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LECTURES

ON

THE STUDY OF FEVER.

BY

ALFRED HUDSON, M.D., M.R.I.A.

New Edition, Revised and Corrected.

DUBLIN:
WILLIAM McGEE, 18 NASSAU STREET,
College, School, and Medical Bookseller.
LONDON: SIMPKIN, MARSHALL, AND CO.
1872.

TO

WILLIAM STOKES, M.D., F.R.S., M.R.I.A.

PRESIDENT OF THE KING AND QUEEN'S COLLEGE OF PHYSICIANS,
REGIUS PROFESSOR OF PHYSIC IN THE UNIVERSITY OF DUBLIN,
PHYSICIAN IN ORDINARY TO THE QUEEN IN IRELAND,
PHYSICIAN TO THE MEATH HOSPITAL,

This Volume is Dedicated

BY

HIS FRIEND AND COLLEAGUE,

THE AUTHOR.

PREFACE.

It has long appeared to me that the student has usually a less clear idea of fever than of any disease which he meets in the wards of the hospital. The difficulty he experiences may arise, partly from the want of correspondence of the particular case before him with the description of some form of fever from which he has obtained his *ideal*, and partly from his not possessing the key, so to speak, to its solution in a knowledge of fever in the abstract, of its laws, and of the phenomena which are common to all types of the disease. It is true he has in the great work of Murchison, the fullest and most comprehensive descriptions of *every* form of continued fever, but I cannot avoid regarding these distinct treatises (for such they are) as much more likely to be useful as a future work of reference, than to serve as a guide to the early study of a complex and difficult subject like fever.

The object I have had in view in delivering the ensuing Lectures to the students of the Meath Hospital, and in now publishing them, is to furnish the

student with a guide to his bedside analysis of each case, by treating of febrile phenomena in succession; first, generally or abstractedly, and secondly, in their relation to each form of the disease. Thus forming in his mind an *ideal* of fever, such as he may readily apply to the case before him, and which he may certainly find to conform to that case, be it of what species, or how complicated soever it may. Should it appear that I have in any degree succeeded in this task, I shall have gained my object, and the student will be assisted, not only in his bedside study of the disease, but also, I trust, in the prosecution of his more extended investigations into its nature and relations, as treated of in the numerous and valuable works which exist on the subject.

By carefully revising and correcting former errors, I have endeavoured to render this Edition more acceptable to the student, and more worthy the approval of the profession.

I have again to acknowledge my obligations to my friend Dr. Sinclair, for his kind supervision of the work while passing through the press, and for the valuable index which he has appended.

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LECTURES

ON

THE STUDY OF FEVER.

LECTURE I.

THEORY OF FEVER.

In recommending you to take advantage of the present opportunity of studying the different forms of fever in our wards, I would observe, that fever is the disease which beyond all others presents the strongest claims to your careful investigation, whether regarded as an object of scientific interest, or of social importance; whether on account of the varied and complex phenomena it offers for our investigation, or the immense influence which it exercises upon the welfare of individuals, and of the community.

To the thoughtful student, fever presents an object of contemplation around which the inferences from his past experiences and his new acquirements may continually accumulate, and these will grow with his daily observations, and ripen with his maturer judgment. More than any other study, it calls into requisition his knowledge of healthy and perverted functions; it educates his

faculty of observation; it cultivates his talent for estimating the value of existing signs and symptoms, for foreseeing the course of the disease, and providing against future contingencies; and, more than any other, it will put to the test his therapeutic resources, his fertility in suggesting expedients, his tact in the management of the patient, and in regulating the surrounding conditions. In a word, no single disease will teach the student so much that is of value, or so far train him for the future practice of his profession, as fever.

But it must be admitted that the difficulty of the study is in proportion to its interest. Of the cases of this complex disease which you will encounter in the wards, perhaps no two will be exactly alike, and, at different periods, you will meet with different groups of phenomena, of which the one will throw little if any light on the study of the other. A similar want of correspondence will exist between your own observed cases, and the descriptions of many writers of monographs on fever; the best of these being descriptions of some epidemic, which perhaps may not correspond in its characteristics with the one under your own observation. In short, if the clearness of our views of a subject is, as we believe, in direct proportion to the comprehensiveness of our knowledge of its nature and relations, there is every reason why fever should be that disease regarding which the most confused ideas are entertained by students in general, and by not a few members of the profession. This will appear from the fact that concerning no disease has so much controversy existed, with reference to its nature, classification, origin, diffusion, pathological anatomy, and treatment, as fever.

If this be so, the student should endeavour, by all

means, to enlarge his view of the subject by looking at it from various stand-points, and with regard to its various relations; studying its analogies with other cognate diseases, and comparing the several functions deranged by fever with the same functions in their healthy condition, so as thus to build up synthetically in his mind, a concrete idea of this complex series of phenomena, at the same time that he is engaged in their daily analysis at the bed-side.

You will find that by conjoining these two modes of study—each enlightening the other—what at first appears a confused and contradictory subject, will gradually become clear and in harmony with the laws of physiology in health and disease.

With a view to aid you to the extent of my ability in this comprehensive study of fever, I propose to supplement our bed-side observations by a few lectures of a *general* character, not strictly clinical, but making occasional reference to such cases as may present themselves in our wards, for the purpose of illustrating the doctrines and practice which I shall here advance.

In this course I shall consider fever—using the term in a general sense—as an object of study regarded from different points of view:—

1st. As one of the group of morbid poisons; identified with them by similarity of origin, and by conformity to certain laws; like them received into the blood, affecting the entire organism, and exerting its influence on different organs in succession; like them having its periods or stages of incubation, maturity, and decline; and like them reproducing itself in the blood of the affected person.

2nd. As requiring a susceptibility to its influence in

the individual exposed to it; and as varying in its operations according to the nature, seat, and extent of this susceptibility or predisposition.

3rd. As generated within the living body, an "animal miasm;" or derived from without it by exposure to some forms of malaria, "civic miasm;" or arising from "epidemic influence:" each several source giving origin to a form of fever essentially distinct from all other forms of the disease.

4th. As presenting pathological phenomena, *primary or essential*—arising out of the affinity of the poison for certain tissues or organs, as well as out of the special predisposition of the organ; *secondary or accidental*, arising—(*a*) from some peculiar exciting cause; (*b*) from secondary blood contamination; or (*c*) from reactive irritation set up during the course of the fever.

5th. As having a more or less definite course and duration, and presenting certain phenomena at its resolution or crisis; and as exhibiting certain variations in the modes of its fatal termination, and its morbid anatomy, in different forms of the disease.

6th. As presenting data for a rational prognosis, or study of its tendencies towards a particular termination.

7th. As presenting rational general indications of treatment and management common to all forms of fever; and special indications for different forms and complications.

We shall thus present for your study the doctrinal or theoretical, as well as the clinical or practical bearings of the subject.

The theory of fever, or the question what is fever, first presents itself to our consideration; and while it cannot be passed over in silence, must yet be approached with

diffidence, and discussed with no little reserve. It has been well said that "such a theory presupposes and involves a knowledge of the intimate processes and relations of the living powers which has not yet been attained. It requires also a knowledge of the agency, or combination of agencies, which sets in motion that concatenation of disordered actions—that complex combination of morbid processes which constitutes fever. We must also know the seat and character of these morbid processes and modifications; their peculiarities; their tendencies; the differences which exist between them in the several forms of febrile disease. We must know their relations to each other—which are primary and essential, which secondary and accidental. Of these things, as of the causes of fever and their mode of action, we are, to a great extent, ignorant; they are known to us rather *analogically*, and by comparison with other morbid processes, than absolutely and positively."—(Parkes.)

The morbid processes to which fever presents the most striking analogies, are those set up in the body by the action of morbid poisons, or what are termed zymotic diseases, among which it is accordingly classed. The principal analogies to these may be thus stated:—

Fever, like other morbid poisons, has a latent period or stage of incubation, during which none of the febrile phenomena are manifestly set up, but at the expiration of which its influence is felt by the entire organism.

Like other poisons, its influence and results seem directly proportioned to its intensity, and, like them, when this is such as to kill at once, there is the least post mortem evidence of its action, the morbid appearances being found in such cases, not in the parenchyma of

organs, but in the confluence, so to speak, between the blood and the tissues, and consisting of congestion or stagnation of blood in an altered condition. Like other poisons, it displays peculiar elective affinities, which are modified, in some cases, and directed to certain tissues or organs, by the existing condition of these with regard to nutrition; it being well ascertained that parts undergoing active retrograde metamorphosis are peculiarly subject to the operations of morbid poisons. As is the case with them, its operations may be modified by temperament, or family and personal peculiarities, by epidemic influence, by the co-existence in the blood of other poisons, as well as by the contaminations originating in the body of the patient from defective elimination or retained excretions. It is reproduced in the blood in like manner as they are, and while the susceptibility to its influence seems to become exhausted by the attack, the susceptibility to the influence of any other morbid poison remains undiminished. Lastly, like them, it has a natural tendency to cure through the elimination of its products by critical evacuations in patients in whom there exists a healthy condition of the excreting organs, conjoined with sufficient power of vital resistance to the decomposing action of the poison.

All our observations tend to prove that the direct action of the poison of fever (and of all morbid poisons) is that of catalysis; in other words, that the poison has a force or power by which a compound body, like the blood, is decomposed by mere contact with it. If we look for the portion of the organism the most adapted by its nature, constitution, and functions, to become the subject of such catalytic change, we surely find it in the blood; in which the chemical and vital forces are in such perfect equi-

librium that a change in it is effected by every disturbance, however trifling, or from whatever cause it may proceed. Moreover, we find that in patients killed by the direct action of an intense fever-poison, the blood is fluid and otherwise changed in character. Again: if we meet with cases of peculiar proneness to receive the infection of fever, or other zymotic diseases, we find the cause in a change in the blood, whether produced by over-crowding, by breathing putrid emanations, by famine, or by the decomposing action of water applied to the surface of the body—whereby a breaking up and solution of the blood corpuscles is effected;—and if we examine the worst complications of fever, we find that they are the result of decompositions set up by the presence in the blood of the products of retrograde metamorphosis of tissue, such products giving rise to the worst forms of secondary inflammations which occur in fever.*

Much labour has been expended in the controversy between the Solidists and Humoralists, whether the *primary* action of the fever-poison is exerted upon the nervous system or the blood. I have elsewhere examined the arguments for both theories, and expressed the conviction which I still entertain; that the phenomena of the latent period, or stage of incubation, and those of reproduction of the same poison, both point alike to the blood as the seat of the operations of the fever-poison, while it is through the conjoined agency of the nervous system and the blood, that the phenomena of the formed disease are produced. I have just now mentioned, as one of the laws of morbid poisons, that these affect the entire organism, using the word in the comprehensive sense of the aggre-

* Appendix (1.)

gate of the molecules of which the body consists. We have every reason to believe that this holds good of fever, and that the first step in the fever process is a modification of the function of nutrition; "of which function," says Mr. Paget, "the tissues and the blood are the principal factors in their mutual relations." I believe that it is by a modification of this relation between blood and tissue that fever commences: here is the seat of its operations, not in the parenchyma of organs, but in the confluence between the blood and the tissues. If so, the first impression of the fever-poison must be upon the blood into which it is received, in which it is rapidly augmented, and through which it is diffused. It is still a moot question whether this change in the attractions between the blood and tissue is immediate and direct, or is effected through the medium of the nervous system, more especially of the eighth pair, Virchow's definition of a theory of fever being that it "consists essentially in elevation of temperature, which must arise from an increased tissue change, and have its immediate cause in alterations of the nervous system." This is the theory which, put forward by Virchow, has been so clearly expounded by Dr. Parkes.* I believe there is no good evidence of any such alteration during the stage of incubation, or up to the period of the initiatory rigor which may be regarded as the first symptom of the moderating nervous centres becoming influenced by the fever-poison.

But in all the phenomena which succeed the invasion of fever, the blood and nervous system are joint-factors. "As the blood," says Claude Bernard, "really describes a circle, the diastaltic nervous system describes a cycloid,

* Appendix (2.)

As the blood diffuses its atoms into every minute space of the system, the diastaltic spinal system extends its influence over every one of these atoms. The blood undergoes its changes in the methematous or blood changing (or capillary) channels, placed between the alternate branches of the arteries, and the incipient roots of the veins; to the same point the diastaltic spinal system extends its wondrous influence." In accordance with this, we find those functions deranged in fever which, like animal heat, are the product of the joint influence of these factors; and we find, moreover, that such derangements will vary in amount with the extent to which the nervous system, or the blood, or the molecular nutrition of an organ may be severally affected.

Of these derangements, the first usually to attract notice is diminution of nervo-muscular force. Even in the most insidious cases, this has been observed in the form of mental hebetude or dulness and bodily languor, dizziness, feelings of fatigue, depressed spirits, irritability of temper, or increased sensibility to external impressions, such as light, sound, and temperature. Even at this early period the respiration is disturbed, laboured breathing being a very early symptom, owing, probably, in part to the diminished tonicity of the right ventricle, but chiefly to the influence of the fever-poison upon the eighth pair of nerves. Most, if not all these symptoms, may be usually observed before the commencement of the stage of reaction; and in some rare cases, in which either the blood has been subjected to the action of an unusually intense poison, or the nervous system has been depressed by some severe shock or strong emotion, fever has begun and ended with these symptoms, the stage of reaction never having succeeded

at all; or if it had, the reaction had been imperfect, and the symptoms throughout were those of depression of the vital energies, characterized especially by failure of mental and motor power, sinking of the temperature, congestion of the right side of the heart, and of the capillaries of all the viscera. Numerous cases are recorded of fever of this type, which terminated fatally at periods varying from six hours to three days.

This form of disease has been admirably described by Armstrong in his chapter on congestive typhus. The following is one of the cases detailed by him—"A young man of slender make, had travelled several miles to see a relative sick of typhus, with whom he remained, and upon whom he attended several days. On returning home, he was suddenly attacked with vertigo, chilliness, and extreme weakness of the lower extremities, and when he reached his own house he appeared most strangely confused in his head and intellect, staggering and talking like one intoxicated. He was immediately put to bed, and did not complain much afterwards, but gradually fell into a profound coma, in which he lay without motion. At my first visit," says Dr. Armstrong, "the face was then pale, and somewhat livid; the breathing deep and impeded; the pulse small, frequent, and irregular; the tongue white, and covered with slimy saliva; the skin dingy, and partially damp; the heat of which felt nearly natural over the heart and belly, but the extremities were rather cold. The head was shaved and blistered without loss of time; mustard sinapisms were applied to the feet, and large cathartic injections repeatedly administered. In about twelve hours, when the bowels had been often and copiously moved, the patient gave some indications of

returning sensibility; and in a few hours more looked up, and even recognized some intimate friends who were present, but spoke in a feeble and faltering accent. For several hours there was an appearance of improvement in some particulars; his pulse and breathing freer, his voice became more natural, and his skin of a warmer glow; but in contravention to these favourable symptoms, his hands were tremulous, his tongue fouler, and there were a few dark petechiæ scattered over the trunk and arms. Moderate portions of wine were now recommended at short intervals, with a view to support his strength, but the debility increased under this plan, and he again sunk into a deep stupor, in which he expired slightly convulsed, about forty hours from the first attack." Several other similar cases are graphically narrated by Dr. Armstrong; the appearances after death being in each, a turgid condition of the veins of the pia mater and substance of the brain; bloody serum in the ventricles; the lungs, liver, and spleen congested with grumous blood; and the two latter viscera so softened in one case as to be ruptured by handling. Dr. Armstrong justly remarks that in these cases the stage of excitement never emerges at all without the interference of art, or does so very imperfectly; the energies of the system being either nearly extinguished, or so much oppressed as to be unable to create an universal excitement. He adds, "sometimes, however, patients do not rapidly sink under the first shock of the attack; but that being passed over, they linger for many days in a state of stupor, or mental indifference, and die, at last, with a foul dark tongue, shrivelled cool skin, and deep sunken countenance. The open forms of fever, in which heat and arterial re-action are equally developed, will be

found the least dangerous; and those of an obscure nature, in which neither heat nor arterial reaction are equally developed, the most perilous and unmanageable."

Fortunately, such cases are rare and exceptional. As a rule, reaction speedily follows upon the stage of depression, when, fever being established, you will observe the evidences of increased regressive metamorphosis of tissue in the marked rise of the temperature, the acceleration of the pulse and respiration, and in the notable increase of the excretion of urea—the product of this metamorphosis.

Two effects of this change in the molecular nutrition follow, which have great influence upon the future progress of fever, more especially in its advanced stage. One is the alteration of the attraction between blood and tissue, upon which the capillary circulation depends, leading to derangements of this function to some extent general, but more especially marked in the organs which may be undergoing the most active disintegration at the access of the fever. A large proportion of our fever cases present at some period or other of their course local lesions, due to deranged capillary circulation. This hyperemia may be either active or passive, the latter being a frequent cause of re-active irritation at a late period of the fever, sometimes in the head, sometimes in the chest. We have at present two illustrative cases in our fever wards, in one of which signs of re-active pneumonia were detected on the thirteenth, in the other on the fifteenth or sixteenth day of fever. In both these cases the first step in the morbid process was congestion, due to the altered attractions between the blood and pulmonary tissue, as well as to the diminished energy of the nerves of respiration. At an advanced period of fever, there was set up in the seat of

this stasis of depraved blood, a low form of pneumonia, recognized in both cases by the ordinary physical signs of that affection. I need not dwell upon the importance of this condition, or its influence on the result if overlooked.*

The other is disturbance of the balance between disintegration and excretion, leading to the accumulation in the blood of a secondary poison, the action of which is more or less that of a fever-poison, or capable, apparently, of entering into combination with it. This secondary blood contamination you will find to be a fruitful source of the most serious nervous symptoms, and secondary inflammatory affections. It may present itself as simply the result of excess of disintegration over secretion, or as the retention or suppression of an excretion. The first form we meet in the over-fed, in the spirit drinker, and in those patients who have induced excessive disintegration of their nervous and muscular tissue by fatigue, at, or subsequent to the period of access of fever. The other form may occur from previous disease of the lung, liver, or kidney; or from congestion produced by cold, when this is the exciting cause of fever, or in the case of suppressed menstruation from a similar cause, or from a mental shock occurring at the same period. Examples of both forms will be presented to us hereafter.

Efforts at elimination of the fever-poison would seem to be made at different periods, and in different modes, in the various forms of the disease. Some would consider the initiatory rigor, and subsequent increase of heat, as such an effort. There may be reason to view, in this light, some phenomena which we refer to the elective

* Appendix (3.)

affinities of these poisons. Thus we may regard as eliminative efforts, not only the early vomiting of variola, scarlatina, typhus, and the diarrhea of typhoid; but also the coryza and catarrh of measles, the irritative cough of the early stages of typhus, and the eruption of all the exanthemata.

Crisis we of course regard as the great and final effort at elimination. Up to this period the products of the decomposition, set up by the action of fever, go on increasing; the disturbance of the balance between metamorphosis of tissues and excretion increasing in like proportion, and with it, the danger of secondary blood contamination and its consequences. The recovery of the patient will depend upon his surviving these dangers, with the excreting organs still capable of eliminating the large amount "of partially metamorphosed substances, which," to use the words of Dr. Parkes, "have been retained in the body, and at length have been brought to that point of oxidation or change which permits their elimination by one or other organ."

We shall meet with abundant examples of the important part which retained effete material plays in the production of secondary complications in fever, as well as of their great influence upon our treatment during its course, and at its final stage.

To recapitulate briefly: The order in which the operations of the fever-poison occur are—1. Its primary toxic action on the blood, and, through this medium, upon each molecule of the body. 2. A form of inhibitory paresis of the moderating nervous centres, and more especially of those nerves connected with the heart, lungs, and stomach. 3. Increased disintegration of tissue, with increase of

animal heat. 4. Derangements of capillary circulation. 5. Derangements of secretion. 6. Accumulation of the products of disintegration in the blood. 7. The phenomena of elimination and of crisis.

The clinical study of fever may be said to consist chiefly in the daily observation of these progressive changes, set up by the action, direct or indirect, of the fever poison, affecting the due performance of the several functions and the physical condition of the organs themselves. Your success in this study will depend much upon your knowledge of the physiology of these functions, the manner in which they are influenced by the action of the fever-poison, and the mode in which their derang d condition influence, in turn, the course and termination of the disease. You should daily make a careful examination of the several organs, and you will, in your investigation, always bear in mind two facts:—First, the essential nature of fever, and its true relation to the local lesions; and, secondly, the influence of the existing state of nutrition of each organ in determining to it, in a greater or less degree, the special action of the fever poison.

In the one is involved the true theory of fever and of its treatment; in the other, the law by which the seat and nature of its secondary affections is determined.

APPENDIX TO LECTURE I.

(1.)

A reviewer of the first edition of this work remarks upon this passage—"We would rather incline to the belief that in the majority of cases the fever-poison is introduced directly through the nervous system; in no other possible way can be accounted for the instantaneous communication of the disease which the recipient himself is often distinctly conscious of. Of course the blood becomes vitiated at a more or less early period; but even then we doubt that it is strictly in the manner of catalysis but rather by cell growth, which will more satisfactorily account for the susceptibility to the disease being exhausted, and the various attempts at crisis at various periods." On the other hand I would adduce the high authority of Dr. Richardson who, in his recently published "Lecture on the poisons of the spreading diseases," says—"We have heard epidemic diseases spoken of as diseases which sprung from germs. But in these poisons of which I speak there is no approach to any thing like a germ or seed. There is no kind of relation between the production of animal from animal and the production of disease from disease in that sense. The poisons do not spring up in that way, but what occurs is this. Each particle of any one of these poisons brought into contact with the blood of the living animal, or with certain secretions of the living animal, possesses the property of turning the albuminous part of that same blood or that same secretion into a substance like itself. We are not masters of the precise physical steps by which this takes place, but we call the process catalytic. It is a change which we do not understand, but it is one by which a body is transformed by the presence of some other body which does not itself undergo change. The multiplication of the poison thus takes place through the power of the body itself—not through the propagation from germ to germ."

(2.)

I would refer the student to Dr. Parkes's "Lectures on Pyrexia," published in the *Medical Times and Gazette* for 1855, for a lucid exposition of Professor Virchow's views on the proximate cause of fever. Perhaps he may obtain some idea of these from the following extract from a lecture delivered by the Professor, of which I have been favoured with a translation by my friend, Dr. Gilbert Nicholson:—

"The complicated mechanism of fever can only be understood altogether, when one regards the peculiar mechanism of the body. One must not consider the body as a dead mass, into which enters the breath—the pneuma, as the Greeks said (or, as the ancient Jews expressed it, the living order to bring into activity); one must not regard the body even as a peculiar machine, which the soul governs according to its own intentions. On the contrary, one must conceive the body to be a many-membered organism endued throughout with life; whose single parts certainly work mechanically, but from which still each separate one has, at the same time, in itself the cause of its activity—the life. Many lives are here joined in united life; many different existences, with an independent power of life and action, are placed in a common dependance on one another, and in this dependance they are influenced the one by the other, each after its own manner and the manners of the others. Many are more highly organized, and therefore nobler and more important in the great common existence; others are weaker, small, poor, and single, seemingly of little importance, and still, in cases of difficulty, hard to be done without.

"Where now do the great regulatory contrivances lie, in the common joining together of the human body? They lie principally in the blood and the nervous system. The blood is the means of the interchange of materials; it streams to all parts of the vessels, in the capillaries, and returns after a long course to the heart, much changed, in order to be driven from that again through the lungs, that great emporium of the exchange of gases.

"It brings the oxygen with it, which consumes the materials, and thither it brings back the carbonic acid gas which has resulted from that consumption. Each part takes from the blood its portion of materials; each gives back to the blood whatever has become useless for it. Can one still wonder that the blood can become a source, too, of general disturbance—the centre point of constitu-

tional disease? Injurious materials force themselves into the blood in the most different ways, and whilst they arrive from that at the separate parts, they become a mighty ferment for internal decomposition. Thus the infectious fevers arise, in which the blood is rendered first impure by means of all kinds of changed substances; for the most part by chemical means, which have arisen from the decomposition of organic vegetable or animal bodies. The earth, the habitations of mankind, their nourishment, and trades, can offer the opportunity for such decomposition; but the body itself, too, can give the material, and so give the occasion to self-infection, the worst because the most secret infection. Here belong many of the so-called traumatic and inflammatory fevers, as they are seen to arise in over-filled hospitals, and therefore so often in the train of great battles.

"But every infection of the blood does not bring about fever. Cholera is one of the worst diseases of infection, and still not essentially feverish. In its heaviest forms it occasions such a reduction of heat, that it has received with right the name of cholera algida. The impurity of the blood brings fever then only, when at the same time the nervous system, in its most important parts, is attacked with it, when, therefore, from the blood injurious matters make their way into a certain nervous part. But there are many channels to the nervous system, of which the circulation is only one; and there is therefore many a fever in which, at least at first, the blood is quite uninjured, and a pollution of it remains quite excluded. But the so-called nervous fever—typhus—does not belong to this class, since it is exactly such a decidedly infectious disease that, as the latest experience teaches, quite near to it lies the suspicion of poisoning. On the other hand, original fevers of the nervous system are well enough known in a popular way. One can certainly reckon among these that consuming fever which is brought on by excessive and continued exertion—it may be mental or bodily—by which the constitution is exhausted, the nervous system weakened; since in all cases of constitutional weakness, original feeble formation from defective nourishment, or from exhaustion by work, the nervous system is also inclined to febrile excitement.

"We are accustomed to say, excitement—but by this must not be at all understood that in a fever, as a rule, development of strength takes place from the side of the nervous system. On the

contrary, every great development of strength takes place only by fits and starts for a limited time, and where it happens it is much more in relation to an increased irritability. But such an event is much more a sign of weakness than of strength; and truly all phenomena point out, that in every fever, however it has begun, the fundamental character of the nervous activity, and in particular of the regulating activity, is that of an ever-increasing weakness and want of resistance. From the beginning a very expressed feeling of tiredness and want of power, frequently shows itself. The muscles obey only slowly the demands made upon them: one has no desire for activity—for any enjoyment; one shivers from the slightest breath of air; in short, one is sensible of a disturbance in all the members, which affects not so much the members in their actual being and existence, as in their relation to one another. The common equilibrium of the parts is removed, and with this is experienced a feeling of internal disharmony. This disharmony develops soon more strongly; the beats of the heart increase, the pulse is quicker, whilst all other muscles are dull: external cold shows itself, whilst the inward heat becomes even more glowing. We can easily understand why the surface of the body becomes cold while the blood is warmer than its wont; for the blood-vessels of the skin contract, grow narrow, until only so little blood can stream through them, that this cannot keep up to the normal elevation the temperature of the skin, sinking from radiation. But the contraction of the vessels is still a phenomenon which points out, like the increased activity of the heart, an unusual work of the contracting parts. How shall we recognise in this a symptom of weakness?—and still it is such, for the nervous system acts over all as a moderator in the natural processes of life. It is that same contrivance which mediates not only between parts in the organic collective being, but also regulates the flow of the blood, in that it changes as well the motions of the heart as the width of the vessels. If it loses the power to exert mediatory or regulating activity, it becomes palsied in its proper central elements. So many single portions of the body, even single sections of it, unfold an increased activity; yet the fact is not by this changed, that the body has experienced a dangerous debility in its most important parts; so to say, in its kernel. The more clearly this conviction has been established by the modern physicians, the more has the idea found its way back, which (idea) had received

the greatest attention in Germany a few decades ago; namely, that fever in itself is a wholesome reaction of the body against any disturbance which has forced itself into the body, or has arisen in it, and that this reaction conquers for itself a natural termination in the crisis, like a victory. This idea has not a little contributed to accustom physicians to the so-called expectant treatment. And this has had its good, too, since it has at last set determined bounds to the excessive quantity of compound and dangerous medicines."

(3.)

"There are causes," says Dr. J. Reid, "in constant operation that can greatly increase or diminish the quantity of blood flowing through an organ, apart altogether from any change in the action of the heart or of any other contractile tissue." These he holds to be the chemical changes that attend the operations of nutrition and secretion, which draw the blood onwards along the vessels leading to the parts where these functions are being performed—adding, "It is this *vis a fronte* that regulates in each tissue the supply it receives from the general mass of blood kept in motion by the heart, or *vis a tergo*."

The objection urged against this doctrine of a *vis a fronte*, viz., "that the same attractive force which is capable of drawing the blood into the tissues will be sufficient to retain it there, and to prevent it from passing onwards along the veins," is met by an explanation of Professor Draper, which rests upon the physical law, "that if two liquids communicate with one another in a capillary tube, or in a porous or parenchymatous structure, and have for that tube or structure different chemical affinities, movements will ensue; that liquid which has the most energetic affinity will move with the greatest velocity, and may even drive the other liquid entirely before it." From these premises he proceeds to argue, that the arterial blood should be drawn into the systemic capillaries so long as the chemical changes between it and the surrounding tissues proceed; and explains how the venous blood, which has no chemical affinities for these tissues, should be driven onwards along the veins towards the heart. If this occurs in the systemic, the reverse will happen in the pulmonic circulation, for the venous blood has a strong affinity for the oxygen of the atmospheric air that occupies the air cells upon which the pulmonic capillaries are ramified, whilst the arterial blood has none, and the venous blood

is drawn into these capillaries and drives the arterial blood before it towards the heart.—*J. Reid's Physiological and Pathological Researches.*

Assuming the above theory to be true, we have an explanation of the production of congestion in fever by blood poisoning alone; and also of the fact that this congestion increases, *pari passu*, with the amount of blood contamination, and in different degrees according to different modes of contamination, or of other chemical change; attaining its maximum in such cases as extreme and fatal pulmonary congestion from insolation, electricity, sudden and violent emotion, &c., and in the form, which, following immersion in water during intoxication, so frequently ends in rapid gangrene of the lung—a local necremia.

LECTURE II.

ETIOLOGY OF FEVER.

I HAVE to-day to draw your attention to the etiology of fever, or to those conditions within and without the body upon which its origin and diffusion depend.

The *essential* cause of fever is, no doubt, the reception and retention in the blood of the poison, by the catalytic action of which the phenomena of the disease are set up.

The source from which this poison is derived is, properly speaking, the exciting cause of the fever, as inoculation may be said to be an exciting cause of variola, contagion of typhus, &c. But inasmuch as many persons exposed to the influence of these exciting causes escape the disease, while others, under a scarcely appreciable amount of exposure, are attacked, we seek within the body for some reason for such a difference in degree of susceptibility, and we recognise a condition which we term predisposition; sometimes a personal or family peculiarity—an idiosyncracy—but generally acquired, and due to certain causes, which we call predisposing causes. In a few instances these causes are found to act with such intensity, as to generate a fever poison without the aid of any exciting or extraneous agency; but in the majority of cases, both the predisposing and exciting causes will be found to co-operate in the result. I shall first consider the nature of

predisposition, and the mode of action of predisposing causes; afterwards I shall examine the exciting causes.

In my last lecture I endeavoured to illustrate, rather than attempted to explain, the nature and modus operandi of the poison of fever, by showing its analogy to other morbid poisons and its conformity to their laws.

It appeared that, like them, it is introduced into the blood, upon which its primary action is exerted, and in which, or in some material present therein, it finds its nidus, and the substance capable of being converted into it, and out of which consequently it is reproduced.

Moreover, we found that it is carried in this substance to the surfaces destined by nature to separate these different materials from the blood, and there sets up certain specific irritations, and gives rise to deposits; processes, which are regarded by many as efforts at elimination, depending upon the elective affinities or attractions of the fever-poison.

Perhaps a more correct expression would be, that each form of fever has a special attraction for some specific material in the blood; and that the so-called elective affinities of the poison, as of scarlatina for the tonsils, typhoid for the intestinal follicles, &c., are, in reality, examples of the attractions of this portion of the blood for these their normal excreting surfaces.

Such a view would seem to be supported by two considerations, to which I shall presently have more particularly to refer. The first, is the fact that susceptibility to the action of each morbid poison is, as a rule, exhausted by the attack—owing, we believe, to the material being exhausted upon which the action of the poison is exerted—while the susceptibility to other poisons remains the same as before.

The second, is the fact that fever, in common with other morbid poisons, manifests a special attraction for whatever organ may happen to be undergoing retrograde metamorphosis at the time of seizure, as if it found in this organ its nidus, and the material for its reproduction.

That the aptitude is exhausted, as a rule, by an attack of the disease, is well known in regard to the exanthemata, and is generally believed to hold true with respect to typhus. I have attended many persons in different forms of fever at different times, but I have never yet attended the same patient in two attacks of typhus; nor have I ever had satisfactory evidence of a typhus patient having suffered a previous attack of the disease. Of the disappearance from the blood of the material capable of conversion by the catalytic action of the poison, Mr. Simon remarks, "that the preparatory and permissive state, is a peculiar chemical state dependent on the presence or the excess in the blood of a material *convertible into identity with the poison;* that the poison thus augmented endeavours to eliminate itself by surfaces, the choice of which is a distinctive mark of each poison respectively; that for a greater or less time after the fulfilment of this eliminative process, *the susceptibility to the disease is exhausted;* and finally, that the severity of the disease in each instance will depend, not on exterior circumstances, but on internal and personal conditions; on the patient's own possession, within the stream of his circulation, of a larger or less abundance of that specific material which constitutes on the one hand his susceptibility to infection, and on the other, his power of expressing the disease. He must necessarily evolve symptoms in proportion to his richness in that which furnishes their material."—*Lectures on General Pathology.*

Not less remarkable is the latter fact, that aptitude or susceptibility is exhausted only in the case of the poison whose attack has been suffered, and that the susceptibility to all others remains undiminished.

This is beyond all question. Scarlatina affords no protection from typhus, variola, or measles; nor does an attack of typhus protect from any other form of fever. It seems to me that we cannot resist the conclusion that each of these poisons finds its own specific material in the blood, each distinct and different from the others.

What the nature of this essential predisponent is we know not, but it seems intimately associated with the presence in the blood of the products of forward and retrograde metamorphosis of tissue, particularly those of the latter. And it will appear, that predisposing causes act by virtue of their power to increase this metamorphosis, either in the system generally, or in some special organ in particular; or, by hindering the elimination from the blood of these products, and thus retaining them in that state of imperfect oxidation which is favourable to their becoming the subjects of zymotic change. We may refer to fatigue and mental emotion as acting in the former mode; and to ochlesis, renal disease, and arrested menstruation, as acting in the latter.

Such is an outline of the theory of predisposition to the action of the fever-poison; whether general, *i. e.*, consisting in an increased susceptibility to its influence; or special, determining the action of the poison to some one organ in particular, and so modifying its primary complications. Strictly speaking, this is, to use the words of Mr. Simon, "not theory, but the simple generalization of facts which lie within the sphere of our daily observation."

The student who wishes to comprehend thoroughly the phenomena of fever, will do well to study the nature and modus operandi of what are termed its predisposing causes; their influence upon the blood and nervous system, and their power of modifying or neutralizing the vital resistance to the action of the poison upon the organism.

I have mentioned that the condition of the organism which constitutes aptitude or susceptibility, is connected with the presence in it, from time to time, of the products of forward and retrograde metamorphosis of tissue; and accordingly we meet with the greatest degree of aptitude, simply considered, in the young, in whom this metamorphosis is most active, and the balance between the forward and regressive changes most easily disturbed.

But although we say the young are susceptible of the action of the poison, we do not imply that they are predisposed in the more strict sense of the term. Predisposition to fever implies, something which interferes with the elimination of the poison before it has set up its specific action; as well as a proneness in the blood, or some material in it, to become subject to this action. Let me illustrate my meaning by an example. A young man has been exposed to the emanations from a fever patient; after exposure he becomes intoxicated. The action of alcohol is to retard elimination both from the lungs and from the kidneys, by checking the excretion of carbonic acid and urea. His susceptibility will be still further augmented, if, during intoxication or its stage of depression, he be exposed to the influence of cold or moisture; such conditions arresting elimination to a greater degree. We know that under this combination of intoxication and exposure, the blood suffers decomposition often to the extent

of necremia or death of a large portion of that fluid, as, for example, in gangrene of the lungs.*

Take another example of this gradation in degree of susceptibility. The female, at the menstrual period, is known to be more susceptible to zymotic diseases than at other times; but if menstruation be checked by cold or a mental shock, about the time of her exposure to infection, she becomes predisposed in a high degree; and in a still higher, if this exposure occur about the puerperal period. In the one case—that of arrested menstruation—a retained excretion furnishes the predisponent, illustrating an observation of Dr. Todd, that "the uterus may be, and often is, a source of contamination of the blood;" while in the other—the puerperal state—the rapid disintegration of the uterus, leads to the accumulation in the blood of effete matter in a state of progress to decomposition, at the same time that it determines the special action of the poison to the organ undergoing such disintegration.

This explanation of the peculiar proclivity of the puerperal female, we owe to Dr. Carpenter, who offers also a

* The following is the testimony of a great physician, as to the influence of these causes in predisposing to fever:—

"Inde enim fit, quod febres hæ hieme potissimum grassentur, et eos quam maxime corripiant, qui pravo victu ac regimine usi, ac præterea, corpus intensius refrigerarunt. Vidimus id ipsa hac hieme, qua ex civibus nostris multi, intemperantiæ in baccho ac venere indulgentes, et traha diutius sub cælo rigido vecti, inciderunt in has febres, et voluptatis dederunt pœnas. Neque etiam ea propter effluvia ex iis, qui his exanthematicis febribus graviter decumbunt, aut mortui sunt, omnes inficiunt promiscuè, sed eos tantum, qui dispositionem ad hujus modi morbum, summam nempe succorum impuritatem gerunt, ceteris, qui ab hac immunes, a contagio etiam liberis."—*Hoffman De Febribus Epidemicis.*

similar explanation of the action of two other predisposing causes, namely, overcrowding and famine.

When I come to enumerate the exciting causes of fever, I shall adduce instances in proof of the power of ochlesis, or the poison generated in the emanations arising from crowded collections of human beings, to cause fever without the introduction of extraneous infection; and also of a similar power to cause another form of fever, in the exhalations from obstructed sewers, cesspools, &c. Inasmuch, however, as both act by producing in the blood an accumulation of matter in a state of progress to decomposition, they must be considered powerful predisposing agencies; and such, in fact, they are, not to fever only, but to all zymotic diseases, especially to epidemic cholera and scarlatina. Did our time permit, I could narrate many instances of the havoc produced by cholera in crowded barracks, schools, and prisons, both in England and in India; and I could give you similar examples of the attraction which the same disease manifested, on each epidemic visitation, for those towns, streets, or dwellings, in which the defective state of the sewerage, or the impurity of the water, furnished a predisposing agency.

Precisely the same may be said of scarlatina, which spreads with extraordinary rapidity and fatality in the overcrowded dormitories of schools, and also in the localities in which civic miasm abounds.

One of the proofs of this action of malaria as a predisponent to fever, is the long period of undefined ill health which often immediately precedes the invasion of fever in a person living in an infected atmosphere. I have known such a state to continue for six weeks before formed disease set in. During the entire time the patient suffered

from capricious appetite, occasional diarrhea, and had daily copious deposits of lithates in the urine. I recently attended a case of typhoid in this city, caused, as there was every reason to believe, by defective sewerage, in which gastric derangement, headache, and langour preceded the attack of fever for at least three weeks, the fever itself running a course of four weeks. A still more decisive proof is afforded by the observations of Dr. Potter, quoted by Dr. Tweedie. He found that the blood drawn from five persons, apparently healthy, who lived in a district in which malarious fever was prevalent, presented the same characters as that drawn from the fever patients (yellow serum and broken-up corpuscles); while the blood of five other persons, residing in a healthy part of the country, presented no such appearance. Again, he bled a young gentleman who had just returned from the country, and found the blood healthy; after fourteen days' residence in the infectious district, he repeated the operation, and found the same appearance as in the fever patients. Of the six persons whose blood had undergone the above change, four were shortly after seized with fever; while two had headache, nausea, and other indications of disease, without formed fever.

I think it is impossible to resist the inference that the condition of the blood, which existed in these cases, constituted a predisponent to fever.

Of the influence of famine, Dr. Carpenter says: "We have not merely that general depression of the vital powers, which is a predisposing cause of almost any kind of malady, and pre-eminently so of zymotic diseases, but also the presence of a large amount of disintegrating matter in the blood and general system, which forms the most

favourable nidus possible for the reception and multiplication of such poisons. And thus it happens that pestilential diseases most certainly follow in the wake of famine, and carry off a far greater number than perish from actual starvation."

Fatigue is a powerful predisposing cause, and of its mode of action, namely, by promoting increased disintegration of tissue, and consequent accumulation of its products in the blood, there can be no question. These effects frequently continue marked throughout the fever. Patients in whom muscular fatigue has been a predisponent, usually present the most formidable forms of secondary blood contamination, and the most remarkable lesions of the nervo-muscular functions, as violent tremor, jerking subsultus, spastic rigidity, and convulsions. Some of you may remember the case of the cattle-dealer from Dundrum, who was admitted into this hospital about two years since, and who presented all these nervous symptoms in the highest possible degree, the jerking subsultus and rigidity of muscles being most remarkable. We found, on inquiry, that subsequently to the rigor which ushered in fever, this man had walked a distance of twelve miles to attend a fair, and having transacted his business, had walked several miles more. Many similar instances of the connexion between muscular exercise and a special form of nervous symptoms, have occurred under our observation in these wards.

In Bright's disease we have a typical example of the influence of certain blood disorders as predisponents; its modus operandi being, the retention in the blood of nitrogenous matter in a state of progress to decomposition, which appears to act as a ferment capable of setting up in the blood, phenomena, so closely resembling typhus or

typhoid fever, as to be not unfrequently mistaken for one or the other.

Of the influence of prolonged exposure to cold and moisture in producing, in a less degree of intensity, increase of regressive metamorphosis of tissue; and in a higher degree, rapid decomposition of the blood itself, we have abundant proofs. Of the former, the experiments of Lehman, Homolle, and others, furnish examples. Lehman found that the effect of remaining in a cold sitz-bath for fifteen minutes, while fasting, was to cause an appreciable loss of weight, and an increase in the amount of urine. The increment in the mere water of the urine amounted to 71 per cent., and that of the urea to 29 per cent.

In a higher degree, and more especially if combined with such causes as retard the elimination of the effete matters from the blood, such as alcohol, the consequence of immersion is, not unfrequently, fever of an intensely septic type. Several instances of this have occurred under my observation. One patient, a young man, was employed by a gentleman, for several hours during a summer day, in wading along a river to search for young wild ducks. Fever followed, marked by oppressed breathing and an extremely rapid pulse. In a few days his skin was covered with petechiæ and vibices; he had uncontrollable epistaxis, and hæmorrhage from the gums, lungs, bowels, and bladder. In another fatal case, the patient, a young man of very intemperate habits, had passed the day in the water, often to his hips, while fishing; after his return home he had a severe rigor, followed by intense heat of skin, stitches in the chest and pains in the abdomen; in a few days a purple typhus rash appeared over the body, followed by numerous boils on the thighs and

arms, which rapidly burst, and discharged a dark tarry blood. When admitted into hospital, a week after seizure, his skin was thickly covered over with petechiæ, and he had hæmorrhage from the nose, stomach, bowels, and bladder. He died on the day following. In a very similar case, which was attended by a friend of mine, a man, of intemperate habits, while partially intoxicated, had bathed in a river, and had afterwards walked a distance of eight miles to his home, where he arrived in a state of great exhaustion. In a few days fever set in, and on the second day of the fever petechiæ appeared, followed, on the third, by dark purple and black spots of very unusual size; discharge of blood from the nose, gums, and bowels followed, and continued till his death, which occurred on the fifth day of the fever.

My friend, Dr. Maguire, of Chapelizod, has favoured me with the particulars of an interesting case of fever, complicated with septicemia, after prolonged exposure to moisture, lately under his care. The fever, which affected four individuals in different degrees of intensity, broke out in a detached cottage in the month of May last, and appeared to him to have had its origin in a large heap of vegetable matter left to decay beside the house, "the smell of which," says Dr. Maguire, "was intolerable, so that I had it removed at once. In addition to this, the patient's bed was so placed that she was exposed during four or five days' constant rain to the dropping from the roof, by which her bed was thoroughly wetted." The consequences were similar to those in the above cases. "About the eighth day," says Dr. Maguire, "her gums began to bleed, and on looking I found her body, particularly the lower extremities, covered with purpuric spots—

distinct from the maculæ. On the day after she had also hæmorrhage from the bowels. Under the use of tincture of perchloride of iron, after two days, the hæmorrhage ceased, the spots began to disappear, and on the fifteenth day she had a distinct crisis, and recovered perfectly, without any untoward circumstance."

I think I have adduced sufficient examples to prove to you, that causes which increase the amount of the products of regressive metamorphosis in the blood, from time to time, whether by increasing the activity of this metamorphosis, or by retarding the elimination of its products, act as predisposing to fever, and to its special complications.

Those causes which act as predisponents, through the agency of the nervous system, are, chiefly, the depressing emotions of fear, grief, shame, anxiety, and the deadening influence of prolonged cold. The connexion between these and the occurrence of fever in the individual subjected to their influences, has occasionally induced some authors to assign to them the power of generating fever, while ignoring its essential cause—a fever-poison. For example, so acute and accurate an observer as Dr. Cheyne describes a class of cases having all the characters of typhus, the causes of which, he states, to have been "loss of property, of character, and wounded pride." "Of such patients," says Dr. C., "a great proportion die. The most remarkable part of the disease is, that it does not spread. I have no recollection of a second case of this kind of fever occurring in a family, and I have never been able to discover that the patient had been exposed to contagion. It would seem to arise solely from mental causes." In such cases I cannot but believe a source of contagion did exist, though not

recognized; and I can regard the mental causes, only in the light of most powerful predisponents, depressing vital energy, and neutralizing that power of resisting the decomposing action of the fever-poison, which is possessed by the healthy organism.

Perhaps the most remarkable instance on record of the action of fear is given by Dr. George Kennedy:—"J. N., aged twenty-six, of remarkably temperate habits, chimney-sweep, left his house in the morning, in perfect health, to assist in sweeping chimneys at Beggar's Bush Barracks. While engaged at his work he lost his balance, and was in the act of falling from the roof of a high building, when he saved himself by clinging to a spout, from which he remained suspended until his strength was exhausted before assistance arrived. On his return home, about two o'clock, he appeared quite well, detailed to his family, with perfect calmness, all the circumstances connected with the accident, but continued to recur frequently, during the course of the evening, to the providential escape he had from death. In the night, he awoke from sleep, excited, and talking somewhat incoherently on the same subject. The following morning he was admitted, in high fever, with violent delirium. He lived twenty-eight days, having become completely paralysed for some time before his death. The delirium continued from the time of his admission till a short time before he died, when consciousness returned for a little, and he recognized his wife."—*Report of Cork Street Fever Hospital*, 1839.

Here we have an instance of a predisponent acting specially upon the great nervous centres, producing not only fever, but also an unusual complication, paralysis.

It is important to bear in mind that the influence of

predisposing causes and of the various forms of predisposition, does not terminate with the invasion of fever; but continues during its course, often determining the nature and seat of its complications and its mode of termination. Generally speaking, if the predisposing cause be mental or emotional, the most profound nervous symptoms will occur in the course of the fever; the seat of most active disintegration being the emotional centres of the nervous system, as instanced in the case I have just read. If it be an arrest of menstruation, the most prominent complication will be the hysterical, attended with marked alteration of the temperature. If Bright's disease, it will be uremia. If immersion during intoxication, septicemia, &c.

The predisposing cause influences the result unfavourably, either by favouring decomposition of the blood; or by lessening the power of resistance to the action of the poison; or, in some instances, by both means. In habitual spirit drinkers, alcohol appears to act by retarding elimination of effete materials, and also by depressing the nervous energy. Prolonged cold, more especially if conjoined with moisture, seems to have this double influence. Renal disease not only predisposes to the invasion of fever, but likewise to a complication in the form of secondary blood contamination; this we shall hereafter find to be of a most serious nature, and usually fatal in its result.

Besides the ordinary forms of predisposition, we occasionally meet with influences which seem to act by impressing, as it were, an exceptional character upon the disease. Such are the cases of individual predisposition or idiosyncracy, and also forms of family predisposition. Not only in in some families is there a peculiar liability to fever, but likewise to the same complications, however unusual these

may be. Dr. Graves observes, that in some families we find a very curious coincidence between the play of the various functions in disease as well as in health. He mentions the case of two brothers who had fever at the interval of a month; each of whom, on the ninth day of the fever and at the same hour, was seized with formidable anomalous symptoms, quite out of the common course; the vital powers becoming suddenly depressed, the heart's action tumultuous and intermitting, and the surface cold. In the course of my life I have met several examples of this family idiosyncracy. Some years ago I attended a gentleman in typhus whose nervous symptoms were unusually severe, and more especially those referable to the medulla oblongata. In particular, he had complete dysphagia, fluids were ejected from the pharynx with the force of a syringe. Several years afterwards his brother was attacked with fever, and presented precisely the same unusual group of symptoms together with complete dysphagia.

In another instance, a young gentleman suffered a very rare complication of typhus—pleuritis with effusion. Some years afterwards I attended his brother in typhoid fever, complicated also with pleuritis with effusion, the right side having been attacked in both. Upon one occasion I was summoned, in great haste, to see a gentleman who was under my care in fever, the patient and his friends having been alarmed by an access of shivering. I ventured to state that this might usher in a crisis of the fever (as, indeed, it did), when I was informed that fever had terminated in the same way in the patient's mother, and some members of his family.

Some years since, three brothers were admitted into this hospital in fever, each of whom had convulsions on

the fourteenth day. In the account of the epidemic of 1847, Dr. Moss states, that in one house three cases of gangrene of the nose occurred. This, however, may have been owing to other causes than the one under consideration. The cases, however, reported by Dr. G. Kennedy, of two sisters who were attacked at the same age with cancrum oris, are illustrative; one having occurred in 1826, the other in 1829.*

These instances may serve to give you an idea of the important part, which family types of constitution sometimes play in the development of fever and its complications.

I have said predisposition may be local or special, as well as general. Not only may the blood be in a condition peculiarly favourable to the action of the morbid poison; but certain portions of the organism may, in virtue of their existing condition, become the special seats of its action; or may manifest comparatively less power to resist this action. The overworked brain of the student is a well-known example of this condition. The nervo-muscular system of the patient who has undergone great fatigue at the period of exposure; and the uterus of the puerperal woman, likewise afford similar examples. The same condition exists in all these, viz.: increased disintegration of the tissue of the organ engaged. Perhaps the most conclusive example of all, is the patient of Dr. Budd, mentioned by Mr. Paget in his lectures on Surgical Pathology, who, having fallen from the mast of a ship upon his nates, and having, soon afterwards, been attacked by small-pox, had a thin crop of pustules everywhere except over the site of former injury, where they were crowded as thickly as possible.†

* Report of Cork Street Fever Hospital, for 1838–39.

† Appendix.

To recapitulate. We have seen, that—

1. In order to produce its specific actions, or formed fever; it is necessary, not only that the fever-poison should be received into the blood, but that it should meet with a material in that fluid capable of becoming converted into a substance identical with itself.

2. That in a few individuals, this material would seem not to exist in the blood with respect to some one or other of the morbid poisons to which these persons appear to be insusceptible under any amount of exposure; the poison being eliminated by the process of excretion.

3. That as a general rule, this susceptibility does exist, but would seem to be exhausted by an attack of the poison, either permanently or for a lengthened period.

4. That this susceptibility though exhausted with reference to the particular poison, remains undiminished with respect to others.

5. That the susceptibility is capable of being augmented in various degrees.

6. That the material in the blood on which it depends, (what may be termed the *essential* predisponent), is probably different in each form of fever, and seems to exist in, or to be connected with, the products of retrograde metamorphosis of tissue, increasing in amount as these are increased.

7. That the predisposing causes are of two kinds. Firstly, those which act immediately, by increasing the amount of the products of disintegration of tissue present in the blood, as ochlesis, malaria, famine, fatigue, cold and moisture; or any other internal condition or external agency which may produce this result by checking elimination of effete matter, as by causing the retention of an excretion. Secondly, those which, by their depressing

influence on the moderating nervous centres, produce, indirectly, the same effect, by lessening the vital resistance to molecular change.

8. That an organ may be said to be predisposed to become the seat of the special operations of fever in one sense, when, as in the case of an excreting surface, it is the normal outlet for the elimination of the matters upon which the poison acts; that in another sense, any organ is predisposed which is undergoing increased waste at the time of invasion of fever; and that the special or local predisposing causes act by producing this increased retrograde metamorphosis in a particular organ.

9. That the nature and amount of predisposition has an important influence, not only on the genesis of fever, but also upon its course, its complications, and its result.

APPENDIX TO LECTURE II.

M. Dauvé relates three cases of typhoid fever, occurring to soldiers who had been two or three months in Algeria, and were much exhausted by forced marches and other fatiguing circumstances. In the first case, a man, aged twenty-three, was admitted into hospital with symptoms of adynamic typhoid, on the eighth day of the disease. He was improving, when, on the seventeenth day after admission, he was seized with vomiting of greenish matter; the pulse rose, and there was found to exist an enormous enlargement of the upper half of the right thigh. As deep fluctuation could be felt, an incision was made through the aponeurosis of the vastus externus muscle, which gave exit to about a quart of blackish brown fluid, mixed with purulent sanies and large black clots. The patient died the next day. On post-mortem examination, the special intestinal lesions of typhoid fever were discovered. The liver and spleen were greatly enlarged. In the thigh was a cavity as large as the fist, formed by the aponeurosis of the vastus externus, which muscle in that region was reduced to the condition of a blackish pulp. The inflammation extended but a short distance downwards, however the whole of the upper part of the muscles were affected in various degrees. There were found hyperæmia of the interfibrillar areolar tissue; discoloration and friability of the muscular fibres, which were surrounded by a dark red exudation; rupture of blood vessels, hæmorrhages, blackish soft and defibrinated clots; and a reddish yellow pus, sometimes disseminated, sometimes collected in small abscesses. In no part was there found the yellow healthy pus arising from suppuration of the cellular tissue; but yellowish points, not yet liquified, denoted the fatty degeneration of the muscular fibres. There was no inflammation of the gluteal or inguinal regions, or within the pelvis. In one of the other cases, the recti muscles were the seat of clots, and their muscular fibres were destroyed; while in the third, who died on the thirtieth day, the internal obturator, pyriformes, gemelli, and levator ani muscles, were found to be the seat of clots, and the right obturator internus contained also purulent sanies.

None of these patients had scurvy, and M. Dauvé attributes the lesion described, to "the influence of the insalubrious state of the camp, together with cold and wet."—*Sydenham Society's Bi-ennial Retrospect for* 1865-6.

I have met with several examples similar to the above, in persons who had undergone great muscular exertion at the commencement of fever. In one farm labourer, who mowed for a day after he had sickened with fever, a quantity of pus was found, after death, in the right shoulder joint and deltoid muscle, and in several of the internal organs, especially in the spleen and in the pelves of the kidneys. In another, a lad of fifteen, large collections of purulent sanies formed in the shoulder joint, and under the knee of the right side. The post-mortem appearances in this case were precisely those described by the late Dr. J. M'Dowell in the third volume of the *Dublin Medical Journal*, first series.

LECTURE III.

ETIOLOGY—EXCITING CAUSES.

At our last meeting I entered into the consideration of predisposition to the influence of the fever-poison, and of what are termed predisposing causes. To-day we have to consider the exciting causes, or the sources from which the poison is derived. The study of these is important, not only from the fact of its bearing upon prophylactic or preventive measures, but also with reference to the classification of fevers. If it could be proved that there is but one source of continued fever, such a fact would be a strong argument for the unity of species of fever. If, on the contrary, it should appear that the disease may arise from several causes, essentially different in their nature and effects upon the organism, we shall be led to regard these effects as constituting several distinct species of fever. These considerations are entirely distinct from, and irrespective of, the differences in symptomatology and pathology, which we observe in our clinical study of fever, and to which I am in the daily habit of inviting your attention; and I shall, accordingly, defer any argument on the vexed question of unity or diversity of species, until we have investigated that portion of the subject, and are prepared to give their due weight, to considerations derived from the clinical observation of the three forms of disease which we meet with in our fever wards from time to time;

namely, infectious typhus; endemic, enteric, or typhoid fever; and the relapsing synocha, which has been epidemic for a season at different periods during the present century; the last being the so-called "famine-fever" of 1847–8–9.

In the meantime, as it seems to me that the history of fever, during a long series of years, furnishes conclusive evidence of the causal relation between all these forms of disease, and certain conditions of persons, places, and epidemic periods; I shall draw your attention to the facts bearing on the etiology of fever—first, with reference to the conditions under which it has occurred; and, secondly, to the forms of disease which have been observed, from time to time, under these conditions. In a review so extended, I must needs draw upon the testimony of many observers; but I shall advance nothing of which I have not myself witnessed examples, in the course of a long experience combined with a tolerably close observation.

If, then, we institute inquiries as to the sources of fever in one of our great cities—in London, Edinburgh, Dublin or Glasgow—we find certain localities rarely, if ever, free from fever of a contagious type capable of deportation and diffusion elsewhere by an infected person. If we investigate the conditions under which this fever arises, we find, uniformly, the co-existence of close ill-ventilated dwellings crowded with human beings; want of cleanliness and of sufficient clothing; and frequently scarcity of food and of fuel; and in times of poverty (and consequent depression of strength and spirits, arising from want of employment), we observe that the fever, which was previously confined to a small number, spreads with rapidity, and becomes more malignant in its type.

