And in support of this opinion, it has been stated, that when putrid matters, or diseased secretions, have been injected into the veins of animals, and excited febrile symptoms, a peculiarly fetid diarrhœa has preceded the recovery from these.

But when it is considered, 1. That copious or spontaneous evacuations (*e. g.* of sweat) at the critical periods of fevers, often take place without the least good effect, if unattended by other marks of restoration of the natural condition of the capillaries; 2. That many fevers abate spontaneously and perfectly without crisis; 3. That in all contagious diseases, morbific effluvia escape for a long time from the body, without any good effect; 4. That there is no evidence of the critical evacuations possessing more contagious property than the effluvia which continually escape without advantage; and *lastly*, that in smallpox in particular, experience has shewn, that the morbific matter in the pustules may be evacuated as quickly as it appears, without benefit, and may be reabsorbed into the blood without injury;—we must think it doubtful whether the critical evacuations are the *cause* of the solution of the fever that succeeds them, or whether we ought not rather to regard them as the *sign* of the restoration of the natural state of the

vital actions in the capillaries of the body; whereby the excited action of the heart is enabled to throw off an unusual quantity of secretions and excretions, and then subsides; because the cause confining the circulation, and therefore stimulating the heart, has ceased to operate.

The doctrine of the existence of a morbific matter in the blood, therefore, is not established by the facts as to the critical evacuations, but must be rested on the other facts above stated.

II. Whether the morbific cause first alter the fluids or not, it is evident that it affects the actions of all the living solids, whenever it excites fever; and it may be questioned whether the first effect of the morbific cause is exerted on the living action of Nervous or of the Vascular system. Besides what was formerly said on this point in treating of symptomatic fever (p. 139), the following reasons may be given for thinking that the Nervous System is much concerned in the changes occurring even from the commencement of fever.

1. The nervous system is evidently more affected throughout the whole series of morbid actions, than in the former case, and the first symptoms by which the idiopathic fever can in general be recognised, are strictly affections of the nervous system.

2. We have seen (p. 7), that when inflammation coexists in the living body, with the effect of a violent concussion of the brain and nerves, the fever that it excites has often quite the typhoid character.

3. We have good reason to believe, that changes taking place unquestionably in the nervous system, viz. those which attend mental emotions of sufficient duration and intensity, if they have not power (as it may

reasonably be conjectured, that in certain circumstances they have) to generate fever, have at least such an influence on its causes, as to determine their efficiency or inefficacy in individual cases; which is of itself a strong presumption in favour of the belief, that the primary action of these causes is on the nervous system.

4. Besides these mental emotions, there are various other agents, formerly noticed as concurrent and accessory causes of fever, and by which we have reason to think, that the development of fever, after the poison has been imbibed, is often determined,—*e. g.* cold, muscular exertion, and intoxicating liquors; and the chief action of all these causes also is on the nervous system.

5. There is at least one remedy, of peculiar efficacy in counteracting the agency of one of the causes of fever, *i. e.* the Cinchona, which produces no visible effect on the vascular system, and the chief action of which, there is reason to believe, from what we see of it in other cases, to be on the nervous system.

But whatever be the mode in which the morbific cause, in Idiopathic Fever, comes to affect the circulation, it is to the direct action of this cause, and not to the influence of any local diseased actions, excited in the body, that we must ascribe the enfeebled state of the circulation,—the altered state of the blood,—the peculiarly vitiated state of the secretions,—and, in a great measure also, the deranged state of the nervous system,—which were described as characteristic of Idiopathic, and especially of Typhoid Fever.

And there is nothing inconsistent with what is known of the action of poisons, or of other agents on the animal economy, in supposing that the morbific cause, after existing some time, and perhaps multiplying itself, in

the fluids, *may act simultaneously* on the constitution of the blood, on the vital affinities in the capillary vessels, on the powers of the heart, and the vital actions of the brain and nerves. Indeed, if its first action be on the vital affinities, as formerly defined, it must necessarily affect nearly simultaneously all these parts.

We have good reason to think, that it is especially by its action (whether direct or indirect) on the vital changes in the capillary vessels, that this cause excites the symptoms which were described as characteristic of Fever; and we refer to the account given of fever symptomatic of inflammation, for the explanation of the manner in which the different steps in the series of changes constituting febrile action, consequent on that deficient vital action in the capillaries, are connected together.

But the peculiar depressing action of the morbific cause on all the parts of the system above mentioned, appears; from what has been said, to be perceptible throughout idiopathic, as distinguished from symptomatic fever; and it is easy to understand, that its effect on any one of these may become so intense as to be dangerous. The sedative effect on the heart is often such as to enfeeble, and sometimes such as nearly to suppress, the febrile reaction, as in Congestive Fever; that on the brain may produce fatal coma, as in some cases of Nervous Fever, independently of any effusion or organic lesion in the brain; that on the vital functions going on in the capillary vessels may be such, and so long continued, as to cause fatal inanition and exhaustion, as in some cases of Fever, fatal merely by reason of the long endurance of the disease, without failure of the functions of any one organ in particular. All this is in accordance with what we see in cases where we know that

the blood is morbidly altered in constitution, particularly Ischuria Renalis, or disease of the Kidneys.

In most cases of fever, however, the danger is not produced solely in this way; but appears manifestly owing to a *combination* of the enfeebled state of the circulation, with peculiar derangement of the functions of individual organs, consequent on the attendant inflammations there, the symptoms and post-mortem appearances of which have been already described. In consequence of this combination, we have three distinct modes of fatal termination of fevers, which are often blended together, but in some cases are quite separate and easily distinguished; and which are clearly illustrated by the different kinds of sudden or violent death formerly described,—and by what has been said above of the morbid appearances left by fatal fevers. These are, 1. The death by *Coma*, referable partly to the peculiar action of the cause of fever on the brain, but partly also to increased determination of blood thither, or inflammatory action or effusion there; 2. The death by *Asphyxia*, referable partly to the enfeebled state of the circulation, and want of power in the heart to propel the blood through the lungs, but partly also to Bronchitis or Pneumonia. 3. The death by mere *Asthenia*, referable partly to the deleterious effect of the morbific cause on the circulation, but frequently also in part to various local inflammations, prolonging the febrile state; and especially to the inflammations and ulcerations in the mucous membrane of the intestines, which appear to have in this, as in other cases, a peculiar sedative, and what was formerly designated as a sympathetic, effect on the heart's actions.

It was already stated, that these inflammations during

the state of fever, are so far influenced by the altered condition of all vital actions in the capillary vessels at that time, that the local effects which they produce differ materially from those which follow inflammation of the same parts in a system free from general fever;—as is seen, *e. g.* in watching the progress of a parotid, or other external abscess, commencing during the febrile state, but only suppurating fairly when that state has subsided. Nevertheless, the internal inflammations often attending fever are quite sufficient, when their effect is combined with the generally enfeebled state of the circulation, to cause great danger.

The nature of the connexion between these local inflammations and the general fever is often obscure. In many cases, especially when the bronchiæ and lungs are affected, early in fever, they are evidently produced by a different cause (chiefly cold applied before the onset, or during the course of the disease), and only accidentally combined with the fever; but in other cases they may probably be regarded as effects of the general fever. The determination of blood to the head, and consequent slight inflammation and effusion, seem often to be of this description, and are analogous to what sometimes happen in inflammatory diseases of other organs than the head. The peculiar condensation of the lowest portions of the lungs, in the later stage of fever, and its distinction from true hepatization, were already considered. The reproduction in any part of the body, of inflammatory action which has recently subsided there, appears to be an effect, rather than a mere accompaniment of fever. And the peculiar inflammation of the mucous glands and membrane of the intestines, when it takes place late in the disease, may be suspected to depend very

much on the bile, and other irritating contents of the intestinal canal, passing over a membrane, which, in consequence of the feeble circulation, the blunted sensation, and the deficient secretion, has lost much of its natural protecting mucus; and resting longest on that portion of the canal where we know that, from the action of the ileo-cœcal valve, there must be a delay of the fœces; and to be analogous to the inflammation of other mucous membranes, consequent on section of their sensitive nerves,—and to that which precedes death by starvation.

On this supposition, inflammations of the mucous membrane of the intestines, occurring towards the close of protracted fevers, will stand in nearly the same relation to them as the inflammation, ulceration, and gangrene, from pressure on external parts; which are very common, and often constitute a great part of the danger in such cases.

These relations between idiopathic fever and the concomitant local inflammations are of great practical importance; and the chief difficulty and nicety in the treatment of fever, lies in determining, how far the danger depends on such local affections as demand evacuations, and how far on the effect produced on the system by the morbific cause, which will often spontaneously abate, and often demands remedies of the opposite class.

An opinion has lately become rather prevalent, that there are two kinds of Fever, to which the names of Typhus, and of Typhoid Fever, have been given, of which the first is usually unconnected with any affection of the mucous membrane, is attended with the eruption, and is more contagious; the latter is necessarily connected

with inflammation going to ulceration of the mucous membrane, is unattended with eruption, is more protracted, and has little contagious property. This term, Typhoid Fever, is to be regarded as synonymous with *Gastro-Enterite*, and with *Dothinenterite*. If it be understood that the intestinal inflammation in this last case is of *specific* character, this doctrine can have no injurious practical results; but it is certain, that some cases resulting from the contagion of the usual spotted typhus shew all the symptoms and post-mortem appearances attributed to the typhoid fever; and therefore it seems most probable that the differences observed are only varieties depending on constitution, and on the agency of other causes affecting the constitution, besides the exciting cause of the disease.

It may be judged, from what has been stated, that the Prognosis in the Continued Fever of this country must depend, partly on the nature of the prevailing epidemic, partly on the intensity and endurance of the proper typhoid symptoms, and partly on the degree of complication with local disease. The whole mortality of patients admitted into the Infirmary in Edinburgh has varied of late years from 1 in 25 to 1 in 6; the later Epidemics being the most mortal; but it is seldom much below 1 in 10. The mortality among cases not admitted to the Infirmary (as these are chiefly children) is, however, less than this.

The following are important observations to be made as to the Prognosis in Continued Fever:—*First*, That the mortality from it is least in early life, and gradually increases as life advances, so that below the age of ten it is often as low as 1 in 30 or 40; and above the age

of forty it is usually 1 in 3, or even 1 in 2;* *secondly*, That the mortality from it is greater, in all ranks of life, beyond the age of puberty, in men than women; *thirdly*, That it is greater, beyond that age, in persons of the higher ranks of life, than of the lower; and especially in those persons of the higher ranks who have been accustomed to much exertion of intellect, or suffered much anxiety of mind.

SECT. V.—*Of the Treatment of Idiopathic Fever.*

What is to be said on this subject is applicable, with very little variation, to the treatment of all the febrile diseases, strictly so called, *i. e.* of all those fevers which we believe to depend on the action of a morbific poison introduced into the body, and which, in the present

* In a recent elaborate inquiry by Mr Watt, into the mortality of different great towns in Scotland for some years, a remarkable uniformity was observed as to the proportion of recorded deaths from fever, falling on the different periods of life; and as the great majority of fever patients are in the early periods of life, this observation confirms what is stated above.

Of the whole deaths from fever, at the following towns, the proportions falling on the different ages stated were as follows:—

	Under 10.	10 to 20.	Above 20.
Edinburgh, . .	12 per cent.	29 per cent.	70 per cent.
Glasgow, . .	12 ...	29 ...	70 ...
Perth, . .	15 ...	30 ...	69 ...
Dundee, . .	19 ...	51 ...	48 ...

The greater mortality early in life at Dundee is probably owing to more numerous cases of affection of the bowels, which complication is most frequent in youth.

state of our knowledge, we have no means either of expelling, or of depriving of its noxious power.

It is obvious, that in undertaking the treatment of any such disease, we must keep constantly in view those provisions of Nature, hitherto imperfectly understood, by which the operation of these morbific poisons is rendered transient, and to which we therefore trust for recovery from their influence, after a given time; provided that, during that time, the functions essential to life can be preserved from serious injury. To these provisions, all that art can do in these diseases, in the present state of our knowledge, must be held to be subservient and auxiliary; but we know that these provisions require a certain, often definite time, and cannot be accelerated, as those on which the resolution of inflammation depends may often be, by art; and although it is true, as stated by Cullen, that "the operations of Nature are precarious, and not so well understood, as to enable us to regulate them properly," yet observation of the natural course of these diseases enables us to judge, with considerable precision, both of the circumstances in which the favourable result of these operations is to be expected, and of the causes which often frustrate their good effect; and in many cases we have good reason to believe, that our remedies may successfully oppose the action of these causes.

Taking this view of the agency of remedies in these diseases, we can easily perceive the correctness of the statement of Cullen, that the object of practice in them is, to "obviate the tendency to death,"—*i. e.* to oppose those of the series of morbid changes, occurring during the disease, by which the fatal event, in any individual case, appears likely to be brought about. These imme-

diate causes of death may be distinctly perceived to be very various in different cases of disease, which spring from the same contagion, and shew the same unequivocal distinctive marks; and they are susceptible of illustration, by reference to the cases of sudden and violent death, and likewise to the fatal termination of inflammations of different parts.

Our knowledge of the essential nature of febrile action does by no means entitle us to acquiesce in the statement of Cullen, that our method of treatment in Fevers "may be directed by a proper attention to the proximate cause of Fevers," but we hold that it ought to be directed *first*, by knowledge of the natural progress and decline of these diseases, and of the symptoms which indicate that course; and, *secondly*, by knowledge of the nature of those changes, and those complications, occurring in many individual cases, which appear to alter the natural progress towards recovery, and determine the fatal result.

Our first object is, to place the patient in circumstances favourable to the ultimate decline of the disease, by withdrawing him from the operation of those causes which are known by experience to aggravate the febrile state, *i. e.* by the Antiphlogistic Regimen. Those parts of this regimen which consist in removing the irritation arising, 1*st*, from strong impressions on the external senses; 2*d*, from voluntary exercise of body or mind; and, 3*d*, from the taking in of aliments,—are proper to be observed during the whole period of febrile action. Rest and quiet are to be strictly enjoined, the irritating influence either of heat or cold to be avoided, and a moderate grateful temperature secured, thirst to be allayed by full allowance of mild liquids, and the

action of the bowels watched, and full daily evacuation of fæces secured by medicines, or enemata, when required. We have many opportunities of observing, that those in whom these precautions are neglected in the early part of the disease, usually have it in an aggravated and complicated form.

The free admission of pure air may be easily believed to be beneficial; but we see the disease so frequently run its course quite favourably in very foul and close air, that we cannot suppose this to be of the importance to the progress of the disease in individuals, which has been supposed; and it certainly often appears, when a patient has lain in a warm and close room during a considerable part of the disease, that the change to cool and fresh air (particularly if accompanied with some muscular exertion), has an injurious effect, chiefly in bringing on a complication of local inflammation.

It is then to be remembered, that when patients are placed in the circumstances above stated, a great majority of them, in most epidemics, especially if young, and previously healthy, will pass through the disease favourably without any farther treatment; and that powerful remedies, of any kind, may materially injure the course of the symptoms that is to be expected; therefore, that we should see clearly before us, some change that is likely to be injurious, and some remedy fitted to counteract it,—and should look forward, besides, to the effect to be expected from that remedy on the ulterior progress of the symptoms, before determining on farther interference; excepting only by such placebos as may seem necessary for the satisfaction of patients or their friends.

Next, we should attend to what has been observed as to the nature of the prevailing Epidemic, particularly as to the circumstances in which death has been chiefly observed, and the symptoms immediately preceding it, and likewise as the effect, either of depleting remedies on the one hand, or stimulating remedies on the other, on the progress of the symptoms. For it is quite certain that in some epidemics, most of the fatal terminations are observed to be preceded by coma, or by dyspnœa, with pretty full pulse almost to the last; and that in others there may be few fatal cases preceded by coma or urgent dyspnœa,—or at least few, in which these symptoms are not attended by such feebleness of the circulation, as obviously in itself implies great danger;—that in some epidemics, the strength of patients may often be observed to sink under evacuations which are usually well borne in others;—again, that in some epidemics, stimulants are taken largely, without any injurious effect on the symptoms of affection of the brain,—while in others, increasing delirium and stupor seem generally to follow their use.

The expectation of cutting short fever, by the use of any powerful remedies in the first few days, must be very slight; we know that all the remedies, usually recommended for that purpose, are very frequently employed, even from the commencement, without any perceptible effect on its duration; and we meet with so many cases of Ephemeral Fever,—*i. e.* of febrile attacks of a day or two's duration only, in persons of irritable constitution, and in those who have been fatigued and exhausted by nursing friends, and been thought likely to imbibe contagion, that we can perceive an obvious source of fallacy in regard to cases thought to have been cut short. Never-

theless it is right to mention, that the means by which this object has most frequently seemed to be accomplished are, a small bleeding, followed by such a combination of purgative medicine, with Tartar Emetic, as has produced vomiting, purging, and sweating, within a short time. In some instances the Emetic alone has seemed effectual, but probably only when sweating took place, and was encouraged after it.

When a case is seen from the commencement, while the rigors continue to recur, and the patient is of such habit of body, and the strength of circulation such, that the subsequent progress of the disease may be expected to be improved, rather than injured, by these evacuations, it is right to use them at this early period, and with this view; but it is always to be kept in mind, that the disease will most probably go on, and that although the first uneasy sensations be relieved, its subsequent course may be very various.

It is important to observe, that in this early stage, the effect of a small bleeding, taken in the erect posture, is often to produce faintness; this is often important as a criterion of the nature of the disease, and likewise as an indication of the quantity of blood which can be safely drawn. In some instances the affusion of cold water, immediately after the febrile reaction, or hot fit of fever has set in, has seemed to cut short the disease; but although that remedy, in the early part of the disease, seldom fails to cause great reduction of the frequency of pulse and heat of skin, and to relieve the most uneasy feelings, it is very generally found, that these advantages are only temporary, and that the subsequent progress is not materially altered; and although the repetition of the remedy is quite safe, when the

pulse is firm and skin is permanently hot and dry, and no indication of inflammation or congestion of blood in any internal organ exists; yet in the much greater number of cases of severe fever, in which some such local indications exist, experience has shewn, that the check thus given to the circulation on the surface, and particularly on the extremities, is attended with very considerable risk of aggravation of the local affection.

More frequently we see a patient in fever only after the reaction has been completely established, and have no expectation that its course can be materially or safely shortened by remedies. In such a case, we can hardly regard it as an object to moderate the general febrile reaction, by active treatment, on account of danger from that cause alone, because we know that the mortality of the disease is least in those patients in whom the frequency and strength of pulse, and heat of skin, are greatest in the early stage; but in so far as we can perceive that there is local disease, approaching to inflammation, which is aggravated or kept up by the strength of the reaction, we are justified in using the means of reducing it to what we regard, from habitual observation, as a moderate febrile reaction,—with a view to the mitigation of that local affection.

1. When we have more than usual of pain of head, —throbbing of the temples,—impatience of light and sound,—restlessness,—pervigilium, or active delirium, early in fever,—we look forward to the prospect, certainly realized in some such cases, of death by coma, before the end of the second week,—the pulse continuing full and firm, and the skin warm, almost to the last; and we know that these symptoms may probably abate considerably after a bleeding at the arm; we

have the less apprehension about this step if the pulse be firm, and not very frequent; and we know, also, that in certain epidemics, the danger above stated has been frequent, and even repeated bleeding, to eight, ten, or twelve ounces, to moderate these symptoms, has been well borne—no failure of the strength of the circulation succeeding, and the mortality under that practice being small. But we know, also, that in most epidemics, the danger, as indicated by the symptoms immediately preceding death, is considerably different from this; that although death may take place in the way of coma, it is not, in general, until the circulation has already been for some time so feeble in itself as to indicate great danger; that the pulse has often rapidly sunk in strength after bleeding; and that the mortality among those bled early in the disease, has been observed to be unusually great. We know, likewise, as already stated, that although such effusion in the cranium, as we may believe to be inflammatory, does occur in fever, yet it is almost always slight, and may be altogether absent, even when death takes place strictly in the way of coma. Therefore, in general, we think it best to moderate the violence of reaction, and lessen the danger of increased determination to the head by other less debilitating means; of which the following are the chief, and the use of which must be regulated, partly by the intensity of the local symptoms—partly by the strength of the circulation.

1. Local Bloodletting by leeches, of which twelve, applied twice to an adult, may be considered full evacuation in this way, in most epidemics of fever.

2. Purging (if there be no spontaneous diarrhœa), so as to produce fluid evacuations; and if this is to the extent of three or four daily, during three or four of the

days of the first week, this remedy may be said to have been fully employed, though there are many cases in which the head is much affected, and the pulse firm, where more than this is done safely, and apparently with good effect.

3. Shaving and cold washing of the head, and occasionally of all the upper part of the body, sometimes even the cold affusion, with the precautions that may be understood from what is stated above.

4. The use of small, slightly nauseating doses of Tartar Emetic, repeated once in two hours.

5. Some expedients which may be said to act as derivants from the head, are also useful in the restlessness and delirium of the early stages,—particularly warm fomentations,—the pediluvium,—the erect posture repeatedly assumed for a short time, and stimulating Enemata, such as that with Turpentine.

Small doses of Saline medicines, especially if given in the state of effervescence, are grateful to the patient, and have been thought to take effect on the febrile state; but we cannot suppose that they do so by their diaphoretic power; for during the greater part of the disease, sweating is hardly to be produced by drugs, and when taking place spontaneously, is followed by no good effect.

After the uneasy feelings in the head have been relieved by more or less of this antiphlogistic treatment, in the first few days of fever, it is very often found, that a moderate dose of an opiate at night, sometimes followed by a second smaller dose, procures sleep, and gives much relief to the feelings of the patient. Without such previous preparation, the effect of opium on the state of the nervous system is often unfavourable,

and even after it, its effect is by no means uniform,—apparently much influenced by individual constitution,—generally more certain in persons of the lower than the higher ranks; but in many cases where delirium is apprehended from the persistence of the wakefulness and restlessness, its use is followed by sleep, and more tranquil feelings, without stupor; and after two or three nights, it may be withdrawn without the restlessness returning.

When the pulse is frequent and full, and active delirium present, even after the evacuations, the opiate, in rather smaller and repeated doses, is given most safely along with Tartar Emetic; or repeated nauseating and purging doses of the Tartar Emetic, may precede any trial of Opium. As the disease advances, there is more danger of stupor, particularly in those who have had much delirium, and the opium should be withdrawn, or given with much caution; but in some it is useful, after some evacuation, and along with the Antimony, on the accession of more violent delirium, even late in the disease.

When there is much tremor and spasm in the advanced stage, the opiates, or Camphor, without the antimony, sometimes appear distinctly useful,—provided the spasms are unattended by any comatose tendency; but full doses of narcotics at this period are always hazardous; and the effects of all should be carefully watched.

The comatose tendency in fever, whether gradually advancing, or more quickly succeeding to delirium, when not too far advanced, may often be successfully opposed by blistering on the head, and by purgatives, especially aided by stimulating Enemata; but drowsiness, from which the patient can easily be roused, re-

quires no active treatment, and is to be regarded as favourable.

2. In the complication with Bronchitis, or threatening of Pneumonia early in fever, the local bleedings (chiefly on the breast),—the Antimonials, or slightly nauseating doses of Ipecacuanha, and the opiates in smaller doses than in the former case (lest they interfere with expectoration), but pretty frequently repeated,—and then blisters to the chest,—are the chief remedies. The blisters, particularly in children, should be kept on only a few hours, and vesication promoted by poultices, lest ulceration or sloughing should succeed.

The chest affection, which is combined with the early stage of fever, usually subsides under this treatment; that which comes on gradually and insidiously in the later stages is more dangerous; and the death, if not strictly by Asphyxia, certainly preceded, and partly caused, by urgent dyspnœa, by no means uncommon. This complication may often, however, be mitigated by more or less of the remedies now mentioned, and by expectorants, gradually made more stimulating, particularly by the addition of Ammonia; and it is to be observed, that if it remains pretty stationary for a few days,—much cough and dyspnœa, although obviously prolonging the disease much beyond its usual period,—may often be gradually but completely recovered from, without active treatment, provided the circulation remains of tolerable strength. This remark applies particularly to fever occurring in persons who are constitutionally liable to chronic bronchitis and asthma.

The symptoms which chiefly indicate that the time for the antiphlogistic treatment is over, and that the stimulating only is admissible, are feeble pulse,—cold-

ness of skin,—lividity and *general* sub-crepitous, and mucous râle. As we know that there is much tendency to serous effusion in the lungs in these circumstances, there is an obvious indication for diuretics; *e. g.* Squill, Digitalis, and Calomel; but these must not be given in such doses as to interfere, by their nauseating or depressing effect, with the main object of keeping up the strength of the circulation.

The dyspnœa which comes on only in the last stage of Fever, with little or no cough, with a feeble pulse, and often with strong tendency to coma, is very generally a fatal symptom; it may be presumed to depend on the congestion of blood in the depending parts of the lungs, formerly noticed, as a natural effect of debility, particularly if any bronchial inflammation is present; and is not a case for any kind of evacuating treatment, excepting in a few incipient cases, where it seems to be partly dependent on insensibility, and to be relieved by blistering the head and stimulating enemata.

3. There is often, in the early stage of Fever, particularly in summer and autumn, pain and tenderness at stomach, occasionally slight yellowness of skin and eyes, and sometimes much vomiting; which may be relieved by leeching on the stomach,—by purgatives, especially those containing Calomel, if the stools are unnatural, and (especially the vomiting) by a blister on the Epigastrium. Sickness and vomiting at a more advanced period, often seem to depend on complication with a more chronic, or even organic affection of the stomach or liver, and are sometimes relieved by small doses of Calomel with Opium, or by Enemata contain-

ing small quantities of Morphia; but sometimes they are associated, especially in older persons, with the comatose tendency, forbidding the use of Opium.

As the disease advances, we must watch the state of the bowels, particularly in younger patients, for indications of the characteristic affection of the mucous membrane, which are unfortunately often very obscure; —suspecting it always, if the bowels are naturally loose, and the disease appear protracted, and especially if the diarrhœa is attended with griping pains, or distension of the abdomen; and by no means expecting that it will shew itself, either by tenderness of the abdomen, or by discharge either of blood or mucus by stool. We know that in many cases, particularly if there be the griping pain and beginning distension, leeches applied to the abdomen in such circumstances, are followed by a distinct abatement of the symptoms, and apparent shortening of the disease; and whether with or without the leeching, we can very generally observe, that repeated small doses of Opiates, with Acetate of Lead, or with the vegetable astringents, or given in Enema, are followed by abatement of the number of stools, and improvement of all the symptoms. These are less likely to be injurious, as in these cases there is generally little of the comatose tendency; but they should not be used in such quantity as suddenly to check the diarrhœa, or to prevent full daily evacuation of the bowels.

When the distended state of the abdomen continues, without diarrhœa or after its abatement, it may sometimes be successfully obviated by astringent and stimulating Enemata, as by those containing powdered bark or Quinine with Assafœtida, and by small doses of laxa-

tives and astringents (as Rhubarb with Quinine) given by the mouth.

But while we watch the local symptoms occurring in fever, with a view to the use of these remedies, we must likewise attend carefully to the indications of the state of the circulation, because we know that there are cases, of the adynamic form of the disease, which are fatal by mere Asthenia, without any of these local affections existing in a degree perceptible, either before or after death; and that generally even in the complicated forms of fever, a great part of the danger depends on the enfeebled state of the circulation; we know, both from dissections, and from experience of the juvantia and lædentia, that there may be coma, dyspnœa, and diarrhœa in fever,—all depending on causes which no evacuating remedies can relieve, and which may nevertheless spontaneously and finally abate; and we know, farther, that a great degree of all these symptoms may exist in fever, and be gradually recovered from, if coexistent with a tolerably firm pulse, and vigorous circulation on the surface of the body, as indicated by the persistence of the heat. We therefore do not urge the use of Evacuations for the local affections in fever, as we should do in cases of idiopathic inflammation of the same parts; and whenever we observe the circulation to become feeble,—or even (in Epidemics where we know that much debility is to be expected, before it has become feeble),—we use the stimulants,—chiefly wine,—in bad cases, spirits, ammonia, or æther,—in small but frequent and gradually-increasing doses,—both during and after the time when the remedies are applied to the local affections,—in the hope of maintaining the requisite strength of the circulation, until the time when the

spontaneous favourable change is to be expected: and although many of the cases, in which the circulation becomes very feeble, are fatal, we see many recover, both from the simpler and more complex forms, to whom the stimuli are given in such quantity as cannot be supposed to be inert; and in whom the pulse becomes less frequent and firmer under their use, and therefore the most dangerous part of the disease undergoes improvement,—even before any distinctly favourable change of any other symptom takes place,—and this without any aggravation, or even with simultaneous abatement, of the local affection. It is perhaps chiefly in cases protracted somewhat longer than usual, that we see especial advantage from the stimulants.

In the later stages, there is not only much suffering, but occasionally danger, from the inflamed, ulcerating, and sloughing parts of the skin, on which the patient has chiefly rested, which may often be, to a certain degree, prevented by the air-pillow, or other expedients, for relieving the sacrum or hips from the pressure. When these sores exist, they are benefited by gently stimulating or astringent, chiefly spirituous, applications at first; followed by poultices, and often by hot dressings when sloughing has begun, and by astringent and slightly stimulating lotions after the sloughs have separated: no healthy granulations can form as long as the truly febrile state continues, but the rapidity of the healing process, after the febrile action has subsided, is often surprising.

It is always important to watch the very commencement of convalescence from fever, on account of the facility with which relapse may be produced by exertion, exposure to cold, or errors in diet; and likewise because

of the frequency of insidious, nearly latent inflammations,—particularly in the chest, which often succeed so quickly, that their symptoms are easily mistaken for the proper symptoms of the fevers; but which may often be distinctly recognised, and successfully opposed, by such depleting remedies as would have been dangerous only a few days previously.

In the case of the Remittent Fevers of hot climates or seasons, the practice must be of the same general character as in the continued fevers of this climate, and requires at least as much to be modified, according to the nature of the prevailing epidemic. In some seasons, the symptoms resemble those of inflammation of the brain, stomach, or liver, and full and repeated bloodletting, and free purging, are well borne, especially by Europeans, lately arrived in tropical climates; but in other seasons, and particularly in those when the disease is most prevalent and most fatal, the symptoms are more typhoid, or the patient is soon exhausted by vomiting, ultimately black vomiting; and in such seasons, generally, evacuations are much worse borne. Whatever remedies appear to be demanded, either by the state of the circulation, or by the local complications, must be used promptly, and in quick succession, as the disease makes much more rapid progress than the continued fever of this climate, and the remissions are not such as to enable us to use remedies between the paroxysms, with any advantage.

Although there is some difference of opinion among practitioners, who have seen much of the Remittent Fever, as to the efficacy of Mercury, yet it may be stated, as the most general opinion, that if it is given in large and repeated doses, and if these take effect in the system

(which they very often fail to do), it appears occasionally to arrest, or greatly mitigate, the progress of the disease; and although we certainly cannot ascribe any such power to Mercury in the fevers of this climate, we are not, on that account, entitled to set aside that observation; more especially as a very important part of the disease, in the worst cases in the hot climates, consists in the suppression of the excretions of Bile and Urine, which is hardly seen in the fever of this climate; but when occurring in other diseases, appears to have been, in a few instances, controlled by the full action of Mercury.

When the Remittent Fever subsides, it very often leaves behind it an Intermittent Fever, which may last much longer, and for a still longer period be easily reproduced by cold, especially exposure to the east wind, fatigue or intemperance; and this consequence clearly denotes that the Remittent Fever (at least of most seasons) is only the highest grade of the Intermittent.

The treatment of the Intermittent Fever differs essentially from that of the Continued, in this, that little or nothing is in general to be done during the paroxysm, the chief remedies being reserved for the intermission.

The Antiphlogistic regimen, diluents, and diaphoretics, should indeed be directed during the paroxysm: in cases of violence, leeching and purging will be useful; the cold affusion has been used in the hot fit with good effect,—more generally a full opiate, given in the beginning of the hot fit, has seemed to shorten the paroxysm remarkably; and the practice of bleeding in the cold fit has appeared to have a similar effect: but the effect of all these remedies is only to abridge somewhat a paroxysm which will at any rate be over in a

few hours; and all of these, and especially the last, will leave a certain degree of debilitating effect afterwards; and therefore, unless the disease is of unusual intensity, they may very often be properly omitted.

The main object in this disease is, the proper administration of the specific remedy, the Bark or Quinine, during the intermission. The only preparation requisite in a case not complicated, before beginning to use this, is to secure the complete evacuation of the bowels. The Quinine is then to be given in repeated doses, the more frequently as the previous paroxysm has been more violent; and it has often been found useful to give a double or even triple dose immediately before the expected paroxysm. Sometimes the treatment is baffled by frequent vomiting, but this may often be controlled by purging with Calomel, by saline effervescent mixtures, and by the opiate Enema, at least so far as to allow the medicine to be taken in pills. In some instances it has answered when given in large doses by glyster.

The success of the remedy is generally promoted by a moderate allowance of fermented liquor, and, if the appetite permit, of animal food during the intermission.

Under this treatment the paroxysms usually become later and slighter, and then disappear entirely, unless the disease is kept up, either by reapplication of the cause, or by exposure to cold, or excess of some kind, or by the presence of organic disease, perhaps consequent on former paroxysms.

The Arsenical Solution taken in like manner, in repeated small doses, during the intermissions, has undoubtedly a similar specific effect, and has sometimes been effectual when the Bark or Quinine has failed.

When the disease is combined with decidedly inflam-

matory action in any organ, that state ought to be much mitigated by the antiphlogistic treatment, before the use of the specific remedy is begun.

The state of the Liver and Spleen, and of the stomach and bowels, require much attention after Intermittent Fever has declined; removal from a malarious district is the first indication: enlarged Liver, with deficient secretion of Bile, is often benefited by the cautious use of Mercury, with other laxatives, the saline mineral waters and bitters; enlarged spleen (almost always injured by the use of Mercury) is stated to be best treated by repeated blisters, and combinations of laxatives with preparations of Iron. The bowels sometimes require laxatives, and sometimes astringents, and both should be used with caution, so as to restore as soon as possible the natural daily evacuation. The diet must be carefully regulated, as the disease is easily reproduced by any disorder of the stomach, whether from the use of food difficult of digestion, or irregularity in the times of taking food, or any excess in strong liquors. In all cases, much gentle exercise, occasional change of scene, and as much of the Tonic Regimen as the patient's condition will admit, are beneficial.

CHAPTER II.

OF CONTAGIOUS EXANTHEMATA, OR ERUPTIVE FEVERS.

We here treat of diseases, caused chiefly if not solely by contagion, and therefore prevailing at times epidemically, in which there are symptoms of general fever, more or less of the typhoid character,—and at the same time an eruption on the skin (as in many cases of the continued fever already described); in which there is very generally likewise inflammation, chiefly of the mucous membranes, in internal parts; and the danger appears to depend, seldom on the extent of inflammation on the surface, but partly on those internal inflammations, and partly on the affection of the general system, and especially of the circulation, which results from the action of the morbific cause. There are these material differences from continued fever, that the duration of the febrile action is generally shorter, and much more uniform, and that the whole succession of the symptoms, and especially the course of the external inflammation, is much more regular. This description applies chiefly to Smallpox, Measles, and Scarlatina, and probably also to the Plague. It applies also to the slight disease called Varicella; and in several important particulars, to the Erysipelas.

In all the eruptive fevers except this last, it is to be observed, as an important part of their Pathology, that experience has shewn the danger of arresting the course of the specific inflammation on the skin. Whether the body contains a morbific poison, which ought to be expelled, or not, it certainly labours under the influence of a cause which becomes more dangerous if the inflammations accompanying it are abortive; and unwonted recession of the eruption, if not a *cause* of injury, is very generally to be dreaded as a *sign of* such enfeebled circulation as threatens immediate death by Asthenia.

The Pathology of these diseases, and especially of the combination existing in them all, of local inflammation, always of a peculiar or specific character, with general typhoid fever, is essentially the same as that of the more complex form of continued Fever; but it is important to consider shortly how far the statements made as to the history of continued fever are applicable to each of these exanthematous diseases.

In the case of smallpox, measles, and plague, we are nearly certain, from facts of the description formerly noticed (p. 66), not only that these diseases are contagious, but that they never proceed, at the present day, from any other cause than the specific contagion, thrown off probably chiefly in the breath of persons themselves affected with the diseases, but likewise existing in the excretions formed on the surface of their bodies, as appears from the communication of the diseases by inoculation. But it is more doubtful whether the scarlatina and varicella (of which a few cases occur almost every season in this country, and which less frequently spread epidemically to great numbers of persons), do not occasionally arise from unknown causes, and then spread by

contagion; and of the frequent sporadic origin, and only occasional communication by contagion, of the erysipelas, there can be no doubt.

In this last case, it seems nearly a necessary condition to the communication of the disease by contagion, that an inflammation of the skin, or at least an abrasion of the cuticle, whether by wound, bruise, scratch, blister, or some other cause, should exist at the time that the morbific poison is presented. It has also been supposed that some derangement of the digestive organs is an essential condition to attacks of erysipelas, but it does not appear ascertained that such derangement does more in this than in various other cases of exposure to the causes of acute disease, viz. strongly predispose to their development.

The protection against future returns of the disease given by its once taking place, which was mentioned as frequently observed in regard to continued fever, is nearly absolute in the case of smallpox, measles, scarlatina, and probably varicella; though a few exceptions to the rule have been observed in all these cases; but it does not hold so surely of plague, and the reverse appears to hold of erysipelas.

The singular and anomalous facts as to the connexion of smallpox and cowpox may be thus stated, That the contagious matter of smallpox may be so applied as to act on the living system of the horse and the cow,* and excite in them a mild vesicular disease, without any general eruption, and without constitutional disturbance; and that this local vesicular disease, communicated to the human subject by inoculation, runs its course there in the same innocent manner; with the effect of pro-

* See Edinburgh Medical and Surgical Journal, 1831.

tecting the system, in a great majority of cases, against all subsequent influence of the contagion of smallpox; and with the effect, in almost all cases, where the protection given by it is not absolute, of so modifying the disease which that contagion can excite, as to arrest the progress both of the cutaneous inflammation and of the fever, about the end of the first week, and so render it nearly free from danger.

The contagious poison of all these diseases, like that of continued fever, is liable to great variations,—in efficiency, as seen in the diffusion of epidemics,—in virulence, as seen in their mortality; and in specific character, as seen in the most urgent symptoms, and most frequent accompaniments of the diseases, as occurring in different seasons. The epidemics of smallpox are perhaps chiefly seen in the summer; those of measles in winter of this climate. The diffusion of measles is generally the most rapid of any, that of smallpox next, and that of scarlatina, in most seasons, the least rapid; although occasionally, and within narrow limits, it appears to be propagated with extreme facility. Of the natives of large towns, there are few adults who have not passed through measles, and one form or other of smallpox, and on this account in these the mortality of both these diseases falls very much on children below the age of ten.*

* Mr Watt's curious tables give the following results on this point. Of the whole mortality from these diseases, there are,—

DEATHS UNDER TEN YEARS.

	Measles. Per cent.	Scarlatina. Per cent.	Smallpox. Per cent.
Edinburgh,	92	64	82
Glasgow,	85	70	85
Perth,	92	63	87
Dundee,	90	66	85

In all these diseases there is so distinct an eruptive fever, although of various duration, before the inflammatory appearances in the skin commence, as unequivocally to demonstrate that the inflammation,—although an effect, and the only sure criterion, of the specific poison which excites the fever,—is not the cause of the fever; which must therefore be held, like idiopathic fever, to consist in the reaction of the system against the depressing influence of the specific poison. The internal inflammations attending these diseases, although often aggravated by the usual causes of inflammation, applied at the time, are yet so uniformly observed, and so frequently severe when there has been no such concurrent cause, that we must regard them as likewise effects of the specific poisons.

SECT. I.—*Of the Smallpox.*

The Smallpox is distinguished by the pretty uniform duration, both of the latent period (from seven to twelve days), and of the eruptive fever (from thirty-six to sixty

DEATHS UNDER TWENTY YEARS.

	Measles. Per cent.	Scarlatina. Per cent.	Smallpox. Per cent.
Edinburgh,	99	98	95
Glasgow,	99	97	95
Perth,	100	98	91
Dundee,	100	95	94

DEATHS ABOVE TWENTY YEARS.

Edinburgh,	·0 }	1·3	4·7
Glasgow,	·0 }	2·04	4·8
Perth,	0	1·4	8
Dundee,	0	4·6	5·1

hours); by the *pustular* character of the eruption,—and the appearance of the incipient pustules shewing always depressions on their tops after the second day; an erythema, or roseolous rash often attends the beginning of the eruption, but disappears in two days. The suppuration is not completed till the seventh or eighth day from the appearance of the inflammation, and, when the eruption is numerous, is followed by secondary fever for some days more. The pustules usually exist in numbers on the eyelids; but hardly on the conjunctiva of the eyes; they are numerous in the mouth and throat, and are occasionally seen in the larynx, but hardly suppurate completely there, and probably never extend to the stomach.

In this disease the peculiar action of the contagious poison on the Nervous System is often shewn, in the case of children, by convulsions before the eruption comes out. The fever is seldom attended with so great depression of the circulation, as is seen in the more malignant cases of other epidemic diseases; the pulse is generally full, even at the decline of the eruption, and the disease is very generally protracted at least until the usual time for the maturation of the pustules; but when their number is very great, the powers of the system are inadequate to the filling of the vesicles that had formed in the skin, or to the conversion of the fluid in them into pus. Hence the peculiarity, and likewise the fatality, of the *Confluent* Smallpox, which is generally, in fact, a vesicular disease, where the vesicles continue flat and broad to the last; and which is very generally fatal about the eleventh day, even when there is very little complication of local inflammation.

When symptoms of Purpura, or of the Hæmorrhagic

diathesis, attend the disease, as happens occasionally in all Epidemics, but with peculiar frequency in some (as in the *Variolæ nigræ* of Sydenham), it is often fatal at a considerably earlier period, and although the eruption be quite distinct; and the fatal event is generally preceded by coma and convulsion. When unattended with that complication, the distinct Smallpox is usually free from danger; and even what has been called the *Coherent*, where a part only of the pustules on the face are confluent, but the whole fill up thoroughly, and their contents become quite purulent, usually terminates favourably, if the patient is in tolerably favourable circumstances, and there is no peculiar complication.

The mucous membrane of the fauces, however, and the tunica conjunctiva of the eyes, are very generally inflamed early in the disease, and that of the trachea and bronchiæ, in a greater or less degree, in the later stages. The substance of the lungs likewise often undergoes changes similar to those described as occurring there in or after Fever. The mucous membrane of the stomach and bowels is more rarely and more variously affected.

The chief danger is of death by Asthenia, or exhaustion, generally attended with much comatose tendency, and rapidly increasing about the time of the maturation, when fresh rigors, preceding, in more favourable cases, the attack of secondary fever, are to be expected. The Dyspnœa resulting from Laryngitis, Bronchitis, and even partial Peripneumony, aggravates the danger much in many cases, and makes some fatal when there is little confluence of eruption; but the inflammation at the larynx hardly ever goes to any other

termination than thickening of the membranes; and the condensation of the lungs, found after death, is seldom to a great extent, and often of the kind described as "Peripneumonie des Agonisans," rather than hepatization.

After the disease has nearly or wholly subsided, inflammation, going with peculiar rapidity to suppuration, is very apt to occur in different parts, most generally in some part of the subcutaneous cellular texture, —occasionally in the eye,—less frequently in the joints, —more frequently in the pleura,—and in small portions of the substance of the lungs,—in which it sometimes goes on likewise to sloughing. And on any exposure to cold, for long after the disease, scrofulous inflammation, in any one disposed to it, is very easily excited.

The Eruptive Fever of Smallpox is often so intense, and attended with so much flushing and headache, as to suggest the use of Bloodletting; but although these symptoms are relieved by it, the quantity of the coming eruption is not found to be diminished; and the uncertain amount, and necessarily long duration, of the diseased action, which is inevitable, of course make all large evacuations at that period inexpedient. There is statistical evidence, particularly as to the practice of the empirical inoculators, which seems sufficient to shew, that, by purging, and by the prudent application of cold in the eruptive stage, the duration of this may be increased, and the quantity of the eruption and danger of the disease may be considerably diminished. After the eruption has come out, and the degree of violence of the disease, which is in general measured by the quantity of eruption, is determined, the practice to be

employed has the same objects,—of palliation rather than cure,—and does not differ from that which we would recommend for Continued Fever, with the complication of local disease here existing,—excepting in this, that, as an additional cause of irritation exists in the state of the skin, and as the affection of the nervous system is seldom urgent, it is important to allay this uneasiness by opiates given daily, or sometimes twice a day, from about the fifth day of the eruption, unless these are clearly contra-indicated by Coma; and that mild Liniments applied very frequently to the surface give considerable relief to that irritation. In the later stages, indeed, more stimulating applications, such as a weak Solution of Chloride of Lime, to allay itching, or a liniment containing a little of the Oil of Turpentine, when there is superficial sloughing, are useful.

The early evacuation of the contents of the pustules has been found, by ample experience, to be inefficacious; and the cauterization of the pustules to be unsafe; but there are two situations in which the application of Caustic, or its Solution, in the early stage,—arresting the inflammation and all its effects,—has been found distinctly useful, viz. on the eyelids, and in the fauces.