Again, in the same or similar localities; or in other situations where the conditions of over-crowding and wretchedness may be wanting, but in which sources of malaria exist in the forms of defective sewerage, open cesspools, half-dry sides of rivers, and such like foci of what is termed "civic miasm;" fever not unfrequently breaks out, in the course of a dry summer and autumn, as an endemic disease, prevailing in, but confined to the locality; seeming to be capable of deportation to a very limited extent, if at all; and manifesting a contagious property in a very feeble degree as compared with that just described.

Again, at different periods, coinciding usually, but not uniformly, with times of scarcity of food, fever will appear and spread with great rapidity among the poor in these crowded localities; but no longer confining itself to them, or depending on deportation from them for its diffusion, will spread by atmospheric influence, as it would appear, rapidly over the country, breaking out almost at the same time in places far remote from each other—as, for example, when it appeared at the same time in London, Galway, and Silesia in 1847.

It needs but a cursory review of these several conditions under which fevers originate from time to time, to satisfy us that they are essentially different and distinct in their nature and modes of operation.

With regard to the first of them, we shall find that the influential conditions appear to be the generation and retention of the effluvia emanating from a number of living beings; the circumstances which favour the generation of the poison being, cold, want of fuel, bad ventilation, and in many instances depression of mind.

A number of histories of epidemics of fever thus originating in barracks, prisons, and other crowded dwellings, have been published by Palloni, Peebles, Ferriar, Murchison, and others, to which I must refer you; but one of the clearest and simplest narratives, as well as one of the earliest, is given by Dr. Hunter, which I shall quote:—

"In the month of February, 1779," says Dr. Hunter, "I met with two examples of fever, in the lodgings of some poor people whom I visited, that resembled in their symptoms the distemper which is called the jail or hospital fever.

"It appeared singular that this disease should show itself after three months of cold weather. Being, therefore, desirous of learning the circumstances upon which this depended, I neglected no opportunity of attending to similar cases. I soon found a sufficient number of them for the purposes of farther information.

"It appeared that the fever began in all in the same way, and originated from the same causes. A poor family were lodged in a small apartment, not exceeding twelve or fourteen feet in length, and as much in breadth. The support of these depended on the daily labour of the husband, who with difficulty could earn enough to purchase food necessary for their subsistence, without being able to provide sufficient clothing or fuel against the inclemencies of the season.

"In order, therefore, to defend themselves against the cold of the weather, their small apartment was closely shut up, and the air excluded by every possible means. They did not remain long in this situation, before the air became so vitiated as to affect their health, and produce a fever in some one of the miserable family. The fever

was not violent at first, but generally crept on gradually; and the sickness of one of the family became an additional reason for still more effectually excluding the fresh air, and was also a means of keeping a greater proportion of the family in the apartment during the day. Soon after the first, a second was seized with the fever, and in a few days the whole family, perhaps, were attacked, one after another, with the same distemper. The slow approach of the fever, the great loss of strength, the quickness of the pulse, with little hardness or fulness, the tremor of the hands, and the petechiæ or brown spots upon the skin, to which may be added the infectious nature of the distemper, left no doubt of its being the same with what is usually called the jail or hospital fever. It would appear there is no great power of infection in the body alone, provided the air be not confined. Cold is the cause of the air being confined, which gives rise to the poison; and thus directly opposite to the opinions usually received, there is more danger of producing this disease in a cold country, and in a cold season of the year, than in a warm one."

It has long been disputed, whether the poison thus arising among crowded collections of living beings—ochlesis—is capable of generating typhus, or whether it is merely a powerful predisposing cause requiring extraneous infection to produce this result. That it acts in the latter mode, cannot be questioned. That it is capable of generating, *de novo*, the typhus-poison, is, I think, also proved by a body of evidence which should carry conviction to any unprejudiced mind. Exactly as scarlatina breaks out spontaneously in the over-crowded dormitories of schools —an occurrence certain to follow from this cause—so in

over-crowded lodgings, barracks, and gaols, will typhus appear, no evidence or suspicion existing of contagion from without. Numerous instances of this have been collected by Dr. Murchison, to whose work I must be conten to refer you. I may, however, mention a fact of some importance, namely, that in several well authenticated instances, persons brought out of these crowded collections of human beings have communicated fever to others, without having themselves been affected with the disease.*

Fever thus generated by ochlesis, is rapidly diffused by contagion. The records of the disease show that those are the most certain to suffer who are most exposed to infection. Medical students frequently furnish examples of this property of typhus, so do physicians and nurses, all being brought into close contact with the sick. Those servants whose duty it is to carry away and wash the clothes of fever patients, suffer in an equal proportion. During one epidemic in Edinburgh, Dr. Christison states that of thirty-eight nurses only two or three escaped; and of fifteen gentlemen who filled the office of resident clerk, but two escaped. In the London Fever Hospital, Dr. Tweedie tells us, the laundresses, whose duty it is to wash the patients' clothes, are so invariably and frequently attacked with fever, that few women will undertake this duty. Drs. Reid and Cheyne both state, that in 1817, not a single person appointed to receive the clothes of the sick escaped the disease.

But you will meet, from time to time, men of curiously constituted minds, who are not satisfied with this kind of evidence of contagion, strong as it is. There is, however,

a fact in the history of fever which should be conclusive; it is the spread of the disease by deportation. In other words, we consider infection to be proved, if the individual who communicates the disease goes from the place where he resides to the spot where the healthy person is, and there infects him.

Many years since I had a very striking proof of the vast influence which the deportation of an infected person might exercise. In two years, 1835-6, there were admitted into a fever hospital of which I had the charge, only 363 cases of fever, all of the abdominal type, none of which appeared to have arisen from contagion. From this time to the end of 1838, the number of such cases continued about the same, while the total number of admissions increased to a thousand in the two years; the difference having been owing to an increasing number of cases of typhus, brought exclusively from two districts which were about fourteen miles apart, and about equidistant from the hospital. Being at the time much interested in the subject of the origin of fever, I instituted careful inquiries as to the source of these local epidemics, and I was satisfied that they originated from two cases of imported infection. In the first, a young man had arrived in this country from America after an unusually rapid voyage, during the whole, or nearly the whole, of which he had been indisposed. On landing he was immediately removed to his father's house, and on his arrival there was seen by a medical man, who pronounced his disease to be fever. He died on the second day after his arrival. The father's house and neighbourhood had been quite healthy previously, but in two days after his son's death the father sickened, and on the day following the young man's sister was attacked.

She communicated the disease to her husband, whose residence was half-a-mile distant. The latter was attended by his brother, who likewise caught the disease, and was sent into hospital. The father was visited, before his death, by a brother who resided nearly two miles distant; and who, on returning home, sickened, and communicated the disease to his son. A brother of the importer contracted the disease, apparently from his father, and died, as did all the above persons, with the exception of the one who was sent to hospital. In short, of this family, eight out of nine persons were infected, and seven died. I learned that in the course of a short time several other families were completely exterminated. The fever spread with a rapidity and fatality perfectly unprecedented, and long prevailed in the town and neighbourhood to which it had been thus carried. Altogether its victims numbered more than one hundred persons.

In the second case, the daughter of the man first admitted into hospital was a servant in Dublin, where she contracted typhus, then prevalent here, and died. Her brother visited her, and remained till after her funeral; he sickened, returned home, and there died of what was described to me as a long spotted fever. After his death, seven individuals of the family sickened within a day or two of each other, and were sent to hospital, where the father died; several of the others passed through very severe fever. Typhus spread from this house to the immediate neighbourhood, and subsequently to the surrounding country.

Many other instances of imported contagion might be adduced, but I have selected these on account of their wide influence, and the conclusive evidence they afford as to the infectiousness of fever of this type—exanthematic typhus.

The characters of the disease thus generated by an animal miasm, whether spontaneously in jails, barracks, and over-crowded lodgings, or introduced from without and spreading by infection; present a striking uniformity in all times, places, and seasons. The typhus described by Huxham, Pringle, Hunter, Burserius, Hoffman, Palloni, Hildenbrand, and Copland, is the same, in every particular, as that which Murchison and Jenner have recently so accurately delineated, and which prevails in London and Dublin at the present time. It appears to me that it has been rightly classed by Hoffman, Copland, and others, among the exanthemata, to the laws of which it will be found to conform in most, if not all, particulars. The frequency and uniformity of the eruption is as marked as that of scarlatina; the alternation of the irritation of the air passages with the exanthem, resembles that of measles; the eruption fades, if the bowels be much acted on, exactly as it does in the other exanthemata; like them, the disease once commenced, runs its determinate course; and, like them, becomes infectious at its acme, and still more so after its crisis, it being a well-ascertained fact that a large proportion of cases of contagion occur during convalescence. Finally, like them, it confers immunity from future attacks in the vast majority of instances. Its characters have been well summed up in the definition of Dr. Peebles:—"This contagious febrile eruption is an exanthematous affection —the production of human effluvia—where society is placed in circumstances favourable to its development, and should be considered the effect of a poison, *sui generis*. It arises from a miasm which generates in the human body an eruptive fever, distinct from all others, as other exanthemata are distinct."

The second of the sources of a fever-poison is most frequently met with in large towns, and hence has been termed by some "civic miasm;" but it is by no means confined to towns; some of the most remarkable outbreaks of endemic fever have occurred in country districts, and even in isolated houses. The essential condition was, however, the same in all the instances which I have met with or have read of, viz., either the diffusion in the locality—whether a room, a house, or a yard containing several houses—of the gases arising from fœcal matter undergoing decomposition in a sewer, a cesspool, or on the banks of a half-dry stream; or the drinking of water contaminated by sewage matter. In many of the recorded instances of this endemic fever, there was no over-crowding, want of ventilation, or of personal cleanliness, and the disease affected rich and poor alike; and, unlike infectious fever, it did not usually commence in the winter, but rather in the summer and autumn, subsiding on the advent of the rains of winter, and seldom, if ever, being carried out of the locality and diffused elsewhere. One of the most striking points of difference between this and the exciting cause we have before described is, that while the segregation of a typhus patient is found to arrest the spread of that disease, the same measure has no such influence upon the endemic fever arising from malaria. On the other hand, while I do not doubt that the fever-poison originally received from civic miasm may be reproduced in the blood of the patient, and diffused by contagion, yet I have reason to believe that the contagion is always feeble in comparison to that of typhus and the other exanthemata, and that the spread of the disease in a locality is seldom, if ever, due to this cause. You are, perhaps, aware that Dr. W.

Budd maintains, that it is diffused by infection through the medium of the alvine discharges of the sick. Some of the instances he gives are apparently conclusive; but on this question I must refer you to his papers in the *Lancet* for December, 1856; or to Dr. Murchison's chapter on the exciting causes of pythogenic fever, in which it is fully and ably discussed. I apprehend, however, that if called to attend a case of enteric fever in an ill-drained house, you were to confine your preventive measures to the removal and disinfecting of the patient's excreta, as recommended by Dr. Budd, you would certainly fail in checking the diffusion of a disease which has its primary origin in sources without the body—in the decomposing fœcal matters of sewers, cesspools, &c.

I could detail a large number of instances of the outbreak of fever which have occurred from this miasm under my own observation, both in Dublin and in the country; but I would rather refer you to the decisive cases detailed by Dr. Murchison. The Croydon fever, the Windsor fever, the Bedford fever, the Birmingham fever; were all examples of pythogenic, typhoid, or enteric fever, as it has been variously termed by various writers.

Of the characters of the fever produced by fœcal miasm, it may be remarked, that the elective affinity of the poison seems to be for the blood-making organs; Peyer's glands, the mesenteric glands, the spleen, and the lungs, being each the seat, in turn, of its operations. When received into the blood in a concentrated dose and of intense virulence, it seems to kill with a rapidity resembling that of the concentrated poison of typhus; producing an effect on the brain similar to that of a narcotic poison, but, unlike typhus, leaving, even at this early

period, the traces of its specific action on the intestinal follicles and mesenteric glands.

Thus, for example, in the remarkable outbreak which followed the opening of a drain at the school at Clapham; one boy died comatose in twenty-three hours from the seizure; another died in twenty-five hours; but the post mortem examinations disclosed tumefaction of Peyer's patches and of the solitary glands (ulceration in one case), and congestion and enlargement of the mesenteric glands.

Dr. Murchison relates a most decisive case of enteric fever originating in the emanations from a cess-pool, which proved fatal in forty-seven hours, and in which the solitary glands and Peyer's patches were enlarged, and infiltrated with a yellowish deposit; while the mesenteric glands were the size of hazel nuts, and congested.

It cannot be questioned that cases of fever are met with from time to time, though unfrequently, in which the phenomena of both forms of disease are present in the same individual; and also, that instances have occurred, where amongst several members of the same family one has presented the distinctive characters of typhus, and another those of typhoid fever. Two explanations of these exceptional cases have been offered. By the one, it is assumed that both forms of disease arose from the same poison, derived from the same source—contagion—and were varieties of the one species. By the other, it is assumed, that in the locality two sources of fever-poison were present, namely, ochlesis and fœcal miasm; that in one member of the family the former poison produced the fever; in another, the latter; while in a third, both set up their operations at the same time, or in rapid succession, the characteristic eruptions being seen together, or one after the other.

In a paper on the co-existence of several morbid poisons, in the twenty-fourth volume of the *Medico-Chirurgical Review*, Dr. Murchison gives several most illustrative cases of this latter hybrid disease.*

Sir D. Corrigan gives an admirable example in the tenth lecture of his work on fever.†

Besides the two above sources of fever, originating in the same locality, and either continuing as the endemic disease of the locality, or diffused around it, or carried from it by contagion; I have mentioned a third mode of origin of fever, observed at periods of uncertain interval, in which bad harvests and want of food have been succeeded by the rapid spread of disease over a wide extent of country, or by its simultaneous outbreak in distant parts of the same or different countries. It is obvious that a condition affecting only part of a country, like the famine of 1847, cannot be the sole or invariable cause of such a general outbreak of fever. We must, therefore, admit the existence of a third exciting cause of fever—viz., what has been termed atmospheric or epidemic influence.

We recognize this influence in the simultaneous outbreak or decline of fever in distant places, the fever being of uniform character in all; in the tendency to peculiar complications during the period; and in the fact that concurrent diseases frequently present some of the characters of the fever of the period.‡

The epidemic of 1847–9 corresponded in time with the famine of that period, and so it is often called the famine-fever; but a little consideration will show that this was rather

* Appendix (2.) † Appendix (3.) ‡ Appendix (4.)

a coincidence than a strictly causal relation. No doubt, famine is a powerful predisponent to this fever as well as to typhus, but relapsing synocha has, like typhus, prevailed as an epidemic when no famine existed.

Such was the case in Scotland and in parts of Ireland in 1844. The same form of fever which spread universally in 1848–9, prevailed as an epidemic in Belfast, Galway, and Meath, in 1844–5; the fact has been recorded by Dr. Seaton Reid of Belfast, Dr. Lynch of Loughrea, and by myself.* In both periods, the yellow tinge of skin was prevalent; the same congestions of the liver, stomach, and spleen; the same sudden and violent onset, early crisis, and frequent relapse; and as, during epidemics of cholera, a choleraic tendency has been observed in other abdominal affections, so, during this epidemic, I observed the same icteroid tinge in different blood diseases —several instances of scarlatina, for example, having occurred, in which the yellow skin and scarlet rash were present together.

In a country and amongst circumstances presenting the conditions for the generation of every form of fever, it could not be expected that any one form should prevail to the entire exclusion of the others; and accordingly we find, that during the three great epidemic periods of 1817, 1826, and 1848, the several observers describe each form as that prevailing in different places. This was particularly the case in 1848, when in over-crowded prisons and workhouses, typhus constantly prevailed at the same time with, or subsequent to, the relapsing fever. Of the essential difference between the two there could be no better

* Report on Epidemic Fever, Dublin Quarterly Journal, vols. vii. and viii.

proof than that the one afforded no immunity from attacks of the other.

To sum up our observations upon the etiology of fever, we believe that two conditions must exist for its production. (1) A morbid poison derived from animal miasm, from fœcal miasm, or from epidemic influence. (2) The presence in the blood of a variable proportion of matter in a state of retrograde metamorphosis—the true nidus of the fever-poison—upon which its catalytic action is exerted, and in which it is augmented and reproduced.

It would appear that the predisponent is necessary, inasmuch as we have proof that persons may be exposed during a lengthened period to the imbibition of the poison, more especially of civic miasm, and may eliminate it from day to day, until the action of cold, of spirits, of a mental shock, or of an arrested excretion, may cause a sudden increase of decomposing matter in the blood, when fever at once follows. It would appear that some of the so-called exciting causes, such as cold, really act by suddenly increasing the existing predisposition; either by their directly increasing the amount of disintegrated material, or by their indirectly effecting this in consequence of their depressing action upon the nervous system.

With reference, then, to the relation between the above described conditions and the different forms of fever, it may be assumed to be proved, that a person previously healthy but susceptible of the influence of fever, will receive the infection of typhus if exposed to the emanations from a typhus patient, and, by the reproduction of the poison in his blood, will become a source of infection to others.

We think it has been proved, that breathing the emana-

tions from crowded collections of human beings in ill-ventilated apartments, is the most powerful predisponent to typhus, and that ochlesis is capable of generating the poison *de novo*.

We think there is a body of evidence of the most conclusive nature proving, that the decomposing fœcal matters of sewers and cesspools generate a poison capable, under certain conditions, of setting up fever of the abdominal type, It appears that this latter is strictly an endemic disease —the fever of the locality. However generally it may prevail during hot and dry summers, it really is not diffused by infection, but has a focus in each locality; while the former, being carried from place to place, may be so rapidly diffused by infection, as to become a *quasi* epidemic; but the true epidemic fever of this country is relapsing synocha, called also famine fever. That this has sometimes appeared in a form pure and unmixed, so as to be readily recognised, as in Scotland, in 1843; but that, on most occasions, one or both of the former fevers have also prevailed during a portion of the epidemic period, and so have been confounded by some observers with the true epidemic fever, while others have recognised and pointed out their separate co-existence.

There appears good reason to believe that the fevers produced are as distinct and different as the sources which give rise to them. Exposure to the infection of typhus will produce typhus only, while exposure to malaria produces typhoid or enteric fever; and one does not confer any immunity from the other. But last summer you saw a female patient in this hospital who presented the rose-coloured patches, and other symptoms of typhoid, return to the same bed within a month after convalescence,

with exquisitely-marked typhus. No fewer than three similar cases have occurred during the present spring. The converse occasionally happens, the patient usually manifesting the phenomena of typhoid during the latter stages, or immediately on the subsidence of typhus, as in the case I have referred to by Sir D. Corrigan.

During the different epidemic periods, abundant proofs have been afforded that relapsing synocha confers no immunity from typhus, and *vice versa*. In 1848, I had under my care twelve individuals, who, after recovery from typhoid contracted typhus in the convalescent ward of the hospital, and were re-admitted to the fever ward, either before or soon after their discharge from hospital.

In the same year, a professional friend, whom I attended through a most severe attack of relapsing fever, was, in less than three months afterwards, attacked by typhus, with profuse eruption. Some years subseqnently I was called to see this gentleman in well-marked typhoid.

At our next meeting I shall proceed to the clinical study of these different forms of fever; however, as I do not intend to give you didactic descriptions of them, such as you will find in books, I shall not pursue the plan of treating each form separately; but while endeavouring to build up in your minds a concrete idea of febrile phenomena as "a whole," I shall constantly keep in view the differences presented by diseases, one of which kills by its action upon the blood and nervous system, without producing appreciable local lesion; another which is characterised by its determinate and constant local lesions; while the third presents phenomena peculiar to itself and differing from the others.

APPENDIX TO LECTURE III.

(1.)

The fact alluded to is mentioned by Fordyce and other old writers on fever:—

"The infectious matter," says Fordyce, "produced by a number of men living in a small space, as well as that produced by fever, may adhere to a person in perfect health, so as to be brought into another place, and communicated to a whole assembly, as has been too often proved by a felon brought from gaol into a court of justice, and infecting almost the whole of the persons assembled, and that even when the felon himself was perfectly free from fever, and never had been affected by the disease.

"It often happens when numbers of persons are confined together in a small space, that putrescent substances are not thoroughly cleared away; hence a person brought out of a gaol where putrescent substances have been accumulated, carries with him substances of a peculiar smell. Hence some have supposed that the infectious matter produced in this last way had sensible qualities. This is undoubtedly not the case, since the infection has arisen from a person brought out of rooms in which numbers had been confined for several months, but kept clean from all putrescent matter, so that there was no particular smell or other sensible quality. In one case that came under the observation of the author, a person under such circumstances, from whom no peculiar smell arose, or any other sensible effluvia, communicated the infection to four others with whom he was carried in a coach for about half-a-mile, so as to produce fevers in all of them, which fevers were violent and fatal."*

Dr. Ferrier includes moral causes—*e.g.*, anxiety and depression of spirits—in his enumeration of the influences which generate animal poisons, "because it is not proved that the mere confinement of the effluvia of clean and healthy persons, free from mental uneasiness, can become poisonous."

* On Fevers. vol. i. p. 114.

The following remarkable case of the origin of fever from a single person under such circumstances, is related by Dr. Harty:—

"A gentleman was suspected of having confined and ill-treated his wife. At length two gentlemen, one of them a clergyman, having obtained the necessary authority, visited the house, and examined every apartment for the wretched object of their humane search—at first in vain; but at length a small closet door attracted their notice, and having insisted on its being opened, both gentlemen eagerly entered, and as precipitately retreated. One was immediately seized with vomiting; the other (the clergyman) felt sick and faint. After a little they recruited, and called the wretched woman from her prison hole, in which she had been for weeks immured It was a small dark closet, without *light or air*, and in it she had been immured without a change of clothes. At the end of a week both gentlemen had fever; both took to their beds almost on the same day. The clergyman died, and the other recovered with great difficulty, after a severe struggle. Both cases were alike throughout, except in the termination. The woman had not then or afterwards any febrile disease, and had been free from any at any period of her confinement."—*Harty on Fevers*, page 163.

(2.)

The following observations of Dr. Murchison on this occasional co-existence of the two eruptions, are worthy the attentive consideration of the student of fever:—

"The doctrine of the compatibility of two of the exanthemata, has an important bearing upon that of the non-identity of typhus and pythogenic fever. They who maintain that the poisons of the two fevers are identical, have appealed triumphantly to certain cases in which they have observed the eruptions of the two fevers to co-exist. Now, allowing for a moment that the facts in all these cases have been correct, the conclusions which have been drawn are based upon a doctrine which is utterly fallacious. The co-existence of two eruptions no more implies an identity of the two diseases, than it does in the case of variola and scarlet fever, or of scarlet and pythogenic fever. But there can be little doubt, that in the majority of cases the facts themselves, from the manner in which they have been described, must be viewed with no small distrust. On few subjects does so much confusion prevail in the profession, as

with regard to the eruptions of continued fevers. A very common mistake is to imagine that petechiæ constitute the characteristic eruption of typhus, a mistake which has been strengthened by petechial fever—being one of the appellations applied to the disease—and it has been argued from a patient presenting both 'rose spots' and 'petechiæ,' that the eruptions of pythogenic fever and typhus have co-existed. But petechiæ do not constitute the characteristic eruption of typhus; and they are met with in the course of pythogenic fever, in the same way as they show themselves in the course of variola, scarlatina, and many other affections. All they who have had much practical experience in studying both typhus and pythogenic fever, will admit that it is excessively rare to find the measly eruption characteristic of the one, co-existing with the rose spots characteristic of the other.

"In my essay upon the etiology of continued fevers, published in the Medico-Chirurgical Transactions (vol. xli. p. 275), I expressed an opinion that such a co-existence was possible; but I maintained then, as I do now, that no argument could be based upon such a co-existence as to the identity of the typhus and pythogenic poison, any more than we should employ a similar argument to show that variola and scarlet fever, or scarlet fever and pythogenic fever, were one and the same. I shall now proceed to detail the facts which testify to the possibility of typhus and pythogenic fever co-existing.

"Such facts might be naturally looked for under circumstances in which a patient labouring under the one disease has been exposed to the contagion of the other; as, for example, in the London Fever Hospital. When the doubtfully contagious character of pythogenic fever (already alluded to) is remembered, it will not be wondered at that patients admitted with typhus have seldom contracted the former disease. During a period of ten years I have only been able to find the notes of two such cases. One was that of a female, aged twenty-one, who, with seven others of the same family, was admitted with well-marked typhus, and who, in the third week of convalescence, had an attack of pythogenic fever, the symptoms of which, however, were mild and not very characteristic. The second case will be shortly alluded to. On the other hand, it has been by no means rare for patients admitted with pythogenic fever to contract typhus during their stay in hospital. But in most cases this has been in the fifth to eighth week of convalescence

from the first fever, and two or three weeks after the patients have been removed to the convalescent ward—a circumstance which is explained by the patients in the convalescent wards being thrown into more intimate relations with one another, and by typhus being avowedly more contagious during convalescence than during the height of the disease. In the following instances, however, the eruptions and other symptoms of the two diseases were almost contemporaneous.

"Illustration XLIX.—A female, aged twenty-two, had an attack of pythogenic fever, which was attributed to the putrid emanations from a bad drain. She was admitted into the London Fever Hospital. The primary attack lasted three weeks. After a fortnight she had a relapse, with a return of the 'rose spot;' and the day after this there was a subcutaneous 'typhus mottling,' along with drowsiness, heaviness, and other symptoms of typhus.

"Illustration L.—A male, aged twenty-five, was admitted with well-marked pythogenic fever.

"On the twenty-seventh day there was a great aggravation of the symptoms, with much headache and stupor; and in addition to several rose-coloured spots, there was a distinct subcutaneous mottling. The diarrhœa still persisted. Four days later the subcutaneous mottling had become developed into a well-marked typhus rash. The patient recovered.

"Illustration LI.—A female, aged twenty-seven, was admitted on the third day of an attack of typhus. The rash began to fade about the fifteenth day, but there was no abatement of the general febrile symptoms. On the eighteenth day there was watery diarrhœa, tympanitic abdomen, and several rose spots. The latter symptoms continued for about a fortnight, after which the patient gradually recovered. It not unfrequently happens that patients are exposed to the poisons of both typhus and pythogenic before their admission into an hospital. In my researches, elsewhere published, I have endeavoured to show that the poison of pythogenic fever is generated in the emanations from decaying animal matter, and that of typhus by the respiration of an atmosphere charged with the exhalations of living bodies, although in the majority of cases the latter disease is propagated by contagion.

"Now, if a certain poison can generate one group of symptoms, and another poison can generate another, surely it is but reasonable to expect that a combination of the two poisons may give

rise to a morbid condition of an intermediate character, without its being necessary to conclude, from the existence of such a hybrid affection, that the first two morbid conditions have been merely different manifestations of the same poison."*

(3.)

The following highly illustrative case and observations I extract from Sir D. J. Corrigan's "Lectures on Fever":—

"Mary Cope, ætat twenty-two, previously in the enjoyment of the best health, was admitted into the Hardwicke Fever Hospital, on the 23rd January, ill of maculated fever. There was nothing unusual in her case. She was soon marked convalescent; when, on the 5th February, fourteen days before her death, she complained of debility and of diarrhea; her tongue became brown and dry in the centre, but not furred; there was no tenderness of abdomen, nor tympanitis, but there was gargouillement over the cœcum; and the stools were like gruel, but neither mucous nor bloody, nor was there any tenesmus. The pulse became quicker and weaker. On the 18th February, she required wine in considerable quantity; the diarrhea became uncontrollable. On the 19th February, fourteenth day of the attack, she died.

"*Post-mortem Examination.*—The peritoneal covering of the abdominal viscera was sound, but the ileum and a portion of the colon presented follicular enteritis in all its stages. The greatest intensity was at the ileo-cœcal valve, the entire circle of which was occupied by a depressed, jagged, greyish, irregular ulcer. In the ileum, both the isolated follicles and the 'glandulæ agminatæ,' or glands of Peyer, were attacked. The sites of the affected 'glandulæ agminatæ' were marked by oval ulcers, while around and above them isolated follicles were seen in similar ulceration, but not to such a degree. In addition to these ulcerations, the isolated follicles in both the lower portion of the ileum, and the upper portion of colon presented every stage of the disease. Some follicles were just protruding under the mucous membrane, filled with a cheesy-looking purulent matter, the mucous membrane around being swollen, red, and prominent, and from the orifices of the follicles, looking like depressions; those follicles bore a strong resemblance to variolous pustules. In others the matter was in such quantity

* "British and Foreign Med. Chir. Review," vol. xxiv.

that the affected follicles presented the appearance of spherical projections, attached by pedicles, and covered with mucous membrane, hard and firm to the touch, while in others, still more advanced, the follicles had gone on to ulceration, destroying the mucous membrane, and leaving only a grey slough of cellular tissue in the place of the follicle itself. The appendix vermiformis was swollen and congested, and, on being slit up, was found distended with a tenacious purulent fluid, and some of the mesenteric glands were infiltrated with purulent matter. This was a case of great rapidity and of equal severity. In most cases the disease is bounded by the ileo-cœcal valve. In another case, occurring about the same time, which ran a longer course, the lower part of the ileum was found extensively ulcerated, the ulcers presenting different appearances; some of them presenting the striking resemblance already described to the pustules of variola, others having the appearance of white cicatrices, as if traced out by a snail traversing a zigzag course along the mucous membrane; while others again, with loss of substance in the centre, but with soft pulpy areolæ, projected above the surrounding mucous surface. In this case, as is most usual, the disease was confined to the small intestine.

"This disease may be of every degree of intensity, proving fatal within ten or fourteen days, or verging into convalescence within two or three weeks; or, when there has been more extended disease, occupying even months in its progress and cure. It is in its most acute form that it bears the strongest resemblance to typhus, from the sudden prostration of strength, dry and furred tongue, maculated appearance of skin, and accompanying delirium. We have already, in our first Lecture, sufficiently shown, I hope, that there is no necessary connexion between this disease and typhus. We need not revert to this. But we must not forget that this disease, like any other, may take its origin in the course of a case of typhus, or may occur quickly supervening, as in Cope's case; in other words, that while typhus exists without it, typhus gives us no surety against the complication or supervention of this disease Follicular enteritis, of moderate degree, and typhus, cannot continue, '*pari passu*,' because typhus must either terminate life, or terminate itself in crisis within a few days, while follicular enteritis, which has arisen during typhus, will continue, after the disappearance of typhus, to run its own course of weeks, or perhaps

months. If follicular enteritis occur early in typhus, as one of its complications and of great severity, as in Cope's case, death may take place, from the combined effect of the two diseases, within a very few days: but still the connexion between the two, typhus and follicular enteritis, is merely incidental, and is not essential." —*Lecture* x.

(4.)

On the subject of "epidemic," or, as he terms it, "pandemic influence," I would recommend the paper of Deputy Inspector-General Lawson to the student's notice. From an elaborate review of the history of a number of epidemics in various countries, Dr. Lawson concludes:—"The facts detailed above, showing the regularity and progression of the oscillations of febrile disease at so many points of the earth's surface, far removed from each other, and embracing the continued, remittent, and yellow forms of the disease, leave no doubt as to the operation of some cause equally extensive. There seem to be a series of waves generated in southern latitudes, which flow to the north or north-westward in succession, leading to an increase of fever at every point over which they pass; and in some instances they are so close that Canada is under the influence of one, the West Indies of the following one, and a third is apparent at the Cape. The atmospheric vicissitudes or local influences to which epidemics are so often referred, confined as they are to limited tracts, are quite insufficient to account for such widely-spread effects, though, when the general cause is operating, these local causes are found most influential in generating disease within their sphere of action. A cause extending over continents and seas, as this does, is more correctly designated 'pandemic' than 'epidemic;' and as the latter term has come to be applied to every local outbreak, and very often without any attempt to distinguish between an epidemic and a mere increase in the ordinary endemic disease of the place, it would be well were 'pandemic' to come into use, to indicate that more general influence to which all the others are subordinate."

Dr. Lawson justly remarks that "as it appears that in different countries different forms of fever prevailed under the same general influence, it must be admitted that the pandemic cause determines the frequency and severity rather than the particular form of the fever, which there are many reasons to conclude is more intimately

connected with the local circumstances at the time. . . . . It is characteristic of a pandemic wave that, during its passage, local causes which, under ordinary circumstances, seem to exercise inconsiderable influence over the health of those exposed to them, then display a potency which, if regarded without due weight being given to the reigning pandemic influence, seems quite unaccountable."

"It is an interesting subject of inquiry," says Dr. Lawson, "whether the pandemic cause acts on the system, rendering that more susceptible of the influence of the ordinary causes of disease, or on these themselves, giving origin to a more concentrated or a different kind of poison, which generates a more virulent or a new form of disease; or whether it affects both, increasing the activity or altering the kind of the causes, and enhancing the liability of the body to be affected by them. Our information on these points is still very limited and unsatisfactory. I have observed that, prior to and during the prevalence of an epidemic of yellow fever, the urine contained an unusual quantity of urrhodin, giving a deep reddish brown, when treated with nitric acid, and set aside for some hours. Something similar has been observed with regard to cholera. These tend to show that the body itself is affected by the pandemic cause; but the observations require to be repeated before much weight can be attached to them."—*On the Influence of Pandemic Causes in the Production of Fever. Army Medical Reports for* 1861.

My friend Professor O'Connor, of Cork, has drawn attention to the fact, that the duration of an epidemic visitation of fever in any place bears a direct proportion to the size and population of that place. Thus with respect to the city of Cork and surrounding small towns, while several successive epidemics of fever have continued for three years in the former, they have each subsided in as many months in the latter. He explains this—in my opinion correctly—by the pabulum, so to speak, of the disease being rapidly exhausted in the one case, and not so in the other. In the smaller place all the *susceptible* individuals are at once attacked; while in the larger, many who were not susceptible on the first outbreak of the epidemic, may, during its course become so, and thus prolong its visitation.

LECTURE IV.

PATHOLOGY AND SYMPTOMATOLOGY.

Having briefly stated the received doctrines regarding the nature of fever and its etiology, I have now to call your attention to the practical aspect of the subject; to the study of its pathology and symptomatology; and to the bearing of our conception of fever as a morbid poison upon the explication of its phenomena as observed at the bedside and after death. While your clinical study of disease in general should in all cases be as comprehensive and methodical as possible, it should be especially so with respect to fever. Everything connected with this disease, with the patient, and with the surrounding conditions, has an influence upon the diagnosis, the treatment, and the result. It is, therefore, of the greatest importance that your notions upon all these subjects should be clear and defined; that the facts presented to your observation at the bedside, should not be allowed to flit, as it were, before your incognisant senses, but should be grasped, and reflected on by the intellect; and that they should, as far as possible, be referred to principles, and studied in relation to the theory of the disease, and moreover, with a constant reference to the antecedent history and future tendency of each case.

Your diagnosis of the species of fever with which you have to deal, and of its secondary lesions, will be mate-

rially aided by a knowledge of the etiology, mode of invasion of the disease, and the early history of the case. Thus I do not hesitate to say, that in a fever distinctly traceable to communication with a typhus patient, you may expect to meet with a case of typhus; while, if the exciting cause be unquestionably civic miasm, enteric fever will follow.

Another guide to diagnosis will be furnished by the mode of invasion, usually sudden and marked in typhus, slow and insidious in typhoid. The typhus patient is usually confined to bed by the fourth day, while the adult attacked with typhoid, may go about his business for ten days or more, and though languid and complaining of loss of appetite and disturbed sleep, will not seek advice, until the diarrhea becoming obstinate, he consults a medical man upon that account. In his graphic sketch of typhoid, under the name of Epidemic Gastric Fever—(Cyclopedia of Practical Medicine)—Dr. Cheyne describes these cases as commonly called "walking fevers." Many patients thus affected have pursued their usual avocations until struck down by fatal peritonitis, from perforating intestinal ulcer.

The invasion of relapsing fever is, on the other hand, still more rapid than that of typhus, the patient passing, in a few hours, from a state of health into one of ardent fever; ushered in by remarkable shivering, with vomiting, often of a green fluid, intense headache, &c.

With respect to prognosis, I shall hereafter have occasion to show you, that the circumstances attending the invasion are, not seldom, such as to render a fatal termination almost matter of certainty; although that result may be deferred to the ordinary period of termination of the fever. Meanwhile, the previous health, habits, occupation of the pa-

tient, and all the circumstances connected with the seizure, will, if conjoined with his existing condition, be data for a just estimate of his power of resisting disease, will enable you to foresee its course, and guide you towards judging of its tendencies to one or other event.

Having ascertained all that is requisite to know of his antecedents, you next enter on a careful examination into the existing condition of the patient, with regard to each of the functions in succession. This examination will have to be repeated daily, or even at shorter intervals; since the condition of the fever patient is one of progressive change, and this change is by no means uniform, but subject to perturbations arising from various influences. You will have to make daily note of these changes: thus, those of temperature; those of colour of the surface; the various phenomena of the eruptions; the variations of the nervo-muscular function; the fluctuations in the play of the organs of respiration, their physical condition and function; the varying conditions of the heart and circulation; the alterations in the gastro-intestinal, urinary, and cutaneous excretions; and the mutations in the functions of the cerebro-spinal system. You will, moreover, have to watch the influence your remedial measures, and the hygienic conditions in which the patient is placed, may have upon all these, and you must continue, modify, or suspend your measures accordingly.

The pathological phenomena, set up by the action of the fever-poison, are of two kinds. Primary or essential —arising out of the action of the poison upon the blood and nervous system, and its affinity for certain tissues or organs; as well as out of the special predisposition of the organ, which, in certain states, may be said to attract the

fever-poison. Secondary or accidental—arising (*a*) from some peculiar exciting cause; (*b*) from secondary blood contamination; (*c*) from reactive irritation. Strictly speaking, the latter, or secondary phenomena, only, can be termed complications. Those of the first class are either purely toxic, or arise from the tendency of the poison to be eliminated by certain surfaces or excreting organs. To the toxic action of the poison, we refer the majority of the nervous symptoms of typhus. To the eliminative effort of the system, we ascribe the infiltration into Peyer's follicles and the mesenteric glands in typhoid; and, perhaps, that form of pneumonia to which Dr. Stokes has given the designation of "arrested or aborted typhus."

The immediate effect of the action of the poison upon the organs which are the seats of its elective affinity, is, to derange their capillary circulation by altering the attractions between the blood and the tissues. In the case of the brain, the derangement of the capillary circulation was long regarded as the cause of delirium, and the other nervous symptoms of fever; by some these were ascribed to inflammation, and by others to congestion of the organ; but, guided by the analogy of the narcotic poisons, we now believe that, in most instances, these symptoms are due rather to the toxic action of the fever-poison. The theory of this action is, that the post mortem congestion, which was formerly believed to be the *cause* of the delirium and coma, is rather the *effect* of the injury done to the brain and to the blood by the poison; whereby the attraction of the materials from the blood suited to the nutrition of the brain, is retarded and ultimately stopped. But this force of attraction between the blood and the tissues is a powerful agent in the maintenance of the capillary circulation;

when therefore it is impaired, the blood moves slowly and feebly through the capillary system.

The examples I have already cited from Armstrong, sufficiently illustrate this toxic action of fever, in its most intense degree; fluidity of blood, and general stasis in the capillaries, having been the post mortem appearances in those cases of congestive typhus.

In the less deadly forms of the disease, the congestion is most marked in the organs for which the particular poison has the greatest affinity. The brain, lungs, and heart, in typhus; the intestinal follicles, mesenteric glands, and spleen in typhoid; the liver, stomach, and spleen, in relapsing fever. All these organs manifest this elective affinity and its results, viz., stasis of blood, disintegration and softening of tissue, and exudation of typhic deposits.

The advanced stages of fever furnish many examples of the secondary group, or true complications. Take the pulmonary complications of advanced typhus for an example. When we open the thorax of a patient who has suffered pulmonary congestion, and who has succumbed under this fatal complication, we find the lungs of a dark colour, heavy, and congested, with portions inclined to a brownish hue softened and friable, from what is termed hypostatic pneumonia. Here we have the material result —quoad the lungs—of a group of conditions which existed during life, acting and re-acting upon each other. Thus, *(a)* the primary alteration of the attractions between blood and tissue, caused by the fever-poison, and its immediate effect—congestion; *(b)* change in the innervation, caused by the influence of the poison on the eighth pair of nerves; *(c)* reactive inflammation, set up in the congested portions, with exudation of a low type; *(d)* secondary blood

contamination, arising partly from deficient aeration, and partly from resorption of depraved blood and exudative materials, with its consequence—secondary poisoning of the nervous centres; all have been in operation, and conjoined have produced the fatal result.

Like every morbid process in fever, the complication, of which the above is an outline, is capable of being rendered more complex by the co-existence of other blood contaminations.

It is to be observed, that our knowledge of the laws which regulate the pathological phenomena of the different species, will enable us to distinguish such as are extraneous and accidental, from those which are the result of the normal and regular action of the fever-poison.

Take, for example, diarrhea, occurring in the course of typhoid and typhus. We know that the attraction of the poison of typhoid is for the glands of Peyer, and diarrhea is, consequently, a normal symptom of that affection; the poison of typhus, however, observes no such law, and diarrhea, if it occurs during its course, results either from catarrhal inflammation of the mucous membrane, is colliquative, or, in not a few instances, even critical.

Some years ago I witnessed two cases, which were running their course at the same time in our female ward under the care of the late Dr. Lees, who kindly gave me his notes of the appearances after death. One of these was a case of well-marked typhoid in a young girl, the other of typhus, with profuse eruption, in an old woman. Both had diarrhea, the latter more especially. On post mortem examination, the usual appearances of typhoid were found in the intestinal glands of the younger

patient; while no trace of such was to be seen in the other.*

There are several methods according to which these pathological phenomena might be presented for your clinical study. We might, for example, take them in the above order of primary and secondary; or as they occur in each form of fever study them in succession—the plan adopted by Bartlett, Jenner, Tweedie, and Murchison, and other writers on fever;—but I think the best method is, to adhere to the simple arrangement pursued in our clinical investigation of disease in general, and to study the derangements of function, with reference to the organs or systems affected, taking these in succession.

Following the rule I have so often impressed upon you, of proceeding in your examination from without inwards, noting external sensible phenomena before you study internal symptoms; you will, on each occasion, first, carefully observe the expression of face, manner, decubitus, and colour of the patient, the condition of the surface with regard to heat and moisture, and the presence and characters of the eruption. All these will be found not only to differ from the appearances of health, but also to present striking differences in the different species of fever, as well as at different periods of the same fever. The derangement of temperature, for example, will be found to have a constant relation to the form of fever, to the period of the disease, to diurnal periods, and to local lesions.

The temperature of typhus, as a rule, is higher than that of typhoid, attains its maximum several days earlier, and sinks to the normal degree much sooner and more

* Appendix (1.)

uniformly than in the latter disease. It appears that in both forms the temperature not only rises higher in the more severe than in the milder cases, but that it also attains the maximum at a later period. Generally speaking, this period is more definitely marked in typhus than in typhoid, occurring in a large majority of cases of the former from the seventh to the eighth day, while in the latter it may be at any time between the seventh and twenty-first days; the diurnal changes following being steady and continuous in typhus, but fluctuating and non-persistent in typhoid.*

The temperature in relapsing fever is known to be, on an average, higher than it is either in typhoid or typhus, amounting, in some cases, to 107°. This is in accordance with the greater increase in the rate of the pulse, and more rapid disintegration of the tissues, in this form of fever.†

With regard to their bearing on the diagnosis of secondary lesions, I could give you no better illustration of the value of daily thermometric observations in fever, than that of the case of Darcy, which is now under your observation. In this case, on the morning of the thirteenth day of maculated typhus, the temperature, which had been slowly and steadily falling for several days, was found to have risen suddenly about four degrees; the only other appreciable symptom being increased rapidity of breathing,

* Appendix (2.)

† On careful comparison of the thermometric observations made by Dr. Cheyne, in two hundred and fifty cases of relapsing fever, during the epidemic of 1817, with those made by Dr. G. Kennedy in three hundred and twenty-five cases of typhus, in 1837-8, I find, that the proportion of cases in which the temperature exceeded 102° was greater in relapsing fever than in typhus; in fifteen cases of the former it amounted to 106° or 107°.

which was loud and somewhat nasal in character. There was no cough or expectoration, and the most careful examination of the chest failed to detect anything, save the slightest possible trace of dulness on percussion, beneath the left clavicle, with slightly roughened breathing. I can say that, taken alone, these signs would not have justified the diagnosis of pneumonia, which was made chiefly because of the marked and sudden rise in the temperature, the character of the respiration being such as might have been readily ascribed to the condition of the nervous centres. You are aware how soon the breathing was relieved by taking away a few ounces of blood by cupping, and how the rusty expectoration soon followed the ordinary signs of pneumonia. Another illustration of the value of daily thermometric observations, is the sudden fall of several degrees of temperature in typhoid, in connection with internal hæmorrhage or perforation of the intestine.

It has been suggested that the following short rules should be observed in using the thermometer:—1. To make observations morning and evening; 8, a.m., and the same hour, p.m., have been recommended. 2. To place the patient in a medium or diagonal position between the back and side; neither fully on the back or side. 3. To insert the thermometer in the axilla of the side on which the patient has been lying, as it has been protected from external cold. 4. To be careful that it is placed in contact with the skin, no clothing intervening, and to place the arm in contact with the side. 5. To allow it to remain in the axilla for at least five minutes. When two daily observations cannot conveniently be made, Dr. Compton proposes a single daily observation,

at 2 p.m., as presenting nearly the mean between the temperatures observed at 9 a.m. and 9 p.m.

The colour and expression of the patient will vary according to the type of fever, according to its stage, and to its internal complications. The muddy, dusky, congested look of the face and eye of typhus are familiar to you. The expression of the eye has been aptly compared by Jenner, to that of a person awaking from a drunken slumber. However distinct the maculæ may appear, the intervening skin is not, as it is in typhoid, pale or of its natural colour, but is darker than natural, and has a dusky mottled appearance, well depicted in Dr. Murchison's plate, now placed before you.

The changes in the appearance of the surface in the progress of a case of typhus, furnish valuable indications of the tendency to one or other termination, and should be studied attentively from day to day; as also should the energy or languor of the capillary circulation, indicated by the effects of pressure. In a favourable and uncomplicated case, the rash which resembles measles—without, however, the distinctly crescentic form of that eruption—appears about the fifth or sixth day, and declines about the fourteenth to the sixteenth, not disappearing altogether until crisis has occurred. I believe it to be a permanent rash, and that the spots, unlike those of typhoid which appear in successive crops, remain unchanged until they either disappear or are converted into ecchymoses —true petechiæ—a conversion which takes place, in most cases, to some extent, towards the termination of fever. This is one of the phenomena it is most important you should observe, inasmuch as you may often measure the gravity of the case by the extent to which

this conversion, and the appearance of petechiæ at the latter periods, occurs. In many cases the eruption is never distinct, a dull marbling, or mottling, of the surface only being present until the petechiæ appears. In such cases the application of a cupping-glass causes the spots to become distinctly visible in a few seconds.

The colour and expression of the face in typhoid usually presents a striking contrast to those of the face in typhus. Instead of the dusky face, injected eye with contracted pupil, and heavy sleepy expression, you will observe a clear, bright eye, with somewhat dilated pupil; a face perhaps pale, perhaps slightly flushed, and in cases in which the intestinal affection is severe, presenting a vivid circumscribed blush, totally unlike the diffused flush which we sometimes see in typhus, with cerebral complications.

The surface of the body corresponds in appearance, being pale after the first days, when a general blush often pervades the entire surface. About the ninth or tenth day on an average, you will find a few rose-coloured spots, of a round or elliptical form, upon the surface of the chest and abdomen, or upon the back. Pass your finger over these, and you will find them slightly papular; press them, and they will completely disappear, returning in a few seconds. Watching these from day to day, you will observe that they become pale, of a rather brown tint, and vanish—never being converted into petechiæ—and are succeeded by another crop, which, after a few days, is in turn, followed by another; and so on until the termination of the fever. Unlike typhus, in which the changes in the eruption furnish the most certain indications of the tendency to a fatal or a favourable termination, I do not think a fatal result is ever predicated by the rose spots of

typhoid, which seem alike in the mildest and in the gravest cases.

At rare intervals in typhiod we meet with pale blue patches upon the surface of the body. I have most frequently seen them upon the sides of the chest. They occurred, in several instances in this hospital, two years ago. Dr. Murchison has accurately figured them in his work on fever.

Another appearance on the skin, frequently observed in typhoid, is what are termed sudamina. These are minute colourless vesicles appearing on the neck and front of the chest, or, less frequently, on the abdomen. Although not peculiar to typhoid, they are certainly more frequent in it than in the other forms of fever. They resemble the transparent vesicles of the ice plant, or the frost upon a pane of glass, more nearly than any other object with which I am acquainted.

You will occasionally find it by no means easy to distinguish the one form of eruption from the other. An imperfectly developed, or discrete, typhus eruption in its earlier stages, may be readily mistaken for a typhoid eruption, if this is more than usually abundant. The frequent uncertainty of the date of access of typhoid favours this error. Such cases require the exercise of caution and farther investigation, and you will best arrive at an accurate diagnosis by a careful inquiry into the origin and previous history, as well as the accompanying symptoms of each case. Not unfrequently you will have reason to believe that the two poisons co-exist, the eruptions being intermingled, or the one succeeding the other, as in the patient Morrit, who was so recently under your observation.

This young man was admitted, labouring under a very

mild form of typhoid, not more than three or four rose-coloured spots being visible. He appeared to be convalescent, and was removed to the convalescent ward, where he contracted typhus, with profuse eruption. Immediately after crisis, he again manifested the symptoms of typhoid, with a much better marked eruption of rose spots than on his first attack.

The colour of a patient in epidemic relapsing fever is peculiar. It is usually a straw colour, or pale yellow—deepening at times, in certain complications amounting to jaundice—but not, as a rule, depending on the presence of bile in the blood, at least not so in uncomplicated cases. Occasionally in the worst forms a bronzed tint has been observed at the commencement, ushering in a highly congestive type of the disease. In the primary attack there is no form of eruption; but in many cases which came under my observation, from 1845 to 1849, I met with the typhoid spots in second and third attacks, owing, I believe, to the co-existence of the two species of fever in the patient, the one continuing after the subsidence of the other.

True, or ecchymotic petechiæ, appear to be not uncommon, and, according to many observers, are not confined to the advanced stage, but seem to depend upon the previous state of the patient as to destitution; or to the existence of other causes which give rise to a depraved condition of the blood. According to Dr. Murchison they differ from the petechiæ of typhus in not being developed in the centre of the exanthem, but occurring primarily.

The phenomena referable to the surface which appear occasionally, or accidentally, in the several forms of fever *indifferently*, are—herpes labialis, sometimes observed in

the early stage of typhus, more especially in that form in which the fever ushers in pneumonia; purpling or lividity of the nose, which seems more common in relapsing than in the other forms; vibices, which, as indicative of decomposition of the blood, are met with in typhus and relapsing fevers; bullæ, which are not peculiar to any form, but also indicate a depraved condition of blood; and bedsores, which properly belong to the sequelæ of fever.

You must bear in mind that changes in the colour of a fever patient are frequently due, not so much to the fever as to some visceral complication, or some form of secondary blood contamination. Thus, the cerebral, pulmonic, bronchial, hepatic, and renal complications, have each their own modification of colour of face and general surface. To these I shall, hereafter, direct your attention, as affording guides to the diagnosis of these complications.

The cutaneous transpiration is modified differently in the different forms of fever. As a rule the skin is dry in typhus, until the period of crisis, and then the perspiration is usually by no means abundant, except in fatal cases, in which it is often cold and clammy, sometimes warm, and generally profuse.

In typhoid, perspiration not unfrequently occurs at the close of the febrile paroxysm, in the advanced period, when, exacerbations and remissions of fever become marked; the tendency to nocturnal or early-morning sweats usually continuing for some time after crisis.

In the relapsing synocha, intense heat of skin is often accompanied by sweating throughout; and the copious perspiration following a rigor which marks the crisis, is one of the most striking characteristics of that form of disease.

The odour from the surface is remarkable and peculiar in typhus; not so marked in the other forms of fever. A cadaveric odour is frequently present in all varieties for a day or two before death, and a similar odour sometimes pervades the room in cases of typhoid with extensive ulceration of the bowels, being most marked after the evacuations by stool.

Besides these that I have mentioned, there are other external phenomena, such as abnormal muscular motions, which are of value, as signs of serious cerebro-spinal lesions. Indeed, it may be said, that the sensible phenomena which you observe at the first glance, will often give you a valuable clue to the diagnosis of serious complications in the course of fever. At your daily visit, therefore, all changes in the countenance, temperature, decubitus, muscular movements, &c., should at once attract your attention, and lead you to a more careful examination of your patient.

Thus a cerebral or cerebro-spinal complication, may reveal itself by the turgid, purple, congested face, flushed brow, suffused eye, and contracted pupil; by the retracted head, and stiffened neck or arms; by the rolling of the head on the pillow; by increase of the cutaneous sensibility; or by loud nasal breathing, and spasmodic sighing respiration. Similarly, pneumonia may be recognised by the suffused face, hurried painful breathing, and suppressed cough. Peritonitis from perforation may sometimes be detected by the change in the patient's countenance, expressive of collapse, and this may be its only symptom; while uremic poisoning produces a change in the countenance and manner, which cannot fail to strike those who have once observed it. These symptoms or signs

shall come under our consideration in their bearing upon the different complications; but I now allude to them, as illustrating the mode in which your daily observations should be conducted—eye, ear, and touch should be trained to receive the different impressions made upon them with each change in the case; while, above all, the judgment must be informed, in order that it may rightly interpret each impression, and assign to each sensible phenomenon its due value. Always remember that our great observers have also been men of highly-cultivated minds; of varied attainments; great thinkers. Of one of these it has been well said—"Gooch was no mere chronicler of so-called facts, but an historian, who could see in the very germ, the laws by which the subject was evolved; a very few cases set his penetrating intellect on the true track. He worked by insight rather than sight—intensively rather than extensively. 'The period of my life,' he says, 'when I improved most rapidly, was when I gained clear and orderly notions of the objects of examination. The faculty of observation requires rather to be guided than to be sharpened; the finger soon gains the power of feeling when the mind has acquired the knowledge of what to feel for.'" — *Ferguson's Prefatory Essay to Gooch on Diseases of Women.*

APPENDIX TO LECTURE IV.

(1.)

The following observations of Dr. Wilks are highly important, as bearing on the question of the value of diarrhea as a symptom in typhus :—

"The condition of the bowels forming one of the characteristic distinctions, and, therefore, diarrhea being an important fact to notice, as its existence or absence might be made the means of distinguishing or confounding two cases. It is important also to know the value of this symptom, or what evidence it carries with it of an organic disease of the intestine. The occurrence of a fluid motion, may, on the one hand, be denied, as constituting a morbid condition of the bowels; while, on the other hand, it may be denominated a diarrhea, and considered evidence of organic change.

"It would be advisable, therefore, to have some experience on this point, before commencing the investigation of the present subject; and, in looking over my fever cases, reported many years ago, and before the commencement of the present series, I find I was prepared to meet a difficulty of this kind, having learned that the mere evacuation of the bowel would not decide the question of a morbid condition of the intestine, as the two following cases will show. A woman, aged forty-five, who was covered with a mulberry rash, and whose bowels had been generally confined, died on the fourteenth day of fever. She had not had any evacuation for two days before death. The necropsy showed the intestines perfectly healthy, but both small and large were filled with liquid fœcal matter. My note made at the time, says, that if this patient had lived a few hours longer, she would, in all probability, have had a large liquid evacuation, and then, if no subsequent post-mortem examination had taken place, there might have been strong suspicion that a diseased ileum existed. It was learned, then, that as a rule, the contents of the bowels in fever were fluid: but not always so, as another case will show. It was that of a young girl, who had been ill three weeks, and whose bowels were said to have been irre-

gular, but generally confined, and who came to the hospital to die. The post-mortem examination showed the intestines full of firm scybala, and on removing these, under each was found an ulcer. These cases have been before me in the present investigation, and although knowing, as a rule, that regular bowels would indicate a healthy state of intestine, and a diarrhea, a morbid one, yet I was prepared to know that in fever, as in phlebitis, and other septic diseases, a fluid motion was common, and did not necessarily indicate a diseased intestine, and on the other hand, that this organ may be ulcerated without producing diarrhea. It had also been learned that a large fluid evacuation at the end of a typhus case was not at all unusual."—*Guy's Hospital Reports, New Series*, vol. i. p. 318.

(2.)

In the former edition of this work, I relied entirely upon the statements of Dr. Aitken as to the ranges of temperature in typhus and typhoid fever. I regret that, as my own observations were neither numerous nor precise, I did not take advantage of those of Drs. Warter, Compton, and Grimshaw, since it has been fully proved that Dr. Aitken's ranges are far from accurate. The observations made by Dr. Compton upon sixty cases of typhus and thirty cases of typhoid have led him to the following conclusions:—

"First, in regard to typhus, that this occurs in two forms—first, the milder form, the subjects of which are children or previously healthy adults under thirty, who have lived sober and regular lives; second, the more severe form, which has been the one somewhat the more frequently met with. This has occurred either in persons of a more advanced age, or in younger adults of unsound condition, from previous disease or in consequence of intemperate habits.