The modified or mild Smallpox, so frequently seen in those who have been vaccinated, is distinguished from the natural disease, not by any mitigation either of the degree or duration of the eruptive fever, or of the quantity of the eruption, or of the appearance of the papulæ in the commencement; but in the circumstance that the fever and inflammation subside earlier than usual, and there being no secondary fever, the dangerous part of the disease (excepting in the case of an unusual complication) is avoided; and of course, unless in com-

plicated cases, little or no treatment is demanded. Sometimes, in such cases, the pustules, or a part of them, run the usual course, but complete it by the 6th day, instead of the 8th; but more generally they are small, show little of the depression on their tops, and either become wholly abortive, or harden into dry scabs,—which then appear set on dusky-coloured tubercles,—without ever shewing pus in their interior. It is perfectly ascertained, that the occurrence of this form of the disease cannot be ascribed to improper vaccination; it being very often seen in persons who have the mark of perfect vaccination, viz. a depressed and indented cicatrix on the skin, a quarter of an inch or more in diameter.

The most important question in regard to this mitigated form of Smallpox is, whether it is more apt to occur, or approaches nearer to the natural disease, in those vaccinated long previously to its appearance; and the fairest conclusion that can be drawn from the facts hitherto ascertained is, that, if not occurring more frequently, it is oftener severe in those long previously vaccinated, than in others,—whence it may be inferred, that, when the disease is prevalent, revaccination may be an effectual preventive as to some who might otherwise be affected.

The variety as to the virulence of the poison of Smallpox, in different seasons, appears especially from this, that the proportion of the vaccinated who take the disease, usually very small, has in some epidemics formed a large proportion of the whole exposed to the contagion.

The Varicella is a vesicular contagious eruption, preceded and attended by slight fever, and lasting only four or five days, and demanding only the mildest anti-

phlogistic treatment, or even the regimen only; but it is important to attend to its diagnostic marks, because ungrounded alarm in some cases, and misplaced confidence in others, may result from its being confounded with smallpox. It is distinguished especially by the vesicles being larger, in proportion to the inflamed bases on which they stand, of more oval form, the layer of cuticle containing them thinner, and arising much more quickly, each attaining its full size in forty-eight hours or less, although several coming out in succession usually prolong the disease a few days more. The inflamed base is also less elevated; and the fluid effused, unless from mechanical irritation, never becomes purulent; the cutaneous inflammation being, in fact, more superficial. By these marks, and by the eruptive fever being shorter and slighter, this disease may be distinguished from the modified as well as the regular smallpox; and the truth of the distinction becomes obvious when it attacks a family of which some have been previously vaccinated and others not, and is found to shew the same characters in all.

SECT. II.—*Of the Measles.*

In this disease, the duration both of the latent period, and of the eruptive fever, is less uniform than in the Smallpox,—sometimes protracted for six or eight days. The disease is distinguished by the peculiar form (generally approaching to the crescentic), and the brownish red colour of the patches of eruption on the skin, which begins on the face, soon becomes general, and lasts about four days in the regular form,—the patches gra-

dually enlarging, and becoming of a deeper colour,—and fades away without any other effect than partial separation of the cuticle in minute powdery scales; and also by the inflammation of the tunica conjunctiva of the eyes, and of the nasal mucous membrane, during the eruptive fever, and of the membrane of the larynx, trachea, and bronchiæ, causing a peculiar hoarse cough, and more or less of dyspnœa, during the continuance of the eruption; which in severe cases go on, and even increase, after the eruption has faded;—in general also by diarrhœa, sometimes taking the form of dysentery, in the decline of the eruption.

In ordinary cases, and in most epidemics, the fever is of considerably shorter duration than that of Small-pox, and shews no typhoid symptoms, but is liable to protraction when the inflammation of the mucous membranes is more violent and lasting than usual. But in certain cases, probably in all epidemics, and in many cases in certain seasons, the fever has quite what was described as the adynamic, or even the congestive form; *i. e.* the depression on its first attack is extreme, and the reaction feeble and imperfect: in such cases the tongue is often dry, and there is always much nausea and vomiting, and tendency to coma,—sometimes diarrhœa,—and the inflammation on the skin appears late, and is pale or livid, partial, and of short duration, often lasting only a few hours in one part.

On dissection after fatal measles,—unless unusually complicated,—the only morbid appearances are those of Bronchitis; *i. e.* much muco-purulent effusion, often very general in the bronchiæ, with congestion and serous effusion in the lungs. If either Pleurisy or decided Peripneumony exist, it is to be regarded as an unusual,

perhaps often as an accidental complication. In the abdomen, ulceration of the mucous membrane is found only in cases that are unusually protracted by diarrhœa, and in which the death must be ascribed to the local affection only.

The danger of the disease, in most epidemics, is only from an unusual intensity of the accompanying bronchitis, indicated by the appearances above mentioned, and is greatest about the time of the decline of the eruption. But this bronchitis is probably always the more dangerous, as it occurs in a system which is under the influence of a weakening disease, independent of itself; and the malignant typhoid fever above described as occasionally attending measles, is very dangerous, even independently of any complication with bronchitis; and when that complication exists in a certain degree, is inevitably fatal.

In weakly, especially scrofulous, constitutions, the bronchitis of measles not only lasts after the eruption has declined, but becomes chronic,—sometimes complicated with Asthma, and often passes gradually into Phthisis; and in like manner the inflammation of the eyes and eyelids becomes chronic, and passes into the forms of Strumous Ophthalmia, formerly described.

A great majority of cases of Measles, in most epidemics, terminate favourably in a few days, without any treatment but the antiphlogistic regimen. Even where there is considerable oppression and laboured breathing, during the eruption, we know that this depends on inflammation of the mucous membrane contemporaneous with that of the skin, aud which may subside completely at the time of the fading, without any active treatment; and we may therefore wait until the de-

cline of the eruption, and apply remedies then if the pectoral affection shall continue or increase. But if the cough, pain on coughing, and dyspnœa, are distinctly observed to be greater than usual, general or local bleeding, purging, and Antimonial Solution or Ipecacuan, followed by blisters (to be applied only for a short time), and the cautious use of opiates, are to be prescribed, even during the eruption, as in the complication of continued fever with bronchitis, and in general with less scruple than in fever, because we know that the general fever attending the local inflammation is to be sooner over. And if the fever, attending the bronchitis, be of the typhoid form, it will be too late to use any form of bloodletting after the eruption has declined.

In some cases, even of this last kind, local bloodletting to a small extent, with the other means above mentioned, may be useful; but blisters, in cases of the typhoid character in children, should be avoided; and the cautious use of wine and other stimuli, as in the similar complication of continued fever, is certainly useful. Indeed, in cases of this malignant form of measles, when the bronchitis is slight, but the depression great, with lividity, coldness, and nausea, the good effects of Stimulants are sometimes unequivocal and striking.

The Bronchitis succeeding measles always requires careful attention, and caution as to exposure to cold, until the strength is fairly restored, on account of the known tendency to chronic inflammation, and to scrofulous disease at that time, and the frequent occurrence of tubercular Phthisis, as a consequence of the disease.

SECT. III.—*Of the Scarlatina and Malignant Sore-Throat.*

This is a contagious febrile disease, characterized by an Exanthema, or Scarlet rash, generally of more florid colour, and always more uniform and continuous, than that of measles,—and, at the same time, an inflammation of the mucous membrane of the nose, fauces, and tonsils, and of the lymphatic glands beneath the angle of the jaw,—which inflammation in the tonsils very often goes on to ulceration, and sometimes to sloughing.

There is very great variety in the history of the different cases, to which this general description applies; both in different epidemics, and in different cases of the same,—as to the rapidity of extension,—the intensity of different parts of the symptoms,—the complications, sequelæ, and mortality of the disease. These varieties led the older pathologists to suppose that there are really two diseases,—the Scarlatina, in which the eruption in the skin is the most prominent part of the disease, and the inflammation of the throat leads to no bad ulceration; and the Cynanche Maligna, in which the eruption is usually less florid, the fever more typhoid, and the affection of the throat goes to rapid ulceration or sloughing. And since it has been generally admitted, that all forms of the disease spring from the same contagion, three varieties have been usually described,—the Scarlatina Simplex, in which there is sore throat only, without ulceration,—the Scarlatina Anginosa, where there is ulceration and much swelling of the

fauces, without rapid depression of the vis vitæ,—and the Scarlatina Maligna, where the general symptoms are very much those described as the congestive form of Fever, and there is generally rapid sloughing of the tonsils. But the varieties observed are more numerous than can be comprehended under these distinctions.

The whole progress of the disease is short; it has been fatal occasionally within 24 hours, and most of the fatal cases, referable to the disease itself, take place from the 3d to the 7th day.

The appearance of the tongue is generally very characteristic; at first it has a thick white fur, through which the red and enlarged papillæ protrude, and gradually the fur clears off, and the surface remains of an unusually florid colour.

The Eruptive fever is of very various intensity and duration, generally attended with vomiting; frequently the rash appears during the first day, but it is often delayed till the third or fourth. Frequently it is in large uniform and continuous patches from the first; but sometimes it begins in numerous small points, resembling measles, which afterwards extend and coalesce: in some cases the eruption is very partial, but of the usual florid colour; in others, partial and faint or livid: in most cases it remains distinct three or four days, but in some it fades within a few hours; and there are a considerable number of cases of persons exposed to the contagion, who are affected with sore-throat, sometimes with ulceration of the throat, enlargements of the lymphatic glands, and fever, without any eruption.

Most frequently, the cases of early, general, florid, and persistent eruption admit of a favourable prognosis, being usually attended with a firm pulse, and a state of

the system which bears evacuations well; but there is a considerable number of cases where the eruption is florid and persistent, but the pulse soon becomes feeble and the fever typhoid, and the strength sinks rapidly under evacuations, particularly of blood.

On the other hand, an eruption which appears late, or, even if early, which is somewhat livid, partial, and quickly fading, is usually attended with great depression of strength, much retching and vomiting, the comatose tendency, and rapid sinking; yet there are some cases, at least of the very partial eruption, where all the other symptoms are mild.

In a few cases the full, florid, and persistent eruption, is attended with delirium, coma, and death in the way of coma, the pulse continuing full to the last; but in most cases of this description, although there is intense heat of skin, and often delirium, the reaction soon abates, and, if the disease go on unfavourably, it is attended, in the later stage, with soft or feeble pulse.

The local affections in the fauces and nostrils,—the ulceration of the tonsils, painful swelling of the glands beneath the angle of the jaw, and often of the cellular membrane there, and ichorous discharge from the nostrils,—may coexist with different states of the constitutional fever, but are always most dangerous when going along with the bad typhoid symptoms,—soft or feeble pulse, dry tongue, typhoid delirium, and comatose tendency. The increase of these, and particularly of the submaxillary swellings, at the height, or even during the decline, of the eruption, chiefly observed in young children, is apparently the immediate cause of such aggravation of the febrile state, as is the immediate cause of death in many cases. In such cases the death is

sometimes evidently by Asphyxia, from straitening of the glottis; sometimes caused by a distinctly inflammatory exudation within the larynx.

When the fever is of the most malignant or congestive kind, attended with extreme oppression and weakness, it may be fatal before there is time for any of these local affections to advance to any length; and in all cases the danger from them is greatly aggravated by the typhoid form of fever usually attending them.

Before the proper symptoms of the Scarlet Fever have abated, various effects may result from the affection of the fauces, by which the danger of the disease may be much aggravated; the inflammation may extend down the larynx, lead to the effusion of a flocculent false membrane, and cause the symptoms of croup; it may extend up one or both the Eustachian tubes, cause destruction of the membrane of the tympanum, escape of the small bones, and incurable deafness, with palsy of the facial nerve; or it may extend downwards along the cellular membrane of the neck and arms, with aggravation of the typhoid fever: And if the enlarged glands at the angle of the jaw suppurate, or if they be leeched or blistered, in the typhoid or malignant cases, rapidly spreading and phagedænic ulceration may ensue.

More frequently, after the whole symptoms of the Scarlatina have abated, and the desquamation of the cuticle (usually in pretty large patches on the extremities) has begun, or been completed, various sequelæ follow, by which the life of the patient is again endangered. These are all of a character more or less distinctly inflammatory, and are attended by more or less of renewal of the febrile symptoms. Sometimes the swel-

lings beneath the maxillæ, especially in young children, enlarge rapidly at this time, and cause renewal of the fever, either of a simply inflammatory or a more typhoid type; sometimes there are rapidly increasing swellings of the joints, or of parts in their neighbourhood, tending quickly to purulent deposits; sometimes there are symptoms of inflammation, and rapid effusion in the head, sharp pain, sickness and vomiting, blindness or imperfect vision, coma and spasms; sometimes inflammation, tending also rapidly to effusion in the lungs, pleura, or peritoneum; and, frequently in connection with these internal inflammations,—but frequently also without such complication,—we have Anasarca, or even more general dropsy, with scanty and albuminous urine, known to depend on granular degeneration of the kidneys. There are many instances also of patients escaping all these dangers, who fall into Phthisis, or other scrofulous disease, as a consequence of Scarlatina.

For these sequelæ of the disease, some external cause, especially exposure to cold, may most generally be assigned; but in some instances they supervene without obvious cause; the affection of the kidneys, certainly much more frequent after this than other Exanthematous diseases, has been thought to be partly dependent on the morbid state of the skin during the eruption and desquamation, but has certainly sometimes been observed to follow the disease, when it consisted only in ulcerated sore-throat and typhoid fever, proceeding from the contagion of Scarlatina, but without the eruption.

The Prognosis in this disease is, therefore, always extremely uncertain; it is unfavourable when the fever

has the bad typhoid or congestive form, and when the ulceration of the throat, and the different local affections in connection with that ulceration, are well marked. The disease itself is fatal to many, especially young children, and remarkably more fatal in some families than others; but after the original disease has subsided, the various sequelæ that have been mentioned, are always attended with danger, and this the more, as the symptoms are more obscure and insidious; the most acute and best marked cases of these inflammatory affections being generally the most manageable in practice.

The great variety in the natural course of the disease, both in individual cases and in different epidemics, makes it obviously absurd to lay down any uniform plan of treatment for the disease, and extremely difficult to judge of the real efficacy of any one method. There are undoubtedly cases, and even epidemics, in which the whole course of the symptoms, general and local, has approached very near to that of healthy inflammation and concomitant fever: repeated bloodletting, as well as purging, have been well borne, the most urgent symptoms been manifestly relieved by these remedies, and the mortality under this practice been very small;* but experience has equally shewn, that the expectation entertained by Dr Armstrong and others, that, by early depletion, the congestive or malignant form of the disease may be made to assume the more healthy form of inflammation and fever, is hardly ever realized; and in many cases, although the pulse has been full, and the eruption florid in the beginning, bloodlet-

* See *e. g.* Dr Dewar of Dunfermline, in Edinburgh Medical and Surgical Journal, 1835.

ting (even local bloodletting) has been followed by a rapid change of the fever to the typhoid type, and manifestly aggravated the danger. It is therefore only when repeated observation of the usual course of an epidemic, and cautious trial of the remedy, have shewn that this change of the febrile symptoms is not to be apprehended, that we are safe in adopting this practice.

The other remedies by which the intensity of the febrile reaction, in the early part of the disease, may be more safely and often beneficially moderated, are the application of cold, and purging, which have been carried to a great length by many, since the works of Currie and of Hamilton were published, and may often be properly combined; but these must be regarded as chiefly useful in that description of cases in which the febrile reaction is strongest and most enduring, but in which the danger and mortality of the disease are least.

No observations have distinctly proved whether any, or which, of these antiphlogistic remedies, used early in the disease, can be relied on as *preventing* either the typhoid tendency of the fever, or the bad ulceration, submaxillary swellings, or other local consequences, to be dreaded in the advanced stage, or any of the sequelæ above mentioned, which are to be subsequently apprehended; and although it seems reasonable to conjecture, that whatever moderates the febrile reaction early in the disease, will tend to avert these consequences, yet as we frequently see them all, in cases where that reaction had been very moderate, or even morbidly deficient, we must, at present, regard the effects of all these remedies on the ulterior course of the disease as doubtful.

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dually enlarging, and becoming of a deeper colour,—and fades away without any other effect than partial separation of the cuticle in minute powdery scales; and also by the inflammation of the tunica conjunctiva of the eyes, and of the nasal mucous membrane, during the eruptive fever, and of the membrane of the larynx, trachea, and bronchiæ, causing a peculiar hoarse cough, and more or less of dyspnœa, during the continuance of the eruption; which in severe cases go on, and even increase, after the eruption has faded;—in general also by diarrhœa, sometimes taking the form of dysentery, in the decline of the eruption.

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In weakly, especially scrofulous, constitutions, the bronchitis of measles not only lasts after the eruption has declined, but becomes chronic,—sometimes complicated with Asthma, and often passes gradually into Phthisis; and in like manner the inflammation of the eyes and eyelids becomes chronic, and passes into the forms of Strumous Ophthalmia, formerly described.

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SECT. III.—*Of the Scarlatina and Malignant Sore-Throat.*

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of the endemic origin, as of the contagious property, of this or any other disease.

The observation, which has been often made, when this or any other epidemic disease has apparently been imported into a town or district,—that some of the first cases occur at a considerable distance from the point where the importation was ascertained to have taken place, and without evidence of intercourse with the sick, or their goods,—is more important; and must be allowed to shew one of two things,—either that the disease may originate, or extend, otherwise than by contagion; or else, that the contagious poison may be carried about, and perhaps concentrated, on certain spots, in a way that we do not understand. But such facts prove nothing against the contagious property of the disease, if that be established by a fair comparative view of the number of seizures in those who have, and in those who have not, intercourse with the sick.

But that the morbific poison undergoes occasional variations in intensity, even in a greater degree than most others, appears distinctly from the frequent and almost complete disappearance of the disease, in those Mahomedan countries where no precautions are taken against its extension; and from the observed effect (in most epidemics) both of very hot and cold weather, in checking its diffusion.

The communication of the disease, by means of fomites, may be considered as more doubtful than many have regarded it; and the distinctions which have been made of substances by which it may or may not be communicated, do not appear to rest on any good ground; but it would be rash to infer, from the frequent immunity of persons, as at the quarantine stations, handling

goods supposed to be infected, that no such property as the communication by fomites exists.

The most general symptoms of the disease, in its worst form, are those of the most malignant or congestive form of Fever formerly mentioned, *i. e.* the symptoms of the first stage of fever, in their highest intensity, and usually commencing very suddenly, weakness of pulse, coldness, comatose tendency, vertigo, extreme feebleness, or irregular action of the voluntary muscles, nausea and vomiting, sometimes fatal within twenty-four hours, and without any local affection,—oftener followed by an irregular and often imperfect reaction, and with which are combined swellings of lymphatic glands (buboes), and gangrenous inflammation of portions of the integuments (carbuncles),—frequently also petechiæ, passive hæmorrhages, or bloody diarrhœa, indicating a diseased state of the blood.

In cases of less malignity, the febrile reaction is better established, assumes a somewhat remittent form, and goes on, along with the buboes in the lymphatic glands, the carbuncles, and what have been called spurious buboes, or swelled and inflamed, and often ultimately suppurating portions of the sub-cutaneous cellular texture, for many days; and many such cases terminate favourably,—as to the febrile symptoms, by critical sweatings, and as to the local inflammations, by suppuration, with or without sloughing,—while others are fatal, nearly in the same manner as in Typhoid Fever. And there is a still milder set of cases, in which the buboes and other local symptoms shew themselves, and run their usual course, almost without any constitutional affection.

The most malignant cases are usually most frequent

in the beginning of an Epidemic, and the mildest description of cases, now mentioned, occur chiefly at its close. The whole period of an Epidemic in any town or district, is generally from three to four months; and it is generally observed, that the course of Epidemics through different towns, is from the south to the north.

The mortality of the Epidemics is exceedingly various, but has often been observed, in pretty large communities, to be above 50 per cent. of those affected, or even of the whole inhabitants.

The appearances on dissection have been carefully studied of late years, but do not appear to differ from those seen after typhoid fever, except that the distension of the great veins, and right side of the heart, are described as greater; and that the buboes and carbuncles are found in various stages of inflammation.

The occurrence of these specific local inflammations must always be regarded as an essential part of the pathology of the disease, and undoubtedly assimilate it much more to the specific result of an animal poison (such as that of the Smallpox, or that of the Glanders), than to the diseases which originate from a Malaria, and are properly called Endemic.

As no means are known which exert any specific power over the disease, the only remedies which we can recommend are those which we believe to alleviate the same symptoms, or moderate the same kind of diseased actions, general or local, when occurring in continued fever, or other febrile diseases. The favourable crisis seems to be generally by sweating; but how far this can be effectually promoted by medicine, we are not well informed. Mercury taken, so as rapidly to affect the system, has been thought by several to have a good

effect on the characteristic symptoms; but it is doubtful whether mercury can take effect on the system in any cases but those which are tending to the favourable termination.

The most effectual means of preventing the disease in individuals seem to be those general tonic measures, which fortify the constitution best against other acute, and especially febrile diseases. The very frequent immunity of persons who are habitually besmeared with oil, and likewise of persons who have issues or ulcers giving a free discharge from any part of their bodies, seem to be ascertained and important facts.

The risk of imbibing the contagion by effluvia directly arising from the bodies of the sick, seems to be very much diminished by a very limited distance,—not more than a few feet from those persons; but we can hardly doubt that there must be some means by which the poison may diffuse itself, at least so as to affect those who are predisposed to suffer from its action, at a much greater distance. And although the details of Quarantine Regulations probably admit of much simplification and improvement, the evidence of the contagious nature of the disease, and the knowledge of its having prevailed epidemically in all parts of Europe, are sufficient to shew the extreme imprudence of any attempt to dispense with such regulations.

END OF PART II.

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Excitement. All this is occasionally seen in the actions of the Heart, Alimentary canal, and Bladder.

In the case of the Heart, these varieties may be from excess or defect of the natural stimuli, or from stimuli applied in an unusual manner (as in the very common case of inflammation on the internal lining membrane of one of these muscles exciting increased action and ultimately hypertrophy); or they may result from changes in, or impressions on, the nervous system, affecting the property of irritability in these muscular parts. Although seldom constituting the whole pathology of individual cases of disease, they are very often the main objects of practice in various diseases, as the affections of the heart belonging to this class are sometimes the cause of immediate and imminent danger.

II. The *Circulation in the capillary vessels* is subject to various morbid changes, independently of inflammation. In such cases, however, as in inflammation itself, any changes that take place in the contractile power of the vessels, are more probably the effect than the cause of the altered flow of blood; so that local determination or congestion, although the most prominent symptom, is seldom the most fundamental change.

Local Determinations and Congestions, however, are a frequent change, and even when not the most fundamental, form great part of the pathology of many chronic diseases, especially of the mucous membranes, and of the parenchymatous viscera, including the brain; although, in the latter organ, we know from Physiology, that it is the impetus of the blood, and the rapidity of its transmission, not its quantity, that is chiefly liable to alteration.

manner as inflammation is; and conversely, many diseases, commonly called Functional, probably imply alterations of the minute structure, either of the constituents of the blood, or of the nervous matter.

Instead of making a formal division of Functional and Organic diseases, therefore, we first study the chief changes of both kinds observed in the living body, and then arrange the best marked chronic diseases of both kinds, simply according to the organs, or sets of organs, in which they occur.

SECT. I.—*General View of the Modes of Diseased Action observed in Diseases of this class.*

Disordered states of vital action in individual parts of the body require to be studied, and indeed are often regarded as constituting separate diseases, not only when they take place idiopathically, but also when they take place symptomatically, in consequence of other diseases, —sometimes of distant parts of the body,—if they are of such intensity as to cause much suffering or danger.

The most important of the modes of diseased action observed in chronic diseases may be ranked under the following heads.

I. The fundamental function of *Involuntary muscular action* may be either simply in excess—or deficient—or may be performed irregularly; or it may be easily excited, but either act feebly from the first, or quickly fail in energy,—the mode of action described by Cullen under the name of Mobility, more frequently designated of late years under the name of Irritation, or Prostration with

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Such local plethora is most easily produced in childhood or early youth in the head and nose; after the growth of the body is over, in the lungs; in women, during the time of menstruation, in the uterus; in advanced life, either in the head or in the abdominal vessels, especially the hæmorrhoidal, and in different individuals in different parts of the body, either from innate peculiarities or habits, or previous disease.

Determinations are often produced by local irritations, physical or mental, of less intensity than those which excite inflammation, and which generally act primarily on the chemical phenomena of the body; therefore at the extremity of the arteries. They are favoured remarkably by various causes, important to be noted, whose action is chiefly mechanical, either increasing the afflux by the arteries, or obstructing the return by the veins; especially by the following,—General plethora, Suppression of usual evacuations, External heat, External cold, Muscular exertion of the whole body or of individual parts, Position, Ligatures. They are peculiarly favoured also by the effect of organic disease, previously existing, on the circulation,—as by obstruction in the left side of the heart, causing congestion in the lungs; or by obstruction on the right side of the heart, or in the lungs (frequently occurring in all diseases of the lungs) causing congestion in the head; or by impediment to the flow of blood in the lungs or heart, causing congestion in the liver; or in the liver causing congestion in the mucous membrane of the bowels; or by any morbid growth in one part of an organ, as the brain or lungs, favouring congestion and its consequences, particularly hæmorrhage, in other parts of the same.

Such causes of local plethora either cause or aggra-

vate disorder of the functions of various textures, especially of the nervous system, or of the different organs of secretion; and are therefore to be carefully kept in view in all disorders of those parts. This is sufficiently shewn by the connection of such disorders with, or their ready transition into, hæmorrhagic or inflammatory diseases, and by the *juvantia et lædentia* in them. The evidence of the existence of such local plethora on dissection is often fallacious, the distribution of blood in the small vessels, after death, being liable to variety from various causes; and it is certain that local plethora, particularly in the brain, may so impair the function of parts as to be fatal, nearly as mechanical injury is, without leaving any decided mark; but it is often followed, and unequivocally indicated, either by Hæmorrhage or by Dropsical effusion, both of which may be regarded as originating in mere increase, with slight alteration, of the *exhalations* of the parts,—therefore as functional disorders only, implying no change in the chemical phenomena of the body. The lesions of texture produced by hæmorrhage are in general easily recognised and distinguished from all other organic diseases.

Both hæmorrhage and dropsical effusion are, as may be judged from the above, very often the results of previously existing organic disease; but both are in themselves sufficient to cause such impediment to the functions of the parts where they occur,—and hæmorrhage, from any free surface, may produce such failure of the circulation,—as may be fatal, on the principles formerly explained; they are therefore proper objects of practice, and are properly regarded as constituting in themselves important diseases.

III. Affections of the *Secretions*, properly so called, constitute the most essential part of many functional diseases, deviating from the external state either by excess, or defect, or by alteration of qualities. These diseased states may be conveniently arranged thus :—

1. The *mucous* secretion, destined only for the *protection* of the surfaces where it is thrown out, is liable to all the variations stated above, and especially to morbid increase of quantity; and thence arise various diseases, which may be troublesome or dangerous, partly by injuring the functions of the parts, or of other parts connected with them, but chiefly as a general evacuation,—as in Leucorrhœa and Diarrhœa mucosa, approximating to, but often quite distinct from, the effects of chronic inflammation.

2. The *recrementitious secretions* of the alimentary canal, requisite for the digestion and *assimilation* of food, particularly the Bile, may be increased to such a degree as to weaken or endanger the system (as in Cholera), in like manner as is done by simple diarrhœa; but the chief functional diseases, in which these secretions are concerned, are the result of deficient or altered secretion, as in the different forms of Dyspepsia, constipation, the torpid condition of the liver, and several kinds of Jaundice, among others, that proceeding from gall-stones. Such alterations of the secretions, resulting from various causes, to be afterwards noticed, have various bad effects, sometimes strictly local (as in the case of jaundice from gall-stones), sometimes on the sensations and other functions of the nervous system, and often most seriously, on the act of assimilation and on the constitution of the blood. Hence the symptoms resulting from this kind of disorders, and the other diseases which may super-

vene on them, are remarkably various and often obscure. The change of the secretions in such diseases is probably seldom the most fundamental change; but it precedes and causes the change in the flow of blood to the part, and it produces changes in the sensations and other affections of the nervous system (just as happens in inflammation), and is often, therefore, the immediate cause of the most prominent symptoms.

3. Another class of these functional diseases consists in, or shews itself by, changes of the different kinds above stated, in the *excretions*, particularly that by the kidneys, that by the liver, and that by the uterus; the natural state of these excretions, especially of the first, being equally requisite (whether as causes or as indications) to the healthy state of the blood, as the action of the gastric juice on the aliments.

We have examples of this kind in the formation of the different kinds of Gravel, and in the Diabetes, both the insipidus and the mellitus, which are pretty clearly traced to changes in the action of assimilation, and in the constitution of the blood,—not, strictly speaking, to morbid actions of the kidneys themselves. Such diseases are likewise dangerous or fatal, sometimes by their local effects, sometimes by the sympathetic changes, particularly in the nervous system, which they produce; but chiefly by reason of the morbid condition of the blood, of which they are the result and indication, and which aids in producing various other local noxious effects.

The great increase of excretion, particularly in the case of Diabetes, and sometimes of Menorrhagia, is dangerous, simply as an exhausting evacuation; and, on the other hand, in the case of absolute *retention* of excretions, as in one kind of Jaundice, in Ischuria renalis, or

even in Amenorrhœa, we have unequivocal examples of local functional disease, so altering the constitution of the blood as to make it act on the body on the footing of a dangerous or even inevitably mortal poison.

4. There is yet another set of disorders usually regarded as functional, because not implying any organic change in the *solids*, and which may be considered here, because they indicate alteration of the general function of assimilation, viz., those which depend on a *morbid condition of the blood*, indicated by its own qualities in all parts of the body, but often leading to dangerous changes in individual parts. Plethora and Anæmia are the extremes as to the *quantity* of blood found in the body, and both are frequent causes or accompaniments and aggravations of local diseases. Scurvy and Purpura, or the Hæmorrhagic Diathesis, are cases in which the constitution and vital properties of the whole blood are *altered*, in a way, likewise, often productive of local disease. These last cases approach to the nature of constitutional, even of malignant, organic diseases.

The process of assimilation is too imperfectly understood to enable us to judge of the manner in which these morbid conditions of the blood are effected; but we know that, besides being dependent on a natural state of the various secretions which have been mentioned, the chemical changes continually occurring in the circulating blood are much regulated by the quantity of oxygen received in respiration, and by the rapidity of the motion of the blood as affected by exercise; and farther, that they are remarkably under the influence of changes in the nervous system, particularly of those connected with pleasing or painful sensations, and with exciting or depressing passions of mind.

IV. Another important class of Functional diseases consists of affections of the *Nervous System*, which are, of course, unknown in their own nature, but shew themselves chiefly in the following ways :—

1. By various uneasy *Sensations;* some local, others pretty general over the body, which are known to occur, in certain constitutions, independently of any lesion of structure in the Nervous System,—the different Neuralgic pains,—the Globus and other hysterical symptoms,—the *suffusiones*, and *tinnitus aurium*, sense of internal heat, &c.

2. By various *Spasms*, known, in like manner, to be often unconnected with organic disease, occurring in the voluntary muscles in different parts—sometimes locally, sometimes more generally—in the muscles of Respiration, or in portions of them, as in Spasmodic Croup, or Asthma, Hiccup, certain forms of Hysteria; or in the muscles of the limbs, as in certain Convulsions of infants, the Chorea of older children, the aggravated forms of Hysteria in adults.

3. By various affections of the *Mental faculties* themselves, likewise known to be functional and transient, often quickly transient, e. g. morbid excitement or depression, spectral illusions, and various degrees of Hypochondriasis, and even of Delirium, or hallucinations, partial or general.

All these affections of the nervous system frequently exist as effects of undoubted lesions of structure in its central masses; frequently also as effects, at least partly as effects, of derangement of the flow of blood on the brain; but in certain constitutions of unusual mobility, chiefly in women and children, all may occur independently of any such lesions, and may pass off rapidly and

completely;—being excited in such cases either by causes purely mental, or by impressions made on the extremities of sentient nerves, as in the teeth, mucous membrane of the stomach and intestines, or surface of the body,—to which case the term Excentric affection of the nervous system has been lately applied; or occurring without obvious cause. In such constitutions we know that even absolute Coma, or suspension of the functions of the brain, may sometimes occur repeatedly, and last long, simply as a functional disease.

This enumeration of functional disorders sufficiently indicates that they must be very frequently blended or combined with each other, and with inflammatory or with organic diseases; and that any formal classification of them may easily mislead us in practice.

SECT. II.—*General view of the kinds of Morbid Structure observed in Diseases of this class.*

These may be divided into three great classes, to all which the term Organic disease is applicable. 1. Those which imply no formation of new growths. 2. Those which consist in the formation of new growths only in individual parts, and generally not consisting of matter foreign to the healthy composition of the body. 3. Those which consist in morbid deposits taking place in different parts of the body successively or simultaneously, and generally composed of heterologous matter, implying a vitiated condition of the fluids. All these varieties have been already so far under our view, because all may occur as results of Inflammation; but there are many cases, of all kinds, which cannot be traced to this source.

I. Of the first kind, the following demand particular study :—

1. *Hypertrophy*, or simply increased bulk of natural textures, resulting sometimes from lymph thrown out in them by inflammation, and gradually organized, as is seen occasionally in bones, glands, fibrous or mucous membranes that have been inflamed—sometimes from a specific action of substances circulating in the blood on the nutrition of individual parts, as in the case of Bronchocele —more frequently from some morbid increase of the natural vital action carried on in a part, implying increased *attraction* of the blood and nutrition there; as when hypertrophy of the Heart, or of any portion of it, follows any obstruction to the exit of blood—hypertrophy of the Stomach, obstruction at the Pylorus—hypertrophy of the Bladder, obstruction at the prostate gland or urethra—or hypertrophy of the muscular coat of the Intestines, any impediment to their peristaltic movement ;—or, again, when disease of one Lung, or of one Kidney, leads to great increase of bulk, without change of texture, in the other.

Such instances of hypertrophy, although often ranked as diseases, are in fact examples (as formerly noticed) of the healing provisions of Nature; but in other cases hypertrophy of natural textures, of the heart, of bones, of the spleen, perhaps more frequently of the substance of the brain, occasionally even of whole limbs, takes place without any such obvious cause, and constitutes in itself a real disease.

2. *Atrophy* of living textures, sometimes resulting from an increase of absorption, consequent on inflammation, or more frequently of pressure, is often also the effect merely of disuse of parts (the converse of what

was noticed as to hypertrophy), as in Muscles wasting, or whole limbs stunted in their growth, from long continued rest, or Nerves of sensation (especially the optic) wasting from inaction, as from opacity of the cornea. And in other cases, particularly in young children, we see imperfect nourishment of organs, or of whole limbs, without obvious cause.

3. The form, and ultimately the vital action, of organs, is in various cases, of great importance, liable to simply *mechanical change*, by at least a process in the first instance, mechanical, although afterwards vital, chiefly implying increased absorption, in consequence of disease of neighbouring parts. Thus in a feeble habit, passive aneurism, or Dilatation of the heart (remarkably of the right side in cases of habitual asthma), results from obstruction to the exit of the blood. Aneurism of Arteries, although always originating in a diseased state of the inner membrane of arteries, is a change chiefly effected by the mere pressure of the blood, causing distension of the outer coats; and Varix of the veins, seems to be effected almost exclusively in this way. Emphysema of the Lungs, dependent on dilatation and rupture of the air-cells, seems to be always the mechanical result of their forcible compression, by the acts of expiration and of coughing, at a time when the exit of air by the bronchia is impeded by the effects of inflammation and spasm. This is most easily produced in early youth, when the texture of the superficial parts of the lungs is soft, and again in old age, when it is comparatively bloodless and brittle. Dilatation of the Bronchiæ seems to be merely the result of habitually increased secretion of mucus in them,—probably especially when the adjoining portions of lung are consolidated and motionless. Dilatation of the ureters, pelvis, and

calices of the Kidneys, and ultimately absorption of the substance of the kidneys, result from any obstruction to the descent of the urine. Gradual unfolding of the convolutions of the brain from Hydrocephalus is partly effected in this way; the formation of the small encysted tumors called Meliceris on the surface of the body, and of Ranula under the tongue, is, in like manner, owing to the distension of obstructed parts; and the partial expansion of the fibres of bones to form the kind of tumour called Spina Ventosa, is to be ascribed to the pressure of morbid growths from their medullary membrane.

4. *Softening* of living textures, with more or less of change of their composition, independently of previous inflammation, sometimes takes place merely by perversion of nutrition, and without change of colour, and they are thus partially and somewhat variously unfitted for their function. This is seen in the nervous substance, in the liver, spleen, and kidneys, perhaps less frequently in the lungs, occasionally in the muscles, chiefly the involuntary, and remarkably in the mucous membrane of the stomach, and in the internal lining membrane of the arteries. The most remarkable example is the general softening of bones, and, indeed of all textures, which constitutes the Rickets of children, seen also in some cases of Mollities ossium in adults.

5. *Hardening*, or even ossification of lining textures, takes place frequently, likewise, altogether independently of inflammation, simply by increase of the proportion of certain of the deposits always taking place there, as in arteries,—chiefly in advanced life, but by no means uniformly even in different parts of the same person—in the liver and kidneys,—sometimes in the muscles, or in the cellular sheaths of muscles, occasionally in va-

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manner as is done by the distinct results of chronic inflammation of those parts, already considered.

3. The rarer deposit of soft matter, sometimes encysted, sometimes not, which, from its black colour, has the name of Melanosis; which is often very generally extended, but has less tendency to invade and alter the surrounding textures, and which seems to consist in the deposition of the colouring matter of the blood, so little changed, that it may be said to graduate into the case of Purpura, or the Hæmorrhagic Diathesis.

4. The irregular, but usually encysted deposits, larger, of whiter colour, usually softer (although in that respect there is much variety), and probably always of more rapid growth than either the tubercles or the granules, to which the term Encephaloid matter is usually applied, and which form occasionally in almost all parts of the body, and affect their functions, in like manner as the last mentioned diseases. When the matter deposited is more firm, and at the same time fatty, the term Lardaceous, and when more translucent and gelatinous in appearance than usual, the term Colloid, has been applied to it.

5. The firm, hard, usually somewhat fibrous deposits, distinguished as the true Scirrhus, seen almost exclusively in certain very vascular parts of the body,—the lips, tongue, cardia, pylorus, cæcum, lymphatic glands, glans penis, testes, and especially the mammæ and os uteri,—slower in their progress than those last mentioned, but equally sure to contaminate, soon after they commence, both the neighbouring parts, and the blood generally; and passing more surely than any of the others into the peculiar fungous and intractable ulceration, to which the term Cancer has been often restricted.

It is especially to the two last of these kinds of morbid structures,—from the certainty with which they invade the neighbouring parts, and extend themselves over the system, and their uniform tendency to increase, until they extinguish life in one way or other,—that the epithet Malignant has been usually applied in this country, and the term Cancer in France; but their diagnosis, either from the effects of inflammation, or the other less formidable organic diseases, is often impossible in the early stage; and, when they are situated internally, is to be made out, as the disease advances, rather by observation of the state of the general health, than of any of the local symptoms.

From what has been said of their frequently originating in, or being repeatedly aggravated by, inflammation, and from what has been formerly said of change of functions, and among others of secretions, in internal parts, forming great part of the symptoms of inflammation there, it will readily be understood, that the symptoms of organic diseases in internal parts should in general very closely resemble, and often be hardly distinguishable from, those of the more chronic inflammations of the same parts, or of the altered secretions of these, already considered. Indeed it is often only by the continuance of the complaint, by the experienced inefficacy of ordinary remedies, and by the increasing weakness and emaciation attending it, that the existence of Organic Disease is made known.

It may be stated in general, that Pain is little to be depended on as a mark of organic disease. It may be felt strongly when there is no such disease, and be intense when such disease is slight, as when the fibres of a nerve are compressed or stretched; it may be absent

when the disease is very dangerous; and although the most malignant organic diseases are often attended with acute pain, yet it is usually liable to great and long remissions. It is very often to be regarded, therefore, rather as an accidental concomitant, than as an essential constituent of such diseases. And in general, these diseases are to be recognised much more by alterations of sensible qualities, or derangement of functions, which may be detected by the senses of the practitioner, than by such uneasy sensations as are known only through the complaints of the patient. This observation is of great importance in reference to cases where organic disease may be suspected, but where the tendency to hysteria or hypochondriasis exists.

SECT. III.—*General View of the Causes and History of these Chronic Diseases, and of the Objects of Practice in regard to them.*

Many of these diseases appear to be almost unknown in the earlier stages of human society, and must be ascribed chiefly to certain results of civilization; which makes the study of their causes particularly important; giving us reason to believe that they may often be prevented or controlled by human wisdom and prudence, exerted either in individual cases, or in devising such political regulations as recognise the obligation of Governments to provide, as far as possible, "ut cives feliciter vivant."

Referring to what was formerly stated as to the fallacies attending the evidence by which we judge of the power of the remote causes of disease, we next observe,

that, in the production of these, as of other diseases, different causes generally concur, which may be ranked, though somewhat vaguely, as Predisponent and Exciting; and most generally the former class of causes seem to act by affecting the constitution of the Blood, and the latter by affecting the Nervous system; through both which channels we consider it certain that all vital actions may be influenced. Many of these causes are the same as, when acting in a higher degree of intensity, produce inflammation, or concur in producing strictly febrile diseases; and it may be said in general, that the causes of Chronic disease, and in many instances the existence of such disease, give a predisposition to Acute disease. We must allow that we have very little information as to the circumstances which determine one form of disease in one case, and others in other cases, from the application apparently of the same causes.

The blood appears to be so altered in constitution as to be rendered a cause of disease:

1. By improper aliments, either defective in quantity, or excessive, or unfitted for due assimilation.

2. By truly poisonous matters (*e. g.* alkohol) introduced from without with the aliments, or by the lungs.

3. By poisonous matters formed and retained in the body itself, though destined for excretion.

4. By a defective or altered condition of those secretions which are immediately concerned in the assimilation of food.

5. By a defective or altered state of other vital actions requisite for the assimilation of aliments, particularly of respiration, as affected by the quality of the air breathed, and of circulation, as excited by the natural stimulus of exercise.

6. By other causes of excessive or deficient quantity of blood in individual parts, besides the nature or due preparation of the ingesta, *e. g.* such causes of local plethora as are stated above (p. 4), or such causes of locally defective circulation, as previously diseased or obstructed arteries.

7. By causes, not yet understood, acting in individual parts of the body, and altering the constitution of the blood there in the first instance, which alteration is subsequently extended; as in inflammation, in tubercles, cancer, &c.

8. By causes not yet understood, but which affect the vital properties of the whole blood, as is seen in cases of Purpura or the Hæmorrhagic Diathesis.

In all these cases it is a vital, not a simply chemical action, which is originally in fault, although in several a chemical change in the constitution of the blood, or of some of the secretions, results from, and indicates that altered vital action.

In several of these cases, it is probably through the intervention of the Nervous System that morbid changes are effected in the blood; and the following are cases in which impressions on, or changes in, the nervous system, are certainly and directly concerned in producing local diseases in different parts of the body; even when we have reason to believe that the constitution of the blood is quite healthy at the time when the diseased actions commence.

1. When impressions causing pain or uneasy sensation are made on the sensitive nerves of individual parts, by a sympathetic or reflex action, various morbid phenomena—sometimes of the nerves and muscles, sometimes of the capillary circulation and secretions,—are ef-

fected in individual, but often in distant parts of the body, as in the case of the teething of infants, the worms of children, the tetanus, or some cases of the dyspepsia or diarrhœa of adults. It has been already stated that the action of certain poisons, when most rapidly affecting the body, seems to be of this kind.

2. When causes are applied which excite excessive and uneasy sensations, apparently affecting the whole system, these frequently excite morbid phenomena, just as in a less degree they excite healthy actions, in individual parts only; as in the case of Heat exciting particularly the actions of the liver; Cold exciting those of the heart or of the mucous membrane of the intestines; Nausea, from impressions made on the nervous centres themselves, exciting the secretions of the mouth, and the actions of the diaphragm and abdominal muscles; or any Sensation very long continued, and therefore becoming irksome and uneasy, gradually depressing the heart's actions.

3. In many instances, voluntary muscular exertions, excited through the nervous system, are more direct causes of disease by their effect on the circulation, as in cases of hæmorrhage excited by exertion of various kinds.

4. When certain emotions, either the violent exciting emotions, such as anger or joy, or the long-continued depressing emotions, anxiety, vexation, or despondency, strongly engross the mind, they very frequently produce or co-operate in producing, much more extended and injurious effects, often not easily traced to their true source; in the vital actions of muscles, voluntary or involuntary, and in all the secretions, especially those which are most immediately concerned in the assimi-

6. By other causes of excessive or deficient quantity of blood in individual parts, besides the nature or due preparation of the ingesta, *e. g.* such causes of local plethora as are stated above (p. 4), or such causes of locally defective circulation, as previously diseased or obstructed arteries.

7. By causes, not yet understood, acting in individual parts of the body, and altering the constitution of the blood there in the first instance, which alteration is subsequently extended; as in inflammation, in tubercles, cancer, &c.

8. By causes not yet understood, but which affect the vital properties of the whole blood, as is seen in cases of Purpura or the Hæmorrhagic Diathesis.

In all these cases it is a vital, not a simply chemical action, which is originally in fault, although in several a chemical change in the constitution of the blood, or of some of the secretions, results from, and indicates that altered vital action.

In several of these cases, it is probably through the intervention of the Nervous System that morbid changes are effected in the blood; and the following are cases in which impressions on, or changes in, the nervous system, are certainly and directly concerned in producing local diseases in different parts of the body; even when we have reason to believe that the constitution of the blood is quite healthy at the time when the diseased actions commence.