"In both of these forms, the temperature rises in a more or less rapid manner to its maximum, when it falls continuously about a degree a day until the normal is reached; and although having further fallen below this, it may rise to regain its ordinary height, it will not again exceed this point, unless some complication be at hand.

"In all cases, also, there is a very uniform temperature of about 104° Fah. on the seventh day; with this exception, there is no temperature peculiar to any one day.

"In the milder form, the temperature attains its maximum on the seventh or eighth days, the average maximum being 103°·7 Fah.; the highest registered, 104°·3; and the lowest maximum, 102°; the normal is reached on the twelfth or thirteenth days.

"In the severe form, the range of temperature is high, the termination not always favourable, and the convalescence, which does not begin until the end of the third week, tedious. In these cases the maximum temperature is attained between the seventh and tenth days (generally on the seventh or eighth); the average maximum is 104°·4 Fah.; highest registered, 105°·6 Fah.; lowest maximum, 103°; normal is reached between the fifteenth and eighteenth days, both inclusive.

"High temperatures, such as 105° Fah. and upwards, do not foretel fatal terminations; but high ranges generally, at the commencement of cases, foreshow severe attacks, and are universally followed by long convalescences. Fatal cases always exhibit abnormal temperatures prior to collapse, but not necessarily very high ones. Judging from the fatal cases I have witnessed, I believe that an abnormal course of temperature much more generally precedes a fatal termination than any unusually high range. Such cases have appeared to differ from the ordinary run of severe attacks, terminating favourably in one or more of the following ways:—

"1st. They exhibit a temperature of only 102° or 103° Fah. about the sixth day, which is below that generally met with, even in mild cases; and considering the severity of the symptoms, we should expect to find a temperature nearly 2° higher at such a date.

"2nd. They have a constant temperature of about 102° Fah. for a week or more.

"3rd. They exhibit a fall of perhaps 3° or 4° Fah. on some day on which, in an ordinary severe case, we should not expect any such fall (say on the tenth day.)

"4th. They have a temperature of about 104° Fah. as late as the sixteenth day, when, even in severe cases, the normal ought to be rarely reached."

Secondly, in regard to typhoid, Dr. Compton observes:—

"In mild cases the temperature attains its maximum between the seventh and eleventh days (but this is not reached more frequently on one day than on another); the average maximum is

103°·3 Fah.; the highest registered, 104°·5; lowest maximum 102°·2 Fah. The normal is arrived at between the fifteenth and twenty-first days.

"In the more severe form, we generally find that either intestinal hæmorrhage occurs during the course of the case, or that we have to deal with a low form of pneumonia, which is a frequent complication, and one which not uncommonly is the immediate cause of death at an advanced period of the fever.

"In such cases which terminate favourably, the temperature reaches its maximum between the nineteenth and twenty-first days; the average maximum is 104°·1 Fah.; highest registered, 105°·2; lowest maximum, 103°·8 Fah. The normal is reached usually between the twenty-third and thirty-fifth days.

"In typhoid fever a high range within the first fourteen days generally foretels a severe and protracted case; but a low range during this period does not necessarily foreshow a mild case, even if the general symptoms be also favourable.

"A sudden fall of several degrees, especially if occurring in a severe case, about the end of the second week, and without improvement in the general symptoms, is to be considered with anxiety, such decline being probably due to intestinal hæmorrhage, or to the commencement of a state of collapse.

"In such an event, the pulse, which very likely up to this time may have kept below 100, usually rises suddenly twenty or thirty beats.

"In these cases, when the patient does not immediately succumb, the fall in temperature and rise of the pulse are frequently followed, within the next twenty-four hours, by opposite phenomena, the temperature rising higher than the point at which it previously stood, whilst the pulse falls considerably.

"Again, if we meet with a case in which the general symptoms continue severe, but the temperature, although an abnormal one, fluctuates for some days at a point disproportionately low when compared with the general symptoms, we must consider such low range in an unfavourable light, rather than the opposite; especially ought the behaviour of the temperature to be so interpreted if it occur in a case of which the date of the commencement of the fever is unknown or doubtful, and in which the period may then be as late as the third or the fourth week.

"In typhoid, the pulse, to a considerable extent, fluctuates with

the temperature, although the exceptions to this rule are much more frequent than in typhus.

"However, generally speaking, an alteration of about five beats of the pulse occurs for each degree of alteration of temperature; thus, a temperature of 99°·5 Fah. will correspond to a pulse of 90, a temperature of 100°·5 to a pulse of 95, and so on."—*Dublin Quarterly Journal, August*, 1866.

(3.)

The following general results as regards temperature in fever, from observations taken in Meath Hospital, during Sessions 1865–66, and 1866-67, I owe to Mr. J. H. Moore, our intelligent clinical clerk:—

"*Typhus.*—In this disease there are three well-marked periods of maximum temperature. The first occurs from the fifth to the seventh day; the second from the ninth to the eleventh; and the third from the thirteenth to the sixteenth. Frequently the first period is modified. In such cases we find that a maximum is attained on the fourth day; this in turn is followed by a slight minimum, and a second maximum is reached on the eighth day. Generally speaking, the second maximum, or that occurring about the tenth day, is the most striking, and often foretels the advent of a secondary complication. In one or two cases where the first maximum was the best marked, *head symptoms* appeared at an early stage. In one such case, (that of Anne Murphy, ætat 9, admitted Thursday, April 11, 1867,) a temperature of 105°.6 was registered on the morning of the sixth day, the second period of highest temperature almost failing to manifest itself. The above was the *highest* thermometrical reading observed during the Session of 1866–67 in the fever wards of the Meath Hospital. The third period of maximum temperature is usually followed by a rapid disappearance of febrile symptoms, and by convalescence; the normal temperature, as a rule, being recovered in uncomplicated cases about the seventeenth day. When some secondary affection is present, the thermometer often ranges above 100° till the twenty-first day, or even later. Complications also modify, to a great extent, the whole range of temperature from the time of their appearance.

"Of the first maximum, the mean may be set down approximately at 103°.5; of the second, at 104°; of the third, at 103°.

During convalescence, the temperature generally ranges somewhat below the usually-received mean—viz., 98°. On the approach of death, a rapid fall in the thermometer, following a high maximum, has often been noticed. The rate of the pulse and of the respirations does not by any means always keep pace with the alterations in temperature."

"*Typhoid.*—In enteric fever the rise in temperature is much more gradual than it is in typhus; and though there is a general tendency to the attainment of maximums at periods rather similar to those in typhus, still their effect is eclipsed by the characteristic curve of typhoid. This curve is composed of maximum temperatures occurring every second or third day, which are interrupted by corresponding depressions of the thermometrical readings. These alterations are more marked from the eleventh day on than in the early stages of the disease. The rapid variations in typhoid to some extent resemble those which occur in relapsing fever. The mean maximum is usually from one to two or three degrees below that of typhus, a temperature of more than 104° being uncommon. Another point of contrast as regards the thermometric ranges in the two diseases is found in the much more protracted elevation of temperature in typhoid. In one case this Session, the normal temperature was not reached till the thirty-ninth day. Frequently the thermometer ranges as high as 100° in the morning up to the thirtieth day.

"Here it may be stated generally, that the above results were obtained from *morning* observations exclusively. These were made in almost every case between the hours of 9.30 and 10.30 A.M.

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(4)

The following case, by Dr. H. Kennedy, presents a close resemblance to that of Morrit, alluded to in the text, as did also cases 2 and 3, which were under my own care:—

"Develin, a young man of seventeen, admitted into hospital during the present month, April, 1866. He had fever, but not of a severe kind, marked by the usual symptoms, and the tongue red and furred. When he was now six days ill, the spots of enteric fever appeared on chest and abdomen, and in an unusually well-marked form. On the second day of their appearance, this patient was seen by the Drs. Martin, from Berlin, who happened to be visiting the ospital. On the third day, however, the number of

spots had greatly increased, and become more those of typhus, and finally the case, beginning with the spots of enteric fever, became one of regular typhus. It was observed that, as the typhus rash declined, the typhoid spots became again quite visible, and at this period a slight attack of diarrhea occurred."—*Essay on Mixed Types of Fever*, page 6.

Thomas Morritt, ætat seventeen, from Grand Canal Street School, was admitted into Meath Hospital, with typhoid fever, February 12th, 1866. The fever was of a mild type, with few rose-coloured spots, and he was discharged, apparently convalescent, on the 9th of March. He was again admitted on the 17th of March, with well-marked typhus and profuse measly eruption. On the thirteenth day of this fever, the maculæ disappeared, and were replaced by a profuse crop of sudamina, followed by a fresh attack of typhoid fever, with more numerous spots than in the previous one. This last seizure terminated without any complication, and he was discharged quite convalescent on April 23rd, 1866.

No. 2.—Kate M'Loughlin, ætat fourteen, from Luke Street School, was admitted into hospital Feb. 1, 1866, with febricula, and discharged convalescent Feb. 13th. She was re-admitted with typhoid on Feb. 23rd, and while in the convalescent ward, after this fever, contracted typhus, apparently from the convalescent typhus patients in that ward. She was discharged quite well on May 5th, having been seventy-one days in hospital.

No. 3.—John Hollywood, ætat nine, from St. Peter's School, Camden Row, was admitted into hospital January 28th, 1866, with typhoid fever, and discharged convalescent on Feb. 13th. He was re-admitted with typhus on Feb. 27th, and discharged quite well, March 27th, 1866.

LECTURE V.

CARDIAC AND PULMONARY LESIONS.

To-day we have to consider the study of those deranged conditions of the functions of circulation and respiration which occur in fever; and the complications arising from the secondary affections of the thoracic viscera.

In this study are comprised the cardiac phenomena; the radial pulse; the capillary circulation; the varied modes of disturbed respiration; and the physical signs referable to the heart and lungs, observed during life; as well as the anatomical appearances presented by these organs on examination after death.

I present the circulatory and respiratory systems for your study conjointly rather than separately, on account of their close anatomical connection, and the mutual interdependence of their functions. While the condition of the left ventricle of the heart must be studied in connection with the radial pulse, and the systemic capillary circulation; that of the right ventricle is associated with the pulmonary capillaries. Situated midway between these and the systemic veins, a weakened right ventricle influences both; and the loaded condition of the right cavities, which may be owing to obstructed pulmonary circulation, is recognised by its influence in causing remora in the great veins which form the descending cava.

The study of the functions of circulation and respiration

furnishes us with symptoms and signs which are not limited in their applicancy to the organs within the chest. We derive the most important and general indications, in regard to both diagnosis and treatment, from the radial pulse. The cardiac sounds and impulse furnish the most unerring signs of cerebral irritation; and the same may be said of that condition of respiration which has been termed cerebral breathing.

When, therefore, you are called upon to examine a patient in fever, you should carefully investigate the phenomena of these systems in succession; with constant reference to each other, as well as to the conditions from which they arise, or with which they may be associated.

Your study of the systemic circulation will comprise—(*a*) the heart, or, more particularly, the left ventricle; (*b*) the arterial pulse; (*c*) the capillary circulation.

The phenomena of the respiratory system, which it is most important that you should note, are, the mode of breathing, its rate and ratio to the circulation; the physical signs referable to the lungs; and the rational symptoms of thoracic complications, if any.

Lastly, you will observe the signs or symptoms of a weakened, dilated, and congested condition of the right ventricle and auricle, which are sometimes associated with the signs of pulmonary congestion.

The condition of the left ventricle in fever may be either —(*a*) healthy throughout its course; (*b*) softened, and becoming gradually weaker from an early period to the end of fever; (*c*) strong and excited throughout the fever; (*d*) weak during the earlier period, but becoming excited as the disease advances, and presenting the combination

of an apparently strong heart, with small and feeble radial pulse.

I need not tell you that we are indebted to Dr. Stokes for a full and complete investigation into the weakened condition of the left ventricle in typhus; and for determining the signs of this condition, and their value, as indications for the exhibition of wine and stimulants. I shall give you Dr. Stokes's description of this change:—

"The condition now before us may be thus described:—The heart is little, if at all, altered in volume. It is generally of a livid hue, but this it may have, in common with other internal organs, as is often seen in fever. It feels extremely soft, especially in its left portions, and the left ventricle frequently pits on pressure. Nothing remarkable is to be found as to the pericardium or endocardium, and the valves are unaffected. The principal change is found in the muscular structure, which is often infiltrated with adhesive, as it were, gummy secretion. The left ventricle exhibits a singular appearance, for the traces of muscular fibre are lost, and the external layer, to the depth of the eighth of an inch, converted into homogeneous structure, in which no fibre can be found. The colour of this altered portion is generally dark, and it resembles the cortical structure of the kidney. In some cases this change occurs in patches, varying in depth, and from a quarter to three quarters of an inch in breadth. The change may affect the septum cordis, and—but to a much less degree—the right ventricle. The internal net-work of fleshy bundles appear less engaged, and though these may be pale, their firmness seems but little altered. The right ventricle is almost always more firm, and harder than the left, which may be so softened as to break down under a slight

pressure. In one case both ventricles seemed almost equally engaged; and so great was the softening of the organ, that when the heart was grasped by the great vessels, and held with its apex pointing upwards, it fell down over the hand, covering it like the cap of a large mushroom. Yet, even in this case, the left ventricle was more softened than the right."

The observations forming the substance of Dr. Stokes's Memoir, were made during an epidemic of typhus in 1837 and 1838. He mentions that he did not meet with the same condition during the epidemic of relapsing fever of 1847, and he justly remarks that—"The phenomena of typhus softening of the heart appear to be under the same influences as those of other secondary affections, and that their frequency varies with the epidemic constitution."

I may mention that having had many opportunities of examining the condition of the heart after death, during the epidemic period referred to by Dr. Stokes, I not only met with the condition he has described, but occasionally also, with a form of softening in which there was none of the concrete exudation causing an appearance resembling the cortical substance of the kidney, but a loosened and macerated appearance of the muscular fibres, which seemed to be infiltrated with a glairy sticky fluid.

In some cases the softening would appear to be due to rapid degeneration of the muscular fibres into fat, as observed by Dr. Murchison.

Dr. Stokes thus describes the signs of this softened condition, as derived from the modification of the heart's impulse and sounds:—

"We observe that the impulse becomes less and less distinct, the change being generally gradual, but in some

cases more sudden. The loss of impulse is first perceived at the apex and to the left side; and we frequently find that while it has ceased in this situation, it can be discovered under the ensiform cartilage. In the most extreme cases of loss of impulse, we cannot discover it even by careful examination; but this is rare, for in many instances in which the impulse appears to have completely subsided, we may find it by examining when the patient is turned on his left side, or by pressing with the fingers in the intercostal spaces at the end of expiration, when we discover it like a feeble vermicular sensation.

"In most cases the diminution of impulse is attended with corresponding loss of sound; but it must not be forgotten that impulse and sound are not always proportionate or corresponding, either in the invasion or retrocession of the disease.

"The re-establishment of the impulse generally takes place before that of the sounds; and in cases where all impulse has subsided, we observe its return first in the inferior sternal region, and next under the left mamma.

"In most instances, however, the diminution and return of the first sound are accompanied with diminution and return of the impulse; but in some the sounds may become distinct before the impulse returns, while in others the inpulse reappears long before the first sound has been fully restored. In one case we found that on the eighth day the sounds were not in proportion to the impulse; on the tenth the impulse continued, but the first sound was totally absent; and on the eleventh day no impulse could be felt, and yet the first sound was distinctly audible. In another case, on the twelfth day the impulse was less

perceptible than on the day previous, but the first sound had more strength.

"It is hardly necessary to observe, that the value of want of impulse of the heart in typhus fever, as an indication of the change in question, depends entirely on the circumstances that in the earlier periods of the case a distinct impulse had been observed. This will assure us that the want of impulse, under the circumstances in question, is not the natural condition.

"*Modifications of the Sounds.*—We shall arrange these characters in the order of their frequency. The first, and unquestionably the most important, is the diminution of the systolic sound, which may go on to its complete extinction, or to such a degree as to give a singular predominance to the second sound. The progress of this lessening or extinction of the first sound follows the same laws as the diminution of the impulse—that is to say, we observe it first as affecting the left side of the heart, and next as spreading to the right; and the diminution or extinction of the systolic sound, as of the impulse, when observed at both sides of the heart, is indicative of an extreme degree of weakening.

"Hence, as might be expected, we meet with the following combination of circumstances:—

"1. Feebleness of the systolic sound, causing predominance of the second sound, evident at the left side of the heart only; under the sternum no loss of proportion between the sounds can be discovered.

"2. Cessation of the first sound over the left ventricle. We have then in this situation the heart acting with a single sound, and that sound the second, while beneath the sternum the double sound continues.

3. "Cessation of the first sound at both sides of the heart, so that, no matter where we examine, we find the heart acting with a single sound, which is the second.

"4. In one or two extreme cases we observed the complete extinction of all sounds of the heart, and yet the pulse at the wrist could be perceived, and life was continued for more than thirty-six hours. One of these cases presented the greatest amount of softening of the heart that I have yet met with.

"During the period of restoration of sounds the phenomena follow an inverse course, the first sound re-appearing under the sternum, soon to be followed by its restoration at the left side. Under these circumstances, too, we may occasionally observe that the progress of restoration of the systolic sound is from the base towards the apex. Thus, in a patient who presented well-marked signs of softening of the heart, we found that on the twelfth day, and when the pulse had fallen to 80, although the sounds were feeble, at the base of the heart they were quite proportionate, yet at the apex and to the left of the ensiform cartilage, the first sound still predominated.

"In the next series of cases the signs, though indicative of great weakness, are very different in character. Like the former, they are attended with diminution or loss of impulse; but the disease seems to act more on the entire heart, and we neither observe the predominance of morbid signs on the left, as compared with the right side, nor that of the second over the first sound. In these cases there is no extinction of either sound, but both are diminished in loudness, and become of a nearly similar character. To this condition I have given the name of the fœtal character, from the close resemblance of the phenomena to those of

the heart of the fœtus in utero—a resemblance which, especially when the pulse is acting at the rate of from 125 to 140, is almost complete. We have not yet been able to point out any anatomical difference between this condition and the more ordinary instance of diminution of the first sound; but it may be observed, that although we meet cases in which this character exists throughout, yet that in others, both sets of phenomena occur at different periods, and as it were, run one into the other. Coupling this with the fact, that the two classes of cases are met with under the same epidemic constitution, and without any ascertained differences in the general symptoms, and, finally, that the treatment by stimulants is equally called for in either case—it may be concluded that there is a close relationship between the conditions in question.

"Finally, we have observed, in a very small number of instances, a diminution of the second sound, while the first was but slightly, or not at all, affected. It is not easy to explain this condition; possibly it is connected with a want of resiliency of the aorta itself, for in many cases the pulse is found to be remarkably compressible."

The important practical result of these investigations may be best stated in the words of Dr. Stokes himself:—"It is not too much to assert, that our researches on the condition of the heart in fever, have given a great facility in judging as to the necessity of stimulants in any given case of that disease; and they not only furnish a rule by which the junior and inexperienced man may be guided, but give to every practitioner a greater degree of confidence in himself, when he has to determine the use, the increase, or the diminution of stimulants in fever. And independent of all this, they have furnished us with new

prognostics of great value. With very few exceptions it may be laid down, that the return of the impulse and of the first sound under the use of stimulants, justifies a good prognosis, more especially if the rate of the pulse is falling; and conversely, we find that the existence of an excited state of the heart, with a strong impulse and clear and proportionate sounds, indicates danger, and the more so if the pulse be weak and rapid, and that its rate increases rather than diminishes under the use of stimulants."—*On Diseases of the Heart and Aorta*, p. 378.

When we come to consider the study of the cerebro-spinal lesions in fever, you will find that the excited condition of the heart referred to by Dr. Stokes, has frequently its origin in the great nervous centres, being mostly observed in combination with other symptoms referable to the brain or medulla oblongata.

I think it might safely be said, that in any case in which the heart's impulse becomes strong and jerking, and its sounds abrupt and exaggerated during the later period of fever, the great nervous centres will be found to be the seat of irritation. This is a fact of which you had several remarkable illustrations in the course of the present year, during which period cerebro-spinal arachnitis has been unusually prevalent. The study of the cardiac phenomena thus becomes of increased importance, from their bearing upon the diagnosis of an otherwise obscure complication.*

* "A large number of facts," says Dr. Burdon Sanderson, "have led me to the physiological inference, that whenever the heart contracts of itself, *i.e.*, automatically, it contracts gradually and peristaltically, its constituent fibres being brought successively into action; and that, in so far as the movement is deprived of its automatic character by the influence of stimuli acting through the spinal cord, it becomes sudden and instantaneous."—*British Medical Journal, July 13th*, 1867.

But, again, the condition of the left ventricle has a close connection with the entire systemic capillary circulation. It appears to be a rule of general applicability, that if, in any blood disease, the capillary circulation becomes retarded—as, for example, in Bright's disease—the left ventricle is called into increased action to aid the circulation in the capillaries, which is rendered difficult by the altered relation between the blood and the tissues. We may, therefore, readily imagine, that in fever the existing general congestion in the capillaries, will be notably increased by any diminution in the power of the left ventricle, and such is, no doubt, the fact. Hence the beneficial effect of wine and brandy is, not only to increase the power of the ventricle, but also through it to arouse the stagnant circulation in the capillaries. The worst cases we meet with, are those in which the one result is produced without the other,—in which, under the influence of wine, the heart's action becomes strong; while the radial pulse gradually becomes imperceptible, the surface cold, and the maculæ darker in colour. On the other hand, in those cases in which wine exerts its beneficial influence; the heat returns to the extremities, the colour of the surface improves, and the maculæ change from a dark purple to a brighter tint.

You should make the radial pulse (as well as that of the larger arteries) an object of your daily attentive study. You should learn to estimate its apparent haste, as well as its frequency, its force, volume, hardness or softness, distinctness or dicrotous character, regularity or irregularity, its equability or tendency to falter and become uneven.

Each of these characters you will find to have relation

to the condition of the heart itself; to that of the pulmonary, cerebral, or capillary circulation; to the type of fever; or to the approach of a favourable or unfavourable crisis. In all cases you should examine the pulse in connection with the heart, and with the respiration; inasmuch as signs of value are deduced from its want of correspondence with the former; and its lack of due proportion in frequency to that of the latter. You should, moreover, note its correspondence with the temperature.

The function of respiration is deranged in several modes and from several conditions, in fever. Thus, at the commencement of fever, a semi-voluntary form of breathing is observed, differing from the dyspnea of thoracic disease, a *besoin à respirer*, as it has been termed, which, to the experienced eye, presents one of the most characteristic signs of the initiatory period. This modification may exist without any physical signs referable to the lungs. Sometimes an engorged and dilated right ventricle coexists, but it seems to be due, less to this condition than to the change produced by the poison in the vital attraction between the blood and the pulmonary tissue; to which must be added, the altered innervation caused by the direct toxic action upon the medulla oblongata and eighth pair of nerves; an alteration, which we shall find to exercise an influence throughout the course of fever, producing the most serious complications during its later periods. It is most important that you should distinguish the derangement of the respiration thus caused, from that arising from the physical conditions of the lungs, which I have just now to notice. This cerebral respiration is graphically described by Dr. Graves, by whom it was first accurately discriminated. "When in cases of

typhus you find the patient's breathing permanently irregular, and interrupted by frequent sighing—when it goes on for one or two minutes at one rate, and then for a quarter or half a minute at another rate, you may rely upon it that sooner or later an affection of the brain will make its appearance. . . . . I speak here of irregularity of breathing independent of any pectoral affection. . . . . I am in the habit of calling this kind of breathing *cerebral respiration*, because my experience has told me that it is almost invariably connected with congestion or oppression of the brain."—(*Clinical Lectures*, vol. i.)

It has been justly remarked by other observers, that the diagnosis of cerebral breathing is assisted by the presence of a nasal stertor; and by the absence of that congested lividity of face which is present in severe pulmonary complication; to which is, of course, to be added, the absence of the physical signs of such complication. Of the two forms of complication, the cerebral and the pulmonary, the former is that which most easily attracts observation; unless we add to the disordered respiration, the congested livid face, the dark colour of the eruption, the character of the cough, and the physical signs in the latter. Both may be attended with that sudden rise in temperature, which we lately observed in the case of Darcy.

The anatomical lesions referable to the lungs in fatal cases of fever, are those of bronchitis; pulmonic congestion; and pneumonia. The first is common to each form of fever; the second is almost constant in typhus; the third is more frequent in typhoid, in the shape of lobular and hypostatic pneumonia. Bronchitis may occur at any

period of typhus, more especially in the epidemics of winter and spring. You are not to suppose that the frequent and irritative cough of the first few days, is invariably, or even usually, due to this condition. This may be merely a cough of irritation resembling that of the early period of measles, and like it may subside on the appearance of the eruption; but on the other hand, it may continue, and on examination of the patient's chest you may find stethoscopic signs of bronchitis, namely, sonorous, sibilous, and mucous râles. The cough may become more intense in degree and more suffocative in its character as the fever progresses; and may greatly or fatally influence the result; especially in those of advanced age, when attended with great prostration and debility; or, if associated with pulmonic congestion.

When this combination occurs, the broncho-pneumonia may be recognised by the progressive frequency of respiration; increasing difficulty of expectoration; greater viscidity of the sputa—which may assume a brick-red or a prune-juice tinge—and by the supervention of dulness on percussion, with ill-defined crepitus or tubular breathing, in the depending portions of the chest.

In typhoid, the bronchitic complication belongs rather to the advanced stage; seldom occurring before the third or fourth week, when it frequently becomes a source of great danger to the patient, and of difficulty and embarrassment to the physician; the differential diagnosis between it and acute phthisis being both difficult and uncertain.

The second lesion—pulmonic congestion, is almost constant in typhus; it having been found by various observers

in 140 out of 146 fatal cases of that disease.* It may be so marked as to cause the lung to become softened, and to sink in water; but it is still to be distinguished from pneumonia, by the absence of the concrete exudation which gives a granular appearance to the section of a hepatized lung. The colour also differs, being purple, resembling the spleen, and both lungs are usually affected; "stagnation of, for the most part, diseased blood being found equably diffused along the posterior surface of the lung; while the anterior half of the lung is generally bloodless, dry—but perfectly sound otherwise." (Hasse.)† One or both, however, of these congestions, or a portion of them, may become the seat of reactive inflammation—hypostatic pneumonia—an occurrence which is not peculiar to either form of fever, but is met with in the advanced periods of both; more commonly, however, in the later stage of typhoid. This condition is defined by Hasse to be due to inflammatory irritation, resulting from genuine hypostasis of blood in the lungs. He states that it frequently occurs in one lung only, the other exhibiting simple stagnation.

The form of pneumonia met with in typhoid, is described with great clearness and accuracy by Dr. Wilks as one of "extreme congestion, an approach to an apoplectic condition, and in some cases inflammation, with an exudative material. The pneumonia is not of that kind called sthenic, in which a whole lobe is throughout uniformly consolidated, but the hepatized portions are found in isolated lobules, causing particular portions of the lung to assume a solid, soft, and granular appearance; and asso-

* Appendix (1).

† Pathological Anatomy, Sydenham Society's Edition.

ciated with this is a peculiar spotted appearance, produced by the extreme congestion of other lobules. . . . . That the affection of the lung is, to a certain degree, peculiar, and dependent upon the fever, is clear, from the fact of its pursuing a course with the latter, terminating with it, and being quite uninfluenced by remedies. Occasionally, however, ordinary pneumonia may occur as a complication, and then the symptoms and signs are of the usual kind. . . . . These instances, however, probably exemplify mere coincidences of disease, for the inflammation of the lungs which was present in them, is altogether a different affection from that which may be called typhoid pneumonia; one which affects especially the posterior lobes, from hypostatic congestion, or the morbid condition of the blood, and which occurs towards the height of the fever, and does not cease until that does—probably, however, the congestion predisposes to pneumonia, or the one may run into the other, in the same way as the ulceration of the intestine is the result of an excessive morbid action of that organ. We may say, therefore, as typhoid fever is associated with derangement of the intestine, the lung, the brain, or other organ, the morbid process may, from some special cause, be extended to a perforation, a pneumonia, an arachnitis, &c., each of which may be the cause of death."—*Guy's Hospital Reports, Third Series*, vol. i.

The signs of this congestive pneumonia correspond very nearly with those of the ordinary sthenic form of inflammation, the patient's countenance presenting the lurid flush and sallow tinge characteristic of the latter; dulness on percussion, with crepitating râle, and tubular breathing being usually met with on a stethoscopic examination of

the posterior portion of the chest. But these signs are not unfrequently latent to some extent; there may be no crepitus or tubular breathing; and the condition of splenization may be revealed by comparative dulness on percussion only, together with a muffled and suppressed kind of inspiratory murmur. In many cases the rational symptoms are still more latent; there may be no complaint of pain or oppression; the respiration may be little more disturbed than in other cases of fever; and there may be little or no cough or expectoration. In this condition I have frequently drawn your attention to a sign, which should at once lead you to make a careful examination of the patient's chest. You have seen, in many instances, that when on percussing the anterior portion of the chest of a patient, who, perhaps, presented no marked symptoms of pulmonary affection, a sound was elicited on one side differing in kind from the normal resonance, higher in pitch, and having a tympanitic character; we found dulness on percussion on examining the posterior portion of the same side, with other signs of congestion or pneumonia. At each daily visit, then, you should at least examine the anterior portion of the chest; and if you detect this change in the percussion sound, especially if conjoined with puerile respiration, accelerated breathing, and elevation of temperature; you should carefully examine the posterior and depending portions of the chest, no matter how marked may be the adynamic condition of the patient.

This is not the time to enter into any detailed explanation of the phenomenon of heightened clearness on percussion, were such an explanation possible. Two causes may, however, be mentioned as *probably* concurring to

produce it. One is the slightly increased tension of the parietes corresponding to the unaffected portion of lung; the other, the shortening of the vibrations (set up by the percussion stroke) in the condensed lung, which may be said to act as a kind of sounding-board.*

* Appendix (2.)

APPENDIX TO LECTURE V.

(1.)

According to Rokitansky, the local hyperemiæ of typhus—including the hypostatis in the lung—are due to the paralysing influence of the blood, upon determinate ranges of the nervous system either at the periphery or at the centres. This pathologist ascribes the occasional occurrence of tubercle, and of pyemia, at the later period of fever, in the one case to a conversion of the typhus crasis into the tuberculous; in the other into what he terms deuteropathic pyemia. The following cases will give the student some idea of the changes referred to.

The first is detailed by Dr. Blakiston* :—

"A policeman, ætat twenty-five, had been losing his strength and appetite for three or four weeks, and had experienced 'a dull, sickening kind of headache.' Four days since, he had been rather suddenly seized with rigors, and on going to bed and covering himself with clothes he became burning hot, and at length perspired, and was relieved. The next day he felt extremely exhausted, had much nausea and headache, and loathed food; his skin became hot and burning, and his breathing oppressed and laborious. When examined the day after his admission into the hospital, he complained of a 'stupid headache' and 'confusion,' a nauseous taste in his mouth, and difficulty of breathing, amounting at times to a sense of suffocation. His eyes were watery and congested, his face was rather swollen and livid, more particularly his lips. The tip and edges of his tongue were of a bright red colour, and the middle was covered with a thick yellow moist fur. His skin was dry and hot; the bowels were confined; the urine was scanty and high-coloured, without containing albumen. The pulse was small, but rather hard, 120. Respiration short, forty in the minute. He had no cough or expectoration.

"The chest sounded well on percussion; small cooing sounds

* On Diseases of the Chest, p. 273.

were heard, more especially over the back, and now and then there was a slight trace of mucocrepitant rattle.

"In three days' time he had sunk into a typhoid state, with a dark, dry tongue, and great lividity of lips; a slight cough without expectoration appeared: the dyspnea became urgent, more mucocrepitant rattle was heard, and some dulness was perceived on percussion at the lower and posterior part of both sides. He died on the sixth day of his admission, in spite of every effort to support him.

"Inspection.—The mucous membrane of the stomach and of the lower part of the ileum was slightly congested in small patches. Both lungs were heavier and redder than usual. They gave out some little colourless serum on incision. They were studded all over with very minute granulations, none of which reached the size of a pin's head, and most of which were not a fourth of this size. They were greyish-white, and opaque. A number of incisions showed that they were distinct from each other. They felt hard to the touch, but could be rubbed down between the fingers, although with some difficulty."

On this case Dr. Blakiston remarks that, "while the appearance of the lung resembled ordinary pneumonic hepatization, it still differed materially from it. The lungs were pervious to air, but more friable than in such cases; whilst the granulations were much larger and less thickly clustered than in any case of pneumonia, whether sthenic or typhoid. *The symptoms indicated the march of simple typhoid fever, accompanied by a degree of obstruction at the lungs, not sufficiently accounted for by any physical sign.*"

The second case to which I refer is one which occurred under my own observation during the epidemic of 1848-9:—

The patient, a fair-haired lad of eighteen, was admitted into hospital on the fourth day of fever. He had a sweating crisis on the eighth, and convalesced rapidly. Eight days afterwards he relapsed, and for the first time since his admission he had cough, but no expectoration. No physical signs whatever could be discovered. On the third day after relapse he had copious epistaxis, and it was discovered that the spleen was considerably enlarged; the lower posterior portion of the left side was dull on percussion.

On the fourth and fifth days the epistaxis recurred, and the dulness had extended as high as the scapula. Inspiratory murmur was feeble and interrupted on the left side, and both inspiration

and expiration were accompanied with a sibilant râle. It was also remarked that the heart's sounds were heard higher than their natural situation.

He died on the morning of the seventh day of relapse.

On examination, the heart was found displaced fully two inches by an enlarged spleen. This latter organ weighed two pounds fourteen ounces. It was of a dark purple colour, coated with patches of a whitish substance, and containing internally numerous masses of the same, of various sizes. The entire left lung was of a dark violet colour externally, the upper portion crepitant, the whole lower lobe hepatized, red, and friable; part of the upper lobe, posteriorly, congested. On washing away the contained blood, the lobe became of a greyish colour, and its section showed numerous aggregated minute granules, each scarcely larger than a pin's point.

Peyer's glands were enlarged, tumid, and, in some instances, ulcerated. The mesenteric glands were congested, and contained a whitish deposit. My friend Dr. Aldridge submitted a portion of each of the viscera to microscopical examination, and informed me, that in none was there to be found any product of inflammation, but that the deposit in all the organs was of a tuberculous nature.

I would direct the student's attention to some valuable observations on the mutual relations between fever, pneumonia, and tubercle, by Dr. F. Zehetmayer, whose excellent memoir, translated by Dr. F. Battersby, is published "in extenso" in the twenty-seventh volume of the *Dublin Medical Journal*, first series.

The subjoined cases and observations by Dr. Stokes will amply illustrate the occasional epidemic tendency to conversion of the typhus crasis (to use the phraseology of Rokitansky) into pyemia; and I may also refer to two interesting examples, published by Dr. Graves in the sixth volume of the *Dublin Medical Journal*, (first series) of the supervention of a pyogenic condition upon fever:—

"Dr. Stokes exhibited a specimen of purulent infiltration of the lung, which was of interest as being illustrative of the prevailing epidemic. It was taken from the body of a man who died in the Meath Hospital of fever, during the past week.

"When the patient first came under notice, the exact day of his

fever could not be determined, but it appeared he had been more or less ill for a fortnight.

"The case was marked throughout by extreme prostration, although there was no loss of power in the action of the heart. It gradually appeared that the posterior portions of the lung were becoming dull, but the dulness was never complete, and the stethoscope did not indicate impermeability of the pulmonary tissue. The patient now began to have frequent sweats, diarrhea, and delirium; and towards the close of the case the dulness extended, but the crepitating râle never disappeared: the pulse rose to 140, but the heart's action continued vigorous. On the twentieth day a profuse eruption of petechial spots came over the back. On dissection it was found there was nothing remarkable in the intestinal canal, beyond a slight enlargement of volume in Peyer's glands; but this circumstance is of interest, as showing that we have been, perhaps, too much in the habit of regarding what is termed follicular enteritis as an invariable concomitant of the diarrhea of typhus fever. The spleen was much enlarged; the heart was free from disease; but the lungs, particularly the left, were in a state of sero-purulent infiltration.

"Dr. Stokes observed, that these cases of purulent infiltration of the lung, were examples of a morbid state clearly different from that of Laennec's third stage of pneumonia. Its antecedents—the mode of succession of its physical signs, and even its anatomical characters—pointed it out as one of that class of local diseases developed under the influence of a general pyogenic state. With respect to the order of succession of the physical signs, he remarked on the want of the signs of consolidation, which in ordinary pneumonia occur midway between those of the inflammatory congestion and those of purulent infiltration. In connexion with the fever of this country, there had been a strong epidemic tendency to this affection lately developed. In some cases, as in that which he presented, the alteration had occurred during the existence of the fever, and while maculæ existed on the surface. In other cases, pyogenic tendency was not exhibited until after a short convalescence from the primary fever. Of this a remarkable case had lately occurred in the Meath Hospital. The patient had gone through a severe typhus fever, and was held to be convalescent. In a very few days, an edematous swelling, attended with a slight blush on the surface, appeared along the line of the lower jaw.

This was followed by another swelling in the right occipital region.

"The pulse became rapid; the breathing laboured, and the posterior portion of the left side showed comparative dulness on percussion, and a large muco-crepitating râle. Death soon took place. Depôts of purulent matter were found in the neck, and the posterior mediastinum and the left lung were found in a state of semi-solidity, and infiltrated with pus; there was no red hepatization, nor did the incised surfaces exhibit the peculiar granular aspect of the third stage of pneumonia.

"In a third case at present in hospital, the patient after having recovered from a very low typhus, was attacked with pain in the right elbow joint, and within twenty-four hours, the parts presented all the appearances so well described by the late Dr. E. M'Dowell in his papers on periostitis and synovitis, in which he dwells on the characters of this purulent disease as affecting the joints, and subsequently the internal organs."—*Proceedings of the Pathological Society, January* 27, 1855.

(2.)

Many explanations have been offered of this phenomenon, none of which can be said to be perfectly satisfactory, inasmuch as it seems to occur in the most opposite conditions. First observed by Dr. Graves, in cases in which the presence of air in the pleural cavity was indicated by other signs, he regarded it as diagnostic of such a condition. My own observations and dissections proved that in some cases, at least, it existed, independently of any such effusion of air, as I found the pleuræ closely adherent in subjects in which the tympanitic clearness was observed immediately before death.*

Several years elapsed before my statement of the fact was believed; but the frequency of the occurrence gradually led to its general recognition.

Of those who have observed it, and offered explanations of it, Dr. Hayden deserves especially to be referred to. In his memoir, in the *Dublin Quarterly Journal*, vol. xli., Dr. Hayden reviews the theories advanced by writers since the time of Dr. Graves, and adds some important observations of his own.

* *Dublin Medical Journal*, vols. vii. and xi.—first series.

Having detailed a case in which a tympanitic form of resonance was present, over the seat of pneumonia affecting a portion of the lung, Dr. Hayden observes:—

"The inflammation, as is usual in typhoid pneumonia, invaded first the apex of the lung, and then slowly travelled downwards, involving, however, only the superior lobe, and at no period extending to the posterior and inferior portion, or inferior lobe of the lung. Are we to seek, in this latter circumstance, an explanation of the tympanitic resonance, or rather that remarkable modification of dulness which might be expressed by the designation of 'resonant dulness,' which became developed on the 3rd of June, *i.e.*, thirteen days after the commencement of the attack? According to Skoda the answer to this question should be in the affirmative: as he holds that the presence of a substratum of healthy lung, freely permeated by air, is capable of communicating a modified resonance, of a somewhat muffled character, to a solidified portion interposed between it and the chest-wall, subjected to percussion. On theoretic grounds this explanation might be deemed satisfactory. There can be no doubt that the presence of a stratum of healthy lung tissue, freely permeated by air, subjacent to a solidified and non-resonant portion, does modify, in a marked degree, the dulness of the latter, the percussion note yielded by which is of a compound character, representing, in the proportions in which they are relatively present, the two elements of which it is composed. It will appear, however, on reference to Case No. II., that the phenomenon of modified tympanitic resonance in a solidified lung, cannot be attributed to this cause exclusively; in that case, although the entire lung was hepatized, the phenomenon was developed even in a higher degree than in the case now under consideration; whilst in case No. III. all the conditions required by Skoda's doctrine for the production of resonant dulness, namely—a solidified lobe, overlying one in a healthy condition, were supplied, yet the phenomenon did not exist.

"From these cases, therefore, the conclusion to be arrived at would seem to be, that although in a partially hepatized lung, in which the solidified portion has a substratum of healthy pulmonary tissue, the percussion dulness of the former may be modified by the resonance of the latter, in such a manner as to give rise to a hybrid sound of a very remarkable character, this phenomenon may be present where the entire lung has become solidi-

fied: and again, that it may be absent where a healthy and a solidified portion of lung-tissue occupy the relative positions mentioned."

Dr. Hayden's second case presented marked tympanitic resonance over the front of the right side, with *prominence* of that side as compared with the left. The side having been opened—post-mortem—under water no air escaped, and the lung and costal pleura were found firmly adherent. On puncturing the lung, however, bubbles of air freely escaped. "The right lung," says Dr. Hayden, "was fully distended, so as to keep that side of the chest in a state of maximum expansion. Its colour was light grey, and on section it was found solid throughout: placed in water, the lung sunk at once." On this case Dr. Hayden observes:—

"I have thought it right to give from my notes, taken at the bedside, a detailed account of the progress of this case from day to day, and likewise of the post mortem appearances; because of the interest that attaches to it in connexion with the phenomenon of tympanitic resonance in a solidified lung. In case No. I, this phenomenon likewise existed, but in a less degree, in a lung only partially solidified. In that case the hypothesis was at least warrantable, that the resonance yielded by the solidified portion was communicated from that which was in a healthy condition, In the case just narrated, however, no ground existed for such an assumption, as that the lung was hepatized throughout its entire extent. Neither was it admissible to suppose that the phenomenon was due to communicated gastric resonance; for, independently of the fact that it occurred on the right side, it will be remembered that it was manifested only in the upper portion of the lung, where it could not have existed, if transmitted from the stomach, without also manifesting itself in the inferior lobe. Lastly, percussion of the lung after removal from the body afforded convincing evidence that the resonance was intrinsic. A portion of it placed upon the hand, a solid body, and percussed in the usual manner, yielded the characteristic metallic note, resonance of a character similar to that heard during life over the corresponding portion of the chest. The occurrence of aëriform accumulations, independently of rupture or perforation of the lung, in connection with acute disease of the organs of respiration, is of great interest as introducing an element of derangement into the rules of diagnosis of intra-thoracic disease. These accumulations may be subdivided into two forms, both of which have been fully established, namely, those in the

cavity of the pleura, constituting the 'simple pneumothorax,' of Graves; and the 'secondary' form of pneumothorax without perforation of Jaccoud, and those in the substance of the lung itself. In the two first cases given by Dr. Graves, there can be no reasonable doubt that there had been aëriform effusion into the cavity of the pleura. Of this, the displacement of the heart without liquid accumulation in the former case, and the compression of the lung without liquid distension of the pleura in the latter, afford convincing evidence.

"The presence of a cavity in the apex of the lung in the latter case, in the absence of positive proof that no communication existed between this and the pleura, may be taken as invalidating, in some degree, the evidence it affords in support of the doctrine of simple pneumothorax by secretion.

"Of this form of gaseous secretion into the pleura, another indubitable example has been admirably reported by by Dr. Little of Sligo. A case is mentioned by Dr Stokes, of typhoid pneumonia in a female, in which, on the eighth day of her illness, the antero-superior portion of the left side, previously dull, yielded a sonorous tympanitic sound on percussion. On the following day, resonance had extended to the postero-superior portion of the chest; but on the next succeeding it had disappeared, and been replaced by dulness.

"In this case, which is given as one of pneumothorax by Dr. Stokes, the character of the resonance described by him as being 'similar to what is produced by the stomach in the highest degree of flatulent distension,' was different from that observed in my cases, in which it was somewhat muffled.

"That there is, however, another cause than effusion of air into the cavity of the pleura, whether by secretion or otherwise, to which resonance over a solidified lung may be due, the cases reported by Dr. Hudson, in his valuable memoir on typhoid pneumonia, afford strong evidence.

"The cases now reported go to corroborate the evidence furnished by Dr. Hudson; and the second case carries that evidence a step further, by demonstrating negatively, that no air existed in the cavity of the pleura, and positively that air did exist in the tissue of the lung, in that portion of the organ which yielded resonance both before and after death.

"In Dr. Hudson's second case, as in mine, there was at first

sharp pain, dulness on percussion, and absence of respiration, and of crepitus over the affected portion of the lung: hence, in both cases, the erroneous diagnosis of pleuritis with effusion. Subsequently, the occurrence of bronchial respiration and of crepitus, showed the error committed, and pointed out the real nature of the disease. Morbid clearness was developed in the previously dull portion of the lung, in Dr. Hudson's second case, on the fourth day of the illness; in my first case, only on the fourteenth day, and in the second, on the sixth day. Of these three cases, it continued up to death in the two which were fatal; but in that which terminated in recovery, resonance was replaced by dulness on the sixth day from its commencement. In all three cases bronchial respiration and crepitus coincided with tympanitic dulness.

"It cannot be pretended that resonance was due to a central pneumonia in these cases; firstly, because of the pre-existence by several days' dulness, in the resonant portion of the lung; and secondly, because post-mortem examination in two of them, in each of which resonance continued up to death, showed that hepatization was universal. In Dr. Hudson's seventh case, bronchial respiration and crepitus, likewise coincided with resonance, which continued up to death. Thus it would appear, that morbid resonance developed in the progress of pneumonia may be associated with bronchial respiration and crepitus, as in the cases above cited; or with total absence of all respiratory sound, as shown by Dr. Graves; and the evidence before us would seem to warrant the conclusion, that upon this distinction may be based the differential diagnosis between resonance due to air included in the tissue of a hepatized lung, and that depending upon aëriform accumulation in the pleura. Grisolle does not mention percussion resonance at all in connection with pneumonia; he only speaks of comparative dulness, and occasional absence of dulness in the pneumonia of children. Dr. Stokes says:—'But of all these signs, the most remarkable is tympanitic clearness over the diseased lung, a phenomenon evidently proceeding from an effusion of air by secretion into the serous cavity.' Thus it would appear that at the date of his great work (1837), this eminent physician, than whom nobody in our day has contributed more to the physical diagnosis of thoracic disease, was still unaware, or at least unconvinced, of the existence of the second form of pneumonic resonance, namely, that not depending upon pneumothorax.

"Dr. Williams includes amongst the essential and characteristic physical signs of pneumonia 'dulness of sound on percussion,' to the presence of which, in the advanced stages of the disease, he makes absolutely no exception, and nowhere mentions tympanitic resonance as of occasional occurrence.

"Dr. Fuller, in his work, *Diseases of the Chest*, (1862), does not allude to tympanitic dulness in pneumonia; and in the two most recent works on the Practice of Medicine, namely, those of Trousseau and of Hughes Bennett, the subject is not adverted to. As far as I have been able to make out, Dr. Hudson's cases, previously mentioned, were the first recorded examples of tympanitic resonance in pneumonia *not due to the presence of air in the cavity of the pleura;* and that Cases II. and VII. in his category, which so closely resembled my second case in all essential particulars, were of this nature."

I am convinced that of the varying conditions under which the phenomenon is observed, one, at least, must always exist—viz., the expansion of the parietes consequent upon tumefaction or displacement of the lung. I add displacement, because the same sound, or one closely resembling it, is to be observed for a short time in cases of pleuritic effusion, and still more frequently, in my experience, in cases of copious liquid effusion into the pericardium. Tympanitic resonance is frequently observed in our wards in cases of pericarditis in young persons—a fact which was first recorded by Dr. Graves. I have also met with several examples of augmentation of the volume of the lung, and consequent expansion of the side, in cases of plastic pneumonia, in which the tympanitic resonance on percussion was most remarkable.

This phenomenon is not merely interesting as a scientific curiosity; it is also worthy the attention of the student as an occasional aid to diagnosis. One instance will suffice to show this.

Some time since, I was called to see a case in consultation with a professional friend, which he believed to be one of hepatitis. He had, accordingly, applied a large number of leeches over the right hypochondrium, had given calomel freely, &c., &c. The patient presented, in an unusually high degree, the icteroid coloration of the surface described by Hasse and Zehetmayer; in fact, he was sub-jaundiced; moreover, as my friend remarked, the right side was even clearer than the left, and no pneumonic crepitus was audible in any part. I, however, pointed out the peculiar tympa-

nitic character of the clearness; I accounted for the absence of crepitus by the fact, that the entire lung being engaged, there was no expansion of air-cells to produce it; and I appealed to the future progress of the case for a confirmation of my diagnosis, predicting that on the commencement of resolution the existing clearness would be replaced by equally marked dulness.

At our meeting on the following day this had occurred; the entire side was dull on percussion, the other signs of pneumonia were present, and my friend acknowledged the value of a sign which previously he had not thought worthy of his attention.

LECTURE VI.

CARDIAC AND PULMONARY LESIONS.

Besides the pulmonary complications noticed in my last Lecture, I have to direct your attention to a peculiar form of pneumonia which occasionally seems to replace, as it were, the symptoms of fever, and to which, accordingly, Dr. Stokes has given the name of aborted or arrested typhus.

This condition has been regarded by others as, strictly speaking, less a complication of typhus, than the localization by elective affinity of a blood-poison in the lung; the general febrile condition terminating thus—by a form of crisis, as it were.

The close relation between fever or pyrexia, and pneumonia, and the frequent replacement of the former by the latter, has long been observed by pathologists; and it has been supposed by Wunderlich, as quoted by Dr. Parkes, that the exudation in the lungs coincides with the end of the pyrexia—that is to say, that the defervescence commences when the lungs become hepatized. "If it could be satisfactorily made out," says Dr. Parkes, "it would certainly imply that the exudation into the air cells relieved or cured the fever; in other words, that the lung disease is not a primary but a secondary condition, and that it succeeds to, and brings to an end, by purifying the blood, a condition of general pyrexia, arising from blood

disease. Without believing that this relation is quite determined (if it were determined the case would be settled), there is no doubt that the fever ends spontaneously, or very greatly lessens, at the time when the inflammation of the lungs is very great."

Upon the hypothesis that the pneumonia is but the localization by elective affinity of a blood disease, by a process analogous to that of gout, is explained, says Dr. Parkes, "the previous malaise; the sudden outbursts of fever, when the diseased blood implicates, at last, the nervous system; the singular and rapid termination of the pyrexia, at a time when the lung lesion is yet intense; and the enormous elimination of urea during the very first days, before the lung exudation has softened down."

You have had frequent opportunities of witnessing this rapid subsidence of the symptoms of fever on the supervention of pneumonia; and you are aware that Dr. Stokes is of opinion, that specific typhus itself is not unfrequently thus arrested.

Dr. Stokes thus states his views concerning this affection:—"The patient is attacked with the usual symptoms of typhus fever, and he comes into hospital after two or three days' illness. There is nothing about him to make one think that his disease will not run the usual course of the epidemic of the day, and we are prepared to expect a fever of at least a fortnight's duration. On admission he may have no symptom which would call attention to his chest; but as early in some cases as the beginning of the fourth, and in others, of the fifth day, it is discovered that the upper lobe of one lung is solid, or nearly so. The clavicle is quite dull on percussion, so is the scapular spine, and the dulness extends to the line of the mamma. This dis-

covery has been so often made accidentally, that I am sure many of such cases have passed unnoticed, at least where the attendant is not well informed as to the insidious nature of typhus local diseases, and does not make it a practice and a duty to examine daily, as far as he can, the condition of every organ.

"But the most remarkable circumstance in these cases is, the constitutional disease seems to be cut short. The expression of fever leaves the countenance; the peculiar colour or hue of typhus disappears; the eye becomes bright and intelligent; the tongue cleans; and the pulse comes down to a natural state. And thus we have seen patients so altered in the course of twenty-four hours, that one had some difficulty in recognizing them; all the symptoms of typhus were gone, and nothing remained but the consolidation of the lung. And this, too, is not attended with any notable suffering. There may be a little cough, some dull pain, or an inability to lie on one side; but that is all. The respiration is scarcely, if at all, accelerated. In fact, it would seem that there was no irritation or excitement of the organ; and the case is another proof how much less the sufferings in disease are connected with the mechanical than with the vital conditions of the organs."

"How," asks Dr. Stokes, "are we to look at such cases? That they are no examples of inflammation of the lung it is plain; and it appears probable that if this local disease had not occurred, the patient would have gone through the course of the fever of the day. Does it not seem as if the constitutional disease exhausted itself, as it were, on the production of the local affection, just as in certain cases of simple variola we see the fever to subside on the appearance of the pustule? I do not know whether such

cases have been observed elsewhere; but of their existence we have had abundant proofs. It is worthy of remark, too, that when we compare these cases with the ordinary forms of typhus attended with secondary disease of the lung, the local affection is here developed at an unusually early period; and it may be that in the more protracted cases of fever, the nature of which is to develop local affections, the periods of this development, and of the cessation of the fever, may also be coincident. We do not, however, find that this is so common as to establish a rule."*

Before I pass on from this part of our subject, I would wish to mention an occurrence which I have not seen noticed by any writer. In several instances in which fever was attended with cerebral symptoms, particularly with great emotional excitement, and with marked cerebral breathing, these symptoms have been succeeded, after some days, by inflammatory congestion of the upper lobe of one or other lung. This complication differs from the affection above described by Dr. Stokes: firstly, in the period in which it has occurred; secondly, in not being attended with resolution of the fever; and, lastly, in having been —in my experience, at least—always preceded by highly-marked excitement of the emotional nervous centres, as if originating in the nerves of the respiratory organs.

I am unable to offer you any satisfactory explanation of this occurrence; of which, however, I have seen too many examples to have any doubt. It is by no means a solitary example of the occurrence of vascular congestion of an organ, consequent upon derangement of its innervation.

* "Lectures on Fever:" *Medical Times and Gazette*, 1865.

Probably its analogue may be found in the reactive inflammation of the brain or its membranes, sometimes met with in the advanced period of fever, functional derangement having existed for some time previously.

The condition of the right ventricle should be studied in connection with the respiratory system, upon which it exercises great influence, and in relation to which it certainly deserves more attention than it has usually received.

Viewed simply as a febrile phenomenon, diminished contractility with passive congestion of the right ventricle, is of frequent occurrence in the earlier periods of typhus and relapsing fever. It manifests itself in a feeling of anxiety and embarrassment about the præcordia, frequent sighing, moaning, and jactitation; there is a sense of weight, with some tenderness of the epigastrium; and, on examination by percussion, the præcordial dulness will be found to extend across the lower third, and sometimes to the right, of the sternum. Along with these signs I have sometimes observed turgescence of the jugular veins, and some degree of lividity of the lips, with a purplish flush of the cheeks. I have often seen immediate relief of these symptoms follow the application of a few leeches over the lower end of the sternum, or the abstraction of a few ounces of blood by cupping. I have even found relief to follow dry cupping. In other cases I have known this condition, and the distressing symptoms due to it, continue throughout the entire course of the fever; the signs above-mentioned disappearing suddenly on the occurrence of crisis.

This fortunate termination is not, however, constant. Occasionally prolonged stasis of blood leads to the forma-

tion of fibrinous clots in the right cavities of the heart. The signs of this occurrence being, marked increase of dyspnea, or rather of apnea; with, sometimes, the sudden supervention of emphysema of the lungs;* irregular intermitting action of the heart, and failure of the general circulation. It may be reasonably presumed that this congestion of the right cavities, is due to several causes co-existing in varying proportions. Thus, it may be owing to the direct action of the fever-poison upon the nutrition of the organ, diminishing its tonicity; to the influence of deranged innervation; occasionally, to pre-existing disease, such as contracted mitral opening, or a weakened condition of the right ventricle, caused by fatty degeneration; to long-existing chronic bronchitis and emphysema; or, finally, to the constant co-existence of pulmonary congestion, set up during the fever, opposing a resistance to the entrance of blood into the lung through the pulmonary artery, which resistance the weakened ventricle is not able to overcome. When the first and second conditions alone exist, the cardiac congestion may be removed by the conjoined employment of derivatives and stimulants. But in the more complex cases, although the condition of the ventricle may seem to improve for a time under the use of stimulants, it returns at the more advanced periods of the fever, and powerfully conduces to a fatal result; as in a case which I saw a few years since, under the care of the late Dr. G. Kennedy:—A middle aged woman was admitted into Cork-street Hospital, on the eleventh day of typhus, much maculated. She had urgent dyspnea—the respirations being 60 in the minute—and cough, with frothy

* *Vide* Dr. Gordon's and Sir D. Corrigan's Cases, Appendix (1.)

mucous expectoration. The lower portions of both lungs were dull on percussion, affording muffled feeble respiration, mixed with bronchitic râles; the heart's action was heaving, with a small, compressible, radial pulse of 128. The præcordial region was dull on percussion from the left nipple to the right of the sternum, and downwards to the border of the ribs; the impulse and sounds much stronger on the right than on the left side of the heart. Under the administration of wine and stimulants, aided by a large blister to the front of the chest, the patient rallied for a time; the colour of the maculæ became bright, the countenance more clear, the respiration easy, and the præcordial dulness diminished in a marked degree. This improvement was maintained for about a week, when the former symptoms gradually returned; and on the day before her death, which occurred on the twenty-first after seizure, she presented a dusky face, with dark petechiæ, and a low temperature of the surface, which was covered with cold greasy sweat; the pulse was faltering; respiration hurried and sighing; heart's action heaving and irregular; and there was great increase of præcordial dulness to the right side.