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fected in individual, but often in distant parts of the body, as in the case of the teething of infants, the worms of children, the tetanus, or some cases of the dyspepsia or diarrhœa of adults. It has been already stated that the action of certain poisons, when most rapidly affecting the body, seems to be of this kind.

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lation of food. The most striking example is the production of fatal jaundice by suppression of the secretion of the liver, resulting from mental emotion, and independent of any obvious change of structure.

In these different modes, changes which we believe to originate in the nervous system, become causes, sometimes predisponent, but more frequently exciting, of various non-febrile diseases, both of those of which the chief symptoms are in the functions of the nervous matter itself, and of those in which involuntary motion, secretion, or nutrition, are more obviously deranged. Referring to the enumeration given (at p. 51 to 61 of Part I. of the *Outlines)* of the chief individual causes of disease, independent of the application of morbific poisons, which afflict humanity, we may here take a practical view of those included in that enumeration, which are most influential in exciting chronic disease; distinguishing them according to the ranks of society, and the periods of life, in which they chiefly take effect.

In the lower ranks of society, and in the early periods of life, the great causes of disease are *privations*, sometimes of sufficient or of adequately nutritious aliments, and of adequate protection against cold,—and more frequently of the pure air, exercise, and mental excitement requisite for the due assimilation of aliments. This applies particularly to the case of children in towns, and is sufficiently illustrated by comparing their condition with that of those of the same rank brought up in the country.

In more advanced life, the following are the chief causes of disease affecting the lower orders, which are superadded to those now mentioned :—

1. Excessive muscular exertion.
2. Intemperance as to strong liquors.
3. Other vices.

4. Mental anxiety and depression, particularly from want of employment. The effects of all these are often very much increased by irregularity of life, particularly as to the time of taking food, and of sleep.

By these causes we believe that the constitution of the blood, and the vital action, and probably the minute structure, of the nervous matter, are deteriorated; and then the effect produced is extended and perpetuated by *hereditary disposition.*

Again, in the higher ranks of society the following are the chief sources of chronic disease:—

1. In childhood there is often a deficiency of exercise, of mental excitement, and of the tonic influence of frequent changes of temperature.

2. In youth there is often over-excitement of the nervous system by mental influences, combined with deficient exercise.

3. Next, there is often intemperance of various kinds, affecting variously the function of digestion, the circulation, and the nervous system.

4. In many there are too sedentary occupations, or only occasional and irregular muscular exertion, such as may excite disease rather than contribute to health.

5. In many there is, as life advances, want of mental excitement and interest, along with want of exercise, especially in women.

6. In others there is excessive exertion, mentally and bodily, deficiency of sleep, and mental anxiety.

7. In many there is, independently of intemperance, Repletion, and Plethora from excess of food, and sometimes of sleep, and defect of exercise.

The morbid tendencies thus produced are likewise extended by hereditary transmission.

Although there is here much want of precise information, yet the principles now stated are sufficient to point out many important means of prevention of Chronic diseases;—in many instances applicable, in a certain degree, after these have already shewn themselves; and the more important, as the power of remedies over them is very limited.

In most of the Chronic diseases, however, as well as in the Febrile diseases, we see a strong tendency to a spontaneous favourable change, although taking place much more slowly and less regularly. The diseased actions are almost always only of temporary duration; and even in the case of the malignant diseases, remarkable intermissions of the activity of their growth and extension are observed. These favourable provisions of nature must always be held in view, and may often suggest caution as to the use, or repetition, of any active remedies.

The objects of practice in these diseases are, accordingly, different in the intervals, and during the continuance of their more decided manifestations.

In the intervals, we are well assured (from observation of the exciting causes of many attacks, and from our knowledge of the nature of the diseases) that much may be done to prevent returns or aggravation, by diet and regimen; in many cases by such a modification of the antiphlogistic regimen as restrains fulness of blood, and prevents local determinations of blood,—still more frequently by such modifications of the Tonic Regimen (*Outlines*, Part I. p. 80) as may fortify the system against many exciting causes of disease,—combined with such precautions as may prevent the application of others. These are the objects of many directions which are properly given to individuals, and of many suggestions

which may be, with still more extensive good effects, made to legislatures or civil authorities.

During the paroxysms or more active periods of the non-febrile diseases, we should first consider to what class they belong, and in what manner they may be expected to become dangerous to life. The practice ought generally to vary according as they are merely functional, simply organic, or malignant.

It is obvious from what was formerly stated (Part I. p. 79, *et seq.*), that when disease is merely functional, we have various means, of very considerable power, of influencing it, by exciting or strengthening, or moderating, involuntary muscular action, especially that of the heart; by altering local determinations of blood; by exciting or by repressing different secretions and excretions, and thereby influencing both absorption and nutrition; in a certain degree by directly influencing the function of assimilation and constitution of the blood; and in a greater degree by exciting, depressing, or even specifically altering certain actions of the Nervous System. But the power of all these, in Chronic diseases, is limited, and especially is temporary; they have all, when used in a certain degree, injurious effects on the body; it is always to be considered how far they may interfere with the Tonic Regimen, which, in most such cases, is one of our main resources; and the apparently frequent success of the Expectant practice, or of the Homœopathic practice (which seems to be only a modern name for the same thing), ought to be viewed as a general warning, that the provisions of Nature for the gradual decline of such diseases, under a judicious management

of regimen, are more efficient than many practitioners suppose.

When we have ascertained the existence of organic disease, but have no reason to think it malignant, we should first reflect how far such disease, especially if merely local, is compatible with the endurance of life, or the enjoyment of tolerable comfort, and how far we have reason to expect that it can be directly affected by remedies or regimen. Next, we should consider what are the more temporary diseases, whether inflammatory or simply functional, that are most likely to complicate themselves with such permanent organic lesions, and render them immediately dangerous; how these may be prevented; and when they occur, how soon, and how few, remedies may be used to counteract them.

In a few cases we can use remedies (deobstruents or alteratives) with a fair prospect of directly influencing the morbid state of nutrition which is the foundation of such diseases, but the use of these remedies always demands special caution, on account of their ulterior injurious effects on the body, and their interference with the most material parts of the Tonic Regimen.

In all chronic diseases, it is a part of our object, and in the case of the malignant diseases, especially in their advanced stage, it is the only rational object of practice, to palliate symptoms; counteract by evacuations, or otherwise, those parts of the diseased actions which are likely to cause the most distress; to relieve uneasy sensations, and study the means by which, in a large proportion of cases, the gradual increase of debility and approach of death may be divested of much of the suffering which would otherwise attend them.

CHAPTER II.

CHRONIC DISEASES OF THE AIR-PASSAGES AND LUNGS.

THE organs of Respiration, from the strength of the circulation in them, from their exposure to the air, and from their being comparatively little under the influence of the ganglionic system of nerves, are less liable than the abdominal viscera to attacks of purely chronic disease; most of their diseases, even when of long continuance, being directly or indirectly connected with inflammation. But in many cases already noticed, the more chronic forms of inflammation of these parts are attended either with functional or organic disease, of such intensity as to demand the chief attention of the practitioner; as, for example, in the case of spasm of the bronchiæ, or asthma, and emphysema of the lungs, attending bronchitis; and we have a few examples of functional and of organic disease existing in these parts, altogether independently of inflammation. The most important cases of the latter kind are the following:—

1. There are cases of Spasm of the muscles of the Glottis, producing difficult and crowing respiration, exactly similar to croup, but more sudden and more violent, which are unconnected either with fever or inflammation. The most common case of the kind is the *Laryngismus stridulus*, or crowing disease of infants, which attacks suddenly, almost always during or immediately

after sleep, soon abates, but often rapidly recurs, although without cough, fever, or other marks of inflammation. In a few instances, a similar strictly spasmodic affection of the glottis occurs, and even habitually recurs, in adults. It is generally to be regarded as a merely functional disorder, excited or aggravated as many other spasms are, in peculiarly mobile constitutions, either by irritations acting at the extremities of certain nerves, especially the teeth of children, or the mucous membrane of the stomach or bowels,—or by causes acting as general irritants on the nervous system, such as mental emotion, or a determination of blood, however caused, to the head; and the tendency to it often admits of relief, from moderate evacuations of blood, in plethoric habits, —from scarifying the gums, from purgatives and antacids, and to a certain degree, from antispasmodics, and medicines usually called tonics, *e. g.* assafœtida, especially if used in glyster, musk, even opiates,—and valerian, oxide of zinc, or the arsenical solution.

But in a considerable proportion of cases such fits of crowing respiration originate in a very different cause, viz. in stretching or irritation of the recurrent nerve (the motor of the larynx) by a tumour, generally within the thorax, which in a child may be the thymus gland or bronchial glands much enlarged, and in an adult is most frequently an aneurism. In the first of these cases, leeches, and other antiphlogistic remedies, and the cautious use of mercury or iodine, may be permanently effectual; in the latter, a cautious regimen and repeated small bleedings are the only effectual palliatives, and will often avert one mode of fatal termination.

2. There appear to be some cases of Hæmorrhage from the fauces which appear to be functional only, *i. e.* taking

place by altered exhalation from the mucous membrane, admitting of relief by the means to be stated presently; but in many cases hæmorrhages, from this situation, are the result of aneurisms, which may have been previously unobserved.

3. There are pretty numerous cases of the local symptoms, either of the most severe Cynanche Tonsillaris, or Cynanche Laryngea, with occasional spasms, being very closely imitated by the growth of tumours in the fauces, at the edge of the glottis, or within the larynx, which are not inflammatory in their origin. Some of these tumours can be felt with the finger, but the greater number cannot. They sometimes gradually abate under the use of deobstruents, particularly of mercury, and sometimes demand the operation of tracheotomy; after which some subside completely, and others remain stationary, still obstructing the respiration through the larynx, but not affecting the general health. In other instances, however, they are of malignant character, and the patient sinks under the constitutional irritation and exhaustion connected with their growth, even although the breathing should be relieved by the operation.

4. The cases of hæmorrhage from the lungs, and of dropsical effusion into the cells of the lungs, or into the sac of the pleura, are often to be regarded as functional diseases, so far as the lungs are concerned; but both will be more advantageously considered immediately, along with other hæmorrhages and dropsies, as diseased states of the capillary circulation.

5. Besides the organic lesions of the lungs which result from inflammation, and from deposition of tubercles, already considered, there are cases of organic disease of

the lungs and pleura, dependent on the deposition of heterologous matter, the melanosis, or the malignant encephaloid matter, or some of its varieties. In most of these cases the morbid matter is partly, and in some it is solely, deposited in the bronchial glands. Such cases are attended with the usual symptoms of phthisis, and sometimes with those of chronic pleurisy; and cannot be distinguished from these with certainty during life, although the absence of the usual phthisical sputa, and the more general diffusion of the disease (as ascertained by auscultation), may give reason to suspect that the disease is not the usual tubercular phthisis; and in many cases this opinion is confirmed by the better ascertained presence of the disease in other parts. In all such cases, the palliative practice recommended for phthisis is our only resource.

CHAPTER III.

OF THE CHRONIC DISEASES OF THE HEART AND BLOODVESSELS.

We have here a much greater variety of disease, both functional and organic, independent of, or only partially connected with, inflammation.

Sect. I.—*Of Chronic Diseases of the Heart.*

The chief morbid states of the heart's action are deficient action, or Syncope, inordinate action, or Palpitation, and painful action, or Angina pectoris—all frequently symptomatic of organic disease, but occasionally idiopathic, and all acute diseases in point of duration, but non-febrile, and the tendency to which is usually quite chronic, and often intractable.

I. The defective action of the heart demands particular notice, both theoretically, as illustrating the important connection between the nervous and vascular system in the living body, and practically, because although seldom existing idiopathically as the sole cause of danger, it takes place in a certain degree, and constitutes a part of the danger, in many complex diseases, and we are necessarily very much guided in practising in these diseases, by the degree in which we believe the danger to result from this cause.

Defective action of the heart, and threatening of death by syncope, is most essentially characterized by feebleness of pulse, and paleness and coldness of the surface, often attended by cold clammy sweats, and by muscular debility; but in many cases, more striking symptoms are presented by that change in the condition of the Nervous System, which is connected with the enfeebled state of the heart; and there is great variety in the degree in which the Nervous System participates in the depressed state of the Vascular System, depending mainly on the degree of suddenness with which the depression of the heart's action is effected.

When it takes place *slowly*, the impetus of the blood on the brain and nerves being very gradually diminished, the Nervous System suffers in the first instance very little, and the pulse may become imperceptible, and the skin quite cold, before the senses are obscured, or the intellect sensibly impaired. The senses of sight and hearing are generally the first that are blunted in such cases; but the mind is clear,—voluntary motions, though enfeebled, may often be performed with precision,—and the sensation which prompts to acts of respiration is so entire, that a heaving and laborious breathing is gradually produced, probably depending, not on any impediment to the access of air to the lungs, but simply on the increasing difficulty, with which the enfeebled heart propels the blood through the lungs. This is the state of the symptoms in many cases of disease (as of abdominal inflammation already considered), where there is imminent danger of death by syncope. In such cases, the pulsations of the heart become usually more frequent as they become feebler.

But when the heart's action is *rapidly* depressed, as

by hæmorrhage, or violent mental emotion, the sudden diminution of the pressure on the brain and nerves, like other sudden changes in the condition of these parts, strongly affects the functions of the Nervous System; and there is first vertigo, tinnitus aurium, confusion of thought, and then often an instantaneous loss of sense, intellect, and voluntary power, constituting what is called a complete fit of Syncope, even when the pulse is still quite perceptible, and before the surface has become cold. In such cases the diminution of sensation is often such, that the action of respiration may be nearly or entirely suspended for a time, without any bad consequence. A sensation of anxiety and of nausea, prompting to acts of vomiting, and slight spasms of the voluntary muscles, are common accompaniments of the impression made on the Nervous System in such sudden syncope. The pulsations of the heart, in this state, especially if the patient has previously been of strong habit, are generally slow as well as feeble.

Thus, the insensibility of syncope is not merely a part of the general failure of vital action from a deficient supply of blood, but is to be ascribed to the *shock* given to the nervous matter (of the medulla oblongata chiefly), by the diminished impetus, and perhaps by the sudden stagnation, of the blood. It is in the same way that insensibility is produced in children by weakening disease, especially Diarrhœa, in the cases to which the name of Hydrocephaloid disease has been given, while the pulse is still distinct at the wrist.

There are some cases, usually called cases of Syncope, where the sudden loss of sense and voluntary power takes place, in nervous systems of peculiar delicacy, almost without alteration of the heart's action, and which in their pathology are more closely allied to Epilepsy.

It has been already stated, that a sudden diminution of the pressure on the brain and spinal cord is itself a cause, not only of insensibility, but of weakened action of the heart; and the impression made on the heart's action, especially in a feeble and irritable habit, by bleeding in the erect posture, as compared with bleeding in the horizontal,—or by rapidly assuming the erect posture after stooping down,—is enough to establish this principle.

When, therefore, we see a fit of Syncope, or a tendency to it, brought on either by loss of blood, or by purging, or sweating, or by alteration in the distribution of the blood, as by drawing off the fluid of ascites, we may reasonably infer, that the immediate cause of the complete failure of the heart's action is not the mere diminution of the stimulus acting on the heart, but a change in the condition of the Nervous System; just as it certainly is, when syncope is produced by strong mental emotions,—by certain long continued and unpleasant sensations,—such as particular odours or by intense pain, —or the sudden transition from pain to ease, which are likewise frequent exciting causes of this affection.

This secondary action or reaction on the heart, of diminished pressure on the brain (originally consequent in some cases on deficient action of the heart itself), is very important to be kept in mind in all speculations as to Syncope; and explains the well-known effect of the horizontal posture, not only on the nervous symptoms in syncope, but on the affection of the heart itself. This is one of the considerations formerly cited to prove, that, in the living body, the actions of the heart are subjected to an *influence and control*, from certain changes which take place in the nervous system; and which seem to extend over the whole of that system, and act at

a peculiar advantage on the heart, as an organ connected through the ganglionic nerves, with all parts of the cerebro-spinal axis.*

The agency of all exciting causes of Syncope is greatly increased by circumstances of predisposition,—often by deficiency of the vital fluid, or general weakness of vascular action, as in convalescents from various diseases, or in persons exhausted by muscular exertion, or under the influence of sedative causes, as certain poisons or contagions; often also by a peculiar state of excitability or *mobility* of the body, in which impressions from without peculiarly affect the nervous system, and affections of the nervous system are transferred with peculiar facility to other living parts, especially to the heart. It is thus that in women, especially of feeble and irritable habit, —about the menstrual period more than at other times, —in women affected with the slighter uterine diseases, and in persons labouring under long-continued mental depression or anxiety,—all the exciting causes of Syncope act with peculiar effect.

The state of Syncope, occurring idiopathically, requires little treatment, except the horizontal posture, and dashing cold water on the face, or applying ammonia to the nostrils, to excite the action of inspiration. The tendency to Syncope, in various diseases, demands careful attention, and is our chief warrant for the use of stimulating remedies, wine, alcohol, ammonia, aromatics, volatile oils, &c., in small frequent doses; and, when the stomach will admit of it, for the use of the tonic regimen. These means may be used with good effect in a great variety of diseased states, when we are satisfied

* See Physiology, 3d Edit. p. 400.

that there is immediate danger of death by *Asthenia;* and the indication for them, in these circumstances, is of such importance, that it may be said to supersede all others.

II. There are several varieties of Inordinate Action of the heart, unconnected with organic disease, which it is to no purpose to consider separately, because we know little of the causes of their difference. Such are permanently increased frequency, and sometimes apparent strength, of the heart's pulsations, with perfect regularity, and nothing unusual in the mode of contraction; or occasional violent fits of palpitation from exercise, mental emotion, or other slight causes (*i. e.* such causes as produce palpitation in the healthy state, but in a less degree, and of shorter duration); or paroxysms of irregular action, the irregularity being sometimes in the succession of the pulsations, and sometimes rather in the mode in which each contraction is effected. In all these cases there is more increase of the sound, than of the impulse of the heart's action, experienced by the ear laid on the chest; the last of these, the irregular contraction of the fibres, is denoted chiefly by unnatural sounds attending the pulsations; but these morbid sounds, in such cases, are usually slight, and are of short duration. When we are satisfied that such conditions of the heart's action are unconnected with organic disease, we usually apply to them the term Irritable Heart.

Such morbidly irregular or excessive action of the heart, if unconnected with increased bulk of its muscular substance, seldom or never indicates any real increase of strength. But it is sometimes evidently de-

pendent on fulness of blood, and increased stimulation of the heart; and farther, it seems a general law, that when the heart is feebler than usual, it becomes more irritable, its contractions are more easily excited, and more easily deranged. Hence both habitual frequency of pulse, and likewise fits of palpitation, or irregularity of pulse, are often observed under the same circumstances, or in the same persons, as the tendency to syncope; and are, equally as that tendency, often to be ascribed rather to alterations in the state of the nervous system, than of the heart itself.

The unusual irritability of heart, indicated by the modifications of its action above stated, is remarkably observed in some persons, previously healthy and perhaps full-blooded, when taking little exercise, when enjoying less sleep than usual, and when under the influence of mental anxiety. It is often observed also in persons previously healthy, but much weakened, as during convalescence from acute diseases; and farther, in certain chronic diseases, particularly those which are attended with habitual uneasy sensations at the stomach. In cases of this last kind, inordinate pulsation is often observed almost exclusively along the abdominal aorta, the immediate cause of which is still uncertain.

Such functional derangement of the heart's action is to be distinguished from the effects either of inflammation, or of organic disease, by the absence of fever, or other marks of carditis; by the absence (or slight and transient degree) of morbid sound; by the absence of any indications of enlargement of the heart; by the presence of *nervous* symptoms; and by the affection of the heart not being increased, generally gradually diminished by muscular exertion.

Advantage may often be derived, in the earlier stages of these cases of increased and irregular action of the heart, without change of structure, from loss of blood, especially when they occur in pretty full habits; and likewise from anodynes, as hydrocyanic acid; but in general, ultimate and permanent relief to them is obtained chiefly by the different articles of the tonic regimen, by which vascular action is invigorated, and the nervous system rendered less liable to sudden and injurious impressions; and by medicines of the tonic class, such as Steel and Quinine, with such other medicines as the state of the stomach and bowels may require.

III. Painful action of the heart is that affection which, in its extreme degree, is described under the name of Angina Pectoris, and is marked by acute pain, not only in the situation of the heart, but in general extending sympathetically to the left shoulder, and down the left arm, generally brought on, and always remarkably aggravated, by any such exertion as may quicken the heart's action. This pain occurs, however, in different cases with very various degrees of intensity; and is attended with various affections of the movement of the heart, generally with increased action at the time when it begins, but in severe cases, with greatly diminished action during its continuance, whence it has had the name of Syncope Anginosa. It obviously depends immediately on an impression made on the sensitive nerves of the heart; but what circumstances are essential to this impression is still uncertain. It is not necessarily connected with any kind of organic disease at the heart, but is seldom well marked when no such organic disease exists. It is certainly more immediately connected with

fulness of blood than mere palpitations are, and although mitigated by anodynes, and sometimes by stimulants, is hardly ever permanently relieved otherwise than by evacuations and low diet.

As both palpitations and painful action of the heart must naturally be readily excited, when the tendency to them exists, by any cause increasing the quantity of blood brought to the heart by the veins in a given time, it is easy to understand, that at the moment of transition from the state of waking to that of sleep, when the circulation on the surface of the body is repressed,* these affections of the heart should especially occur, hence the "subitanea excitatio a somno" often characteristic of diseased heart, though not, as formerly supposed, of Hydrothorax.

It is obvious, that both palpitation and irregular painful action of the heart, will more easily be excited when there is any obstruction to the free transmission of the blood through the heart, than when the motion of the blood is free; and, therefore, that habitually increased strength and fulness of pulse, palpitations, irregular pulse, and fits of angina pectoris, must be much more frequent and dangerous when any disease of the valves of the heart, or of the aorta, impeding the transmission, or allowing the reflux of blood, exists, than in any other cases. And although it is perhaps not so easy to explain the fact, it is equally certain, that in those circumstances fits of syncope are frequent and dangerous.

The manner in which such obstruction to the flow of blood, through the left side of the heart, especially, is produced by inflammation of the Pericardium, and more frequently by inflammation of the internal lining

* See Physiology, p. 406.

membrane of the heart, was formerly considered; but although many of the lesions of that membrane, and of the valves of the heart and aorta, are certainly the results of inflammation,—being preceded by the causes and symptoms of inflammation, attended by the undeniable effects of inflammation, such as the effusion either by lymph or pus, and often resulting from an obvious metastasis of rheumatic inflammation,—yet there are others producing the same ulterior effects, which cannot be traced to inflammation,—the disease commencing gradually, without febrile or inflammatory symptoms, and the changes being such as cannot be ascribed to a simply inflammatory action, viz. deposition of numerous patches, often nearly symmetrically arranged, of granular, atheromatous, and ultimately cartilaginous, or even bony matter,—the latter generally deposited in minute irregular specks, at the time when the cartilaginous patches are beginning to ulcerate. The whole coats of the arteries in such cases become thickened, rigid, and inflexible, and the valves at the heart become thickened, often shortened, stiff, and unfit for their functions.

These changes are more various, take place more slowly, last longer, and extend farther than the simple results of inflammation. They occur, especially in persons of bad habit of body, very generally in middle or advanced life, and probably depend, in part, on a morbid condition of the blood; and besides these, there are some cases of soft fungous growths, or vegetations, on the valves of the heart, which produce similar symptoms, but cannot be ascribed to any effect of inflammation. These excrescences are often of the same nature as the fibrinous concretions found in the

same cavities, and which, from their varying appearance, and from some indications of organization in them, appear to have formed slowly for some time before death; and it is, therefore, highly probable, that the vegetations are formed of these concretions.

There are also a few cases of Palpitation, and of fatal Syncope, dependent on disease of the muscular parietes of the heart, on their being softened, or degenerating into a fatty matter; or on the formation of a kind of aneurism, after ulceration of the lining membrane, on the heart itself (almost always on the left ventricle), which may lead to rupture.

The existence of organic obstructions to the course of the blood, is very generally demonstrated, soon after they have commenced, and in many instances their nature or position is more specifically indicated, by the symptoms stated in treating of the effects of inflammation at the heart; especially, *first*, By the enlargement of the heart, and often of the aorta, consequent on them, and which is easily ascertained after a time by the hand applied to the chest, and especially to the precise point of contact of the apex of the heart with the parietes; *secondly*, By the increased *impulse* which the heart communicates to the parietes of the chest, when, as commonly happens in consequeuce of such obstructions, it has got into the state, not only of dilatation, but of hypertrophy; and, *thirdly*, By alterations of the natural sounds, that attend the heart's actions,—consequent on the obstructions which the current of blood encounters, and on the modifications of the muscular contractions, which are required to overcome these obstructions.

While these general characters of organic disease at the heart exist, there are many varieties in particular

symptoms, of less urgent importance, but which claim attention. The chief of these are the following:—

1. In many cases, the pulse at the wrist is preternaturally strong, full and regular, or nearly so; and the pulsations of the carotid, and especially of the subclavian arteries, are felt distinctly to be fuller and stronger than natural. In such cases, the aorta is very generally enlarged; and if there be, as is most common, disease of the valves, it is of the aortic valves, and of such a kind as to admit of reflux of the blood. Of this last change we are more certain, if the interval between the impulse at the chest and the pulsation at the wrist can be observed to be longer than usual.

2. In others, the pulse at the wrist is small in comparison with that felt at the breast, often very irregular. There is no strong action in the carotid or subclavian arteries; and sometimes there are pulsations felt at the chest, which do not extend to the wrist. In such cases, the aorta is probably little affected; if there be disease of its valves, it is such disease as obstructs the exit of the blood from the ventricle: disease of the mitral valve may rather be presumed; and, if the last mentioned symptom be present, such a state of that valve is commonly found, as admits of a reflux of blood into the auricle.

3. In some cases, the *impulse* felt on laying the hand or the ear over the heart is very strong, while the sound of the heart's action is less than natural. In such, Hypertrophy of the muscular parietes of the ventricles (chiefly the left), is denoted, without dilatation, perhaps with diminution of the cavity.

4. In others, the impulse is weak, while the sound, especially the first sound, corresponding to the ventricular contraction, is unusually loud and sharp. This

usually denotes Dilatation without hypertrophy. When there is both the loud sound and the strong impulse, both dilatation and hypertrophy are denoted.

5. In some cases, the chief impulse and sound are perceived near the end of the sternum, and the jugular veins appear more turgid, and often pulsate more distinctly than usual. In such, enlargement of, and probably obstruction on, the right side of the heart are denoted.

6. In most cases, a preternatural sound, varying considerably in different cases, but generally characterized as the bellows murmur, or the rasping sound, sometimes a musical sound, is heard to accompany either the first and long, or the second short sound of the heart's action; and this generally denotes that some rough or irregular obstacle exists, either at the orifice through which the blood, in its natural course, is passing at the time when that sound is produced, or in that through which it has an opportunity, in consequence of the disease, of regurgitating. When this morbid sound is heard most distinctly as high as the third rib, the obstruction may be presumed to be at the aortic valves; when as low as the fifth, at the mitral valve. This symptom, although very characteristic, is not pathognomonic, because it may undoubtedly be correctly, although temporarily, imitated by the motion given to the blood by irregular contractions of the fibres of the heart, chiefly in cases of palpitation from affections of the nervous system, where no organic disease exists. And in some cases, especially when the circulation has become feeble, no unnatural sound can be observed, although there be much valvular disease.

7. In some cases, the sound on percussion in the situation of the heart, is remarkably dull; which, if taken

along with other indications of organic disease, denotes either an effusion into the pericardium, or an unusual degree of enlargement and hypertrophy of the heart.

8. Sometimes a morbid sound cannot be heard over the heart, but is distinctly perceptible over the subclavian arteries, because dependent on a very diseased state of the arch of the aorta and subclavians, not affecting the aortic valves.

In a few cases we have dyspnœa and painful palpitation on exertion, and even ultimately fatal syncope, without either enlargement of the heart, morbid impulse, or unnatural sound; dependent on disease and obstruction of the Coronary arteries, implying that the heart cannot have its supply of blood duly increased, when increased exertion demands it.

When the unequivocal indications of organic disease at the heart exist, the progress of different cases is still very various. All such patients are in danger of sudden death from slight exertion, or without apparent cause. The case of hypertrophy, without obvious cause, and that of enlargement or hypertrophy from the effects of inflammation of the pericardium, are probably the only cases in which material amendment of the state of the heart may be anticipated, and that chiefly from gradual and spontaneous changes. In some, all the symptoms may remain stationary for a length of time, and not only a comfortable state of existence may be enjoyed, but considerable habitual exertion may be made; especially where the symptoms belong to the first head above stated; in others there is a rapid increase of the symptoms depending on the affection of the heart itself; and in all cases, sooner or later, it is to be expected that other complaints, consequent on the disordered state of the circulation,

will supervene, and their indications combine themselves with the symptoms already mentioned. These consequences take place more rapidly and more surely in young and full-blooded subjects, than in persons already old and emaciated. The affection of the heart seldom acts as their sole cause; but as a great and permanent predisposition to them. In the majority of cases, some of the exciting causes of disease, and especially of inflammatory disease, most generally cold, intemperance, or muscular exertion, and some inflammatory disease consequent on them, may be observed to aid in producing these effects. When these exciting causes are carefully avoided, the fatal effect of the affection of the heart may sometimes be averted for a long time; but the longer the organic disease has lasted, and the more it has disturbed the circulation, the less amount of exciting cause is necessary to produce these injurious effects.

The organic affections of the heart predispose to these consecutive diseases, partly, as is supposed, by the increased impetus of the blood in the arteries, which is given by the heart in the state of hypertrophy; but certainly chiefly by the obstruction to the flow of blood in the great veins, and in the lungs, which is produced in the ways above described, and which leads to the dilatation or hypertrophy of the heart.

Of these ulterior effects of such obstruction, the following are the most important.

Attacks of Bronchitis are easily excited, and are unusually obstinate in such cases; aud hence cough, expectoration, and habitual dyspnœa, with the sonorous, sibilous, and mucous râles, more or less general over the chest, soon supervene in cases of this kind, and often attend them from the first. In certain con-

stitutions also, occasional paroxysms of spasmodic Asthma (already considered), takes place in this, as in all other complaints attended with any permanent embarrassment of respiration. In many there are repeated (and always peculiarly dangerous) attacks of true Peripneumony.

2. Attacks of Hæmoptysis, and, with or without hæmoptysis, of Apoplexy of the lungs (of which we shall afterwards treat), are also common, particularly in cases where the chief obstruction is at the mitral valve; evidently because the auricle has much less power than the ventricle, to re-act against any obstruction, and maintain the average velocity of the circulation.

3. Partly in consequence of the increased impetus from the left ventricle, in the case of hypertrophy, and partly of the obstructed return by the veins of the head, during the frequent congestions of the lungs, there are frequently symptoms of Plethora Capitis, in connexion with organic disease of the heart. In some persons there are repeated attacks of Epistaxis, and in others, or subsequently in the same, there are strokes of Apoplexy or Palsy, or fits of Epilepsy. But for all these concomitants of the disease of the heart, a cause often appears in an extension of disease of the arteries to the interior of the cranium, facilitating their rupture.

4. The obstructed state of the circulation, in cases of diseased heart, and the frequent congestion of blood in the lungs, lead very generally (perhaps most remarkably in young subjects) to stagnation of blood in the Liver,—sometimes to occasional turgescence of the liver during paroxysms of dyspnœa, and much more frequently to enlargement, morbid induration, and deposition of one kind or another, both in the liver and spleen.

5. The same obstructed state of the circulation, especially if aided by the exciting causes above mentioned, leads generally, sooner or later, to the effusion of serum in some part of the capillary circulation, independently of inflammation there, *i. e.* to Dropsical Effusion;—in the cells of the Lungs, in the sac of the Pleura or Pericardium, in the subcutaneous Cellular Substance, and, especially after the liver has become affected, in the cavity of the Abdomen;—the symptoms and effects of which effusions will be shortly considered afterwards.

From what has been stated, it will readily be understood in what manner these organic diseases of the heart, besides involving the risk of sudden death by Syncope, naturally lead to such changes as threaten death, frequently by Asphyxia, and occasionally by Coma; and farther, by the general depressing influence of frequent uneasy sensations, and often by the more special influence of disease of the liver, so impair the actions of digestion and assimilation, as to weaken the whole system, and dispose it to suffer from the application, and to sink under the effects, even of slight exciting causes of disease.

Such cases of diseased heart, unless when resulting from recent and decided inflammation, are in themselves only objects of palliative practice. The counter-irritants and deobstruents can hardly be expected to be of service, excepting in these incipient cases. The palpitations may be moderated by Digitalis, Hydrocyanic acid, or Opium; more generally by a careful regimen, avoiding all excitement of the circulation, and all causes of acute disease; but frequently they become so violent, as to require the only effectual pallia-

tive in cases of considerable obstruction, repeated Bloodletting, general or local, which should be to as small an extent as will relieve the urgency of the symptoms; but may often be repeatedly employed with good effect, even after dropsy has supervened. By these means, and by watching and opposing the first threatenings of any of the *sequelæ* above stated,—inflammatory, hæmorrhagic, or dropsical,—many such persons may be long kept in tolerable comfort.

Cases of malformation of the heart, of various kinds, of which the general result is a mixture of the blood of the right and left sides of the heart, are not uncommon, and many such persons live till the age of puberty, although hardly any attain to middle life. They are distinguished by permanent lividity of the lips, and to a certain degree of the whole surface, coldness, and imperfect nutrition of all parts; are short breathed, and suffer much from dyspnœa on exertion, and the name of Cyanosis has been applied to their condition. This is a case admitting only of palliative practice, especially from a very careful regimen. It has lately been distinctly pointed out by Dr Craigie, that in some cases the mixture of the venous with arterial blood takes place long after birth, in consequence of disease and obstruction of the pulmonary artery, and engorgement of the right side of the heart, stretching the septum of the auricles, and pushing asunder the edges of the foramen ovale.*

* Edinburgh Medical Journal, 1843.

SECT. II.—*Of Chronic Diseases of the Arteries.*

Various formidable local diseases, besides the affections of the heart, result in different cases from diseased conditions of the Arteries.

1. When ulceration, effected by such a morbid action as has been described above, at any one part of an artery, is such as to cause the entrance of blood into the cavity thus formed, and its stagnation there, the exterior membrane, which resists the ulceration, is gradually distended, and the Aneurism of SCARPA, or pulsating tumour on an artery, formed by blood which has penetrated the two inner coats, and distended the outer, is established. In other instances, it must be admitted, that aneurismal sacs or pouches are formed on arteries, of the mode of formation of which we have no such accurate knowledge; sometimes by the erosion of arteries from without, by the pressure of chronic abscesses; and in a few cases, to which the name Dissecting Aneurism has been given, the blood escaping by a fissure from the interior of an artery, instead of swelling into a pouch at the spot, slits up the coats, spreads along the artery, and often escapes through the outer coat, by a second fissure, at some distance.

These aneurisms are found in very various parts of the body, chiefly, as may be readily supposed, at flexures of the arteries; and as they enlarge, they compress and cause absorption of all surrounding textures; their pulsations are in most parts perceptible to the touch, and sometimes, when within the thorax, and not to be reached by the finger, may be detected and distinguish-

ed from those of the heart by the stethoscope, particularly by a morbid *bruit* heard *there*, synchronous with the first sound of the heart, but not heard over the ventricle of the heart itself. Their other symptoms are very various,—depending sometimes on the degree of obstruction to the circulation which they present,—sometimes on the disturbance of the functions of the parts in their neighbourhood, as when aneurism of the descending aorta, pressing on the œsophagus, causes dysphagia, or, pressing on the lung, causes dyspnœa, and suppresses the respiratory murmur at the part;—often chiefly on the nerves, which they stretch or compress, and in the extremities of which they excite sympathetic effects, *e. g.* pains in the loins, hips, or thighs, when the aneurism is in the abdomen, in the side of the neck or arms, when it is in the thorax, or spasm in the larynx, when it presses on the recurrent nerve. These effects of aneurisms are sometimes fatal without any rupture of the sac; but they are more frequently fatal by rupture and discharge of blood, very seldom externally, but often into some cavity of the body,—the interior of the cranium, the larynx or trachea, the stomach or bowels, the cavity of the thorax, or abdomen, or pericardium. The symptoms dependent on them are only effectually relieved, and their fatal termination retarded, by the antiphlogistic regimen and occasional small bleedings; it has been stated, however, that this practice may be carried too far; and may prevent the consolidation and subsequent gradual diminution which often take place in aneurisms.

2. From the rigid, inelastic, and brittle state of the smaller arteries of the brain, arises very often their easy rupture on occasion of sudden determination to the

head, and either apoplexy or palsy; or, even independently of rupture, such a deranged, probably retarded, state of the circulation in the brain, as may cause various diseases there, to be considered hereafter.

3. From the same state of the arteries of the extremities, often perceptible to the touch, and disqualifying them for their office in regard to the flow of the blood, arises, in many cases, a tendency to Gangrene there from slight inflammation, similar to that formerly noticed (Part I. p. 303), as resulting in rare cases from more acute inflammations of arteries. To such cases the term Gangræna Senilis has often been applied, but incorrectly, because, although most frequent in advanced life, they may occur at almost all ages. In cases of this kind, inflammation of this character at the extremities of the diseased arteries is often excited by very slight causes; and even without it there are often violent neuralgic pains, admitting of relief chiefly from Opium, not from any operation or incision. But we do not understand how it happens, that in many other cases, where the arteries are found diseased or ossified after death, no such effects had resulted.

Again, the peculiar thickened and softened condition already mentioned, as occasionally observed in the inner coat of arteries, leads sometimes to sudden rupture of the diseased coat, which then becomes coiled up, and obstructs the artery, stopping pulsation, and leading often rapidly to irremediable gangrene of the limb below.

SECT III.—*Of Chronic Diseases of the flow of blood through, and exhalations from, the Capillary Arteries.*

We here treat of Congestions of Blood and Hæmorrhages, and of Dropsy in general; regarding these as the chief diseases which can be distinctly referred to variations in the flow of blood, independently of alteration of the products formed from the blood at the extremities of the arteries; and more specifically we here consider the hæmorrhage into the lungs, producing apoplexy of the lungs and Hæmoptysis, and the Hydrothorax; reserving the other cases of hæmorrhage and serous effusion, until we treat of the diseases of the parts where they occur.

I. There are hardly any chronic local diseases in which local determinations and Congestions of blood do not occur; and we are not sufficiently informed of the cases in which such irregularity in the distribution of the blood may be regarded as the primary or fundamental morbid change. Probably these cases are in reality few; but it is important briefly to enumerate the principal diseased states, in which morbid determinations of blood certainly occur, and in a great measure determine their extent and intensity, and injurious results.

Thus, very various derangements of the functions of the Nervous System, headaches, giddiness, transient imperfections of sense, or of memory, fits of epilepsy, of hysteria or other spasms, even of mania, in those predisposed to these diseases, some cases of transient paralytic affections, and many of apoplexy, appear to

result from simply increased afflux of blood to the brain, without rupture of its vessels, disorganization of its texture, or even increased effusion of its serous fluid.

So also there are many cases of asthma and of catarrh, which may probably depend on merely increased determination of blood to the mucous membrane of the air-passages; but such cases are hardly to be distinguished from those either of inflammation or of spasm affecting these parts.

An increased determination of blood to the mucous membrane of the stomach, although not followed by inflammation there, is probably a frequent cause of severe dyspeptic symptoms.*

An increased flow of blood to secreting organs is certainly one condition, and in many cases probably the chief condition, essential to the production of those diseases which consist in simple increase of their secretions, such as cholera, or many cases of diarrhœa and of leucorrhœa.

Even independently of attacks of hæmorrhage, there is evidence of increased flow of blood to the uterus, in many cases of uterine pains; and of a similarly increased flow to various other parts in connexion with nervous pains, *i. e.* pains which are unconnected with indications of inflammation.

An increased flow of blood to, or stagnation of blood in, the serous membranes, or the cellular membrane of the body in general, or of the lungs,—whether it be dependent on obstruction to the circulation in the great

* See Parry's Elements of Pathology and Therapeutics, sect. 484.

veins, as in cases of diseased heart or liver, or on suppression of excretion by the skin and kidneys, as in cases of dropsy after scarlatina, or be connected with the altered state of the blood attending disease of the kidneys,—is certainly a condition essential to the occurrence of dropsical effusion in those parts.

As true inflammation of cellular, serous, or mucous membrane is always attended with increase of the quantity of fluids thrown out there, it is obvious that effusions dependent on simple congestion of blood, and those dependent on inflammation, must often closely approximate; and the only essential distinction between them lies in the peculiar *alterations* of the products effused in those parts, which are effected by inflammation, and which have been already described.

All the diseased states now mentioned, proceed frequently from the same exciting causes as inflammation, and especially from the suppression of other evacuations,—more remarkably of the menstrual discharge than of any other.

In many instances of the kinds now stated, the symptoms are the same, and the whole history of the disease, up to a certain period, is the same, as in other cases, where the increased determination of blood is afterwards unequivocally shewn by hæmorrhage; *e. g.* a fit of apoplexy, in a plethoric person, after a full meal, and either mental agitation or intoxication, although preceded and attended with flushing of face, and heat of the head, may be fatal without any effusion being discoverable in the head; but after many cases of fatal apoplexy, of which the history is similar, we find effusions of blood; and we cannot doubt that these latter cases illustrate the essential

nature of the diseased action which took place in the former.

So also, urgent dyspeptic symptoms, following suppression of the menses, have often been succeeded, and immediately relieved, by vomiting of blood; and this fact evidently so far illustrates the nature of the severe affections of the stomach which often succeed the suppression of that discharge, when there is no hæmorrhage. And the nature of many cases of diarrhœa is illustrated by what is seen in a few unusually violent cases of that kind, which are attended by severe hæmorrhage, even when there is no inflammation or ulceration, and no obstruction to the flow of the venous blood through the liver.

Again, the nature of such chronic diseases, involving determinations of blood, is very often illustrated by their ready transition, in the same patient, into hæmorrhagic or inflammatory diseases. Thus we know that various combinations or successions of symptoms of affection of the nervous system, the cause of which may be thought doubtful if they stand alone, are often followed by regular apoplectic or paralytic attacks dependent on hæmorrhage in the brain; and that cases of simple diarrhœa are easily convertible, by errors of regimen, which in other circumstances would be innocent, into strictly inflammatory diseases.

Farther, the dependence of many cases of these diseases on the cause here assigned, is farther confirmed by a very sufficient experience of the *juvantia* and *lædentia*, in at least a large proportion of cases of the kind, especially in their earlier stages; although experience also teaches that morbid actions which commence with increased local determinations of blood, and

even with general excitement of the circulation, and which threaten or even go on to dangerous hæmorrhage, often subsequently continue for a long time, without any indications of increased flow of blood, and when remedies are chiefly demanded by the general weakness of the circulation which subsequently ensues.

There are probably cases of affection of the lungs, and certainly cases of affection of the brain, where the fatal event is produced by the injury of these parts consequent on mere congestion of blood, without farther change; and there are many cases of very various diseases, in which congestions of blood in these organs are *part of the cause* of the fatal event. It is therefore of great importance to study the indications of mere Congestion of Blood, as well as the effects of Hæmorrhages, as they appear on dissection.

It may, however, be stated generally, that the indications of local congestions of blood, observed after death, when no farther consequence has occurred, are very liable to fallacies, and are not much to be trusted as proofs of the nature of the preceding disease, unless the nature of the symptoms, or other circumstances in the condition of the patient, confirm the conclusion which they suggest.

These fallacies result chiefly from what is known of the unequal and irregular distributions of blood that may take place at the moment of death, or within a very short time before it, even in cases where there had previously been little or no unusual determination of blood.

At the moment of death, or soon after it, congestions of blood in various parts and textures (at least in

the skin, most of the vascular parts, mucous membranes, and the parenchyma of some of the viscera), frequently occur; which are not referable to any known cause, but may be followed by transudation of serum after death, and present appearances very similar to those of inflammation in its first stage.

A congestion of blood, with some serous effusion, and even extravasation of entire blood, is certainly often determined also by gravitation, acting before death, but at the time when the circulation is very much enfeebled, in those parts of the body which then lie lowest.* This takes place especially, if any additional cause for slow motion of the blood at the same time exists in these parts; as in the lungs, when there is any impediment to the free arterialization of the blood, or in the abdominal viscera, when the flow of venous blood is obstructed either in the liver or at the lungs or heart. A similar state of congestion and serous effusion sometimes occurs in the lower extremities from old age or extreme debility; and in any part of the body, if the veins leading from it are narrowed or compressed by tumors.†

Such congestions and effusions are of course most apt to take place in cases when the blood is in full quantity, and has less tendency to coagulation than usual, and therefore such fallacious appearances are seen most frequently after different kinds of violent death, or after contagious febrile diseases of short duration.

* Hence the Peripneumonie des agonisans of Laennec, and the Engouement de Position of Andral.

† See Andral, Precis d'Anat. Pathol. t. i.

But when the same appearances are found in parts of the body where gravitation would not determine them,—when they are found under the circumstances stated above, as favouring local congestions of blood,—and when they correspond to symptoms observed during life, of embarrassment of the functions of the parts where they are formed, especially of hæmorrhage, and when they are found after death associated with such lesions as result from hæmorrhages, there can be no difficulty about regarding them as the effects and indications of morbid determinations of blood.

The only practical inference which we state at present from the facts here noticed is, that, in all the diseased states above enumerated, especially if of recent occurrence, and attended with a vigorous state of the circulation, depletion, and the antiphlogistic regimen, although seldom requiring to be carried so far as in inflammations, will often form an important part of the most useful plan of treatment.

II. Hæmorrhage frequently takes place from the mucous membranes of the nose, fauces, bronchiæ, stomach or bowels, and still more frequently of the uterus; in some cases in such quantity as to be dangerous or fatal, by reason of the debility produced by the loss of blood, or, in the case of its occurring in any of the air-passages, by reason of the obstruction to respiration thence produced. When taking place from the inner surface of the uterus, at the moment of the separation of the placenta, it has often been fatal in persons previously quite healthy; but in the other parts mentioned it is seldom immediately dangerous, unless connected either with the morbid state of the blood, or

with some of the obstructions to the free course of the blood, formerly mentioned. In all these parts, it often appears, on minute investigation, that no rupture of vessels on the surface whence the blood came can be detected, and, in a few instances, from the surface of the skin, and in many, from the mucous membrane of the uterus, blood has been seen to exude in minute drops, without any breach of texture.

Hence hæmorrhage is usually regarded at present as simply a diseased state of exhalation; perhaps it has been of late too exclusively so considered, for certainly the greater number of fatal hæmorrhages in any of the shut cavities of the body, and some of those which take place from mucous membranes, are the result of rupture or erosion of bloodvessels.

Effusion of blood into the substance of the lungs is not so common as that into the brain, to be afterwards considered; the effusion, in most cases of hæmoptysis, being either into the bronchiæ, or into ulcerated cavities; but it takes place occasionally, and has been accurately described under the title of Apoplexy of the Lungs; and the history of the organic lesion thus effected is important.

This hæmorrhage takes place occasionally when there is no organic disease within the chest; pretty frequently when there is other disease of the lungs, limiting and obstructing the circulation; most frequently when there is disease of the valves on the left side of the heart, and consequent impediment to the movement of the blood there. The bloody effusion into the lungs is most generally attended with hæmoptysis, but the amount of that discharge bears no proportion to the extent of the effusion, and sometimes, even in fatal cases, it is altogether awanting.

Besides the hæmoptysis, the effusion of blood into the air-cells must naturally produce sudden dyspnœa, and disorder of the heart's action, and more or less of local inflammation; and when it is in any considerable quantity at one spot, it must obscure or suppress the natural respiratory murmur, and even make that part of the chest dull on percussion; but these last indications are equally given by various other lesions, formerly mentioned. When, however, they take place rapidly, with sudden dyspnœa, with hæmoptysis, however slight, and especially in a case where there are indications of diseased heart, it may be suspected that they proceed from this cause; and in such cases, the affection is sometimes rapidly fatal.

The appearance, in the dead body, of the lesion of the substance of the lung thus caused, is just that of a coagulum of venous blood filling up a part of the cellular texture. The colour is darker and more uniform, the texture is firmer, and the edge more circumscribed, than in the case of effusions from inflammation.

Blood thus effused into the substance of the lung, does not appear so rapidly to excite inflammation around it, as in the brain; and it is not, therefore, found afterwards to be surrounded with any cyst; but in the lungs, as in the brain, and as in the cellular substance after bruises, such simple effusions of blood, in the perfectly healthy state, appear to be easily absorbed; and judging both from the gradual improvement of the general symptoms after many cases of hæmoptysis, with much dyspnœa (unconnected with phthisis), and from the gradual abatement of the indi-

cations of effusion given in such cases by auscultation and percussion,* we may presume, that large coagula of blood may be absorbed from the cellular texture of the lungs, and the functions of the part gradually restored; although the complex and necessarily dangerous nature of most of the cases, where this accident happens, prevents our having many examples of this kind.

In all situations, where effusions of blood occur from disease, we have reason to believe, that the blood effused in a few cases becomes an organized mass, and then is gradually converted into different kinds of tumor. This we gather from careful examination of some instances of the kind, where successive effusions have taken place, and are found at the time of death in different stages of their progress.† But as many facts inform us, that blood effused in the perfectly healthy state is readily absorbed, it is obvious that there must be some constitutional peculiarity in the cases, where such transformation of effused blood takes place; and where such peculiarity exists, we have good reason to believe, that mere congestions of blood lead to the formation of adventitious textures (very little liable to absorption) without any hæmorrhage.

It may be judged from what has been stated, that hæmorrhages may occur in very various circumstances, and with great variety of concomitant general symptoms; and accordingly, the practice to be employed in them is various.

* See Laennec, t. i. p. 383.

† See *e. g.* Andral, Precis, &c. t. ii. p. 589 and 764.

The most powerful remedy in checking hæmorrhage is general Bloodletting; and in many cases, where the disease is attended with febrile symptoms, either connected with the sudden local determination of blood, or with incipient inflammation, excited by the effused blood, large and repeated bleedings are obviously demanded, and well borne. In such cases also the antiphlogistic regimen in all its parts, absolute rest, repeated purging, the local application of cold, if the part is near the surface, and sedative medicines, particularly nauseating doses of antimonials, properly precede the use even of astringents. If the part is actually within reach, the saturated solution of alum, and the lunar caustic, are the most powerful applications.

But when the circulation becomes weakened, as the disease advances, or if it is much weakened from the first, internal astringents are more important. The Acetate of Lead in full doses, pretty frequently repeated, has appeared to answer well in many cases; the Sulphate of Alumina in others; the Sulphuric Acid, and more especially the Gallic Acid, in others. The Sulphuric Acid or Sulphates must not be combined with the lead, on account of their chemical action on it. The Oil of Turpentine has been thought useful; but, in general, vegetable astringents are less approved in these cases, and Opium seems chiefly useful when the hæmorrhage is in the intestines, and attended with diarrhœa.

And in some cases, particularly of hæmorrhage from the stomach or bowels, or uterus, the state of the circulation becomes such as to demand the full use of alkohol and other stimulants, even while the hæmor-

rhage continues to recur. Of course, the proper application of these different remedies may often require much discrimination, and it is particularly necessary to remember that there is in many persons the irritable condition of the Heart, called "Reaction after loss of Blood," attended often with throbbing at the temples, sometimes with delirium, which may give a fallacious impression of the heart's strength, even when there are all other indications of extreme weakness, and when laxatives, opiates, and stimulants may be found the most effectual remedies.

The subsequent treatment must depend on the other diseased states with which the hæmorrhage is complicated, *e. g.* previous disease of the heart, or lungs, or amenorrhœa, or purpura and the hæmorrhagic diathesis; in all cases, such exercise as particularly excites the part affected, must be long and carefully avoided; and in the case of hæmoptysis, the patient must always be treated, for a long time after, as one who is threatened with one form or other of ulceration of the lungs.

III. Dropsical Effusion, *i. e.* increased and somewhat altered Exhalation into the shut cavities, or cellular membrane (without any of the effusions characteristic of inflammation), is the most essential part of the morbid change in many cases of disease, and often the immediate cause of death by Coma or Asphyxia, and therefore is properly made a subject of separate study. It is most generally, however, like hæmorrhage, consecutive on other diseased states, often part of very complex diseases; and after what has been said of inflammation, and of congestions of blood, as causes of se-

rous effusions, and likewise of obstructions to the free movement of blood, especially in the veins, as a great predisposing cause both of inflammation and congestion, we need not dwell at any length on the pathology of Dropsy.

We mentioned formerly two cases in which merely serous effusion, consequent on inflammatory action, without any obstruction to the return of the venous blood, may be fatal, viz. the common case of rapid effusion of serum into the ventricles of the brain; and the rare case of pneumonia, affecting both lungs at once, and fatal by serous effusion into the cells of the lungs, before any but that first effect of inflammation has taken place.

There are also cases of fatal Coma in adults, some very rapid, others slow in their progress, where nothing but effused serum is found after death, and no distinct marks of inflammation have preceded the coma, and which have the name of Serous Apoplexy; in such cases, likewise, the precise resemblance of the symptoms to many of those in cases where hæmorrhage is ascertained to have taken place, and the experience of the juvantia and lædentia, entitle us to say that the effusion is generally to be ascribed to increased determination and congestion of blood, although no obstacle to the return of the venous blood may exist.

The Hydrocele, or dropsy of the tunica vaginalis testis, is another case, often referable, in the first instance, to an inflammatory action,—as when it is excited by a blow,—and although naturally favoured by the position of the part, not distinctly referable to obstruction of the venous circulation.

In other cases, dropsical effusions are apt to go on to

a greater extent than in these, and perhaps in all others it is an essential part of the disease that some impediment exists, if not to the flow of blood in the veins, at least to its natural movement in some part of the system, which retards the capillary circulation on some considerable surface, and favours the escape of more than usual of the serous part of the blood.

In general, in dropsical cases, the vital actions in the vessels which yield the effusion have not undergone any change in *kind*, as they uniformly have in cases of inflammation; but the natural action of Exhalation from these vessels predominates over that of Absorption; generally on account of some impediment to the return of venous blood from them, situated at some distance from themselves, but causing congestion and retarded flow in them, and facilitating transudation from them.

There are some cases, even of general dropsy, where no such impediment to the circulation can be detected, but such cases are in general slight and easily removed, unless they occur towards the close of a long continued disease, which is dangerous in itself. The truly important distinction among dropsies is according to the nature and seat of the local disease, obstructing or impeding the circulation, with which they are connected; but it is of course necessary likewise to ascertain, as far as possible, in every case, what cavities are occupied by the effusion.

Anasarcous or œdematous swellings, dependent on effusion into the subcutaneous cellular membrane, are easily known by their soft feel, without discoloration, and by pitting on pressure; and the Ascites, or effusion into the cavity of the abdomen, by the sense of fluctuation felt with one hand when the abdomen is gently

struck by the other, particularly if this is most distinct in the part of the abdomen which is lowest in the position of the patient.

The effusion into the cavity of the Chest is not so easily discriminated, especially as it is very often only a part of the cause of the dyspnœa, and other general symptoms, which are present; and when it occupies both sides of the chest, it may be a cause of considerable dyspnœa, without going to such an extent in either as to be distinctly ascertained by examination. But in many cases, the dull sound on percussion, and obscured, or even suppressed respiratory murmur, in whatever part of the chest is lowest at the time of examination, and especially the disappearance of these symptoms in that part, when it is made highest, unequivocally denote the disease.

The dropsy of the Pericardium, when unattended with any strictly inflammatory effusion, seldom exists without dropsy in other parts of the chest, and other disease within the chest; its diagnosis is uncertain, but when considerable it causes a dull sound on percussion; usually makes the heart's action feeble and irregular, with variable and perhaps undulating impulse; and the recumbent and especially the supine position insupportable.

In many cases dropsical effusion, though without inflammatory symptoms, takes place into the cells of the Lungs, more than into any other part within the chest. In such the sound on percussion is hardly sensibly altered; but the respiratory murmur at the part that lies lowest is obscured, and sometimes the crepitant or subcrepitant râle may be perceived; but as this case is generally complicated, at least with chronic bronchitis,

causing the sonorous and mucous râle, the diagnosis is generally difficult.

The increase of dyspnœa on lying down, although often a striking, is neither a uniform nor characteristic, symptom of any serous effusion within the chest; and the starting from sleep is certainly not an effect of this effusion, depending generally, when it is observed, on concomitant disease of the heart. But the presence of anasarca, and of scanty urine, especially if these can be ascertained to have been contemporaneous with the attack of dyspnœa, always give great reason to suspect that effusion exists; there being few cases of any considerable dropsy either of the thorax or abdomen without these symptoms.

The internal parts, with disease of which dropsy is most naturally connected, with the symptoms of which, therefore, its indications are most frequently combined, are the Heart, the Lungs, the Liver, and the Kidneys. The effect of almost all organic diseases, or of inflammatory effusions, at the heart, at the lungs, or at the liver, in retarding the flow of blood in the great veins, either the venæ cavæ, or the vena portæ, requires no illustration. When the kidneys are diseased, in the way formerly described, as the most common, although no great veins be affected, the natural outlet of part of the serum of the blood is more or less obstructed; and in such cases, as the albumen of the serum is partly drained off, and diminished in proportion to the serosity, it is likely that the latter is habitually in a state more prone to effusion, just as the whole blood is when deprived of a part of its fibrin, in the experiments of Magendie. Accordingly it has been found by Andral that in sheep, dropsy attends diseases of the liver, only

when the serum of the blood is deficient in albumen. Chronic diseases of the peritoneum and of the mesenteric glands, are likewise frequently attended with dropsy, probably by reason of pressure on some of the mesenteric veins.

The following appear the most important principles to be kept in mind, regarding the connection of dropsy with the diseases of these parts.

1. It is not a uniform, and therefore not a necessary consequence, of any disease that we can specify in any one of these parts; and the chronic diseases of them, on which it so frequently supervenes, may be regarded simply as great and permanent *predisponent* causes of it. When that predisposition exists from chronic disease of one of these parts, an acute disease, although slight, of another of them, or even a general disturbance of the circulation, is often the exciting cause of the first accession, or of the subsequent returns of dropsical effusion; and the greater the amount of the permanent predisposition, and the more frequently the dropsical effusion has recurred, the less action of any exciting cause is necessary to reproduce it. There are, however, cases of peculiar tendency to dropsical effusion, the cause of which is quite obscure.

2. Inflammation of the heart, of the lungs, or of the kidneys, appears in some cases to excite dropsical effusion, when no other disease of internal organs exists. This we conclude from the dropsy, whether general or partial, supervening almost immediately on the usual symptoms of inflammation of these parts;—or, in the case of the kidneys, from its being attended with the albuminous urine, of low specific gravity, and taking place suddenly, generally from exposure to cold, and with fe-

brile symptoms. Such cases have the name of Acute or Inflammatory Dropsy. But in most cases of dropsy supervening so rapidly on inflammation of any one of these organs, it will probably appear, on careful examination, that another of them is at least slightly inflamed also; *e.g.* that some degree of pneumonia or bronchitis attends either the acute dropsy with coagulable urine, or that which is apparently owing merely to inflammation at the heart. The acute dropsy after scarlatina is generally attended with coagulable urine, and may therefore be supposed to depend on subacute inflammation of the kidneys, coinciding perhaps with the obstructed state of the excretion of the skin. But in severe cases of this kind, inflammation within the thorax is very generally present likewise.

3. In like manner, when dropsy supervenes on chronic and organic disease only, of the organs above mentioned, it is most commonly owing to a complication of such disease in more organs than one.

4. When the permanent predisposition, resulting from organic disease of one or more of these organs, exists, it is important to be aware of the nature of the supervening diseases, from which attacks of dropsy are most to be apprehended.

a. Most of the attacks, in this description of patients, which take place *suddenly*, especially if the dropsy is general, appear to depend on an inflammation, often of no great intensity, in the lungs or bronchiæ (which will necessarily be attended with some acceleration of the pulse, and at the same time with some impediment to the flow of blood through the lungs); supervening either on disease in the left side of the heart,—or on permanent organic disease (*e.g.* partial condensation

from previous inflammation) of the lungs themselves, or on an obstructed state of the liver or kidneys.

b. There are other cases in which pretty acute, but more partial, dropsy supervenes on these chronic and organic diseases, and where its immediate cause appears to be a subacute inflammation of the membrane where the effusion takes place, generally the pleura or peritoneum; and in some such cases, on dissection, a few flakes of adhesive lymph are found mixed with the serous effusion; *i.e.* the affection of the serous membrane evidently commences as inflammation, but an unusual amount and duration of serous effusion, consequent on that inflammation, is determined by the existing organic disease which retards the venous circulation.

c. When dropsy supervenes more slowly on organic disease of the heart, it may often be ascribed, in part, to the gradual accession of chronic bronchitis, to which it was formerly stated, that any obstruction on the left side of the heart gives a great predisposition. In this case, the effusion into the cells of the lungs is fully as common as that into the cavity of the chest.

d. When dropsy, especially if ascites, slowly supervenes on chronic disease of the lungs (*e. g.* on old asthma and emphysema), the reason generally is, that the liver has become hardened and obstructed.

Here it should be observed, that as hydrothorax, or general dropsy, from disease within the chest, is more frequently, in part, dependent on a temporary and remediable cause (*e. g.* bronchitis) than ascites from disease of the liver, so it is more frequently seen to abate under remedies.

e. Dropsy with diseased kidney is probably more variable than that dependent on any other cause—often

abating entirely, without any improvement of other symptoms. And there is this peculiarity attending it, that the bulk of the urine passed in the day is sometimes fully as great as natural; and in some instances is raised by medicines considerably above what is natural, for some time together, without diminution of the dropsy; whereas in other cases of dropsy, a full flow of urine, though often a temporary, is a certain cause of absorption of the effused fluid.

4. As a certain degree of retardation of the motion of the blood seems essential to dropsical effusion, it is easy to understand, that while on the one hand it is favoured by such a degree of fulness of blood, as increases the effect of any mechanical impediment to the circulation,—and is more apt to supervene, therefore, on a given amount of obstruction at the heart in a young and strong, than in an old and feeble subject,—it must also, on the other hand, be favoured by such a state of weakness as hinders the blood in the capillaries from receiving their due impulse from the action of the heart; and therefore may often gradually supervene in the later stages of diseases where any organic obstruction exists, although absent in the earlier stages; and may in some such cases be apparently promoted by evacuations of blood. The effusion into the cells of the lungs, in particular, is apt to occur, in a greater or less degree, in circumstances of extreme debility, from whatever cause that may arise.

Dropsical effusion is always injurious to the strength of the circulation in the capillaries in its immediate neighbourhood, which must necessarily be impeded by the pressure of the effused fluid; as is distinctly shewn by the coldness of dropsical limbs, and still more by

their peculiar tendency to gangrene when inflamed. In this way such effusion in the abdomen must necessarily impede the functions going on there, and so co-operate towards the fatal event of cases where it occurs. In the thorax it is frequently the cause, or great part of the cause, of death by Asphyxia. And when much dropsy, especially within the chest, exists, even independently of disease of the heart, sudden death is not uncommon. Lastly, in the course of dropsical diseases, effusion not unfrequently takes place in the ventricles of the brain, and causes fatal Coma; and this sometimes unexpectedly, without increase of the other dropsical effusions. Of course, the prognosis in dropsical cases is always uncertain, and very generally ultimately unfavourable.

There are many cases of partial dropsy, as, *e. g.* of the lower limbs, evidently explained by compression, or some mode of obstruction, of the larger veins leading from the part, as by enlarged lymphatic glands. The most remarkable case of the kind is the Phlegmasia dolens, the connection of which with Phlebitis was formerly considered. But in this case the serum effused into the cellular texture of the limb is somewhat albuminous, or nearly of gelatinous consistence, so that the swelling has a degree of elasticity. A somewhat similar condition of the effused fluid is seen in some cases of anasarcous effusion from more common causes.

The effusion of firm matter into the cellular membrane of new-born infants, which is occasionally seen, and even prevails epidemically at times, and has the name of Skinbound, has been likewise described as a kind of œdema; but appears to be rather a variety of

erysipelatous or diffuse inflammation of the cellular membrane.

A great part of the remedies to be used in cases of dropsy must be directed by the inflammatory or organic diseases, with which the effusion is connected, or of which it is a consequence; and particularly the use of blood-letting, and of mercury or other deobstruents, which are often the most important remedies in such cases, must be guided by the symptoms of those diseases; the only general rule being, that when these symptoms appear manifestly to demand those remedies (especially the first), they are not to be regarded as contra-indicated by the presence of dropsy, although that concomitant of the disease, especially if in the chest or pericardium, is a reason for caution and moderation in the use of blood-letting.

The dropsical effusion itself is chiefly an object of practice when any inflammatory symptoms are declining, or have abated, and the following are the most important general rules that can be laid down in regard to it:—

1. It may be, in most cases, more promptly and surely carried off by the action of strong or hydragogue Cathartics than by any other means, *e. g.* by Elaterium in small but repeated doses, Croton Oil, Gamboge, or Jalap, Scammony, &c., with or without the Bi-tartrate of Potass, or the latter alone. The weakness of some patients, and the tendency to nausea and vomiting in others, are the chief objections to this practice; under which, however, when certain intervals of rest are allowed, we not unfrequently see, not only the effusion disappear, but the strength gradually improve. In some persons we see these medicines taken singly (especially the two first), act remarkably well; but it has been more gene-

rally thought that a combination of several, with one another and with Calomel, acts more mildly and effectually. It is in all cases essential, for this object, that full watery evacuation be procured.

2. The Diuretics, when they act fully, causing a decided excess of the urine over the fluid ingesta, never fail for the time to remove the dropsy, except in some very unusual cases of disease of the kidney; and their action has no debilitating effect; but then it is very uncertain, especially in the more advanced complex cases of organic disease, and many of the diuretics cannot be continued on account of their sickening effect. The following rules as to their use seem to be justified by experience:—

They generally act best when several are combined, and the combination which is perhaps most frequently successful, is that of vegetable diuretics, particularly Squill and Digitalis, with Mercury. This is especially useful when the urine is acid, high coloured, and with a copious reddish sediment.

In other cases of the same description, a combination of the Saline Diuretics, Acetate, Carbonate, or Hydriodate of Potass, with the vegetable diuretics, and likewise with some of the bitters, infusion of Quassia or of Pyrola, or decoction of Broom and Juniper, are more effectual.

In others the saline diuretics alone, particularly a mixture of several, as of Bi-tartrate of Potass, Nitrate of Potass, and Carbonate of Potass or Soda, or of the Bi-tartrate with Sub-Borate of Soda, act satisfactorily.

When the urine is pale, of low specific gravity, and albuminous, implying the renal disease formerly described, the more acrid diuretics seem to be contra-indicated, particularly in the early stage; and Mercury is

peculiarly apt to act violently; but the Bi-tartrate of Potass with Digitalis, and even small doses of Mercury, cautiously given, have often acted remarkably well.

When there is much weakness, and no indication of active inflammation, many of the symptoms will be relieved, and the effect of the diuretics promoted, by frequent small doses of stimuli, particularly wine, gin, and nitrous ether.

On the other hand, in a plethoric state of the body, and when the pulse is full and firm, although there be no local inflammatory symptoms, bloodletting or purging, or both, previous to the diuretics, obviously aid their action.

The absorption of dropsical effusion seems to be always promoted by free cutaneous transpiration,—by exercise when the strength of the patient will admit of it,—by summer weather,—by warm clothing, and in some instances by the warm bath and diaphoretic remedies. The latter have been naturally and particularly recommended in cases of Renal Dropsy, but are certainly often employed, in such cases, without obvious effect.

When the distension of the skin by serous effusion is great, and inflammation with ulceration or sloughing likely to ensue, these consequences may sometimes be averted, and the removal of the effusion obtained by small punctures and by the aid of bandages; but the punctures should be minute and not below the knee, and the skin should be protected against the serum that exudes, by oiled silk coverings, lest these punctures lead to inflammation and sloughing.

The removal of the dropsical effusion seldom implies the disappearance of the disease from which it originates;

but there are a few cases, in which its cause is obscure, and the effusion, once removed, is not reproduced; and many where the dangers, obviously the most imminent, are obviated by the absorption of the effusion; and in which the more permanent disease may subsequently last long without recurrence of the dropsy, or other very serious consequence.

CHAPTER IV.

OF CHRONIC DISEASES OF THE ORGANS OF DIGESTION AND ASSIMILATION.

SECT. I.—*Preliminary Observations.*

THE chronic diseases of the Viscera of the Abdomen and Pelvis are more various, and demand more minute discrimination, and more variety of treatment, than the inflammations of these parts; as may be expected, from the number and importance of the secreting organs contained in these parts, and from the influence exerted over them by the Nervous System.

Some general observations, in regard to the manner in which these diseased states of the digestive organs are produced, and their connexion with other disorders, demand attention in the first place.

Even when the Organs of Digestion are in perfect health, the symptoms of disorder there are very often produced, and their vital action injured, by such ingesta as are beyond their powers, or by such other excitements acting on the body,—particularly on the Nervous System, after food has been taken, as interfere with the process by which the digestion and assimilation of that food are secured.

In studying the modes in which the organs concerned in that process may be disqualified for their office,

we must first attend to the peculiarity and complexity of the process itself. We speak of strength and weakness of the stomach; but the process of Digestion requires the natural state of every kind of vital action; and to several of these, such terms can only be analogically or metaphorically applied. The main agent in the first part of the process, is the Gastric Juice, a secretion dependent, of course, on a due supply and due quality of the blood, but which is likewise peculiarly influenced by the Nervous System; being only efficient as a solvent of the aliments, when its formation is duly excited by these aliments themselves, and that excitation being either directly dependent on, or at least much influenced by, certain vital actions of the sensitive nerves of the stomach, indicated by the sensations of the stomach, and variously excited and stimulated by those aliments. Various other secretions, and a proper action of involuntary muscles, are required for the proper introduction of the aliments into the blood; a healthy action of the organs of absorption from the Primæ Viæ,—*i. e.* both of veins, which seem simply to absorb fluids, and of lacteals, which give occasion for the strictly vital action of the formation and transformation of cells,—is essential to the transference of the nutritive portion of the ingesta into the bloodvessels; and when they are introduced there, their due assimilation must depend on the condition of those portions of the lymph of the blood itself, to which they are to be added.

Hence strength or weakness of the stomach implies strength or weakness, or a perfect or imperfect vital agency, not only of muscular parts, but of secreting organs, of the secreted fluids of these, of portions of

the blood itself, and especially of those portions of the Nervous System, by which the organic functions are continually, although variously, excited and controlled.

We know also, that the assimilation of the aliments is only completed after they have passed through the lungs, and that much of the ultimate result, as to the quantity and quality of the blood formed, depends on the agency (still obscure, but certainly important) of the oxygen taken in there, and the quantity in which it is absorbed, as is most distinctly proved by the fact, that persons debarred from taking exercise require more aliments to maintain health and strength, than those who are regularly exercised.

We know that the due assimilation of the ingesta likewise depends essentially on the healthy state of the other organs of excretion, by which certain portions of those ingesta themselves, as well as of the previously existing materials of the body, are continually expelled.

Lastly, we know, that, along with the aliments, substances are often taken into the system, which act more or less as poisons, variously affecting the nervous and muscular powers, and the secreting and excreting organs, and thereby injuring the process of digestion itself as subsequently performed.

So long and complex a vital process may of course be injured by causes applied in various ways, and at various points; and the means which are truly effectual in restoring the natural condition of the function, must necessarily be very various, and often applied at a distance from the stomach.

Indeed, the processes of digestion and assimilation of

food would be much more easily disordered than they are, were it not for the beneficial influence of Habits, whereby this and all other actions connected with the Nervous System are performed with gradually increasing facility, even in circumstances otherwise unfavourable; which provision of Nature may be truly considered as a *vis medicatrix* in regard to this function.

Functional disorders of the digestive organs, however, very generally depend, either on the nature of the ingesta, or on influences communicated through the nerves, *e. g.* painful or uneasy sensations, mental irritations or anxiety, or the effect of intoxicating liquors or other injurious habits; and the most effectual means of correcting such disorders consist, therefore, in the regulation of diet, and in the judicious application of the other articles of the Tonic Regimen, by which, chiefly through the intervention of the nervous system, all vital action is invigorated; particularly pure air, exercise, variations of temperature, especially by warm, tepid, or cold bathing, and mental excitement.

Again, it is obviously important, and in some instances difficult, to understand the connexion existing between disorder of the function of digestion and injury or disease of other parts of the body.

1. Disorders of the digestive organs are often the result of changes taking place in the condition of the Nervous System, the peculiar influence of which on the secretions must always be remembered; as when long continued mental languor or depression, or more violent mental emotion, lessens, and probably vitiates, all the secretions of the primæ viæ, and causes dyspepsia, sudden loathing of food, or vomiting, constipation, diarrhœa, sometimes jaundice, according to the constitution

of individuals;—or when the sensation of intense pain in any part of the body causes thirst or dryness of the mouth, and destroys the power of the secretion at the stomach.

2. They are often produced by deficiency of fresh air, exercise, and salutary variations of external temperature; which privations act primarily on other parts, producing long continued irksome sensations, repressing the circulation on the surface, and the different excretions from the body, and so favouring plethora in internal parts; and likewise diminish the supply of oxygen to the blood, which is essential to the changes continually going on in its composition, and, among others, to the due formation of the secretions required in digestion.

3. They are often produced by diseases, functional or organic, of other parts of the system, either sympathetically, *i. e.* by an influence quickly communicated through the nerves, or more slowly but more permanently, by injury of the composition of the blood, or of some of the secretions. Such secondary affections of the digestive organs are often distinguished with difficulty from, and often mistaken for, primary; as when various disorders of the stomach ensue in the course of diseases of the brain, liver, bowels, kidneys, uterus, or other pelvic viscera.

4. Although not necessarily implying any alteration of the usual state of the circulation, yet in many cases they supervene on congestions of blood in the parts where they take place, or are aggravated by such congestions of blood; as is obvious when we observe the facility with which Dyspepsia or Diarrhœa often supervenes on obstruction to the flow of venous blood through the liver.

5. On the other hand, a disordered state of the secre-

tions of the stomach and bowels, injuring the digestion of food, often gives rise to morbid determinations and congestions of blood. It is thus that dyspepsia or diarrhœa often assumes somewhat of the character, and is relieved by a moderate use of the remedies, of inflammation of the stomach or bowels.

This is remarkably observed in certain forms of dyspepsia in adults, described by Dr Wilson Philip, Dr Parry, and others, in this country, and by Broussais and his followers in France; and again, in many cases of the Febris Infantum Remittens, formerly described as often depending on, or passing into, inflammation of the mucous membrane of the bowels.

6. Alterations of the secretions immediately concerned in digestion frequently produce derangement, not only of the functions in which they are themselves concerned, but likewise of other functions, often of distant parts; and this we can perceive to take place in three distinct ways, —either, *first*, when the function secondarily affected is necessarily dependent on that first deranged;—or, *secondly*, in a more precarious and variable way, when the affection of the second is truly a sympathetic change;— or, *thirdly*, when the affection of the second is owing to a distempered constitution of the blood, resulting from the primary disorder of the Primæ Viæ.

Thus a disordered state of the function of digestion, or habitual constipation or diarrhœa, leads naturally to deficient nutrition, and to debility and emaciation; and it also leads much less certainly, but sometimes more obviously, to a distempered state of the external senses, particularly vision,—or of the mental faculties (Hypochondriasis),—or of the respiratory actions (Asthma),—

or of the voluntary muscles (Hysteria, or even Convulsion),—or to various indefinite uneasy sensations common in persons of *nervous* temperament.

The spasms of the legs, attending violent diarrhœa or cholera, are an example of a more definite and uniform sympathetic effect, resulting from derangement of the secretions of the Primæ Viæ.

But a more permanently disordered state of the organs of digestion and assimilation, naturally injures (although in ways hitherto imperfectly understood) the composition of the blood. Hence it modifies the progress of inflammation, especially in a constitution already scrofulous, or of any other local disease that may be excited in the body, rendering it more obstinate, and less amenable to treatment, as has been well illustrated by Mr Abernethy, Dr Hamilton, and others. In children, febrile action is frequently excited by derangements of the secretions of the Primæ Viæ, independently of inflammation; and in certain (chiefly scrofulous) constitutions, fever, from this cause, as from any other, is very apt to pass into Hydrocephalus. And in adults, the local diseases, depending on a morbid constitution of the blood, may often be ascribed, originally, to such imperfect or perverted digestion and assimilation. Indeed, it is probably only by thus altering the constitution of the blood that functional disease of the stomach and bowels leads to the more dangerous organic diseases of these parts themselves.

It may be understood from what has been stated, that functional disorders of the organs of digestion may be dangerous or even fatal in different ways,—sometimes, in like manner as inflammation of those organs, by reason of a sympathetic effect in the heart, as in cases

of violent Gastrodynia or violent Cholera,—sometimes by reason of the wasting and exhaustion, rapid or more gradual, consequent on them; but more frequently by weakening the system, and aggravating, or aiding to produce, various other diseases, inflammatory and organic, with which they then become complicated.

SECT. II.—*Of Chronic Diseases of the Stomach.*

It may be supposed, from what has been already said, that the different forms of Dyspepsia will be more frequent in adult age than in early youth; more frequent, *cæteris paribus*, in women than men; more frequent in persons of sedentary occupations, and living in towns, than in those who breathe pure air, and follow active occupations; and more frequent in those whose mode of life is irregular, and who indulge in excesses either of eating or drinking, than in those who live regularly and temperately. But we often see the disease when we can assign no such cause for it.

The symptoms of Dyspepsia vary much in different individuals, particularly when it is complicated with other disorders; but the following may be stated as its most usual forms:—

1. First, and most frequently, there are pains, usually a burning pain, with sense of distension and uneasiness in the stomach, in different parts of the abdomen, or even referred to various parts of the body, flatulence and acid eructations, beginning, in general, half an hour or more after food has been taken, causing much indescribable discomfort, and continuing while the process of digestion is going on; therefore often disturbing sleep, and suc-

ceeded by anorexia, often thirst, and bad taste of mouth, with white tongue, the next morning.

In cases where these pains begin very soon after food has been taken, there is more reason to apprehend the existence of subacute inflammation, formerly stated as apt to supervene on urgent dyspepsia; and this especially if there be pretty uniform tenderness on pressure (not merely at the time of flatulent distension), and more or less of hardness of pulse.

In women, particularly during the time that they are subject to the menstrual discharge, it is very common for these symptoms to be followed by vomiting, although the disease be only functional: but frequent recurrence of vomiting in men, or in older women, may always excite suspicion of organic disease, either in the stomach itself, or in some other organ, with which, as is generally said, the stomach sympathizes, *i. e.* (as we may express it more simply and more correctly) the diseases of which are attended with much nausea; in some cases the heart, more frequently the brain, the liver or pancreas, or the kidneys. The vomiting of blood, or hæmatemesis, in women who have suppression of the menses, is a pretty common consequence of this form of dyspepsia; and in some cases it is seen, even to a great extent, independently of that cause, in cases of dyspepsia merely functional; but more generally it depends, when unconnected with Amenorrhœa, either on ulceration of the Stomach or disease of the Liver or Spleen.

2. In another form of the disease there is more acute pain (Gastrodynia), often attacking in sudden paroxysms, and often most felt when the stomach is empty,—sometimes attended with morbid craving for food or capricious appetite, rather than anorexia—often also at-

tended with Pyrosis or eructation of an insipid fluid. Sometimes this intense pain is attended with unusual acidity and flatulence, but sometimes not. This kind of pain has often the name of Spasm of the Stomach, and is sometimes connected with Gout. It is sometimes hardly to be distinguished from the pain of gallstones, and ought, perhaps, to be regarded as a form of Neuralgia.

3. In other cases, the chief symptom at the stomach is sickness and anorexia rather than pain, but attended with much headache, often with giddiness, sometimes with suffusiones before the eyes—or with these last symptoms without the headache. Such cases occur in paroxysms usually lasting two or three days, and with irregular but often long intervals; in some cases they certainly proceed from disorder of the stomach only, but in many they originate elsewhere, probably often in the brain. The old name Sick Headache is perhaps a more appropriate one than the modern name Bilious Headache, the appearance of bile in the matter vomited being in general only the result of long continued nausea, as in sea-sickness.

In all these forms of dyspepsia, when uncomplicated with other diseases, the secretion of bile is usually deficient, often depraved, and the bowels costive.

All forms of dyspepsia are very often attended, and evidently aggravated, particularly in persons of the melancholic temperament, by that morbid condition of the mental faculties, to which we give the name of Hypochondriasis, in which the mind dwells with inordinate earnestness on the uneasy feelings, exaggerates their importance, and anticipates danger from them. It is partly owing to the peculiarly oppressive nature of the

sensations of dyspepsia, that these mental feelings so frequently attend it; but in many instances it is obviously this tendency in the mind, or the peculiarity in the nervous system which accompanies it, that is the immediate cause of the dyspepsia; and in young men particularly, merely functional dyspepsia is not of common occurrence, excepting in constitutions of this kind, where it is associated with Hypochondriasis, and with indescribable uneasy sensations not referred to the stomach.

In other cases, particularly in women, sometimes along with, and sometimes without the hypochondriacal tendency, we see dyspepsia associated with various other uneasy sensations, in the bowels, in various parts of the surface, in the bladder, in the head; and with the slighter spasms, to be afterwards described, under the name of Hysteria.

All these forms of dyspepsia, although partly owing to known causes, suffer exacerbations for which we can assign no reason; and again, although often tedious, have the tendency to occasional spontaneous abatement. When unusually urgent, we suspect that they are connected with the subacute inflammation of the mucous membrane formerly considered; and when they last long, and are attended with much emaciation and weakness, we apprehend that they are connected with organic disease, either of the stomach itself, or of the viscera which adjoin it, or are connected in action with it in the modes formerly noticed.

Even in youth, especially in young women, it is not uncommon to find the symptoms of dyspepsia—perhaps but slight—connected with ulcers on the mucous membrane of the stomach, which are preceded or at-

tended with so little of the symptoms of inflammation, that they may be regarded as a form of chronic organic disease; and these may be suddenly fatal, either by erosion of a bloodvessel, and hæmorrhage, or (more frequently) by perforation of the coats, escape of the contents of the stomach, and rapid peritonitis.

The other cases of organic disease of the stomach are most generally seated either at the Cardia, or near the Pylorus. In the former case, we have the pain and difficulty felt on the morsel of food passing into the stomach, and after a time very generally partial *regurgitation* of food. In the latter case, we have the accession of pain at regular times,—generally from two to three hours after food is taken, followed and relieved by the periodical vomiting; the matter vomited often becoming ultimately of the dark brown or blackish colour. In the case, not uncommon, where the stomach becomes greatly distended and enlarged, the vomiting is not so frequent or regular, but is occasionally to an enormous extent. In both cases, but especially in the latter, we may have, after a time, a small firm tumour perceptible to the finger, and somewhat tender on pressure, at the seat of the disease; which, however, is sometimes considerably moved from its natural position. Such diseases of the stomach are generally attended with obstinate costiveness.

The adventitious textures, which are deposited in the stomach in such cases, usually originate in the cellular texture uniting the coats. They vary exceedingly from simple induration and thickening of this texture, to the formation in it of circumscribed tubercles of malignant character, most frequently either of the encephaloid kind, or of the true scirrhus, or sometimes of melanosis. They

are very generally attended, after a time, by ulceration of the portion of mucous membrane immediately above them, which sometimes becomes very extensive, not unfrequently perforating all the coats of the stomach, and either leading to effusion of its contents and suddenly fatal peritonitis, or prevented from causing this termination only by adhesion of neighbouring viscera. When they occur in constitutions evidently much impaired, and where we believe that the blood is tainted with disease,—and when they have lasted some time,—they are to be regarded only as objects of palliative practice.

Another form of organic disease nearly peculiar to the stomach, is that which consists essentially in softening of the mucous membrane, without the absolute destruction of that membrane, or the hardened, usually elevated edge of the diseased part, to be seen in ulceration. The partial softening of this membrane, seen after death, is indeed very often a post mortem or pseudo-morbid appearance, the consequence of death having taken place suddenly during digestion, *i. e.* at a time when the active gastric juice exists in the stomach. But there are cases, both in children and adults, where there are severe dyspeptic symptoms and much vomiting, in children both vomiting and diarrhœa, and the body is sometimes much weakened and emaciated, and death takes place either with the symptoms of sudden rupture, or by gradual exhaustion; and where this morbid softening is the chief or only morbid appearance. This softening may probably be ascribed to a morbid condition, and generally an unusual acidity, of the secreted fluid, which shews itself by giving a black colour to the blood in the vessels of the part.

The treatment of the merely functional Dyspepsia may be said to consist essentially of two parts,—the relief of symptoms by medicines, and the removal of the remote causes of the disease by diet and regimen. The use of medicines to *strengthen* the stomach, *i. e.* to counteract directly or specifically the injurious effect of these causes, is not to be neglected, but cannot be much relied on.

The medicines which are most effectual for the relief of the symptoms of dyspepsia are—

1. The Antacids, where there is much acidity and burning pain, particularly soda, magnesia, and bismuth, the latter of which seems in some persons to have a more specific power as to pain and sickness at stomach.

2. Carminatives, to relieve the distension from flatulence, whether the effect of fermentation of the aliments or of secretion, particularly preparations of ammonia, volatile oils, and ether.

3. Laxatives, particularly such as act gently and regularly, imitating as to their time of action the natural process, and promoting, as far as we can judge, the secretion of bile, but not causing any considerable increase of the mucous or watery secretions of the bowels. Mercurial preparations, in combination with other laxatives, seem to have a certain degree of peculiar power in exciting the secretion of bile, but the amount of this has been much exaggerated.

4. Anodynes, *e. g.* the Hydrocyanic Acid and Morphia, especially the Opiate Enema, where the pain or sickness and vomiting are peculiarly urgent, care being taken as to the latter that its use be restricted to the times when either pain or sickness is urgent, and, therefore, chiefly to the second variety above stated, and that its constipating effects be corrected. The

Creosote, in some persons, acts nearly as an anodyne in regard to vomiting; and warm applications assiduously used, or even counter-irritants applied to the epigastrium, are likewise useful in this way.

The medicines which seem to have most power in restoring the natural functions of the stomach when the appetite and digestion are much impaired, without organic disease, are the preparations of Steel, and the bitters, Quinine, Gentian, Quassia, or Colombo, which seem in general to answer best when combined with such quantity of laxative medicine as may act once or twice, and not more frequently, in twenty-four hours. The Quinine and Steel, and perhaps especially the Carbonate of Iron, seem to be peculiarly useful in the second variety, when the pain attacks in paroxysms resembling neuralgia of other parts; and the preparations of steel are peculiarly indicated when there is Amenorrhœa.

It was formerly stated that there are many cases in which the tenderness on pressure, the pain immediately on food being taken, and the state of the pulse, indicate an inflammatory action in the mucous membrane, and in which local bloodletting, sometimes even small general bleedings, blisters, and antiphlogistic diet, should be premised to the use of any other means.

There are also cases of obstinate character, and beginning to resemble the organic disease at the Pylorus, in which Mercury, particularly in the form of Calomel and Opium, taken so as to affect the mouth, with precautions against exposure to cold, and against excessive action on the bowels, is certainly and signally useful; but if this benefit is not observed within a few days after the mouth has been affected, it may be injurious to the general health to continue this remedy.

The essential articles of regimen, proper for dyspeptic patients, are the following:—

1. The diet should be such as will give the most nourishment with the smallest risk of exciting the uneasy sensations of indigestion, or irritating and so injuring, the secreting surface. We know that a diet chiefly vegetable, and of soft consistence, may give an insufficient stimulus to the secretion, even for its own solution; and on the other hand, that more solid food, in larger proportion animal, may require more gastric juice for its solution than the stomach can furnish; and we must steer between these difficulties according to the circumstances of individual cases, observing, in general, the following rules:—

1. That there should be a mixture of animal and vegetable food, or more correctly, a mixture of azotized and non-azotized substances (all vegetable matters capable of nourishing animals being now believed to contain albuminous matters identical in composition with the albumen of animals),—if possible a mixture of albuminous, saccharine and oily matters in each meal. There seems to be reason for believing, according to the statements of Liebig, that the first of these, the azotized aliments only, are directly concerned in nutrition; but the others are required for combination with oxygen, for the excretion of carbonic acid and water, and the maintenance of animal heat, which is attended with the conversion of the residuary non-azotized aliments into fat; and afterwards, if the supply of those non-azotized aliments is diminished or stopped, this fat is acted on by the oxygen, thus maintaining the heat of the body, and at the same time protecting the tissues which are of more essential use to the economy, from the destructive action of

the oxygen. If these views are confirmed, they will go far to explain the fact, which seems at all events to be ascertained,—that a mixture of azotized and non-azotized matters in the aliment is necessary to life.

2. That these substances be taken in a state of medium aggregation, very soft matter giving little stimulus to the secretion, and substances thoroughly dried and hardened being difficult of solution in the gastric juice.

3. That the quantity of the oily or fatty constituents of the aliments be much less than of the others;—all such substances being difficult of digestion.

4. That the times of taking food be regularly kept; the intervals being such as the previous experience of each individual may shew to suit his digestive powers; for in this respect there is much variety in individuals, those of middle age and of the strongest habit usually taking the largest quantities, and requiring the longest intervals for the perfect assimilation of their food.

5. That regular and early hours of sleep be enjoined, in order that much of the process of digestion of the food taken during the day, may be allowed to go on during sleep, and again, that so much sleep be not allowed, as to favour an excessive formation of fat.

6. That the quantity of fermented or spirituous liquors allowed be small, such as may give only a gentle stimulus to the secretion of the stomach, and have no permanent sensible effect on the Nervous System.

7. That any peculiarities of constitution as to the effect of particular substances on the stomach, if carefully observed, be consulted.

8. On the other hand, that care be taken not to encourage dyspeptic patients to dwell on their uneasy sensations, or make their complaints objects of solicitude,

lest the hypochondriacal tendency be increased or confirmed.

The other articles of Regimen, which are of essential importance to dyspeptic persons, are,

1. Exercise of the voluntary muscles in pure air, not violent or irritating, especially in feeble persons, nor so long continued as to fatigue,—but steadily continued, repeatedly in the day, with a view to the following effects, clearly attributable to it. *First*, That a full supply of oxygen taken in at the lungs, and certainly important for the assimilation of the aliments, be maintained. *Secondly*, That the circulation be encouraged to the muscular parts of the body, the surface and extremities, and congestions of blood in internal parts averted. *Thirdly*, That the secretions, not only on the surface, but of internal parts, required in digestion, and especially that of bile, be duly supported and stimulated: And, *fourthly*, That the mind be so occupied as to diminish its tendency to dwell on internal uneasy sensations.