You lately had an opportunity of studying this condition of the heart in the case of Jane Fisher. In this case you observed the signs I have enumerated, more especially the sighing respiration, the lividity of countenance, and the marked increase of præcordial dulness. The signs disappeared, in a great measure, under the influence of repeated dry cupping conjoined with the free administration of stimulants; but returned, from time to time, in a less degree, until crisis occurred.

In this case the loaded condition of the right ventricle

was associated with pulmonary congestion; and it may be questioned if it ever occurs singly, except at the invasion of fever, inasmuch as pulmonary congestion, to a greater or less extent, may be considered a constant condition in typhus. If, as I have before remarked, the influence of the fever-poison produces a change in the systemic capillary circulation, the same cause is certain to produce the same effect in that of the lungs; in which we have reason to believe, that the vital attractions between blood and tissue are even more readily altered, and, in which, we have a powerful disturbing influence in the deranged condition of the nerves of respiration Moreover, the diminished power of the right ventricle must have an influence on the pulmonic capillaries, similar to that observed in the systemic circulation in cases of weakened left ventricle. When this derangement of the pulmo-cardiac circulation becomes extreme, we have the most urgent dyspnea and præcordial anxiety, deranged action of the heart, feeble and irregular pulse, and sinking of the temperature. After death we find, together with bronchial and pulmonic congestion, a loaded condition of the right cavities of the heart, and, frequently, fibrinous coagula of firm consistence extending into the pulmonary artery.

Inasmuch as the coagulation must be favoured by prolonged stasis of blood in the right cavities, it becomes most desirable that this latter should be removed, the contractions of the ventricle excited, and the pulmo-cardiac circulation relieved with as little delay as possible. Various measures may be resorted to for this purpose, with more or less advantage—such as brandy, turpentine, and ammonia, dry cupping, revulsives, and local blood-letting by leeches or cupping. But in extreme cases of pulmo-

cardiac congestion, I have conjoined with stimulant and revulsive remedies—the abstraction of a few ounces of blood from the arm, by venesection, with the best effect. I shall read to you an abstract from my notes of two of the most urgent cases of pulmo-cardiac complication I have ever seen, and which I treated in this way : —

Margaret Colman, aged eighteen, strong, and previously healthy, was brought four miles to hospital on a cold day in the month of January, 1840, in the sixth day of typhus, and on arrival was much chilled.

On the eighth day she was reported to have raved during the night; pulse, 100; eyes suffused; surface of arms, chest, and back thickly covered with dark-coloured maculæ; urine, pale.

On the tenth day it was said that she had breathed with rapidity and difficulty, had coughed incessantly, and that her extremities had become cold during the night.

The resident apothecary applied a blister between the shoulders, warmth to the extremities, and administered decoction of senega, with camphor and carbonate of ammonia.

Notwithstanding these measures, the respiration was gradually becoming shorter, more hurried, and laborious, accompanied by moaning and jactitation; and she complained of weight about the heart. The lividity of the face and arms had much increased during the hour preceding my visit, and the extremities were cold and covered with dark maculæ. The physical signs were those of bronchitis, with congestion of the lower lobes of both lungs, and of congested right cavities of the heart, the action of which organ was heaving and tumultuous, while the pulse was weak, rapid, and compressible. Her intelligence was per-

fect, but she manifested little sensibility to external impressions, such as the irritation of the mustard cataplasms and turpentine epithems, which were being freely employed.

Considering that the indications were, obviously, to relieve the loaded right auricle and ventricle, and at the same time to arouse the heart's action by stimulation internal and external; I took six ounces of blood from the arm, and ordered the senega and ammonia to be continued, with the addition of twenty minims of oil of turpentine to each dose, a wineglassful of warm punch being given at intervals.

A large sinapism was also applied to the chest, followed by turpentine epithems; and sinapisms to the legs.

On visiting her in the evening I learned that the incessant cough had been at once relieved by the bleeding, that she had slept quietly, and had passed some high-coloured urine. The countenance was visibly improved, being much less livid; the skin had become warm and dry; the respiration easier, with less moaning; and the pulse fuller and stronger than in the morning.

11th and 12th.—Little change. Ordered small flying blisters above and below the clavicles, and to have four ounces of wine.

13th.—Was reported to have passed a sleepless night; lividity had returned, with laboured respiration; had low muttering delirium, with involuntary discharge of urine. Four ounces of blood were taken from the chest by cupping; senega mixture, with turpentine, continued, and a musk and camphor bolus given every fourth hour.

14th.—Has had no sleep; cough and expectoration improved; no other change. Blister under each clavicle; eight ounces of wine.

15th.—Had a few hours' sleep. During this day she had occasionally a tendency to faintness, which was averted by the free administration of stimulants. During the following night she slept soundly, and awoke on the sixteenth day with a pulse of 100, soft and full, respiration easy, skin warm, and, for the first time, slightly moist. Henceforward her recovery was steady and rapid.

The other case to which I have alluded was, in many respects, the most remarkable, and the effect of treatment the most striking, I have ever witnessed. The young lady was a relative of the late Dr. Graves, who published, in the second edition of his "Clinical Medicine," a short account of her case which I sent to him at the time.

Miss ——, aged fourteen, was attacked by typhoid fever, attended with severe diarrhea, which had caused much prostration at the time of my first visit, on the eleventh day. From this time till the end of the third week the tendency to diarrhea continued, yielding finally to port wine, decoction of bark with aromatic confection, and enemata of acetate of lead and opium. Towards the close of the third week the bronchitis attending the latter period of typhoid fever set in, and during the night following the twenty-first day, became suddenly and alarmingly aggravated; the breathing at the same time became loud and laborious, the pulse fluttering and occasionally imperceptible at the wrist, the surface cold and hot by turns, and covered with a profuse greasy perspiration.

At my visit on the following forenoon, I found her apparently moribund. She was breathing hurriedly and with stertor, the cheeks puffing slightly with each expiration; she also had convulsive twitchings of the mouth; sight, hearing, and consciousness appeared to be totally lost;

the eyes were fixed and glassy, and their pupils contracted to a point; the face had become bloated and livid, the lips purple, and the jugular veins distended; the respiration was accompanied by loud râles over the front of the chest; the heart's action was tumultuous and jerking, but the radial pulse was scarcely to be felt; finally, the abdomen was enormously distended and tympanitic. It appeared to me that death was impending from sudden congestion of the lungs and right side of the heart, and I proposed to try the desperate chance of a small bleeding, with the view of relieving the loaded right ventricle, and so gaining time for further measures. I accordingly took about four ounces of blood from the arm, and followed immediately, this operation, by the application of sinapisms to the spine and to the soles of the feet, and of relays of hot flannel sprinkled with oil of turpentine to the abdomen; giving, at short intervals, a few drops of oil of turpentine in brandy punch. The turgescence and livid colour left the face after the bleeding, and did not return; the breathing also became easier, but no other signs of improvement were manifested, and at the end of three hours it was still impossible to arouse her to consciousness. I then left her, giving directions that the external and internal stimulants should be continued; brandy and water being given every half-hour, while the power of swallowing remained.

During the following night there was little change in her condition; but in the course of the morning of the twenty-third day she began to manifest some return of consciousness, and in the afternoon I found her evidently able to recognise those around her. The pulse was still fluttering and irregular, and the breathing high and la-

borious, accompanied by loud bronchial râles, but without the stertor of the day previous. I continued the turpentine and brandy, and applied small flying blisters over the course of the eighth pair of nerves—a practice frequently recommended by Dr. Graves. A gradual change for the better took place during the night, and on the twenty-fourth day the pulse had become full and steady, though still over 100; the breathing less hurried and laborious; the meteorism had entirely subsided; the profuse greasy perspiration had also disappeared, and the skin was moderately warm, and soft. I now desired the brandy and water to be administered at longer intervals, and withdrew the turpentine, giving decoction of senega and carbonate of ammonia for a few days, while the cough and copious expectoration continued. The convalescence was rapid and complete.

Dr. Graves remarks, that no case could teach more decidedly than this the necessity of a cautious prognosis in fever, and of never relaxing our treatment in despair of recovery. When we consider the subject of treatment, I shall have to impress upon you the supreme importance of the measures you should adopt in the last paroxysm of fever, upon which the fate of the patient so often depends; and that the nature of these measures will necessarily vary with the indications requiring to be fulfilled. In the two cases I have narrated, I have not a doubt that life was saved by the abstraction of blood. The explanation of its salutary effect we find in the experiments of Coleman, as quoted by Wilson in his lectures on the vascular system, and of Dr. John Reid, as given in his physiological and pathological researches.* Both of these experimenters

* Appendix (2.)

found that in animals asphyxiated by hanging, or by the operation of narcotic poisons, the right cavities of the heart became turgid with blood, and ceased to contract on the application of a stimulus; but that their contractions were at once renewed upon the distension being lessened, by the abstraction of a small quantity of blood from the overloaded auricle.

Of course I should never advise the abstraction of blood, without the most energetic measures being at the same time adopted to sustain the heart's action, and arouse the failing nervous energy. Warm punch at short intervals, turpentine, ammonia, and the repeated application of flying blisters, sinapisms, and turpentine epithems, are the best means of fulfilling these indications.

To recapitulate briefly—The rules you will observe in your study of the circulatory and respiratory systems in fever are :—

1. To study them conjointly, bearing in mind the intimate connection of the two functions, and the close anatomical connection between their organs.

2. Never to be content with the observation of one portion of the systemic circulation; but, in all cases, to note the condition of the heart, arterial system, and capillaries.

3. Similarly, to conjoin your observation of the congested condition of the right cavities of the heart, with that of the larger systemic veins on the one hand, and the pulmonary circulation on the other.

4. To bear in mind that the heart, though weakened by the action of the typhus-poison, may become excited under the influence of cerebral or cerebro-spinal irritation, when the phenomena of jerking heart and small radial pulse will be observed.

5. To connect the observation of the rate of the respiration with that of the pulse, and to note carefully any deviation from the normal ratio of the former to the latter; especially when this is conjoined with sudden elevation of temperature.

6. To note any alteration in the percussion sound of the anterior portion of the thorax; and no matter how latent may be the rational symptoms, to make a careful examination of the posterior portion of the chest, when any such alteration as a heightened clearness is observed.

7. To be careful to discriminate disturbed respiration of cerebral origin, from that arising from pulmonary congestion; taking, as your guide, the associated symptoms, such as the excited action of the heart in the former, and the more marked rise of temperature, with the physical signs, in the latter.

8. In all cases, when called to attend fever during its early period, to make daily a careful examination of the chest, in order that pneumonia may not supervene unobserved.

9. To be equally on your guard, during the later period of typhoid, to detect the occurrence of hypostatic congestion and lobular pneumonia.

APPENDIX TO LECTURE VI.

(1.)

In the following case, presented to the Pathological Society by Dr. Gordon, the coagulum was evidently formed several days before death. The case by Sir D. Corrigan, which I also subjoin, was probably connected with the action of a saline purgative.*

"Dr. Gordon detailed the history of a case of typhus fever, in which a firm coagulum was formed in the pulmonary artery, causing emphysema of the lungs.—Hugh Reilly, a dairyman, aged twenty, was admitted into the Hardwicke Fever Hospital on 1st November. He was at that time fourteen days ill; from the history which he gave of his illness, and the symptoms which then existed, he was evidently labouring under an attack of intermittent fever, although I could not trace the origin of the disease to any peculiar malaria. The fever assumed the rather unusual form of the quartan ague; there were two clear and distinct days on which there was no paroxysm; but when they did occur, they were unusually severe, and were always accompanied by very sensible splenic enlargement. He was treated at first, after mild but efficient purgation, with sulphate of quina in moderate doses. This plan not succeeding, a large additional dose was administered a short time before the febrile accession was expected, and thus the disease was arrested—and that suddenly: it did not yield by the paroxysms becoming gradually less severe, or the intervals becoming more distant.

"The paroxysms came on at noon; he had a severe attack at this hour on 11th November; he had another equally severe on 14th November, and this was the last. Although the attack of ague terminated, the patient did not appear to convalesce satisfactorily, and he gradually assumed the aspect of one labouring under typhus fever. The entire system became affected. The cerebro-

* For a complete history of the formation of fibrinous coagula in the heart, I would refer the student to Dr. Richardson's Lectures in the *British Medical Journal* for 1860.

spinal system was engaged, for the patient suffered from pain in his head and back, weariness of his limbs, soreness of the entire body, restlessness and inability to remain long in any position; his intellect became dull, and he raved occasionally at night. The respiratory system was engaged, for he complained sometimes of cough and weight on his chest, and the existence of sonorous and sibilous râles, indicated that there was at least some congestion of the bronchial mucous membrane. The gastro intestinal mucous membrane was engaged, for his tongue was hard, and his lips and mouth were gradually becoming parched and dry; he had lost all appetite for food, and even for drink, and the bowels ceased to act spontaneously. The principal evidences of the circulating system being engaged, consisted in marked acceleration of the pulse and its great debility; while the morbid pallor and coldness of the surface, showed that the capillary circulation was not in a healthy condition. I could not assign any preponderance to any collection of symptoms, or say that any particular system was more deeply engaged than the remainder. The patient was not maculated, nor had he an eruption of any kind at any period of his fever; neither were there present any of the other evidences of increased fluidity of the blood. The sounds of the heart were natural and perfectly distinct; the urine was scanty.

"The symptoms of typhus fever continued to increase and accumulate; and on the 28th there was superadded a loud bruit de soufflet towards the base of the heart, but not exactly in the usual situation where aortic murmurs are heard: it was confined to this situation, and did not pass into the large vessels. There was in this case no previous history of cardiac disease, nor any symptom of it during his stay in hospital. I had little hesitation, therefore, in designating this murmur, in the nomenclature of Dr. Stokes, as 'the typhoid anæmic murmur,' and I carried out the indication it afforded, by ordering for the patient an additional quantity of wine and diffusible stimulants, and extensive and repeated counter-irritation over the præcordial region.

"The abnormal murmur persisted on the following day, with symptoms of greatly-increased prostration and debility. The physical signs of bronchial congestion became less evident, while the patient complained of increased dyspnœa and pain, which he referred to the epigastrium. This apparent anomaly was accounted for by the sudden supervention of extensive emphysema of both

lungs, evidenced by the usual physical signs of increased resonance on percussion, and diminished intensity of respiratory murmur. He died rather suddenly, on the morning of the 30th.

"The post mortem examination showed excessive vascularity of the meninges and substance of the brain, with slight superficial softening, chiefly of its inferior surface. The lungs exhibited a perfect example of intense vesicular emphysema; the muscular structure of the heart was healthy, and the valvular apparatus perfect. The left side of the heart was almost empty: the right ventricle contained a well-formed fibrinous coagulum; it was exceedingly firm and strong; it passed into the pulmonary artery, and through several of its ramifications. It was formed of concentric layers, was partially adherent to the sides of the vessels through which it passed, and terminated not very abruptly. The liver was slightly congested; the spleen was about the natural size; when incised it seemed of normal consistence; the capsule, which was slightly opaque, had a shrivelled appearance, particularly along the circumference, where was a fringe-like border, as if the parenchyma had receded somewhat from the edge of the capsule. The mucous membrane of the intestines was healthy, excepting some spots of very decided vascularity, corresponding to the situation of Peyer's glands, in the vicinity of the ileo-cœcal valve."—*Proceedings of the Pathological Society.*

"Anne Rock, ætat sixty-eight, was admitted into Hardwicke Hospital, upon the 20th November, 1851, four days ill. She had previously taken salts, which purged her violently. On admission, her countenance looked dark and sunken; the skin was dry and hot, and spotted with dark-coloured maculæ; tongue dry and brown; pulse 108, very weak and intermittent. She lay on her back, making no complaint; and when questioned, answered intelligently. She had little thirst, and swallowed without difficulty; respiration was rapid and laborious, and bronchial râles were audible over the whole chest. On the sixth day of her illness the maculæ were still more extensive and dark-coloured, and the pulse was 116, weak and intermittent; the respiration 40 in the minute. She lay as before, and was quite collected. On the seventh day the pulse was 120, the respiration 48 in the minute; hands, cold; tongue, dry and brown, covered with sordes. She began to mutter to herself, but was sensible when roused.

"On the eighth day the pulse was 120, very weak; the hands

and arms were cold, and dark purple spots of congestion appeared on her elbows, knees, and ankles, the maculæ enlarged in size, and were dark and ill-defined. She continued to sink, and died at eight o'clock next evening—ninth day.

"*Post-mortem.*—The surface of the body was of a dusky yellow colour, but where a blister had been applied, it was of dark purple. The lungs were greatly congested posteriorly, and there was effusion into the bronchial tubes. Upon cutting into the right ventricle of the heart, it appeared to be distended with a quantity of black clotted blood. Upon turning this aside, a yellow fibrinous deposit was found firmly attached on all sides in the interstices of the inner walls of the ventricle, and extending from the ventricle continuously into the pulmonary artery, and its branches to the third and fourth subdivisions. This fibrous deposit was tough, elastic, and consistent, not more than half filling the calibre of the tubes through which it lay. Where this fibrinous formation, which was rather globular in the ventricle, passed through the neck of the pulmonary artery, it suddenly became constricted, and again swelled out in size in the trunk of the artery beyond the valves. The left cavities of the heart were full of black blood, but without any such fibrinous deposit as that on the right side. The other viscera were sound.

"In this case it is obvious there were two stages of coagulation: the one, that forming the dark coloured clotted mass of blood which occurred immediately at or after death, and which presented nothing remarkable; but the other coagulation, I think it is obvious, existed for some time; how long, it is difficult to say, but probably for one or two days before death. The extreme toughened consistence, and freedom from colouring matter, of the fibrinous deposit, would render this probable; but this probability is greatly strengthened by the neck-like form of the fibrine where it crossed the valves into the neck of the artery, and which can only be accounted for by admitting, that while the polypus was in process of formation, the valves were in action, and for a sufficient length of time to produce the constriction described. Supposing this to have been the state, we can understand what a formidable aggravation such a formation must have been, and how the case must have sunk from the lesions of circulation, with little comparative disturbance of any other function."—*Lectures on Fever*, page 67.

(2.)

"I have observed," says Dr. J. Reid, "in several experiments on the lower animals, that disgorging the right side of the heart, when its contractions are enfeebled or suspended, by opening the external jugular has, in some cases, a decided effect in renewing its action, and this, I am convinced, may be of considerable practical advantage in promoting the return of the circulation under certain circumstances.

"Exp. 1.—While assisting my friend Dr. Cormack in some experiments upon the physiological effects of creosote, we found, on opening the thorax of a dog, immediately after it had ceased to breathe, into whose femoral vein twenty-five drops of creosote had been injected, that the heart was perfectly quiescent, and remained so even when pricked and cut superficially with a scalpel. As the right side of the heart seemed much engorged, a small opening was made into the auricle, and part of the blood allowed to escape. As soon as the blood began to flow, the heart immediately resumed its contractions, and continued to act vigorously and spontaneously between two and three minutes, and only ceased after five minutes.

"Struck with the effect which disgorging the right side of the heart had in renewing its contractions, under circumstances where no external stimulus was of any avail, I was anxious to ascertain if the same results would follow the unloading of the heart when arrested from other causes.

"Three dogs were killed by hanging, and, as soon as they had ceased to breathe, the thorax was laid open. In all of them the heart was acting pretty vigorously, particularly in one, only a few months old. When the contractions had become feeble, the external jugular vein was opened. This was followed by a decided but temporary increase in the contractions of the heart in two of them, which were large and full-grown. The opening of the jugular vein was found rapidly to empty the right side of the heart."—*On the effects of venesection in renewing and increasing the heart's action under certain circumstances.—Physiological and Pathological Researches*, page 51.

"I have not unfrequently observed in the human species," says Dr. Reid, "when the respiration had been impeded for some time before death, a condition of the lungs similar to that observed in the lower animals after division of the *vagi*. In several of the fever patients I have had lately occasion to inspect at the Royal

Infirmary, the lungs in the posterior and middle parts were dark coloured, and gorged with blood and serum. When cut into, the substance of the lungs, in some cases, appeared at different parts denser than what could be accounted for by mere congestion of the blood-vessels, and a comparatively small quantity of blood could be squeezed from the cut surface, though the blood in other parts of the body was fluid; but sections of the lung generally, though not always, floated in water, and presented none of the granular appearance. In some cases the bronchial tubes contained a considerable quantity of frothy serum, in others, very little. In all probability these morbid appearances are occasionally dependent on the disturbed respiration, consequent upon derangement of the central organs of the nervous system. I lately saw a gentleman labouring under fever, whose respirations for a short time were only eight in the minute, though the lungs at the time were unaffected, but they fortunately soon rose to sixteen in the minute, and he ultimately recovered. Dr. Alison has suggested to me that these morbid changes in the lungs are sometimes owing to another cause. He believes that in cases of fever, when the heart's action is feeble, the bronchiæ often somewhat obstructed, and the blood altered, the right side of the heart is unable to propel the blood through the lungs, it consequently goes on accumulating in their depending parts, and the same results follow as when the respiratory movements are diminished in frequency. In confirmation of this view, he states that he has seen these morbid changes occur in the lungs without any preceding diminution of the respiration.

"When we remember that the pulmonic circulation is dependent upon two distinct causes, varying in efficacy—the right side of the heart, and the chemical changes going on at the lungs—both of which are necessary for the proper propulsion of the blood through the lungs to the left side of the heart, we can easily understand how a diminution in the activity of the respiratory muscular movements, and the impaired contractility of the right side of the heart, should produce the same effect, viz., congestion of blood in the lungs, and effusion of frothy serum."—*Physiological and Pathological Researches*, p. 205.

LECTURE VII.

ABDOMINAL LESIONS.

Proceeding in our study of the pathology and symptomatology of fever, we have next to consider the derangements of the digestive system, and the anatomical lesions found in the abdominal organs after death. These you will find to differ in the various forms of fever, their importance being the greatest in typhoid, and, comparatively, the least in typhus.

1. The symptoms which you have to study are chiefly derived from—(*a*) The tongue and fauces. (*b*) The desire for food or drink. (*c*) The quiescence or otherwise of the stomach. (*d*) The alvine excretions, their frequency and character. (*e*) Pain in the abdomen; the signs revealed by exploration of this region—meteorism, retracted condition, gargouillement, tenderness, and the symptoms of peritonitis from perforation.

The tongue of the earlier stage of typhus—soft, blanched, tremulous, notched by the teeth, and sometimes shrivelled, is highly characteristic; more especially when the disease is of the fatal congestive type. In these cases the character of the tongue often approaches that of cholera. The tongue of the typhoid patient usually differs at this period, being preternaturally red, especially at the tip and sides, and covered elsewhere with a creamy fur; sometimes it is coated on the dorsum and edges, and presents a tri-

angular red patch on the tip. As the disease advances, the upper surface becomes dry, the tip continuing red; and in typhoid, especially, it is sometimes fissured so deeply as to bleed. In other cases of typhoid the dorsum of the tongue is glazed, and occasionally presents aphthous spots, or a curdy coating, with, now and then, one or more ulcers. In the more advanced stage of typhus it is protruded with difficulty, tremulously, and uncertainly; frequently it cannot be protruded at all. In the worst cases it seems to be retracted, drawn back as it were into the pharynx. Changes in the mode of protrusion and appearance of the tongue usually follow other signs of improvement. In many cases of typhus, however, a line of moisture at the sides of the organ is one of the earliest indications of the approach of a favourable crisis.

Anorexia is almost constant in fever from its invasion—with the exception of relapsing synocha, in which a morbid appetite has been frequently observed—but patients often appear to relish liquid nourishment, such as beef tea, throughout the disease. Thirst is present as a rule. It usually becomes less marked as the fever advances, and its total absence constitutes one of the most serious symptoms, more especially in the later periods, when conjoined with other anesthesiæ. By some, absence of thirst has been attributed (erroneously in my opinion) to arrest of the function of nutrition. By the older writers it was correctly ascribed to diminished sensibility—an explanation which is supported by the fact, that a patient who can no longer ask for drink, often swallows it with avidity when presented to him.

Nausea and vomiting are normal phenomena, when occurring in the early periods of typhus, typhoid, and re-

lapsing fever, especially in the two last. In the more advanced stages vomiting is a symptom of a formidable character, arising usually from enteric, hepatic, renal, or cerebral complication.

The early vomiting of typhus or typhoid may be ascribed, in all probability, to the action of the fever-poison upon the eighth pair of nerves; at a later period, in typhoid, irritation in the mucous membrane of the stomach, or of the ileum, may be the cause, it being associated with tenderness on pressure in these situations. With reference to this, Dr. Bright remarks: "The most alarming symptom is the irritable state of the stomach, accompanied by frequent vomiting, when a quantity of green fluid is usually thrown up." In relapsing synocha, the very frequent vomiting of green fluid—sometimes black—seems to depend on congestion of the liver, stomach, and spleen. Other forms of vomiting depend upon complications to be hereafter noticed. The most frequent of these is, probably, the cerebral; the next the renal. Lastly, there is a form of vomiting which, in my experience, has been uniformly the precursor of a fatal termination, due, apparently, to paralysis of the eighth pair of nerves, and associated with other symptoms of this lesion. In this condition, the stomach seems, for a time, inert, all fluids swallowed accumulating in it; until at length—generally during an attempt to swallow—it suddenly and violently ejects a copious quantity. I may remark that this form of vomiting is very frequently associated with another serious symptom—obstinate hiccup—and also with yawning.

You will arrive at the differential diagnosis of the conditions causing vomiting, by careful study of the co-existing symptoms; as well as by the species of fever in which it

occurs. Thus, there will be little difficulty in recognising the nature of the bilious vomiting of relapsing fever, which occurs in about seven-tenths of the persons affected—not unfrequently passing into black vomit—and is occasionally, though rarely, followed by hematemesis. Again, in typhoid, when it occurs associated with tenderness over the ileo-cœcal region, meteorism, and ochrey diarrhea, and with constant nausea and frequent ineffectual retching, you will seldom err in ascribing it to follicular enteritis. Renal vomiting can be recognised by the presence of albumen, or of blood corpuscles in the urine, or by the suppression of this excretion; also, by the marked urinary tremors, facial spasms, &c., of the renal complication. The cerebral vomiting is associated with headache and intolerance of light and sound, with excited jerking action of the heart, soreness of the surface, and other symptoms of arachnitis. Cerebral vomiting is sudden, and the fluid ejected is almost invariably of a bright green colour. The frequency of this form of vomiting led Dr. Graves to state, as an axiom, that "in all feverish complaints, where, during the course of the disease, the stomach becomes irritable without any obvious cause, and where vomiting occurs without any epigastric tenderness, you may expect congestion or incipient inflammation of the brain, or its membranes."

Crisis, by bilious vomiting, has been observed by some writers.*

True jaundice, as distinguished from the characteristic sallow tinge of skin, occurs occasionally in relapsing synocha, and has been noticed by different authors. Cheyne and O'Brien mention, that in the epidemics of 1818, and

* See Dr. Gordon's* Lectures on the Complications of Fever, Dublin Hospital Gazette, 1854.

1826, it was met with in those who, from previous intemperance, had suffered disorders of the biliary system. It appears from the observations of Graves and Cormack to be unconnected with hepatitis. In a fatal case reported by Dr. Law,* the liver and spleen were found much enlarged, congested, and softened; and I have reported a case† which terminated favourably, in which there was discharge of blood from the bowels, with deeply jaundiced skin, there being at the same time enlargement of the liver, with tenderness on pressure. Jaundice is a very rare complication in typhus, and is said, by some, never to occur in typhoid. This, however, is not strictly true, as a few cases have been recorded by Andral and others.

The frequency and character of the alvine discharges in fever, are of much importance, and should be daily inquired into, as they have a direct bearing on diagnosis, prognosis, and treatment. No fact in medicine is better established than, that ochrey diarrhea—the recognised sign of ulceration of Peyer's glands—is the all but invariable rule in typhoid, while it is the rare exception in other forms of fever. It becomes, therefore, a valuable diagnostic sign of this disease: while in typhus, if diarrhea occurs at all, it is either the effect of hypercatharsis; a catarrhal diarrhea; or, coming on at the close of the case, it may be critical; or, lastly, the profuse liquid discharges, in some fatal instances, may be properly termed colliquative.

As in typhus, so in relapsing fever, constipation is the rule; at least in the primary attack. At the time of crisis, however, diarrhea sometimes sets in along with sweating; and in relapse, occurs (as well as other phenomena of typhoid) not unfrequently.

* *Dublin Quarterly Journal*, vol. viii. † Ibid.

Diarrhea being one of the most constant phenomena of typhoid, and depending, as it does, upon one of the most essential pathological conditions of that disease, claims your serious attention. It may be the first, or one of the first, symptoms, or it may not come on till the end of a week or ten days, or, in more rare instances, it may be postponed until a still later period. It may also continue after the termination of the fever, or, having subsided previously, may return during the period of convalescence. In each of these cases diarrhea will have relation to a different pathological condition, and will possess a different diagnostic and prognostic value. Thus, occurring as an initiatory symptom at the commencement of typhoid, I should regard it as an eliminative discharge from the liver and intestinal glands.* In the second stage it is a sign of ulceration of Peyer's patches, and of inflammatory irritation of the surrounding mucous membrane. Continuing after fever, it is a certain indication of the persistence of ulceration. Its return during convalescence is usually caused by reactive irritation; or, as too frequently happens, by a new attack of enteritis and ulceration, arising from indulgence in improper food, or from some other mismanagement. Finally, it has appeared to me, that diarrhea has occasionally originated from suppression of the cutaneous transpiration after fever. To this condition I shall have to draw your attention when speaking of the treatment of the convalescent.

The characters of the stools in typhoid fever are strikingly uniform. Usually they resemble pea-soup in colour and consistence, and, on standing, separate into a supernatant ochrey fluid, and a gritty flaky deposit. According to Murchison, the fluid contains about four per cent.

* Appendix (1.)

of albumen and salts, chiefly chloride of sodium; and the deposit consists of particles of undigested food, disintegrated intestinal epithelium, blood corpuscles, shreds of sloughs which have separated from the intestinal ulcers, together with multitudes of crystals of triple phosphate. Not unfrequently I have observed, instead of the characteristic stools, evacuations entirely consisting of a green fluid, evidently containing the colouring matter of the blood which had undergone a change. Occasionally, the stools are mucous and mixed with blood, resembling those of dysentery. Lastly, pure blood, in greater or less quantity, is sometimes discharged by stool. This latter occurrence is one which should immediately arouse your attention, as, although it may sometimes be salutary—a form of crisis, in fact—it is often a source of great danger.

You must not, however, forget, that although diarrhea is the rule in typhoid, the rule is not without exceptions. Ulceration of Peyer's glands has been found after death, in cases in which no diarrhea had existed during life. In the first volume of the third series of "Guy's Hospital Reports," Dr. Wilks mentions a case of typhoid in which constipation had existed and the intestine was full of firm scybala, under each of which was an ulcer. Dr. Compton gives the following instructive case:—

"A boy of fifteen was admitted with general malaise and sore throat. His tonsils and the back of his pharynx were somewhat inflamed, but his tongue was moist and nearly clean.

"After the first few days, he complained of nothing except weakness, although his voice continued very husky. His appetite remained pretty good throughout, and he slept well. About the fifteenth day, he had some bron-

chitis, and on the sixteenth, some hæmorrhage with a loose motion; previously his bowels had been somewhat confined. The hæmorrhage did not recur. There was never any rash or abdominal tenderness, and the physician in charge of the ward, considered the patient's illness to be due to the apparent symptoms manifested, viz., the sore throat, with, probably, some laryngeal mischief and the thoracic complication.

"The course of temperature was that of typhoid fever throughout; and at the time, I mentioned this fact to several, but little expected to be afforded any corroboration of my statement, as the lad's temperature fell to normal on the twenty-eighth day, and two days afterwards he was up and about the ward.

"However, as the case was not considered to have been one of typhoid fever, there was no especial necessity to be careful with his diet, and he was placed on meat diet. Having a very hearty appetite, he did good justice to the food allowed him, besides partaking of some extras which were surreptitiously conveyed to him by his friends. The consequence was, to use his own expression, he went to bed "feeling very well," but "very full." Some hours afterwards, symptoms of colic came on, which, not being relieved by the appropriate measures adopted, were followed by those of peritonitis, of which the lad died on the seventh day from his seizure.

"The post mortem disclosed a quantity of purulent fluid in the peritoneum, and numerous ulcers of Peyer's glands, the majority of which had already cicatrized, but in many the healing process was still going on. The peritonitis had been caused by an overloaded intestine previously weakened, the colon being completely stuffed with scybala. There was no perforation."

Intestinal hæmorrhage in typhoid fever seems to follow upon some one of three conditions:—1. Ulceration, involving a considerable vessel; 2. Congestion of the venous capillaries, with or without extravasation into the sub-mucous tissue, the extravasation, when it does occur, sometimes occupying a large portion of the intestine; 3. A septic condition of the blood, sometimes primary, but no doubt often caused by re-absorption of matters from the surface of typhoid ulcers, more especially in protracted cases. I have seen several examples of the latter, but I may refer you to cases reported by Dr. Todd* and by Dr. M'Dowel.†

In relapsing fever, hæmorrhage from the bowels is by no means unfrequent. It seemed to me, during the epidemic of 1848, to be often connected with the highly congested condition of the spleen in that form of fever. I may here mention, that epistaxis, which was also of frequent occurrence in the epidemic relapsing fever, seemed to be also connected with the same condition of the spleen; the physical sign of which is dulness on percussion of the lateral and posterior portion of the left side, this dulness being frequently accompanied by pain in the epigastric and left hypochondriac regions, both, no doubt, produced by congestion and enlargement of this organ. During the epidemic of relapsing fever of 1848-9, I so frequently observed this condition of the spleen existing after the crisis and followed by relapse, that I was led to connect them, and to regard the relapse as probably due to the re-absorption of depraved blood which had lain by, as it were, in this organ, and so had not shared in the depuration of the circulating mass during crisis. A somewhat similar obser-

* *Clinical Lectures*, by Beale, p. 106. † Appendix (2.)

vation is made by Dr. Henderson:—"When the enlargement of the spleen took place during a paroxysm of the epidemic fever," says Dr. H., "it did not subside when the latter terminated, so that the treatment of the splenic disease was, for the most part, the business of the intervals between the paroxysms. None of the cases terminated fatally, and I cannot, therefore, give an account of the changes of structure or aspect which the spleen may have undergone; yet, that the disease was truly inflammatory, the great degree of pain, and tenderness which accompanied it, and the occasional development of a symptomatic fever, distinct from the epidemic fever, and unlike it in several important particulars, appear sufficiently to attest." *Edinburgh Medical and Surgical Journal*, vol. lxi.

Pain in the abdomen is of frequent occurrence in the early periods of typhoid; indeed, it is often the first thing complained of in association with diarrhea, under which condition it is of a griping character, resembling that of ordinary bilious diarrhea.

Careful and daily repeated examination of the abdomen is necessary in all cases of fever, more especially in typhoid. This reveals, in general, more or less meteorism, which sometimes, in the latter stages of typhus or typhoid, amounts to very considerable tympanites. In typhus, this symptom is expressive of a depressed condition of the nervous system, and is usually associated with other indications of this condition, especially with paralysis of the sphincters. It acts injuriously by embarrassing the respiration, and moreover is of very unfavourable augury. In typhoid it sometimes appears to indicate extensive disease of the intestinal follicles, being usually associated with obstinate diarrhea. Occasionally you will remark a localized meteorism in cases of typhoid, the

cœcum being distended with air, and presenting an evident globular tumour. The opposite condition—or that in which the abdomen is retracted—is sometimes met with at an advanced stage of typhoid, or during an imperfect convalescence. It is usually associated with a harsh, dry skin, together with uncontrollable diarrhea, and is a sign of the worst possible augury; sometimes, however, it co-exists with constipation, and even great fæcal accumulation.*

Gargouillement is a sign of much value in typhoid fever, indicating, as it does, a condition of the ileo-cœcal valve, which allows of the reflux of the fluid contents of the cœcum into the small intestine. In cases in which diarrhea has not yet occurred, you may expect it, if, on making steady pressure over the seat of the valve, you feel a crepitation or gurgling. This is not to be confounded with the gurgling produced by displacing the air in any other part of the intestinal canal. It is a totally different phenomenon, giving the idea of the passage of fluid from a larger into a smaller space, and being strictly localized, while the other is not.

It has been observed that diarrhea occurring in typhus is not attended with gargouillement. Thus, Dr. Da Costa† remarked, that in an epidemic of typhus in Philadelphia, attended with diarrhea, there was in all instances a total absence of gargouillement, as well as of affection of Peyer's patches, in the cases which terminated fatally. My experience agrees with this.‡

* Appendix (3.)

† *American Journal of the Medical Sciences*, 1866.

‡ In the fatal cases of typhus observed by Dr. Compton, ulceration of Peyer's patches was never present; while in all those of typhoid there was well-marked ulceration of these glands.—*Dublin Quarterly Journal*, No. 82.

In many cases of fever you may find general tenderness of the surface, or cutaneous hyperæsthesia, in which the surface of the abdomen shares. This, however, is a sign of no value, *quoad* the abdominal organs; the tenderness of dothin-enteritis is localized, confined to the ileo-cœcal region, and even to a portion only of this region; and if it is produced by pressure elsewhere, still it is referred to this part, or, in some cases, to the umbilicus. You should carefully distinguish these forms of tenderness, as they are both signs of much value, but of conditions each wholly different from the other.

You should always attach much importance to tenderness on pressure over the ileo-cœcal region; but at the same time you should not infer too much from its absence, since extensive disease may exist in the intestinal follicles without its being felt. Instances of fatal peritonitis have occurred in which no complaint of pain or tenderness has been made, up to the occurrence of perforation of the bowels. These cases, however, are the exception, not the rule; and usually, steady pressure will elicit a complaint of pain or uneasiness, provided the patient's consciousness be not too much impaired.

The symptoms which indicate that peritonitis has supervened during the course of typhoid fever, or during its convalescence, are—rigor; vomiting of green fluid; pain, commencing in the ileo-cœcal region, and extending over the abdomen; tympanitic distension of the abdomen most frequently, but sometimes a tight, retracted, and rigid condition; arrest of diarrhœa, if it previously existed, is usual, though not constant; and in some cases I have observed a frequent desire to pass urine. To these succeed all the signs of collapse, rapid thready pulse, cold skin with

greasy perspiration, hiccup, hippocratic face, and death, usually, within forty-eight hours—often in a much shorter period.

These symptoms, or most of them, may be present, and yet no perforation be found after death. This fact has been stated by several observers, and occurred to me in two instances during the epidemic of 1847-8, in which I found extensive ulceration, but no perforation. But in the vast majority, the peritonitis is the direct result of perforation of the intestine, or rupture of some other organ, as of the spleen, the gall bladder, or of a tumefied and softened mesenteric gland. In most instances the first-mentioned lesion is the cause; and the perforation may take place at any time, from the ninth or tenth day, to an advanced period of convalescence. In reading the history of these cases you cannot fail to be struck with the fact, that in a large number the symptoms of peritonitis were so obscure, (owing to the defective consciousness of the patient at the time), that neither it, nor the perforation which caused it, was even suspected. In many cases collapse was the only symptom observed.

The anatomical lesions found in the abdomen after death in the different forms of fever, vary in each. Thus in typhus, nothing is met with beyond a congested condition of the intestinal capillaries and of the spleen; and (while diarrhea is not unfrequent, either as the effect of purgative medicines, in the early stage, as a critical evacuation at the close, or as a sign of great secondary blood-contamination in the advanced stage of the disease) in no case, as already observed, is the characteristic ulceration of the intestinal follicles of typhoid present. Full proof of this interesting

fact is to be found in Dr. Wilks' Report on Fever, in Guy's Hospital Reports, Third Series, vol. i.

The vomiting, which occurs in seven-tenths of the cases of relapsing fever, and the jaundice which was observed in nearly one-fifth of the cases in Scotland in 1843, are accounted for, by the existence of various degrees of congestion of the mucous membrane of the stomach—amounting sometimes to submucous extravasation—and by more or less engorgement and softening of the liver and spleen. In the remarkable case reported by Dr. Law—in which the patient passed, in the course of less than two days, from a slightly jaundiced hue into deep jaundice, with delirium, lethargy, coma, and death—the liver and spleen were found much enlarged and congested, and so softened in structure that they seemed as if they had been soaked in blood.

In a case under the care of my friend, Dr. O'Reilly, of Trim, during the epidemic of 1847-8, this condition of the spleen led to fatal rupture. Dr. Murchison states, that in one case, Dr. Jenner found the spleen to weigh thirty-eight ounces. I have recorded a case of relapsing fever in which it weighed forty-six ounces. There can be no doubt, that congestion of this organ, is much more marked in relapsing synocha than it is in typhus or even in typhoid fever; while the affection of the intestinal glands, so constant in typhoid, is altogether absent in the primary attacks of relapsing fever, though frequently present in the typhoid form of relapse.

Pathologists have remarked, that the liver is not prone to become the seat of peculiar affection in any of the forms of fever, beyond congestion and some degree of softening.

A distinction has been drawn between the frequency of the occurrence of abscess of the liver, in connection with ulcerated colon in dysentery; and the extreme rarity of the same occurrence in ulceration of the glands of the small intestine. Some years ago, Dr. Hare presented to the Pathological Society of London (Transactions, Vol. iii.), an example of acute abscess following enteritis, the peculiarity of the case being, that the small intestine was the seat of the inflammation and ulceration; but, even in this case, neither the symptoms nor morbid appearances were those of typhoid fever. Dr. Gordon has, however, published an interesting case of acute hepatic abscess complicating typhoid fever, as well as one of abscess complicating typhus.* Frerichs and Gordon relate cases of acute atrophy of the liver occurring in fever with jaundice.

The constant and characteristic anatomical lesion of typhoid, is the affection of the glands of Peyer, (which is called by some dothin-enteritis; by others, acute follicular enteritis) with which is constantly associated, a congested, enlarged, and softened condition of the mesenteric glands, and of the spleen.

The morbid process in these organs has been so accurately described by Rokitansky,† that I shall refer you to his account of the successive changes; which you may compare with the plates by Bright and Cruveilhier, now placed before you.

In a few words, the order of the morbid process in the agminated and solitary glands, seems, according to the most

* "Lectures on the complications of fever." *Dublin Hospital Gazette*, Vol. i., 1854.

† "Pathological Anatomy." Vol. ii.

recent and accurate observations to be—first, infiltration of the gland by the deposit; next, escape of the exudative material into the submucous tissue covering the gland; then, inflammation and sloughing. The infiltration appears to occur in the early stages of the fever; ulceration usually from the ninth to the eleventh day; and sloughing with perforation, sometimes as early as the fourteenth or fifteenth. If this direct and rapid sloughing does not occur, the ulcers gradually cicatrize. Dr. Murchison states that, in a case which terminated fatally from other complications, about the fortieth day, he found all the ulcers cicatrized. Dr. Peacock, however, gives a case, fatal on the sixtieth day, in which the healing process was still incomplete. Much will depend on circumstances independent of the fever; but you cannot be too guarded in your prognosis with regard to this question, since numerous cases have occurred of fatal peritonitis from perforation, long after diarrhea had ceased, and even after convalescence had appeared to have been established. This may occur in examples of the uncicatrized chronic, or what Rokitansky has termed the atonic ulcer; or it may arise from inflammation being set up, in and around the newly-healed ulcers. It is obvious that the possibility of such an occurrence should suggest the greatest caution in the management of the convalescence from typhoid, more especially with regard to diet.

Along with the changes in the intestinal follicles, we meet with corresponding ones in the mesenteric glands situated opposite to the ulcers of the intestine. From the first, they become enlarged and congested, this state increases, and they occasionally suppurate. As the ulcers heal, the mesenteric glands gradually shrink, and return to their natural size and condition.

The spleen is constantly enlarged and softened in typhoid, and, according to Rokitansky, the congestion and softening of this organ extend to the mucous membrane of the large curvature of the stomach; the vessels of which become turgid, and the mucous membrane softened and friable.

The morbid appearances in fatal peritonitis from perforating ulcer present nothing peculiar; with the exception, perhaps, of a greater tendency to be circumscribed than is the case with idiopathic peritonitis. Circumscribed peritoneal abscess has been met with by several observers.*

* See Dr. Bristowe's analysis of fatal cases of typhoid fever. Appendix (4.)

APPENDIX TO LECTURE VII.

(1.)

It may be remarked that the analogy of the action of putrid substances injected into the veins of animals, and the histories of poisoning by putrid ingesta, seem to support the view which would regard the primary diarrhea of typhoid as an effort at elimination, made by the liver and the intestinal glands. Thus, by a reference to the experiments of the injection of putrid pus, &c., into the veins of animals, performed by Majendie, Gaspard, Cruveilhier, &c., it will be seen that when the animal recovered, it was after copious discharges of a vitiated character from the bowels. To these discharges the last-named writer attributes the recovery; and adds, that it is a fundamental fact of pathology, that the intestinal canal is chiefly affected in diseases caused by miasmata. These experiments also explain the fact not unfrequently observed, that of a number of individuals exposed to the same source of miasm, some will suffer an attack of typhoid fever, while others will be affected by diarrhea or dysentery only; just as in the experiments of Gaspard, the recovery of the animal after putrid injection was attended with profuse and offensive discharges, seemingly the method adopted by nature for relieving the blood from the presence of the poison.

Again, if we refer to the published cases of poisoning from putrid ingesta, we shall find that, besides those of irritant poisoning in which the rapid rejection of the substance was followed by recovery, there existed another class of cases, in which, after an interval having been allowed for the absorption of the poison into the circulation, a different set of symptoms followed, as for instance in the following illustration from Christison on poisons:—"A family of five persons took for dinner broth made of beef, which, owing to its black colour, the master of the family had previously said to his wife he thought bad and unfit for use. In the course of some hours two boys were attacked with sickness and vomiting, but appear to have soon got well, probably from the early discharge of the poison. Next morning a washerwoman, who had dined with the family, was

seized with violent pain in the bowels, diarrhea, racking pains, and weakness in the limbs, and did not recover for ten days. On the evening of the second day the master of the house was similarly affected, and was ill for a fortnight; and a day later, his wife was also seized with a similar disorder, preceded by soreness of the throat and tongue, and difficulty of swallowing, and ending fatally in fourteen days."

It is worthy of notice that the gravity of these cases was in proportion to the interval allowed for absorption of the poison; and in an inverse proportion to the severity of the primary symptoms of irritant poisoning.

(2.)

"Dr. M'Dowel exhibited a specimen of acute ulceration of the intestine occurring in typhoid fever. The patient was a remarkably fine-looking young man, twenty-six years of age, who was admitted into the Hardwicke Hospital, January 10, 1857. He was a person in comfortable circumstances, well fed and well clothed, so that he was not exposed to those external influences, to which bad types of fever are so often referred, at least among the poorer classes. We learned that the symptoms of continued fever had existed for twelve days, but so slightly that the patient had not been obliged to keep his bed until three days previously. On admission, and for two days after, the ordinary symptoms of continued fever were present. There was slight cough; the pulse was 112; the skin was warm, but not inordinately so; the tongue was disposed to be dry; the surface was free from eruption; the mind was a little confused, and the patient raved somewhat at night, but slept a good deal. It is particularly to be observed, that neither diarrhea nor abdominal tenderness existed.

"On the third day after admission (fifteenth day of fever), a few scattered papules were observed over the abdomen. The eyes were clear and bright, hearing unaffected; no sordes on the teeth. In these particulars, and in the absence of any marked signs of depression, the case was quite unlike one of ordinary typhus. On the evening of the same day, excited delirium, closely resembling that of delirium tremens, set in, which continued, but with diminished violence, during the next day. On the evening of that day, profuse bleeding occurred from the bowels; a large quantity of dark fluid blood was voided at the chair, and subsequently so much came away as to soak through the clothes and bedding to the floor. The

following morning the man was greatly sunk, and his voice weak; his face was pale, and his pulse small and rapid; he was quite conscious, and the abdomen was free from tenderness. During the night a profuse and sudden hæmorrhage again occurred; he gradually sunk, and died on the nineteenth day of fever. On examination of the body, all the characteristic appearances of typhoid ulceration were observed in the cœcum, and lower thirty inches of the small intestines. The incipient condition of that affection was seen in the cœcum, in the form of small greyish elevations, on some of which a minute point of ulceration was visible. In the small intestine were numerous large oval ulcers, with elevated and thickened edges. Almost the entire of the mucous membrane of the lower end of the ileum was destroyed, but higher up the ulcers were confined to that portion of the intestine opposite the attachment of the messentery. No spots, showing incipient disease of the Peyerian glands, were found in the small intestine. At the highest point to which the disease had extended, the ulcers had attained a considerable size. The rapidity of the ulcerative process seemed to be indicated by this fact. In many places not only the mucous, but even the muscular coat, had been destroyed; and at one point the serous membrane had almost been penetrated. The mesenteric glands were considerably enlarged; and in some of them a whitish deposit (not pus) was found. The intestines did not contain any blood, nor were there any small coagula in any of the ulcers to denote the special source of the fatal hæmorrhage. The tissue of the heart was firm, and looked healthy; the left ventricle was closely contracted; the lungs presented numerous bright petechial spots on their surface, and a section showed numerous small dark spots of extravasated blood in their parenchyma.

"I have somewhat minutely detailed the preceding case, as its importance seemed to deserve more than a mere passing notice. The latency of the abdominal lesion, and the suddenness and profuseness of the hæmorrhage, constitute its most remarkable features. The attack of nervous delirium on the fifteenth day, depended probably on the rapid development of the intestinal lesion; whilst, on the other hand, the intensity of the nervous symptoms would have masked any evidence of enteritis which might otherwise have existed. At the same time, a depraved blood, partly, perhaps, the result of absorption of the vitiated

fluids of the intestinal ulcers, might produce a similar train of symptoms, and of such an altered condition of the blood, the ecchymoses, on and in the lungs, are to be regarded as evidences.

"The appearances in the intestines presented the full pathological history of typhous ulceration, the enlargement of a Peyerian gland, and elevation of the mucous membrane, by sub-mucous deposit; ulceration of the summit of the mound thus formed in order to eliminate the morbid material. Lastly, sloughing of the mucous membrane over the whole extent of the diseased gland, and in some places the ulcerative process rapidly destroying even the muscular coats, and, by opening the blood-vessels, giving rise to one of the most serious accidents of such a lesion."—*Proceedings of the Pathological Society of Dublin.*

(3.)

The writer of a review of this work, in the *Dublin Quarterly Journal*, has supplied an important omission, viz., the mention of this retracted condition in combination with accumulation in the intestines, at a late period of the fever:—"When under the action of suitable purgation, &c.," says the reviewer, "the alvine contents are discharged, the quantity found to have been retained is most surprising. Unless seen it would not be credible that an abdomen so contracted could have contained even half so much." The almost immediate disappearance of the cerebro-spinal symptoms prove these, in my opinion, to have been the effect of the accumulation, causing a form of reflex cerebro-spinal irritation. In the instances which have fallen under my own observation, the symptoms have been less those of cerebro-spinal irritation than of adynamia, consequent on blood poisoning. A very striking example has been recently under observation in the Meath Hospital. A few days after the commencement of her convalescence from severe typhus, this woman gradually sank into a state of profound adynamia, with loathing for wine and food, great thirst, and repeated attacks of vomiting. The face assumed a dark muddy hue, the skin became dry and harsh, the temperature was normal (98°), pulse 120, and weak, urine moderate in quantity, of a deep brown colour, and of a specific gravity ranging on different days from 1,028 to 1,036. On examination of the abdomen it was found to be retracted and concave to an extreme degree. The pulsations

of the aorta could be seen, those of the common iliacs distinctly felt; and the descending colon could be seen filled with fæces. The evacuation of the contents of the bowel by enemata and mild cathartics, was followed by sinking of temperature and general collapse, from which she never completely rallied.

(4.)

I commend to the careful perusal of the student the two subjoined extracts, which contain admirable descriptions of the morbid process set up in Peyer's glands in typhoid fever, from its commencement to its termination by perforation of the intestine:—

"The appearances which are most marked in the mucous membrane of the intestines are those of increased action; vascularity sometimes occurring in patches of greater or less extent, without any obvious dependence on inflammation of the mucous glands, and occasionally extending, under some form or other, through the whole tract, from the pylorus to the rectum. But this vascularity is more generally connected with inflammation of the mucous glands, which often appear, like the small pox on the second or third day of the eruption, elevated and almost transparent, and covered with minute vessels, which dip into them from the lining membrane of the intestines. They scarcely seem to go into a state of true suppuration, but become distended with a yellow cheesy matter, and slough off; or sometimes ulceration takes place upon their points externally, without any collection of yellow matter being perceptible. The same process, or nearly so, takes place both in the solitary and in the congregate glands; except that in the latter the appearance becomes much more formidable, and the mischief more extensive. The masses or clusters of congregate glands are chiefly placed along that part of the intestine which is furthest from the insertion of the mesentery; and when the parts are irritated from disease, three, four, or five considerable branches of vessels are seen passing on the mucous membrane, from the mesentery on each side towards the cluster of congregate glands: these divide and subdivide before they reach the glands, and running in part over the surface of the cluster, till their distribution is lost to the eye, enter apparently into the thickened mass of glandular structure beneath. The glands themselves seem first to enlarge, becoming distinctly visible to the eye, and after some time form a

thick, flat mass of a lighter colour than the surrounding intestine; this sometimes increases to the thickness of a half-crown piece, and occasionally even spreads on the top, so that the surface overhangs the base nearly the sixth part of an inch; sometimes a dark-coloured matter like grumous blood is deposited amongst the glands, so that the whole mass instead of being lighter than the intestine is of a brown colour, elevated evenly above the surface; but in either case the mucous membrane is at first only raised, and not broken. In a little time fissures are formed with ulceration on this mass, and ulcers, more or less deep, occupy the surface of the whole. Where the irritation is little the ulceration is often mild, and merely superficial; but when anything has occurred to irritate the ulcer it becomes deep and ragged, with an uneven bottom, caused apparently by the projecting remnants of the enlarged glands, or it is filled by a dense slough, stained of a yellow colour by the bile and fæces. As the inflammation subsides the depth of the ulcer diminishes; and the greater part of the glandular structure being apparently removed by ulceration and sloughing, the edges fall down, and the ulcer becomes shallow, sometimes leaving the muscular fibres nicely displayed, or often exposing the internal surface of the peritoneum for the space of a quarter or half an inch square. This excavation is filled up by a process of granulation, which may be seen very beautifully, by suspending the intestine cut open before a lamp or bright sunshine, and examining it with a common lens; the granulations are then seen, sometimes arranged in broken lines in the direction of the muscular fibres, at other times arranged in radiated lines around a central point; and when the whole is healed a scar remains visible for some time, not unlike a superficial scar from the small-pox, and generally interspersed with slight elevations of a grayish colour. This scar appears to be covered with a true mucous membrane, the surface being quite continuous with the membrane lining the rest of the canal; indeed, when inspecting the ulcer in the process of healing, we perceive the vessels of the mucous membrane running over the surface to be repaired. The whole process of the ulceration and the healing is quite analogous to those painful and irritating sores which frequently take place within the lips or on the mucous membrane lining the cheeks, where obstruction in the follicles, enlargement, ulceration, sloughing, and perfect repair, are, all, most distinctly and easily traced. The space occupied by the ulcers in the

intestines is usually about two feet at the lower end of the ileum, and frequently the valve of the colon on the side next to the ileum is the part where the disease is furthest advanced. A few ulcers are likewise often found in the cœcum, and some are occasionally dispersed along the colon, depending on a process very similar to that which I have described as taking place in the small intestines; but the glandular distribution being in this part more simple, the ulcers usually commence by small rounded elevations, and not in spreading masses.

"The peritoneal covering of the intestines at the back of the ulcer is generally discoloured and vascular; but seldom appears actually inflamed, and the distribution of the vessels is somewhat different from that of the vessels which may be seen through the peritoneum on the mucous membrane, and is, perhaps, chiefly derived from vessels belonging to the muscular structure; for, instead of forming numerous branches, they arrange themselves in parallel lines, with vessels crossing nearly at right angles. Occasionally, however, the mischief is not confined to the mucous or even the muscular covering, but the peritoneum becomes decidedly inflamed; in which case the symptoms are always greatly aggravated, and the tenderness of the abdomen is much more marked, and after death a sero-purulent effusion is found, and shreds of coagulable matter glue the convolutions together. In a few rare cases the ulceration finds its way completely through the peritoneum, and a portion of the contents of the intestine actually passes into the cavity of the abdomen, when general inflammation is excited, and death follows.

"With these appearances of the intestines we usually find some considerable derangement in the structure of the mesenteric glands; they are almost always enlarged and vascular, often exceeding the size of a pigeon's egg, and appearing quite covered with turgid vessels. They are in general most affected immediately opposite to the ulcers of the intestines, and occasionally go into a state of complete suppuration, so that I have seen them apparently on the point of discharging themselves through the peritoneum, into the cavity of the abdomen; but I believe that not unfrequently the pus, even after it has been formed, is absorbed, and quietly subsides."—Dr. Bright, *Medical Reports*, vol. i. p. 180.

"As demonstrator of morbid anatomy to St. Thomas's Hospital," says Dr. Bristowe, "it has fallen to my lot to examine a considerable number of cases of typhoid fever. These I have lately ana-

lyzed, and have been particularly struck by the large proportion of them in which death was caused by intestinal perforation. Some of the results at which I have arrived, in reference more especially to the latter complication, I propose to lay before the Society.

"The exact number of fatal cases of which I have preserved records is 52. Of these 28 were of males, and 24 of females; *one* occurred between 5 and 10 years of age; *eight* between 10 and 15; *nineteen* between 15 and 20; *ten* between 20 and 25; *eight* between 25 and 30; *five* between 30 and 35, and *one* at 42.

"In *eight* instances the patients died before ulceration had been thoroughly established in the diseased Peyerian patches, and evidently from the uncomplicated effects of the typhoid poison. In *nine* cases death occurred late in the disease, and when many of the ulcers had become more or less perfectly cicatrized, from perforation, from relapse, or from pneumonia, pleurisy, abscess, or debility dependent upon other causes. In the remaining *thirty-five* examples, the fatal termination took place at various periods between the above limits, either, as in the first class, from the direct influence of the disease itself, or from this associated, as in the second class, with diarrhea, intestinal hæmorrhage, bed sores, pulmonary mischief, or perforation and peritonitis.

"The small intestine was the seat of specific disease in every instance; the colon in twenty-seven cases. The mesenteric and other glands connected with the bowels, were, I believe, (although their condition is not always recorded) invariably affected to a greater or less extent, being large, soft, and congested, presenting at times a fibrinous deposit, or even actual suppuration. In addition to the complications mentioned in a former paragraph, I observed in *one* case cicatrices in the stomach; in another (that of a boy of *ten* years of age) half a dozen recent shallow ulcers in the same organ; in a third, a sloughy ulcer in the groin, connected with diseased lymphatic glands; and in a girl of seventeen, who had been suffering from gonnorhea, superficial gangrene of the genital organs, together with a phagedenic condition of the intestinal ulcers. I have never yet met with laryngeal disease; nor have I recognized any visible affection of the brain beyond mere congestion. I may add, that my cases confirm the statement that there is no necessary connection between the intensity of the general symptoms of the disease and the extent of the intestinal mischief.

"The remarkable tendency which typhoid ulcers have to pro-

duce perforation of the bowels is shown by the fact that this lesion had occurred in no less than 15 of the above 52 cases, or in a proportion of 1 in rather less than 3·5. It happened *eleven* times in males, *four* in females; a disproportion dependent, in great measure, doubtless, on the different nature of their respective avocations, which, in the milder cases of the disorder, may be carried on up to the very instant of perforation. *One* individual died therefrom between 10 and 15 years of age; *seven* between 15 and 20; *one* between 20 and 25; *two* between 25 and 30; and *one* between 30 and 35; a result which seems on the whole to indicate that age exerts no special influence in its production. The periods of the disease at which it took place will, perhaps, be better judged of by the condition of the ulcers at the time of death, than by the history: in *nine*, it occurred during the process of separation of the sloughs; in *five*, after the sloughs had become completely detached; and in *one*, when cicatrization, excepting only in the ulcer perforated, was progressing. The number of ulcers present, and the degree of the general symptoms seem, neither separately, nor in combination, to have exerted much influence in producing the lesion in question, for in at least *two* instances, (cases 3 and 7,) the patients, though complaining, continued to work up to the very moment of its occurrence; in several others, the febrile attack was more severe, though still mild, and in several also, (cases 4, 5, 6, 8, and 13,) the accident occurred during symptoms of extreme intensity. Further it appears, that in *five* cases, the ulceration was really very slight, and that in the remaining *ten*, it was more or less severe; in some instances, indeed, to an extreme degree.

"This is not the place to detail symptoms, but I may briefly state, that in the cases in which the antecedent illness had been slight, and in which the patient was conscious, the access of peritonitis was characteristically indicated: and that in the remaining cases the symptoms resulting from perforation were more or less indefinite, in exact accordance with the degree of mental and bodily prostration of the patient; and that, therefore, in some instances, as might be supposed, the occurrence of the lesion was revealed by post-mortem only.

"The interval between perforation and death rarely exceeded a day or two, but varied between a few hours (case 10) and two weeks (case 3.)

"In every case the perforation had occurred in the ileum, and

generally in quite the lower part. In one instance, the orifice was found two inches from the valve; in another, at a distance of two yards: and in the remainder, at various points intermediate between these extremes. The actual perforation was, I believe, without exception, due to laceration; at all events, I may venture to say that in every case in which speedy death ensued, the perforation was more or less linear in form, and the edges, consequently, though somewhat irregular, tending to a parallel direction. Nevertheless, this character was masked in various ways; as by adhesions binding the lips of the orifice to one another, or to some neighbouring loop of intestine, or by the occasional extreme tenuity and softness of the floor of the perforated ulcer. The size of the orifice was generally sufficient to admit a No. 4 or 6 Catheter, but now and then little more than a mere pinhole.

"The inflammation of the peritoneum following perforation was indicated by patchy congestion of its parietal layer, and of that covering the stomach, intestines, and pelvic organs, together with a certain amount of soft lymph, smeared, with more or less uniformity, over the serous surface, and producing generally slight adhesions between contiguous viscera. There was present, also, a variable amount of gas and of fæcal matter; the latter incorporated usually with lymph and pus, and, if sufficiently abundant, accumulated in the pelvis, or some other dependent portion of the abdominal cavity.

"There are still two points to which I wish to draw attention, the importance of which has been impressed upon me by more than one case that has come under my observation. They are points indicating a tendency towards cure, which might, perhaps, scarcely have been suspected in such cases as those under consideration, but which, taken in conjunction with the actual progressive improvement temporarily manifested in some instances, hold forth a glimmering hope, which should not be lost sight of in the treatment which we may adopt. The first is, that in consequence of the disposition of parts in the abdomen, there is a great tendency for the peritonitis to become circumscribed. The great omentum, with the parts to which it is attached, forms a natural septum between the upper and lower halves; and we sometimes find inflammation strictly limited, through its instrumentality, to the lower half, in cases of typhoid perforation; to the upper, when the liver or stomach is the primary seat of the disease. The closure

of the foramen of Winslow, again, occasionally forms a bar to the spread of inflammation from the sac of the great omentum, and conversely: while adhesions among the small intestines, and between them and neighbouring parts, not unfrequently limit inflammation and its results to one or other lumbar region, to the pelvic cavity, or even to some more unlikely situation than these. The second is, that there is a great tendency for the perforation itself to become closed by adhesions, and this within a very short period of its occurrence; so that in a considerable proportion (*six*) of the cases which I have examined, I have failed, notwithstanding the presence of fœtid gas and of actual fæcal matter in the peritoneum, to recognize any communication between the intestine and abdomen, until I have torn the very slight, though distinct, adhesions by which the margins of the orifice had become connected with some adjoining organs.

"It is quite clear, therefore, that notwithstanding the almost utter hopelessness of these cases, there is still a curative effort on the part of nature:—firstly, to close the orifice by lymph, and thus to prevent further extravasations; secondly, to limit the material poured out, by adhesions between the surrounding organs, to that portion of the abdominal cavity which is contiguous to the seat of mischief, and thus to circumscribe the more serious results of the accident. Of course, if the opening be large, or the effused fæcal matters abundant, the probability is that the patient will die so speedily, that little or no indication will be presented of either of the above curative processes. But if the perforation be small, and a mere weeping of the bowel have occurred, there seems no reason whatever (so far as the actual condition of the parts is concerned) why the patient might not recover without further complication. And even if a yet larger amount of matter have escaped, and this have become circumscribed by adhesion, there is still no reason derived from local considerations, why he should not ultimately do well; even though the progress of the case would necessarily be retarded by the formation of a peritoneal abscess, which must discharge itself either through the intestines or abdominal parietes, or by some still less favourable route.

"The case, No. 3, in the appended table, though it ultimately proved fatal, affords some justification on other than pathological grounds for the remarks just offered; and I may add, that some two or three years ago, I had under my charge, a case, since

published in the *Medical Times and Gazette*, of a little girl who recovered after paracentesis from an attack of circumscribed suppurative peritonitis. This I believed at the time to have been due to perforation of the bowel, occurring in the course of a slight attack of typhoid fever, but the mildness of her antecedent symptoms, and her final recovery, combined to render the case inconclusive."—*Analysis of Cases of Perforation of the Bowel in the Course of Typhoid Fever*, by Dr. Bristowe.—*Transactions of the Pathological Society of London*, vol. xi.

LECTURE VIII.

DERANGEMENTS OF THE URINARY SYSTEM.

To-day we have to consider certain disordered states of the function of secretion, and more especially of the secretion of urine, as one which is immediately connected with the molecular nutrition of the body, and the derangement of which constitutes one of the most serious complications of fever.

You note in the dryness of the tongue and mouth of a fever patient, and in his total loss of appetite, signs of the arrest of molecular nutrition or assimilation. A similar arrest of these changes would seem to take place in the lungs, since, according to the observations of Dr. Malcolm, the excretion of carbonic acid is notably diminished in typhus. On the other hand, Liebig's statement, that the exhalations from a fever patient are highly charged with ammonia, has been confirmed by many observers. "It is well known," says Dr. Murchison, "that in severe cases of typhus, the breath has often an ammoniacal odour, and that thick white fumes are produced on holding a glass rod, previously dipped in hydrochloric acid, close to the mouth of the patient. Dr. Richardson found the breath in one case so ammoniacal, that it coated a glass slide moistened with hydrochloric acid with crystals of chloride of ammonium, and restored the blue colour to reddened litmus paper."

We may presume that the secretion of gastric juice is arrested, or nearly so, in cases in which little or no solid food is taken by the patient. I am not, however, able to refer you to any observations of importance regarding the secretions of the stomach, or of those of the pancreas, or liver.

I have long entertained the belief, that in most cases of typhoid, a deranged condition of the biliary excretion is the first step in the morbid process. That, in fact, an effort is made to eliminate the poison through this channel, as is the case with regard to other putrid substances received into the circulation; and that the diarrhea of the early stage of typhoid (often its first symptom) is due to this cause.

But of the condition of the biliary excretion and the part it plays in fever, we have little knowledge of a satisfactory kind. Neither do we derive any information of value from the intestinal excretion, unless in the instance of the ochrey diarrhea, attending ulceration of Peyer's glands in typhoid, of which affection it may be said to be a pathognomonic sign.

It is far otherwise with the secretion of urine, the importance of which, in relation to fever, has been recognised by physicians of all ages. This importance arises from the fact, that healthy urine is an accurate indication of healthy assimilation; and that retention of the excreted urine in the bladder, or suppression of its secretion by the kidneys, or faulty or imperfect secretion, are, each and all, attended with a form of secondary blood contamination, constituting one of the most serious complications of fever.

Your investigation of this subject will be much aided

by your previous knowledge of (*a*) the constituents of healthy urine, and the relation of this excretion to the waste of the tissues; (*b*) the changes of its constituents produced by disease; and (*c*) the symptoms set up by the retention or suppression of the excretion, or of one of its constituents (urea).

In my Lecture on the Theory of Fever, I dwelt strongly upon the importance of the preservation of the balance between disintegration of tissue and the elimination of effete material; and also on the serious blood contamination resulting from an arrest of the latter in a disease like fever, in which regressive metamorphosis is notably increased. Some portion of the typhoid or adynamic state undoubtedly is, as Parkes observes, "an urinemic condition, due, not to diminished formation, but to diminished excretion of urea." And this condition is most formidable in those patients, in whom the previous mode of living has produced the accumulation in the blood of the greatest amount of materials in a state of metamorphosis, and so has incurred the greatest necessity for the active exercise of the excreting function of the kidney. We shall hereafter find, that some of the most serious of the cerebro-spinal complications of fever may be ascribed to the poisonous action of these nitrogenous matters—urea and its cognate compounds—upon the nervous centres.

If, then, from a faulty action of the kidneys, due to pre-existing disease of these organs, or any other cause—or even from simple retention—excretion of these substances is checked, the complications alluded to may be expected to arise. Your daily attention, therefore, is required in order to ascertain that the patient is able to void urine by his own unaided efforts; a daily examination of the urine,

so far as regards its quantity and sensible qualities, is also necessary; and to this should be added, in many cases, the occasional determination of its specific gravity, and of the presence in it, or the absence, of albumen or of blood.

Urine may be discharged involuntarily, retained, suppressed, or altered in quality, in various modes, as above mentioned.

The first occurrence indicates diminished sensibility, or paralysis of the sphincter vesicæ; the second, paralysis of the muscular coat of the bladder; in the combined conditions we have retention, with dribbling, often mistaken for involuntary discharge. Thus you can understand why it is so necessary, to examine carefully the hypogastric region in all cases in which the urine is observed to dribble.

You should never rely on the statement of the nurse, but ascertain for yourself, by percussion over the pubes, if the bladder be empty; or if, on the contrary, the urine discharged into the bed is but the overflow of the distended viscus.

The general characters of febrile urine, according to Dr. Parkes, are—deficiency of water and chloride of sodium; increase of other solids, more particularly of urea, uric, hippuric, sulphuric, and phosphoric acids, and the pigments. "The deep colour of the febrile urine," according to Dr. Parkes, "is only partially due to its concentration. If febrile urine is diluted to the usual amount of healthy urine, it is still darker than the latter. Professor Vogel has shown that the colouring matter is sometimes increased fourfold."

"The importance of this pigment," says Dr. Parkes, "consists in the fact that it may, apparently, be consi-

dered as a measure of the metamorphosis of the blood globules; and from its amount we are led to conclude, that in some cases of fever, the disintegration of the blood particles may be four times as rapid as in health."

Observers of all ages, have regarded any deviation in the sensible qualities of febrile urine from the above type, as indicative of danger.* Thus, the frequent coincidence of pale, watery urine, with convulsions and other serious nervous lesions, has been noticed by Willis and other old English writers on fever. I have myself most frequently observed it in cases in which the nervous derangement was of an emotional kind; some examples of this will come under review when we are considering the lesions of the cerebro-spinal system.

Albumen has been found in the urine of typhus and

* Recent observers have added but little to the descriptions of the sensible qualities of the febrile urine by the older writers. Take, for example, the following description of the appearances of the urine of exanthematous typhus, by Burserius (Institutes, vol. iii.): —"At first it is at one time thin and watery; at another time natural, and exhibits a globular, unequal palish cloud floating in it. Sometimes, also, at the beginning it is whitish, but copious; shortly after it grows confused, (?) like pomegranate wine, or yellowish, thick, turbid, and deposits a sediment. It likewise sometimes grows black, as if it were mixed with soot, or turns red, being slightly tinged with blood. Sometimes, during the increase, and at the height of the complaint, it is nearly suppressed, which must be considered as a fatal symptom, unless it quickly comes off thick, and deposits a sediment. Trollius, in his patients, always found it proper in quantity, seldom thin and pellucid, but generally free of sediment; sometimes of a dusky red, but never concocted or having a proper sediment. Pinaroli, however, found the urine, on the first days of the complaint, pale, clear, and scanty; during its increase, somewhat red and confused; at its decline, turbid and thick, but not uniformly so."

typhoid patients, as an occasional occurrence independent of any lesion of the kidney, by Edwards, Warburton Begbie, Sidey, Parkes, and other observers. It would seem to occur more frequently in some epidemics than others, and it has appeared to me to be occasionally caused by the exhibition of saline purgatives; a very common practice among our hospital patients. Upon one occasion two brothers were admitted into this hospital, one of whom had been severely purged, by salts, before admission. In him, the urine was albuminous for several days; while his brother presented no trace of it, the course of the disease in both being similar in all other respects. Taken alone, the presence of albumen would usually seem to indicate the participation of the kidneys in the general congestion of typhus. This congestion is, however, sometimes scarely appreciable after death, even though symptoms of uremic poisoning may have existed during life. Of this fact I have witnessed several examples in this hospital; and a case published by Mr. M. Taylor is quoted by Dr. Murchison:—"A man, aged fifty-three, died on the twelfth day of an attack of typhus; the eruption was well marked. Death had been preceded for four days by stupor and muttering delirium. Some hours before death, three pints of urine were drawn off by the catheter. After death, the kidneys were found perfectly healthy—not even congested—and urea was discovered in considerable quantity in the blood removed from the heart and large veins."

We sometimes meet with blood in the urine. (*a*) It may occur from the nature of the exciting cause; cold applied to the loins, or prolonged immersion in water. In the former case there is usually, with hematuria, suppression of secretion of urine from acute nephritis. In the

other, there are the symptoms of septicemia, as in cases already detailed.

Some years ago I attended two young gentlemen, in each of whom fever followed upon cold applied to the lumbar region, while perspiring. Hematuria came on in both in an early stage of the fever, and was rapidly followed by complete suppression of the secretion, by strabismus, convulsions, coma, and death.

(*b*) It may be an indication of the highly congestive type of fever, as noticed by Sir D. Corrigan. "The urine in such cases," says Sir D. C., "is dark-coloured, muddy, and without sediment, properly so-called, but occasionally showing a small quantity of a dark-coloured pasty deposit, such as is seen in the dark-coloured urine of hematuria after scarlatina. It is of low specific gravity, is small in quantity, and coagulates when heated, from the serum it contains."*

(*c*) It is one of the most frequent signs of the septic type of fever; of that condition in which the blood is decomposed by the action upon it of putrid substances received into it, either through the stomach or by respiration. Such cases are invariably fatal.

In a patient, ætat thirty-five, previously healthy, with the exception of a constipated condition of the bowels, fever came on after violent sickness apparently caused by eating mushrooms. He was profusely maculated when I first saw him, on the ninth day. His consciousness was perfect, but his manner listless and apathetic; his face and brow flushed; his eye injected, and the pupil contracted; distressing vomiting still continued, and during the ensuing thirty-six hours he had frequent returns of facial spasms,

* Appendix (B)

and constant tremor of the muscles generally. The attacks of spasms were accompanied by a peculiar tremulous moan, characteristic of uremic poisoning. The urine was a smoky-looking fluid, coagulating on the application of heat, and containing a large quantity of blood corpuscles. The facial spasms gradually increased in frequency, and ended in a fatal attack of convulsions on the eleventh day. Apparently the cause of the hematuria in this case was septicemia.

Uremic poisoning of the blood and nervous centres, is the consequence of the different morbid conditions, of which the above-mentioned states of the urinary excretion are the signs. This poisoning may arise from—1st, retention, which may be either simple, or complicated with diseased prostate or kidney.

2nd. Rapid disintegration, and consequent accumulation in the blood of the products of regressive metamorphosis.

3rd. Nephritis, either acute or chronic.

I. Cases have been recorded which prove that uremic poisoning may occur in fever, simply from retention. Dr. Todd's observations also prove that these symptoms may be produced, in non-febrile cases, by enlarged prostate. He records the case of a gentleman who suffered a succession of attacks of loss of consciousness, with partial paralysis of sensation, which, however, ceased altogether upon the difficulty of micturition having been relieved by mechanical means. I have met with similar cases, and I have sometimes seen the symptoms of uremia come on during fever in old men who were the subjects of enlarged prostate, apparently from resorption of the retained urine. I have several times known general muscular tremor subside immediately after the introduction of the catheter in

these cases; and I may refer you to examples published by Dr. Brinton* and Sir D. Corrigan,† of uremic poisoning, evidently due to retention, and relieved by the same operation.

But less complete or prolonged retention will be followed by the same result, when this is associated with either chronic nephritis or acute congestion of the kidney. "In most cases of typhoid fever," observes Rayer, "in which there was affection of the kidneys, the patients were prostrated, after one or more days, by stupor; the bladder distended, formed a tumour in the hypogastric region, and the urine was retained, or dribbled from an overflow. The condition of the patients did not suffer them to make a spontaneous complaint of pain in the region of the kidneys; and the nephritis was diagnosed, during life, by the alkaline state of the urine, the presence of mucus or sometimes of blood globules, and that of albumen, in this liquid. . . . . The practitioner should be aware of the possibility and of the gravity of this complication, and of the danger which, in this respect, attends retention of urine, and of the necessity there exists not to allow urine to accumulate in the bladder; because nephritis, once developed, determines or hastens the death of the patient."‡

II. Uremic poisoning, caused by the accumulation in the blood of the products of rapid disintegration, was of frequent occurrence in the epidemic relapsing fever of 1843 in Scotland. I believe this fact was first noticed by Dr. Henderson, in a paper published in the sixty-first volume of the *Edinburgh Medical and Surgical Journal*. Dr. Wardell, about the same period, announced that "in some

* Lancet, 1854. † Appendix (1.) (2.)

‡ *Maladies des Reins*, tom. ii., p. 204.

patients there were good reasons for believing that urea was formed in the system with great rapidity; so much so, as to lead to the opinion that a peculiar tendency to its generation existed."

It was long since observed, that persons of full habit, and who have been habitually luxurious in their mode of living, are peculiarly liable to convulsions in fever; and as modern observations tend more and more to show that uremia is the pathological condition upon which these convulsions depend, and inasmuch as numerous dissections have revealed a state of the kidneys either perfectly healthy, or at most but slightly congested, we are led to the conclusion that in such cases the uremia is due to excessive formation of urea from disintegration of tissue on the one hand, and to defective elimination on the other.

III. Lastly, uremia in fever often depends upon acute or chronic nephritis. I have already alluded to cases in which albuminuria, hematuria, and suppression of urine, occurred in consequence of the application of cold to the lumbar region. The cause of these symptoms in such instances is acute congestion or inflammation of the kidney. The result, we may say, is usually fatal. Dr. Parkes mentions that in two cases of typhoid fever, the patients left the hospital well of the fever, albuminuria still existing. "In one of these two," says Dr. Parkes, "it existed when the urine was first examined; in the other the urine, at first non-albuminous, contained afterwards blood in small quantity, casts and albumen in large quantity. Although I had no opportunity of knowing what course the kidney disease afterwards took in this case, there was evidently a very profound kidney lesion which did not pre-exist, but was immediately excited by the fever."—*On Urine*, p. 250.

Equally fatal is the pre-existence of chronic disease of the kidney; and of its frequency we may judge from the statement of Dr. Christison, that "every instance of death from sudden convulsions in fever, which has of late occurred in the Edinburgh Infirmary, and underwent proper investigation, has proved to have been connected with an albuminous state of the urine, and with organic disease of the kidneys." Experience proves that patients suffering from Bright's disease may go on for months enjoying tolerable health, if the blood is from time to time relieved by some evacuation, by means of which urea is eliminated; but such eliminative actions, being checked by fever, symptoms of blood-poisoning manifest themselves, and so commingled with those of fever, as often to render difficult an accurate diagnosis of the exact share of each in the production of the group. Such are the cases described by Fenger, under the name of masked forms of Bright's disease.*

The extent to which this uremic poisoning of the blood will affect the nervous centres in fever, depends much upon other causes, influencing both the nutrition of the brain, and the condition of the circulating fluid. In this respect the fever patient resembles the puerperal female, in whose blood urea may exist in large quantity without producing convulsions, provided this fluid be otherwise healthy, and the brain free from congestion.†

* Translated by Dr. W. D. Moore, *Dublin Hospital Gazette*, 1854.

† M. Blot submits the following among other conclusions:—(1) That every case of eclampsia seen by him has been accompanied by albuminuria; (2) That the albuminuria of pregnancy is free from danger when uncomplicated with cerebral conges-

I reserve a detailed description of the nervous symptoms characteristic of uremia, merely mentioning, that the aspect is so peculiar as not to be mistaken by those who have once witnessed it. Some present a brick-red suffusion of face and brow, with a glaring blood-shot eye, and contracted pupil; others, in whom the disease of the kidney is more advanced, being pale, waxy, and bloated-looking; the facial spasms also being perfectly pathognomonic of this condition. Dr. Christison has recorded a most characteristic case, in his work on diseases of the kidney, which I shall read to you:—

"A night-watchman, of regular habits, aged thirty-two, about four years previous to his attack of fever, had suffered some form of urinary complaint, and had since been liable to frequent micturition, and at times retention, and also to hematuria. His fever commenced with nausea, vomiting, general pains—especially in the loins—headache, giddiness, and singing in the ears. On the fifth day he had frequent calls, with much inability to pass urine, and on the seventh complete retention. On the evening of the seventh day sixteen ounces of urine were withdrawn by the catheter, and on the following evening twelve ounces. On the ninth he complained of great weakness, general soreness, frequent greenish vomiting; the face was brownish, flushed, oppressed, and characteristically febrile. The pulse 100, and feeble; skin warm, and covered with pale, irregular, diffuse petechiæ; tongue dry and furred; bowels constipated. His answers were clear and intelligent, but he had muttering delirium and subsultus tendi-

tion; (3) That the relation between the two, is, probably, sanguineous congestion occurring at the same time in the kidneys and cerebro-spinal centres.—*London Medical Gazette*, 1850.

num. He was ordered a laxative solution and a little wine, cautiously, with a morphia draught at night; eight ounces of urine were withdrawn by the catheter, but not preserved for examination. He passed a restless night, and on the morning of the tenth day he was incoherent, torpid, less easily roused, and affected with frequent twitchings of the face. The pulse was 120, and weaker; the tongue covered with sordes; deglutition difficult; the face flushed, and the eyes injected. Soon after the visit he was suddenly attacked with violent convulsions of the whole body, attended with deep, imperturbable coma, squinting of the eyes, a full, strongly-jarring pulse, and powerful action of the heart. Three ounces of urine were withdrawn by the catheter; specific gravity, 1014, strongly coagulable by heat. The coma continued profound, with occasional spasmodic tremor and contractions of the limbs; and death took place only two hours after the appearance of convulsions.

"On examination, the only organs presenting any abnormal appearances were the kidneys. Both were very large, elongated, one-third at least beyond their average length, and very flabby. The cortical portion presented much greater breadth than usual; its fibrous structure was very obscure everywhere, and in most parts obliterated—generally darker than natural—exuding a good deal of blood from a fresh cut surface, and presenting a remarkably mottled appearance, composed of the ordinary brown cortical, but chequered uniformly with small, brighter brownish-red, or blood-red points. Two ounces of fluid blood were cautiously removed from the heart, in which, upon examination, an appreciable quantity of urea was discovered."

"I have several times found," says Dr. Christison, "the blood loaded to a much greater degree with urea than in the present case, without any tendency to coma being manifested; and a greater amount of diminution of the urine not unfrequently occurs, without the functions of the brain seeming for some time to suffer. But in this instance, the brain and nervous system had also to encounter the oppression arising from the typhoid form of continued fever."

Besides its poisonous action upon the nervous centres, urea occasionally manifests its presence in the blood during fever, by the occurrence of vibices and bullæ, always considered symptomatic of danger by physicians of experience. These are ascribed by Henderson and Wardell to the conversion of the retained urea into carbonate of ammonia, which has the power of dissolving the fibrine of the blood.

To recapitulate. In your clinical study of fever you will always remember that—

I. The excretion of urea bears in health a constant proportion to the quantity of nitrogenous food ingested, and to the amount of disintegration of tissue from bodily exercise, mental labour, anxiety, and other causes.

II. That, therefore, the balance between the work to be done by the kidney, and its due performance—in other words, between the amount of the products of disintegration of tissue present in the blood, and the excretion of urea—may be disturbed in either of two modes, viz., by excessive accumulation of the one, or by deficient elimination of the other.

III. That the consequence of this disturbance is in each case the same, uremic poisoning being set up by the one

mode in those who, by luxurious living, have caused the accumulation in the blood of a large amount of nitrogenous matters, which the kidneys are unable to eliminate perfectly; by the other, in those who suffer from congestion of the kidneys, produced by cold, by septicemia, by acute or chronic nephritis; or from simple retention, and consequent resorption of the urine.

IV. That your daily attention to the state of the bladder is imperatively necessary; and that the catheter should be at once employed in cases of retention, with or without dribbling.

V. That the quantity and sensible qualities of the urine being daily observed; any marked deviation from the normal colour or amount, should lead you to note the specific gravity, and apply the tests for albumen, or blood.

VI. You should bear in mind that the poisonous action of urea upon the nervous centres, acts, like all poisons, with greater intensity, in cases in which there also exists congestion of these centres.

VII. You should also remember, that what may appear, at first view, to be simply the adynamia of fever, is often, in a great measure, due to secondary blood contamination—in fact, to uremia.

VIII. The occurrence of bullæ, or vibices, during the course of fever should lead you to pay more than ordinary attention to the state of the urinary secretion.

APPENDIX TO LECTURE VIII.

(1.)

"I cannot too earnestly impress on you," says Sir D. Corrigan, "the necessity of closely watching the condition of the bladder. Murphy's case afforded a good illustration in point. He was very ill in maculated fever, so violent that it was necessary to put a straight waistcoat on him. His delirium was furious; his tongue dry and brown; his pulse above 130, and skin covered with both maculæ and petechiæ; he had not slept, and his eyes were suffused; he passed fæces in bed, and we were positively assured by the nurse that he had also passed urine copiously under him. This statement seemed confirmed at first sight on turning back the bed-clothes, for there was a strong urinous smell from him; the sheets were wet, and the urine was seen welling from the orifice of the uretha, and dribbling over the thigh. Notwithstanding all this, I introduced the catheter, and there passed off more than two quarts of urine. You know what the effect on the brain and system would have been had the bladder been allowed to remain in this state. It is scarcely possible to suppose anything more calculated to extinguish life in fever than the bladder continuing in such a state. Remember what you saw in Murphy's case—that urine flowing out upon the sheets may be only the surplus which no longer finds room in the bladder.

"I saw not long since, in private practice, another case illustrating the same point. In this case the patient was a lady under the care of a homœopath. You know a homœopath would not use a catheter. It was on the fifteenth or sixteenth day of fever. I found her in epileptic convulsions, which had continued for some hours, foaming at the mouth, insensible, unable to swallow, and, to all appearance, dying. On examining the abdomen, I felt the bladder extending as high up as the umbilicus. On introducing the catheter, it was scarcely possible to bear the intolerable ammoniacal smell of the urine, which must have been shut up for several days. It continued to flow until some large basinfuls were drawn off. This patient recovered, but she suffered much for the neglect.

Subacute and then chronic cystitis followed, under which she continued to suffer for more than a year afterwards."—*Lectures on Fever.*

(2.)

An illustration of this remark was afforded recently in a case of cerebro-spinal meningitis, admitted into the Meath Hospital, for notes of which I am indebted to our clinical clerk, Mr. Scott :—

"Denis Fitzwilliam, aged forty, a cabman, of intemperate habits, was admitted on the night of Friday, September 13, 1867.

"He stated that on the previous day he was occupied in driving from 9 A.M. to 8 P.M. without food or drink. The day was cold and windy, and towards evening he felt much fatigued. While sitting on his driving-seat he was seized with a violent shivering, which compelled him to return home at once. On arriving at home he vomited, and had frequent returns of vomiting and rigor during the night and following day, up to his admission.

"Saturday, 15th. Third day of illness.

"He lies on his side moaning constantly, and, when questioned, complains of severe pain in his head and limbs.

"His face is suffused, of a brick-red colour; his brow corrugated, his eye injected, the pupils natural; pulse, 96; temperature, 102°·8; respiration laboured, with great heaving of the chest, 24 in the minute; no chest signs. A few red patches are observed on the wrists and knees, presenting the appearance of a blush, and disappearing on pressure; urine pale, with an iridescent pellicle.

"In the evening, the pulse and respirations were the same, the temperature, 104°·8; he had been delirious during the day, attempting to leave the bed and to take off his shirt.

"15th. Fourth day. Lies on his back, with the eyes closed, in a state of partial stupor, breathing heavily, and with constant moaning. When aroused, complains of pain in the back of his head; brow corrugated; pupils much contracted; his arms are folded across the chest; the right is readily drawn down, but the left is rigidly flexed, and resists the attempt to extend it.

"He has had no return of vomiting since his admission, but has had diarrhœa during the night, with involuntary evacuations. The heart appears weak, but irritable; pulse, 104; respirations, 32; temperature, 102°·8; tongue, white and moist; red patches have disappeared, no eruption apparent.

"Evening. Has been delirious during the day; diarrhea continues; passes water; pulse, 100; temperature, 104°.

"16th. Fifth day. Lies on his back, perfectly unconscious, moaning piteously; face has a deep purple colour; pupils greatly dilated; one round herpetic spot has appeared on the right ankle, no other eruption; heart's action weak, second sound only perceptible; pulse, 140, imperceptible at wrist; respirations, 36; temperature, 103°·4.

"The bladder was distended with urine, which, being drawn off by the catheter and examined, was found to be smoky in appearance; sp. gr. 1,019, and coagulable by heat.

"Died at one P.M.

"The head was examined six hours after death.

"The surface of the brain presented an intensely red appearance, from the injection of the small arteries on the convolutions. Lymph was found between the pia mater and arachnoid, in both fissures of Silvius, at the junction of the crura cerebri with the posterior lobes, and at different other points.

"The convolutions of the posterior lobes of the cerebrum were greatly softened, and the cerebellum was so soft as to be removed with difficulty; the upper portion of the cord was also softened, and intensely congested.

"The urine drawn off was examined by Mr. Collins, who found that under the microscope, with a power of 375 diameters, it showed an extraordinary number of blood corpuscles, renal cells, and epithelium casts of the uriniferous tubules."

LECTURE IX.

CEREBRO-SPINAL LESIONS.

I HAVE now to direct your attention to the study of a group of derangements of the highest importance in themselves, and of which it may be said more truly, perhaps, than of any other, that while they are not seldom obscure, latent, and difficult of diagnosis, the safety of the patient will often depend upon the sagacity with which they are recognized, or even anticipated, and the promptitude with which they are met by suitable and energetic treatment.

The difficulty of a diagnosis of the nature of the various nervous derangements occurring in fever, and of their relation to this disease, arises from several sources; for example, we sometimes find it not easy to determine whether cerebral or meningeal inflammation is primary or secondary, the cause or effect of fever; in other cases, whether cerebral symptoms are due simply to the fever-poison, or to its complication with inflammation; or whether, with this last condition, there is also one of the many forms of secondary blood contamination. Occasionally, also, the period of crisis is marked by various nervous derangements peculiar to itself, but yet not easily discriminated from those of a more serious nature. In conditions so complex, perfect accuracy of diagnosis is not to be attained, but you will be assisted in an approxima-

tion to it by a careful consideration of the following points :—The influences acting on the functions of innervation in fever; the various modes in which these functions are deranged in this disease, as well as the physiological relation of each mode of derangement to different portions of the nervous centres; the results of the investigations of morbid anatomy; and, lastly, the effects of certain methods of treatment, of which we shall meet with illustrations hereafter.

The functions of the cerebro-spinal system, the derangements of which become subjects of your study in fever, are those of ideation, or the intellect; consciousness; the voluntary or sensoro-motor, and the involuntary or excito-motor functions; the special senses of sight, hearing, taste, and touch; and the cutaneous sensibility. Your attentive consideration will also be demanded by the derangement of animal heat, and, most important of all, of sleep.

The modes in which these functions may become deranged will vary: (*a*) according to the type of fever—those set up by the true action of the fever-poison being more frequent in typhus, while those due to reactive irritation are rather met with in the advanced stages of typhoid; (*b*) according to pre-existing states of nutrition of the cerebro-spinal centres—you will find that these states of nutrition have a powerful influence on the production of nervous complications in fever, in conformity with the law I have so often referred to, that the elective affinity of a morbid poison is for the organ which may be undergoing the most active retrograde metamorphosis; (*c*) again, different states of the cerebral capillary circulation exercise a marked influence upon these derangements —this holds true equally of active hyperemia, anemia,

and passive congestion. Lastly, different forms of secondary blood contamination predispose to corresponding forms of nervous derangement in fever, or modify those already existing.

In your analysis of each case of fever, you will find the function of innervation is variously affected, according to the influence of one or other of the above conditions. I shall presently adduce some instances illustrating this influence.

Of the cerebro-spinal functions, the intellect is the one most frequently deranged in fever, more especially in typhus, and in a mode characteristic of the intoxicating action of the poison. The aspect of the typhus patient has been aptly compared to that of a man awaking from a drunken slumber; his apprehension is, in a similar manner, confused and defective; impressions made upon his senses are imperfectly perceived by the sensorium, producing the phenomena of dreaming without sleep; he talks incoherently about external objects, confounding them with internal impressions, or with the faintly-remembered objects of past sensations; occasionally he seems to be, for days together, under the influence of some painful dominant idea, the product, as it were, of confused perception of the present, and imperfect recollection of the past. This distressing state is sometimes produced by injudiciously excluding the light. Cullen mentions in his Physiological Lectures, that in his own fever the admission of light, by rectifying the perception, and supplying the different parts of the complex idea to his mind, removed much of his delirium. The memory is so deficient, that the patient, who seems while in fever to recognise his attendants, calling them by name, becomes immediately afterwards

unconscious of their previous presence; while the judgment is occasionally but little impaired, the patient being sometimes capable of sustaining conversation, and giving judicious directions; there is, however, one exception to this remark, namely, that he seldom judges rightly of his own condition. The character of the delirium varies according to the age, mental activity, temperament, previous habits, &c., of the patient, and according to the state of the cerebral circulation, and the existence of secondary blood contaminations, &c. It may be observed, with truth, that nothing can be more varied than the forms of delirium met with in various pathological states; and, at the same time, nothing can be more unscientific or unsafe, than to attempt to diagnose these states by the kind of delirium. Thus the delirium of exhaustion, and that in pneumonia complicating typhus, are sometimes equally noisy and impulsive; while depletion in the one would be a scarcely less fatal mode of treatment than a full opiate in the other. Any such differential diagnosis you can only arrive at, by studying the group of other nervous symptoms with which the delirium is associated; yet some recent writers have proposed to deduce from the form or character of the delirium, a diagnosis of the portion of the brain affected with inflammatory irritation in fever.

The normal state of a fever patient with regard to his consciousness, may be described as one of blunted sensibility. He sleeps from time to time, but nevertheless complains of want of sleep, and generally manifests dulness of perception, and a drowsy apathy, becoming slightly delirious during the night. *Cæteris paribus*, such is, no doubt, the most favourable condition with regard to consciousness; but this function may be variously modified by the intoxi-

cating action of the fever-poison; its heightened state being marked by watchfulness, often resisting all our efforts to procure sleep; the opposite condition, by coma or stupor. It might be safely said that the worst forms of delirium are those which are ushered in by more or less prolonged watchfulness. In some cerebral complications we witness the alarming combination of watchfulness and stupor, but usually associated with the former there is a morbid quickness of apprehension; the patient talks rapidly, and answers instantly; his senses of hearing, taste, smell, and touch, are morbidly acute; and, while his skin is hot, he is much alive to the impressions of cold upon the surface of the body. This form of delirium is chiefly met with in youth, or early manhood; in the over-worked brain of the student, anxious professional man, or merchant; and in the spirit-drinker if young.

The opposite affection of the consciousness manifests itself, when, early in the fever, the patient shows more than usual somnolence and stupor, with sluggishness of perception; when he is aroused with difficulty from this condition, and immediately lapses into slumber. In this state he protrudes the tongue slowly and hesitatingly, and does not withdraw it promptly; he refuses to drink, or does so listlessly and imperfectly, allowing the fluid to run from his mouth, or coughing after each attempt. When such symptoms are associated with other serious nervous lesions, we may fear that the stupor will merge in fatal coma.

The most unfavourable cases are, indubitably, those which present the combination of watchfulness and delirium with stupor; symptoms of heightened consciousness, associated with those belonging to the opposite state.

The motor functions are differently affected in different

stages of fever and in different complications. The fever-poison, *per se*, depresses nervous energy, and the lesions of nervo-muscular force caused by its direct and uncomplicated action, seldom amount to more than various degrees of debility, or, in other words, diminution of muscular power; or to diminished control of volition over the muscular movements. The former is first manifested in the voluntary muscles; the limbs and the tongue tremble, and their movements are performed languidly and feebly; but as fever advances, the automatic and involuntary muscles suffer; swallowing sometimes becomes difficult, respiration laborious, and the heart's action faltering and irregular. There is usually in the advanced stage, more or less subsultus, which, in graver cases, passes into carphology, or involuntary picking of the bed-clothes. The want of consensus between the volition and the muscular movements—or the power of co-ordination—in these cases, is shown, in the vain attempt to protrude the tongue, and in the difficulty of swallowing. Meantime, as the control of the will is withdrawn, involuntary excito-motor actions occur, upon such impressions being made on the nervous centres as should normally excite voluntary movements of another kind: thus we occasionally observe violent facial twitchings to follow the putting of a spoon to the lips; and Dr. Laycock narrates a curious instance in a glass-blower who, on attempting to drink, blew involuntarily into the cup every time its edge touched his lips—the will being powerless against the incident excitor stimulation, which had been habitually applied in the exercise of his daily occupation.*

* Clinical Lecture on Fever, *London Medical Gazette*, vol. xxxix.

Muscular rigidity is witnessed in various forms in certain complications of fever—such as rigidity of the neck and trunk, retracted neck, spasmodic closure of the jaws, retracted tongue, rigid extension or flexion of the limbs.

Tremor, as distinguished from subsultus, may be associated with several conditions. Thus it has been observed by Cheyne and Southwood Smith, in cases in which arachnitis with sub-arachnoid effusion were found after death. It is, as well as subsultus, often a sign of extensive ulceration of the intestines in the advanced stages of typhoid, and it occurs to a remarkable degree in a large proportion of cases of uremia.

Convulsions rarely occur in uncomplicated fever. When they have then been observed, it would seem that they have occurred as a mode of crisis. In most cases they are symptomatic either of inflammation or of some form of secondary blood contamination, usually that of uremia.

Derangements of sensation, like those of the motor function, are among the early and normal effects of the fever-poison, but become signs of cerebral irritation when they occur out of their order as to time—such as early deafness, or the headache of a later period—or with undue severity. Towards the termination, indeed, of simple and uncomplicated fever, if severe, profound lesions of the sensational consciousness are sometimes exhibited, —such as anæsthesia of sight and hearing, insensibility to cold or to thirst, and to the impressions by which the active contraction of the sphincters are regulated. It has been maintained by some writers, that want of thirst arises from a lesion of the function of nutrition. I think the old writers were correct, who, like Willis and others, taught that it is a lesion of sensation—a nervous symptom

forming one of a group of the most serious character.* Willis's expression regarding those in whom the symptom was associated with low temperature is:—"Quippe ad hunc modum affecti circa morbi statum, plerumque in deliria, motus convulsivos, et non raro in maniam incidunt; e quibus brevi in mortem precipitantur."

With regard to the special senses, I may observe, that hearing is defective in a large proportion of cases of fever; and that in typhus the sense of taste is usually perverted, so that, in many instances, cold water alone is relished.

The cutaneous sensibility is augmented in some forms of cerebral complication; but in severe, uncomplicated typhus, is usually lost, or nearly so; in the advanced stages, the patient manifesting complete insensibility to cold.

Sleep, as a rule, is more or less deranged in all forms of fever. In favourable cases of typhus, the patient sleeps from time to time, often without being conscious that he does so. In typhoid, the sleep is restless and unquiet from an early stage; the wakeful period usually corresponding with the febrile exacerbation. In both we occasionally meet with obstinate sleeplessness, associated with the worst forms of delirium.

It cannot be said, that there is any causal relation between the nervous derangements of uncomplicated fever, and the appearances discovered after death. The appearances most usually observed are, venous congestion of the membranes and substance of the brain, and subarachnoid effusion. With regard to the first, it is no doubt due to the altered attractions between the blood

* "Sometimes there is no thirst present, even when the fauces and mouth are parched, which must certainly be ascribed to impaired sensibility."—*Burserius.*

and the tissues, whereby the nutrition of the organ becomes modified; and perhaps, in some cases, it may be partly caused by the position of the body, the state of the pulmonary circulation, or the mode of death. With regard to the second, Dr. John Reid has shown it to be the effect of deranged nutrition, and more frequently connected with the age of the patient, probably with his previous habits of intemperance, and want of sleep, than with either fever or inflammation.*

In cases of true inflammatory complication, and more especially during certain epidemic periods at which this complication prevails, you will meet with its products in the form of minute arterial injection of the surface of the convolutions; opacity and thickening of the arachnoid membrane, with exudation of lymph, and of turbid or gelatiniform serum—occasionally of pus—under the arachnoid, and in the ventricles; great augmentation in the number of bloody points on section of the brain, and increased firmness or perhaps acute softening of its substance. At different periods recently, the appearances found after death, and the symptoms during life, have been those of that peculiar inflammatory affection termed cerebro-spinal arachnitis, which has, from time to time, occurred as an epidemic in this country and on the continent.

Of the symptoms of acute congestion of the brain, I may observe, that in such patients their behaviour is at first quick excited and restless, but in some it becomes at once heavy, stupid, and somnolent; the face and forehead flush, and again become pale; there is a constant knitting of the brow, increased on the admission of light; one or both eyes become suffused, and the sclerotic tinged

* Appendix (I.)

from the injection of the minute vessels, the pupil being usually contracted; there is generally intolerance of sound, and tinnitus, sometimes early deafness. While the normal headache of fever declines about the period that delirium commences; in this complication, it increases, or perhaps comes on for the first time at an advanced period; the patient is generally loud in his complaint of the pain, which is of a heavy, throbbing character; at first, all motion of the head is instinctively avoided, but at a later stage it is incessantly rolled upon the pillow, sometimes tremulously; the respiration—cerebral in its character—is hurried, or sometimes fast and at other times slow, interrupted by frequent sighing, which has often a catching, spasmodic character. The circulation is variously affected: the pulse, at first rapidly accelerated, usually, soon falls below the natural standard, or becomes still more hurried and irregular on the slightest movement. The radial pulse is often small and constrained while the carotids throb, and the heart's impulse is strong and jerking, its first sound being augmented and abrupt. The muscles of the neck, and sometimes those of the limbs, become rigid, and there is frequently muscular as well as cutaneous dysæsthesia, the patient screaming on any attempt being made to move him. There is green vomiting, persisting for several days, in a large proportion of cases. Frequently the pasty fur on the tongue presents a bright green colour. The urine is usually scanty, and of high specific gravity.

When this group of symptoms is presented at an early stage of the fever, your diagnosis will be comparatively easy; but it is not so in the case of a patient seen at a more advanced period, in which the symptoms of acute

congestion may have become masked by those of the typhus state, and the patient's condition may, on a superficial view, present nothing differing from the simple toxic action of the fever-poison. On this subject, Dr. Graves justly observes:—"It is in many instances extremely difficult to distinguish the cerebral symptoms produced by the poisonous influence of fever on the brain, from those which depend on true inflammation. The one gives rise to delirium and fatal coma as well as the other; and in the advanced stages of fever, when the manifestations of nervous energy are feeble and imperfect, and when the circulating and respiratory organs act with diminished power, the distinction between irritation and actual inflammation becomes a matter of great difficulty." Daily experience proves the truth of this observation; nor do I believe that accuracy of diagnosis can always be attained even by the most experienced, or that we have any single, positive, and certain sign by which the two forms of disease can be, in all cases, distinguished. And yet, notwithstanding the infrequency of this complication, its recognition is of the utmost importance. There are a few differential symptoms which will be found of value as aids to your diagnosis, more especially if associated together. The first is the state of the consciousness, which in cerebral congestion, at this period of fever, presents the double derangement of watchfulness and stupor, usually conjoined with delirium of an impulsive character. Again, though unable to rise, the patient is restless, rolling his head on the pillow, and not unfrequently even rolling out of bed; —in a word, not presenting the supineness of the intoxicated fever patient. Neither is the expression of his countenance the same: there is usually some degree of knitting of the

brow, with contracted pupils and suffused conjunctivæ; the muscles, whether flexed or extended, are rigid; his teeth firmly set; if he lies on his back, with his knees drawn up, it will be found that his heels are firmly pressed against the buttocks; at other times the extended limbs will present the combination of rigidity with tremor. The frequency of respiration is disproportionate to the rate of the pulse, it is noisy, and there is often a loud and forced inspiratory murmur heard over the chest. The heart's sounds present that kind of augmentation, with abrupt action, as if caused by running or other over-exertion. This sign will be less easily recognised if the heart's tonicity is impaired by the fever-poison, its muscular structure having become softened, the first sound being feeble, and its impulse imperceptible. Cerebral irritation may, even in this condition of heart, be sometimes detected by the character of the sounds, which, though feeble, are rapid, and give the idea of a jerking impatient contraction of the organ. You also will have a valuable sign in the greatly increased frequency or irregularity of the pulse on the slightest movement or excitement, or on the exhibition of wine or stimulants; while, at the same time, under their use, the head becomes hotter, and the extremities colder, the respiration more hurried and irregular, and the reflex actions, rigidity of muscles, restlessness, and jactitation, more marked.* Whenever these symptoms follow the exhibi-

* Stoll thus sums up the signs—Constans delirium, vero et ferox, cum urinâ paucâ pallidâ, sine contentis; . . . . tendinum subsultu, artuum tremore, inflexione eâ que violentâ, si eos extendere conetur medicus, maxillarum contractione ad ingerenda: depositionem seri ad ventriculos cerebri, infra tentorium cerebelli, atque ad thecam vertebrarum factam significat.

tion of wine, there can be little doubt of the existence of active cerebral congestion, no matter how advanced the period of fever, or how apparently debilitated the patient; and here, accordingly, treatment becomes a valuable aid to diagnosis. From my notes of many similar examples, I select short abstracts of a few cases which came under my own observation; and in which the symptoms during life, and the appearances after death, illustrate the observations I have just made.

A girl, aged sixteen, was admitted into hospital on the twelfth day of fever. She was not maculated; nothing unusual or unfavourable occurred after admission until the evening of the nineteenth day, when she became suddenly delirious, having been found by the nurse walking about the ward.

On the twentieth day the delirium continued, and she frequently attempted to leave her bed. The pulse had risen from 90 (on the preceding day) to 100, but was small and constrained, while the heart's impulse was strong and widely felt.

On the twenty-first day there was less active delirium, but a tendency to stupor; the pulse rose in the evening to 120; heart as before.

Twenty-second day. She is reported to have slept for a very short period, for the first time since the nineteenth; less stupor, but great irritability; the arm is strongly and involuntarily retracted on attempting to feel the pulse; the heart's action is strong and jerking.

Twenty-third day. Sleeplessness, restlessness, and general soreness of the surface; coldness of extremities; thready pulse, 120; with jerking action of the heart.

Twenty-fourth day. Stupor, passing into coma. Death.

On examination, the surface of the brain was found minutely injected, the convolutions slightly flattened, and the arachnoid thickened and opaque, in patches, on the surface of both hemispheres. The substance of the brain was unusually firm and extremely vascular, presenting very numerous red points on being sliced; there was considerable effusion of serum in the ventricles and at the base, in which situation the large arteries were in a most congested condition. The heart was empty, contracted, firm in structure, and altogether healthy in appearance in every respect.

In the above instance the cerebral congestion, no doubt previously latent, did not manifest itself until an advanced period of the fever. In the following it set in early.

The patient, a middle-aged man, who had contracted fever by exposure to contagion, was admitted into hospital on the sixth day. He was maculated, his extremities were cold, there was a tendency to stupor and low delirium, an inability to protrude the tongue, and involuntary evacuation of urine and fæces.

On the day following (the seventh,) prostration was more marked; there was low delirium, with stupor and sleeplessness; pulse 112, and weak; heart's impulse weak, and first sound indistinct. He was ordered four ounces of wine.

On the eighth day it was found that sleeplessness had been continuous; added to which, while stupor had increased, dysphagia and difficulty of protruding the tongue were manifested. The pulse was 120, and weak; heart's impulse stronger, and first sound more distinct.

On the ninth day he had convulsions, which continued for nearly three hours without intermission, but ceased when

the apothecary had taken five ounces of blood from the temporal artery, leaving, however, a distorted mouth, and ptosis of one eyelid. He had one slight return of convulsion before his death on the following day, and gradually sank into coma, the pulse becoming imperceptible, but the heart's action jerking and excited to the last.

On dissection the appearances were similar to those of the preceding case; the convolutions of the brain were flattened, their surface red, and minutely injected, and there was very copious effusion of serum into the ventricles. The heart was firmly contracted, its cavities empty, and its structure apparently healthy.

Dr. Anderson thus narrates a similar case:—

"Elizabeth Riddell, aged fifteen, became suddenly stupid and very restless on the twelfth day of typhus, having previously complained of headache and oppression; she had a vacant stare; death in a few hours. *Inspection* twenty-six hours after:—Upper surface of arachnoid and convolutions rosy; much effusion into the pia mater, though but slight congestion. The cerebral substance was very soft, the cortical of a pink colour; the ventricles contained bloody serum; purpuric spots on the pericardium."

There can be no doubt, that active congestion of the nervous centres manifests itself in different modes at different times, and that it is much under the influence of what is termed the epidemic constitution. You have a striking example of this in the occasional epidemic occurrence of cerebro-spinal arachnitis, which was very prevalent in this city from ten to twelve years since, and of which several cases have occurred in this and other hospitals during the past winter. It appears, moreover, to have prevailed in some places during the epidemic period of 1847-9, and is

noticed by several observers, as by Dr. Cullinan of Ennis, and Professor Law of this city. Dr. Graves describes an outbreak of cerebro-spinal arachnitis, in a family at Rathmines, at a still earlier period. Recently, this complication has been described by Dr. Fritz of Paris.*

The group of symptoms usually present in the instances which have come under my own observation, all of which were in cases of typhoid or enteric fever, were :—

1. Headache, with intolerance of light.
2. Congested purplish flush of the face.
3. High temperature of the surface.
4. Marked soreness of the surface ; cutaneous hyperæsthesia ; and tenderness over the cervical vertebræ.
5. Pain and stiffness of the muscles of the neck, with partial opisthotonos—the patient usually lying with the head drawn back.
6. Sighing ; irregular and panting respiration, or noisy respiration.
7. Jerking, sometimes rasping, action of the heart, much moderated, occasionally, by blood-letting.
8. Thick pasty fur on the tongue, usually of a light green colour.
9. Vomiting of a green fluid.
10. In a few cases, partial paralysis ; or tonic contraction, with pain in the limb so affected.
11. In several instances, the patient has complained of acute pain with tinnitus in one ear.

A fact noticed by several observers, is, the great resemblance these cases sometimes bear to cholera, or to peritonitis ; vomiting, diarrhea, and abdominal tenderness, being

* " Étude clinique sur divers symptômes spinaux, observés dans la fièvre typhoide." Paris, 1864. Appendix (2.)

so marked, as to mask for a time the cerebral characters of the disease. Another occasional source of difficulty is their great similitude to hysteria. Such was presented in the woman Donnelly, who was recently under your observation; accurate notes of whose case were taken by Mr. Todhunter, our clinical clerk.*

I have met with several examples of this complication in private practice at different times. Two of these (both cases of typhoid) occurred in a brother and sister residing near Portobello, in close vicinity to an offensive open sewer.

In the sister, aged 20, the purple congested face, extreme cutaneous hyperæsthesia, and green vomiting, were well marked; and partial paralysis of both hands continued, after the termination of the fever, until the mouth was slightly touched by mercury.

In the brother, aged 18, the most prominent symptoms were, rigors; sickness and vomiting brought on by the slightest motion; notable acceleration of pulse on change of position; severe headache, and rigidity with spasmodic jerking of the muscles of the neck. This latter condition also eventually yielded to the action of mercury pushed to ptyalism.

While these patients were under my care, I was in attendance upon a young lady in whom typhoid was apparently brought on by the same cause—an offensive drain in the house in which she resided. Towards the close of the fever, the cerebro-spinal complication appeared in the form of pain and numbness of the left arm, continuing for several weeks, and yielding only to the same measures, viz., repeated leeching, blistering the neck, and mercury pushed to slight ptyalism.

Two of the cases which have fallen under my observation, were in medical students, in whom the disease was watched by myself and others with more than ordinary care.

In the first of these, the cerebral symptoms set in on the invasion of fever, masking it completely for several days. This gentleman was seized with shivering, followed by headache and remarkable soreness of the surface, green vomiting, and strong jerking action of the heart. To these symptoms were soon added painful rigidity and retraction of the neck; the left arm, and subsequently the leg, becoming also rigid, numb, and painful; the fingers being strongly and painfully flexed on the palm. Leeches were applied in relays, first of eight, and afterwards of six, behind the ears; each time with partial relief of the painful state of the neck and limbs, and on the third application with complete relief. Rose-coloured spots appeared on the ninth day, and the fever ran through its usual course. At the period of crisis, there was a partial return of the rigidity of the neck, with pain in the arm and slight contraction of the fingers, but these symptoms yielded on the application of a blister to the neck.

A few days after crisis, this gentleman was attacked by pleuritis with signs of copious fibrinous exudation, from which he slowly recovered.