2. Such use either of the warm bath, the tepid, or the cold bath, as may appear most effectual for maintaining vigorous circulation on the surface of the body, and securing a frequent recurrence of grateful sensations there.

3. Chiefly as a means of inducing patients to take exercise with animation, and mental gratification, occasional changes of scene and mode of life.

4. Temporary relaxation from care and mental labour, and gentle mental excitement, by occupations in which interest is taken, especially if in the open air, and by all justifiable means of exciting the pleasing emotions of hope and confidence.

It is still a question how far large draughts of water,

either pure, or with slight saline, sulphurous, or chalybeate impregnations, or of the different mineral waters, assist the effect of these means on the digestive organs; but it seems to be certain, that such quantities of watery fluids are only proper when the excretions are at the same time promoted, particularly by exercise.

Great varieties of temperature are compatible with a very healthy state of the digestive organs; but the enervating effects of extreme heat, and the depressing effect on the nervous system, or the revulsive effect on the circulation, of cold, especially applied to the extremities, are to be carefully avoided.

The organic diseases of the stomach, when they have lasted some time, and led to much wasting, or when the previous health of the patient gives reason to suppose that they are parts of a constitutional and probably malignant disease, are properly objects only of palliative practice, by regulation of diet and regimen, and by the frequent use of opium, and other anodynes, alternated with the mildest laxatives. But there are some cases in which recovery from these symptoms has taken place, after considerable emaciation, under the cautious use of Mercury and of Iodine, particularly the former; and a greater number, where these symptoms, in young women, have been connected with Amenorrhœa, and in which the persevering use of Steel, and other Emmenagogues, with so much of the Tonic Regimen as was admissible, has been completely successful.

In such aggravated forms of Dyspepsia, not only much of the requisite laxative or anodyne medicine, is best given in Enema; but nourishing Enemata, repeated once or twice daily, even for some weeks together, are a resource of great value, preventing the

patient from sinking, until after a fair trial is made of complete abstinence from all stimuli or irritations affecting the stomach.

SECT. III.—*Of Chronic Diseases of the Liver, Pancreas, and Spleen.*

Two Functional diseases of the Liver are well known; those of the Pancreas or Spleen, cannot be accurately distinguished. Those to be noticed are the Cholera, and certain kinds of Jaundice.

I. The common Cholera of this country consists essentially in an overflow of Bile, shewn by frequent copious vomiting and purging of matter containing much bile, and is most generally produced, at least in part, by the peculiar effect of heat on the liver; it is therefore most common in hot weather, occurring however, now and then at all seasons, sometimes from obvious excess in diet, sometimes without obvious cause. It generally begins suddenly, and is often attended with severe internal pain, not, however, of inflammatory character, with cramps of the calves of the legs, and with rapidly increasing debility, going on in a few days, or even hours, to coldness of surface, clammy sweats, and feeble or nearly imperceptible pulse.

A short delay is proper, after the disease has commenced, before means are employed to check the discharges, lest morbid bile or other irritating matters be pent up in the body, and during that time diluents only are proper; but before the patient becomes feeble, recourse should be had to Opium, in full and repeated

doses, chiefly in pill, by which the disease, if uncomplicated, may very generally be arrested. In cases where the circulation has been much enfeebled before this treatment is begun, the assiduous use of stimuli, externally and internally, is often required before the patient rallies.

II. Jaundice, distinguished by the yellow colour of the skin and eyes, the dark brown colour of the urine, and whitish colour of the fæces, depends on very various causes, and admits, therefore, of very various prognosis. It is to be regarded as a merely functional disease of the liver in three cases.

1. It may proceed from a merely thickened and viscid state of the bile, impeding its own descent through the ducts, and leading to its reabsorption, particularly when much of it has been long stagnant in the gall-bladder. Such cases are chiefly to be expected in persons of sedentary habits, especially succeeding to a more active mode of life, when the appetite and digestive powers have become deficient, and the descent of bile, already secreted, is not solicited, as in the more active state of the digestive organs, by the passage of chyme along the duodenum. This cause of jaundice may be suspected when the health has been previously good, when no pain, swelling, or other indication of diseased liver exists, and no cause, except such habits as have been mentioned, can be traced; and it may be known by the appearance of dark viscid bile in the stools, contemporaneous with abatement of the symptoms.

2. Jaundice may proceed from longer delay and internal changes in the bile in the gall-bladder, leading to the formation of Calculi, consisting chiefly of Cholesterine, to which portions of inspissated bile have adhered, and

which become fixed in, and obstruct the ducts, and produce the symptoms of Icterus Calculosus, *i. e.* Jaundice, attended by paroxysms of sudden and violent pain, with vomiting, referred to the pit of the stomach, without frequency of pulse or tenderness on pressure, although rigors and faintness often attend the intense pain.

It may be easily understood that the obstruction to the descent of the bile by the gall-stones may be only partial, either in consequence of the obstruction being only in the Cystic duct, or of the form of the calculus allowing the descent of part of the fluid; and therefore, that a paroxysm of this disease may be attended with but little yellowness, or even with none, especially if the disease has repeatedly recurred, and the ducts become permanently enlarged.

It may be easily understood, also, that the obstruction of the ducts by the calculi may often lead to inflammation there, which may extend from the obstructed point; and therefore, that more or less of the symptoms of Hepatitis or Peritonitis may supervene on aggravated cases of these calculi.

Such cases often occur without any obvious cause; but in many instances they are obviously dependent on the same causes as the last species, particularly a sedentary life and long-continued depressing passions of mind, affecting, in certain constitutions, this secretion more than others. Any cause of congestion of blood in the liver (such as has been described as frequently resulting from organic disease of the chest) may become a cause of gall-stones. There being some cases of jaundice, from organic disease, attended with paroxysms of intense pain, the only absolute proof of its dependence on calculi is the appearance of these in the stools.

3. It is quite certain, that, in other cases, jaundice is produced in a very different way, but likewise independently of obvious change of structure of the liver; viz. by suppression of the secretion, not obstruction to the excretion, of the bile; this, like other excretions, being formed in the blood, and only evolved at the liver, and therefore accumulating in the blood, when its separation at the liver is suspended, as the urea does in cases of failure of the function of the kidneys. That this may happen, we know, from fatal cases of that kind, in which, on dissection, the liver has appeared sound, and the bile ducts pervious and *empty*, implying that the secretion has been suspended. The existence in the blood of matters destined to excretion, in this as in other cases, is properly to be regarded as a disease of the organ intended for their excretion, although the formation of such matters in undue quantity, or with morbid qualities, is properly a disease of assimilation, or of absorption.

The fatal event, in cases of this kind, is always preceded by delirium, spasms, and coma,—not explained by any thing found, on dissection, in the brain, and indicating that the retained bile, like retained urea, acts as a narcotic poison on the nervous system. From comparison of these with many cases of long-continued jaundice, from obstruction of the ducts, without any affection of the brain except drowsiness, it may be inferred that the *retained* bile is more injurious than that which is *reabsorbed*, and probably altered in that process. This case is to be distinguished from that of jaundice with pervious ducts occurring in the course of fever, sometimes also in cases of inflamed veins, in which the secretion of the bile is not suspended, the stools being all along loaded with bile,—in which, therefore, we must

suppose that an increased formation of bile takes place throughout the system.

But we can, of course, have no proof that all cases of the suspension of the secretion of bile are fatal; and it may be suspected, from the cases we see of jaundice, even long continued, abating gradually without any cause of obstruction ever appearing, in the stools or elsewhere, that, in some constitutions, probably when other excreting glands are active, the retained excretion may be otherwise expelled, and the patient survive even a pretty long suspension of the secretion of bile.

Cases of jaundice, from this cause, may almost always be traced to violent mental emotions. This cause of jaundice may be suspected, when it occurs suddenly from that cause, and without indications either of calculi, or inflammation, or organic disease. The old notion of their depending on spasm of the ducts, is obviously inadmissible; but the nature of the disease, although it may often be suspected, from the attack of cerebral symptoms, can only be certainly known by post mortem examination.

In all cases of jaundice, there is necessarily much interference with the process of digestion and assimilation of food, although the exact province of the secretion of bile, either in that process or in those chemical changes which end in the evolution of carbonic acid, and maintain the animal heat, is still somewhat doubtful: more or less of emaciation and weakness therefore always attend it, but the affection of the appetite is more various, it being frequently altered or perverted, rather than diminished.

In the uncertainty which often exists in regard to the cause of jaundice, unattended with obvious organic dis-

ease, the prognosis may be said to be generally good, unless such affections of the nervous system as are noticed in the account of this last variety shew themselves. When they occur, the case is nearly hopeless, although they have been seen to abate under the use of strong purgatives and mercury acting fully on the system.

In all cases of Jaundice, it is right to act steadily and regularly on the bowels for some time; and if the disease is obstinate, and no adequate cause appears, Mercury or other alteratives, Iodine, Taraxacum, Sulphurous waters, may be tried; but if the health has been previously good, and no affection of the nervous system shews itself, it may be confidently expected that the disease will gradually abate, and any such remedies as may weaken or otherwise injure the constitution ought to be avoided. The use of such articles of the Tonic Regimen as may appear feasible, particularly of exercise, light but nourishing diet (excluding oily matters), the excitement of change of scene, and the stimulating influence of external heat on the liver, are to be advised.

In the paroxysms of the Icterus Calculosus, much reliance may be placed on full doses of Opium, chiefly given in enema, with external warmth or the warm bath; alternated, of course, with the laxatives; but we can expect little or nothing from Turpentine, Ether, or any other means intended to affect the composition of the bile in the ducts; and we may regard the use of Emetics as very generally hazardous.

There are many cases of stomach complaints, as well as of diseases of other parts of the system, connected with disordered stomach and bowels, which have been supposed, of late years, to originate in a disordered or torpid condi-

tion of the Liver, indicated by deficiency or a morbid appearance of bile, generally of a very dark colour, in the stools; and to be, in consequence of dependence on that cause, more effectually relieved by Mercury than any other means: but the evidence of a morbid condition of the bile, with which many have been satisfied, is defective; and we have so little means of judging how far derangement of the function of digestion, unconnected with structural alteration in the liver, can be the result of altered or deficient action there, or how far such deficient action may be only a part of the general derangement—that the only practical rule which we can deduce from such observation is, that the appearance of the bile in the stools, as well as the regularity of action of the bowels, demands attention in all cases where the digestion is much impaired. The combination of mercurials with other laxatives, appears sometimes peculiarly (although it is certainly by no means exclusively) effectual in restoring the natural appearance of the stools; and that change, when distinctly observed, is certainly often very favourable, whether we are to regard it as the cause or the sign of a more general recovery of the powers of digestion; but these facts do not justify the indiscriminate use of Mercury, sometimes adopted in such affections, in cases where no immediate benefit from it results, and where its ulterior effects on the system may be very injurious.

The most common Organic disease of the Liver is the Granular Degeneration, sometimes appearing as the result of pretty distinct inflammation, often gradually effected without inflammatory symptoms; beginning apparently as simple increase, or hypertrophy, of

the grey cellular texture, and passing ultimately, in aggravated cases, into the state described as Cirrhosis, in which the whole organ is often shrunk and corrugated, the glandular substance nearly absorbed away, its place occupied by irregular clusters of brownish-yellow tubercles, and the whole circulation in the liver, as injections demonstrate, very much lessened. These changes appear, on minute examination, to consist essentially in the deposition and growth of minute granules on the membranous and very attenuated and convoluted prolongations of the Capsule of Glisson, which extend throughout the substance of the gland enveloping every one of the acini. This affection of the liver may generally be held to be constitutional, and often symmetrically affects different parts of the organ; but it is not usually of malignant character, especially when it results from causes which determine local congestions of blood, without implying change of its constitution, such as chronic disease of the heart or lungs, or frequent paroxysms of intermittent fever. In different cases (by reason especially of the complex nature of most such), death takes place in very different stages of this progress; and many modifications of these changes are also observed. In scrofulous cases, the liver is sometimes infiltrated with matter, in its first stage, of nearly opaline lustre; in some instances it is enlarged and much hardened, with little change of colour; in others it undergoes the fatty degeneration formerly mentioned; or is simply softened without other change of texture.

In other cases, large and distinct tubercles form in parts of the liver, while others are of natural structure; and there are three kinds of morbid growth, which may be easily distinguished from the more usual changes in

the liver,—the effusion of clots of blood, which gradually change into various kinds of tumor,—the cysts or sacs containing Hydatids,—and the Encephaloid deposits, or Medullary Sarcoma (Tubera diffusa of Farre), which soften in the centre, and are generally attended by similar deposits in other parts.

The large white tubercles of this last description, but considerably various in consistency and aspect, are in general very little dependent on any local cause, and are the most truly malignant of the adventitious textures here found.

The Bile in these different diseased states of the liver is often scanty, and either lighter or darker coloured than natural; but the alterations which it undergoes have not been carefully examined. In most of those cases, where a considerable portion of the substance of the liver remains sound, the bile is of natural appearance and quantity; and in some of those where its whole structure is diseased, the alterations of the secretion are much less than might have been expected.

From what has been already said, it will be understood, that such organic lesions of the Liver are chiefly to be expected in persons somewhat advanced in life; and that the tendency to them is remarkably given by chronic diseases of the heart or lungs, by intermittent fever, by the habitual use of distilled spirits, and by residence in warm climates, especially in circumstances otherwise favourable to the formation of organic disease.

The symptoms attending such organic lesions of the liver, especially when they do not distinctly commence with marks of inflammation, are extremely various. The most certain is perceptible enlargement of the or-

gan, with dull sound on percussion, as far down the abdomen as the diseased organ stretches; but this enlargement may be absent throughout a case of the worst kind, and often disappears in the later stages of cases where it was at first distinct. In some cases an enlargement upwards, forcing up and encroaching on the lung, as high as the fourth or third rib, may be detected, and distinguished by the attendant symptoms from a chronic pleurisy of that side, although the liver do not project beyond the margin of the false ribs. When there is no enlargement, the difficulty of lying on the opposite side is not to be expected. Sharp pain in the hypochondrium or shoulder, seems to be an accidental, and not a very common, attendant of any kind of these deposits. Jaundice is only to be expected, if there be pressure on some of the gall-ducts; which is neither constant, nor, if present, necessarily permanent; nor is it the effect of organic disease of the liver only. A sallow though not jaundiced complexion is very often observed, but is by no means peculiar to organic disease of the liver. The alterations of the alvine evacuations are various, and, agreeably to what is stated above, are sometimes absent, even when great alteration of the substance of the liver exists. And the dry cough, and confined breathing on the one hand, or the sympathetic affections commonly referred to the stomach, anorexia, thirst, dryness of tongue, sense of oppression, flatulence and acidity, nausea and vomiting, on the other, though often obvious and distressing, are neither uniform nor characteristic. The existence of organic disease of the liver is therefore often a matter of probability, rather than of certain knowledge, and gathered from observation of two or more of the symptoms above noted, rather than inferred

from any one pathognomonic symptom. In many cases, the most pathognomonic symptom is a peculiar smell of the breath, easily distinguished, and distinctly perceived over the diseased liver in the dead body. The nature of the organic affection is of course still more obscure; but it may be stated, that, in a constitution previously healthy, and when such a cause exists for liver disease, as organic obstruction in the chest, and especially if the symptoms have been originally inflammatory, we may generally expect the induration by small granular deposits only; and that when the health has been otherwise long infirm, and perhaps especially when the stomach is much affected, the encephaloid, or other constitutional morbid structure, may be suspected.

The greater number of such organic alterations of the liver must necessarily obstruct more or less the flow of blood in the vena portæ, and hence they act very generally as a great predisponent cause, and sometimes as the only perceptible cause, of farther diseases of the abdomen, which frequently contribute to indicate their existence. These are,

1. The effusion of serum into the cavity of the abdomen, constituting Ascites.

2. The increased flow of the mucous secretion of the intestines (common in the warm climates), constituting mucous Diarrhœa, but easily aggravated into the form of Dysentery.

3. Bloody discharges from the primæ viæ, *i. e.* Hæmatemesis, Melæna, or Hæmorrhois, or a combination of these.

The debility and emaciation consequent on those organic diseases of the liver, which are attended with the greatest sympathetic affection of the stomach, nausea

and vomiting, sometimes go on to a fatal termination, without any of these ulterior consequences; but more generally either dropsy, and consequent dyspnœa, or mucous or bloody diarrhœa, has existed for some time before death. In all kinds of severe affection of the liver, it sometimes happens that a sudden attack of coma, not always explained by effusion within the cranium, takes place. It is uncertain whether this can be ascribed, as in the case of disease of the kidneys, to retention of matter destined to excretion.

When organic disease of the liver has gone a certain length, it is only an object of palliative practice, and no doubt there are many cases, particularly where the malignant deposits have taken place in it, which are of that kind from the first. But we have good evidence that a certain degree of disease of the liver, probably especially of the common granular deposits going on to Cirrhosis, may be controlled by remedies and regimen.

The regimen required is a light diet, with only a very moderate allowance of animal food, and that of the kinds noted as easiest of digestion, without fat or oil, and with little or no strong liquor; and much moderate exercise in pure air. The medicines which have seemed most effectual are:—1. Mercury, given so as to affect the mouth for some days or weeks, not to be urged, however, in constitutions which seem to be irritated by it. 2. Saline and sulphurous laxatives in moderate quantity, but steadily employed, as at Harrowgate, Cheltenham, Airthry, &c. 3. Other supposed deobstruents, preparations of iodine, sarsaparilla with alkalis, taraxacum, the nitro-muriatic acid, and, according to the German physicians, the muriate of ammonia.

It has been already explained, that the Spleen is affected with organic disease most generally at the same time, and in the same manner as the liver, more remarkably as a sequela of intermittent or remittent fever than in any other case. In some instances it is the seat of morbid deposits, or of simple Hypertrophy (sometimes going to an enormous extent) when the liver is sound. Such affections of the spleen have been sometimes found, as the chief morbid appearance, when there has been much vomiting, a peculiarly pallid complexion, and great and progressive emaciation and debility. Tumors of the spleen produce local symptoms chiefly by reason of their pressure on, and interference with the functions of, neighbouring parts; and they have been often observed, as may easily be understood from the vascular connections of the organ, to be attended with attacks of Hæmatemesis, which have been followed by sudden reduction of the swelling.

The most important practical observation on organic diseases of the Spleen usually made is, that they are seldom benefited by mercury, which very often acts violently on those subject to them; and that blisters and combinations of laxatives with bitters and chalybeates, have generally appeared the most useful remedies.

The Pancreas has been often found affected with different organic diseases, perhaps chiefly in cases where other organs were at the same time similarly affected; but the symptoms have appeared at least as obscure, and the degree of affection of the function of digestion at least as variable, as when the liver has been organically diseased; and many of the symptoms, obvious in some cases, have evidently proceeded from compression of adjoining organs, as jaundice from obstructed gall-

ducts, pulsation from compressed aorta, pain of back probably from stretched or injured nerves. No remedies can be pointed out as peculiarly applicable to diseases of this organ.

In regard to all the organic diseases now mentioned, it is to be observed, that watching for attacks of sub-acute inflammation, and applying the remedies for them early and moderately, are among the most important objects of practice. And another important practical observation is, that all of them are often observed to abate in an extraordinary degree, particularly in their earlier stages, from change of scene and of climate.

SECT. IV.—*Of Chronic Diseases of the Intestines.*

Two important Functional diseases here first claim our attention, Diarrhœa and Constipation, usually attended with pain, and described under the name of Colic, both of which, however, when unusually violent or obstinate, may always excite apprehension of organic disease.

I. The sub-acute forms of inflammation of the mucous membrane of the bowels, being often attended with little pain, are sometimes not easily distinguished from cases of simple Diarrhœa, and some have supposed that there is no diarrhœa without inflammation of that membrane; but Andral and others have shewn that diarrhœa may be fatal, without any mark of inflammation being left in the body; and the experience of the juvantia et lædentia leaves no room for doubt as to such diarrhœa frequently occurring, idiopathically as well as symptomati-

cally, although in the former case it is not frequently fatal.

Such diarrhœa is more easily produced in infants and children than adults; it is most common in hot weather, and is often excited either by improper diet,—particularly raw acescent, or ill prepared vegetable food,—or by cold, applied about the feet. In young children it is often produced by the irritation of teething; but in such cases there are generally some febrile symptoms, and, in the commencement at least, some inflammatory tendency.

The origin of the disease, in cases of diarrhœa, is probably always an increase either of the secretions poured into the duodenum, or of those of the mucous membrane of the intestines, most frequently of the latter; and the inordinate action of the muscular coat is brought on secondarily.

In children, the increased secretion of mucus is often attended, after a time, by enlargement of the ducts of the mucous glands and follicles; and the quantity of mucus thrown out gives a light colour to the stools, even when the liver is secreting a full quantity of bile, —which, however, has been often mistaken for an indication of torpor of the liver.

This increased secretion of mucus is often the means by which, particularly in children, a morbid quantity of the earthy phosphates, existing in the blood, is expelled from the body, and when not passing out of the intestines, this mixed fluid sometimes acts as a cement, by which, with residuary alimentary substances, such as the husks of oats, intestinal calculi are formed.

It is always to be remembered also, that Diarrhœa, especially when alternating with fits of colic and con-

stipation, is often a result of organic diseases, of the kinds to be noticed under the next head, particularly of such as involve deposition on, or ulceration of, the mucous membrane of some part of the intestines.

In some constitutions, Diarrhœa is also easily produced, not only in the course of febrile and inflammatory diseases, but of chronic, and especially organic diseases of other parts; which, therefore, may always be suspected when diarrhœa is obstinate. In particular, it is often a concomitant of the granular disease of the kidney when that is unattended by dropsy; and then it is probably the channel, by which much of the retained urea passes out of the system, and is prevented from exerting its noxious influence on the brain. Its frequent connection with the suppurative stage of inflammation, with scrofulous disease, either of the abdominal viscera or of the lungs, or of other parts, and the partial inflammation, tubercular deposits, or ulceration, generally found in such cases of colliquative diarrhœa, have been already considered.

As it sometimes results from improper aliments, and perhaps sometimes from diseased secretions, which it does not fully expel, Diarrhœa is sometimes most effectually checked by a mild laxative; but the continued use of laxatives in cases of diarrhœa is often very injurious, and in a great majority of cases,—even when attended with some febrile symptoms, as is very common in young children,—it is most beneficially restrained, after it has lasted a day or two, by repeated moderate doses of opiates and astringents, particularly Chalk, and Lime-Water; the vegetable astringents, such as Kino, Catechu,

or decoction of Logwood; or the mineral astringents, such as acetate of lead, the latter of which has the advantage, in small doses, of hardly ever causing sickness.

II. Colic has also a strong affinity to abdominal inflammation, and is sometimes distinguished from it with difficulty, particularly as we know that active inflammation may occur there without frequency of pulse; and, on the other hand, that there may be pretty acute tenderness of the abdomen, from flatulent distension without inflammation. The tenderness in such cases, however, is usually both partial and temporary, depending, apparently on an unusual degree of sudden flatulent distension of part of the intestines.

In general, the pain of Colic occurs in paroxysms, "circa umbilicum torquens," and is relieved by pressure. It is often violent, although always remittent, is attended with sickness, vomiting, and constipation; sometimes it appears to proceed merely from the obstruction of long retained and indurated fæces, most frequent in women,—sometimes from intestinal concretions, which in a few cases can be felt externally;—sometimes from merely flatulent distension from improper aliments, shifting its place, and also capable of being felt; not unfrequently it appears to be a form of Neuralgia, not referable to any of these causes. The most intractable cases are those which proceed from the poison of Lead (chiefly if not exclusively the carbonate of lead), somehow introduced into the body. This Colica Pictonum is usually associated, after a time, with partial palsy of some of the limbs, and wasting, especially of the exterior muscles; and ample observation has shewn that colic from this cause may last long, and cause extreme

suffering, and leave behind it no mark of disease in the abdomen perceptible in dissection.*

It has been lately stated that the action of lead on the system may be known by a bluish line along the edge of the gums, next the teeth, which, if fully confirmed, will be a useful guide.

It is also to be remembered that pains hardly to be distinguished from those of colic may be the effect of urinary calculi, impacted in the pelvis of the kidney or in the ureter.

When the existence of this cause cannot be ascertained, the occurrence of violent colic should always lead us to examine carefully for indications of inflammation, or for Herniæ, and may often justify, when there is no special contra-indication, the use of bloodletting while the nature of the disease is still obscure; and the repeated recurrence of colic may always induce suspicion of some kind of organic disease, impeding the peristaltic action of the intestines; and when the disease becomes attended with gradually increasing emaciation and debility, we can have little doubt of this being its cause.

Such organic impediment to the passage of the fæces is often the result of adhesion of the folds of intestine to one another, or to adjoining organs (particularly in the pelvis in women), by lymph thrown out by previous healthy inflammation; and this may often be suspected from the previous history: but in many cases it results from heterologous deposits, of the kinds formerly mentioned, as frequently found in the stomach, and which occur also in various parts of the canal, especially the

* The altered colour and appearance of the muscles paralyzed by lead, noticed by Hunter and others, is certainly not a uniform appearance, and may probably therefore, when seen, have been only an effect of long continued inaction.

great intestines; commencing generally in the submucous cellular tissue, and varying exceedingly, from simple thickening and induration of that texture, causing more or less of Stricture, to the formation in it of scrofulous tubercles, of Fibro-cartilaginous or Scirrhous tumours, or of the Colloid, Encephaloid, or Melanotic masses. They generally lead, sooner or later, to ulceration of the mucous membrane immediately above them, and often to considerable distension of the alimentary canal above them, as compared with the part below them: they often attain such size as to be felt through the integuments of the abdomen; when seated in the rectum, they may be felt by the finger or bougie, although there are sources of fallacy in regard to this last observation, in some cases, from the form of the Sacrum in some persons, and from disease, or mal-position of the Uterus in women, which have led to inaccurate statements.

We must admit, that these organic diseases of the alimentary canal can often hardly be distinguished, during life, from the effects of simple chronic inflammation. Their symptoms are of very various intensity, and often subject to remarkable remissions; but the most frequent and important are,—pain and anxiety; nausea and vomiting, constipation, alternating usually with painful and intractable, though seldom violent, diarrhœa; tenesmus, and frequently mucous and bloody stools, and alteration of the natural form of the feculent evacuations, when the disease is in the great intestines; obstinate costiveness, and tympanitic distension, with pain, vomiting, and sometimes ileus, when it attains such a size as nearly to close the passage; and progressive emaciation and debility in almost all cases.

Such disease very often excites, or becomes complicated with, inflammation, acute or chronic, in the parts around

them, even repeatedly before it is fatal; and in consequence of the adhesions thus formed, ulceration extending through all the coats of the stomach or bowels has often been found connected with organic diseases, in which the contents had not escaped, and the usually fatal effects of perforation of these coats had been averted. In other cases, the ulceration and adhesions have led to false communications between the upper and lower portions of the canal, making large portions of the tube useless, but by which life has been considerably prolonged; and in a few they have led to external abscesses and fistulous communications with the intestines, by which the fæces have been voided for a considerable time.

These are very generally diseases of advanced life; but one set of organs, necessarily connected with the functions of the bowels, the Mesenteric Glands, are very often organically diseased in children and young persons. The kind of affection is the deposition and growth of the common scrofulous tubercles in these glands—sometimes as a part of a more general deposition,—sometimes almost exclusively;—in some instances, with symptoms, and indications on dissection, of chronic inflammation preceding the formation of the tubercles,—in others, without such indications;—sometimes apparently depending on the previous formation of ulcers on the mucous membrane of the bowels at the parts corresponding to the affected glands, formerly noticed under the head of Inflammation of the Intestines,—sometimes when little or no disease of that kind accompanies it. The tubercles undergo changes almost exactly corresponding to those in the lungs, but few have, in general, passed into suppuration before death takes place. The local symptoms are generally

obscure and equivocal; tympanitic distension and mucous diarrhœa are perhaps the most common; but the gradual emaciation, paleness, and weakness, in a scrofulous habit, in early youth, and without adequate apparent cause, are generally sufficient to excite strong suspicion of the disease. In other instances, but seldom without some affection of the glands, the tubercular deposition takes place chiefly on the peritonæum, leading to the great solid enlargements, with colic pains, often attended with sense of heat, and occasional diarrhœa, often also with partial serous effusion, described by Dr Baron. The medullary sarcoma also occasionally affects the mesenteric glands, and peritoneum, producing similar symptoms, but a more rapid progress. In adults it is not uncommon to find cartilaginous or bony concretions (*i. e.* hardened tubercles), or encysted tumours, in these glands, without any symptoms having been observed which can be confidently ascribed to these lesions.

When not fatal by reason of the inflammations that are complicated with them, or by the colic gradually taking the form of Ileus, from nearly complete closing of the passage, these organic affections of the digestive organs may go on until the patient is so much weakened and exhausted, that his death takes place nearly in the same manner as that caused by fasting.

In some constitutions, and especially in the case of children, it is important to be aware, that chronic affections of the bowels, especially those connected with ulceration, even partial, of the mucous membrane, or with disease of the mesenteric glands, are very apt to give origin to affections of the brain and nervous system; either to strictly inflammatory affections there, ending in serous effusions, formerly noticed, or to different chronic diseases of those parts, to be considered afterwards.

The different kinds of Worms, so often found in the alimentary canal, and the origin of which is still obscure, the small worms called Trichuris (usually found in the cœcum), and Ascaris vermicularis (usually found in the rectum);—the long round worm (Ascaris lumbricoides) which usually infests the small intestines; and the jointed tape-worm or Tænia, also found there, but more frequently in adults,—demand attention here, chiefly because of the effect of the irritation which they occasion, to excite symptoms of nervous disorders, and sometimes dangerous diseases of the Nervous System. The symptoms which they excite in the abdomen itself, colic pains, capricious appetite, tympanitic abdomen, and troublesome itching at the anus, and especially at the nostrils, cannot be distinguished with certainty from those which other irritations acting on the mucous membrane, or slight inflammation and ulceration, may occasion there; but from the action of the lumbrici in particular, epileptic fits, and more anomalous nervous affections, have often evidently originated; and in some cases symptoms closely resembling those of hydrocephalus (*i. e.* inflammation in the brain) have been apparently excited in this way, and abated after the expulsion of the worms; while in others, the symptoms apparently originating in this way, have gone on to decided and fatal hydrocephalus.

The treatment of the merely spasmodic or flatulent colic, consists simply in the combination or alternation of laxatives with anodynes, especially opiates. Sometimes a full dose of castor oil alone, or with laudanum or morphia, procures both full evacuation and complete relief; but frequently, and particularly when the dis-

ease is of some standing, it is better to give an opiate first, and afterwards such a combination of laxatives and enemata, or enemata followed by laxatives, in repeated rather than in very large doses, as may cause full evacuation. When the case is merely of this kind, stimulants and carminatives, probably by restraining the sudden distension of the bowels, give much relief; and therefore mixtures containing some of the purgative tinctures answer well. There is no indication for mercurial medicines in such cases, at least none for affection of the system by them; and their use may, in some constitutions, rather alter or prolong, than relieve the disease; and the remedies now mentioned (often repeated), with hot fomentations, and the warm bath, are all that can be required. In some cases, particularly in women, such accumulations of hardened fæces are brought to the rectum, as require not only enemata, but mechanical means of breaking them down, before they can be thoroughly evacuated.

In cases of habitual constipation with colic pains, from errors in diet, and neglected bowels, it usually happens that, after strong purgatives have been used, and accumulations removed, the milder laxatives are effectual, and, with a somewhat laxative diet, comprising vegetable matters, well boiled or otherwise prepared, will answer every purpose. But when the pains are of simply neuralgic character, returning in paroxysms, influenced by the weather, and unconnected with any ascertained torpor or derangement of the action of the bowels, these remedies will prove unavailing, and although the alternation of laxatives and anodynes is still required, they must be regarded as palliatives only; each paroxysm of the disease will gradually and spon-

taneously subside; or it may be permanently relieved (although not uniformly or certainly) by Quinine or preparations of Steel.

If the action of the poison of lead can be ascertained, the same general plan of treatment is required, and must often be very frequently repeated; but if there is reason to think that any part of the lead remains in the Primæ Viæ, there is a special indication for the laxative Sulphates (of Soda or Magnesia) to form the insoluble and inert Sulphate of Lead. And it has been lately stated, with great probability, that the free use of drinks containing Sulphuric Acid, is an effectual preservative against the disease, even for workmen and others, who are unavoidably exposed to its cause.*

In cases where, from the obstinate recurrence of the symptoms, from the weakness aud emaciation attending them, or from more special evidence, we are pretty certain of the existence of organic disease, more or less impeding the action of the bowels, the most important practical rule is similar to that insisted on as to inflammation, with similar complications,—that purgatives by the mouth be used sparingly and cautiously, lest, by forcing the contents of the bowels against constricted or compressed portions of the intestine, they increase the sufferings of the patient, and probably irritate the afflicted part into inflammation and ulceration. Some cases of this kind are ascertained to depend on stricture of the rectum, and admit of relief, at least in the early stages, from its dilatation by the bougie.

There are a few cases of this description in which the bowels have been long constipated,† where, under the in-

* See Watson's Lectures, vol. ii. p. 455.

† In one case, under my own observation, for twenty-five days.

fluence of mercury, affecting the mouth, the natural action of the intestines has been restored; and therefore, in cases where highly scrofulous or malignant constitutional disease is not indicated, this expedient may be tried. In some cases the external application of purgative medicines, in liniments or poultices, has seemed effectual when their internal use was ineffectual or injurious; and in others, Galvanism, applied gently but continuously, has seemed to remove the obstruction; but in general the case is to be regarded as hopeless, and the object of the practitioner should be to procure evacuations, as long as it can be done, by mild medicines and enemata, and, at all events, to mitigate pain and spasmodic action by repeated and full doses of Opium or other anodynes; watching at the same time for occasional inflammatory attacks, which, even at an advanced period of the disease, may be properly obviated by antiphlogistic remedies, with much relief to suffering, although at the risk of a somewhat earlier exhaustion of strength.

The expulsion of worms from the intestines is to be effected, partly by repeated doses of purgatives, particularly the resinous and mercurial Cathartics, and partly by the use of medicines, and in the case of the Ascarides of Enemata, which act on them as poisons,—of which the best recommended are, for the Tæmia, the Oil of Turpentine (often given along with Castor-oil), — or the Decoction of the Pomegranate;—for the Lumbrici, the Oil of Turpentine with Castor-oil, and different bitters and Chalybeates, likewise the Tin-filings;—for the Ascarides, the Bitter infusions, Lime-water, a strong Solution of common Salt, or the Tinctura muriatis Ferri largely diluted—given in enema.

III. The Ascites, or Abdominal Dropsy, *i. e.* the Serous Effusion into the cavity of the abdomen, is easily recognised by the peculiar feeling of fluctuation, and most commonly depends, not only on the general causes of dropsy already mentioned, but on some special causes of determination to, or congestion in, the different parts of the Peritoneum. Of these, by far the most common is such disease of the Liver, generally induration (often with enlargement, but sometimes with diminution of size), as obstructs the free flow of blood through the Vena Portæ. But in other cases, particularly in young persons, the Ascites is connected either with the chronic forms of inflammation, or with tubercular or other morbid deposits on the Peritoneum and in the mesenteric glands. In such cases, disease of the kidneys is likewise often present. And there are other cases of this effusion, which seem to be connected, or to alternate, with the increased flow from the mucous membrane of the intestines, constituting the Diarrhœa Mucosa, even when the liver is sound.

Cases of Ascites, therefore, are sometimes attended with such indications of inflammatory action, as demand evacuation—at least local—of blood; and when this is the case, the subsequent action of the laxatives and diuretics is sometimes remarkably increased: but more frequently the diseases which determine this form of serous effusion, are quite chronic; and it is an important practical observation, that Ascites is less frequently removed by remedies than Anasarca, or even Hydrothorax, probably because the causes which lead to effusion at this part are more permanent. Accordingly, this form of dropsy is generally observed to be attended with more indications of feeble health, parti-

cularly of deficient digestion or assimilation of food, than attend the hydrothorax.

There is, therefore, more generally an indication in this than in other dropsies, for the use of deobstruents, such as Mercury or Iodine, along with the means of removing the effusion, already considered; but in a large proportion of cases, the use of them is clearly contra-indicated by the enfeebled state of the patient, and by their known inefficacy in organic disease of any considerable extent or duration.

The Paraceutesis Abdominis has certainly in some cases been followed by an increased efficacy of the diuretics, and complete removal of the Ascites; but in a far greater number of cases, the relief given by it has been only partial, and obtained at some risk of peritoneal inflammation, a slight degree of which, in feeble habits, may be fatal; and therefore, it is generally thought right to reserve this remedy for cases where the extent of the effusion is such as to cause much suffering, particularly by pressing on the diaphragm and impeding respiration.

All that need be said in regard to the Ascites Saccatus or Encysted Dropsy in the abdomen is, that the fact of the fluid being so confined may be in general detected by careful examination, particularly in the early stages of the disease; that such encysted dropsies are occasionally found in connection with the liver or kidneys, particularly when they contain Hydatids; and in that case inflammation, adhesion, ulceration, and escape of the contents of the sac, through the integuments or through the lungs, may occur, as in cases of chronic abscesses of the same parts; but that their most common origin is from disease of the

Ovaria; that when such disease has produced great effusion, it is very seldom capable of being affected by any deobstruent remedies, and the effusion in this situation is hardly under the influence either of purgatives or diuretics; but, on the other hand, that the paracentesis, as a palliative remedy, is safer in this case than in the Ascites Abdominalis, and has often been very frequently repeated. In the case of encysted dropsy with hydatids, the cyst is generally to be regarded as the largest, or parent, hydatid; and on its being punctured, it would appear that sometimes it perishes, and its contents become liable to absorption, so that the whole disease may nearly disappear. The question as to the safety or expediency of the excision of diseased Ovaria is still *sub judice*, and is more properly discussed in surgical works.

IV. In connexion with the disordered states of the Secretions and actions of the Alimentary Canal, and likewise in connexion with what is next to be stated, as to diseases depending on a morbid condition of the blood, a few words may be said of the pathology of the new and anomalous disease, which is essentially characterized by a very diseased condition of all these, viz. the Epidemic Cholera.

As occurring in India, this disease was characterized by copious vomiting and purging of a watery fluid (often loaded with flakes of whitish matter), without bile;—by cramps, not merely of the legs, but often pretty general over the body,—and by rapid sinking of the heart's action,—uncommon shrinking or shrivelling, coldness, and often blueness of the surface,—and frequently labo-

rious breathing in the latter stages, as in other cases of death by syncope. The blood was always observed to lose its power of coagulation, and to be thick and dark-coloured, very soon after the attack of the disease. All the secretions, excepting those by the mucous membranes and the skin, appeared to be nearly suppressed during the violence of the disease; but the whole duration, whether in fatal or favourable cases, was seldom more than two or three days. In this climate, there is this essential difference from the usual form in India, that, in many cases, after the symptoms above mentioned have abated, the system rallies, and the pulse becomes pretty full and firm, a state of fever, more or less distinctly marked, often with delirium, and always with strong tendency to Coma, supervenes, and may be fatal strictly in the way of coma, at the end of some days, or even a fortnight or more from the attack. During this febrile or comatose state, although the secretion of bile (of morbid quality) is generally restored, that of urine is still frequently suppressed; or, if passed, it is generally in small quantity, of low specific gravity, and often albuminous.

Both in the warmer and colder climates, it has been distinctly perceived that the spasms of the limbs are not merely the effect of frequent stools,—not only because they are more general than those of the common cholera, but because they have often been violent before there was any diarrhœa, and continued after that was stopped, even after apparent death;—again, that the depression of the heart's action is not merely the effect of the evacuations, because it is rapid and excessive in some cases where these are slight;—and lastly, that the coldness of

the surface is not merely the effect of the depression of the heart's action, because the body has often become warm immediately before, or even after death.

The most important additional facts which have been lately ascertained in regard to the changes in the Epidemic Cholera are, that the blood, deprived of much of its watery constituents by the diarrhœa, is found to contain much less water, and less of its usual saline ingredients, than in health; that the watery dejections consist merely of the serosity of the blood, with a small quantity of albumen; and that in the cases of long-continued suppression of urine, the urea has been detected, as in cases of diseased kidneys, in the blood, and also in the serum of the shut cavities of the body.

No morbid structure has been ascertained to be constantly present in the bodies of persons who have died of this disease. A great variety of morbid appearances, found in such bodies, have evidently existed before the attack of cholera; others, such as softness of the mucous membrane of the primæ viæ, and unusual development of the mucous glands there, may reasonably be ascribed to the obviously great change in the distribution of the blood. Slight bloody effusions, or ecchymosis, often found on the heart, but more especially on the sympathetic nerves and par vagum, although not essential to the disease, and probably to be regarded as its effects, appear to be important as affording an explanation of a part of the symptoms.

The mode of diffusion of this disease is as anomalous as its symptoms. Although a few cases of violent diarrhœa or cholera (especially such as might be traced to the action of poisonous articles of diet), have shewn symptoms nearly approaching to those of this epidemic

disease, yet it is certain that no such disease was frequently seen,—still less did any such prevail epidemically,—in any part of the world before 1817,—or in Europe before 1829, or in Britain before 1831;—and that at this day no such disease has been seen in many towns, villages, or districts of this country, while in others, during the years 1831-2, and a part of 1833, it was very destructive. It is quite in vain, therefore, to attempt to refer the appearance and extension of this disease to the agency of any of those causes of disease, which are of general and nearly uniform operation in any climate; notwithstanding that such causes may very often have appeared, as in the case of other epidemic diseases, to co-operate in exciting the disease in individuals. As this disease has hitherto existed only within certain assignable limits of space and time, so its main cause must be one of local and temporary agency.

It is equally certain, that this disease does not present the usual indications of one which arises from a Malaria; for, instead of being confined to certain districts, and those of similar character in different parts of the world,—and of appearing and disappearing at certain seasons or in certain circumstances only,—it has been found to prevail epidemically in all climates and all seasons, and although perhaps most frequently in low moist situations, yet repeatedly in all descriptions of localities.

It may be stated farther, with confidence, that on different occasions, and particularly on several occasions in Scotland, where the introduction of the disease into a town or district previously unaffected, from a known source (*i. e.* by a person coming from a place where the disease prevailed, and falling ill of it in another, pre-

viously untouched by it), has been carefully watched,—it has been observed, that those who had intercourse with the sick took the disease, in the first instance, in a proportion so very much greater than those who avoided such intercourse, as to leave no reasonable ground for doubt, that it possesses a certain degree of Contagious property.*

It is no objection to the belief of the contagious nature of the disease, that a large proportion of those who have free intercourse with the sick remain unaffected; for, where the disease is epidemic, such persons are necessarily exposed to the local and temporary cause of the disease, whatever it be; and, therefore, their exemption, although it proves the agency of that local cause to be very irregular (or contingent on conditions not yet understood), gives no information as to the nature or origin of that cause.

But, while a certain degree of contagious property is confidently attributed to the disease, it must at the same time be stated, that, when it has become epidemic in towns or districts, many persons have been observed to be attacked, who had certainly no intercourse with the sick; many others, whose intercourse either with the sick or with any thing that could have been in contact with them, must have been very slight and transient; and sometimes it has not appeared that those who had full and free intercourse with the sick, were affected in larger proportion than either of the two first-mentioned classes of persons.

From these facts it appears to be a perfectly fair inference, that either the disease, besides the degree of contagious property already ascertained to belong to it, has

* See Simpson in Edin. Med. Surg. Journal, vol. 49.

another mode of extending itself, independent of contagion, and not yet understood; or else, that the contagious poison arising from those affected with it, acts according to laws materially different from those which regulate the diffusion of other contagious diseases. It must have the power of extending itself to a very considerable distance through the atmosphere, so as to affect those who are peculiarly liable to its influence; and, again, its action, even on those the most fully exposed to it, must be very much dependent on other circumstances in their situation. Its effect must bear no proportion to the quantity of it introduced into the system; and its virulence must be liable to great and unaccountable variations at different times.

Perhaps, when the whole history of the disease,—its recent introduction into the world, and its generally following the great lines of human intercourse,—are taken into account, and the analogy of other contagious diseases considered, it will appear more reasonable to ascribe these singular properties to a specific poison of human origin, than to admit two distinct causes for the extensive diffusion of the disease. The old notion of the dependence of this and other epidemics on swarms of insects, or rather of animalculæ, thrown off from the bodies of affected persons, but afterwards maintaining, for a time, an independent existence, agrees better with many of the facts observed, than any other theory that has been proposed.*

Two important facts, in regard to the local and temporary cause of the disease (whatever be its nature),

* See Holland "On the Hypothesis of Insect Life as a Cause of Disease," in Medical Notes and Reflections.

seem well ascertained, and similar in kind to what has been observed as to other epidemics, viz. 1. That its effect on the persons exposed to it is sometimes very rapid, and sometimes delayed for several weeks; and, 2. That the effect of its application is very dependent, not only on previous predisposition, but on subsequent contingencies; avoiding which may probably, in many cases, suffice to avert the disease.

The concurrent and accessory causes which seem most efficient in determining attacks of the disease are, previous organic diseases, unconnected with febrile excitement (for phthisical and other patients, with hectic fever, seem very little susceptible of it), intemperance, and previous diarrhœa.

As the whole history of the disease shews its dependence on a local and temporary cause, so its essential symptoms, and the mode of its fatal termination, evidently assimilate it to the effect of Poisons on the animal economy, much more than to the phenomena of any of those diseases which arise from causes of more uniform occurrence.

In particular, the spasms of voluntary muscles, and the very rapid depression of the heart's action,—certainly not referable merely to the amount of evacuation from the primæ viæ,—bear a close resemblance to the action of certain poisons, and to other malignant epidemic diseases proceeding from malaria or from contagion, *e. g.* yellow fever and plague. And the analogy to other effects of specific or morbific poisons appears farther from the remarkable tendency to reaction of the heart, to a certain degree of febrile action, and spontaneous favourable termination, observed in many cases of the disease, and under all possible variety of treatment.

The remarkable effect of injection of large quantities of weak saline solutions into the veins, in causing temporary excitement of the heart in the stage of collapse or extreme depression in this disease, shews that a part of the cause of the depressed state of the circulation lies in the altered condition of the blood consequent on the evacuations; but the tendency to syncope is seen too early, and recurs too frequently and too rapidly, after the full amount of water and salts have been restored, to be solely referable to this cause.

The stupor in the later stage of the disease may certainly be ascribed, in a great measure, to the suppression of the excretions, particularly of the urine; but it is still doubtful whether this may not be in part also a direct effect of the morbific poison.

The numerous observations made in this country were sufficient to prove, that no known remedies, not even the saline injections, have any specific power of counteracting the peculiar agency of the specific poison; and the cases in which the full effect of the poison, in the circulation, took place within a very short time from the invasion of the disease, were almost uniformly fatal. Hardly any of these cases, of sudden collapse, shewed any favourable reaction after the loss of blood, and many were evidently farther depressed by it; but cases which began with pain, and cramps, and with firm pulse, often improved rapidly after bloodletting, followed immediately by full doses of opium with calomel. Cases apparently commencing with diarrhœa, and defect of bile in the stools, seemed to be sometimes arrested by full doses of opiates only; and many cases, in which a considerable degree of collapse had taken place, especially of young persons, recovered under stimuli, internal and

external, of which the saline injections appeared undoubtedly the most powerful,—and of opium in moderate doses (regard being had to the comatose tendency always to be apprehended in the latter stage), with astringents, or with mercury. Wine or spirits could seldom be taken, or retained, in such quantity as to have a decided effect.

The speedy removal of the unaffected inmates of the first houses in which the disease had shewn itself, to quarantine houses, or to any more airy situations, where they could be preserved from all accessory causes,—seemed to be a measure of real and important efficacy, in restraining the diffusion of the disease.

SECT. V.—*Of Chronic Diseases of the Function of Assimilation.*

We here consider several diseases, in which it is certain that the assimilation of the aliments and constitution of the Blood, and thereby the nature of the depositions and excretions from the blood, are much altered, but of the exact seat of which (if indeed they have any local habitation), and of the nature of the alteration of the vital affinities producing them, we are still ignorant.

It is important to observe, in regard to these diseases, in which the constitution of the whole blood is certainly in fault, that the indications of their existence are often quite *local*, *e. g.* those of Scurvy affecting only certain portions of the skin and mucous membranes. These, therefore, clearly connect themselves with the whole of the *constitutional* organic diseases (*e. g.* Scurvy or Pur-

pura, with Melanosis), as they do also with the specific inflammations, and the contagious febrile diseases, and with the effects of various poisons,—and the pathology of all may be said to be essentially *humoral.*

These chronic diseases have usually been termed Cachexiæ, and possess a peculiar interest and importance at present, because the recent discoveries in organic chemistry and in microscopical anatomy give reason to hope that they may soon be better understood, or referred to more general principles than can at present be laid down, and that the respective provinces of chemical affinities and vital powers in producing them may be more clearly fidened. In the mean time it is certain, that, in speculating on these diseases, we must always have in view, not merely the chemical *composition* of the blood, but its whole *constitution*, including its aptitude or inaptitude for certain changes which are constantly going on in it, but which are essentially vital phenomena, and may be referred, in general terms, to vital affinities.

The principle laid down by Liebig, if fully confirmed, viz. that the food of man consists of two parts,—the *non-azotized portion*, which is destined only to unite with the oxygen of the air, and maintain the excretions and thereby the heat of the body, and the *azotized portion*, or compounds of Proteine, which go to the maintenance of the organized structures,—will be a leading principle in the pathology of these diseases; but in order to enable us to turn this general law, supposing it established, to practical account, we must first understand how far the different excretions are supplied by those non-azotized ingesta; how far by the azotized articles of food, particularly if in excess; and how far by the disintegration of the textures already existing in the body, and continu-

ally liable to absorption.* This seems to be the greatest difficulty at present attending the investigation of these diseases.

I. The symptoms of Scorbutus or Scurvy are exactly the same, and indicate the same kind of alteration in the constitution of the blood as those of Purpura, already considered, in connection with cutaneous diseases, *i. e.* not only purple spots and ecchymoses (often very extensive), spungy gums, hæmorrhages, particularly at injured or inflamed parts; but farther, great emaciation, absorption even of the callus uniting broken bones, debility, faintness, and ultimately death by Asthenia; but with this remarkable difference, that the former are distinctly produced by deficient or unwholesome aliments, and by other causes which depress vital action, and are injured by any causes which have a weakening effect; whereas the latter take place independently of the action of any such cause, are often co-existent with inflammatory as well as febrile diseases, and even appear distinctly to be sometimes excited by the invasion of such diseases; and are relieved rather than aggravated by such depleting remedies as may be effectual in subduing these concomitant affections. The Purpura, therefore, would seem to consist entirely in a perversion of the vital process of assimilation; whereas the Scurvy is probably always chiefly owing to a defective state of the materials, on which that process is performed.

Like the Purpura, the Scurvy is apt to combine itself with others, particularly inflammatory diseases, and then

* See Review of Dr Bence Jones on Calculous Disorders, in British and Foreign Medical Review, 1843.

the effusions from these inflammations are tinged with, or even consist of, entire blood. This seems to have been exemplified in fatal cases of scurvy with effusions beneath the Periosteum, given by Dr Budd (Library of Pract. Medicine, vol. 5), also with effusion in the Pericardium, described by Dr Seidlitz in Russia (British and Foreign Review, vol. i.)

Extensive and long-continued as has been the experience of the production and effects of Scurvy, there has been much difficulty in fixing on the particular alterations in the constitution of the blood in which it consists, and on the particular causes which are necessary to its development and increase. It has been generally supposed, that the red globules are broken down and diffused through the serum, and that the coagulation of the blood is imperfect, implying defect in the quantity or vital properties of the fibrin; and it is certain that in some cases both these peculiarities in the state of the blood have been observed;* nor does it seem easy to conceive, how the extravasations of blood, characteristic of scurvy, can take place, while the fibrin and the globules retain their usual qualities. But in other instances, the separation of crassamentum and serum, and the firm coagulation of the fibrin of the former, have been observed equally in the blood of persons affected with scurvy (perhaps complicated with inflammation), as in healthy blood.† Similar varieties have been observed, even during the progress of the same case, in Purpura.

* See *e. g.* Dr Watson's account of the blood drawn from a patient of his. Lectures, vol. ii. p. 804, and Huxham, quoted by him.

† See Article Scurvy by Dr Budd, in Tweedie's Library of Medicine, vol. v. p. 191.

The proportion of the globules to the other constituents of the blood appeared, in the cases now quoted, to have been much diminished; but that is a change common to this and various other chronic and weakening diseases, particularly Chlorosis, and disease of the kidneys.

The researches of Dr Budd, and his collection of very numerous prior observations, seem to have nearly established, that the scurvy neither depends on the use of salted provisions, as has been commonly thought, nor on deficiency of nourishing food, as some have supposed, but exclusively on the long-continued absence of certain kinds of vegetable food; and that the true anti-scorbutics are the vegetable acids, as lime-juice and lemon-juice, and the succulent vegetables, especially if taken raw, or in a state of, or prone to pass into, acetous fermentation, not when much acted on by heat. Potatoes appear, from the observations of Dr Baly, to be distinctly anti-scorbutic, probably from containing much vegetable acid;* but the farinaceous vegetables, and generally the vegetable albumen and gluten, have no such virtue.

It would here seem pretty clearly indicated, that the introduction of non-azotised aliments is necessary for the prevention and cure of scurvy; and according to the principles of Liebig, this may be supposed owing to their supplying carbon and hydrogen to the oxygen of the air, and thereby protecting the animal solids, and probably the fibrin and globules of the blood, from the destructive agency of the oxygen.

It is very doubtful, however, whether this would explain the peculiar virtue of the vegetable acids, in counteracting the tendency to scurvy; and at all events, that the change in the constitution of the blood, which

* See Watson, *l. c.* p. 600.

occurs in scurvy, is influenced by causes exclusively vital, is certain not only from the fact, that a similar change on the constitution of the blood takes place in the Purpura, where no chemical cause for it exists; but also, from the observed effects of all causes which weaken vital action, particularly cold, inactivity, and depressing passions of mind (perhaps diminishing the force of vital affinity, by which the usual condition of the fibrin and globules during life is determined), in disposing to the disease.*

The rapid effect of fresh succulent vegetables, and vegetable acids, on the whole symptoms of Scurvy, and therefore on the constitution of the blood in that disease, is more striking than that of any other remedy, on a chronic disease. All other remedies, stimulants, tonics, astringents, &c. are trifling in comparison; but it has been repeatedly stated, and particularly very lately, that frequent doses of Nitrate of Potass possess a similar virtue.

II. The tendency to dry Gangrene of the extremities, *i. e.* to death of various superficial parts of the body, preceded by pains of those parts, but very little of the other symptoms of inflammation, and attended with hardly any fluid effusions, is another case of disease affecting individual organs only, but clearly dependent on a diseased condition of the blood, resulting from ali-

* A remarkable instance of the power of such mental causes is given in an account of the extension of scurvy among a class of convicts, by Dr M'Cormac, transported on account of agrarian disturbances, when the crew of the ship, and other convicts, habitual felons, were unaffected.—*Methodus Medendi*, p. 213.

ments which are in a certain degree poisonous, or not duly assimilated; it being fully ascertained that this disease has been occasionally endemic in different countries, only because damaged grain, and especially rye, infected with the ergot (Secale cornutum), has formed a large part of the nourishment of the people. The experiments which prove that a similar disease is produced in animals fed with this grain, and the disappearance of the disease when sound grain only has been used, are conclusive on this point.

III. Another disease, which is properly regarded as depending on a morbid condition of the function of assimilation, and of the constitution of the blood, is the Rachitis,—of which the characteristic symptoms result from the peculiar nutrition and softened state of the bones—the large head, with projection of the frontal bone, enlargement of the joints, depression of the central parts of the ribs, and, when the erect posture is habitually assumed, the curvature of the bones of the extremities. But it is equally certain, that all the solids of the body are imperfectly nourished, and the muscular parts in particular are soft, flabby, and feeble, the muscular fibres of the intestines relaxed, and abdomen tympanitic; while the almost uniform precocity of intellect shews that the nervous matter in the brain must be in a state of morbid activity. The bones, in this disease, are not only deficient in earthy matter, but do not acquire their usual structure; their cellular texture is less compact than natural, the contents of the cells gelatinous instead of being medullary; and, while the extremities of the long bones acquire an unnatural size, the medullary canals are not formed in the usual way in their interior.

This is a disease of infancy and childhood, the causes of which are apparently the same as those formerly stated as favouring the scrofulous diathesis,—damp and impure air, want of exercise, innutritious diet, or such disorders of the stomach and bowels as habitually impair the digestion and assimilation of food; and it occurs so frequently in the children of scrofulous parents, and is so continually associated with scrofulous disease, that we can have no difficulty in regarding it as dependent on a constitution of the blood essentially similar.

It is certain, that this disease may be produced, altogether independently of any want of the usual earthy salts in the ingesta, and that it cannot be remedied by merely adding phosphate and carbonate of lime to the food; and it is certain also, that it is often attended with an unusual excretion of the phosphates, by the bowels or kidneys, or both; and that in other cases there is an irregular deposition of phosphate of lime,* shewing that the quantity of this substance in the system is not deficient, but that the fault lies in the vital powers and affinities by which the nutrition of bones and other textures is effected; but these observations leave it still doubtful, whether the blood, in rickety patients, contains the phosphates in an unusual state, or whether there is in the bones a defect in the vital power of abstracting it from the blood, or in the blood an excess of the power of abstracting or reabsorbing it from the bones.

But whatever be the precise nature of the change in the vital acts, subservient to the nutrition of the bones,

* See Wilson on the Bones and Joints, p. 164.

muscles, and nervous matter, in this disease, it is certain, that it is in a very considerable degree under the control of causes which can only affect vital action; for by the continued use of a Tonic Regimen, by solid and nutritious diet, pure and dry air, habitual inducement to muscular exertion, by tepid or cold bathing, and assiduous frictions, and by the use of medicines which promote the appetite and digestion, particularly of the preparations of steel, many children affected with rickets, are gradually restored to health; and the only other medicines which appear useful, are such as are fitted to obviate symptoms of derangement of the stomach and bowels, as they appear,—the ant-acids, the bitters, the mild laxatives, or astringents with opium, according to the state of the bowels.

It is to be observed, that the alteration of the form of the chest, which takes place in this disease, renders the breathing somewhat short, or easily embarrassed, and, in many cases, disposes to Bronchitis, or more urgent diseases of the chest, the symptoms of which necessarily interrupt the use of the tonic regimen, and even demand, in many cases, that the antiphlogistic regimen and remedies, in so far as the patient's strength appears fitted to bear them, should be substituted.

IV. Another case, in which the constitution of the blood is undoubtedly altered, by a very peculiar perversion of the function of assimilation, is that of Diabetes.

There are, however, two distinct diseases to which this name is given, although their pathology is widely different; the D. insipidus, in which the quantity of urine is greatly increased, but its specific gravity proportionally diminished; and the D. mellitus, in which

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the urine is not only in greater quantity but of higher specific gravity than natural (its specific gravity 1035 to 1045, instead of 1020 to 1025), and usually loaded with sugar.

In the former case there is always much thirst, and the urine seems in exact proportion to the quantity of fluid taken into the blood, so that the essential part of the case may be called Polydipsia, or it may be thought only a modification of Dyspepsia, although, from being of very long duration, attended with emaciation, and very little influenced by remedies, it is of more formidable character.

In the latter cases, there is not only great thirst, but morbid appetite; but the quantity of urine is so great, often from 20 to 30, and sometimes above 40 lb. in the day, and its specific gravity so high, that fully twenty times the usual quantity of solid matter may pass off by the kidneys, and with it frequently much more fluid than is taken in; so that, notwithstanding the great quantity of ingesta, a gradual diminution of the weight of the body usually attends the disease. Along with this, there is usually, at first, a remarkable dryness of the skin, gradually increasing debility, and bodily and mental torpor. In the advanced stages of the disease there is some degree of fever, and often much sweating, and some patients die by mere exhaustion or anœmia, while a greater number die from the effect of some more acute, often inflammatory disease, which supervenes in the enfeebled state of the body.

It is quite certain that the disease is not only constitutional but often hereditary, but the causes which directly excite it, seem to be the same as produce in other persons very different diseases, particularly exposure to

cold or wet, and mental depression. In many cases no exciting cause is observed.

The presence of sugar in the urine is not essential to the development of the disease, for the same symptoms have been observed in a few cases where the urine was in greater quantity and of greater density than natural, though containing only its usual constituents. It has even appeared in some cases, that this Diabetes *Ureosus* has gradually changed into the mellitus; and it has been ascertained also, that the urea and other solids of the urine are not absent during the presence of the sugar, but exist along with it, sometimes even in larger proportion than natural.

And it is ascertained, not only that the kidneys are sound in this disease, but that no perceptible organic lesion of any organ necessarily attends it,—that the kidneys even remain fit for their usual function during it; and for a short time before death, when the strength is very much impaired, that they secrete urine of the natural quantity and quality; farther, that the sugar exists in the blood, and even, according to the observations of Mr Macgregor, that it exists in the Primæ Viæ in unnatural quantity, as shewn by fermentation of their contents with yeast.

The disease is therefore strictly one of the Function of Assimilation; but it is still doubtful what is the original and fundamental change. It may be supposed, that it is a morbid increase of the function of Absorption, all over the body; that this is indicated generally by the wasting of the body, notwithstanding the enormous ingesta, and more especially by the great hunger and thirst, by the morbid dryness of the skin, in the early stage, by costiveness of the bowels, and by an

increased absorption at the lungs, shewn by the fact, that the diminution of weight of the body in a given time, is not nearly equal to the difference between the observed egesta and the observed ingesta in that time,*— that hence the uric acid and urea, which are formed by the absorption of portions of textures previously existing in the body, are necessarily increased; but that the chief supply of this morbidly increased absorption being from the Primæ Viæ, the aliments which yield it are not capable of furnishing so much azotized matter, as to load the whole fluid which they supply with uric acid and urea, but furnish, in addition to these substances, a large quantity of sugar, a substance known to have this remarkable relation to urea, that it contains, in given weights, the same quantity of hydrogen, and twice as much oxygen and carbon, with no azote.

Or it may be supposed, that the original change is the tendency of the fluids of the body to form sugar, a tendency which is communicated to the ingesta; that the sugar thus formed and taken into the blood, being greatly in excess of any demands of the system for that matter, acts as a powerful diuretic, and is thrown off by the kidneys, stimulating them to a great increase of watery secretion; and then that the increased absorption all over the body, and the hunger and thirst consequent on that increased absorption, are to be ascribed to the great evacuation, both of fluids and solids, thus effected.

Which of these is the more correct view cannot be known, until we have more precise information as to the modification which chemical laws undergo in the eco-

* See Dill in Edinburgh Medico-Chirurgical Transactions, vol. ii.

nomy of living bodies, and as to the relation of these laws to the movements of the fluids in their interior.

It is obvious that the sugar found in the blood, and in the urine in this disease, must be furnished chiefly by the vegetable portion of the ingesta; and accordingly it is found, that, by the use of a diet almost exclusively animal, the quantity and density of the urine are considerably diminished; and experience has farther shewn, that, along with this change, a considerable abatement of the other symptoms of the disease is often effected,—so far favouring the second of the theories above stated as to the essential nature of the disease.

But the purely animal diet can hardly ever be taken for a length of time, and neither by this nor any other known means is the disease permanently subdued. It very often abates for a considerable time, seldom is itself fatal, and in a few cases has disappeared entirely; but sooner or later it very generally returns, and by its weakening effect, disposes to the accession, and accelerates the fatal effect, of other complaints, perhaps most frequently of the chest.

Besides the animal diet, however, other means are often found to have a considerable effect in restraining it, particularly,

1. In the early stage, bloodletting, even repeatedly.
2. The warm or vapour bath, during the very dry state of the skin.
3. As much exercise as the patient can be induced to take, or can take without exhaustion.
4. Opiates in gradually increasing doses, which seem to be on the whole more generally effectual than any other means.

5. Bitters, chalybeates, acids, other astringents, creosote, ammonia, given along with the opiates.

6. Wine and other stimulants, when the strength is becoming much impaired.

The use of laxatives is requisite, more on account of constipation generally attending the disease than of the effects of the opiates during it; but they do not seem to have any favourable effect on the disease itself.

V. Another diseased state, of much importance, and certainly dependent on a faulty condition of the function of assimilation and the constitution of the blood, is the Lithiasis, or tendency to the deposition of Calculi from the urine, in the living body, which tendency may be advantageously considered separately from the local effects which result from these deposits taking place in the urinary passages.

That the lithiasis is dependent on the constitution of the blood brought to the kidneys, rather than on any morbid action of the kidneys themselves, has been long believed, from the absence of organic lesion of the kidneys, in most cases of the disease,—from their observed connection with disorders of the stomach, and from the efficacy of all means which correct such disorders, in relieving them; and this conclusion is strongly confirmed by its being known, that the materials of the animal matter, as well as of the inorganic ingredients of this or of other excretions, exist in the blood in the same state, or almost exactly the same, in which they are separated at the kidneys.

These observations, however, apply more strictly to the formation of one great class of deposits from the

urine, viz. the Lithic Acid and Lithates, and the compounds of Oxalic Acid, of which the chief ingredients are organic products, than of the other great class of urinary deposits, viz. the Phosphates, which are almost entirely inorganic deposits, and the formation of which appears, in many cases, to be promoted by injury or disease of the kidneys.

The usual kinds of urinary gravel or sand are easily distinguished, especially the lithic acid, and lithate of ammonia, by their reddish colour and solubility in alkalies, without or with disengagement by ammonia,—the phosphates by the white colour, insolubility in alkalies, and solubility in muriatic acid. The gravelly deposits from the urine containing Lithic acid and Lithates, take place under various circumstances of the body, frequently before the age of puberty, seldom during youth, but frequently also in more advanced life, in those who lead sedentary and luxurious lives, in whom they are very often associated with repeated fits of Gout; and it was formerly stated, that the frequent concurrence of these diseases, and the existence of lithic acid in the deposits in gouty limbs, have led to the opinion that gout depends essentially, and make it nearly certain that it must depend partly, on the existence of too much lithic acid in the blood.

It has been long known that the lithic acid and the urea contain a larger quantity of azote than any other animal matters, and must, therefore, be formed from the albumen and fibrin of the blood, and of the textures.

It is supposed by Liebig, that these animal constituents of the urine are formed only by that decomposition of previously existing albuminous tissues, which seems to attend the performance of all vital actions, under the

influence of the oxygen taken in at the lungs; that the lithic acid and lithate of ammonia (as the proportions of their elements indicate) are formed by the lowest degree of oxidation of the product of that decomposition, the oxalic acid by a greater oxidation, and that urea and carbonic acid are formed by the full oxidation of the decomposed albuminous tissues; therefore, that an excess of lithic acid, or the presence of oxalic acid, in the blood, implies deficient oxygenation of the decomposing tissues; which deficient oxygenation may be owing, either to a deficient supply of oxygen by respiration, or to the presence in the blood of other substances with which the oxygen will unite in preference, such as the non-azotised aliments.

On this supposition, vegetable food must be improper when the lithic diathesis exists, and exercise must be the chief preventive; and this he considers to be supported by the fact, that the carnivorous mammalia, consuming much oxygen and taking only azotised aliment, throw off urea only, while serpents, consuming little oxygen, throw off lithic acid only from the kidneys.

But this goes on the supposition, that the lithic acid and urea come *solely*, as we can have no doubt that they do *partly*, from the products of absorption of the decomposed tissues of the body itself, acted on by the oxygen; whereas it has been generally thought, that these are in part furnished by the aliments themselves; and for this opinion, we can give these reasons;

1. That excretion in general appears from various facts, as to vegetables as well as animals, to be essential to the assimilation of aliments, and not merely intended for the discharge of the products of absorption. 2. That the excretion of urine itself, and especially the quantity

of urea contained in it, appear to be much regulated, and very quickly altered by the nature of the ingesta, being much increased within a very short time after much fibrin has been swallowed.*

Now, if the lithic acid is partly formed by the action of the oxygen on albuminous matter taken into the stomach, its formation will be increased when that matter is in large quantity, and may be much diminished by the use of vegetable food, with which the oxygen uniting in preference will leave the albuminous matter untouched, to be applied to the purpose of nutrition.

Accordingly, experience has often shewn, that the lithic diathesis has been much diminished by the use of vegetable food, *e. g.* as recommended by Magendie; and we know that, when connected with gout, it is very generally found to be increased by the free use of animal food and of fermented liquors containing much gluten or "vegetable fibrin."† Even supposing that all the lithic acid and urea are formed by the transformation of textures; still, if that transformation, and the absorption of materials for forming these excretions, can be rapidly increased by the use of highly azotised ingesta, and diminished by non-azotised food, this last will be useful in diseases which depend essentially on more of the products of that absorption existing in the blood, than the oxygen taken in at the lungs can thoroughly oxidize.

There are, therefore, two objects which theory enables us to understand to be essentially important in the management of such cases: *First*, That the azotised

* See Willis on Functional Disorders of the Kidneys.

† See Liebig's Animal Chemistry, p. 47.

ingesta be, sooner or later, duly oxygenated, so as to form urea rather than lithic acid: *Secondly*, That the quantity of azotised food, ultimately the chief pabulum of both, be restrained; and of these objects the former is usually less under our power than the latter.

All that we are as yet justified in concluding, therefore, is, what is certainly in accordance with practical observation, that the lithic diathesis is diminished by the use of such food only, as is easily and speedily digested and assimilated, and by pure air and much exercise.

It is also certain, that this tendency in the urine is much promoted by acidity, especially by the formation of much of the lactic or acetous acid at stomach, leading to unusual acidity in the urine; because such acids, combining with the earthy and saline bases in the urine, set free the lithic acid alone or with ammonia, a super-salt, which is sparingly soluble and is thrown down. Accordingly, acidity at stomach is found to increase, and the habitual use of magnesia, potass, and soda, is distinctly found to diminish, the tendency to the deposition of the lithic acid or the red sand.

The tendency to the deposition of the white sand and of the Phosphates, appears to depend on a different principle. It is seen chiefly either in persons of feeble habit of body, weakened by fatigue, anxiety, and poor living, or in those who have suffered injury or disease of the kidneys. In such persons, the urine is apt to be ammoniacal, in consequence, as Dr Prout and others suppose, of the urea undergoing a spontaneous decomposition within the body, similar to that in which it is prone when out of the body. Even when not sufficient to make the urine alkaline, this ammonia unites with the phosphate of magnesia, always in solution in the urine, and forms

a triple salt, which is insoluble, and which is often combined or associated with phosphate of lime, when deposited.

To correct the deposition of the white sand thus separated, generally from pale urine, the Tonic Regimen as far as possible, a nourishing diet, tonic medicines, and mineral acids, are proper; the latter sometimes giving such acidity to the urine as controls the deposition of the phosphates; either holding them in solution, or combining with the ammonia, which is the main agent in causing their deposition.

The use of Opium in this phosphatic diathesis is likewise certainly often beneficial, probably because the injurious influences, which lead to the decomposition of the urea, and formation of ammonia, are often communicated through the nervous system, and are counteracted by the anodyne effect of opium.

What has been called the Oxalic Diathesis is stated to be attended with a more natural colour and transparency of the urine than either of the others, and the deposits of gravel take place at longer intervals; but on whatever cause the appearance of the oxalic acid in the urine immediately depends,—whether on an imperfect assimilation of saccharine aliments, or on the introduction of oxalic acid itself in acid vegetables, or on a peculiar decomposition of urea, leading first to the formation of oxalate of ammonia,—it would seem that this diathesis is attended with a weakened state of the system, like the phosphatic diathesis, and that animal food, farinaceous vegetables, a tonic regimen, and the use of bitters and the mineral acids, as in the former case, are the best remedies.

Thus, the kind of diet which is easiest of digestion,

and the regimen which is found to be most strengthening to the stomach, are advisable in all kinds of gravel; pure air and exercise, a truly tonic regimen, and medicines, so far as they seem to have truly a tonic effect, are useful in all; diluent and demulcent liquors are useful in all; and the use of acid or alkaline remedies may be guided by the nature of the deposits,—with this caution, that different kinds of gravel sometimes succeed each other rapidly, so that frequent examination of the urine is necessary to enable us to judge what kind of chemical remedy is demanded.

CHAPTER V.

OF CHRONIC DISEASES OF THE ORGANS OF URINE AND GENERATION.

We may divide these simply according to the parts in which they reside, and which are in general easily distinguished.

SECT. I.—*Of Chronic Diseases of the Kidneys.*

These, as in other cases, are Functional and Organic. Of the Functional the only truly important are, the Nephralgia Calculosa, *i. e.* the local pain and other symptoms resulting from irritation of calculi, formed in the ways above stated, and the Ischuria Renalis, or suppression of the excretion.

I. The pain of Nephralgia, often very acute, situated in one lumbar region, or extending into the iliac, is not always to be certainly distinguished either from that of colic or from that of lumbago,—having, however, usually more resemblance to the former, because little affected by movements confined to the muscles of the loins, and often attended by sickness, and preceded by other symptoms of disordered stomach. It is often attended by pain

stretching down the thigh and leg, sometimes by retraction of the testicle, often by some unusual appearance in the urine (blood, mucus, or gravel), but it may be unattended by any of these. It is generally, yet not uniformly, augmented by exercise, especially riding in a carriage, or on horseback. Frequently, as may easily be understood, it is combined with symptoms of inflammation (usually sub-acute), especially febrile symptoms, hard pulse, and tenderness, either anteriorly or posteriorly. Its nature is sometimes clearly indicated by its passing downwards, in the direction of the ureter, and then subsiding, and leaving behind it a frequent desire to pass urine, and pain in doing so, which again may be quickly relieved by the passage of a calculus.

The violence of this pain may be relieved by the same means as a fit of colic,—bloodletting, if there be even threatening of inflammation, large warm enemata, fomentations or the warm bath, and especially by opiates, often best given in enema, alternated with mild laxatives. At the same time, diluent and demulcent liquors are to be freely given; and if there be any guide to the kind of calculus to be expected, from the previous state of the urine, the remedies for it mentioned in last chapter.

Sometimes, within a short time after the descent of a calculus into the bladder, its expulsion may be procured, by giving an opiate to cause the bladder to become distended,—the patient then using the warm bath and passing urine in it; or by the opiate, or (probably better) the tobacco enema. Afterwards, if the indications of calculus in the bladder continue, the case falls more properly under the case of the surgeon, except in so far as it may be relieved by the remedies already mentioned for the lithic diathesis, (whereby we may often prevent

the formation of fresh calculi), by demulcent liquors, freely given, and by anodynes, especially the opiate enema.

II. The Ischuria Renalis, independently of organic disease of the kidney, is a rare disease, but has been unequivocally observed at various periods of life, usually in advanced life; its causes are unknown, and its attack generally sudden and unexpected,—beginning in some cases with rigors; but it is often unattended, in its course, by any indications either of fever or inflammation, and leaves behind it on dissection no inflammatory appearance. Its course is generally short, and it is fatal, almost if not quite uniformly, in the way of Coma, preceded by drowsiness, nausea, and more or less of delirium and spasms; exactly similar to, and obviously proceeding from the same cause as, the symptoms in cases of granular disease of the kidney, where urea has been found in the blood, which has acted as a narcotic poison on the brain. No effusion or morbid appearance in the brain has been found in some such cases.

Many cases are on record, some of them probably resting on insufficient evidence, of long-continued suppression of urine, generally in connexion with hysteria, from which there was recovery, hardly referable to any remedy, but most probably owing in a great measure to the discharge of the animal matter of the urine by another outlet (as in the case of the granular disease formerly considered). In a few cases, in which suppression has certainly existed for some days, the secretion has returned under the use of strong diuretic medicines, mercury, digitalis, and cantharides, preceded sometimes by general or local bloodletting.

In some cases it has appeared, that obstruction to the

excretion of urine by the ureters or bladder has been attended, after a time, by similar symptoms of affection of the brain; but certainly, there are many cases of such obstruction lasting long, leading to much absorption of urine, and often to much distension of the ureters, in which no such consequences resulted; illustrating apparently the principle formerly laid down, that re-absorbed excretions (probably altered in the process) are less dangerous to the system than retained excretions.

III. The most important organic disease of the Kidneys is the Granular Degeneration, with light and albuminous urine, formerly considered, because often a consequence of inflammation, but which often comes on insidiously, without inflammatory symptoms, becomes associated with various other diseases, and may be fatal in various ways, already considered; when running its course uncomplicated, this disease ultimately produces almost complete suppression of urine, and is fatal by coma, exactly like that of the ischuria renalis, although more gradual in its accession. The nature of the lesion in such cases is considerably various; but the general result is, that the cortical or secreting portion of the kidneys is disorganized by adventitious matter deposited in it, very generally nearly symmetrically in the two organs.

The other organic diseases to which the kidneys are liable, are much less easily recognized during life, and indeed are most generally to be regarded only as parts of other diseases, the symptoms of which are often more obvious. These are the following:—

1. Serous cysts are often formed on the external surface of the kidneys; sometimes true hydatids form there

also; these cysts, when numerous and large, ultimately cause absorption of much of the glandular structure; and may therefore produce suppression of urine. More generally, this lesion, when extensive, is either combined with the granular disease, or with intercurrent inflammation, and is fatal by means of these complications.

2. Malignant deposits, most generally of the lardaceous, or the encephaloid kind, sometimes affect one or both of the kidneys, either alone or in connection with similar deposits in other parts. These are attended with more or less of albumen in the urine, and are therefore hardly to be distinguished during life, from the more common granular disease; but in some cases the encephaloid disease, as in the cases called Fungus Hæmatodes on the surface of the body, is attended with repeated hæmorrhage, and sometimes such morbid matter has made its way, after adhesion and ulcerative absorption, into the adjacent vena cava, and stopped the circulation.

3. The Ureters are sometimes permanently obstructed by morbid deposits (*e. g.* tubercular matter) in their own textures; sometimes by calculi descending from the kidneys, and impacted into them; but more frequently by tumors of some of the neighbouring viscera compressing them; and the effect of their obstruction and distension, in causing gradual, but ultimately enormous dilatation of the cavities, and absorption of the kidneys, has been already noticed. When both ureters are affected in this way, to such a degree as to cause wasting of the glandular substance of the kidneys, the symptoms of ischuria renalis must naturally be expected.

SECT. II.—*Of Chronic Diseases of the Bladder.*

The only functional diseases of this organ that demand notice, are the following:—

1. An *Irritable Bladder*, independently of any organic disease, occurs not unfrequently in hypochondriacal and hysterical persons, and is indicated by frequent and painful passing of urine, when nothing morbid can be detected, either in the bladder, prostate, or urine that is voided. It admits of some degree of relief from anodynes (particularly in enema); from alkalies, from demulcents, from preparations of iron, and mineral acids; but is often more permanently relieved by change of scene, and the different articles of the tonic regimen.

2. In women, and generally in connection with hysteria, a spasmodic Ischuria Vesicalis is not uncommon, and often excites unnecessary alarm. When unconnected with other disease, it is often relieved by emollient, stimulant, or anodyne enemata, and by the spiritus ætheris nitrosi, with preparations of iron, and by the warm bath; and the most important caution in regard to it is, that the catheter should hardly ever be used to relieve it, in such patients; for if it is once used, the patient is very apt to become dependent on it afterwards. The complaint seems to depend on a defect of the voluntary effort requisite for passing the urine, and, like others of the same kind, is not benefited by that voluntary effort being made unnecessary.*

The Bladder of Urine, like the heart, undergoes changes of its structure much more frequently, in con-

* See Brodie on Diseases of the Urinary Organs.

sequence of disease of its lining membrane, or of the passage leading out of it, than from morbid deposits in its muscular substance.

The inflammation of its mucous membrane, formerly considered (*e. g.* that which results from injuries of the spinal cord), leads to thickening of its muscular fibres, and contraction of its cavity, which of course implies frequent irritation, and evacuation of the bladder; and the same results follow from whatever permanently irritates its inner surface, or opposes the exit of the urine; therefore, from morbid growths, which sometimes originate in its mucous membrane, particularly flocculent or fungoid deposits, nearly of the encephaloid kind, not uncommon in advanced life,—from calculi lodged in it, from enlargement of the prostate, or stricture of the urethra,—causes of difficult excretion of urine which require to be carefully distinguished by surgical examination, but of the diagnostics and treatment of which it is not necessary to treat here; the medical treatment being, indeed, almost entirely palliative, and consisting chiefly in the habitual use of demulcents and anodynes, with occasional local depletion, where inflammatory symptoms supervene.

SECT. III.—*Of Chronic Diseases of the Male Organs of Generation.*

The disease of the Prostate Gland, which is common in advanced life, consists sometimes of mere enlargement, but often of a gradual change of its substance, similar to that which often takes place in the cellular substance connecting the coats of the stomach and bowels,

until it has assumed the appearance of a scirrhous tumor. Strictures of the urethra very generally result simply from lymph effused by inflammation immediately behind the mucous membrane; but in some cases this lymph is gradually altered, and becomes ultimately cartilaginous.

The medical treatment required in such cases is demanded either by attacks of inflammation or of spasm, and consists, therefore, chiefly in local bleedings, the warm bath, and anodynes. Deobstruents are clearly indicated, but in general found quite unavailing.

It is difficult to be certain as to the existence of functional disease of the other Male Organs of Generation, as distinguished either from the excitement of vicious practices, or the impotence consequent on vicious indulgences, or the very common hypochondriacal feeling, which supposes impotence to exist, when it has only been deserved. This last feeling is often much aggravated by the arts of empirics, and becomes a source of much misery, or a cause of partial insanity; but for all these evils, moral remedies only can really avail; and if all unnatural or excessive excitement is really avoided (which is more generally effected indirectly, by otherwise occupying the mind, than by direct exhortation),—if the aggravated representations of interested empirics are prevented from impressing themselves too strongly on the mind,—and exercise, cold bathing, and other tonic remedies, are carefully employed, the natural functions of these parts may often be successfully, although gradually, restored.

The "Gonorrhœa Dormentium" occurring only occasionally in young and healthy persons, is to be regarded as an indication of health, not of disease; but it is certain, that a morbid state of sensations, prompting to se-

minal discharges, and in some instances such discharges, without pleasurable sensations, may occur from an irritable or rather morbidly sensible state of the prostatic portion of the urethra (just as they appear to proceed sometimes from organic disease of the prostate),—even in a feeble or exhausted constitution; and it appears to be well ascertained, that the tendency to involuntary emissions of this character, may be corrected by remedies,—sometimes by leeching on the perineum,—more frequently by passing the bougie, or by the cautious application of caustic to that portion of the urethra,—sometimes by the cautious use of anodynes, while the general health may be improved by a tonic regimen.

The morbid changes of structure, to which the Testes are liable, besides simple enlargement, and sometimes a peculiar kind of fungous growth, with destruction of the glandular structure, described by Mr Lawrence,—which are consequences of inflammation,—are the results of deposition, either of tubercular matter, or of the encephaloid matter, or of the true scirrhus. All these complaints, being usually regarded as surgical, require no detailed notice here. They can hardly be distinguished from the effects of chronic inflammation, or from each other, in their earliest stage; but the differences become obvious, as the organ enlarges,—as the spermatic cord, and neighbouring glands are, or are not affected, and as the general health, or distant organs, are or are not involved. In the two latter cases the prognosis is necessarily unfavourable, and even the chance of successful operation, unless in the earliest stage, is very small; but in some cases, which would seem to be of the two former kinds, the usual remedies

for chronic inflammation, a very careful regimen, and the cautious use of Mercury and of Iodine, are successful.

SECT. IV.—*Of Chronic Diseases of the Uterus and Ovaria.*

These, as usual, we divide into Functional and Organic.

I. It has been already stated, that there are many cases of the more chronic forms of inflammation of the Uterus, tending either to simple enlargement, or to effusion of lymph into the cavity, or even to ulceration, which are unattended with fever, of long duration, and often distinguished with difficulty from, or graduating into, the more dangerous chronic diseases depending on deposition of heterologous matters. A similar connection often exists between the chronic inflammations of the uterus, and the following, which are properly to be regarded as its functional diseases, because often existing long, and causing much uneasiness, and nevertheless admitting of perfect recovery, without perceptible alteration of the texture of the organ remaining.

1. The state of Amenorrhœa, *i. e.* the Emansio mensium, where the menstrual discharge does not appear after the usual period of puberty has arrived, and the other marks of puberty have shewn themselves,—or the Retention of the menses, *i. e.* their non-appearance at the usual periods, after they have been established, —must be carefully distinguished from the sudden Suspension of the menses, *i. e.* the interruption of the flow, when taking place at the usual period.

In the former case, the changes at the Ovaries, which we have reason to believe to be the immediate cause of the act of menstruation (probably the discharge of a fully developed ovum at each period), do not take place; in the latter, these changes go on for a certain time, and the increased flow to, and secretion from, the inner surface of the uterus, consequent on them, is established, and then the whole series of changes is interrupted, usually by some sudden impression on the nervous system, checking the determination of blood to that part, or inducing other determinations.

The retention of the menses is often the effect of diseases of other parts of the body, and only a sign of general feebleness of habit, produced by other diseases, as, *e. g.* when it occurs in Phthisis; but in other cases it seems to result from causes acting peculiarly on the ovaria, and the affection of other parts appears to be secondary, as when dyspepsia and hæmatemesis (rare in other cases of functional dyspepsia) supervene on this state. And the action and reaction of this and other functions of the body on one another are such, that it is often very difficult to judge whether amenorrhœa should be regarded as the cause, or only as the sign, of other derangements of the health. But there can be no difficulty about regarding it as the cause, when, as often happens, it occurs in a constitution apparently strong or even plethoric. Even when occurring in constitutions otherwise feeble, if not the immediate cause, it is very generally a great aggravation; and if the health is not suffering from organic disease, this part of the complaint is a fit object of practice.

The indications of enfeebled constitution, independently of organic disease, which we usually observe to be

produced or aggravated by Amenorrhœa, and to be relieved by a restoratiou of the menstrual flux, are those known by the name of Chlorosis; of which state the most essential constituent probably is, the deficiency of the red globules of the blood, which have been known to be reduced as low as 29 in the 1000, instead of 125 or 130, their usual proportion (Andral). With this are connected paleness, or a yellowish, or even greenish colour of the skin, deficient nutrition of all parts, slight anasarca, coldness of extremities, muscular debility, generally a costive state of the bowels; a morbidly irritable but feeble state of the heart's action, resembling the reaction after loss of blood, and shewn by palpitation and breathlessness, often alternating with tendency to syncope, and sometimes attended with temporary unnatural sounds; and an unnatural *mobility* of the nervous system, shewn by various uneasy sensations and morbid cravings at stomach, neuralgic pains, and mental agitation easily produced by sudden impressions on the senses, particularly the hearing.

With this state of the system, the following more local affections are very frequently associated :—

(1.) Severe dyspeptic symptoms, much vomiting, and not unfrequently Hæmatemesis, which usually gives great relief to the feelings of the patient, and, although going to a great extent, is seldom dangerous, when clearly traced to this cause.

(2.) Very various uneasy sensations, flatulent distension of the intestines, and slighter spasms of the voluntary muscles (usually rather the effects of peculiar perversion of the will, than strictly involuntary), which are generally referred to the head of Hysteria; in some cases, more violent and really involuntary spasms, with insen-

sibility, to which the name Uterine Epilepsy has been applied.

(3.) Various modifications of the mental faculties, likewise often called Hysterical; sometimes merely the capricious or irritable state of the mind, sometimes the state of Reverie or *extase*, and sometimes transient fits of delirium, or even more permanent forms of Insanity; among which we may perhaps include a singular propensity to practise deception, and thereby excite attention and sympathy, against which practitioners must always be prepared.

All these have been often seen to abate when the menstruation has been restored, and admit, therefore, of a better prognosis, when connected with Amenorrhœa, and when there is no evidence of organic disease of the parts immediately affected, than in other cases.

Women in the state of Amenorrhœa are likewise liable to sudden inflammatory attacks, in the chest, more frequently in the uterus itself, or somewhere in the abdomen, and not unfrequently in the head (which may be acute or subacute, of healthy or scrofulous character, according to their previous habit of body);—perhaps more than those equally weakened by other causes.

All the more acute forms of these secondary affections are still more frequently seen when there has been sudden interruption, than when there has been retention, of the discharge.

The remedies proper to be employed in cases of Amenorrhœa must depend partly on the nature of these secondary affections, and partly on the state of the general health and strength, which attend the suspension or obstruction of the discharge.

When there are clear indications of inflammation, especially in a case of recent suspension, the antiphlogistic remedies are not only admissible on account of it, even in a feeble habit, but may often be more effectual than any other means in restoring the discharge itself. In like manner, Hæmorrhage from the lungs requires loss of blood in this case equally as in others; and Hæmorrhage from the stomach, if attended with fulness and hardness of pulse, is much benefited by it likewise, although it has been found that this last affection is often successfully relieved by free purging only. And although there be no distinctly inflammatory or hæmorrhagic symptoms, if the case be recent, and the system tolerably plethoric, cupping, or leeches applied, about the expected period, to the groins or pudenda, or, as has been stated, to the mammæ, and purgatives, particularly aloetic, with the warm hip-bath, and stimulating enemata, sometimes followed by the opiate enema, have been found the most effectual means.

But in cases of some standing, where the symptoms of Chlorosis exist, our reliance must be on medicines called Emmenagogues, which seem to act in some degree specifically on the uterus and ovaria, and at the same time on means of improving the general health.

The preparations of Steel (whether they have a specific power on the uterus, or, as some suppose, on the constitution of the blood, particularly its globules), may generally be prevented from injuriously affecting the head, by combination with Aloes or Rhubarb; and if along with them the stimulating Gum-resins, as Myrrh and Galbanum, are taken regularly for some weeks together, they are the surest remedies of this kind that we possess; but other means seem, to a certain degree, like-

wise effectual, particularly Hellebore, the oil of Savine, Turpentine, Cantharides, small doses of the Ergot, Electricity ;—the latter of which appears, from recent observations, to be one of the most powerful direct remedies, but only serviceable when the general health is good, or has been so far restored by other means.*

The articles of the Tonic Regimen, most important in such cases, are exercise, on foot or on horseback, as far as can be borne without fatigue, and in general gradually extended ; pure air, changes of scene, and other means of mental excitement, inciting to exercise; the Saline and Chalybeate mineral waters; the tepid shower-bath, and, when the strength will permit, the cold-bath—more generally tepid spunging, and diligent frictions ;—a light nourishing diet, with as much albuminous food, and fermented liquor, as can be taken without offending the stomach. By the use of these means, the morbid sensibility, which is the immediate cause of many of the symptoms, and which is aggravated by any considerable depletion, may often be gradually corrected, and if the disease is uncomplicated, health is frequently restored.

The state of Dysmenorrhœa, or painful, and often deficient menstruation, is generally gradually relieved by perseverance in the use of some of the means now stated, both during the interval, and at the menstrual periods, particularly a course of Steel, and the hip-bath and opiates, or other anodynes, and sometimes cupping on the loins.