In the second patient, the cerebral symptoms set in at a more advanced period of the fever, the access of which was very gradual. When I saw him, on the fourteenth day from the first feeling of indisposition, he presented the usual phenomena of typhoid fever. He had distinct rose-coloured papulæ on the trunk and arms, meteorism, gurgling over the cæcum, and great increase of the limit of dulness over the spleen. There was but slight diarrhea,

but he had had repeated returns of vomiting and epistaxis during the preceding week; the urine was high-coloured, and in small quantity.

His face at this time was clear, with a bright flush; his pupils rather dilated; he had very slight headache; the heart's action was natural, rather weak than otherwise; pulse, 100; respiration rather high and accelerated.

On the eighteenth day, headache had become very severe, attended with slight delirium; tremor of the hands and arms was also now observed; the pulse rose to 128; respiration loud and nasal, 36 in the minute. In the course of the next twenty-four hours, a marked change in the face was evident; the right eye became minutely injected, while the left remained clear; the flush became deeper and constant, and spread over the forehead; the brow was corrugated. At intervals of ten or fifteen minutes a slight spasm seemed to pass over the face, the eyelids closing, and the eyes rolling under them; at the same time he moaned faintly, and thrust out the right arm, clutching the bedclothes with his hand. I happened to be engaged in sponging his hands at the moment when one of these paroxysms occurred, and on the instant the fingers closed on the sponge like a vice. He had slept for four hours on the night between the eighteenth and nineteenth days, but his sleep was noisy and distressing, his respiration appearing more laborious than when awake, and accompanied by loud moaning. The urine, which had been retained for twelve hours, was now drawn off, was found to be albuminous, and to contain blood-corpuscles.

On the twentieth day there was little change; he had involuntary dischage of urine, with partial retention. The

cerebral symptoms continued as before, with injection of both conjunctivæ, and there was a dark flush of the face and forehead ; the heart's action was remarkably strong and jerking.

Twenty-first day. He had a good night; consciousness much improved ; had passed urine voluntarily; pulse, 108; rose-spots fastly fading.

Twenty-second day. Still improving ; urine loaded with pale lithates, and not albuminous.

Twenty-third day. All the signs of reactive irritation of the brain had set in. The sleep had become more noisy and laborious than ever ; the eyes much injected ; the face deeply flushed, and of a purple hue ; skin, hot ; there was great thirst ; the heart's action was jerking and impulsive; pulse 132 ; respiration high, laborious, and irregular. In consultation it was agreed to apply four leeches behind the ear, a bladder half filled with ice to the head, and to give three grains each, of grey and antimonial powder, three times a day.

Early on the morning of the twenty-fourth day a gradual change took place ; he breathed more easily, slept more quietly, the face became less flushed, and in the course of the day the pulse came gradually down to 92, at which point it remained for several days, and during which he steadily improved in all respects.

On the twenty-seventh day, however, another change occurred. After a sudden and violent fit of coughing, he was found, on our visit, with a flushed face, a hot and dry skin, a rapid pulse, and hurried breathing. He had no headache or nervous symptoms, and his intelligence was perfect ; his only complaint, besides the cough, being, the intolerable heat of his skin, and he constantly demanded a

warm bath. On examination, the right side of the chest was found to be dull on percussion, both anteriorly and posteriorly in its superior half, in which situation, the respiratory murmur was muffled, almost inaudible, and mixed with slight sibilant râles. The expectoration was scanty and extremely viscid, and during the following three days, was occasionally tinged with blood ; and when examined under the microscope, it was found to contain a few pus corpuscles.

This pulmonary congestion was apparently resolved by a critical effort. On the twenty-ninth and thirtieth days copious sweating supervened, accompanied by a deposit of lithates in the urine ; and from this date the signs of solidification gradually disappeared, and his convalescence proceeded.

APPENDIX TO LECTURE IX.

(1.)

After giving an analysis of the fatal cases of fever in which the head was examined, Dr. Reid observes:—

"From this view of the post mortem appearances observed in the brain after death from fever, and the symptoms with which they were attended during life; and from the contrast we have instituted between those cases where an abnormal quantity of serum was found within the cranium, and those cases where the usual quantity only was observed, we think we are justified in concluding that they afford no distinct evidence, that the serous effusion was in all cases, if in any, the cause of death. We have seen one case in which one ounce of serum was effused into the lateral ventricles, and yet nothing different from the usual confusion of thought was observed. We have also seen a cerebral derangement as strongly marked in those cases where no increased effusion of serum was found within the cranium after death, as in those where this was observed. Besides, it must be remembered that it is not unusual to find increased serous effusion within the cranium of old people, or when the patient has been emaciated by previous disease, in quantities equal to what we have described as occurring so frequently in fever. And this last statement naturally leads us to inquire into the probable effects of age, and the duration of the disease, upon the amount of this serous effusion. I find that the average age of the cases in which an increased effusion of serum was found within the cranium was $42\frac{3}{15}$ years; while the average age of those in which no increased effusion was found within the cranium was $26\frac{4}{14}$ years. The average age of the four fever patients in which seven drachms or upwards of serum was found within the lateral ventricle was $57\frac{1}{4}$ years; the youngest being 48, and the oldest 68 years of age. With regard to the average duration of the disease in the two classes of cases, we do not find so striking a difference. The average duration of the disease in the cases in which an increased effusion of serum was found within the cranium (as calculated from twenty-four cases) was $12\frac{14}{24}$ days;

while the average duration of those cases in which no increased effusion of serum was observed within the cranium was $11\frac{1}{18}$ days, or only a difference of nearly one day. . . . . It has already been stated that in most of the cases in which the brain was examined, we observed the blood vessels well loaded with blood, as indicated by the numerous red points which presented themselves on the cut surfaces of the brain. In judging of the degree of vascular congestion in the brain, we ought to remember that part of the increased quantity of blood in the vessels of the brain may be merely apparent, and arise from the fluid state of the blood; for it is obvious, that if the blood remained fluid, the pressure of the knife used in slicing the brain will force the fluid blood through the open mouths of the vessels upon the cut surfaces. In judging of the probable causes of the congested state of the blood-vessels of the brain, and of derangements of its functions, we must take into account the state of the respiratory organs; for it is apparent that if there be any impediment to the passage of the blood through the lungs, this may materially influence the circulation within the cranium, even in those cases where the respiratory function is only secondarily affected through derangement of the central organs of the nervous system; for it is equally obvious that when from this cause there is any impediment to the circulation through the lungs, it will react upon the central organs of the nervous system, and increase the primary derangement.

"It is probable, however, that the increased effusion of serum within the cranium, and the greater plenitude of blood-vessels of the brain, occur too frequently to be fully accounted for by the age of the patient, the previous emaciation of the body, and the derangement of the respiratory functions; and that it may, in a few cases, be owing entirely to, and in others much aided by, causes connected with the nature of the disease itself, and by which that disturbance of the cerebral functions so generally observed in fever is induced. The facts which we have stated ought, however, to render us very cautious in attributing the phenomena observed in any individual case of fever, to increased plenitude of the blood-vessels, or to the effusion of serum."—*Physiological and Pathological Researches*, p. 460. *Report on the Epidemic Fever of Edinburgh.*

(2.)

Dr. Fritz arranges the symptoms referable to the spinal marrow, met with in typhoid fever, under the heads of those of the spine proper, and those of the medulla oblongata. The first he divides into—

I. Derangement of sensibility.

(1.) Hyperæsthesia (*a*) cutaneous (*b*) spinal (*c*) muscular.

(2.) Spontaneous pains comprehending (*a*) rachialgia, or pain affecting different portions of the vertebral column; (*b*) radiations of pain from the spine towards different regions, as towards the neck, shoulders, chest, arms, stomach, different parts of the abdomen, &c.; (*c*) pains in the inferior extremities, deep-seated, pungent, lancinating, terebrating, &c.—these pains being generally accompanied by muscular hyperæsthesia; (*d*) thoracic pain, occasioning difficulty of respiration; (*e*) perversions of sensibility, consisting in abnormal sensations, as tingling, pricking; (*f*) analgesia, including abolition of muscular sensibility.

II. Derangements of the motor functions of the spine, including paralysis, convulsions, and reflected movements.

Under the second head, he details, at great length, a case in which the following symptoms, referable to the medulla oblongata, presented themselves, being preceded, in the first instance, by extreme cutaneous hyperæsthesia, rachialgia, and pain on moving the head, with retraction of the head upon the neck. Panting, respiration—an extreme degree of anhelation, resembling a paroxysm of asthma, the head being carried back on the neck with each inspiration—the tongue unable to articulate—intermittent spasm of the pharynx, causing dysphagia; violent spasms of the larynx, causing hissing inspirations, and momentary closing of the glottis.

(3.)

The following is the case reported by Mr. Todhunter:—

"Julia Donnelly, ætat thirty-four, cook, admitted into hospital, May 12th, 1866; states that she works hard daily, and sleeps in a small uncomfortable bedroom, in a house in which the sewerage is out of order. A few weeks since, when getting up in the dark, she struck her head violently, and was stunned for a time, and

had headache on the following morning. She states that on the day before admission, she washed her head, and afterwards sat in the sun; in the course of the day she was attacked with headache and vomiting. When admitted, she complained of headache and continued vomiting. Pulse 116, and weak; tongue thickly furred.

"13th. Heart weak; pulse rapid and weak; tongue thickly furred; some cutaneous hyperæsthesia; no distinct eruption; bowels confined. Slept well, but still complains of sick stomach and headache; complaints uttered in a low whining voice, interrupted by sudden cries, accompanied by pressure of the hands over the forehead; frowning, and tossing of the arms; headache said to be confined to one spot of the forehead, over the left eyebrow; slight tenderness of the occiput and nape of the neck, tenderness on pressure of every part of the abdomen; respiration very rapid, although she does not complain of her breathing; no abnormal chest signs; skin rather hot; complains of weakness when sitting up in bed.

"14th. Seems much prostrated; heart weak; both sounds audible however, and rhythm pretty nearly normal; pulse weak, 100 in the lying posture, 120 when sitting; respiration still very rapid; cutaneous hyperæsthesia increased, and extending to the limbs; she cries out when the knees are held in the hand; does not complain of pain on pressure over dorsal spines, but feels pain on pressure over the occipital and cervical regions; pupils contracted; no photophobia, but says the sight is bad; has darting headache, extending over more of the forehead than yesterday; the whole scalp being tender, and feeling '*tight;*' cutaneous hyperæsthesia greatest over the abdomen, on which, as on the chest, there are several rose spots; gargouillement in the ileo-cæcal region; epistaxis; tongue thickly furred, the fur being greenish in the centre; bowels confined; urine dark.

"15th. Heart rather weak; pulse rather weaker, 100 lying, 116 sitting; temperature as registered by thermometer in axilla, 100°; tongue same as yesterday; cutaneous hyperæsthesia less; headache not so violent; complains of pain and buzzing in her left ear, the upper part of the pinna being sore to the touch; dorsal spines slightly tender; gargouillement in the ileo-cæcal region; spots much better marked than yesterday, and in considerable number over abdomen and chest; no diarrhea; slight

increase of the previous converging strabismus of left eye; eyes a little suffused; not so much screaming.

"16th. Heart and pulse perhaps a shade weaker; pulse 100 lying, 108 sitting; temperature 101·7; tongue rather cleaner, greenish hue still evident; cutaneous hyperæsthesia almost gone; headache better, and pain in ear gone; pinna numb; gargouillement in ileo-cæcal region, and slight meteorism of abdomen, spots fading; complains of 'tightness' of the scalp, which is sore to the touch; slept pretty well, but had unpleasant dreams; 'thought she was standing in an ash-pit, and the top of her head was taken off,' &c.; respiration much less rapid; strabismus more marked; sees things badly, 'a mist like' over her eyes; pupils still contracted; a few greenish stools; urine dark.*

"17th. Heart very weak; pulse not weaker than yesterday, 100 lying, 106 sitting; hyperæsthesia of trunk and limbs gone; no pain in the back; headache worse, and scalp very tender; gets relief by pressing her hands to her head; more jactitation, and tossing of head on pillow; temperature 100·6; eruption almost gone from chest; considerable gargouillement, and slight tenderness of ileo-cæcal region; less strabismus; sight much better. Complains much of her head, and cries out a good deal; wishes her head could be 'taken off;' has buzzing in her ears, and 'a sound like the wind through trees;' less prostration: respiration much more tranquil; no pain in the back; several greenish stools; gums slightly touched.

"18th. Had several hours' sleep; less headache; no cutaneous hyperæsthesia, except of scalp; heart is slightly weaker; pulse soft, 92 lying, 96 sitting; temperature 100°; tongue cleaning; tenderness in ileo-cæcal region; spots almost faded from

* The urine examined by Mr. Collins at this period, was found to contain a marked excess of phosphates:—

Specific gravity, 1019.
Reaction, acid.

Amount of Phosphates in 1000 grs. (by weight) of urine.

Phosphate of Lime.	585
Triple Phosphate, ...	2,561
Total,	3,146
Normal quantity being,	1,000

chest, a few still scattered over abdomen, which is very slightly tympanitic; no splenic dulness; sight better; pupils rather more contracted than yesterday; able to sit up without feeling giddy; feels stronger; some epistaxis last night; some retching this morning; no stool since yesterday; gums still a little sore.

"From this date she slowly but steadily improved, until, on the 26th, she was pronounced convalescent."

LECTURE X.

CEREBRO-SPINAL LESIONS.

I HAVE mentioned, that the mode in which the functions of the cerebro-spinal system may become deranged in fever, will vary according to the pre-existing states of the nutrition of the great nervous centres.

Among the causes which modify their nutrition, and so predispose them to become the seats of the nervous complications of fever, may be mentioned previous disease or injury of the brain; previous exciting causes of cerebral irritation or congestion, such as insolation, overwork either of mind or body, emotional excitement, anxiety, fear, or despondency; all seem, to predispose to one or other form of derangement of the cerebral circulation in fever.

It may be observed that in some instances, due in part to previous disease or injury, the cerebral lesions set in with the commencement of fever, continue during its course, and undergo, first, exacerbation, and then, resolution at the period of crisis; while in others, they are more or less latent during the progress of the disease, as if masked by the adynamia of fever, appearing manifestly at or subsequently to the period of crisis. The following are examples of each mode of occurrence:—

A young woman was admitted into hospital, under my care, on the seventh day of maculated fever; having been

for many months previously subject to frequent attacks of headache, ascribed to a severe injury, the effect of the fall of a heavy piece of timber upon her head.

The fever was ushered in with rigors and headache, followed by repeated vomiting; and on admission the face was flushed, the eyes dull and suffused, skin hot and dry, pulse ninety and full, heart's action violent, and the tongue coated with a white adhesive fur; there was also intense thirst, and ardor urinæ. Soon after admission she vomited about eight ounces of green fluid, and either vomiting or retching recurred at intervals throughout the fever. On the thirteenth day, after more than usually severe retching, she complained of great increase of headache, with intolerance of light, the eyes being much suffused. Six leeches were now placed behind the ears, and the same number twice repeated. Subsequently, she was also ordered to take a grain of calomel every third hour. On the fifteenth day, the report states she had not been relieved by the leeching; she had constant rolling of the head on the pillow; the head was hot, the skin dry, tongue brown, and the urine scanty and high-coloured. A blister was applied to the nucha, and on the seventeenth day, there being no amendment, another was applied to the occiput. On the evening of this day she had a convulsive seizure of a mixed character (hysterical epilepsy), and, after an interval of an hour, a second. On the following day the cerebral symptoms were relieved, and she appeared free from fever, but had mercurial griping and slight ptyalism; her convalescence was rapid and complete.

A remarkable illustration of the occasional latency of cerebral lesions during the progress of fever, was presented in the case of a man named Cromwell, who was admitted

into this hospital in the early stage of typhus, having been severely beaten over the head two or three days previously. No symptom whatever of active congestion of the brain appeared during the fever of fourteen days; on the contrary, those of asthenia were so marked, as to require the exhibition of twenty ounces of wine, and twelve ounces of brandy, daily, for a short time before crisis. Immediately after crisis, however, the most complete intolerance of all stimulants was manifested; and, shortly, acute headache came on, attended with constant vomiting of green fluid, marked cerebral breathing, jerking impulse and rapid action of the heart, together with all the other symptoms of arachnitis. This state continued highly marked during a week, yielding eventually to the daily application of leeches, and the administration of mercury pushed to ptyalism.

It sometimes happens that exposure to a noon-day sun, more especially if combined with severe muscular or mental exertion, will produce active congestion of the membranes of the brain, with fever of a gastric type; the latter more or less masking the former. Some years ago I attended a gentleman, aged twenty-five, who had for several weeks undergone much mental excitement and bodily fatigue, with prolonged exposure to the sun during a hot season. For several days before fever set in he complained of pain, tightness and weight in the occipital region, with intolerance of light and, more especially, of sound. He also complained much of the distress occasioned by the forcible and jerking action of the heart, which could only be moderated by the repeated application of leeches to the mastoid process. After the termination of the fever, the recurrence of the same cerebral symptoms re-

quired repeated leeching, and they eventually yielded only to the full influence of mercury. Although his recovery was complete it was extremely slow; and for several months, any fatigue, excitement, or a single glass of wine, were each, invariably, followed by headache, flushing of the face and brow, sleeplessness, and irritability of temper.

A less fortunate case came under my observation more recently. A gentleman imprudently sat reading for a considerable time, with the head bent forward, under the direct rays of a noonday sun in summer. Headache soon followed, attended with vomiting of green fluid. To these succeeded fever of a gastric type, which was treated by a medical man without peculiar reference to the head symptoms. After his convalescence from the fever, a constant headache remained; and when I first saw him, which was some months subsequently, he appeared to be suffering from chronic arachnitis, attended with partial hemiplegia and epileptiform convulsions. He also had amaurosis to some extent. Shortly afterwards he had an attack of apoplexy, which ended fatally an hour subsequent to the seizure.

One of the most remarkable instances I have ever witnessed, of the influence of pre-existing disease in determining the early occurrence of nervous lesions in typhoid fever, as well as their peculiar mode of manifestation, was in the case of a valued professional friend, attended by myself and others. One of those who were in constant attendance has kindly given me some memoranda of the case.

Our patient was a gentleman of remarkable ability, and distinguished for his scholarly attainments, but was, unhap-

pily, of a strumous constitution, which had manifested itself in various forms. Shortly before his last illness, he had presented a group of symptoms, which the late Dr. Hutton was of opinion arose from strumous disease of the base of the brain. The symptoms which set in at an early period of his fever (typhoid) were most peculiar, but were distinctly to be referred to the same portion of the nervous centres. The first was excruciating facial neuralgia, which was not relieved by the topical application of sedatives, but yielded at once to blistering the nape; a practice suggested by our belief as to its centric origin. To this succeeded the móst remarkable paroxysms of hysteria, more especially of hysteric dyspnea; similar to the paroxysms of spasmodic dyspnea, which we occasionally, though rarely, observe in epileptics, and which appear to replace the epileptic fit; and also resembling, somewhat, a form of paroxysmal dyspnea I have occasionally seen in connection with aneurism of the arch of the aorta. In these paroxysms he would start up in bed, gasping for breath, the mouth open, the eye-balls staring, crying out, "brandy, give me brandy." This condition lasted on each occasion for a few moments, and gradually subsided. To it succeeded coma, convulsions, partial paralysis of the left arm and hand, low delirium, failure of the circulation, and death.*

In your clinical study of the cerebro-spinal derangements of fever, besides the difficulty of diagnosis to which I have referred in my last lecture, you will sometimes experience much difficulty in distinguishing the symptoms of hyperæmia from those of anæmia of the brain—those of inflammatory excitement from those of exhaustion; since opposite states of the cerebral circulation in fever may

* Appendix (1.)

produce similar derangements of innervation. In like manner, as we know, that in cerebritis, after the inflammation has been subdued, a set of symptoms, termed pseudo-inflammatory, often present themselves, arising from exhaustion, and demanding the exhibition of opium and wine.

The following case, which was under my care many years ago, and of which I took daily notes at the bedside, so well illustrates this fact, that I am induced to offer it, not as a guide to your treatment of cerebral complications, (since it occurred at a period when bleeding and calomel were more freely employed than in the present day), but as showing both the tendency to cerebral symptoms of the inflammatory form, in those fever patients who have previously suffered arachnitis from injury of the head, disease of the internal ear, &c. &c.; and also the fact, that sometimes the symptoms of inflammation are so commingled with those of adynamia and exhaustion, as to make the treatment of the combination neither simple nor easy.

M. Suttle, a shoemaker, aged twenty, of intemperate habits, was admitted into the Navan Fever Hospital on the 10th of January, 1840, complaining of violent throbbing pain in the head, especially of the forehead, intolerance of light, deafness, with a discharge of reddish fluid from the right ear. He states that, twelve months since, he had a similar attack in the head and ear, for which he was six weeks under treatment in a Dublin hospital. During the interval, there has been no discharge from the ear, but it has remained perfectly deaf.

On the 26th of December (the sixteenth day before admission), and for the three following days, he was constantly intoxicated. While in this condition he fell into

water, and slept in his wet clothes. On the 31st (eleven days since), he had a violent shivering, which continued with little intermission for two days, and it has since frequently recurred. His health was not, he says, otherwise much affected, till the 7th instant, when acute headache set in, accompanied by flushing alternating with shivering. On the 9th, the discharge from the ear recommenced without any relief of the headache.

The pain is sometimes very violent, coming on during sleep, and awaking him; he is drowsy, yawns frequently, and says he feels heavy and oppressed. His face and head are flushed and hot, temporal arteries throbbing, eyes suffused and heavy, pupils sluggish, pulse 88, full and vibrating, tongue soft and clean, bowels costive, urine natural.

He was bled to sixteen ounces, ordered a purgative enema, and to take a scruple of calomel in the course of twenty-four hours.

January 11th. The enema produced three copious light-coloured evacuations; he fainted after the bleeding, and complained that he passed a bad night, feeling very cold, and shivering frequently. At noon he was sleeping, the trunk and limbs being agitated with tremor and twitching; his feet were cold; face and head flushed and hot; eyes suffused; pain in the head somewhat less acute, but still very great; the ear continued to discharge freely. Pulse 112, hard and jerking. Ordered, six ounces of blood to be taken from the neck by cupping; and to take every three hours an ounce of a mixture, containing two grains of tartar emetic in eight ounces of water.

12th. Was much relieved by the cupping, passed a good night, no return of rigors; skin generally warm; pulse

120, and hard; tongue white and moist; bowels confined.

The mixture to be repeated, and to have a rhubarb draught.

13th. Much better, slept well, skin warm, face pale, and the head much cooler; pulse 116, but softer; tongue white and moist; gums slightly sore; bowels opened by draught.

14th. No visible change.

15th. Has had vomiting and hiccup, apparently caused by the antimony; is now quite free from pain in the head and intolerance of light; no discharge from the ear; pulse 120, and soft. The antimonial was suspended, and a diaphoretic mixture given.

16th. Passed a sleepless night, but dozed a little in the forenoon; makes no complaint of pain, but says he is weak; he seems torpid, and a little inclined to rave; bowels not opened since yesterday; tongue cleaner, but red at the tip; has slight hiccup; pulse 128, soft and compressible. Ordered, to continue the diaphoretic mixture, and to have six ounces of wine.

17th. The nurse states that he lay awake a great part of the night, with his eyes fixed on the ceiling in a vacant stare, that he raved a good deal, and had occasional hiccup. This morning he is delirious, and answers incoherently. There is a great tremor of the tongue and lips; his hands are also tremulous, and there is an appearance of extreme prostration about him; pulse 144, small and compressible; respiration natural; tongue red, and rather dry; bowels free; urine normal.

A blister was applied to the nucha, and the wine continued, with the following bolus every third hour:—

Calomel and camphor, of each three grains; James' powder, two grains; opium, half a grain.

18th. Last evening he vomited, and had much hiccup; vomited again during the night, had but little sleep, and raved a good deal, leaving the bed occasionally, and walking about the room; answers incoherently with a fatuous smile; appears much prostrated; pulse 116, and improved in character; tongue white in the centre and moist, tremulous when protruded; has much subsultus; skin cool; feet cold. Ordered, to continue the bolus; to have eight ounces of wine, and a draught containing twenty drops of the acetum opii, and thirty of Hoffman's anodyne liquor.

19th. Much improved. The draught was soon followed by quietness and sleep; he has since slept a good deal, and is now perfectly coherent; he has had no return of vomiting, nor for some hours has he had any hiccup; his countenance has lost the silly expression of yesterday; pulse 112, and soft; skin warm; tongue white and moist.

To have a bolus three times a-day, and eight ounces of wine.

20th. Passed a good night; slept almost uninterruptedly; no delirium, and but little hiccup; no headache; is perfectly rational, but very deaf; tongue steadily protruded; pulse 112, and full; skin warm; bowels open.

21st. Had a good night, and is much better; no headache; is rational; pulse 88, and soft; tongue clean; bowels regular.

23rd. Has passed an indifferent night. The nurse states that he wandered a good deal in his sleep, still he appears improved; intellect clear; countenance good; tongue clean, and protruded firmly; pulse 84, full and soft; bowels regular.

To have a draught containing twelve drops of the acetum opii at bed time.

25th. Perfectly convalescent.

One source of difficulty in distinguishing the hyperæmic from the anæmic condition is the similarity of the symptoms in the opposite states. It is true, that in many the exhausted brain is indicated by pallor of the face, by a clear eye with dilated pupil, cold, white, or mottled skin, a weak whispering voice, limpid urine, tendency to faintness in the erect posture, &c.; but the eye may be suffused, and the pupil contracted from want of sleep, and the other signs mentioned may be wanting. Another, is the difficulty of determining whether the symptoms of exhaustion are secondary and produced by depleting treatment, especially by repeated purging, or, are owing to the deficient power of the left ventricle, by which a condition of the brain is produced, differing in degree, rather than kind, from that anæmic, ill-nourished condition of brain met with in cases of fatty degeneration of the heart; an analogy suggested by Dr. Stokes in his researches on the condition of the heart in typhus. I could not give you a better illustration of the difficulty and importance of this diagnosis, and its bearing upon treatment, than the following case, which I have slightly condensed from Dr. Ormerod's work on fever.

The case is entitled, "Fever with papular rash; affection of the brain; symptoms relieved; death by exhaustion."

The patient was a previously healthy, temperate man, admitted into hospital on the seventh day of fever. He had taken purgative medicine previous to his admission. His face was pale and anxious; eyes glassy; head hot and

perspiring; feet cold; tongue moist and furred; pulse 74, small and soft; bowels freely open from medicine; urine free and high-coloured; skin moist, with a papular rash about the chest and abdomen; pain in the head much increased by cough.

Eighth day. No sleep because of cough and headache; face flushed and perspiring; eyes suffused and glassy; skin hot and moist; pulse 92; tongue thickly coated with white fur; cough, and rusty expectoration.

Ordered, to be cupped to six ounces from between the scapulæ; to take two grains of calomel to-night, and half an ounce of castor oil to-morrow morning.

Ninth day. The cupping gave immediate relief; cough and headache are much less severe, but he was wakeful and restless during the night; his face is flushed and hot; tongue dry and furred; pulse 98, with more power; three copious evacuations from the bowels.

Ordered, to have the head shaved, and to be cupped to four ounces from the temples; to take two grains and a half of mercury with chalk thrice a-day; and a saline draught with camphor mixture every six hours.

Tenth day. Restless, with incessant pain shooting from the forehead to the temples and occiput; pulse 108, small; face hot, flushed, and anxious.

Ordered, to be cupped to six ounces from the temples; to take half an ounce of castor oil immediately, and to continue the medicine.

Eleventh day. Head hot; face flushed; skin hot and dry; tongue dry and furred; pulse 110, small; three copious, liquid, ochrey evacuations from the bowels; he breathes hurriedly and with difficulty, but auscultation detects nothing more than slightly prolonged expiration.

Ordered, ten leeches to the forehead; to take a little more nourishment, and to continue the medicine.

Twelfth day. Delirious; restless; two loose, ochrey evacuations from the bowels; abdomen tender; pulse 120, small and soft.

To continue treatment.

Thirteenth day. Two scanty liquid evacuations; pulse 120, small and soft.

Fourteenth day. Lies on his back, unconscious, breathing with difficulty; unable to protrude the tongue; stares wildly at any one who addresses him, but does not move a feature, and returns no answer.

Ordered, to be cupped to six ounces from the temples immediately; to continue treatment.

Fifteenth day. He lay in the same way for two hours after being cupped, then, soon after, bursting into a profuse perspiration, he recognised and spoke to his father; had some sleep during the night, and is now quiet and free from pain; pulse 98, small and soft.

Ordered, to have six ounces of wine, and more beef-tea; to continue the saline draughts, and cold lotion to the forehead.

Sixteenth day Noisy and restless during the night; when visited, trembling and hardly sensible.

Ordered, a blister to the nucha, and a common enema.

In the evening he was lying on his back, perspiring profusely; was trembling, and had muscular rigidity and dysphagia; perspired all night, and died at 6 A.M. of the seventeenth day.

Post mortem Examination.—The brain and membranes were in every respect natural, but there was a little old thickening of the arachnoid, and no more than the ordi-

nary quantity of fluid in the meshes of the pia mater; the lungs were slightly gorged with blood; the heart healthy, containing fluid blood, &c. &c.

Well may Dr. Ormerod say:—"If we looked to morbid anatomy only as a guide to future treatment, there would be a decided condemnation of all the depletive treatment here adopted."

Besides the marked influence exerted upon the cerebral complications of fever by previous disease or injury, insolation, excessive exertion, &c., we observe, that previous mental and emotional states, so modify the nutrition of the nervous centres, as to render them peculiarly liable to suffer from the operations of the fever-poison, which manifests an elective affinity for these organs under such circumstances.

I have observed two forms of nervous complications in patients who, at the invasion of fever, laboured under some depressing emotion, whether anxiety, grief, shame, fear, or despondency. In one, these were characterised by derangement of the cerebral circulation; in the other, by purely nervous symptoms, bearing more or less resemblance to hysteria. In cases of the latter description there is little or no complaint of headache; the intellect is often but slightly affected, the patient retaining volitional control over his thoughts, but not so over his excito-motory actions. If delirious, he raves on the subject of his previous emotion, or perhaps manifests general depression of spirits, and a hysterical tendency. I believe that it is to this class we should refer the pseudo-hysterical cases which Cheyne, and after him Graves, have mentioned, under the name of dangerous hysterical complications of fever, of which Dr. Graves says:—"In every case of fever where symptoms

resembling those of hysteria come on, you should be apprehensive of danger. I do not recollect having met with a single instance of this kind which did not terminate in nervous symptoms of the most formidable nature." It is probable that a form of blood-contamination, to be hereafter noticed, exists in many such cases; but in others the character of the nervous symptoms is determined by the previous emotion. These cases are usually marked by the greatest disturbance of the respiration; the low temperature of the surface; the early and general subsultus and tremor, especially of the facial muscles; dysphagia; and by the early loss of the sensational consciousness: symptoms, all of which, point to the great centre of emotion, the medulla oblongata, as the seat of lesion.

The following are short abstracts of cases, in which the symptoms of cerebral congestion manifested themselves during fever, in patients suffering from painful anxiety at the time of its access:—

A lady, aged thirty-five, of nervous and excitable temperament, who had recently been subjected to unusual exertion and mental anxiety, was attacked by typhoid fever, which, during a fortnight, presented no peculiar symptoms. I was first called to see her upon the sixteenth day, when there was much prostration, with a dusky, muddy hue of the face; dark, thinly scattered eruption; tympanitic distention of the abdomen, with tenderness and gurgling over the ileum, and gritty, ochrey diarrhœa. The urine was natural in appearance and quantity; the breathing was high and frequent, without any appreciable bronchitis. The heart's action was feeble, and the pulse weak, ranging from 120 to 130; the intelligence was dull, but otherwise undisturbed. With a view to moderate the

diarrhea and support the strength, a small blister was applied over the ileum, and she was ordered decoction of bark and muriatic acid, with port wine. A gradual improvement followed these measures, and between the eighteenth and nineteenth days a favourable crisis seemed to take place; slight perspiration occurring, with copious deposit of pale lithates in the urine. On the following day, however, my attention was aroused by the turgescence and purple colour of the patient's face. Her breathing had become hurried, 52 in the minute, with laboured jerking inspirations, while careful examination of the chest disclosed no pulmonary lesion. The most marked sensibility and soreness of the surface had supervened; and she had, for the first time during her illness, involuntary discharge of urine. Her manner was hysterical and excited; and lastly, the heart's action, for days previously so feeble, had become jerking and forcible; pulse 112. The diagnosis of cerebral congestion was confirmed in the course of the day, by the gradual supervention of paralysis of the right arm and hand. The head was shaved; relays of leeches were applied to the mastoid process; a large blister was placed over the occiput; and grey powder and James' powder given three times a-day, mercurial inunction being, at the same time, employed. No improvement appeared until the twenty-third day, when the gums had become slightly touched. The mercurial action was immediately followed by a change in the appearance of the face and manner; by the respiration becoming easy, and decreasing to 24 in the minute; by the pulse falling at once to 84, and the heart's action becoming tranquil; and by the loss of soreness of the surface. The paralysis of the arm and hand, however, remained, and disappeared very gradually, so

that some months elapsed before she could resume her professional avocations as a teacher of music.

In this patient I remarked that, for a considerable period after recovery, attacks of cerebral congestion, indicated by headache, flushing, brightness of the eyes, &c. were induced by any mental exertion or emotion.

A lady, aged forty, had typhus, which, up to the tenth day, ran its course without any unfavourable symptom. A little wine had been given from the eighth day with apparent benefit. Sleep had been tranquil, and the pulse was becoming improved in volume and slower. On the tenth day, however, a slight and infrequent intermission of the pulse was observed, and on the eleventh, this amounted to complete irregularity, while it was also unequal in force; on sitting up it became much accelerated, but at the same time more regular. The heart's action, previously weak, had become strong and abrupt. The headache of the early period had never subsided, and the patient now complained of sharp shocks of pain lasting for a few moments, and attended with buzzing in the ears. Along with these symptoms, I observed a marked change in the colour of the face, which had a purplish flush, while the arms and hands were dark and mottled. There was also marked tremor of the hands and of the tongue. This lady had been the subject of most painful anxiety for some time previous to the commencement of fever, and to this I ascribed the evident congestion at the base of the brain. I advised the withdrawal of wine, the application of a small number of leeches to the mastoid process, a blister to the nucha, and the administration of mercury with chalk, and antimonial powder.

On the 12th day the intermission of pulse was much

less frequent, and the colour of the face was much improved.

On the 13th there had been incoherence and slight muttering delirium during the night, and there was slightly increased irregularity of pulse.

On the 14th the pulse was steady and full, the face bright and clear, the tongue had lost its tremor, and had commenced to clean. She had slept soundly, and had had slight perspiration, with cloudy urine. She recovered perfectly.

Some years since, I witnessed and took notes of a very striking example, of what I have termed the second form of nervous lesion, due to the influence of depressing emotion. My patient was a member of the profession, between fifty-five and sixty years of age, enjoying a large practice, wealthy, beloved by his family, but unhappily of a peculiarly nervous and sensitive temperament. Having to appear as a witness, in a cause in which he had taken a more zealous interest than was prudent, he was subjected for several hours to a cross-examination of the most painful nature, by a barrister notorious for performances of that description. He returned home broken down by shame and vexation. He could not sleep or eat; he absented himself as much as possible from the society of his family; and fever being then prevalent in the town in which he resided, he soon contracted the disease.

The symptoms of profound nervous depression appeared at once; he began to sink from the first day; and on the eighth, the stupor, difficulty of breathing, coldness of surface, and failure of the heart's action, were so marked that he was to all appearance moribund. He was, however, kept alive till the fifteenth day by the free employment

of stimulants, especially of wine and brandy. The sinking of the temperature continued throughout, with most painfully laborious breathing and dysphagia; occasionally there was profound stupor and stertorous breathing; universal subsultus; tremor of the jaw, lips, and tongue; together with paroxysms of tremulous rolling of the head, &c. Near the end of the second week, the skin, which had been yellow, inclining to bronze, improved in colour, and the maculæ faded, but the nervous lesions increased daily; hiccup became constant, the voice sank to a whisper, the tongue became retracted, the breath cold, he had involuntary discharges, a bed-sore formed, and he died at length completely exhausted.

In this case, there had been scarcely any delirium throughout the illness, except upon the subject of the trial, but the aspect always indicated extreme despondency and want of desire to live. Thus, when offered wine, it was usually refused with the expression—"It is of no use; wine cannot work miracles." The nervous lesions seemed specially referable to the medulla oblongata, the nerves of which were all profoundly affected.* The sinking of temperature, tremor of the facial muscles, disturbance of respiration, and dysphagia, were the most remarkable I have ever witnessed: the last was at times complete. Flying blisters, sinapisms, &c., produced no effect on this latter

* "The nerves which take their origin from the medulla oblongata, mesocephale, or crura-cerebri, are especially apt to be affected by emotions. The choking sensation which accompanies grief, is entirely referable to the pharyngeal branches of the glosso-pharyngeal and vagi nerves, which come from the olivary columns. The flow of tears, which the sudden occurrence of joy or sorrow is apt to induce, may be attributed to the influence of the fifth nerve, which is also implanted in the olivary columns, upon the lachrymal

symptom; but I could usually remove it, for the moment, by dipping my fingers in water, and smartly dashing the face, when a few mouthfuls would be swallowed freely. He retained his intellect to the last; and, though unable to speak, he exhibited to me signs of recognition a few moments before he died.

gland; or of the fourth nerve, which anastomoses with the lachrymal branch of the fifth. The more violent expressions of grief, sobbing, crying, denote an excited state of the whole centre of emotion, involving all the nerves which have connection with it, the portio dura, the fifth, the vagus, and glosso-pharyngeal, and even the respiratory nerves, which take their origin from the spinal cord, as the phrenic, spinal accessory," &c.—*Todd and Bowman's Physiological Anatomy of Man*, vol. i. p. 355.

APPENDIX TO LECTURE X.

The following memoranda will be read with interest, as illustrating the influence of pre-existing disease upon the type of the nervous symptoms in fever:—

"I recollect the late Dr. ——— from an early age—I believe about twelve or thirteen years. As a boy, as a youth, and as a man he was always delicate. I have heard his mother state that he was reared with difficulty—that he suffered grievously from the ailments of childhood, and at all times required the most anxious care. From the earliest period his intelligence was of the highest order, and he always evinced an extraordinary love for study. I recollect his suffering from various ailments during his earlier life, especially glandular swellings in the neck, lithic diathesis, causing at times painful micturation—a certain irritability of the heart, which rendered him liable to very distressing palpitations on running or making exertion—and several attacks of acute tonsilitis, which left some permanent enlargement of the amygdalæ. For some years before his death he suffered a good deal from dyspepsia, not causing the loss of appetite, but distressing pyrosis, with more or less of rumination.

"As a rule, Dr. ——— was negligent of his health, and it was with difficulty that those around him could induce attention to the most ordinary and obvious precautions. Coming to the time more immediately preceding his fatal illness, I should observe that I was in less close contact with Dr. ——— than previously. Nearly all that year I lived in Paris, and when at home, as I stopped in the country, we were at some distance from each other, and consequently seldom met.

"I believe it was during this year, and very shortly after his marriage, that he suffered from slight hemoptysis, for which he consulted you. Of this attack I was not aware until you informed me of it about the time of his death.

"However, about the spring of the year, (1859,) I heard that he was complaining of some affection of his sight. I forthwith went

to see him, and on cross-examination discovered a series of symptoms, of which he made light, but which appeared to me very serious.

"He told me that very often—perhaps once in a month or three weeks—he found his sight confused, especially that of the left eye, which he felt himself obliged to close while reading or writing. This state of things would last for a day or two, and then pass off. On examining the eye, I found the pupil slightly dilated, and when his back was turned to the light, I thought I observed some degree of ptosis. I further made out that at times he experienced uneasy sensations in the left arm and leg, though not the slightest loss of power. I learned from Mrs. ——— that his sleep at night was uneasy, and that he was latterly profoundly lethargic and unwilling to rise in the morning. The tongue was fairly clean, pulse regular, and digestion rather better than usual.

"I immediately brought him to Dr. Hutton, who, having examined him most carefully, expressed an opinion to the effect that the symptoms were probably due to a cerebral affection of a strumous character. He advised an issue in the arm, and regular doses of proto-iodide of mercury. These measures were carried into effect, and with decided benefit at the time.

"Shortly after, (May, 1859,) I went abroad again, and did not return to Dublin until the middle of September. I then found him looking poorly, worn and haggard, complaining of fatigue on the least exertion; but, as regards the special symptoms detailed above, he assured me that they were much lessened, although not entirely gone. I saw him again on the 19th of September, and to my eye he was obviously ailing. On taxing him therewith he parried the questions, and assured me that he felt well; yet his tongue was loaded, his pulse about ninety, and he was prostrate. He agreed to take some grey powder and James' powder that night.

"The following days he was still, to my judgment, ill; but persistently denied it, although his wife assured me that he had bad nights and occasional rigors. On the evening of Friday, the 23rd September, he suffered greatly from headache. I was absent from town; but he had some leeches applied to the nape of the neck, and took some aperient medicine which acted sharply. On Saturday he maintained that he was perfectly well. Sunday morning, September 25, not being satisfied with his state, I stripped him, and examined his skin carefully. On the abdomen I found a few

rose-coloured spots, which I recognized as those of typhoid fever. He would not even then go to bed, and with difficulty I obtained his consent to bring you to see him. You may recollect that it was on the afternoon of that Sunday you first visited him, in his study. Here we enter upon the history of the terrible fever of which he died on the 8th of October. I shall not attempt to give a daily account of its progress. I made no notes of the case, and indeed was too much occupied and overwhelmed to retain very accurate recollections of it. Doubtless, you remember the case better than I do.

"The first four days and nights passed very quietly by. On the 30th of September he began to suffer from facial neuralgia, which yielded on the application of a blister to the nape. That night, however, he got no sleep, and next day his pulse was dicrotous and somewhat irregular, and he was ordered brandy in small quantities. All that day, namely, Saturday the 1st of October, he was excited and hysterical. That evening he got a suppository, containing a quarter of a grain of morphia. During the earlier portion of the night he slept quietly. I recollect his awakening just at two o'clock, as I was preparing to lie down on a sofa in his room. He awoke excited and hysterical, and began to shout in a frightful manner. From this state he passed into coma, about three o'clock that morning. While insensible he had slight convulsions, principally confined to the left side. He was roused to sensibility by blistering of the scalp, together with the internal use of musk and camphor, with small doses of brandy, which his faltering pulse indicated.

"After this period of coma, I think he never perfectly recovered control over the left arm and leg. October 2nd, Sunday, he had no sleep, nor on the following night. October 3rd, he was again greatly excited, and when you and Dr. Stokes saw him, it was agreed to give him three drops of tincture of opium in camphor mixture. Shortly after he relapsed into a comatose state, from which he was only roused by strong coffee. The following day he vomited unceasingly. There was no nausea, but whatever he swallowed he rapidly gulped up, in a fashion which reminded me of the same symptom in some cases of hydrocephalus. Profuse sweating set in—the most profuse I ever saw—another link—as I am disposed to interpret it—in the chain of symptoms directly referable to the nervous system.

"About this period he began to sink decidedly, passing into a condition of low muttering delirium, (which lasted until his death, on the 8th of October,) and from which he only roused occasionally for a few moments when spoken to. Finally, the abdomen became more and more tympanitic—the evacuations were passed unconsciously, and the pulse gradually failed. During the six or eight hours immediately preceding death he again became perfectly insensible."

LECTURE XI.

CEREBRO-SPINAL LESIONS.

We have now to notice those serious nervous lesions, connected with the various forms of blood contamination which are met with in fever, whether existing previously or set up during the course of the disease.

In a former lecture I have endeavoured to illustrate the influence of pre-existing disease of the kidney, or of arrest of its functions, by cold or other cause, at the time of invasion of fever. Other conditions existing at this period may exercise a similar influence; and our daily experience shows, that in the advanced stage of all fevers, secondary blood contaminations occur to a greater or less extent, which may produce various forms of secondary nervous lesions, more particularly of the excito-motory centres.

These contaminations arise, for the most part, from the presence in the blood of—

(*a*) The products of increased metamorphosis of tissue.

(*b*) Of resorbed sanguineous congestions or exudations.

(*c*) Of retained or suppressed excreta.

Several causes usually concur, whereby the products of regressive metamorphosis are present in the blood in excess. Of these, indulgence in animal food and vinous or spirituous liquors, muscular exercise during the latent period of fever, exposure to cold at the same period, and

the increased disintegration of tissue which occurs in all fevers—most remarkably in the epidemic relapsing fever—without proportionate increase of elimination, are among the most influential. The well-known influence of a highly animalized diet in producing or increasing a tendency to epilepsy, is an illustration of the special affinity of these products of metamorphosis for the excito-motor centres of the brain and spinal axis. We have another, in the existence of the same affinity, in the case of retained urea, itself a product of disintegration. The tendency to peculiar nervous lesions in the wealthy and well-fed has long been observed. Thus, Sims gives a graphic description of them, as prevailing in his time, "among the middle ranks of the people, who use much flesh in their diet, and whose prevailing foible is an indulgence in spirituous liquors." And I cannot better detail the symptoms usually observed, than as given by Cheyne in his sketch of a form of fever frequently met with in the upper ranks of society during the epidemic of 1817. "Persons in this class of society, more especially if they had passed their thirtieth year, who had been accustomed to live fully and luxuriously, were liable to a fatal form of the disease, which, to the inexperienced, was often very deceptive: the intellect was clear; the manner rather hurried, but otherwise natural; the patients declared themselves without pain or uneasiness, unless what arose from great weakness, which they were astonished at, so little seemed to themselves to ail them; and this at a time when their skin felt greasy, and was covered with dun petechiæ, when their eyes were glassy, their countenance somewhat suffused, and their breathing quick. *Such patients were very liable to convulsions*, in which case death (which in the

upper ranks frequently took place on the eleventh day) was seldom distant," &c.*

Of the second class, you have examples in the furious delirium sometimes occurring, with other nervous symptoms, in typhus complicated with pneumonia; and in the advanced stage of typhoid with intestinal ulceration.

It has been frequently noticed, that patients presenting the delirium of typhus with pneumonia, present also a remarkable yellow, or sallow, discoloration of the surface, which Hasse has shown to depend on the tinging of the serum by broken-up blood corpuscles and exudative material. There is, therefore, good reason to ascribe the nervous derangements of this complication to blood contamination.

The active delirium which occasionally arises in the advanced stages of typhoid, has been explained by some, as the result of the occurrence of similar contamination produced by absorption from the surface of the intestinal ulcers—an opinion which is supported by the fact, that this delirium is frequently associated with a low condition of these ulcers, and with hæmorrhage and other signs of a depraved condition of the blood. Dr. Murchison, however, has proved that these symptoms are often the effect of the deficient elimination of the products of disintegration of tissue. I shall have to notice his important observations hereafter.

Of the third class, you have striking examples in the peculiar nervous symptoms produced by suppressed menstruation, suppression of urine, or deficient elimination of urea. The female whose menstruation has been arrested by the exciting cause of fever—whether cold, or a mental

* Barker and Cheyne's Report, vol. i.

shock—usually displays serious blood lesions, associated with nervous symptoms of an emotional or hysterical character, such as Cheyne, and after him Graves, state, in their experience, to have been almost uniformly fatal.

Some of you had an opportunity of seeing an example of this, in a woman named Leeson, who was admitted into our fever ward about a year since.

This woman contracted fever when menstruating. The catamenia were at once checked, and, as you witnessed, the nervous symptoms in the fever which ensued, were of a highly marked hysterical character; obstinate mutism being one of these, and remarkable sinking of the temperature another. Inasmuch as very similar symptoms not unfrequently follow the suppression of the catamenia without fever, I think we may fairly ascribe them in both cases to a common cause; and this cause appears to be, the poisonous action of a retained or suppressed excretion upon the emotional centres of the nervous system.

The most frequent, and by far the most serious, nervous lesions arising from blood contamination, are those which result from deficient excretion of urea, the effect of one or other of the several causes, to the study of which I directed your attention in a former lecture.

The great importance of this complication, will justify me in dwelling at some length on its study.

The first effects of the poisonous action seem to be felt by the spinal axis, as evidenced in the remarkable tremor and subsultus; but it also manifests its action on the cerebrum, producing peculiar psychological phenomena. The patient seems to preserve his intelligence, but becomes peevish, dispirited, and fretful; he is occasionally drowsy, but not equally so at all times, and before the stupor

becomes profound he awakes from his doze suddenly, with a start, or the appearance of affright; sometimes with a scream. I recollect being led to the diagnosis of this complication, in the case of a young lady in typhoid fever, from her mother mentioning that she always awoke from sleep in a state of alarm, and with a faint scream. When addressed, the patient seldom looks at the physician, and answers the questions addressed to him with averted head, and in a dreamy, careless, or sullen manner, as if looking at and thinking of something else; occasionally he is mute, or perhaps, instead of replying, he mutters as if in conversation with another person.* The eye is usually red, as if from want of sleep; and the pupil, previous to the occurrence of coma or convulsion, is contracted as if from opium. The face and forehead usually present a flush of a brick or copper-red colour, diffused and permanent; in some cases, however, it inclines to purple; and, in patients affected with chronic renal disease, the face is occasionally pale and bloated. As the disease advances, if we watch the patient for a few moments, we observe the eyelids to close, and the eyeballs to roll convulsively beneath them; at the same time a spasm passes rapidly over the face, causing an expression of pain, and he utters a low, plaintive, tremulous moan; the facial convulsion becomes

* Dr. Walsh describes a manner closely resembling that which I have noticed in many cases of uremia, as occurring in tubercular meningitis. He says:—"I have now observed at least six cases of this affection in the adult, in which a peculiar form of mutism formed a striking symptom. The patients, when questioned, looked steadily in the speaker's face for a few moments, and then, without making the slightest effort at speech, deliberately, but without any sign of petulance, turned their heads away."—*On Diseases of the Lungs and Heart*, p. 392.

gradually more marked, and may sometimes be excited by touching the lips with a spoon.

I have frequently questioned these patients as to the cause of the peculiar moan, but could never obtain an answer from any one of them.* I believe it is not a voluntary act, but a simple reflex phenomenon, of which, perhaps, the patient is not conscious. I lately witnessed something like this in a case of fatal apoplexy, to which I was called very shortly before the patient's death. Although perfectly unconscious, she cried hysterically each time that any one spoke loudly in her ear. It appears to be always accompanied with facial spasms, or rotation of the eye-balls; and though different in its character from the scream which ushers in the epileptic fit, is, probably, like it, a true convulsion.

Another characteristic sign of this complication is, the muscular tremor affecting every part of the body and extremities. This is painfully evident when the patient, who is usually obstinate, insists on being raised in the bed to take a drink from his own hand. Sometimes there is a droop in one eye-lid, sometimes squinting, occasionally double vision. After a few hours the muttering subsides into stupor, from which the patient can for a time be aroused by speaking loudly—exactly as in narcotism from opium—but which passes gradually into coma, with nasal stertor. Very generally he awakes from this state, and becomes noisy and unmanageable; to this delirium con-

* Dr. Cranfield makes the same remark relative to patients in the secondary fever of cholera:—"Those that died moaned almost continually, and when questioned as to the cause of it, they could not assign any. They became comatose, and fell into collapse."—*Practical Treatise on Cholera*, p. 138.

vulsion soon succeeds, followed by coma or a second convulsion; ccasionally, but not often, the convulsion is again repeated, and death ensues.*

The course of the symptoms will sometimes differ from the above, according to age, constitution, and different complications. Thus, in the old and enfeebled subject, lethargy and coma will quickly supervene, so as to take the place of other symptoms; and in those who labour under a more acute form of kidney complication, vomiting and bloody urine may be superadded. In most of the cases which I have seen, vomiting occurred once towards the close, a sudden, copious vomiting, like that sometimes seen after narcotism—in the following case for example:—

A gentleman, aged forty-five, of full habit and purplish complexion, with marked arcus senilis, was much exposed, at the period of the invasion of fever and for two or three days subsequently, to cold and severe bodily and mental exertion. His habits of living had been previously luxurious, and he was daily accustomed to drink a large quantity of wine.

The fever came on gradually, and I was not consulted

* I might adduce many examples from the older writers on fever, to show that they recognised the peculiar symptoms of this complication, though not its cause. Thus Stoll describes the sullen character of the delirium as, "Silentium ad interrogata sermonicatio cum absente;" and Armstrong thus sketches the group:—"Sometimes acute inflammation of the brain is to be recognised by a glary, bloodshot eye, a contracted pupil, an agitated expression of the countenance, and a peculiar species of moaning, which scarcely ever ceases for a moment; to these indications confusion of mind, tremors of the muscles, and coma rapidly succeed, and the patient expires at last with a bloated, pale face, and laborious breathing." These are the symptoms, not of acute inflammation, but of uremic poisoning of the brain.

till the eleventh day, the patient even then obstinately refusing to see any physician. I found him propped up in bed, with a wild, angry expression of countenance, but with perfect intelligence; breathing rapidly and with effort, as if after strong muscular exertion; his face was not flushed, but bloated, dusky, and haggard; the lips and ears purple; the eyes suffused; the lower jaw and lips agitated by a constant tremor; the tongue dry, and tremulous when protruded; the surface of the trunk and extremities cold—the latter particularly so—mottled, and slightly livid; a few dark maculæ were scattered over the abdomen, which was tumid and tympanitic; there was moderate diarrhea, of an ochrey character; the heart's action was weak; the pulse small, weak, rapid, and most irregular, its rhythm being entirely lost.

There was no change in the symptoms till the thirteenth day, when the facial convulsions and peculiar moaning I have described set in, and recurred frequently in the course of the forenoon; followed, at two P.M., by a severe and prolonged epileptiform convulsion, after which, for twelve hours, neither spasms nor moaning returned. The urine, on examination, was now found to be smoky in appearance, and coagulated on the application of heat.

In the course of the evening he had frequent fits of loud yawning; and at midnight, while I was giving him a spoonful of wine, he suddenly vomited a large quantity of fluid.

Early on the morning of the fourteenth day the moaning and facial spasms returned, the latter being excited by putting a teaspoonful of fluid to the lips; then occasional stupor merging in coma supervened; and about one P.M. a second and fatal convulsive paroxysm.

You will sometimes meet with nervous derangements of a more or less serious nature, at or immediately following the period of crisis. Thus, occasionally the "exacerbatio critica" is marked by a sudden increase of delirium, subsultus, or tremor; the delirium being impulsive, the patient restless and agitated, jumping out of bed, leaving his room, striking his attendant, &c. After a time this agitation subsides; he lies down, and falls into a calm and prolonged sleep. Sir D. Corrigan has pointed out that the nature of this nervous excitement may be recognized "by the absence of coma, by the hysterical character of the agitation, and by the copious secretion of urine loaded with lithates." Occasionally, some attention is required to distinguish the profound sleep which follows this delirium from coma. This, however, can be always done, by noting the equal distribution of heat; the state of the pulse, respiration, and pupils; and also by observing the consciousness, which is perfect in the former, while it is lost in coma.

Of the less serious nervous lesions following crisis, sleeplessness with delirium is frequent in those whose cerebration has been active previous to the fever, or too soon after its termination; and in those who have suffered from any form of emotional excitement during the early stage of convalescence.

One of the most obstinate cases of this kind which I ever witnessed, was in the person of a young man of studious habits, who, after a favourable crisis, passed sixty hours in delirium without sleep. He was at length quieted by repeated doses of muriate of morphia and tartar emetic. A smilar and most interesting case is narrated by the writer of a review on Dr. Graves' Clinical Medicine, in the twenty-third volume of the *Dublin Medical Journal*, First Series:—

"The patient, a gentleman of nervous temperament and high literary attainments, and suffering under his first attack of typhus, had an imperfect crisis on the fourteenth day.

"His pulse had been 140; he was incoherent, looked wildly about him, and towards morning became extremely low, and said he was dying. He then broke out into profuse perspiration, had great tremor of the hands, and appeared in extreme terror. He got some stimulants, and soon fell asleep, awaking in four hours much refreshed, with his pulse having fallen to 112. On the sixteenth day he again became greatly excited. He struggled violently, his features twitching and his pupils greatly dilated. His state now became terrible. The subsultus amounted almost to convulsion; his pulse 132 and miserable; opium and musk were given without effect. The head was shaved, but he continued as violent as ever, thrusting downwards in the bed, sobbing and screaming, and with the subsultus like tetanic shocks. Under these circumstances the following was ordered by Dr. Lees:—

℞ Tartrat. Antimonii gr. vi.
Liquor Opii sedativi ℥i.
Misturæ Camphoræ ℥viii.

"Of this mixture he got one ounce in a single draught. He fell asleep, and slept calmly for three hours, when he awoke in great terror; all the bad symptoms returned. Another ounce was administered, and soon after a third, with the same happy effect. Thus he continued to the evening of the next day, comparatively rational and taking nourishment, when he began to look wild, got restless, and tossed himself about; his tongue was dry and glazed. Another dose was administered, which did not produce

sleep; but the patient lay quiet, passed much urine, and from this time began to recover. The gentleman is now in perfect health; and we hesitate not to say that, in our experience of typhus fever occurring in the upper ranks of society, we never witnessed a recovery so distinctly attributable to medicine."