2. The state of Menorrhagia, *i. e.* of too frequent, or too long-continued, or profuse menstruation, sometimes attended with such a change on the secretion of the uterus that the discharge contains coagula of blood, is

* See Guy's Hospital Reports.

nevertheless often a merely functional disease; and when ascertained, by examination, to be unconnected with organic change of structure of the uterus, is to be regarded in many cases as on a footing with other hæmorrhages, most easily produced in a plethoric constitution; but, when little exercise is taken, when the nervous system is habitually excited, by various causes which strongly impress the nervous system, or which suddenly disturb the circulation, and the general strength thereby impaired;—when it lastslong, frequently recurs, and is associated with a discharge of Leucorrhœa in the intervals,—it becomes a cause of extreme weakness and Anœmia, and in fact, of symptoms exactly similar to those of Chlorosis; the tendency to these discharges, once established, cannot be corrected without much care; and partly, no doubt, by a strictly nervous sympathy, partly by the deteriorated condition of the blood, the general health suffers nearly as in aggravated cases of Amenorrhœa: dyspeptic and hysterical symptoms are particularly frequent, and various affections of the nervous system shew themselves; although seldom so peculiar, or so obstinate, as some of those which attend Amenorrhœa.

The morbid conditions of the parts, on which the menorrhagia depends, are, a frequently augmented determination of blood to the uterus, enlargement and flaccidity of its substance, and a state of turgescence, though generally without much sensibility, of its mucous membrane.

During the continuance of the discharge, it must be treated on the footing of a hæmorrhage, sometimes by loss of blood, always by mild laxatives, particularly the saline with acids, by rest in the horizontal posture, the antiphlogistic regimen, the application of cold to the

lower part of the body, and the use of astringents, the sulphuric acid, small doses of Alum, or of Acetate of Lead, or the Gallic acid: in some cases the peculiar action of the Ergot, in exciting contraction of the uterus, has been availed of with success, or the mechanical compression by a plug in the vagina may be requisite.

In the intervals of the discharge, much may be done to diminish the tendency to its recurrence, by such parts of the tonic regimen as the patient can bear; by cold bathing, gentle exercise, and fresh air, light diet, regular hours, avoiding all strong excitements mental or bodily, and by the use of medicines of the class of Tonics and Astringents, particularly the Sulphate of Quinine, Sulphate of Zinc, Alum, and Kino, or by the daily use of injections, cautiously tried, consisting of solutions, particularly of the Zinc and the Alum.

The more permanent discharge of Leucorrhœa, often likewise found to be unconnected with organic change of structure, and probably proceeding more from the mucous membrane of the vagina and os uteri than of the uterus itself, is often associated with more or less of the Menorrhagia, but sometimes with a deficient state of the menstrual discharge: although sometimes commencing in full and strong habits, it is always attended, after a time, with much debility, a deficiency of the colouring matter of the blood, and many dyspeptic and hysterical symptoms. It is, however, very frequently relieved by the tonic and astringent means above stated—or in aggravated cases, by absolute rest in the horizontal posture for a time, with pretty constant application of nitrate of silver or of iodine (considerably diluted) to the os uteri, and afterwards by the tepid or cold bath, pure air, and gentle exercise.

3. Often in connection, either with the Amenorrhœa or the Menorrhagia, and sometimes independently of either, we meet, as was formerly observed, with the Hysteralgia, or irritable uterus, indicated simply by pain in the situation of the uterus, liable to frequent aggravations, particularly from exertion or excitement, and attended with extreme tenderness of the os uteri, but without any inflammatory symptoms or change of texture—demanding rest in the horizontal posture, and anodynes locally or generally—sometimes relieved by a little local bleeding, generally aggravated by purging, and most permanently relieved by the use of steel or quinine, in small but gradually increasing doses, and by as much of the tonic diet and regimen, gradually employed, as the frequent recurrences of pain will permit.

II. The organic diseases of the Uterus and Ovaria constitute a numerous and important class, demanding much attention, and capable of being accurately discriminated; some of them admitting of effectual relief from surgical treatment, most of them, however, only of palliation from the care of the physician. Of these we give here only a general outline.

Organic disease of the Uterus may always be suspected when morbid discharges from the vagina are obstinate, particularly if they occur towards the end of the period of menstruation, or after menstruation is over,—if they consist of matter different from the menstrual flux itself, or the simply mucous discharge of Leucorrhœa,—and if they are attended by much pain extending down the limbs, or by progressive debility and emaciation. But they can, of course, only be accurately known by examination. Here, as in other parts, there

is an essential distinction between the local and simply organic, and the constitutional or even malignant growths; which distinction is in some cases obvious, but in others, at least for a time, is obscure or ambiguous.

1. Within the cavity of the uterus, various morbid formations may take place on its mucous membrane, by some of which it may be distended, and even its cervix expanded, as by the development of the fœtus. The simplest in its mode of formation, appears to be the tumour occasionally seen there, which consists of layers of partially decolorized crassamentum of blood, like the contents of an aneurism, formed by a morbid alteration of the menstrual excretion, and apparently, from the increase of uneasy feelings at stated intervals, receiving an increase of bulk at the menstrual periods. The next in point of simplicity are the Polypi, often growing within the uterus, and projecting into the vagina; which seem in some cases to originate likewise in coagula of effused blood, and which are usually attended with frequent and profuse hæmorrhage. Many such polypi have been removed without reproduction or extension of the disease, and a complete cure obtained; while others appear only to be a part of constitutional disease, and their removal is only a temporary benefit. Again, in some cases a mass of Hydatids, and in others a single sac containing a serous or bloody fluid, has been found to occupy the cavity of the uterus, and the contents of such sac have been repeatedly discharged by the vagina. And in unhealthy constitutions masses of the encephaloid matter have also been formed here, perhaps in some instances by transformation of effused blood.

2. In some instances the muscular substance of the uterus has been found preternaturally hard, and in others

preternaturally soft, without decided previous inflammation; and in many cases Ulceration, beginning on the mucous membrane at the os tincæ, gradually pervades the organ, causing purulent and fetid discharge, with very little of inflammatory symptoms, and with no deposition of adventitious textures preceding it. This case likewise admits, in some cases, of permanent relief, probably most effectually by destruction of the part affected by some chemical cautery.

In some cases, likewise, it appears that changes of position of the uterus, particularly a degree of retroversion, causing pressure on the rectum, lead to symptoms nearly resembling those of enlargement and organic disease, although its texture be sound, and such cases may admit of relief by instruments.

3. Different adventitious textures are often deposited in the substance, or even originally just beneath the peritoneal coat of the uterus. Of these the most common are the Fibro-cartilaginous tumors, which although often closely resembling the true scirrhus in structure, yet, when growing quite distinct from the natural textures, may be found in considerable numbers, attain a great size, last long perfectly inert, and cause no symptoms, excepting what may result from their pressure on the adjoining parts. The Medullary Sarcoma, admitting here as elsewhere, of considerable variety, sometimes even in the same subject, from the soft encephaloid to the firm lardaceous deposit, and the true Scirrhus, are more intimately intermixed with the muscular texture, and sometimes with each other. These are almost uniformly first deposited at the os tincæ and cervix uteri, causing enlargement, irregularity, and generally hardness of these parts; and go on to ulceration, begin-

ning at the os tincæ, causing much fetid discharge, and infallibly spreading through the substance of the organ; frequently spreading likewise through the coats of the rectum or bladder, so as to establish unnatural communications; and sometimes through the peritoneal covering of the uterus, so as to allow the escape of the morbid secretion into the cavity of the abdomen, and excite rapidly fatal peritoneal inflammation.

These last diseases sometimes appear to commence with inflammatory symptoms, or at least with increased determination of blood to the uterus, denoted by uterine hæmorrhage after the period of the cessation of the menses, before any puriform discharge begins; but such symptoms are not always observed, and even when they are, it may often be suspected that an unperceived perversion of the nourishment of the part had preceded their appearance: they are attended generally with severe pain, referred to the back and lower limbs, as well as to the pelvis, but liable to great and long continued remissions; and with rapid sinking of strength, frequently febrile symptoms, sometimes distinct hectic, and ultimately extreme emaciation.

In regard to all organic diseases of the uterus, it is to be remembered, *first*, that they are very generally attended with various sympathetic sensations, and with sympathetic derangement of the functions of other parts, particularly the stomach; and *secondly*, that many of the symptoms that are very urgent in such cases may depend on the pressure of the diseased and enlarged uterus on the neighbouring parts, and on the chronic inflammation excited, and unnatural adhesions frequently, though not uniformly, formed among these; especially, as has been already stated, when the morbid growth is of

a malignant kind. Thus dysuria from such affection of the bladder, dysenteric symptoms from such affection of the rectum, in some instances disease of the kidneys from distention of the ureter, and in many colic pains, constipation, vomiting, &c. from adhesions of the folds of ileum in the pelvis, combine themselves with those of the diseased uterus. In some instances, symptoms also arise from the enlargement and degeneration of lymphatic glands within the pelvis, consequent on such diseases of the uterus, *e. g.* anasarca of one or both of the lower extremities from pressure on the iliac veins.

In some instances, the Fallopian tubes are distended by serous cysts; or these tubes, and the broad ligaments of the uterus, are beset with different kinds of morbid growths, which may have effects on the adjacent viscera, similar to those just now described.

When the existence of such disease is ascertained, palliative remedies can only be employed; occasional local bleedings when inflammatory symptoms supervene, the warm hip-bath, opiates and other anodynes, chiefly in enema, mild but effectual laxatives, a light nourishing diet, and the horizontal posture, with the use of means to prevent excoriation from pressure.

The most common disease of the Ovaria is the formation of encysted tumours (generally several in one ovary), which appear sometimes to commence as serous cysts, unconnected with the sound texture of the organ, but frequently are formed by the distention of the Graafian vesicles, and which often attain an enormous size; sometimes, in their advanced stage, hardly to be distinguished from the Ascites abdominalis. The contents of these are very various even in the same ovary; serous, gelatinous, atheromatous, or purulent; and in other instances,

blood, more or less altered from the sound state, encephaloid matter, or melanosis. In other cases sarcomatous, fatty, or fibro-cartilaginous tumours form in and project from the ovaries; and in some, these different morbid growths are found combined. Many of these may subsist long, and cause no symptoms but what depend on their situation and size, and pressure on adjoining parts; but the growth of several of them is preceded or attended by occasional pain, tenderness, and other inflammatory symptoms, admitting of relief from local bleedings: when the encephaloid, perhaps also when the melanotic matter is deposited, the general health is much impaired, and in the former case especially, there are often repeated attacks of inflammatory symptoms, followed by increase of the tumours.

These diseases, likewise, are generally an object only of palliative practice. They are certainly not to be combated by mercurial medicines, which fail of effect on them and injure the general health; but have sometimes appeared to abate considerably under the long continued use of Muriate of Lime, or more particularly of preparations of Iodine. The paracentesis is the only effectual palliative for the uneasiness occasioned by the bulk of the tumour, and has often been many times repeated with temporary advantage, of course only in cases where the tumour was not a part of constitutional disease. The question of the excision of diseased ovaries belongs to surgery.

CHAPTER VI.

OF CHRONIC DISEASES OF THE NERVOUS SYSTEM AND ORGANS OF SENSE.

SECT. I.—*Preliminary Observations.*

THESE diseases cannot be better arranged than was done by Cullen, into the Comatose diseases, the Spasms, the affections of the External Senses, and the affections of the Internal Senses, or of the Mind; although we exclude from these heads of nervous diseases several which, on theoretical grounds, were placed there by Cullen.

But it is necessary here to remember what was formerly stated as to the difference between the strictly pathological and the nosological meaning of the term Disease. Many of these diseases of the Nervous System are perfectly well distinguished by their symptoms, and therefore have properly specific names assigned them; but are known to proceed, in different cases, from perfectly different morbid actions or changes; and again, the same change may produce, even in the same person, a series or combination of very different symptoms, such as ought to be referred to different places in a merely nosological arrangement.

That there should be much variety as to the affections of sense and of voluntary power, and also as to the affections of the strictly mental powers, in diseases affecting the nervous system, is not surprising, when we re-

member certain principles now ascertained in Physiology —that the two former powers are directly and immediately connected only with a small portion of the contents of the cranium, and *that* a portion which is not often *directly* injured,—that the conditions necessary to the exercise of all the mental faculties may probably be furnished by various portions of the nervous matter of the hemispheres,—and that all the functions of nervous matter may be retained, notwithstanding very considerable changes in the form, and even in the texture of that matter, provided that these changes are *gradually* effected. But making allowance for all these facts, we must still admit, that a greater variety than could have been expected is observed in the kind, and in the duration, of the alterations produced in the functions of the nervous system in disease, even when the parts injured, or the mode of injury, appear to be the same.

The uncertainty as to the morbid conditions on which the symptoms of the strictly nervous diseases may depend, makes it right to enumerate all those morbid conditions, before treating of the nervous diseases in detail.

We have formerly stated in what manner the functions of the Nervous System are frequently affected by mechanical injury, by heat, cold, electricity, &c. by poisons, and by the influence of imperfectly arterialized blood in asphyxia; again, how they are often altered, either by sudden diminution, or sudden increase of the flow of blood to the brain; by inflammation and its consequences; by the different forms of idiopathic and eruptive fevers, and by the kind of inflammatory action which frequently accompanies these; how they are affected sympathetically, in cases of disordered secretions, especially of the primæ viæ; and more uniformly in

cases of suppression of excretions, especially of that at the kidneys. And we have found that in all these cases the affection of the Nervous System may include various affections of the external senses, of the muscular parts, and of the acts or affections of mind, and that in all it may proceed to absolute Coma, and to death from that cause.

In like manner, diseased states of all, or almost all, those functions of the Nervous System may be merely functional, unattended either by the application of any known cause of injury, or by any perceptible lesion,—or they may result from diseased structure simply organic and local, or from constitutional and even malignant disease; and the progress and ultimate result will very much depend on the nature of their cause. But as the symptoms, or series of symptoms, marking these diseased states of the Nervous System, are in general well marked and striking, and as the nature of the change producing them is not open to inspection during life, it is necessary to retain the nosological classification of these diseases, at the same time that we keep in view the different changes which may be concerned in producing each; or several in the same patient, and in rapid succession.

I. They may be functional only, or result from injury applied in a degree so very much less than that, which is often unattended with any such effect, that the action of some additional and unperceived cause is clearly manifested. Even in such cases they necessarily imply corresponding changes in the Nervous System, which is the physical agent concerned in all the functions now in question; but as all changes, healthy and morbid, which take place in the nervous matter, cor-

responding to mental acts, are known to us only by their effects, it is impossible for us to do more, in regard to the merely functional disorders of the Nervous System, than state the symptoms by which they are made known, the circumstances in which they are observed, and the effects which result from them.

Two general observations, however, may be made on these strictly nervous affections, and their connection with the state of the circulation. 1. That as the healthy action of any part of the Nervous System, when strongly excited, appears to be attended with some increase of the flow of blood to that part, and as the total inactivity of any part usually leads to a diminished supply and consequent wasting,—so it is reasonable to suppose, that a morbid increase of the activity of the changes in any portion of nervous matter, although not originating in, may readily *become attended by*, an increased determination of blood thither; and although we cannot affirm that this is a general law, yet many facts in the history of diseases indicate that it is a frequent and important occurrence. 2. That the state of the Nervous System most favourable to the *original excitement* of such nervous disorders, is generally that which attends great weakness, and in which both the fulness of the vessels, and the strength of the circulation, may be supposed to be below the average.*

* In cases of great weakness, from hæmorrhage, previous disease, or fasting, says Andral, "l'impressionabilité des centres nerveux devient souvent d'autant plus grande, que la quantité du sang diminue, et que le systeme musculaire s'affaiblit. Dans cet état l'hyperemie la plus legèrement douloureuse peut determiner dans le systeme nerveux les desordres functionaires le plus graves."—*Precis*, t. i. p. 18.

II. The diseased states of the functions of the Nervous System may be, and in fact the most sudden and violent affections of this kind often are, the effect of hæmorrhage, the consequences of which, occurring in the substance of the brain, have been carefully studied.

This hæmorrhage takes place generally in persons advanced in life, and is preceded most generally, though not uniformly, by the circumstances formerly noticed, which favour, by the causes which excite, and by the symptoms which indicate, an increased determination to the head, and consequently obvious, although slight, derangement of the functions of the brain.

It takes place most generally in the parts adjacent to, or on a level with, the lateral ventricles, especially the corpora striata or adjoining parts. It is often obviously confined to a spot, and certainly often depends on rupture of a single vessel, facilitated by a previously diseased state,—an inelastic and brittle, or even ulcerated, condition of the arteries there situated. But in other cases, no disease of vessels is detected, and, in some, the effusion is in many minute points, and could not have been produced by rupture, unless of the smallest vessels. Such a case is strictly of the kind described as Hæmorrhage by Exhalation, probably more frequent in other parts of the body.

When the progress of a case of this kind has been rapid, softening of the brain is very generally found around the clot of blood that has been effused (unless it is very small);—in the most rapid cases such softening, without discoloration, as is obviously the result of the mechanical injury done to the nervous matter; but in other cases, such softening, with discoloration, as was

formerly described as indicating inflammation of the brain, usually attended with serous effusion into the ventricles. In cases of this last kind, it has been often disputed, whether the inflammation and softening had preceded and led to, or had succeeded and been produced by, the effusion of blood. Judging from the different progress of cases, we may be assured that the inflammation may be connected with the hæmorrhage in both ways, perhaps most generally in the latter way.

When no such extent of disorganization attends the effusion of blood, and when its immediate effects on the functions of the brain abate, the changes consequent on it are, that a thin layer of coagulable lymph is thrown out around it, and becomes gradually organized, and that the colouring matter of the blood, and afterwards the rest of the coagulum, are gradually absorbed from the interior of the cyst thus formed; which is then left, containing only a serous fluid, and afterwards shrinks farther, but never completely disappears. The substance of the brain around it sometimes remains permanently discoloured and hardened. It is certain that the absorption of the coagulum may be effected in this way within three months after its effusion.

Perhaps the most uniform of all the diseased states of the functions of the Nervous System, consequent on organic lesion within the brain, is the occurrence of Hemiplegia, more or less complete, in the opposite side of the body from the side of the brain where this effusion has occurred; and the gradual, but very variable and seldom complete, recovery from that and other morbid conditions thus produced, during the progress of the absorption now described.

III. Almost every other known variety of organic disease has been repeatedly observed to affect the contents of the Cranium,—all, or almost all, sometimes appearing to originate in an inflammatory attack (*e. g.* from an injury), and at other times appearing merely as results of perversion of nutrition, without any such precursor. The bones of the cranium are sometimes found of unusual form or thickness, and appear to have compressed the contents. Exostoses from the inner table, and sometimes tumours, even passing inwards through the bone, from the pericranium, have been found to compress and irritate parts of the brain. The dura mater has been found partially thickened, ossified, or beset with tubercles, or other kinds of tumour. Attached to the pia mater on the surface, or to the membrane continuous with it in the ventricles, or detached from any of the membranes in the substance of the brain, we often find scrofulous tubercles, especially in younger subjects, of very various number, and in various stages of progress; sometimes the medullary sarcoma, or other morbid growths of the kinds which affect the general habit; sometimes more isolated tumours, and these either encysted and containing serum (as is frequently seen in the choroid plexus, and sometimes on the surface of the brain), or blood; or of the class described as sarcomatous, or fibro-cartilaginous, or even bony. We have also examples of injurious effects on the brain, evidently resulting merely from a diseased state of the vessels, enlargement or aneurisms of the arteries, or partial obstructions either of these or of the sinuses, from diseases of their lining membrane, without rupture.

Again, besides the hardening and softening of the substance of the brain, which were described as effects

of inflammation, either more acute or more chronic, we meet with some examples of both those changes of consistence in portions of the brain, without change of colour, or any clear evidence of inflammation; and in other cases, with the hypertrophy, formerly described, of the whole cerebral substance, or more partial atrophy of the nervous matter.

Along with almost all these organic lesions within the cranium, serous effusion into the ventricles is often found; and in many cases of persons advanced in life, without any enlargement of the skull,—and in children where the sutures have yielded and the head become enlarged (sometimes to an enormous extent),—we see much effusion into the ventricles, without the indications either of inflammatory action or of organic disease; sometimes similar effusion exterior to the substance of the brain; and in both cases much diminution of its size, and change of its form.

Some general observations may be made here in regard to the symptoms attending and denoting this great variety of organic lesions within the cranium.

1. A great variety of these lesions have certainly existed, and probably for a length of time, in some cases, without causing any such derangement of the functions of the brain as attracted any attention;—certainly without causing so decided derangement of these functions as has often been observed in cases where, on dissection, no morbid alteration of structure could be detected.

2. In a much greater number of cases these organic lesions, as well as those which result directly from inflammation within the head (*i. e.* effusion of serum and of lymph, abscesses, yellow or red softening of the cerebral substance), have been found connected with de-

rangement of some department of the functions of the Brain and Medulla oblongata—of Sensation, of Thought, or Voluntary motion; but the *seat* of the lesion has no ascertained connexion with the function deranged, farther than this, that any paralytic symptom is generally in the opposite side from the affected part of the brain, and that a lesion near to the origin of a nerve may be expected to affect the function of that rather than of a distant nerve.*

3. The symptoms found in connexion with these organic lesions of the brain are sometimes quite chronic, and nearly unchanged for a great length of time, *e. g.* constant dull pain of head, intractable nausea and vomiting, palsy of one side of the body, or of a single limb, loss of memory general or partial, insanity general or partial, or even partial or total imbecility or fatuity.

4. In other cases, such organic lesions are found in connexion with violent symptoms recurring only occasionally, and leaving intervals, either of perfect health, or of some of the less violent and more permanent affections of the nervous system; *e. g.* with fits of epilepsy, or with fits of transient insensibility without spasms, or with fits of mania, or melancholy.

5. In other cases, these organic lesions are found after an attack of fatal coma, which may or may not have been preceded by febrile and inflammatory symptoms; and those symptoms may either have supervened on

* There are abundance of cases to shew, that no reliance can be placed on the supposed necessary connexion of disease of the anterior lobes with palsy of the tongue, or with loss of the memory of words, of the corpus striatum with palsy of the lower, or of the thalamus with palsy of the upper, extremity.

some of the more chronic diseases above mentioned, or occurred without previous ground for suspicion of cerebral disease.

In many cases of organic disease within the head, there is a combination or succession of several of these sets of symptoms, acute or chronic, in the same person.

In order to form some conception how so great variety should exist in the symptoms connected with these organic lesions of the brain, it is necessary to recollect the following principles :—

1. Nervous matter may be totally unfit for its functions in the living body, although possessing quite its usual structure and appearance, at least to the naked eye, and although duly supplied with arterial blood; as we learn from some cases of amaurosis, or of palsy, unconnected with any perceptible alteration of the nerves or brain; and again, nervous matter may undergo considerable change of form and appearance, if slowly and gradually effected, and nevertheless continue to perform its functions; as we learn particularly from some observations on diseases of the spinal cord. From these facts it evidently follows, that parts of the brain apparently somewhat diseased may still be susceptible of the changes which attend the exercise of sensation or thought; and again, that portions of nervous matter may be disqualified for their functions by such organic diseases, although there be no obvious lesion of them, or although they be situated at some distance (and in various directions) from those which are the most obviously diseased. And in fact, we know from Physiology, that it is only by deranging the functions of nervous fibres at some distance from itself, that any lesion of parts, superior to the medulla oblongata, can cause either palsy or convulsion.

2. Any such organic disease must necessarily confine and disturb the circulation within the head, and therefore will necessarily act as a predisponent cause of those diseased states which may be excited, either by sudden determination of blood to the head, or by sudden diminution of the flow of blood thither;—which causes are certainly often concerned in producing the more temporary diseases connected with these organic affections in the brain.

3. Such organic affections must also evidently act as a great predisposing cause of inflammatory action within the cranium, which may be generally supposed to have occurred, not only when decidedly inflammatory effusions are found, but whenever there is reason to believe that a rapid serous effusion has taken place, especially if preceded by violent pain and febrile symptoms.

It will readily be understood, that it is chiefly by the great predisposition given to these more acute diseases, that the organic lesions of the brain produce fatal coma; although in some cases, the more chronic and uniform symptoms which they excite pass insensibly into coma without inflammatory symptoms, and without any effusions that can be ascribed to inflammation appearing on dissection.

The contents of the canal of the vertebræ, and the nerves, are liable to organic lesions corresponding to those described in the contents of the cranium, and with similar effects, often well marked, but likewise variable, on the functions of the spinal cord and nerves: perhaps the most common is the chronic softening or chronic hardening of the medullary matter. We can understand, from what has been stated as to the effects of fatal injuries of the nervous system, that when the spinal

cord is extensively and seriously injured by disease, the organs of circulation should be gradually enfeebled, and that death may ensue apparently from this cause, independently of the accession of coma; and likewise that tumours growing within the sheaths of nerves, and separating their fibres, should cause intense pain (liable, however, to remarkable remissions), whatever be their own nature.

Certain of the organic lesions of the brain are no doubt liable to absorption, as that which results from hæmorrhage has been described to be; but we can have little expectation of any of them being much changed in this way, particularly when they are of the kind described as constitutional or even malignant; and therefore the main principles we must hold in view in regard to them are those which have been already stated, viz. 1. That many of them may exist in a certain degree, and for a long time, without any serious consequence resulting; and 2. That when such consequence does result, it is very often immediately excited by some cause deranging in one way or another the circulation in the brain and medulla oblongata, and the effect of which will bear some proportion to the degree of that derangement.

SECT. II.—*Of Apoplexy and Palsy.*

It may be judged, from what has been repeatedly stated, that the Apoplectic state may occur from various causes, and in very different states of the system; but it occurs most frequently as an idiopathic disease, when

we have reason to believe it to depend either on congestion of blood or hæmorrhage in the brain.

Such cases occur most frequently in those who have lived fully, especially if they have taken little exercise, and become plethoric,—in those who are advanced in life,—in those who have a hereditary disposition to the disease,—in those in whom the head is large and the neck short,—in those who have organic disease of the heart, obstructing the circulation there,—and remarkably in those, in whom a previous attack of the same disease has occurred.

The disease occurs, however, in many persons who have not these peculiarities; and it is easy to perceive that those who have a diseased state of the arteries must be liable to it, whatever be their constitution in other respects. This is indeed the chief cause of the frequency of the disease in connection with dilatation, or hypertrophy of the heart.

In those who are predisposed, it is excited by any of the causes mentioned as deranging the circulation, and causing irregular determinations,—by violent muscular exertion, particularly with straining,—by strong mental emotion, particularly anger or vexation,—by exertions of voice, fits of coughing, &c.—very often by exposure to cold, checking the circulation on the surface,—and by suppression of accustomed evacuations.

It is often preceded, and a warning given of its approach, by various uneasy sensations, or temporarily disordered actions, of sense or voluntary motion, to which it is of the utmost importance for those who have any such predisposition to attend, particularly headache, fits of giddiness, often attended with nausea, temporary fits of blindness, dimness of sight, or suffusiones, or double

vision, tinnitus aurium, temporary numbness or loss of power over some limb, or transient loss of memory or confusion of thought.

The amount of disturbance of the functions of the brain, in an apoplectic attack, which may be followed by palsy, is exceedingly various, from transient loss of speech, or of recollection, or of power over a few muscles, up to perfect Coma, which may be fatal within an hour, and is often fatal in a few hours.

In some cases, there is first a sudden and temporary loss of sense, and of voluntary power, with depression of the heart's action, coldness and paleness,—then a recovery from this state, and, within a few minutes more, a gradual accession of coma, which in such cases is uniformly fatal. It was first observed by Dr Abercrombie, that as the succession of symptoms in such cases is exactly similar to that in persons who have received an injury and concussion, and had a bloodvessel ruptured within the cranium; so the appearances on dissection, in cases which have run this course, are just similar to those found after such injury, viz. *extensive* effusion of blood, generally either in the ventricles, or at the base of the brain.

There are many varieties as to the extent, and degree, and duration of the insensibility, and the affection of the mental faculties, in an attack of apoplexy, or sudden coma. It may easily be supposed that the symptoms indicating the most immediate danger, are those which denote that the muscular actions of Respiration are affected,—the slow, noisy, stertorous breathing,—the irregular or interrupted breathing,—the puffing of the cheeks in expiration,—and ultimately what is generally

the last change, the rapid and laboured, but obviously imperfect expansions of the chest.

The pulse is variously affected,—often it is slow and full,—often varying somewhat with the changes of the respiratory actions; in many cases a distinctly febrile paroxysm sets in soon after the stroke, which may always be suspected to be connected with the inflammation to be apprehended about a clot of blood effused in the brain.

It is always to be apprehended that this state of apoplexy will be followed (as indeed it may often be observed to be attended) by loss of sense, or of voluntary motion, or both, in some part, generally one side of the body; and likewise with some degree of loss of recollection, and of weakness of intellect, particularly of a tendency of the mind to dwell on particular thoughts, and to have emotions easily excited, and easily affecting the body.

There is no fixed proportion between the degree, or duration of the insensibility, and the extent of palsy that follows, or the speediness or completeness of the recovery, which is always gradual, and almost always begins in the lower extremity, sooner than the upper.

When the palsied limbs are found contracted or affected with Tonic Spasm,—especially if some degree of fever be present, there is much reason to suspect that inflammatory softening of the brain has supervened, and therefore, that although a certain degree of improvement may have taken place, the patient will relapse into coma; in these circumstances, attended with extreme danger.

If this do not occur, there may be gradual and ulti-

mately nearly complete—hardly ever absolutely complete—restoration of the powers of sense and voluntary motion, and of the natural state of the mind; but in many cases, partial palsy, or partial mental aberration or idiotcy, or partial loss of memory, *e. g.* of the memory of words, or more peculiarly of the memory of substantive nouns, remains for a long time, or for life.

The bowels are generally costive, and moved with difficulty by medicine, during, and after the apoplectic state; the affection of the bladder is more various; in bad cases there is generally retention of urine at first, which is apt to be followed, as in other cases, by incontinence.

Although there be complete Hemiplegia, the actions of Respiration are performed perfectly on the palsied side of the body, as is easily understood when we remember, that the impulse to these actions comes only from the medulla oblongata, whereas the cause that impedes the action of the will, lies very generally higher than this in the brain. In like manner, we can understand that such indications of the reflex action of the spinal cord, as are not necessarily attended with sensation (as *e. g.* on tickling the soles of the feet), should take place in the palsied limbs,—often indeed with unusual intensity;—and that such motions as are excited only by sensations, *e. g.* stretching the limbs in the act of yawning, should be observed, while those limbs are quite palsied to the will.

When the cause of palsy lies in the medulla oblongata, or spinal cord, the respiratory motions are usually suspended, so far as they depend on the motor nerves arising below the injured part; but it would appear from a few cases, that although the motor portion of the spinal cord in the neck has lost its power, and the body is incapable

of voluntary effort, if the sensations are entire, the respiratory actions can go on; which seems manifestly to imply, that the nervous action excited by the impulse to breathe, may pass downwards along the posterior portion of the cord, and cross to the anterior, so as to excite the motor nerves concerned in this action, at different parts of the cord.

The state of apoplexy may be produced, and be fatal, without any effusion of blood, or other morbid appearance, shewing itself in the brain, to which cause the term Simple Apoplexy has been applied. We have reason to think, however, that in the greater number of such cases, the cause of the apoplectic state is the pressure exerted on the brain, by an increased propulsion of blood upon it, or transmission of blood through it;—not so much on account of the indications of such determination of the blood, visible on dissection (which we regard as equivocal) as on account of the reasons stated formerly (p. 554–6, *et seq*).

This is probably the cause of most of those attacks of apoplexy, occasionally occurring, from which the patients recover perfectly; and there are also cases,—chiefly in persons of that habit of body, which is described under the name of Mobility of the Nervous System,—in which absolute coma occurs as a strictly functional disease, without the application of any known cause. Of this the most striking examples are in the cases on record, of long continued stupor, occurring chiefly in women, and described under the name of Hysteric Coma, from which there may be speedy and perfect recovery.

The sudden attack of apoplexy above described, followed by Hemiplegia, is almost always the result of effusion of blood on the brain, and the consequences

thence following which were formerly described, and has been generally termed Sanguineous Apoplexy. And there are many cases more gradual in their attack, generally abating and recurring repeatedly, and leaving behind them either no palsy, or more partial palsy, a more variable affection of the mind, and often a variety of other nervous disorders, such as were specified above (p. 684),—to which the name of Serous Apoplexy has generally been given; and in many of which, serous effusion has been found on dissection, but in many others, either more unequivocal indications of chronic inflammation, or some of the kinds of organic disease formerly described.

In a few cases of palsy, with more or less of comatose tendency, it has appeared, on dissection, that the cause had been just the opposite of the more usual condition, viz. such an obstructed state of the arteries, leading to part of the brain, as must have nearly deprived that portion of its supply of blood.

There are cases of Paraplegia, as well as more partial palsy, which come on gradually, after threatenings or attacks of apoplexy, and some of these have appeared, on dissection, to be connected with some such morbid appearances as those now mentioned, in the brain; but in the greater number of cases of Paraplegia, the senses and the mind are unaffected, and the cause of the disease, whether inflammatory or organic, or, in a few cases, hæmorrhagic, is evidently in the spinal cord.

There are also cases of more partial palsy, which appear on examination to depend on local causes, sometimes inflammation, often organic disease, affecting individual nerves only. Of this the palsy, either of the facial nerve (*i.e.* the motor nerve of the cheek, lips,

and eyelids), or of the fifth pair (*i. e.* the sensitive nerve of the face, and motor only of the elevators of the lower jaw), are examples familiar to us since their nature was pointed out by Sir Charles Bell.

And there are also cases of palsy, the cause of which probably resides in the muscular fibres themselves being wasted and attenuated, rather than in any change in their nerves; particularly the palsy from rheumatism, and that from the poison of lead.

Apoplexy is one of the cases in which the most important part of the practice that we can employ is directed, not against symptoms that we see, but against those which we apprehend to be approaching. In the persons who are predisposed to the disease in the ways above stated, and who have suffered any of the threatenings of its approach above enumerated, a careful regimen ought always to be prescribed, such as may obviate plethora, and diminish the tendency to determinations of blood to the head; and by such a regimen we have good reason to believe that many attacks of the disease may be prevented. This regimen may be said to be a combination of the strictly antiphlogistic with some part of the tonic, and consists chiefly of the following particulars:—

1. A light and spare diet, consisting chiefly of the more nourishing and least flatulent kinds of vegetable food, with only a moderate quantity (varying somewhat according to the degree of plethora, and the age and habits of the patient, and urgency of the symptoms) of animal food, simply dressed, and without fat, taken at dinner time only. Spirituous liquors are too stimulating, and the stronger malt liquors, as favouring plethora,

should be entirely prohibited; and wine and the weaker malt liquors either proscribed altogether, or allowed in small quantity only, as the state of the circulation, and of the assimilation of food, may demand.

2. Regular and early hours both of taking food and sleep; and abridgment of the time spent in sleep.

3. Shaving or close cropping of the hair, and frequently washing the head with cold or tepid water.

4. A regularly open state of the bowels, secured partly by vegetable diet, and partly by the frequent use of mild laxatives. Those which act likewise on the skin, particularly such as contain small quantities of antimony and ipecacuan, are thought by some the most appropriate.

5. A great deal of regular moderate exercise in the open air, secured by the inducement of any interesting occupation, but never carried so far as to cause fatigue, nor so violent as to cause strong excitement.

6. Care to avoid any exposure to cold or wet, particularly such as may cause chilling of the extremities.

7. Care to avoid any such external heat as may stimulate the circulation, *e. g.* cool airy rooms, a firm mattress and pillow, on which the head and shoulders should be much raised during the night.

8. Mental tranquillity, or gentle excitement only.

On occasion of a sudden and decided threatening, by any of the symptoms above mentioned, the proper remedies are, bleeding, particularly local bleeding, purging, and a very low diet for a few days.

The remedies to be employed during a fit of apoplexy are few and simple. They are—

1. Full, and generally repeated, bleeding from the arm, which we should regard as contra-indicated, in this

case, not by the age, or apparently feeble previous habit of the patient, but solely by the indications, sometimes observed, of failure of the circulation.

On the other hand, when the insensibility is abating and the palsy remains, the indications for further bleeding are in the state of the pulse, and perhaps pain of head, not in the other affections of the brain, which must be expected to abate very slowly.

2. Full purging, for which purpose the Croton Oil, or other purgatives in small bulk, are the most proper, and which may in general be repeated much more frequently than the bleeding.

3. Cold applications to the head, which should be shaved and kept high, while the extremities are kept warm, and all ligatures or tight dress removed.

These remedies are used with the intention of restraining the flow of blood to the injured part of the brain, preventing fresh effusion, and checking the inflammation which is to be expected from effused blood; and their repetition must be directed chiefly by the urgency of the symptoms denoting that inflammation. For a considerably longer period, the strict antiphlogistic regimen should be directed, unless the state of the pulse should demand the cautious use of stimuli; and this regimen should be gradually exchanged for the somewhat more tonic one above described.

The state of palsy succeeding to an apoplectic attack admits of no useful treatment except gentle, gradually increasing, exercise of the affected limbs, and frequent frictions. In some instances, at a later period, galvanism passed through them, or the effect of strychnia, taken cautiously in such quantity as to cause twitching of the limbs, has appeared to accelerate the return of

the power; but, in other instances, even over-doses of the strychnia, such as obviously implied temporary danger, have had no effect whatever on the patient's limbs.

The effect of such expedients is probably greater in cases where the palsy is only partial; and especially when it is dependent on the state of the muscles, rather than of the Nervous System.

When we have reason to suppose, from the frequent recurrence of slight fits, or from the urgency of uneasy sensations, as fixed pain, vertigo, nausea and vomiting (sometimes almost the only symptom), dimness of sight, &c. without febrile symptoms, that some organic disease is slowly making progress, the only additions to the practice above stated which we can recommend, are an issue or seton in the neck, and a course of Mercury, cautiously employed, lest it produce an irritating effect on the brain, or a long continued course of preparations of Iodine in small doses.

Frequently there are dyspeptic symptoms or other indications of failure of the general strength, which may demand remedies, particularly bitters or chalybeates, during the paralytic state; sometimes there is such restlessness as makes it necessary to use some of the Narcotics—Hyoscyamus, Conium, or even Morphia, in combination with laxatives; and in the advanced stage of many cases, particularly when softening of the brain has occurred, there are such typhoid symptoms, and such gangrenous sores from pressure, as demand the cautious use of wine.

It was formerly stated, that in children a state very nearly resembling the coma of Hydrocephalus sometimes occurs as a consequence of much evacuation, particularly of diarrhœa, and abates in some cases under the use of stimulants and astringents. In like manner, in adults,

after long-continued discharges, *e. g.* by Piles, symptoms sometimes occur nearly akin to those which usually result from increased determination of the head, and presage apoplexy, *e. g.* headaches, giddiness, dimness of sight, tinnitus aurium, all which, in such circumstances, admit of relief from stopping the discharges, and from a fuller diet, and the cautious use of stimuli.

SECT. III.—*Of Spasmodic Diseases.*

The diseases which can be distinctly referred to this head are the following:—

I. The term Convulsion is generally applied to a fit of general spasms, with insensibility, occurring in the course of another disease (*e. g.* of Fever, Hydrocephalus, or Hooping-Cough), or proceeding from a known cause of irritation, affecting the Nervous System, such as teething or worms, or the pains of labour, "ab irritatione manifesta oriens, et ablata irritatione cessans;" and when similar fits occur idiopathically, and without such known irritation, and especially when they occur repeatedly without obvious cause, and therefore constitute a disease in themselves, the name Epilepsy is usually applied; and although this use of the terms is not in accordance with the definitions of Cullen, as it has become general, and is not liable to serious objection, it may be retained.

The symptomatic convulsions in the course of various diseases, or occasional convulsions, excited by a reflex action, from teething, or from any irritation affecting the mucous membrane of the alimentary canal,—are

much more common in infants and children than in adults; and we have many cases in such young subjects likewise, of habitually recurring convulsions, with insensibility, not traced to any such single cause, but to which the term Convulsion is more generally given than that of Epilepsy; but when children, after the time of the second dentition, become subject habitually to such attacks, this last term is generally applied. At all periods of life such convulsions may be produced by certain causes directly affecting the brain or spinal cord,—by mechanical injury, sudden hæmorrhage, or the action of certain poisons.

In the perfect form of Epilepsy the attack is as sudden as that of Apoplexy, the duration of the spasms very various, but the insensibility always continues some time longer,—the recovery of the power over the muscles, and of the Senses, is complete, no palsy following;—but the recovery of recollection is more gradual, and after a certain number of recurrences the memory is in general permanently impaired.

There are many varieties, however, in regard even to the well-marked epilepsy. In a few cases the fits of convulsion, at least the earlier fits, are without insensibility to surrounding objects; in a greater number there are fits of insensibility, repeatedly recurring, followed by no palsy, but unattended with spasm: in some cases the spasms are partial, and the insensibility lasts only a few minutes or even seconds, but the recurrences are frequent, several in a day, or even in an hour; in others the fits are long and profound, but the recurrences are at intervals of many weeks or even months: in some cases, transient fits of delirium, or of jactitation, take the place of regular epileptic fits; and are equally ef-

faced from the recollection immediately afterwards. Some cases evidently graduate into the slighter spasmodic diseases, Hysteria and Chorea, while others are from the first, or gradually become, combined with the different forms of Insanity.

In some cases of Epilepsy there are distinct premonitory symptoms, either a short time previously, or immediately preceding the paroxysm,—slight fits of delirium, or loss of recollection,—transient difficulty of articulation,—partial spasms,—screams or sobbing,—flashes or suffusiones before the eyes,—coldness of the extremities and flushing of the face,—or the peculiar sensation called Aura Epileptica, moving upwards from one of the extremities to the head.

In many cases, particularly the less violent, the fits come on only during sleep, or at least only in the recumbent posture.

Observation of the history of this disease shews that the following are the chief predisponent causes to which it may be ascribed.

1. Hereditary peculiarity, the efficacy of which has sometimes been strikingly seen in cases where a parent has become epileptic (*e. g.* from an injury), and the disease has been transmitted to those of his children only, who were born subsequently to that occurrence.

2. Fulness of blood.

3. A certain mobility or irritability of constitution, existing in infants and children, and in women at the time of menstruation.

4. Previous disease of the heart.

5. The facility given to this or to other inordinate muscular motions, by their own repeated excitation.

And morbid anatomy teaches, that although there

are many cases of predisposition, and even of hereditary predisposition, for which we cannot assign a reason, yet in many cases the predisposition is given by one or other of the following peculiarities, visible on dissection.

1. Malformation, or irregular growth of some of the bones of the head.

2. Organic disease, of some one of the kinds formerly noticed, in the brain or its membranes.

3. Organic disease of the heart, particularly such as impedes the descent of blood by the superior cava, and through the right side of the heart.

In those thus variously predisposed to the disease, many of the paroxysms are distinctly seen to be excited by causes either acting directly on the brain or spinal cord, or disturbing the circulation; particularly,

1. Injury of the head or general concussion of the body—electricity—intense heat.

2. Violent muscular exertion.

3. Strong mental excitement or emotion.

4. Intemperance, either in eating or drinking.

5. Venereal excesses.

6. The sudden suppression of any usual evacuation, as that of Porrigo in children, or of Hæmorrhoids, or of any chronic cutaneous disease, in adults.

7. Intense pain, as from wound of a sensitive nerve.

8. Large hæmorrhage, or other cause of sudden syncope.

It may be easily understood from what was stated as to the effects of different violent and fatal injuries, in producing convulsions, that Epilepsy may be excited either by causes of Apoplexy or by causes of Syncope.

There are many instances of the communication or propagation of Epileptic fits by Imitation, although that

is more especially observed of the slighter spasmodic affections next to be mentioned; and it is probably only in those peculiarly predisposed to it that the perfect Epileptic paroxysm is produced in this way.

It is obvious, that when organic disease of the brain or cranium is found on dissection in persons long subject to Epilepsy, some temporary and occasional cause must have co-operated with the permanent predisposition, each time that the temporary spasms supervened on the organic disease. And although there are many paroxysms which cannot be traced distinctly to the action of any of these exciting causes, yet we cannot doubt that many may be prevented, and their injurious consequences on the bodily health, on the mental faculties, and on the facility of reproduction of the disease, be avoided, by precautions to avoid these exciting causes.

The absolute disappearance of the disease, however, after it has been well marked, is seldom observed,—more frequently in the Epilepsy of children under the age of puberty, and who become free of it at that time, and in the Uterine Epilepsy, recurring only at the menstrual periods, than in any others; evidently because the peculiar mobility of constitution stated above as the chief circumstance of predisposition in these cases, is less permanent than the other predisposing causes above enumerated.

But we have no doubt, that, by proper management of the disease, the frequency of its recurrence may generally be diminished, and its transition into other more immediately dangerous states of the Nervous System be often averted.

The occasional attacks of Convulsion from obvious causes, although attended with more immediate danger

than single paroxysms of habitual epilepsy, admit often of more decided benefit from remedies, both from depletion by bleeding and purging, and from removal of the cause of irritation; as, *e. g.*, those dependent on teething, from scarifying the gums, —those dependent on Lumbrici, from effectual Anthelmintics,—those dependent on other irritations acting on the bowels, from the full action of Cathartics; those dependent on child-bearing, from assistance to accomplish that act. A few cases, dependent on suppression of urine by incipient granular disease of the kidneys, have been effectually relieved by full bloodletting.