We also often see other nervous symptoms occur as modes of crisis, and as consequences of imperfect crisis. The first are chiefly met with in the young and in females. In women whose menstrual period corresponded with the commencement of fever, hysterical symptoms—sometimes hysterical convulsions—are apt to occur on the eve of crisis. In the young of either sex, a fit of convulsions is not uncommon, even when no cerebral symptoms have marked the earlier period of the fever, beyond, perhaps, a more than usual amount of headache. I once saw a case of this kind in a boy aged fourteen, who complained of headache, without suffusion of the eyes, or any other symptom of cerebral inflammation. Towards the termination of the fever a degree of stupor came on; after this had continued about a day, he had a severe convulsive paroxysm, followed by a return of stupor, which continued for two days, and was again followed by an attack of convulsions; from thence he recovered without any further bad symptom. I ascertained that this boy never had epilepsy previously. The urine at the time of the fit was copious and limpid, like the urine of hysteria.

A very similar case is given in Henderson and Reid's Report of the Fever of Edinburgh, in which a single paroxysm, preceded by stupor, was followed by immediate recovery. In some of these cases the cerebral circulation seems to become much deranged, for the first time, on the

eve of crisis. This appeared to be the case in a girl aged nineteen, who was admitted into hospital under my care on the eighth day of fever, and had no cerebral symptoms until the fourteenth, when she was suddenly seized with convulsions; the attack continued for fifteen minutes, and recurred after five hours, the last fit being followed by much stupor, pain in the head, and distortion of the mouth. The evident cerebral congestion was treated by cupping the neck, calomel, and small doses of tartar emetic. On the next day the patient was free from fever, and her subsequent recovery was rapid; the facial paralysis remained for several days, and gradually disappeared.

When epileptiform convulsions of a more serious character occur repeatedly about, or soon after, crisis, they are usually due either to reactive irritation, consequent upon long continued passive congestion; to exhaustion; anemia; or to blood contamination, as in the uremic convulsions after crisis of the relapsing fever. An interesting case of the former kind came under my observation some years since, in a lady who had passed through typhoid fever caused by malaria. The patient, aged forty-five, was of an excitable, hysterical temperament, and jealous disposition; her habit of body was full, and she was accustomed to live well. The brain had not been apparently engaged during the fever, and she had therefore been allowed by her medical attendant to retain a mass of hair at the back of her head, of which she was very vain. She had also continued to take wine after crisis, and up to the time of my visit.

I was consulted in consequence of the supervention of severe headache with some degree of stupor, and constant distressing vomiting and retching, followed, after about a

day, by an epileptic fit, which was ushered in by the usual scream. The fit recurred after a few hours, and again at intervals during the two following days. The treatment employed consisted in withholding wine, cutting off the hair, applying cold to the head, and leeches behind the ears; also in the exhibition of grain-doses of calomel at short intervals. She had no fit after the leeching, and the vomiting ceased after the first or second dose of calomel. As is usual after fever, ptyalism was very rapidly induced, when all unfavourable symptoms disappeared. This lady never had epilepsy previously, nor has she since suffered from any return of it.

Fatal convulsion, immediately consequent upon crisis, is mentioned by Cheyne as having occurred in his own and in Dr. E. Percival's practice. Paralysis after fever has been met with either in the form of true hemiplegia, or paraplegia, and in that form described by Dr. H. Kennedy, who gives the following example of general paralysis from the poison of fever:—"A woman aged forty-four was attacked by severe fever attended with petechiæ, and recovered from it but slowly. When the time came round that she might be supposed to exert herself, it was found that she had lost the power of moving both the upper and lower extremities; in fact, she was completely paralytic, and no means seemed to be of the slightest use. The arms presented exactly the appearance of limbs paralysed by lead. In truth, no one could see this patient without having the conviction forced on his mind that the shock of the fever had literally destroyed the nervous agency. The patient lived about one month in the state described, never having given any sign of rally whatever, and, it is particularly worthy of note, not even a threatening of

stripping. The brain only was examined; it was particularly healthy; there was a very small quantity of effusion into the ventricles, and a slight degree of venous congestion."—(*Dublin Quarterly Journal*, vol. xx.)

It may be useful to recapitulate shortly, the principles which I have endeavoured to bring before you in the foregoing lectures.

I. You will bear in mind, that in your study of the cerebro-spinal lesions of fever, you are engaged in the investigation of a complex problem, involving :—

(*a*) The mode of action of the fever-poison upon the great nervous centres. (*b*) The states of nutrition—present and pre-existing—of these centres which predispose them to become the seats of the special action of the fever-poison. (*c*) The derangements of their capillary circulation which may arise from previous injury or disease; from the influence of the exciting cause; from peculiar epidemic influence; from stasis, the effect of long continued decubitus; from passive congestion caused by obstructed pulmo-cardiac circulation, or weak left ventricle, or anemia consequent upon depleting treatment. (*d*) The influence of the depressing emotions. (*e*) The influence of the various forms of secondary blood contaminations, which concur to set up at the later periods of fever, what is called "the typhoid state"—examples of these being met in septicemia, and in the poisonous action of the different retained excreta. (*f*) The perturbations of crisis, and the cerebral symptoms which occasionally appear during the early periods of convalescence.

II. That the cerebro-spinal functions will be variously deranged, according as one or other of these influences may operate in combination with the fever-poison.

III. That the symptoms will vary, according to the portion of the great nervous centres which may be the seat of impaired nutrition, or of deranged states of the capillary circulation. That, accordingly, different groups of nervous symptoms may be referred to the cerebral hemispheres, to the mesocephale, or to the upper portion of the spinal axis.

IV. That, "ceteris paribus," the derangements of the cerebral hemispheres will seldom be marked by more than mild delirium, the motor functions remaining unaffected; while, in proportion as the important organs at the base of the brain become engaged, a more impulsive form, "delirium ferox," usually manifests itself, attended with jactitation, rolling of the head, tremor and subsultus, rigidity of muscles, &c.

V. That certain depressing emotions, as grief, fear, shame, anxiety, remorse, and, above all, despair of recovery, with dread of death; appear to predispose the emotional centres to become the seats of the operation of the fever-poison in a peculiar degree, and to manifest symptoms referable to the medulla oblongata; such as derangement of the respiration and of the circulation, sinking of the temperature, convulsions, tremor, subsultus, and dysphagia, &c. &c.

VI. That nervous lesions of the most serious character, referable more especially to the medulla oblongata and spinal axis, are of frequent occurrence in cases of secondary blood poisoning from retention of the products of disintegration of tissue—as in uremia.

VII. That besides the poison of urea—which it is well known acts upon this portion of the nervous centres—the following cases may be included in the above category :—

(*a*) The excessive accumulation of the products of me-

tamorphosis, in the blood of persons living luxuriously up to the invasion of fever, in whom a set of symptoms arise undistinguishable from those of uremia. (*b*) A similar accumulation from the rapid disintegration of muscular tissue, in patients who have been exposed to severe muscular exertion during the earlier periods of fever, and who accordingly manifest a similar group of nervous symptoms. (*c*) The blood-poisoning resulting from an arrest or suppression of the menses.

VIII. While you must endeavour, on the one hand, to avoid the mistake of ascribing the nervous derangements caused by the toxic action of the fever-poison, to cerebral inflammation; you must, on the other, avoid the opposite error of ignoring the existence of true inflammation, when this is indicated by the groups of symptoms enumerated above, whether it occurs in the form of acute congestion of the brain, as in some epidemics of typhus, of epidemic cerebro-spinal arachnitis, of arachnitis, or as the effect of previous injury, or of reactive irritation and inflammation set up in the advanced period of typhoid fever.*

IX. You must not in all cases rely upon the apparent subsidence, during the course of fever, of the cerebral symptoms which ushered in its commencement; since these having been masked by the fever, not unfrequently reappear at the period of crisis.

X. It is, however, most necessary to avoid the mistake, of confounding these with symptoms due to exhaustion and anemia, which most closely resemble them.

* Appendix.

APPENDIX TO LECTURE XI.

That true inflammation of the brain and its membranes does occur, from time to time, in the course of fever, was proved in the case of several patients, admitted into the Meath Hospital since this lecture was delivered.

For the following notes of the first of these, and of the post mortem appearances, I am indebted to Mr. J. W. Moore:—

"George James, ætat forty, a cab-driver, was admitted into the Meath Hospital on the evening of the 2nd of August, in maculated typhus.

"He attributes his illness to cold caught by sitting upon a wall, exposed to a cold wind, when perspiring after exertion. While thus sitting, he felt suddenly chilled. On the following morning, the 28th ult., he arose from bed, complaining of cold and shivering. Epistaxis came on repeatedly during the next few days.

"When I saw him, on the morning of the 4th instant, he was profusely maculated, the spots being very dark and indelible on pressure. His breathing was hurried, his eyes heavy and congested; pulse, 116; respirations, 30; temperature, 103·5°; heart's impulse and sounds weak; tongue thickly coated with a dirty white fur.

"August 6 (11th day), and for two following days, he continued in much the same state, the heart's action becoming gradually more excited, and the patient's manner more sullen and obstinate. He had also frequent rolling of the head upon the pillow; and for the last two days of his life he roared loudly from time to time.

"On the 15th day the temperature rose from 101·6° (of the day previous) to 102·2°; at the same time he perspired to excess. He died on the morning of the 16th day.

"On post-mortem examination, the dura mater appeared slightly but sensibly thickened; the quantity of sub-arachnoid fluid considerably increased; the vessels of the membranes and of the substance of the brain much congested; both lobes of the cerebellum

softened; the right more especially, which was reduced to a pulpy consistence. The medulla oblongata was also softened to some extent. No deposition of pus was observed, and the cerebro-spinal fluid was clear, though of a deep yellow colour."

The second patient was a young man, who was unable to give any account of himself; but from the time of his admission lay in a state of gradually increasing stupor, with ptosis of one eye, strabismus, retention of urine, and dysphagia (towards the close).

Upon examination, post-mortem, Mr. Todhunter found intense venous congestion of the cerebellum and upper part of the cord; and on the lower surface of the cerebellum a circumscribed collection of yellowish green pus, included between the arachnoid and the nervous substance, and extending from one lateral lobe to the other, across the middle lobe.

There was no appearance of pus elsewhere, nor any exudation of lymph, although the arachnoid covering the cerebellum bore traces of inflammation throughout most of its extent.

The third patient, for notes of whose case I am indebted to Mr. Collins, "was admitted on the evening of the 4th of October, 1867. Five days previously, after a debauch, he was attacked with rigors, headache, pains in his bones, and general malaise. The pain in his head had since continued unabated. Each day the stomach had frequently rejected food and drink; at night he had some delirium. His wife had noticed a slight drooping of the left eyelid, and he himself complained of impairment of vision since the illness commenced.

"When seen on the following morning (10th day of illness) he was very heavy, and remarkably unwilling to answer questions, complained of much pain in his forehead, and had an oppressive smell. He had some cough, with mucous expectoration; and there was slight drooping of the left eyelid, unaccompanied by strabismus or dilatation of the pupil. His tongue was covered with a thick, pasty, white and faintly-greenish coating; his face was dusky. A well-marked subcuticular mottling, with some distinct maculæ, was noticeable over his arms, chest, and abdomen. The heart's action was excited, and of a peculiar jerking spasmodic character. The thermometer in his axilla stood at 100·6°; his pulse beat only at 72; his respirations were 30 in the minute, interrupted, and laboured.

"About 5 P.M., the same day, he became unconscious and appa-

rently speechless, and at 8 P.M. he had an epileptiform seizure. During the fit both sides were convulsed, the left eyelid hung motionless, and he frothed at the mouth. On coming out of it he slept, and snored heavily for some time. During the night his urine and fæces escaped involuntarily, and ever and anon his right hand kept convulsively twitching.

"The next morning (11th day) he was found lying on his back, wholly unconscious and much sunk, with each forearm rigidly contracted on the arm, the right hand constantly twitching, and he moaned at intervals. The slight ptosis of the left eyelid still continued. The pupils were neither dilated nor contracted, and were sensible to the stimulus of light. The conjunctiva of the right eye was slightly injected. The temperature and pulse had not much altered, remaining 100·8° and 70 respectively, but the latter was much weaker and faltered at times. His respirations were 40, rapid, and of the same interrupted laboured character as before. Loud mucous râles were audible all over the chest, and rendered any examination of the heart impossible. The mottling of the skin was of a slightly darker colour.

"During the evening he became conscious, and endeavoured to speak, but could not be understood. The next morning (12th day) he appeared more sunken, and of a still more dusky hue. The maculæ had become much darker, and in several places had become true blood-extravasations (petechiæ). His temperature was 101·3°; his pulse had become rapid (120), feeble, and small. His respirations were very rapid (52) and laboured; and with each expiration his cheeks, especially the right, were puffed out. Loud mucous râles, heard all over the chest, prevented any examination of the heart. When loudly spoken to, he opened his eyes, stared with a vacant look on those addressing him, and at times endeavoured to speak. What he said, however, was unintelligible. At other times he lay on his back, with his eyes shut, seemingly unconscious. He had passed no water during the night, and this morning he actually got out of bed for this purpose. On examining the hypogastric region, it was evident that there was a considerable quantity of urine in the bladder, and it was accordingly removed. This urine, when examined, was found to be of a specific gravity of 1·038, alkaline, of a deep red colour, and albuminous. The deposit, viewed under the microscope, consisted of a great collection of triangular prisms of ammoniaco-magnesian

phosphate, and blood-corpuscles, along with many granular, epithelial, hyaline, and blood-casts of the uriniferous tubules, pigmentary particles, renal cells, and mucous. He was much troubled with a distressing hiccough. The forearms were no longer contracted on the arms, and the twitchings also had ceased.

"The following day, the 13th, he appeared somewhat improved. He was conscious, and protruded his tongue when asked, but with some difficulty. It was moist, red at the edges, and covered with a thick brownish-white fur. His pulse felt stronger, and was not quite so rapid (116); his temperature had risen to 101·7°. The respiratory distress was very great, the respirations numbering 58 in the minute, and loud mucous râles were heard all over the chest. The maculæ were intermingled with dark petechiæ, and he bore a very dusky and sunken look; his pupils were dilated.

"On the next day, the 14th, and his last, his aspect was still more wasted and sunken. The left eyelid still slightly drooped, and was redder than its fellow, and the pupils were rather dilated. He retained his consciousness, and, when asked, protruded his tongue, which presented the same character as on the previous day. His temperature had fallen to 100·6°; but the respiratory distress had even still more increased, the respirations numbering as many as 64 in the minute. The distressing hiccup still continued, and his manner was restless and agitated. His pulse was rapid (124), feeble, and at times irregular, so that it could only be counted with difficulty. He lay thus on his back, grasping at imaginary objects, and picking at the bed-clothes, till he died, at 8·35 P.M.

"The autopsy, which had to be performed two hours after death, showed intense injection of the pia mater of the encephalon and upper portion of the spinal cord, which, in very many places, presented patches of a bright rose-colour. Old deposits of lymph and opacities of the arachnoid were very numerous, both at the base and on the surface of the brain. Recent greenish lymph was also found effused in several places, more especially on the superior surface of the cerebellum in the great fissure of Bichât. The hemispheres, on section, presented many bleeding points, and there was very considerable effusion, both sub-arachnoid and ventricular. The kidneys were congested, as was also the lower portion of the ileum and the cæcum, but there was no ulceration."

Several interesting cases, bearing some analogy to the above, are

recorded by Sir D. Corrigan, in the proceedings of the Pathological Society of Dublin.

"The first was that of a female, admitted into the Hardwicke Hospital on the 17th of March, 1841, labouring under maculated fever of a low character. She was irritable, weak, and restless; complained of severe headache, and could not sleep; the fæces and urine were generally passed involuntarily.

"At the time of her admission, she was in the eighth month of pregnancy. On the 29th, without any premonitory symptoms or any labour pains, the child was expelled alive, but died a short time afterwards. The lochia also appeared, but after some time became suppressed. The delirium under which she had laboured for several days was now replaced by coma, and she died on the 1st of April. In addition to the coma, she became universally jaundiced a short time before death.

"On examination, the following conditions were observed:—

"In respect to the brain, it was exceedingly firm. The whole surface of the organ was very vascular, and presented a very remarkable bright red tinge at various points. A portion of this redness was really the result of increased vascularity; but a portion was also produced by effusion of blood on the pia mater. The base of the brain, in front of the pons varolii, was covered with lymph. The principal features of the case were the extreme hardness of the white substance of the brain, the brilliant shading of red on the surface, and the effusion of lymph on its base."

In the second case the woman, who was a patient in the Hardwicke Hospital, had fever and bronchitis, then the intestinal mucous membrane became affected; and along with this were the usual symptoms of the common adynamic fever of the country. On the fifteenth day she was apparently getting well, when she was observed in the evening to be heavy and somewhat confused; in an hour afterwards she was comatose, and on the following morning when he visited the hospital, he found her lying on her back, with her arms paralyzed and contracted across the chest. She died within twenty-four hours after the accession of the cerebral symptoms. On examining the contents of the cranium, there was observed sub-arachnoid infiltration of pus, which was also very remarkable in the sulci of the convolutions. Dr. Corrigan made a section of the brain in the presence of the Society, and found that its tissue was healthy, except, perhaps, a slight increase of vascularity scarcely perceptible.

"In another case, mentioned by Dr. Corrigan at the same meeting, a man, convalescent from fever, became suddenly violent and refractory during the night. Dr. C. saw him in the morning; he was lying on his back, with the arms firmly folded across the chest; the teeth set; he would not reply to any question, but spat through the teeth when any person spoke to him; he rapidly became comatose, and died in that state. A considerable quantity of lymph was found effused at the base of the brain, extending from the origin of the optic nerves to the pons varolii."

In the first edition of this work I stated that, with such facts before me, I could not subscribe to the dictum of Murchison, that "when the rash of typhus is present, it may be always concluded that there is no cerebral inflammation; for post-mortem examinations show that inflammation of the brain or its membranes rarely if ever occurs, even as a complication of typhus." I was not at the time aware, that Dr. Murchison's views had been modified by his subsequent experience. In a paper on the cerebro-spinal symptoms and lesions of typhus fever, published in the *Lancet* for 1865, vol. i., to which he has kindly drawn my attention, Dr. Murchison says:—

"In rare cases, typhus fever is complicated with unmistakable inflammation of the membranes of the brain. At the time of the publication of my work on fevers, I was under the impression that this complication never occurred, but subsequent experience has convinced me that I was mistaken. In the interval, I have met with two unequivocal cases of typhus complicated with true meningitis and the effusion of lymph on the surface of the brain. One case was that of an infant, aged seven months, admitted with his mother into the London Fever Hospital. Both mother and child had a characteristic typhus rash. The infant was feverish and very restless, moved his head constantly from side to side, and died about the fifth or sixth day of his illness, death being produced by a severe attack of convulsions. After death the pia mater was found to be intensely injected, and there was a quantity of solid lymph plastered over the base of the brain. The second case was that of a girl, aged nineteen, who had previously enjoyed good health. During the first night of her illness she was delirious; in the second night she had acute delirium, followed next day by coma. On the fourth day of her illness, an eruption of

typhus appeared on the chest and abdomen, and rapidly became petechial. On the following morning, at three o'clock, A.M., the patient died comatose. On examining the body, the petechiæ on the skin were found to be persistent. There was intense congestion of the pia mater and of the brain substance. The white matter presented a pinkish tint, and the grey matter a dark chocolate hue. Large patches of soft, opaque, yellow lymph were found on the surface of the hemispheres, following the course of the veins. There was no lymph at the base, and no sub-arachnoid serosity. Each of the lateral ventricles contained about half a drachm of turbid fluid.

"In an epidemic of typhus in 1831, several cases were observed by Dr. Roupell in the Seamen's Hospital, in which lymph or pus was found deposited beneath the arachnoid. Some of these cases were dissected by Mr. George Busk, F.R.S., who, I find, corroborates Dr. Roupell's descriptions. A case of typhus complicated with true meningitis is reported by Jacquot. Louis also records two cases of enteric fever in which the signs of recent meningitis were found after death."

The following is one of the cases published by Dr. Roupell, referred to by Dr. Murchison:—

"Edward Jones, supposed to be aged forty, was admitted into the Seamen's Hospital on the 15th of April, 1831. He could give no rational account of himself, being in a state of furious delirium. He complained of no pain; his tongue was clammy; pulse 120, and very weak; he had cough, with some crepitation at the posterior part of the right lung; his bowels were constipated; and his limbs were spotted with the rash, mixed with true petechiæ. He sank in four days. On examination, lymph and serum were copiously effused into the ventricles, and a layer of lymph, fully a line in thickness, was found on the surface of the hemispheres. The other viscera were healthy, except a few very minute ossific deposits around the left auriculo-ventricular opening."

LECTURE XII.

DIAGNOSIS OF FEVERS.

HAVING sketched in outline the functional derangements and visceral lesions that occur in fever, I have now to invite your study of this disease from another point of view; viz., "as having a more or less definite course and duration; comforming in both of these particulars, more or less perfectly, to certain laws of periodicity; as manifesting pathological changes peculiar to each of the several forms; as presenting different modes of resolution or crisis; and exhibiting certain differences in the manner of fatal termination, and in the post-mortem appearance, in various forms of the disease."*

The practical object or result of such an inquiry is, first, the diagnosis of fever, considered as an essential disease set up by the action of a morbid poison, from several forms of pyrexia, or other morbid states bearing a greater or less resemblance to it; and, secondly, the differential diagnosis of the various species of continued fever.

The diagnosis of fever as an essential disease, will be simplified by our determining, what is its special and invariable characteristic phenomenon.

This, I believe, you will find to be its paroxysmal character, or conformity to the law of periodicity—all fevers consisting essentially, of a succession of paroxysms, and

* Lecture I. p. 4.

the termination of the fever being but that of the last paroxysm;—and you will find that the diagnosis of essential fever will be difficult, in proportion as local complications or other conditions may interfere with this conformity.

The diagnosis of the various species will be derived from several specific characters, differing in each variety; one of which is, the fact, that they present the paroxysmal character, and conform to the law of periodicity in different degrees.

In reviewing the several affections liable to be confounded with essential fever, I have to confess my inability to give you any easy or certain guides to their differential diagnosis. Patient and accurate observation, with prolonged experience, will alone furnish you with the power of discriminating between asthenic pneumonia and typhus; between delirium tremens and the delirium of typhus; between the fever attending acute tuberculosis, whether meningeal, pulmonary, or abdominal (tubercular peritonitis), and the remittent form of typhoid of early life; between the uremic condition and the adynamia of advanced typhus, of which it so often forms an important constituent; and between other forms of the typhoid state, and the advanced stages of fever. If you should ever have the charge of a fever hospital, you will have abundant opportunities of realising this difficulty as experienced by others, in the numerous cases of these affections which are sent to the fever wards by medical practitioners, under the mistaken idea that they are examples of essential fever. I confess I have frequently treated as fever, the pyrexial condition ushering in pneumonia, not becoming aware of the true nature of the case until one or more days had elapsed. In a similar manner I have mistaken tubercular peritonitis,

and acute phthisis for remittent typhoid; and I still consider the differential diagnosis of these and tubercular meningitis, from typhoid, as, perhaps, the most difficult in the practice of medicine.

Your differential diagnosis will be much aided by a knowledge of the exciting cause of the disease, whenever this can be obtained; by the presence of the distinctive characters of one or other affection; and, in some cases, by the fact of a pre-existing state of disease, or of a constitutional tendency to it. Thus, in a certain case, if you discover that the patient has been exposed to its contagion, the diagnosis will incline to typhus. If the typhus-rash is present, this diagnosis will be confirmed. If, on the other hand, the exciting cause was cold—typhus not being prevalent at the time—and if cough and rusty expectoration existed, with the rational symptoms of inflammation of the lungs—you would diagnose pneumonia, even although the physical signs were not as yet discoverable.

You will also be assisted, by closely and carefully noting the features of resemblance, which your more accurate and mature observations may convert into those of disagreement. Thus the face of a typhus patient and that of one labouring under pneumonia, present at first view a strong resemblance; but if more closely studied, you will recognise a marked difference between the supine sleepiness of the one, and the painful, anxious expression of the other. Neither is the colour the same, one being dusky and dirty; while the other presents either a bright suffusion over the cheeks and brow, or a darker and more circumscribed flush mingled with the icteroid tinge of pneumonia in the stage of hepatization. I can give you no better idea of this difference, than by repeating what I have so often pointed out

to you at the bedside; that while the typhus countenance, is accurately and happily likened by Dr. Jenner to that of a man awaking out of a drunken slumber; the face of the patient in the early stage of pneumonia, exactly resembles that of a man who has sat for some time before a strong fire. The mode of respiration presents another feature of difference. The breathing of the fever patient, has been aptly compared to that of a man who pants after exertion. It is breathing with effort; semi-voluntary breathing. The respiration in pneumonia is constrained and painful; in a large proportion of cases, interrupted by pleuritic stitch; and above all, presents an alteration in its ratio to the pulse, peculiar to itself.

The nervous symptoms of fever most resembling delirium tremens, are those of exhaustion; they come on at a late period, and being preceded and attended with other symptoms of fever, are not likely to be mistaken. An error is more to be expected, from confounding delirium tremens with commencing fever; but even this is not probable, if care be taken to ascertain the previous history and mode of life of the patient, and the causes which led to the attack.

The diagnosis of typhoid from acute phthisis, and *vice versa*, is one of the most difficult in medicine. I lately attended a young lady through typhoid fever of forty-eight days' duration, in whom, for the last three weeks, the signs of consolidation of the depending portions of both lungs were present, with cough and expectoration, hurried breathing, nocturnal exacerbations of fever and morning sweats. Resolution seemed to be effected by gradual crisis, at this advanced period. On the other hand, I have, in several instances, witnessed the same symptoms and signs

herald the rapid and extensive deposition of tubercle; so that, in the absence of the rose-coloured spots of typhoid, I regard the differential diagnosis in such cases as one of extreme difficulty, as sometimes even impossible. The diagnosis of tubercular peritonitis from typhoid is also occasionally very difficult. In both you will meet with vomiting, diarrhea, periodical exacerbations, wasting, pain and tenderness of the abdomen; and certainly my experience does not lead me to the conclusion of Dr. Murchison, "that in most cases of tubercular peritonitis, the abdomen, unlike that of typhoid fever, is retracted." I have more frequently observed the contrary to be the case.

With regard to tubercular meningitis, Dr. Russell Reynolds* observes:—

"No greater difficulty of diagnosis can occur than that which is sometimes presented by a case in which the question arises, whether the symptoms are due to meningitis with fever of a low (or typhoid) type, or to typhoid fever with cerebro-meningeal complication. The question is not so much whether inflammation is or is not present (for it may exist in the latter), but whether that inflammation (or cerebro-meningeal condition) is primary or secondary; in other words, whether fever is the result or secondary product of the inflammation, or whether the inflammation is one of the many secondary phenomena of the fever." Dr. Reynolds justly observes that the difficulty is greater with regard to typhoid than to typhus fever; I may add, that the younger the patient, the greater is the difficulty.

We endeavour to arrive at this diagnosis:—1st. By ascertaining the cause, when this can be done satisfactorily.

* Reynolds on the Diagnosis of Diseases of the Brain.

2nd. By the presence of the special symptoms of one or other condition; or by the absence of some essential characteristics of one or the other. Thus, if ochrey diarrhea, with tenderness and gurgling over the cæcum are present, more especially if rose spots and the bronchial affection of typhoid are superadded, the diagnosis of fever may be made with certainty; but if these or the two first be absent, and vomiting not only ushered in the attack, but continued for some days, arachnitis may be diagnosed with nearly equal certainty; more especially, if there is also persistent intolerance of light and sound, and increased cutaneous sensibility. Moreover, a close observation of the patient will detect differences in the mode in which certain features are affected in the two states; for example, the eye in the typhoid patient is usually clear, and the pupil open and dilated; while in arachnitis, the contrary occurs; this sign, however, is subject to exceptions, and the same may be said of the appearance of the tongue, &c. One sign, I think, you will find all but unerring when present, as it is peculiarly characteristic of cerebral mischief. I refer to that deranged condition of the circulation, in which we meet with a jerking impulse of the heart, together with an irregular, intermitting pulse, of unequal volume and uncertain rhythm. You may occasionally diagnose the existence of tubercular meningitis, and impending effusion into the ventricles, by this sign, when the intelligence is perfect, and scarcely any other symptoms are present.

Any difficulty in the diagnosis of fever from the exanthemata, is most likely to occur in the early periods of these diseases. Thus, I have more than once known the efflorescence, which in typhoid precedes the appearance of the rose spots, mistaken for scarlatina—an error more likely

to occur if sore throat exists, as it sometimes does at this stage of typhoid. I have occasionally seen a rash in measles, which bore an unusual resemblance to the measly eruption of typhus, and *vice versa;* and I remember a case, which occurred in this hospital some years ago, regarding which opposite opinions were entertained. The rash which resembled both affections being, in fact, an eruption caused by balsam of copaiba.

Elderly persons attacked by bronchitis or pneumonia, erysipelas, or, most of all, by epidemic influenza, frequently slide into a condition resembling typhus, and hence denominated the typhoid state. In popular language you may sometimes hear, that such a person's illness has run into typhus. Of course, I need not tell you, that although their condition may present several of the characteristic features of typhus or typhoid fever, it is essentially different from either. This state has been well defined, as consisting in an excess of that general derangement of the assimilation, which can be traced in every fever, as usually presenting a combination of the asthenic and septic types; a poisoned state of the blood, with a depressed state of the nervous system.

Sometimes the blood-poisoning may have its source in the original affection, as in erysipelas, or a resorbed pneumonic congestion; or it may be the consequence of deranged assimilation, in other words, of the accumulation of the products of disintegration which the excreting organs can not eliminate; or lastly, it may be, and according to my experience, often is, uremia. In other instances it has arisen from septicemia, produced by the entrance into the circulation of putrid matter from disease of the internal ear; the absorption from an ill-conditioned intestinal ulcer,

or by resorbed sanguineous congestion; and it should be observed, that typhus and typhoid are not unfrequently themselves thus complicated, septicemia being superadded to the original poison. In all these cases, the patient lapses into what is termed the *typhoid state*. The colour becomes dark and muddy, ecchymotic petechiæ appear on the depending portions of the trunk, and perhaps purpuric spots on the extremities; the tongue has the appearance of typhus, the mouth is dry, and the teeth and lips are covered with sordes; the odour of the breath is often urinous, or in some cases cadaveric; the respiration sighing and laborious; the abdomen tympanitic; the cerebral functions are oppressed; the patient is drowsy and apathetic, has low delirium and subsultus, and finally lapses into coma.

I have several times observed, this group of symptoms to co-exist in old men, with partial or complete retention of urine; and I would caution you to attend carefully to the state of this excretion, in all cases of disease or injury you may be called upon to treat in persons of advanced life.

The diagnosis of the various forms of this typhoid condition, must be derived from the previous history, primary affection, and existing symptoms; and can only be arrived at, by the careful study of all these. We have no short and ready method of distinguishing such a condition, as I have described, from the advanced stage of typhus, of which it is often a complication. Notwithstanding, however close may be the resemblance, the two forms of disease are essentially different, the one not being convertible into the other.

We shall study the specific characters of the several forms of fever under our consideration, as they present

themselves at the periods of invasion or access; at those of the fully formed disease; and at those of termination or crisis—denominated by writers, the stages of depression, reaction, and subsidence;—glancing for a moment at the post mortem changes and sequelæ presented by each form.

The access or initiatory paroxysm of all fevers is, in many respects, the same. In the language of Fordyce, who has described the "fever paroxysm" more graphically and minutely than any writer with whom I am acquainted, "a fever of about eight, ten, or twelve hours' duration may present all the phenomena, and may complete its existence as perfectly as if it had taken as many months." That this idea is not founded upon any inadequate conception of the febrile phenomena, is evident from his comprehensive and oft-quoted definition of the disease, as well as from the accuracy and minuteness of his description of what may be termed a microcosm of fever—the fever paroxysm.

The first thing to be noticed is the suddenness of access—a suddenness not peculiar to any form of fever, but more marked in typhus than in typhoid, and still more so in ephemera and relapsing synocha than in either of the others. Thus, a man may sit down to dinner with a good appetite, and not be able to eat a morsel, being at one moment in perfect health, and at the next stricken with fever. To the undefined feeling of indisposition, succeed other subjective and objective symptoms; as, general uneasiness; restlessness; præcordial oppression, seeking relief by sighing and jactitation; frontal headache; pain in the back; giddiness, and confused perception; nausea; bodily languor and mental hebetude; horripilation, and a feeling of chilliness amounting, frequently, to shivering.

If you are called to see the patient at the moment of access, he presents the objective symptoms of change of colour of the face and general surface; he appears shrunken, dingy, and perhaps yellow, or of a bronzed hue; his eye is dull and heavy; his tongue soft, blanched, and tremulous, perhaps with a dry streak commencing to form on its centre. At this stage, too, the kidneys secrete a large quantity of limpid watery urine, the bladder retaining but a small quantity, and micturition being accordingly very frequent.

To the above stage of depression succeeds that of reaction; marked by heat and dryness of skin, excited action of the heart, and rapid bounding pulse, increased headache, pain in the back, and not unfrequently vomiting. The bowels are usually costive, and the urine has become scanty and high coloured.

If the fever is, to use the words of Fordyce, completed in one paroxysm, as in ephemera; or if it assumes the remittent character, as in relapsing synocha; perspiration more or less profuse will follow the above stage, sometimes even occurring in the latter affection, as Dr. Cormack has observed, without the intervention of a hot stage, and commencing while the patient is in his initiatory rigors. But this well-marked and complete initiatory paroxysm is peculiar to that form of fever, being less constant in typhus, and often altogether escaping notice in typhoid.

As a rule, the typhus patient can fix the date of access with tolerable certainty; but frequently, the lassitude, pain in the back, loss of mental energy, and slight chilliness alternating with heats and perspiration, which mark its invasion, pass unheeded for a day or two, until his attention is arrested by a marked shivering, together with in-

crease of headache and prostration, compelling him to take to bed. At the same time he breathes with effort, and has a short cough, which increases his headache; he complains of want of sleep, or his sleep is disturbed and painful; he now presents to the observer the flushed, dusky face, with sleepy expression and congested eye, characteristic of the disease; and usually, from the fourth to the sixth day of the fever, the characteristic rash, which I have described in a former lecture, makes its appearance, and confirms your diagnosis.

As I have already mentioned, the invasion of typhoid is not so well marked or definite with respect to time as that of typhus.

A patient—generally a young person—will present himself to you, having walked to your house, perhaps from some distance, complaining of diarrhea, with, probably, some abdominal pain. You are struck with the bright but languid eye, pale complexion, with, perhaps, a circumscribed flush on the cheek; his skin is hot, his tongue presents a white fur, is red at the tip and edges; and you note the wavy dicrotous character of the pulse, which is likewise somewhat accelerated. He will make light of his illness, but, if closely questioned, will tell you that he has more or less frontal headache and pain in the back, alternate slight chilliness and heat, want of appetite, thirst, and debility; that his sleep is disturbed and unrefreshing; and that he usually awakes thirsty, hot, and restless, at an early hour (from two to four) in the morning. Perhaps this patient's illness is of nine or ten days' duration; if so, on making an examination of the abdomen, you will find, in addition to meteorism, the tenderness and gargouillement, described in a former lecture, a number of

round or elliptical rose-coloured spots, scattered over the abdomen and chest, and your diagnosis will be thereby confirmed. Such a mode of access as the above is by no means uncommon; and even when the commencement is marked by a slight shivering, this, and the subsequent fever, are usually so little attended to, that unless compelled by the severity of the diarrhea, the typhoid patient —if an adult—seldom seeks medical aid until a comparatively advanced period of the fever.

If we trace the onward march of these fevers, we shall find that the stage of reaction, in relapsing synocha, rapidly succeeds to that of depression, and is usually of a highly-marked character. The headache is severe, the delirium active, the pain in the back and limbs continues during the course of the primary attack; the pulse is, as a rule, far more rapid than it is in typhus; and the heat of the skin is higher. In Dr. Cheyne's able report of the epidemic of 1817-18, he gives the results of thermometrical observations in 250 cases; and, in 214 of these, the temperature was from 100° to 105°. The tongue usually continues moist throughout, being white, with vividly red tip and edges. The aspect of the patient during the primary attack is very unlike that of typhus; being flushed, without the dusky, dirty look of that disease, or else presenting that sallow sub-jaundiced hue, which has been remarked in all the epidemics of relapsing fever. In a few instances there is presented a true jaundice, which resembles the intense yellowness of tropical yellow fever. I say resembles, because I cannot consider our epidemic, relapsing synocha, in the least identical with yellow fever; presenting, as it does, this "specific difference," as pointed ~~pointed~~ out by Dr. O'Brien, "that in the latter, the yellow

colour of the skin is pathognomonic and general, though perhaps not a universal symptom; while in the epidemic fevers of this country it is a rare and accidental occurrence, arising from an accidental cause."

This cause I shall have to refer to presently, when speaking of the complications of this form of fever.

Usually on the evening of the fifth or seventh day, when the fever is at its highest, and the pulse ranges, perhaps, from 140 to 150, crisis suddenly occurs, ushered in by a well-marked *exacerbatio critica*. The several stages of this change were so accurately described by Dr. Cheyne, that I cannot do better than give you his graphic sketch. "The most perfect crisis," says Dr. Cheyne, "consisted of three stages. First, a state of restlessness and anxiety, with flushing of the face, rapid pulse, frequent laborious breathing, and increased heat of the surface, with great distress at the pit of the stomach from heat, tenderness, or pain; which distress was not unfrequently relieved by vomiting. The patients were in a state of universal uneasiness, which would have been truly alarming had we not known its tendency; but this state is well understood, even by the servants of a fever hospital, who soon come to know by these symptoms that the patient is near 'the cool.' This state sometimes lasted for the greater part of a day, during which one of our experienced nurses, who was fond of figurative language, would generally remark, that 'the cool was hovering round' the patient. Secondly, a rigor or tremor, not unlike the cold fit of an ague; the patient shivered, and complained of excessive cold. I never, save in two instances, was able to measure the temperature during the rigor of crisis, and in both patients the thermometer stood at 105°, even while the patient was

shivering and complaining of excessive cold, and asking for an additional blanket. In one of these patients the thermometer in the evening stood at 100°, although the rigor was not followed by sensible perspiration; next morning the thermometer stood at 97°, the tongue was clean, the pulse 88, and the patient convalescent. The rigor of crisis seldom lasts long, perhaps only a few minutes, perhaps half an hour, or an hour. Thirdly, warm perspiration flowing from the whole surface of the body; this, which in general completed the salutary effort, the nurses in the Hardwicke Hospital call the 'cool,' being aware of its efficacy in reducing the heat of the body."—*Dublin Hospital Reports*, vol. ii.

The convalescence now commenced, is often marked by voracious appetite, and seems for a few days to be perfect. But in a great majority of cases, on the fifth or seventh or it may be the fourteenth day after crisis, there is a return of the initiatory rigor, and of the symptoms of the first attack. This occurrence is so constant, as to give the name of relapsing synocha to the disease. It has been observed in numerous epidemics; as, for instance, those described by Dr. Rutty in the last century; the Irish epidemics of from 1801 to 1847-8; the Scotch epidemics of 1817-19 and 1843; and long ago gave rise to a proverb, that "short fevers are the most prone to relapse." Some observers, have noticed a correspondence between the duration of the primary paroxysm and the interval preceding relapse. Thus, Dr. O'Brien records a case, in which "the patient suffered two relapses; the interval between each attack was five days, and was synchronous with the febrile period; so that the whole duration of her fever, not including the intermissions, was fifteen days.

The same thing occurred in one or two other cases." All observers seem to agree, that as the epidemic advances, the tendency to relapse becomes less marked; instead of being the rule, it becomes the exception.

The progress, duration, and mode of termination of typhus differ materially from the above description. Less sudden and violent in its invasion, it displays less marked paroxysms in its course; and, totally unlike the former, its termination is often by an insensible crisis, which, however, differs from the still more gradual lysis of typhoid. I shall not enter into any detailed history of the disease, as such is no part of my object. But I may remind you that, while its paroxysmal character is faintly marked in comparison with that of typhoid, there is a close conformity of its course to that of the exanthemata, to which class it properly belongs. The nervous symptoms occur as primary phenomena at an early stage; the prostration generally compelling the patient to betake himself to bed about the third or fourth day, and preventing his leaving the bed, without assistance, on the sixth or seventh day. The characteristic rash appears from the fourth to the sixth day, fading from the fourteenth to the seventeenth, unless in cases in which, owing to a depraved state of blood, the exanthem becomes converted into, or is replaced by, ecchymotic petechiæ; the exanthem and specific fever usually subsiding together, and crisis being followed by desquamation of the cuticle and falling of the hair, as in scarlatina.

While the crisis of typhus is silent and gradual, as compared with that of relapsing synocha, it is abrupt and defined in comparison with that of typhoid. "I think," says Dr. A. P. Stewart, in his admirable essay on the two

fevers, "I may appeal to the experience of every physician, and more especially of every clinical clerk in a fever hospital (for they have more constant opportunities of observation), whether they have not often been struck at seeing, during their morning visit, the glassy eye, the haggard features, the low muttering delirium, the stupor, approaching to coma, the tremor, the subsultus, the carphology, the rapid, thready, tremulous, and intermitting pulse of the previous evening, the formidable array of symptoms—in short, which seemed to indicate a speedy and fatal termination, exchanged for the clear eye, the intelligent countenance, the steady hand, the comparatively slow and firm pulse, and the returning appetite of approaching convalescence."—*Edin. Med. and Surg. Journ.* vol. lxxiii. p. 305.

The nature of the process by which this wonderful change is produced, is a mystery. We know not how the silent transformation is effected. Of one thing, however, you may be certain, it is not necessarily through the agency of evacuations; which often do not occur at all—at least sensibly—and when they do, are, frequently, injurious. There are many cases, moreover, in which evacuations are evidently post-critical rather than critical; the consequences, not the cause, of crisis.

An obvious practical inference from this fact is, that although in special complications, and under exceptional circumstances, measures tending to elimination by some excreting organ may be indicated, any attempt to determine crisis by evacuation, any form of factitious crisis, in short, must be fruitless, as from experience we know it will probably be fatal in its result.

The progress, duration, and termination of typhoid or

enteric fever differ in many particulars from the other forms. When the period of invasion has been determined —not always an easy matter—it has been remarked, that fever of a remittent character becomes established about the third day. There is usually a morning and afternoon exacerbation—more marked in young patients—and while the diarrhea of the initiatory period continues or returns in an aggravated degree; there is a complaint of frontal headache and giddiness, sometimes of tinnitus, epistaxis, wandering pains, and restless and disturbed sleep. In some cases vomiting continues for a few days. There is meteorism, and pain on pressure over the ileo-cæcal region. The urine at this period is high-coloured, containing an excess of urea; and I have often observed, throughout this stage, a curious deposit of lithates every alternate day. I have already fully described the eruption which now appears in successive crops; and, as already observed, the range of temperature presents marked differences.* At this period the diagnosis of typhoid fever, from typhus of the same duration, is not difficult; but it becomes more so as the disease advances, and nervous symptoms and the phenomena of toxemia, bearing a close resemblance to those of typhus, make their appearance. During the third

* "The study of thermometry in typhus and typhoid fever," says Dr. Warter, "puts, I think, an end to the question, as to whether these two depend on separate poisons, or are really one and the same disease. In typhus the pulse and temperature rise more or less together until the seventh, eighth, or ninth day, when they are at their highest; then they begin to decline, and drop down steadily, day by day, in unison, both becoming normal about the fifteenth or sixteenth day. In typhoid fever, however, all is chaos, the pulse and temperature rise and fall irregularly, taking separate and distinct courses."—*Remarks on the use of the Thermometer in Disease*, *St. Bartholomew's Hospital Reports*, vol. ii. p. 70.

week, in many cases, the noisy delirium, subsultus, and deafness closely resemble the same symptoms in typhus; and to these may succeed, in the typhoid or septicemic stage, a group of symptoms resembling those of the worst forms of secondary blood contamination in that disease.

These nervous symptoms, as was long ago proved by Louis, do not arise from any inflammatory affection of the brain, and we are, therefore, obliged to seek their cause in some other condition. Two have been assigned; absorption of septic matters from the intestinal ulcers—septicemia—and the retention in the blood of those products of the metamorphosis of tissue which ought to have been eliminated by the kidneys. You will find the former theory stated by Dr. Todd in his clinical lectures, edited by Dr. Lionel Beale, page 107. The latter is the explanation put forward with much force by Dr. Murchison; who argues, from the want of proportion of the cerebral and other symptoms of the typhoid state, to the amount of intestinal ulceration; adding this most important observation: "On the supervention of the typhoid state, it is found that the urinary solids, which have previously been so much in excess of the normal amount, diminish; and in several instances I have ascertained that the quantity of urea excreted in twenty-four hours diminished on the advent of cerebral symptoms, and increased again on their cessation. In one case, the quantity which was 292 grains when the patient was delirious and unconscious, rose to 964 grains when the delirium abated, and the consciousness returned. In another case, the quantity which at first was 422 grains, fell to 352 grains on the appearance of delirium and stupor, and rose to 490 grains when these symptoms ceased."

With regard to the termination of typhoid, it differs in a marked degree from that of relapsing fever and typhus.

The termination of typhoid is not usually by crisis, but by lysis or insensible resolution. If you visit your patient in the morning, in the commencement of the third week of the fever, you will mark a decided fall in the temperature, and will probably observe a copious deposit of lithates in the urine. You may, perhaps, flatter yourself that the fever is resolved; but if you pay an evening visit, you will find that the temperature has risen to the average of the week preceding, and this alternation between morning and evening will, perhaps, go on for six or seven days, the average temperature subsiding to the natural standard, usually, about the commencement of the fourth week. This change is attended with remarkable deposit in the urine, as compared with the crisis of typhus.

While the primary attack of relapsing synocha runs its course in a week, or even less, and typhus usually terminates in fourteen to seventeen days; typhoid, as a rule, continues from twenty-one to twenty-eight days, and not unfrequently much longer. A comparison of the average duration of large numbers of the two fevers, justifies the conclusion, "that even apart from complications, and the chances of a relapse, typhoid is a much more protracted disease than typhus."—*Murchison.*

We have next to review the characteristic differences, presented by the pathological changes which occur in the course of each form of fever.

With regard to relapsing synocha, it may be said, that on the reception of the poison into the circulation, a change in the blood is set up, which first manifests itself in the

sallow, yellow, bronzed, or purple colour of the skin; the tint varying with the amount of intensity of the blood poisoning. Secondly, in the formation of congestions, more or less in degree, within the right side of the heart, the vena cava, the liver, stomach and spleen. The symptoms and signs indicating a marked degree of this condition being, a feeling of weight and anxiety at the præcordia, restlessness, continued vomiting of green fluid—which, in extreme cases, becomes black—epistaxis, and hæmorrhage from the bowels. The skin becomes deeply jaundiced, sometimes, perhaps, in consequence of gastro-hepatic congestion; sometimes, also, there is much reason to believe, as a direct consequence of the introduction of the poison into the blood. At least, a very large proportion of jaundiced cases occur, in which there are no other symptoms of more than the ordinary amount of congestion.

The most serious pathological condition in this fever, is, no doubt, the presence, in an appreciable quantity, of urea in the blood, in consequence of the marked excess of disintegration of tissue over the urea excreted; causing the symptoms of uremic poisoning of the nervous centres to become evident.

While this is the most fatal condition, congestion and enlargement of the spleen is certainly the most frequent, in relapsing fever; and I have long entertained the opinion, that it is to this, more than to any other cause, that the characteristic tendency to relapse is owing. In my report of the epidemic of 1847-8, I mentioned, that in every case in which I observed the persistence of splenic congestion and enlargement after crisis, relapse followed. The cause of the relapse I believe to have been the gradual commingling with the circulating mass, of a large quantity of

blood, which lying by, so to speak, in the congested organ, did not share in the depuration of that mass during crisis.

For the purpose of comparison, we may consider the pathological phenomena arising in the course of typhus and typhoid; as due,—to the elective affinity of the typhus or typhoid poisons;—to pre-existing conditions of the blood, or of the organs which become the seats of complication;—or to accidental and extraneous circumstances, as season, locality, and treatment.

Of these, the first group, only, are uniform in their appearance and characteristic of the fever; and it is with respect to them, therefore, that a comparison may be best instituted.

For this purpose I shall select, 1. The eruptions; 2. The order of the occurrence of the pathological phenomena, viz., of the pulmonary lesions; the intestinal lesions; the urinary, and the cerebro-spinal lesions.

1. I need add nothing to what I have said of the first in a former lecture, except, that the difference in their appearance, in the date of their occurrence, in the continuous persistence of the one as compared with the successive crops of the other; and lastly, the frequency of the conversion of typhus rash into ecchymotic petechiæ, while no such change is observed in that of typhoid; constitute, in the aggregate, what appears to me to be, a specific difference between the two eruptions.

2. All observations tend to show that the pathological changes in typhus, as compared with typhoid, occur in a different order. In typhus the bronchial mucous membrane seems to become the seat of irritation in the early stage; and in certain seasons this irritation passes into true inflammation, which continues throughout the fever,

constituting the formidable catarrhal typhus of this country. Pneumonia may occur at any time during the progress of typhus, but, as well as hypostatic congestion, it is most frequent at the early periods.

The cerebro-spinal lesions, when due to the direct action of the typhus-poison, also set in early; those of a later period being, either inflammatory, due to secondary blood contamination, or to exhaustion.

Of the intestinal lesions, it may be said, that none belong to typhus; constipation is the rule; and if diarrhea occurs spontaneously, it is at an advanced period, and, in most cases, is colliquative or critical.

The urinary lesions do not, strictly speaking, arise out of the operation of the fever-poison in either case; but inasmuch as the balance between disintegration of tissue and excretion, is most disturbed in typhus, uremic poisoning is of more frequent occurrence in this disease than it is in typhoid.

If you study the order of the corresponding lesions in typhoid, you will find it strikingly different from the above. Unquestionably, the seat of the primary operation of this poison is the intestinal follicles, which have been found swollen and ulcerated within twenty-four hours after its invasion. The diarrhea characteristic of this lesion is often the earliest symptom in the fever.

Far from the cerebro-spinal system being early engaged in typhoid, it is, in a large proportion of cases, either not at all, or but little affected; and when delirium, subsultus, and other nervous symptoms do occur, it is usually at a late period, when they are either due to accidental complication, as cerebro-spinal arachnitis, to reactive irritation set up in the brain which has suffered passive congestion

from long continued decubitus, or from this latter cause combined with secondary blood contamination.

You will find a similar difference, in the period of the occurrence of bronchial and pulmonary lesions. When specific bronchitis occurs in typhoid, it is at a late period, seldom earlier, I should say, than the third week; while the longer the duration of the case, the greater the risk of hypostatic congestion as well as of its accompanying lesion—lobular pneumonia.

Pre-existing conditions of the blood, or of the nutrition of the different organs will, of course, be alike influential in both diseases. Septicemia or uremia, for instance, will lead to the same typhoid condition in both, and any viscus in a state of special predisposition at the access of either, will suffer from the special operations of the poison in a disproportionate degree during its course. But we may observe this difference between the results of the two, that whereas after typhus—a blood disease—the visceral health, as a rule, continues good; typhoid, which is rather a disease of the blood-making organs—the function of sanguification being consequently deranged—is more frequently followed by tubercle or some other form of diseased nutrition in these organs.

Of the differences arising from the influences of such causes as locality, season, and treatment, little need be said. I may remind you, however, that the effects of season in generating and aggravating the two forms of fever, are exactly the opposite in each. As to the influence of treatment, it has been proved that typhoid patients will not bear to have wine pushed to the same extent as those in typhus; while, on the other hand, their tolerance of opium is much greater. Purgatives may be

safely administered in the one, at a stage when they would be highly dangerous in the other; and, while a nutritious and stimulant after-treatment in the one, has generally the effect of hastening the progress to recovery, the safety of the patient demands a more guarded, cautious, and abstemious treatment in the early convalescence of the other.

With regard to the differences presented in the critical and post-critical periods, you will observe—first, the most striking difference in the tendency to relapse. As you are already aware, relapse is the rule in epidemic relapsing synocha. It is very much less frequent in typhoid, and when it occurs, cannot be ascribed in all cases to a law or necessary condition of the disease, but frequently to mismanagement, more particularly to errors in diet, by which means irritation and deposit has been set up anew in the ulcerated glands of the intestine. It is to be remarked, that the lenticular rose spots may reappear in such a case; as well as in those rare instances, in which typhoid replaced for a time by typhus, again sets in on the subsidence of the latter, as in the case of the boy Morritt, before referred to.

Relapse in typhus it is all but unknown. Typhus may, and often does, relapse into typhoid, and typhoid into typhus; but a relapse of typhus into typhus, is as rare as that of measles into measles, or as a second attack of scarlatina, occurring during convalescence after the first. As each of these has been known to take place, I would not deny the possibility of the same occurrence in typhus; but of its extreme rarity, I need no other proof, than that among many thousand cases which have fallen under my observation in the course of twenty-five years' hospital experience, I have met with no instance.

The difference with respect to emaciation, presented by the convalescents from typhus and typhoid is very remarkable; wasting being scarcely observable in many cases of the former, while it is often extreme after the latter.

The sequelæ of the several forms of fever cannot be said to present specific distinctions, or to justify us in considering any of them peculiar to any one form, with one exception, to be presently noticed.

As a detailed description of these sequelæ is no part of my plan, I shall merely enumerate those which are the most frequent, and of the greatest importance.

The first in frequency is bedsores, which are undoubtedly more prone to occur in typhus than in typhoid fever. The same remark holds good of pyemia, of diffuse cellular inflammation, erysipelas, and edema glottidis, cancrum oris, and parotid bubo.

I think phlegmasia dolens is as often a sequela of typhoid as of typhus; and this form of fever is more frequently followed by ulceration of the larynx, acute phthisis, and disease of the intestinal glands, with marasmus; mental imbecility is also of much more frequent occurrence after typhoid than typhus, more especially when the fever has been prolonged beyond its usual duration; but if any morbid condition can be said to be peculiarly a sequela of typhoid, it is the intractable form of ulceration of Peyer's glands, with enlargement, softening, and occasionally suppuration of the glands of the mesentery, attended with ochrey diarrhea, retracted abdomen, griping pain and tenderness, together with a dry, harsh skin, and extreme emaciation, which occasionally supervenes upon a temporary convalescence, and too frequently resists our best endeavours at treatment.

With regard to the modes of fatal termination :—

That of simple, uncomplicated typhus occurs by syncope or coma; failure of the power of the heart and failure of nervous energy, inducing the one; the conjoined action of the fever-poison and of the accumulated products of disintegrated tissue, the other. Any of the complications may end fatally, each in its own peculiar manner. Those which most commonly influence the result are, the cerebral, bronchial, pulmonary, and uremic complications. The laryngeal complication, while of rare occurrence, may be said to be uniformly and directly fatal.

The first and most striking feature of difference in the fatal termination of typhus and typhoid fevers, is in the period at which this occurs. While a large proportion of the deaths in typhus occur between the 11th and 15th days, and in uncomplicated cases the patient's chances may be said to improve with the duration of the disease; the contrary holds good with respect to typhoid, in which the dangers increase with the duration of the illness, this contrast continuing, even increasing, in the stage of convalescence; at which stage the typhus patient may be said to be safe, while the typhoid is still exposed to great risk from the existence of intestinal ulceration.

Typhoid fever may prove fatal—by exhaustion; by asthenia from the long continued fever; by the accumulation in the blood of the products of disintegrated tissue, and consequent blood poisoning and coma as in typhus. Death may also be the result of one or more local lesions, as, of intestinal ulceration, leading to fatal hæmorrhage, to intractable diarrhea and consequent inanition, to perforation and fatal peritonitis; of general bronchitis of the suffocative character; or of hypostatic pneumonia.

A very striking difference is presented by the rates of mortality of the two fevers at different periods of life. Dr. Murchison gives the tabulated results of 3,506 cases of typhus, and 1,820 cases of typhoid, admitted into the London fever hospital during ten years. The average mortality of typhus cases, from 5 years to 25 years of age, was as follows :—

From	5 to 10 years	7·65 per cent.
„	10 to 15 „	4·95 „
„	15 to 20 „	4·76 „
„	20 to 25 „	9·5 „
While from	40 to 45 years it was	29·79 per cent.
„	45 to 50 „	39·15 „
„	50 to 55 „	52 „
„	55 to 60 „	51 „

Taking the same periods of life, the average mortality of typhoid was :—

From	5 to 10 years	14·43 per cent.
„	10 to 15 „	12· 8 „
„	15 to 20 „	16·18 „
„	20 to 25 „	20· 3 „
While from	40 to 45 years it was	17·39 per cent.
„	45 to 50 „	25 „
„	50 to 55 „	25 „
„	55 to 60 „	55·55 „

According to Dr. Murchison, relapsing synocha observes the same law as typhus, the rate of mortality increasing as age advances. The proportion of fatal cases has, in all epidemics, been very low in the primary attack. Death has sometimes occurred at this stage from intense splanchnic congestion, the direct effect of the action of the poison. "Thus, in one case," says Dr. Law, "from its commence-

ment to its fatal termination, the disease lasted only four days. The case to which we allude, was a man aged forty years, of a full habit, who exhibited a stupified aspect, like one in a state of intoxication, his eyes were deeply suffused. The surface of the body was of a greenish yellow hue, the colour of tallow; the pulse was scarcely to be felt at the wrist, and the stethoscope indicated an extremely feeble action of the heart. No stimulants, either applied externally or given internally, appeared to produce the slightest result or response. The effect in this instance resembled that of a strongly concentrated poison acting with overwhelming powers on all the energies of the system, and deadening them to every stimulus. Here, if the morbific impression was made on the system alike, all was equally overpowered by it."