The paroxysms of the disease are sometimes, particularly soon after they have commenced, attended with much frequency and fulness of pulse, and signs of determination to the head; and in such cases full bleeding and other measures of depletion and derivation, as in apoplectic cases, are demanded, and may probably sometimes prevent fatal coma: the convulsions of puerperal women are a good example of the danger now in view, and of the importance of full bleeding to arrest it: but in the progress of the habitual epilepsy, the paroxysms are attended with less or less permament disturbance of the circulation, and large depletion becomes injurious, as increasing the mobility of the Nervous System, or even in some cases directly exciting the fits.

It is obvious, however, that of the circumstances of predisposition above stated, fulness of blood is that which is most under our power, and, accordingly, it may be stated with confidence that in plethoric persons, or even in those of average fulness, a diet almost entirely vegetable, and absolute abstinence from strong liquors, along with much habitual exercise in the open air, is

more effectual than any thing else, in diminishing the frequency and violence of the paroxysms.

By these means, by a tranquil mode of life and carefully avoiding the exciting causes of the disease, and by the regular action of laxatives on the bowels, it may be supposed that the growth of organic diseases in the cranium may be restrained, and many occasional and dangerous determinations to the head be averted. But in weakly persons, and in the more advanced stages of the disease, there is often no plethoric tendency, and the disease is obviously more dependent on mobility of the nervous system; and besides exercise, other parts of the tonic regimen become more important, particularly tepid or cold bathing (with precautions against chilling of the extremities), and even a somewhat fuller diet.

In all cases, precautions against local Plethora, washing of the head, a cool bed-room, and a high and firm pillow, are important; and in some the evacuation of a seton or issue in the neck has been obviously beneficial.

It seems well ascertained, that various medicines possess a certain degree of power in correcting that excitable condition of the Nervous System which we regard as constituting a part of the predisposition to Epilepsy; but the degree of this power is very generally quite inadequate to counteract any but the slightest cases of this disease. In the milder and incipient cases, particularly those marked as admitting the best prognosis, it is right to give them a fair trial; but in inveterate cases, if they are used at all, it should be understood that no reliance can be placed on their efficacy. Those which have appeared the most useful, although with varieties as to their power, which we can refer only to peculiarities of constitution, are the following; Valerian, Bark

or Quinine, and Indigo, in full doses, often best used when combined with small doses of laxatives,—the Oil of Turpentine in frequent small doses,—the Nitrate of Silver, the Ammoniuret of Copper, the Oxide or Sulphate of Zinc, and the Arseniate of Potass,—all in small but gradually increasing doses.

II. There is a large class of Spasmodic Affections, which would appear to originate in morbid action of the motor nerves, and of the parts within the spinal canal and cranium immediately connected with them, but which seem never to depend either on inflammation or organic lesion of these parts, or even on vascular congestion there, as an essential condition, although it may often be an aggravation, of their existence. These spasmodic diseases may in general be distinguished from those which depend on the effects of inflammation, or of organic disease, by their being *unattended with insensibility;* and indeed, in several of these, the spasms may be said to denote rather a *perversion* of Voluntary Motion than strictly Involuntary Motion.

Of these Spasmodic Diseases, unattended with coma, there are three divisions, obviously distinguished from one another. In the first it is confined to certain of the muscles concerned in respiration, and being always attended with inflammation, of greater or less violence, in the mucous membrane of the air-passages, has been already under consideration. In the second, the affection of the voluntary muscles is general and irregular, but chronic, and seldom dangerous; in the third it is equally general, but much more acute and violent, and attended with very great danger.

The only addition to be made to the first of these

divisions of diseases, of which Asthma and Hooping-Cough are the chief, is the mention of the Laryngismus strodulus, or crowing disease, most frequent in children, but also seen in adults, which is a spasm of the muscles of the glottis. Sometimes idiopathic, at other times symptomatic, already considered, and often admitting of relief in like manner as other spasmodic diseases.

The *second* of these divisions comprises a number of cases, in which the spasms vary so much, that it is impossible to rank them together under one general description; but the most definite cases of the kind are the following.

a. The disease called Chorea is characterized by involuntary motions of one side of the body, increased by attempting any definite movement, and attended by much weakness of the lower extremity of that side, which occur chiefly between the ages of ten and fourteen, and often abate entirely, under various treatment, within a few months; in some instances, however, going on, either to permanent amentia, or to fatal hydrocephalus.

In such cases, this disease must depend, in part, on organic disease of the brain; but the favourable result of the great majority of cases of the disease shews that it cannot have depended on any permanent alteration of structure. In some cases of this disease, as in the practice of Sydenham, bloodletting has seemed effectual; in others, as in that of the late Dr Hamilton sen., long-continued purging has been distinctly beneficial, particularly where the appearance of the evacuations has shewn previous retention and accumulation; in others, counter-irritation along the spine has seemed more useful; in

others, what has been called the tonic plan, the tepid and cold shower-bath, and full doses of carbonate of iron, or gradually increasing doses of oxide of zinc, or of arseniate of potass, have been successful; and it must always be remembered, that in some, where several of these measures had been ineffectual, the disease has spontaneously subsided, particularly under the influence of country air and summer weather.

b. The name of Hysteria is properly given to fits of Convulsion, affecting many parts of the body, but commencing generally with uneasy feelings in the abdomen, and with the sensation called Globus, ascending thence to the throat, and exciting a spasm of the glottis: it differs from epilepsy in being unattended with insensibility; in the paroxysms being more generally excited by some evident cause, and recurring often more frequently within a short time, but much less pertinaciously throughout the life of the patient:—it is hardly ever seen in the male sex, and admits of a very great variety as to the nature of the spasms, the frequency of their recurrence, the other affections of the nervous system, and of the secretions of the body attending it, and also as to concomitant affections of the vascular system, the pulse being full and firm, and evacuations of blood useful in some cases, while in others there is great weakness, and advantage from stimulants.

The variety as to the symptoms and history of the disease is in fact such, that there is hardly any other disease, the symptoms of which may not be imitated, more or less exactly, in persons liable to hysteria, by affections which are simply nervous, and which are evidently akin to hysteria, and are generally designated by that

name. Thus symptoms nearly resembling those of inflammation of the parietes of the chest and the stomach, or peritonæum,—tympanitic distension in all degrees,—violent and obstinate palpitations, sometimes attended with slight *bruit*,—violent headaches, or other local pains,—tetanic or other partial spasms, or fits hardly distinguishable from epilepsy,—partial palsy, especially paraplegia, and retention of urine,—occasional fits of delirium, or of partial hallucination,—even perfect coma, sometimes of long-continuance, may occur in hysterical patients, especially when affected with amenorrhœa, or irregular menstruation; and,—in some cases by careful observation of the attending symptoms themselves, in others by cautious trial of remedies, and in many by the rapid and favourable event of the case, particularly if the menses shall be restored,—may be proved to depend neither on inflammation nor permanent disorganization of the nervous matter. Thus also violent fits of coughing, or of vomiting, dependent on peculiar sensations, which seem to reside in the nervous system only, without any indication of disease of the bronchiæ, lungs or stomach, are not uncommon in persons liable to Hysteria.

Fits of Convulsion in children, without insensibility, as from teething, or from worms, or disordered bowels, are often more analogous to hysteria than to epilepsy, particularly as to their ultimate results.

c. The rare, but well marked, and easily distinguished, state of the voluntary muscles called Catalepsy, is that modification of spasm, in which the limbs retain any position in which they are placed; a state never of long continuance, often combined with hysteria, but which, as it evidently implies a perversion of the men-

tal act of volition, is generally excited by mental causes, and attended with more or less aberration of intellect, forming therefore a part of strictly mental diseases.

d. Another set of cases of spasmodic disease, of this general character, have been described as periodical Jactitation, distinguished by the periodical recurrence of violent and outrageous, but uniformly recurring, movements of the body or limbs, generally associated either with fits of Delirium, or with that state of mind to which the names of Reverie and of Somnambulism have been given.

Some general observations, of practical importance, may be made on the whole of this class of cases of spasmodic disorders, which are often the source of great uneasiness, but, unless they become complicated with others, seldom dangerous; and these observations apply also to the merely functional disorders of sensation, to be afterwards noticed.

1. They are in many instances almost precisely similar to the alterations of these functions which may result, either from chronic inflammation and its effects, or from organic disease affecting the portions of the nervous system concerned in them.

2. This analogy gives us reason to suspect, that even when no organic lesion appears on dissection, such disorders may often proceed from imperceptible changes in the organization of the portions of nervous matter concerned. And accordingly we find, that these simply nervous disorders are most common in the same description of persons, and under the same external circumstances, as organic diseases; they are more common in the inhabitants of towns than of the country, more

common in those whose lives are sedentary than in those who have much habitual exercise in the open air, more common in those in whom the nervous system has been habitually excited, by the artificial stimuli of civilized life, than in those in whom it has been habituated only to the ruder impressions of a life of labour; several of them are more common in scrofulous than in sound constitutions, and probably all in the children of sickly than of healthy and robust parents.

3. When we have reason to think, particularly from the ultimate result of the cases, that these disorders have really no permanent cause in the *structure* of any part of the nervous system, we may observe that they occur only in certain individuals, and that in them there is that peculiarity of the *actions* of the nervous system, for which we have no more precise or definite expression than Nervous Irritability, or Mobility;—a state more common in women and children than in men, and in all persons when in a state of weakness, than when in the full enjoyment of muscular strength; in women, particularly, more common about the menstrual periods, and immediately after delivery, than at other times; more common likewise in those whom the menstrual flux is habitually excessive, or altered, suppressed, or obstructed, than in others;—in which state both sensations and emotions are intensely felt, and their agency on the body is stronger and more lasting than usual; and continued voluntary efforts of mind, and steady or sustained exertions of the voluntary muscles are difficult or impossible, the muscular motions usually rapid and irregular, and the "animus, nec sponte, varius et mutabilis." When such a general condition of the functions of the nervous system exists, any portion

of it, on which a special exciting cause may act, is apt to fall into a diseased mode of action more or less resembling that which inflammation or organic disease may excite in it. And it is farther of great importance to observe, that this tendency is greatly increased by each repetition of diseased action of this kind; or even by any strong impression made by sensations or emotions on the bodily organs; and therefore, that avoiding all occasions which can excite violent and unpleasing sensations or emotions, is of essential use in correcting the tendency to such diseases.

One modification of this nervous temperament, very frequently connected with its other marks, is the disposition of the mind to dwell upon all uneasy sensations, and anticipate danger from them, which so frequently attends all diseases of which such sensations are an essential constituent, and especially disorders of the stomach and bowels, and to which we give the name of Hypochondriasis;—which is chiefly observed in persons of the melancholic temperament, but not confined to them, and is more properly described as a condition of the mind, accompanying and aggravating many chronic diseases, than as a disease *sui generis*.

Another mental affection, frequently attending such diseases, is the propensity to practise various impostures, and thereby excite interest and attention, formerly noticed.

4. The nervous disorders in question, are easily excited *sympathetically* by diseases of other parts of the system;—not so much, however, by violent febrile or inflammatory diseases, in which the circulation of the blood is much excited, as by those in which the secretions are much deranged, and many uneasy sensations

produced, without excitement of the circulation. Thus the symptoms of these disorders are very frequently combined with Dyspepsia in all its forms, with Constipation, and Diarrhœa, as well as with derangements of the Menstrual flux.

5. These slighter spasms, and other nervous affections accompanying them, are the description of diseases most easily excited by mental emotion, especially in constitutions of the peculiar nervous irritability already described. Such affections, accordingly, in varied and sometimes in unusual forms, have very often been excited by intense religious enthusiasm, and often by the emotions excited by such applications as the metallic tractors (real or fictitious), or the manipulations of those who profess animal magnetism. In all such cases, agreeably to facts known in Physiology, the emotions that may be excited are much heightened by the presence and participation of numbers; and these are the diseases which have been particularly observed to spread by Imitation, nearly after the manner of epidemics.

The treatment of these functional disorders of the Nervous System, must be so much varied by the ever-varying circumstances of individual cases, that it can only be stated in very general terms.

1. When they are connected with a vigorous and excited state of the circulation, and particularly when they have occurred recently and suddenly, and from obvious exciting causes, they may be greatly relieved by depletion of all kinds, and antiphlogistic regimen; but much or frequent depletion is to be avoided, as a cause which certainly increases the *mobility* of the Nervous System.

2. On the other hand, when attended by an enfeebled state of the circulation, they may be decidedly benefited by the prudent use of wine and other stimuli, and more especially by a tonic regimen, gradually applied, of which probably the most important article is mental excitement, interest, and confidence, prompting to a gradual increase of muscular exertion, and withdrawing the mind from that minute attention to uneasy feelings, and morbid trains of thought, which is great part of the cause of these diseases.

3. The slighter and earlier attacks of these diseases may often be relieved by the use of anodynes and other anti-spasmodics, opium, camphor, valerian, musk, assafœtida, ammonia, &c.; in some instances by the affusion of cold water, or other strong impressions on the organs of sense; and, in cases of this kind, when the spasms are unattended with insensibility, there is not the same danger to be apprehended from opium, or other narcotics, as in Epilepsy, or more violent convulsions; but the continued use of all antispasmodic medicines, like the use of strong liquors, is ultimately injurious to the Nervous System, and destructive of the good effects first observed; and, therefore, they cannot be used with permanent good effect in diseases which are essentially chronic.

4. The medicines, therefore, which are most habitually useful in these diseases, are combinations of laxatives, with chalybeates, quinine, or other bitters, with which the tepid or cold shower-bath (according to the strength of the patient) may very often be conjoined. The laxatives are most useful in cases when morbid or accumulated excretions appear to be great part of the cause of the disease; and, in like manner, stomachic

medicines in some cases, and emmenagogues in others, are the most effectual auxiliaries.

The *third* order of those Spasmodic Affections, which seem to originate in morbid action of the nervous system itself, comprises the very dangerous disease called Tetanus, and the almost inevitably fatal one called Hydrophobia. The first, in a few cases, originates idiopathically from cold, but is much more generally excited by injuries, in which a portion of nerve has no doubt peculiarly suffered, although its injury is often imperceptible on examination. The disease does not commence, however, till some days after the cause has been applied; and of the nature of the changes taking place in the interval we have no information whatever. It is characterized by violent painful *Tonic* Spasms, with frequent aggravations, but no absolute relaxation, beginning in the muscles of the hind neck and lower jaw, and extending over the whole muscles of the body; it is unattended with any affection of the functions of the brain proper; and is fatal, not by coma, but merely by reason of the gradual failure of the strength of the circulation, which accompanies the repeated paroxysms of spasm, nearly as it accompanies violent spasms of the same description when produced in animals by the action of poisons, or by extensive injury of the spinal cord. This progress is, however, much more rapid in some cases than in others; and there are many, particularly of the cases excited by cold, which are slow in their progress, and capable of being controlled by remedies.

Hydrophobia is likewise produced by the action of a specific cause, and an interval, varying, in this case, from a few days to several months, likewise elapses between

the time of its application and the commencement of the disease; but in this case the cause is a peculiar animal poison, the conditions necessary to the generation of which are not yet ascertained, communicated only by inoculation, and which seems, like the poisons exciting the contagious exanthemata, to multiply itself in the blood during the latent period. The spasms are here first and chiefly in the muscles of the fauces, and are repeatedly excited or aggravated by external causes, by the contact of any fluid with the fauces, or even of cold air with the face; bnt they generally extend over the body as the disease advances, and death takes place, as in Tetanus, not in the way of coma, but rather by syncope; in consequence of the gradual depression of the heart's action that attends the violent spasms, perhaps in consequence partly of a sedative action of the contagious poison on the heart itself.

Although a congestion of blood on the surface of the spinal cord has been described by some in cases of Tetanus, and although an unusual vascularity in the mucous membrane of the pharynx and œsophagus is common after Hydrophobia, yet these appearances are certainly to no great extent; it is probable that they may be rather effects than causes of the morbid actions; and at all events, they do not afford, by comparison with other cases of inflammation of these parts, any explanation of the peculiar phenomena of these diseases, nor invalidate the conclusion, that they are both to be regarded as strictly diseases of the Nervous System.

The remedies which have seemed useful in Tetanus are very various, as may be understood from the condition of the circulation attending it being various. In some acute cases the pulse is frequent and firm, and

the spasms have been relieved by full bleeding; in others, of chronic form, a full allowance of wine has been taken during the disease with apparent advantage; in all cases regular action on the bowels seems useful, and for this purpose very large doses of purgatives are required. In all cases, likewise, there is a clear indication for the anti-spasmodics and anodynes; and very large doses of opiates, in particular, may be given with safety, and sometimes evidently with good effect. The advantage of combining mercury with the opium is more doubtful; but in some cases the warm, and in others the cold affusion, and in some also the tobacco enema, have aided the anti-spasmodic effect. It has been said that similar means, particularly bleeding, and calomel and opium, have succeeded in some cases of Hydrophobia; but it seems very doubtful whether there had really been cases of spasm proceeding from that specific poison.

SECT. IV.—*Of Disordered Sensations.*

We have various instances of Sensations undergoing such change, both in kind and intensity, as to become decidedly morbid, for which we can assign no reason, either in the application of any known external agent to the Nervous System, or in any altered action of the Vascular System. There are cases of original defect of sensibility in the eye or ear, general or partial, *i.e.* either congenital Amaurosis or Deafness, or insensibility to certain colours or sounds, without any unnatural appearance either in the exterior parts, or in the nerves of these organs; and there are cases likewise of such affections, or of *Suffusiones* of various kinds,

before the eyes, or *Tinnitus Aurium*, coming on in the progress of life, sometimes from a morbid state of the circulation in the brain, and admitting of relief, either from depleting, or from stimulating remedies,—sometimes from irritations acting on distant parts, particularly on the Primæ Viæ, and admitting of relief from Emetics, purgatives, alterative, or soothing medicines; and sometimes also without apparent cause,—without benefit from remedies applied, either to the state of the circulation in the head, or to the condition of any part by which the organs of sense may be thought to be sympathetically affected,—and without change of structure of the parts, or with such change only as may be regarded as the effect, not the cause, of the disease. These last cases are, therefore, not symptomatic of any other disease, but truly idiopathic disorders of Sensation.

A case of morbid sensation not uncommon in nervous constitutions, and often exciting unnecessary alarm, is the tickling feeling in the Larynx or Trachea, which excites frequent dry cough, unattended with fever or other indication of disease of the lungs, or even of the bronchiæ, and admitting of relief from the general treatment of strictly nervous diseases.

Again, the Anæsthesia or loss of common sensation in more or less of the surface of the body, although often manifestly the result of injury of some part of the Nervous System, and co-existing with other symptoms of palsy, occurs in some instances without such accompaniments, and when no cause whatever appears for it on dissection. A morbid Sensation of Cold, or more frequently, in hysterical patients, of Heat externally, or in

internal parts, particularly the abdomen, is often, likewise, a simply nervous affection.

Much more frequently we meet with cases of Pain, referred distinctly to individual parts of the body, often very intense and very lasting, which the whole history of the cases shews to be strictly *nervous; i. e.* to be an alteration of the function of the nerves of the part, for which no adequate cause exists, either in any diseased structure, or in any diseased action of vessels.

Such pains have the general name of Neuralgia, and the following appear the most important facts regarding them.

1. They occur (chiefly in adults, and in persons whose health is otherwise disordered) in all parts of the body, but most frequently in the head and abdomen. Many headaches, and especially those which affect one side of the head, and recur at pretty regular intervals, and have the name of Hemicrania, or those remitting pains which affect only small spots on the cranium, and have the name of Clavus hystericus, are of this description; so also is the severe pain of face termed Tic Douloureux. Some cases of Angina Pectoris appear from their history to have no more permanent origin. Many cases of Gastrodynia, and of pains, even fixed and violent, referred to different parts either of the abdomen or sides, or to the situation of the uterus and back, appear to be of this description; and some cases of severe pain of the hip-joint, of the feet, or other parts of the lower limbs, are more correctly referred to this head than to Rheumatism.

One form of these pains has been accurately described under the name of Spinal Irritation, and is distinguished

by pain and tenderness over the spinal processes of some of the vertebræ, connected with similar pains on corresponding parts of the thorax, and tenderness often on the slightest touch, implying that the pain on pressure is not the result of inflammation, but of morbid sensibility of the cutaneous nerves.

2. They have been stated to follow evidently the course of certain nerves; but this is neither uniform, nor characteristic, as distinguishing them from other diseases of nerves themselves. But they are chiefly characterized by the suddenness of their attack (which is repeated often at pretty regular intervals), and frequently of their abatement also; by the total absence of heat, and swelling, and often of tenderness when they are external, and of febrile symptoms when they are internal, even although their intensity be extreme; by frequently appearing to be determined by sudden changes of weather; by occurring chiefly in persons of nervous temperament, and in connexion frequently with other nervous affections; and by abating frequently under the use of anodynes, of a tonic regimen, cautiously adopted, and of remedies called Tonic (perhaps more properly specifics), rather than under antiphlogistic treatment.

3. These pains, although hardly ever observed during violent inflammatory diseases, are by no means incompatible, but on the contrary frequently combined, with such diseases in their subacute or chronic forms, and are apt to deceive us as to the violence or danger of such cases; but their character may generally be detected by observing the correspondence, in more or fewer particulars, to the characters now stated.

The Sensation of Vertigo, although often symptomatic, either of disordered circulation in the brain, or of

irritations affecting peculiarly the sensitive nerves of the stomach or bowels, is sometimes independent of either of these causes, and can be referred only to a morbid action of some part of the Sensorium.

The most extraordinary of all these cases of disordered Sensation is that of Spectral Illusions, *i. e.* of Sensations, often definite and complex, exactly resembling impressions on the external senses from the external world, and equally independent of the will of him who feels them, but which result merely from internal causes. Such Sensations sometimes precede epilepsy, sometimes occur in connection with apoplectic or paralytic attacks, often result from the use of narcotic medicines, or from repeated indulgence in strong liquors; but in other cases, they cannot be traced to any such causes; and they must be regarded as indications, that the mental acts of Conception and Imagination are connected with changes in the nervous matter of the brain or medulla oblongata; which changes, when stronger and more enduring than usual, affect the mind in the same manner as the changes which result from external objects impressing the senses.

In regard to all these disorders of Sensation, it may be observed, that although not necessarily dependent on obvious disorder of the circulation, or on irritations acting on the sentient extremities of nerves, or on any noxious matters taken into the circulation, they are always easily aggravated by such causes; and therefore, that evacuant and derivant remedies when the flow of blood to the head is in excess, gentle stimuli when it is deficient, laxatives, astringents, or anodynes, according to the state of the bowels, and a regulated diet, exclud-

ing all but the mildest stimuli, are proper in all such cases. When no such remedies appear to be demanded, or to be useful, we can have less expectation of giving relief to such cases; but in some instances the cautious use of a Tonic regimen and remedies, with occasional aid from anodynes, appear to be decidedly beneficial, when no other cause can be assigned for such complaints than a morbid condition of those vital actions which are strictly confined to the Nervous System. The most striking examples of this kind, are the use of Quinine or of Arsenic, in intermitting Hemicrania, and the use of preparations of Steel (particularly the Carbonate), in the Tic Douloureux, and in certain other forms of Neuralgia, particularly when aided by opiates internally, and by Belladonna or the Aconitin, externally.

Sect. V.—*Of Mental Disorders.*

III. The last class of diseases of the Nervous System is that of Vesaniæ, or morbid changes of the purely mental powers or faculties; which we can have no doubt depend on alteration of the state of the nervous matter in the brain; because we know that it furnishes the physical conditions necessary to the manifestation of all mental phenomena; and this alteration is sometimes connected, in idiopathic Insanity as well as in symptomatic Delirium, with a disordered state of the circulation through the brain, or with organic disease there, or with the application of poisonous matters of the blood; but in other cases, no one of these causes can be assigned for the morbid changes.

The diseased states to which the mental powers are

liable, are most easily understood as consisting in, or depending on, alterations of the laws according to which the different thoughts succeed each other in the mind, and of the intensity and duration of the attention fixed on them, rather than of the nature of the mental acts themselves.*

The great and obvious division of these diseased states is into the state of Amentia or Fatuity, and that of Dementia or Insanity, both of which states admit of very considerable varieties.

Both states are very frequently produced temporarily by inflammation, and by different febrile diseases, and more permanently by organic diseases, in which the brain is affected; and both may be suspected to proceed in every case, from some alteration of the structure of the parts of the nervous system, with which the mind is specially connected; but this alteration is certainly in many cases imperceptible by any means yet known for detecting such changes; and some of the forms of both kinds of mental disease commence so suddenly, and abate so completely, that it is difficult to suppose any peculiarity of structure that may exist to be essentially connected with them, or to be on any other footing than a great predisponent cause of them.

The state of Amentia is that in which impressions on the senses, although distinctly felt, and exciting certain mental acts, fail to suggest many of those thoughts which in men of sound minds would naturally, and according to the ordinary laws of association of thoughts, result from them. This obviously admits of a subdivision, according as the deficiency lies in the *simple sug-*

* See Physiology, p. 212 and 225.

gestion of objects of sense, or of thoughts previously before the mind in connection with each other,—or as it lies in the suggestion of the qualities and *relations of things* (which are perceived by what was described as the faculty of Abstraction), and of the abstract notions which were described, as either naturally attending different acts of mind, or formed by our perception of the relations of things, — and which are the subjects of Judgment and Reasoning.* In the first case, there is merely loss of Memory; in the second there is Idiocy; and both admit of many varieties; for in many persons some of the associations by which thoughts are laid together in the mind are retained, while others are lost; and again, in many persons, some of the relations of things are distinctly perceived and remembered, while others are wholly overlooked. But in almost all cases we may be satisfied of the accuracy of the definition of Cullen, that the state of Amentia is that in which "rerum relationes vel non percipiuntur vel non reminiscuntur."

The state of permanent Idiocy is probably always the effect of original malformation (often obvious on inspection of the skull) or injury or alteration by disease of some part of the brain; and when it takes place in the course of life (as, *e. g.* after long-continued chorea, or many fits of epilepsy) although often abating and recurring, is seldom permanently removed, and very often is a prelude to ultimate coma. The loss of Memory, though very often dependent on organic lesion, is often observed in old age, in persons convalescent from febrile diseases, &c. without visible change of structure; in old

* See Physiology, p. 331.

persons it often comes on in sudden fits, sometimes attended with delirium, and repeatedly disappears again; and there are some cases (chiefly of the anomalous and slighter affections of the nervous system) where it occurs, even repeatedly, and disappears so suddenly and so completely, that we cannot suppose it to have been connected with disease of structure.

The state of Somnambulism or Reverie, although one in which the mind often acts with great energy on certain objects of thought, is yet properly ranked under the head of Amentia, because some of the natural associations of thoughts are suspended, and certain of the relations of things are unperceived, and the conduct of the person affected thereby altered (sometimes without any hallucination or delusion being perceptible); and when this morbid state of the mind ceases, little or no recollection is retained of what passed during it. Short paroxysms of such a state are not uncommon, and have often been unconnected with any very serious disease, in persons of the nervous temperament, chiefly in women subject to the slighter nervous diseases; and sometimes recur repeatedly, the recollection of what happened during each being recovered in the next paroxysm. And in some cases this perverted condition of the mental powers has lasted so long, that knowledge previously obtained, or arts previously learnt, have been acquired again, during the suspension of the associating principles which had formerly suggested them; and then the lost association has been suddenly restored, and the mind regained possession of all that had formerly been learnt.*

* See Abercrombie on the Intellectual Powers, 3d edition, p. 303.

The state of Dementia or Insanity is, perhaps, most uniformly characterized merely by the unusual energy or fervour with which certain acts of thought are performed,—especially acts of Conception and of Imagination, and Emotions resulting from these; which state of the mind is sometimes attended by a great acceleration, and sometimes by an equally distinct retardation, of the trains of thought. When those mental acts take place with morbid energy, and the attention is involuntarily fixed on them with unnatural force, so as to exclude all other thoughts, which in the circumstances of the case would otherwise present themselves, the morbid energy of the conceptions or fancies, in the mind of the madman, most generally overpowers the checks, which, in the natural and healthy state, prevent our believing in the real and independent existence of the images formed in our minds;* and he then reposes belief in something which he has conceived or imagined, in like manner as all men do in the images presented during sleep; and this erroneous belief, or hallucination, "qua rerum relationes *falsæ* percipiuntur," shews itself in his language or actions, and indicates and characterizes his insanity.

The erroneous belief being not the original and fundamental change, but only the natural result of other previous changes in the state of the mind, it is obvious that we cannot draw a distinct line of demarcation between Insanity and mere Eccentricity of character, only by trusting to the definition of Cullen; and we can have no doubt that there are many cases, particularly of those kinds to which the names Moral and Instinctive In-

* See Outlines of Physiology, p. 329.

sanity have been lately applied, in which insanity is indicated merely by morbid hurry and excitement, or by morbid earnestness and tenacity of thought, or by habitual gloomy ideas, or by open violations of decency or veracity, or by morbid propensities, such as that of drinking (when only occasionally recurring)—that of indulging in wholly irrational expenses—that of stealing—or of committing homicide, or even suicide, without any such motive, grounded on consideration of consequences of such actions, as can induce men of sound mind to commit them.* Still we may regard the definition of Cullen as affording the simplest character by which the disease is to be recognised in the great majority of cases.

This morbid state of the train of thought in the mind obviously admits of very considerable variety, without deviation from these essential characteristics.

In some cases, all, or almost all, the images formed in the mind are equally the subjects of this erroneous belief; so that the patient, although his mind will generally act for a short time in the natural way on any new object presented to his senses, and arresting his attention, yet, as often as he returns to those trains of thought, of which conception and imagination form a large part, relapses into the varied hallucinations that spring from the faith erroneously reposed in the images which these faculties present to him. This is the state of the mind in what is properly called *Delirium*, so common in febrile diseases, and occurring occasionally in the course of many cases of more permanent insanity.

In other cases, it is only in regard to certain objects

* See Prichard's Treatise on Insanity.

of thought that the mind acts with morbid fervour, and therefore forms false judgments; and in regard to others, its operations are nearly natural. This is generally the case when there is no febrile action in the system, and the term Mania is then more correctly applied. In some such cases, the subjects of false judgment are very limited and unvaried for a great length of time; and such cases (called Melancholia by Cullen), are usually termed Monomania.

Again, there are many cases of mental derangement, where the whole train of thought is much more rapid than natural; and some where it is so rapid that the control of the will over it is evidently suspended; and the language of the patient so rambling and incoherent as to convey no definite meaning. This is the state to which Pinel, and other French authors, restrict the word Demence. When there is such rapidity of thought, the emotions attending the insanity are generally of the exciting class, either joy or anger.

On the other hand, there are many cases in which the train of thought is much slower than natural, or the succession of acts of thought almost suspended, the mind dwelling almost exclusively on particular images. In such cases, these images are usually attended by painful or depressing emotions, and the term Melancholy is that generally applied.

In many cases, along with, and consequent on, the delusions and emotions attending them, there is, at least occasionally, a propensity to violent and outrageous acts; and, in some cases (as may be judged from what has been stated above), this propensity shews itself so suddenly, and with so little apparent cause in the previous language or conduct of the maniac, as to lead to the sup-

position that it is the sole disorder of the mind; but it is a matter of great difficulty and nicety to judge, in what cases we may hold such a propensity to be a sufficient indication of insanity, although it cannot be shewn to coexist with any mental delusion.

Again, there is a distinction, easily observed in many cases, and of considerable importance, between those forms of insanity, where the delusions rest on erroneous *conceptions* of what has actually been before the senses, and those where they rest on morbid acts of *imagination* only, whereby persons or things are invested with fancied qualities, which are not supposed to have been actually under the observation of the maniac, but of the existence of which he nevertheless entertains a thorough conviction. This distinction is expressed by Dr Arnold by the terms Ideal and Notional Insanity.* The delusions in a case of delirium tremens from drinking, which are generally founded on morbid sensations, and on the recollections of these, are an example of the first kind; and the common hallucination of a combination or conspiracy formed to injure the affected person (who generally supposes, in such cases, not that he has seen or heard proofs of what he alleges, but that he has divined the thoughts of his enemies), is of the last kind, which is probably the more inveterate malady of the two.

The following facts are well ascertained by experience, in regard to the circumstances in which the diseased actions of the nervous system, on which these lesions of the mental faculties depend (but which are known to us only by their effects), are chiefly observed.

1. Abstracting from the case of the delirium of fever,

* Observations on Insanity, vol. i. p. 72.

there is only a small portion of the human race who are susceptible of this kind of disease.

2. In a very large proportion, probably a majority, of those who are affected in these ways, a predisposition from hereditary constitution may be traced.

3. In a large proportion also, some of the organic diseases within the cranium, formerly mentioned (p. 682), are found on dissection, with or without serous effusion, and frequently there are marks either there or in other parts of the body, of scrofulous disease. Where there has been no organic disease, something unusual in the form or texture of the bones of the head has often been remarked.

4. In those predisposed by known or unknown causes, the disease shews itself more frequently between the age of twenty-five and forty, than any other time of life; and the earlier it does so, there is the more chance of at least temporary recovery.

5. In those predisposed, mania may be excited by almost any cause adequate to excite any kind of disease; probably the most frequent exciting causes are, intemperance in the use of strong liquor, or in venereal indulgences, the irritation of mercury, long continued external heat, injuries on the head, the suppression of usual evacuations, and mental emotion. In many cases, the symptoms attending a violent fit of Mania, excited by any of these, as well as the nature of the causes, the other diseases with which it may be combined, the juvantia and lædentia, and the effusions in the brain frequently found after such a fit has been fatal, clearly indicate that an increased determination of blood, and frequently even an inflammatory action, has preceded and accompanied the attack; but in every such case, a

peculiar predisposition must have existed to give this character to the effect of such morbid determination; and in many of the cases, where the predisposition is strong, little or no excitement by any of those external circumstances can be perceived.

In some cases, organic diseases of the heart give a manifest disposition to Insanity, as they have been already stated to give the tendency to Apoplexy or Epilepsy; and in a greater number, disordered states of the stomach and bowels, probably by reason of the peculiarly oppressive sensations attending them, appear to excite the disease.

The cases of insanity which present the best prospect of a perfect recovery of the mental powers, are those in which the action of a powerful exciting cause is the most manifest, and previous disposition least obvious; but these are also the cases which bear the closest analogy to inflammation, and in which there is perhaps the greatest risk of the maniacal excitement, if not moderated by remedies, quickly subsiding into fatal coma. Such are many of the cases of insanity immediately succeeding delivery.

The Delirium Tremens from drinking (but which almost invariably commences after the excitement from the strong liquor is over) may be said to differ from other cases of insanity, in shewing throughout its course the action on the brain of a substance which affects the constitutions of the patients, on the footing of a poison, but not of a narcotic poison. The mental hallucinations are founded in a great measure on what may strictly be called spectral illusions, and are attended uniformly with tremors resembling but exceeding those of typhoid fever. The effect of this poison to pro-

duce this form of disease is manifestly determined by previous predisposition, the effect being seen only in a very small proportion of those to whom the cause is applied. And the specific action of the poison on the brain and nerves appears manifestly to be aggravated and maintained, sometimes by a morbidly diminished, and at other times by an increased, action of vessels,—as indicated both by the symptoms accompanying the mental derangement, and also by the juvantia and lædentia; the specific effect of opium, in controlling the characteristic symptoms of the disease being sometimes certainly aided by antiphlogistic, and at other times by stimulant remedies.

The peculiar agency of a cause affecting the nervous system in this disease after the manner of a poison, is shewn by the mode of fatal termination of the disease, which is hardly ever preceded by coma, but takes place almost instantaneously, or in the way of syncope.

In almost all other cases of Mania, the immediate danger of death, in so far as it is connected with the mental disease, may be said to depend on the gradual accession of coma; and the fatal result is accordingly very generally preceded by a combination of other of the cerebral diseases, Epilepsy, Phrenitis or Hydrocephalus, &c. and very often Fatuity;—which combinations seems to be owing, sometimes to extension of organic disease in the brain, and sometimes to accession of more acute disease there.

The remarkably partial affection of the mental powers, in many cases of Mania and Melancholia, and the limitation of the morbid condition of the mind, in many cases, to its exercise on particular objects of thought, may be thought to favour the supposition of the ap-

propriation of individual parts of the brain, either to particular acts of mind, or to acts of the mind on particular subjects; but it does not appear, on examination of this subject, either that the allocation of the different operations of the mind, in the different parts of the brain, proposed by Gall and Spurzheim and their followers, is confirmed by observation of the portions found to be diseased in these cases of partial insanity; or that the forms of the partial insanity itself correspond to their divisions and arrangement of the mental acts.

The state of Amentia is hardly ever a direct object of medical practice, but is sometimes seen to diminish and disappear very remarkably, when the cause from which it proceeds is one which admits of a cure, spontaneous or artificial, as in the convalescence from fever and from apoplexy, or other serious diseases of the brain. Even the Amentia of old people,—often connected with occasional fits of delirium, and admitting of frequent abatement before it becomes permanently fixed, when attended with febrile excitement or symptoms of Plethora Capitis, may be relieved by moderate evacuations, antimonials, or other sedatives, and especially by a combination or alternation of such remedies with opiates.

The singular form of Amentia, to which the term Somnambulism or Reverie is applied, like other anomalous conditions of the Nervous System, sometimes admits of great relief from medical treatment, when it is distinctly ascertained to be connected with any tangible bodily ailment,—with excitement of the circulation and determinations to the head, which may be moderated by depletion, —with irritation of the intestines, or retention and accumulation of fæces, which may be removed by thoroughly

evacuating, and, at the same time, soothing the bowels;—or with retention of the menses, which may be remedied by a tonic regimen and emmenagogues. But when no indications for such active treatment present themselves, it is to be remembered that complaints of that kind may last long, and cause much anxiety, and resist much treatment, and afterwards spontaneously and even suddenly abate, provided that the digestion and assimilation of food continue in a tolerably healthy state.

In cases of Dementia, or of the different forms of Insanity, the general objects of medical treatment may be said to be these:—

1. In those known to be predisposed, to avert, as far as possible, all exciting causes, and keep the suspected persons in a state the least likely to pass into the disease.

2. To oppose the diseased action by medical treatment, so far as that is likely to be of service.

3. To adopt such a regimen, and such moral treatment, as is found to conduce to the spontaneous abatement of the paroxysms of the disease.

1. The first object is to be accomplished chiefly by much bodily exercise, and such a mode of life as shall occupy and interest the mind, without straining the mental powers, or exciting any violent or engrossing emotions; with strict temperance as to strong liquors, moderation as to animal food, and regularity as to the taking of food, and the enjoyment of sleep.

2. In those cases of insanity which are of recent occurrence, and attended with frequency and fulness of pulse, or with symptoms of determination to the head, decided advantage may be derived from bleeding, purging, cold applications to the head, and sometimes from

nauseating doses of antimony; and, after the system has been so far lowered by these means, opiates may in some persons be given in full and repeated doses with very good effect; but when we have reason to suspect organic disease, the opiates cannot be expected to do good; and in some constitutions they have always unpleasant effects.

The case of Delirium Tremens differs from other forms of Insanity, not only in the peculiarity of the symptoms, but in the nature of the exciting cause, viz. the action on the Nervous System of a specific stimulus, which has been, in general, suddenly withdrawn, before the disease distinctly shews itself; and in that case, the soothing effects of opium, in procuring sleep, and total abatement of the symptoms, have been often strikingly seen. The use of this remedy should be preceded and accompanied by purgatives, and either by small bleeding, and nauseating medicines,—or by stimulants, according to the state of the circulation; the efficacy of depletion in some cases, and of stimulation in others, as auxiliaries to the opium, is clearly ascertained, and often exemplified.

In other cases of Insanity, and particularly when it is observed that the patient enjoys pretty natural sleep, without restoration of the natural state of his mind, experience has shewn that persistence in the use of depleting remedies, and even of antiphlogistic regimen, may only weaken and injure his bodily health; and retard rather than accelerate that spontaneous abatement of the disease which may generally be expected, although at very irregular periods from its accession.

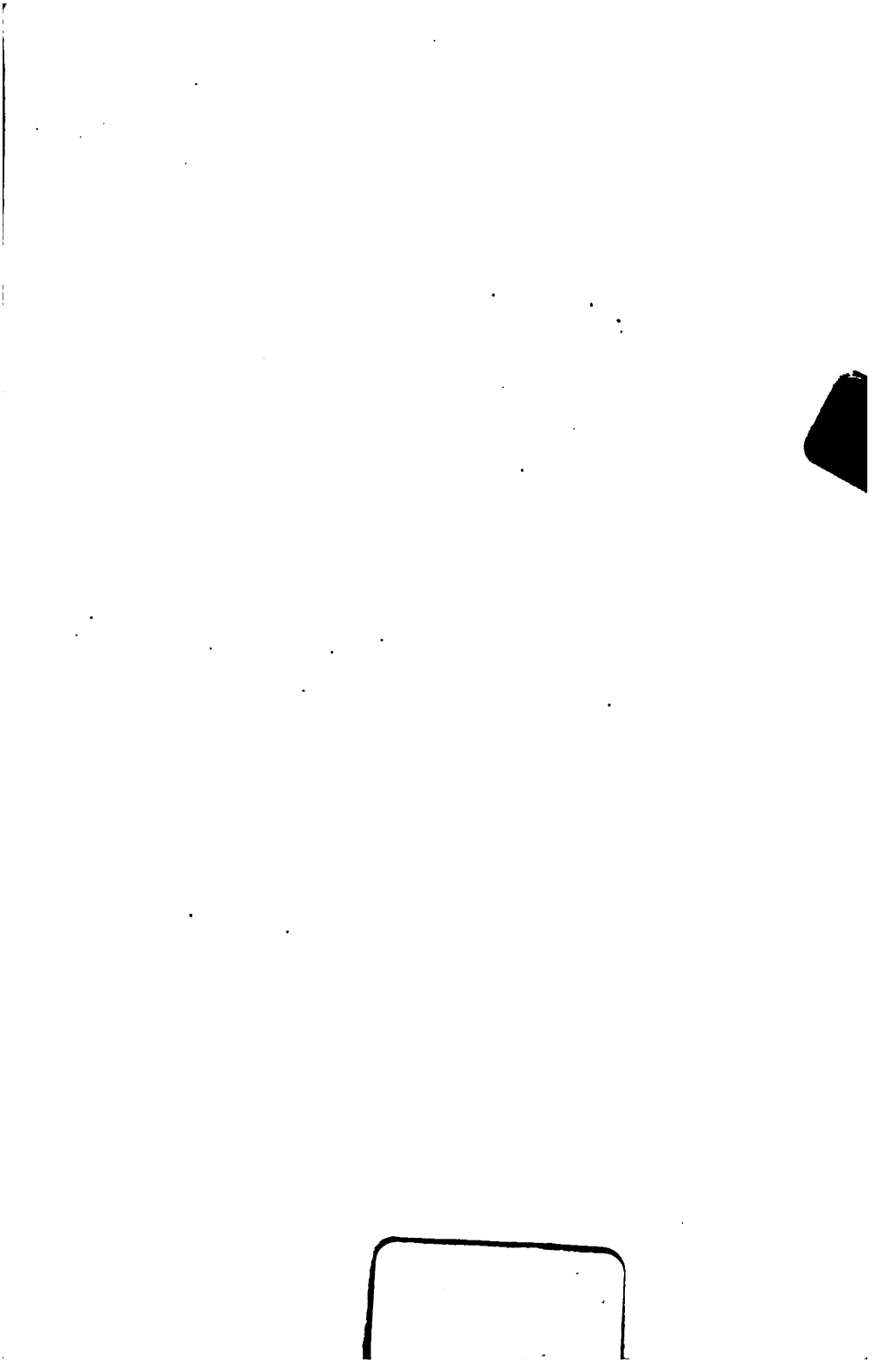
3. The moral treatment of patients during the paroxysms of Insanity, consists essentially in the follow-

ing particulars:—*first*, Preventing injury to themselves, or to others, by confinement, or by such means of restraint as are consistent with humanity, and are least likely to excite unavailing and exhausting efforts of the patient to escape from them; *secondly*, Removing all exciting causes which may aggravate or renew the morbid trains of thought, and accompanying violent or absorbing emotions; and, *thirdly*, Taking advantage of that law of the mind, by which different acts or feelings are virtually rendered incompatible with one another, and placing the patient in circumstances which tend as much as possible to divert his attention from those thoughts, of which the morbid fancies or delusions are a constituent part, and to fix it on other objects, on which the mind can still act in the natural way.

These principles enable us to perceive the importance of the seclusion and separation of insane persons from former friends and accustomed scenes; of having them watched by careful and experienced attendants; of their dangerous propensities being checked, particularly during the occasional paroxysms of general, or what is called maniacal, excitement, without any appearance of violence or anger; of various occupations and amusements being assiduously provided for them, particularly such as to induce them to muscular exertion; of their diet being such as fully satisfies their appetites (often strong in the chronic state of the disease), without oppressing the stomach; even of such society being provided for them, as a well regulated Lunatic Asylum presents, with the precautions which are there easily taken, against excitement or intemperance.

Under such management, the exasperation of insanity to violent maniacal paroxysms, is often prevented, or

greatly mitigated; when the disease is complicated with epilepsy, or other obvious disease, and probably connected with organic lesion, it usually gradually subsides into Fatuity; in other cases, after several variations of character, it often gradually disappears, at least for a time; and the most important practical caution, in regard to such cases is, that the patients should always be kept in seclusion for a considerable time after they have ceased to betray every symptom of insanity, in order that the diseased actions (always easily reproduced) should have full time to subside completely, before the re-application of any of those causes of mental excitement, which are necessarily implied in the removal of restraints, and the return to those scenes and occupations in which the disease had originated.

THE END.

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