Another case reported by Dr. Law has been already referred to, in which the patient, at first slightly jaundiced, became rapidly deeply so, with a pulse of 180 in the minute, lethargy and coma, speedily ending in death. "Examination after death exhibiting the liver and spleen much enlarged in size, and congested, and so softened in structure that they seemed as if they had been soaked in blood."—*Dublin Quarterly Journal*, vol. viii.

At other times death has occurred from syncope or exhaustion, owing, apparently, to the violence of the fever; while in many cases the same cause has produced such excessive disintegration of tissue, as to set up a fatal form of uremic poisoning, due to the accumulation of the products of this metamorphosis in the blood. The idea once entertained that the fatal result was sometimes caused by jaundice, seems to be without much foundation. "Hence-

forth," as Dr. Henderson observes, "before any one can assert that he has lost a case of this fever from jaundice, he must be prepared to show that there was no urea in the blood."

By far the greater number of deaths occur during the relapse, and not during the primary attack, or the period of intermission. In some cases, a fatal termination is ushered in by symptoms closely resembling those of typhoid fever; as obstinate diarrhea, pain and tenderness, gargouillement over the cæcum, and, not unfrequently, fatal peritonitis with or without perforation. In others, dysentery, equally obstinate, proves fatal. From observation of the epidemic of 1847-9, I am convinced that two causes operate in different cases to produce these pathological conditions. One, is the frequent co-existence of the poison of endemic typhoid, with epidemic relapsing fever, the one disease replacing the other in the same patient. The other, is the influence upon the blood of the resorption into the circulation of a quantity of depraved blood laid up, as it were, in the congested spleen, and commingling with the circulating mass after crisis. I shall be mistaken if future observations do not prove this to be an important element, not only in the production of relapse, but also in determining the enteric lesions, which occur during the second and third attacks, in this form of fever.

I need add nothing to what I have already said concerning the anatomical lesions of relapsing synocha; it may suffice, to contrast those of typhus and typhoid fevers.

The former may be comprised in a single sentence. Dark fluid blood and general congestion, with softening of the tissues, are the only appearances found in uncomplicated typhus. Upon this point the observations of

pathologists of all countries are strikingly uniform. They are thus summed up by Dr. Murchison :—

"The most extensive results of post mortem examinations of typhus yet published, are those of Messrs. Gerhard and Pennock, (50 cases); A. P. Stewart, (22 cases); John Reid, (147 cases); Thomas Peacock, (31 cases); William Jenner, (43 cases); F. Jacquot, (41 cases); and Barrellier, (166 cases). My own observations, amounting to 54, entirely confirm the results arrived at by these authors, as do also the dissections of many hundreds of dead bodies at the London fever hospital during the last fourteen years."

"Speaking generally," continues Dr. Murchison, "the appearances found after death from typhus, are of a negative character, there is no constant or characteristic lesion."

While this testimony is given with regard to typhus by observers of different countries in Europe and in America, a similar uniformity characterises the reported dissections of cases of typhoid throughout the world.

Wherever it is met with, the same affection of the agminated and solitary glands of the intestines, and those of the mesentery, is likewise invariably observed. These morbid appearances are, to use the words of Dr. Murchison, "constant in and peculiar to pythogenic fever."

The two diseases are thus forcibly contrasted by Dr. A. P. Stewart. "If asked to describe shortly the pathology of typhus, I might sum it up in these words :—general congestion; no prominent local disease—a congestion so general and so excessive, as is rarely, if ever, met with in typhoid fever, or any other disease—a congestion singled out by most authors as one of its leading characteristics—

a congestion that is evident during life, by the livid skin and petechial eruption, and is found after death to have affected, more or less, every organ in the animal economy —a congestion so constant as to be often passed over as almost valueless, but, which future researches, may prove to be the grand peculiarity of typhus; and which, in common with many other considerations, directs attention to the blood as the essential seat of the disease."

"If required, on the other hand, to give a brief account of the pathology of typhoid fever, I should be inclined to sum it up in these words: prominent local lesion, comparatively little general congestion."

We have now arrived at a position, from whence we can review the evidence upon which we found the division— of typhus, typhoid, and the relapsing synocha, into three distinct species.

Unwilling as I am to enter upon questions of a controversial character in these lectures, or to occupy your time with anything which is not essentially practical, yet I cannot ignore the question of the classification of fevers, or lightly regard its relations to the more practical part of our subject.

The terms of the controversy may be succinctly stated thus:—

We may suppose an instance like that so often referred to, as recorded by Huss, of Stockholm—that amongst a family residing in a crowded apartment in an ill-drained court in London or Dublin, several cases of fever occur; presenting in one the characters of contagious typhus, in another those of typhoid, in a third those of a mixed type— the exanthem of typhus, with the rose spots and intestinal affection of typhoid.

Such an instance is explained differently by the advocates of each theory.

The advocates of identity of species maintain, that one source existed generating one poison, which manifested itself variously in patients differing in age, temperament, &c. Those of the opposite theory explain the occurrence by pointing out, that in such situations, the sources of two distinct poisons—ochlesis and fæcal miasm—exist together; that inasmuch as it is constantly found that either, when singly existing, produces its own form of fever—typhus in the one, typhoid in the other case—there is nothing exceptional in the occurrence, in two individuals, of two forms of disease in a locality in which the two sources co-exist. That while we regard a case of mixed types as exceptional, we can no more consider it inconsistent with the theory of distinct species, than we can consider the equally frequent occurrence of dothin-enterite in cases of scarlatina in malarious situations, as proving the identity of these poisons; and that the existence of a hybrid of typhus and typhoid, no more proves their identity, than does the similar existence of a hybrid between measles and scarlatina prove these to be one and the same disease.

In fine, while the theory of identity of species involves the belief, that causes the most diffused in their nature generate the same poison, and that this poison shall, at the same time and place, and among the same collection of individuals, produce two diseases totally dissimilar in their modes of access, order of symptoms, pathology, modes of death, treatment and modes of transmission; we, on the other hand, maintain, that whether we draw our conclusions from the genesis and modes of diffusion of these fevers, or their clinical history and pathology, we

find the conditions under which they arise, and the laws by which they are governed, so distinct and diverse, that we cannot but regard them as constituting different species.*

Without entering into any detail of the evidence upon these points, we may recapitulate the results to which it leads.

I. The first conclusion at which we arrive is, that whereas in a multitude of instances exposure to the contagion of typhus has been followed by typhus, we can find no satisfactory instance of typhoid following such exposure. In other words, typhus generates typhus, and typhus only. Neither is typhoid capable of communicating typhus. The two diseases are not intercommunicable.

II. I must consider as scarcely less important, the fact, proved by unquestionable evidence, that while typhus confers a remarkable immunity (fully equal to that conferred by the other exanthemata) from future attacks, it confers no such immunity from subsequent attacks of typhoid; and conversely, that typhoid does not exempt from attacks of typhus, as our daily experience in this hospital abundantly proves.

I have already adduced facts to show that the same rule applies to relapsing synocha.

III. That while the occasional occurrence of a hybrid disease is unquestioned, it is so infrequent and exceptional as really to prove the rule. That the co-existence of typhus rash with rose spots and dothin-enterite, no more proves the identity of these diseases than does rubeola—the hybrid of scarlatina and measles—prove that these are one and the same poison.

* Appendix (2.)

IV. That the conditions in the individual, and those external to him, which predispose to each form of fever, vary with regard to each other.

The great predisponents to typhus are ochlesis and the continued imbibition of the poison—those most seasoned by constant exposure are the most highly predisposed.

The reverse seems to hold with regard to typhoid, as was long since pointed out by Louis, and subsequent observers who have accepted his definition of typhoid as a disease—"Propre aux jeunes sujets, *principalement à ceux qui se trouvent depuis peu de temps au milieu de circonstances nouvelles pour eux.*" The other peculiarity remarked by Louis, that typhoid is prone to attack the young, by no means belongs to typhus, which is rather a disease of middle life. Thus, according to Dr. Murchison, of 1772 cases of typhoid admitted into the London fever hospital, the majority were between 21 and 25 years of age; while of 3456 cases of typhus, the greater number were attacked between 29 and 33 years of age, or about four years above the mean age of the population.

Of another powerful predisponent—famine—it may be said that it has not appeared to influence the occurrence of typhoid in any marked degree; on the contrary, persons in the higher ranks of life are far more subject to this disease than to typhus; while with regard to the latter, famine appears to be one of the circumstances which, with over-crowding, want of clothing, and insufficiency of fuel, exercises a powerful influence as a predisponent.

The evidence in favour of the influence of famine is, however, much stronger in the case of relapsing synocha; and although I have maintained in a former lecture, that not

famine, but epidemic influence, is the true exciting cause of this disease, the constant, though by no means invariable, pre-existence of famine at the epidemic periods, fully justifies us in regarding it as the great predisposing cause of the fever. The other predisposing causes, such as cold and moisture, intemperance, fatigue, depressing emotions, &c. seem to act pretty equally with reference to all forms of fever.

V. That the laws which regulate the prevalence and diffusion of typhus and typhoid vary. As a rule, both do not prevail together to the same extent; and in hospital, we usually observe typhus to prevail in the winter and spring, and typhoid in the autumn. The three forms may, however, exist together; but in this case we observe a remarkable difference in their diffusion. Typhus and relapsing synocha spread over the country; the former being diffused apparently by deportation, a single case furnishing the germ of the epidemic of a town or village; relapsing synocha, no doubt, spreads in the same manner as typhus, and also by atmospheric or epidemic influence; typhoid is never epidemic, in the true sense of the term, but is strictly endemic, the disease of the locality in which the fæcal miasm, which is its cause, exists.

It follows, as a corollary, that the diffusion of typhus and typhoid is to be arrested by different measures. No one doubts that the segregation of the typhus patient will accomplish this object, while I have over and over again witnessed it fail to prevent the occurrence of other cases of typhoid in houses exposed to fæcal miasm.

With respect to typhoid, what the separation of the infected has failed to accomplish, a heavy shower of rain, or a change from hot and dry to cold and wet weather,

or frost, will at once effect; whereas these have no such influence on typhus, but rather operate in the opposite way, by leading to confinement within doors and overcrowding.

VI. It may be mentioned, that whereas the greatest number of fatal cases occur in the outbreak of an epidemic of typhus, the fatality of typhoid increases as the season during which it prevails is prolonged.

To enumerate the arguments derived from the pathology and symptomatology of fever, would be to repeat a large portion of the preceding lectures. I shall merely recapitulate the conclusions at which I have arrived, in the fewest possible words; trusting that your memories have retained the facts and considerations upon which these are founded.

I believe, then, that those diseases must be of distinct species which differ so remarkably.

1. In their invasion and early history.
2. In their conformity to the laws of periodicity.
3. In their duration and modes of termination.
4. In their external phenomena, more especially their eruptions.
5. In the special affinities of the poisons, the order of symptoms, and their internal pathology.
6. In the mode of fatal termination.
7. In the anatomical appearances.
8. In the law regulating the mortality with regard to age.
9. In the comparative rapidity and security of the convalescence in typhus, and its complete exemption from relapse; the comparative certainty of relapse in epidemic synocha, its frequent occurrence in typhoid, and the

other risks and uncertainties of the convalescence in this disease.

Finally, you will meet with abundant proofs in your clinical study of fever, that this distinction is not merely theoretical or speculative, but, on the contrary, that it has an immediate bearing upon the important questions of prognosis and treatment.

APPENDIX TO LECTURE XII.

(1.)

The following are some of the cases of septicemia referred to at page 265 :—

A boy, aged ten years, was admitted into the Meath Hospital, labouring under symptoms of typhoid fever. He gradually lapsed into a state of stupor, with low muttering delirium; a few dark coloured petechiæ appeared on the surface, which became generally dusky and muddy in colour. On examination, after death, this was found not to be a case of typhoid fever, but of purulent infection. The boy had suffered for years from disease of the internal ear, and the disease had at length caused a minute opening in the petrous portion of the temporal bone, which communicated with the lateral sinus, and had thus produced the septicemia and typhoid state which simulated true typhoid fever.

Several years since I saw, in consultation, a lady, who, many weeks before, had presented the usual symptoms of early pregnancy, more especially morning sickness. Gradually, however, the sickness assumed more the character of that arising from gastritis, and was treated accordingly by her medical attendant, who began to entertain doubts of the existence of pregnancy, which evidently was not progressing if it had ever existed. I was struck with the sallow, muddy colour of the surface, which presented a dusky, mottled appearance, without, however, any distinct eruption. There was much prostration and emaciation, which, however, might reasonably be ascribed to the long-continued persistent vomiting. I found a circumscribed globular swelling in the region of the cæcum, with a remarkable doughy feel, and I detected some crepitation over the ileo-cæcal valve.

It appeared to me that the patient was sinking into a typhoid condition, and I suggested the exhibition of hydrochloric acid and bark. I did not see the case again; but I was favoured with a report of the examination after death.

The cæcum was found distended, with a mass of fæces of pultaceous consistence; its mucous membrane was the seat of a large, and, evidently, chronic ulcer, with jagged, thickened edges: a shrivelled fœtus, apparently long dead, was found in the uterus. In this case I have no doubt that the typhoid state was due to septicemia, caused by absorption from the surface of the ulcer. I had not long since under my care, in the Meath Hospital, a case of typhoid fever in a young woman—the cæcum being distended and doughy to the feel—in which a highly septicemic condition coexisted. The case proved rapidly fatal; but unfortunately no examination of the body was permitted.

In the Second Lecture I have referred to several examples of septicemia produced by exposure to moisture and by immersion. I have seen several instances in which the septic type of the fever, was apparently due to the emanations from decomposing animal or vegetable substances, and the works of the older physicians contain numerous similar examples.

(2.)

The theory of the difference of species is by no means new. The clinical differences have been observed by all our best writers on fever, and their observations have been confirmed, illustrated, and explained, by recent investigations. As soon as Louis, with his characteristic precision, determined the anatomical character of typhoid, it became manifest that his description did not apply to the fever prevalent at the time in London, Dublin, and Edinburgh. Gradually, however, its existence was recognized in each of the three cities, for example, by Dr. Bright, who gave an admirable description of it as it occurred in London; by Dr. John Reid, who recognized its exceptional occurrence in Edinburgh, or rather in its neighbourhood; and by Dr. Stokes, who has fully described it as it occurred in Dublin,* during a few years previous to the outbreak of typhus in 1836.

In the meantime, numerous observers, who had opportunities of studying the typhoid form under Louis, were struck with the marked differences presented by the typhus of Dublin and Edinburgh, and suggested that the two diseases might be of different

* Clinical Lectures, *London Medical and Surgical Journal*, vol. v.

species. I may refer to the papers of Dr. H. Kennedy, Dr. Lombard, and Dr. Staberoh, in the early numbers of the *Dublin Medical Journal*, and to Dr. Gerhard's able memoir on the typhus epidemic in Philadelphia of 1836, in which the characteristic differences between this disease and the endemic typhoid fever of the country are admirably pourtrayed.* But it is to Dr. A. P. Stewart that we owe the most complete and extended series of observations upon both diseases on a large scale. I need not repeat his conclusions, as I have referred to them in the lecture on the diagnosis of fevers.

The symptomatology, pathology, and morbid anatomy of the two fevers having been so manifestly different, the question soon arose, can the exciting cause be the same?—and, since that of typhus is proved to be contagion, while the French physicians, Andral, Louis, and Chomel, are all disbelievers in the infectious power of typhoid, may not the latter be connected with the existence of malaria in our large cities? Physicians of eminence had, from time to time, been struck by the occasional coincidence of enteric fever with defective sewerage. Thus Dr Christison observes:—

"In great towns cases are met with during the intervals between epidemics, and in a station of life, where epidemic fever in epidemic seasons of the worst kind is seldom witnessed. A fever of this description, tedious in its course, characterized by much nervous and muscular depression, without any particular local disturbance, and, especially, without the marked disorder of the functions of the brain which distinguishes most cases of epidemic typhus and synochus, was so prevalent among the better ranks in certain streets of Edinburgh, some years ago, at a time when fever was not prevalent among the working classes, that a general impression arose among professional people of the existence of some unusual local miasma. A great variety of parallel facts might be referred to—all leading to the general conclusion, that a disease if not identical with, at all events closely resembling synochus and typhus as described above, may arise without the possibility of tracing it to communication with the sick. A statement of this kind acquires great weight in the instance of such a visitation of disease as that just alluded to, which prevailed among people in easy circumstances in a great town."†

Very similar is the testimony of Dr. Cheyne:—"For several

* *American Journal of Medical Sciences*, 1836-7.

† "Library of Practical Medicine;" Art. Fever.

years the fever appeared in families only in solitary instances, or if more than one were affected, they were seized nearly at the same time, but it did not extend so as to lead us to think that it propagated itself. We are unable to assign the cause of the disease further than that we observed in several houses, in which our patients lay, that fœtor which is discoverable when a sewer is choked, and, in some instances, upon inquiry it was found that the sewer leading from the house had been improperly constructed and neglected."*

Histories of the outbreak of endemic enteric fever, in various places, apparently arising from this cause, rapidly accumulated. A remarkable instance occurred in Birmingham, a town previously peculiarly exempt from fever. The circumstances of the outbreak are thus described by Dr. Ogier Ward:—

"The river Rea, that separates Birmingham from its suburb Badesley, and serves as a cloaca maxima to both, carries its filthy stream onward, partly to turn a mill, and partly to fill a mill pond. During the drought which prevailed last year the water was very low in the main stream and mill pond, and, the mills not being regularly worked, became quite stagnant and offensive. The back stream also became dry, and showed its mud banks, that were only occasionally wetted by a flush of the washings of the town after a shower, or by the small surplus accumulated during the cessation of the working of the mills. The exhalations from the half dried mud and putrid water were so disagreeable at night as to nauseate the more delicate inhabitants of the adjoining streets, and soon produced disease in the form of typhoid fever of an infectious (?) character." He goes on to state that about fifty cases—some fatal—occurred in the immediate vicinity of the stream, and "still lower down the stream, where the water was as black as ink, there were thirteen pauper cases in one yard, and many others, both pauper and private, along the same line." That this fever was owing to the state of the stream, is proved by the disease being confined to the locality, the small number affected in so large a population as Birmingham, the season of the year, and the exemption of this town from the causes which aid contagion.—*Provincial Medical Transactions*, vol. vi.

A number of similar instances have been collected by Dr. Mur-

* "Cyclopædia of Practical Medicine;" Art. Epidemic Gastric Fever.

chison, who has added many valuable facts resulting from his own investigations, and which conclusively prove the causal relation between civic miasma and enteric or typhoid fever. Year by year the conviction is strengthened in the minds of the profession, that in typhus and typhoid fevers, we have two distinct species arising from different causes. There are still, however, among us those whose opinions we must respect, who think differently; and who point to the many symptoms common to the two diseases, to the relapse, as they term it, of the one into the other, and to their occasional co-existence as proofs of their identity. Of this theory my friend Dr. Henry Kennedy, who was among the first to recognize the differences between the typhoid of Paris and our typhus, is now one of the most zealous and determined advocates, and during the last few years he has published three papers in its support. One of these was read before the Medico-Chirurgical Society of London, and published in the *Edinburgh Medical Journal* for September, 1860. The second was published in the 34th volume of the *Dublin Quarterly Journal;* and the third was read before the Medical Society of the King and Queen's College of Physicians during its last session. Having carefully read each of these memoirs, I find the clearest and most succinct statement of Dr. Kennedy's views is in the second of them. It is as follows:—

"The conclusion, then, to which, after the fullest consideration of this question, I have arrived, is the same as that of two years since, but with still stronger convictions on the point. *I believe that the two fevers known as typhus and typhoid are the result of a single poison: and that no other hypothesis can explain so well all the difficulties of the case.* I consider further, that those who hold for a plurality of poisons, are bound to explain the facts already given in this paper. They should tell us why the symptoms of these two affections so often run the one into the other; why the same type of fever, whether typhus or typhoid, presents such marked contrasts; why typhoid may assume the character of putrid ataxic, or inflammatory fevers, febricula, meningitis, &c., and still be typhoid all the time; and this, be it observed, is described by those who believe in the two distinct poisons. They will also have to answer the argument taken from analogy, and tell us if scarlatina affords the most marked contrasts, why fevers should not do the same; also, how it has happened that symptoms which one writer considers essential to the natural history of typhoid, are ignored

and made little of by another? And, in the last place, an explanation must be given of what has occurred in Dublin this year—that is, the union of typhus and typhoid in the same subject. Now, one and all of these points may be satisfactorily explained on the idea of the existence of but one poison. I confess, however, it appears to me impossible to explain them on the theory of two."

Let us examine these difficulties of belief seriatim.

First, we are called upon to explain why the two fevers—assuming them for the moment to be two—have so many symptoms in common, and yet why each *presents* such marked contrasts, by which expression I presume is meant, want of conformity of each to its own type.

To the first part of this question, I answer, first, that pyrexia is common to both, and many of the symptoms referred to are common to all forms of pyrexia; and secondly, that the great similarity of these fevers, in many particulars, is no more than might be looked for in the case of two morbid poisons, each of which affects the entire organism, while each has its own special affinities. When Dr. Kennedy speaks of the symptoms of the one running into those of the other, he refers to the diarrhea, epistaxis, and intestinal hæmorrhage of typhoid; the delirium, and other nervous symptoms of typhus, met with also in typhoid; and the eruptions of the two fevers.

It is true that diarrhea, which is all but constant in typhoid, does occur in some cases of typhus. Moreover, in some epidemics, as in that described by Dr. Da Costa, referred to in Lecture VII., it seems not to be the exception, but the rule. But diarrhea is only a symptom arising from one of several conditions. Is the condition producing it the same in typhus as in typhoid? By no means; on the contrary, the testimony of numerous observers is, that the specific affection of Peyer's patches is invariably absent in the former. Such was the case in one of the examples adduced by Dr. Kennedy himself.—Case of Bellew, *Dub. Quarterly Jour.*, vol. xxxiv.

The same observation applies to intestinal hæmorrhage. "This," says Dr. Kennedy, "is looked on as a symptom of typhoid, but I find it more frequent in typhus."

We answer, that typhus being a blood disease, and frequently complicated with septicemia, hæmorrhage from a mucous surface is to be regarded as likely to occur; but this does not prove that it is connected with, or symptomatic of, a special local lesion, as in

the case of typhoid. On this point Dr. Kennedy's testimony may be quoted against himself:—"In another place," says Dr. Kennedy, "I have put on record some thirty cases of well-marked typhus—some of them examined after death—in which there had been extensive hæmorrhage, and yet not a trace of ulceration was found; and when the patient survived the bleeding a week, I was unable to say from what part of the canal the blood had come. It must, in fact, have been an exudation."

I need not say that the intestinal hæmorrhage of typhoid has a very different signification, and that it too frequently indicates the existence of a serious local lesion.

Of epistaxis little need be said, but that the experience of Dr. Kennedy as to its greater frequency in typhus, is opposed to that of the profession. With regard to delirium, and other nervous symptoms, all observers agree, that the attraction of the poison of typhus for the nervous centres is more marked than that of typhoid, and the primary nervous symptoms more constant; but that those secondary lesions which supervene at a later stage, and are due to reactive inflammatory irritation, to septicemia, or to uremic poisoning, are common to both. The more accurately we discriminate between the different forms of nervous derangement, the more satisfied we shall be that, in regard to these, there is no confusion of type, no running of the symptoms of one form of fever into the other. As to the eruptions, I must consider Dr. Kennedy's objections vitiated, by the mixing up of petechiæ with the exanthem of typhus and with the rose-spots of typhoid, and by the want of clearness in his definition of the characters of the fever, in which the alleged mingling and confusion of eruptions occurred. If—as I believe is the case—this commingling occurred in the cases of mixed type, in which both poisons were present, the presence of both eruptions is accounted for, and is consistent with our theory.

But Dr. Kennedy overlooks the important fact that petechiæ, properly so termed, are not peculiar to fever of either form. In fact, in this instance, he does not distinguish between the phenomena of fever and its epiphenomena, between its essential and its non-essential characters. And moreover, he confounds typhus and typhoid fever, with the typhoid state. To this we must attribute such an objection as the following:—"Why typhoid may assume the characters of putrid ataxic, or inflammatory fevers,

febricula, meningitis, &c., and still be typhoid all the time; and this, be it observed, is described by those who believe in the two distinct poisons."

Dr. Kennedy next proceeds to demand an answer to "the argument taken from analogy"—and to the question, "If scarlatina affords the most marked contrasts, why fever should not do the same?" We reply, that we fully admit the close analogy between the poison of scarlatina and that of typhus in their modes of origin and diffusion (by oehlesis and contagion)—in the effects of intense poisoning—it being sometimes a matter of difficulty to decide which poison has produced the fearfully rapid result—in the definite course of the eruption, and in the special affinities of the poison. We even recognize the analogy in the varying amount of eruption, and in the occasional occurrence of petechiæ.

But will Dr. Kennedy assert, that there exists another form of scarlatina presenting a contrast to typhus in these particulars, and an equally complete analogy to typhoid; or that there are any two forms of this exanthema presenting characters as widely differing from each other as do the invasion, course, duration, eruptions, and anatomical lesions of typhus and typhoid?

If, however, by the term "contrasts" is meant, that scarlatina, usually analogous to typhus, occasionally presents analogies to typhoid also, we freely admit the statement, and find an explanation in the fact, that the poison is frequently met in combination with miasmatic poison, to the influence of which the occurrence of the intestinal affection is to be ascribed. Dr. Kennedy refers to a remarkable case of this *typhoid* scarlatina, by Dr. Anderson, of Glasgow, who has had immense experience of fever: but he omits to mention, that Dr. Anderson's conclusions are the opposite of his own. The whole passage is so important that I shall quote it at length. "J. F., aged twenty-seven, a domestic servant, died on the eighteenth day of a fever, characterized by the presence of a *very copious and livid typhus eruption* over the body and extremities. On inspection of the body we found the mucous membrane of the duodenum covered with enlarged solitary glands, softened and ulcerated, so that in some places the peritoneum alone remained of the coats of the bowels. Peyer's glands were enlarged throughout the greater part of the jejunum and ileum, a patch in the lower part of the latter being about five inches long, and an excavated ulcer existed in its vicinity. The small and large intestines were besprinkled with numerous, enlarged, solitary follicles."

"The generalizing faculty would readily conclude from this case that typhus and enteric fevers are identical; but listen to two more:"—

"Jane S. died of asthenic confluent *small pox* at the period of maturation. On opening the body we found on the mucous surface of the ileum a number of enlarged Peyer's glands, two of which were ulcerated."

"Mary S., aged sixteen, was admitted on the fourth day of fever; there was copious *scarlatinous* efflorescence over the body; she had sore throat, and a tongue white and florid at the tip and edges. Two days after she died, having passed a large quantity of blood by stool. On inspection, we found the whole surface of the ileum of a deep red on its mucous surface, and thickly besprinkled with enlarged solitary follicles. Peyer's glands were also much enlarged and ulcerated, and many swollen follicles were scattered over the colon."

"Now can we suppose it possible that small pox, scarlatina, and typhus are *all* identical with enteric fever, because these cases prove that the special lesions of that disease may co-exist with each of them? Thus by a *reductio ad absurdum* the position falls."*

"But, lastly," says Dr. Kennedy, "an explanation must be given of what has occurred in Dublin this year—that is, the union of typhus and typhoid in the same subject." Here again Dr. Anderson draws an opposite conclusion from the same facts. In the passage following that just quoted he says—"I have notes of the case of a young man, aged twenty-two, who was a patient in the hospital here, with every symptom of enteric fever, including the characteristic eruption. After a month's stay, he went out convalescent, but while at his work five days thereafter, was suddenly taken ill again and re-admitted, having the *typhus* eruption out on him, though the symptoms of this second fever were still partly intestinal. He slowly recovered. This case seems to me to place the non-identity of the fevers beyond a doubt; and as we have already had proof that measles and scarlatina may co-exist, why should we hesitate to admit that typhus and enteric fever may also occur combined? Besides, the late Dr. Todd stated that he was convinced he had observed the co-existence of the two eruptions."

Dr. Anderson concludes his argument by remarking that, "the

* Lectures on Fever, p. 112.

co-existence of typhus and typhoid is no greater proof of their identity, than a man having the misfortune to break *both* his arm and his leg by a fall, would be a proof that these injuries were in fact the same."

But Dr. Kennedy asserts that "all the above difficulties may be satisfactorily explained on the idea of the existence of but one poison."

As the explanation is not given, we cannot judge if it be adequate; but we may remark, that it appears to involve certain postulates which are far from being proved.

The first of these is the dogma of Hunter, that no two morbid poisons can set up their action together in the system. That they may, has been proved by the observations of Dr. Robert Williams, Dr. Murchison, and other British and foreign physicians, as also, that the one poison may remain latent during the operation of the other, and appear upon its subsidence. Thus, some time since, I attended the daughter of a physician in this city in scarlatina, the sore throat and eruption being well marked. On the decline of the disease, and before the young lady had left her bed, she again sickened with equally well marked measles.

Now, in this case we must believe, either, that two poisons were together present in the blood; or, that measles and scarlatina—which, like typhus and typhoid, sometimes co-exist in the form of a hybrid disease—arise from one poison.

Secondly, it would seem to follow from the above, that the perfect or typical case of fever, is that which presents the exanthem of typhus with the rose spots and enteric lesion of typhoid; that each *form* is but a *part* of the disease, and, consequently, that it does not protect from a future attack of the other—in other words, that each of the groups of phenomena, which we call typhus and typhoid fevers, is the complement of the other, and that, in fact, the fever-poison never sets up its complete operation in the blood, unless both groups are present together, or in succession—that is to say, scarcely once in a hundred instances. Now, to the advocate of the opposite theory, it appears, that when, with rare exceptions, all the most recent and accurate observations agree with those made in the London Fever Hospital—(where we are told that during fourteen years, and in many hundred bodies dissected, no single exception has been met with)—"that when lenticular rose spots appear in successive crops, the abdominal lesions of enteric fever

are invariably present, while in exanthematous typhus they are invariably absent"*—the presumption is strongly in favour of these hybrid cases being the exception, not the rule; of their being due to the presence of *two* poisons in the system, rather than of the ninety-nine per cent. being cases of the imperfect development of *one* poison.

Thirdly, it is assumed that the two forms of fever are intercommunicable. We have, however, no satisfactory evidence of a fact, which should be as easily proved as the contagiousness of typhus. The cases adduced by Huss and others, prove no more than the co-existence of the two diseases in a locality, a fact which admits of a simple and satisfactory explanation.

Lastly, the theory of unity of poison necessarily assumes the fact of a common origin. Either different forms of fever must be derived from a single source, or different sources must contain the same poison.

Dr. Kennedy's argument not only overlooks the *possible* co-existence of two poisons in the body, but also the *probable* co-existence of two distinct sources of poisons, in the dwellings of the class from which our hospital patients are derived. He thus—not very clearly—expresses his views on this point:—

"Not that I have the slightest faith in bad sewerage causing typhoid more than typhus."

This sentence may mean, that Dr. Kennedy doubts the power of fæcal miasm to produce any form of fever; or, that he considers it may cause both equally. Either reading leads us to infer, that Dr. Kennedy considers the etiology of fevers, so far as their exciting causes are concerned, as of little moment in connexion with their natural history and classification. We cannot agree with this view, and we consider that the science of pyretology has been much advanced by the large and daily increasing mass of observations made on this subject: observations which fully prove the law, that the factors of fever, or those substances which act as poisons when —whether generated in, or received into, the living body—they are *retained in the blood*, have a special affinity for the surfaces from which they are normally excreted. That in accordance with this law, the poison generated by the accumulated and confined emanations from the lungs and skins of crowded collections of human

* Murchison, p. 581.

beings (ochlesis), has an attraction for those surfaces, which is manifested in typhus and in scarlatina; while that arising from the decomposing excreta of the intestines has a similar attraction for that surface, and is eliminated by it. Dr. Kennedy does not dispute the action of the first of these agencies; but he seems to deny, or at least to ignore, the influence of the other, but on what grounds he does not inform us.

Now, we contend for this influence for two reasons. One is the all but entire absence of evidence as to the existence of a contagious property in typhoid fever. Not that we would be understood to assert, that it cannot be propagated by contagion – for example, in the manner suggested by Dr. Budd—but that in the vast majority of cases it is not so propagated, we have the strong testimony of so accurate and experienced an observer as Andral, who says:—

"In Paris, either in the hospitals or out of them, we never recognized in this disease (dothinenteritis) the slightest appearance of a contagious character. In the hospitals, we do not see it transmitted, from the individual who brings it from without, to those who are lying in the beds next his own; neither do we see that the patients who lie in a bed previously occupied by a person who has recovered from, or who has died of a dothinenteritis, are attacked by it; neither are the physicians or medical students who come there attacked by it, more particularly those who have had to come in contact with patients labouring under the disease. Out of the hospital, what circumstances are more favourable to contagion, than those generally found combined, in the case of medical students who attend their companions when attacked with typhoid fever? Shut up in a room, which in general is very small, they pay the most assiduous and devoted attention night and day; if the affection were contagious, almost all of them would contract it, and yet we do not remember to have seen the disease even once arise in this way in a healthy individual."*

It is true that many cases occur, from time to time, in a house or family; but, as Dr. Murchison remarks, at such intervals as do not admit of the idea of communication from one patient to another. Thus, six cases were admitted into the London Fever Hospital from one house—one in June, 1849, one in October, 1851, one in February, 1854, and so on. A similar example of successive cases

* Clinique Medicale, by Spillan, p. 728.

admitted into hospital from a small hamlet, happened in my practice some years ago, which I may mention. Thirty cases of typhoid occurred in twelve houses, in the course of four months, without my being able, by strict and repeated inquiries, to obtain evidence of contagion in a single instance. In some, the attack was nearly simultaneous in several members of the family; in others, three months elapsed between them. Again, in others, the patients first affected were in hospital when members of the same family sickened. A number of facts, which it is unnecessary for me to detail, proved, that the fever in this instance arose from malaria, which was removed, along with the endemic, by six weeks of almost constant rain.

But, not to dwell on the negative proof, it may be said that upon no subject in practical medicine, is there a larger or more constantly increasing mass of evidence, than as to the power of fæcal miasm to generate typhoid fever, and to the fact that it does so.

We may consider this evidence, both as it is presented to us on the large scale in our great cities; and as offered in single instances of fever, originating in rooms, houses, or limited localities.

Of the first, an able writer in the *British and Foreign Medico-Chirurgical Review* observes:—"The position of civic populations with respect to the miasmata derived from animal excreta is this—a daily and hourly accumulation of the fæcal evacuations of the population, and of the domestic animals they employ, takes place with the most unerring continuousness, unvaried by any circumstance whatever. On the other hand, the removal of these excreta is uncertain, and depends upon various circumstances, as the proper construction of water closets, and of sewers, a supply of water, due diligence on the part of scavengers, &c. Recent inquiries have shown that all cities, towns, and villages are more or less defective as to their arrangements for the prompt removal of these noxious agents, whilst in numberless instances there are scarcely any arrangements whatever, and they are left to be completed as chance or necessity may dictate. The consequence is that great numbers of people are exposed to these fæcal miasmata, and especially in the summer months, when decomposition is accelerated by the augmented temperature of the season."

Such, this writer goes on to show, are the conditions of London and of Paris; and to the gradual growth of a similar condition in Edinburgh, Dr. Murchison attributes the marked increase of typhoid in that city of late years.

For examples of the generation of typhoid in smaller localities, I may refer to Dr. Murchison's work. One, of many which have come under my notice in this city, I may mention.

I was called to attend one of the students of this hospital in exquisitely marked typhoid fever. I was told he had contracted the disease in our fever wards. Not believing that exposure to typhus can produce typhoid, I expressed my doubt of the fact. No other cause could, however, be discovered at the time, and, in particular, I was assured that there was no defect in the sewerage of the house in which the patient resided. Within a year after this occurrence, the proprietor of the house called upon me, and stated the following fact, which, he thought, might interest me. It appeared that our student occupied a small sitting-room, a few steps below the hall, the floor of which rested on the ground, having no room underneath; here he passed much of his time reading. For some reason, the owner of the house wished to increase the height of this room by sinking the floor, when, on removing the boards, a large quantity of ordure, in an advanced stage of decomposition, was found collected under them, having leaked from a cess-pool belonging to the adjoining house. It was conjectured that the leakage was of long date, as no complaint of the smell had been made by the gentleman, who had for many months occupied the room.

We maintain the true explanation of the mixed types of fever, is to be found in the unquestionable fact, that in few of the zymotic diseases is one poison alone present in the blood. I have alluded (in Lecture II.) to the action of malaria as a predisponent to other zymotic diseases; but there can be little doubt that this poison not only predisposes the system to such disease, but, moreover, modifies and renders it more complex when it is set up.

This is the case with epidemic cholera, and with scarlatina and diphtheria; and, if with these, why not with typhus.

In proof of the supervention of the one upon the other, either during its course or in succession, we point to the analogous combination of scarlatina with measles, and of typhoid with scarlatina. In his valuable paper on the co-existence of several morbid poisons,

Dr. Murchison, remarking on the co-existence of scarlatina and typhoid in the London Fever Hospital, says: "I have notes of nine such cases, and in four, at least, of these the eruptions of the two diseases were present at one and the same time.

"With regard to one of the cases, my notes are very imperfect, and I am unable to state at what period of the pythogenic fever the scarlet fever supervened.

"In the second and third cases, the scarlet fever appeared in the third week of convalescence, and five weeks after admission; and in one of these cases the scarlet fever was followed by enlargement of the sub-maxillary glands, general dropsy, and albuminuria; and during the persistence of these symptoms, about the thirtieth day from the supervention of the scarlet fever, well marked variola showed itself. In a fourth case the scarlet fever supervened nine days after admission, and on the twenty-first day of the primary fever. It was followed by glandular swellings, and discharge from the ears, and proved fatal. No mention is made of rose-spots after the appearance of the scarlet rash, but diarrhœa, which had been a prominent symptom before, still continued. In a fifth case, scarlet fever appeared six days after admission, and on the sixteenth day of the primary fever. Rose-spots were noted three days before the appearance of the scarlet rash, and it is not impossible but that they existed afterwards. In all of these cases, as well as in those about to be mentioned, the usual symptoms of scarlatina, in addition to the rash, were present. In the four following cases the eruptions of pythogenic and scarlet fever existed simultaneously."*

If the fact is admitted that two morbid poisons may, and not unfrequently do co-exist in the human body, one of these being malarial, and, as such, having a special affinity for the intestinal glands, all the exceptional cases given by Huss, and others, are accounted for, and all Dr. Kennedy's difficulties are explained.†

* *British and Foreign Medico-Chirurgical Review*, vol. xxiv.

† The following is the case by Huss, so frequently referred to by Dr. Kennedy:—

"A man had died, it was stated, of typhus fever. the brother and his wife went to live in the house of the deceased, and used his clothes without previous airing and cleaning. They were soon taken ill, and brought to the hospital where they both died. The husband had violent delirium, and a profuse petechial eruption; the post-mortem examination showing no change of the intestinal glands. The wife had milder cerebral symptoms, and a very scarce crop of eruption; but on examination, swollen mesenteric glands, and swollen and ulcerated Peyer plaques were found in abundance."

I may be allowed to observe, that I cannot agree in Dr. Kennedy's estimate of the value of the researches of London physicians, nor do I think that on this subject they can be fairly said "to have ignored anything but what has occurred in their own city."

It is true that Dr. Cheyne * distinctly recognised and described, the *clinical* characters of the three forms of fever prevailing in Dublin fifty years since; but it is by observers in London, Scotland, and America, that their natural history has been investigated, and their classification determined, with an accuracy and a precision, which must eventually carry conviction to every unprejudiced mind.

* Dublin Hospital Reports, vols. i. and ii.

LECTURE XIII.

PROGNOSIS.

We have now to enter upon the consideration of fever, regarded from another point of view, namely, "as presenting data for a rational prognosis, or study of its tendencies towards a particular termination."* There is no portion of the clinical study of fever of more importance, than that which is termed its prognosis. By which I wish you to understand, not merely an acquaintance with what are called prognostic signs, and that just estimate of their value in particular cases, to be acquired only by prolonged experience and the incommunicable tact which such experience alone can give; but rather, the study of the tendencies of a given case of fever to one or other termination, as inferred from the past and present condition of the patient; the history of the disease; its complications; and all the conditions which can influence its course or affect its result. It is in this sense the term is used by Hippocrates, who says—"The physician must be able to tell the antecedents, to know the present, and foretell the future; must meditate on these things, and have two special objects in view with regard to diseases—namely, to do good, or to do no harm." Taking this axiom as a guide, you should endeavour to attain to that

* Lecture I.

foreknowledge, which is based upon a comprehension of everything related to the disease on the one hand; and an accurate estimate of the constitutional power, the proclivities and individual peculiarities of the patient on the other; thus, you will be able to anticipate all tendencies of whatever nature, and to provide against all emergencies, foreseeing what is about to take place, and the measures which will be necessary; arranging, beforehand, the means to guard against all accidents, and comprehending the moment when this or that remedy should be administered or withheld.

Considering prognosis in this comprehensive sense as the knowledge of tendencies, whether of the disease or of the treatment, you will make it a part of your daily study at the bedside. Each day you will carefully estimate the tendency of the case to run a certain course, to develop certain complications, or to terminate in one or other of the modes I have already described; deriving your data from everything in the individual, the disease, and the treatment, which can possibly influence the result.

Before entering on this investigation of the conditions of prognosis in a particular case of fever, it is well that you should be reminded of certain facts or laws which may be asserted of fevers in general; and which are derived from the characters of the epidemic period, the type and history of the disease, the age, sex, previous history, health, and habits of the patient.

One of these facts is, that the rate of mortality in fever will vary considerably in different epidemics, at different periods of the same epidemic, and throughout its whole continuance at different places. Thus it has been observed, that at a time when a low or asthenic type of scar-

latina or erysipelas prevails, a fatal form of fever will prevail also; and it cannot be doubted, that those epidemics of typhus are the most fatal, which are characterized by complication with acute cerebral congestion, or which occur during epidemics of cerebro-spinal arachnitis. It may be added, that the form of disease known as catarrhal typhus, is especially fatal to patients of advanced age. At other times, the prevailing diseases being mild, cases of fever of a severe form will be less fatal than usual.

Of epidemics of typhus, it has been remarked by Gerhard and others, that the earlier cases were by far the more fatal. The same has been observed in epidemics of cholera. While the epidemic typhus generally becomes less fatal; the contrary is rather the tendency of the endemic typhoid of summer and autumn, which gradually augments in severity, the poison becoming more and more intense, as septic decomposition advances, until a change in its character follows upon a change of season.

The marked difference in the rate of mortality at various periods of the same epidemic, is sometimes due to the prevalence of several forms of fever at these periods.

I have already, in a former lecture, drawn your attention to the fact, that three forms of fever have prevailed in various proportions at different periods of the same epidemic. This has been observed by Armstrong, Cheyne, and others, of the epidemic of 1817, and by many observers of that of 1847. As the average rate of mortality of these various forms of fever varies, the death-rate at different periods of the epidemic will consequently vary also.

There is another point of view, from which we should regard these different forms of fever, with reference to

rational prognosis—viz., the variations in the complications which occur, and the several accidental lesions which require to be guarded against in the different species of fever. While, in typhus, the nervous and pulmonary complications are the chief causes of anxiety in the progress of the case, and the uncertainties of crisis suggest a guarded prognosis, up to that period; the same care and caution are called for in typhoid, by the more prolonged and indefinite duration of the disease, the great danger of imperfect crisis, and the peculiar risk of a latent and insidious affection of the intestine, often continuing for some time after the termination of the fever, and the existence of which may perhaps be first revealed by a fatal hæmorrhage, or peritonitis from perforation.

In short relapsing fever, the dangers of the primary illness are very much less, but death seems sometimes to occur from the excessive disintegration of tissue, caused by the highly-marked crisis. Relapse, with its dangers, is infinitely more frequent than in the other forms; and the greatest caution is required to avoid mistaking for convalescence, that period of remission which so often ushers in a second, or even a third attack of fever.

The age of the patient has a marked influence on the result of fever. While typhoid fever is much more fatal than typhus in early youth, it seems to be an ascertained fact, that after twenty years, there is a steady increase in the rate of mortality in typhus up to fifty; about which age it amounts to one-half of those attacked. After this, the increase is still more rapid, until at eighty years it is almost uniformly fatal.

We find the explanation of these facts—Firstly, with respect to typhoid, in the great demand upon the formative

energy during adolescence, when all portions of the organism are undergoing constant molecular change. The danger from this source is, of course, in proportion to the rapidity of growth, and is much augmented by anything causing increased waste, such as violent exercise, exposure to cold and damp, dissipation, &c.

Secondly, the increased fatality of typhus in advanced life, is, no doubt, due to the gradually diminishing energy of the function of nutrition; progressive metamorphosis becoming less active, and the products of regressive change being less perfectly eliminated by the excreting organs.

The greater mortality of adult males than of females, as well as the disproportionate mortality of pregnant and puerperal women attacked by fever, admit of a similar explanation.

The occupation and mode of living, have, each, an important influence on prognosis in fever. Take two patients of the same age, say twenty-five or thirty years; one a healthy farm labourer, the other, a hard-working student, a professional man, or an anxious man of business. There can be no question, that the chance of recovery of the latter, is far less than that of the former, owing to the greater severity of the cerebral complications, sure to arise in the man whose brain is undergoing the most active metamorphosis at the time of seizure.

The peasant has another advantage over his neighbour, in the comparatively less amount of effete organic matter in his blood, the more healthy condition of his excreting organs, and, consequently, the diminished risk of the dangerous secondary blood contaminations to which the luxurious liver is so liable.

You will occasionally meet with personal and family peculiarities of constitution, of a nature not, perhaps, ascertainable, but which have much influence on the result of fever; as I have before remarked, these frequently determine the course and complications of the disease. The members of some families seem not only to have a proneness to become the subjects of fever, but also to exhibit a tendency to succumb under it. Of course you will, in such cases, endeavour to ascertain from what special condition the danger is to be apprehended, so far as this can be learned, from the history of previous fevers occurring in other individuals of the family. It may be a peculiar predisposition, or a family tendency to some complication; or some peculiar psychical condition not in our power to obviate; or, it may be connected with residence in a particular locality, or some other preventible condition.

Residence in an infectious locality has often a most unfavourable influence on the result. If, as in the instance of a fever nurse, or of a clinical clerk, it has been in the atmosphere of the fever ward, the accumulation of the typhus-poison too often manifests itself in a malignant form of fever; while, on the other hand, prolonged residence in a malarious atmosphere, by its decomposing influence on the blood, renders an attack of typhus septic in its type; or, it may be, together with the typhus-poison, generates a hybrid disease, presenting the unfavourable combination of the cerebral complications of the one, with the abdominal lesions of the other form of fever.

The previously existing diseases of the patient, which have been observed to have the most injurious influence on the course and termination of fever, are, diseases of the brain, of the heart, of the respiratory organs, and of the kidney.

You might naturally expect, that a brain suffering from malnutrition, will not resist the disintegrating action of the typhus-poison; and that the tendency to pulmonic congestion in fever, will be greatly augmented by pre-existing chronic bronchitis, by mitral valve disease, or by a weak and dilated condition of the right ventricle. Again, if your patient is suffering from chronic disease of the kidney, and deficient elimination of urea, nothing will, probably, avert the most formidable secondary contamination of the blood, and death by uremia.

A knowledge of the history of the disease, including the circumstances of the seizure, and the phenomena attending the stage of incubation, or latent period, is necessary, as well as that of the management pursued during the early stage of the disease.

"Physicians of experience," says Dr. Cheyne, "pay particular attention to the circumstances under which fever commenced, and to its first symptoms." This axiom you will do well to remember. With regard to the first, the tendency of a case of fever, to death or recovery, may be influenced by the condition of the patient at the time of seizure, and the peculiar predisposing cause; or, by the special exciting cause. If the access of fever has occurred, when the nervous system was exhausted or depressed by excessive exertion, fatigue, long watching, want of food, or by the depressing emotions of grief, anxiety, shame, or fear, the prognosis will, *ceteris paribus*, be unfavourable. The high rate of mortality among the better classes, during the epidemic of 1847-8, has been ascribed to these latter causes by many writers. To these may be added, the continued expenditure of nervo-muscular force after the seizure by fever, during its latent period and earlier stages; for

the history of too many valued members of our profession has proved, that after a short struggle, the patient is struck down with more than the ordinary prostration of strength and energy, dying, not unusually, several days before the ordinary period. Some of you have witnessed, in our fever wards, the fatal influence exercised upon the nervous system and the blood, by the prolonged bodily exertion of the peasant who has continued to labour during the earlier days of his fever.

Such cases, indeed, rarely recover, manifesting, always, severe and peculiar nervous symptoms, and the worst forms of blood dyscrasia. Ever remember, that fever has a special affinity for those portions of the organism which are undergoing disintegration or waste, and that, under its influence disintegration of tissue is increased; then you will appreciate the value of the practical rule, never to allow any exercise of the nervo-muscular function, which can be avoided, after the access of fever has occurred.

The influences of grief, anxiety, and despondency, are not less fatal. It has often been observed, that a presentiment of death, at the commencement of fever, is almost certain to be realized. If the patient has not a desire of life, he seldom survives. Shame and remorse frequently destroy their victims through the agency of fever.

The conditions in which the patient is placed during fever, exercise a powerful influence upon the result.

I have already alluded, in a former lecture, to the spontaneous generation of typhus by overcrowding and want of ventilation; and, to the power that this ochlesis has of intensifying, and rendering more malignant an existing fever. You will, therefore, readily imagine, that under these circumstances, the rate of mortality is much in-

creased, and, accordingly, our hospitals, barracks, and prisons, furnish many examples of the fact. Take the following from Dr. Dillon's account of the fever of 1847 :— "In March, 1847, our county gaol (Castlebar) was crowded to more than double its capability, those committed being in a state of nudity, filth, and starvation. The prison hospital, calculated to hold sixteen patients, had, early in March, eight cases of low typhus. From the character of the fever, the condition of the prisoners, and the fearfully crowded state of the gaol, I clearly saw we must, before long, have a full visitation of bad typhus ; and accordingly applied for immediate and further hospital accommodations. Before temporary sheds could be erected, we had fully one-fifth of the inmates in bad maculated typhus. Our Roman Catholic chaplain, deputy governor, deputy matron, and a turnkey, fell victims ; every hospital servant was attacked, and from our wretched over-crowded state, the mortality was fearful ; fully 40 per cent."

While the poorer classes are usually the most exposed to this influence, the more wealthy are not without their dangers, arising from over care and injudicious nursing. I shall have to draw your attention to this subject in my next lecture.

It is generally believed, that if fever is sudden in its invasion, and this is followed by proportionate reaction, the patient being at once laid aside, the chances of re-recovery are greater than when a period of slight indisposition preludes the apparent commencement of the fever, and renders this insidious and uncertain, wanting the evidence of reactive resistence of the constitution. Statistics furnished by several observers support this belief. Thus, according to Chomel, of 76 suddenly attacked, 26, or less

than one in three died; while, of 39 in whom fever commenced with preliminary indisposition, 20 died, or more than one-half. According to Dr. Ormerod, of 115 cases of different types, in which the mode of aggression was noted in St. Bartholomew's Hospital, the fatality of the cases in which it was sudden, was one in five; of those in which it was gradual, one in three.

I think these results may, in a measure, be owing to a circumstance of which I have already spoken—the expenditure of nervo-muscular energy during the earlier periods of fever, which is obviously more likely to occur in the insidious, than in the sudden mode of invasion. But, apart from this, it can be readily imagined, that the insidious access may be, as a rule, the more dangerous in both typhus and typhoid fevers, though, perhaps, for different reasons. In the former, it would seem, that a prolonged and insidious period of incubation is sometimes associated (whether as cause or effect I cannot say) with a more than usually profound nervous depression. In the latter, the most remarkable cases of insidious aggression, have been found associated with the most extensive disease of the glands of Peyer. A short time since, a young woman was admitted into this hospital, labouring under symptoms of peritonitis, which proved fatal after a few hours. Her history was, that for seven or eight days she had felt weak and languid, but had continued her work, as housemaid, until the day before her admission. On examination of the body, the glands of Peyer were found swollen and infiltrated, several were in a state of ulceration, and one of these ulcers, having perforated the bowel, had given rise to the fatal peritonitis. The mesenteric glands were also enlarged and infiltrated, and the spleen

was congested and soft. My friend, Dr. Carl Martius, has informed me, that an eminent surgeon of Munich, performed a capital operation in the hospital theatre the day before his death, which was caused by a perforating typhoid ulcer of the intestine.

Instances of this kind have been recorded by many writers. According to Chomel, as quoted by Dr. Murchison, ten out of twelve instances of perforation occurred in a latent form of fever; and Dr. Bristowe accounts for its greater frequency in males (11 to 4) by their continuing to work up to the very instant of perforation. I have myself witnessed so many cases terminating fatally by perforation or by hæmorrhage, that I make it a rule, in private practice, to apprise the patient's friends of the risk there is of the occurrence of one or other, even in the mildest form of the disease. I may add, that this warning may sometimes save the patient, by leading to increased care and caution in the regulation of the diet and management, during both fever and convalescence.

But if the insidious accession of fever is often attended with danger, it by no means follows that cases of sudden and severe invasion are exempt from their own risks. On the contrary, typhus—like scarlatina—in a concentrated dose, occasionally kills, as has been said, *uno ictu;* deadening the energies of the cerebro-spinal centres, destroying the contractility of the heart and the consistence of the blood, and causing general capillary congestion; the patient passing at once into a state of stupor or coma, as if under the influence of a narcotic poison; the blood, after death, being found fluid, or semi-fluid, and stagnating in the heart, lungs, brain, liver, and spleen.

I have already, in a previous lecture, quoted Arm-

strong's graphic sketch of this congestive typhus. I may here refer to two examples of it, observed by Dr. Cullinan of Ennis, during the epidemic of 1847. He says:—"There were presented to my observation, some remarkable cases of fever, which ran a fatal course in a period of from six to twenty-four hours. They were not cases of cholera of any kind. At first, I supposed that their rapid progress was influenced by previous privations, but now I am of opinion that their course and issue were determined by the agency of some potent aërial poison. I remember, particularly, two cases which occurred in the county of Clare gaol, where the food was always abundant and wholesome. A young man had eaten his breakfast, and began to complain. In two hours afterwards I found him so weak that he could not stand without support; his head was giddy, his eyes glassy and without expression; his pupils contracted and vision dull; his skin was cool, pulse very weak, almost imperceptible; the action of the heart rapid and indistinct; secretion of urine scanty; tongue rather clean, but clammy. He was laid in bed, got some wine and chlorate of potash, and had a sinapism applied to his epigastrium. He sank gradually, and died in eight hours.

"The second patient died in a little more than six hours from the time of his first complaining. His symptoms were very similar to those detailed. The gaol, at this time, was greatly crowded, and fever and dysentery were very prevalent and fatal among the prisoners."

Passing on, from the initiatory stage of fever, to the study of those indications of unfavourable prognosis arising in its progress, we shall find, that so far as these belong to the disease, they may be usually referred, either, to want of conformity to the type of the particular species of

fever, the affinities displayed being abnormal or unusual, and not those properly belonging to the poison; or, to the unusual severity of the complications, especially of such as arise from different forms of secondary blood contamination; on the other hand, they may arise out of the condition of the patient, and be due to deficiency of vital force, and want of power to resist the operations of the disease upon the vital functions.

As an example of the first, I may mention, that if the delirium and slight stupor (which are normal phenomena, and, as such, excite no apprehension in the earlier stages of typhus), occur at the same period in typhoid fever, they are most unfavourable prognostic signs. Again—if in typhus the pulse rises to the same rate of frequency as is usual in relapsing synocha, it is a bad sign; and if, at a comparatively early period, say on the ninth or tenth day of typhus, there occurs a critical effort marked by copious sweating, such as ushers in recovery in relapsing synocha, the result may be said to be almost uniformly fatal.

Another example of a symptom favourable or fatal, according to the form of fever, is rigor. In relapsing fever, this frequently marks the commencement either of favourable crisis, or of a change into the intermittent type; while in typhoid, it too often indicates the commencement of fatal peritonitis, or some other inflammatory complication. In estimating the prognostic value of the deviations from healthy conditions in the course of fever, you should not merely measure the amount of derangement of function, but also compare this with the typical amount of such derangement at a corresponding period of the same form of fever, and, as far as possible, this should be done with reference to the cause of the

deviation, and, in the case of severe nervous lesions, to the seat of the lesions, according as it is associated with other nervous symptoms of a serious character, such as active delirium, stupor, cutaneous hyperesthesia, muscular rigidity, tremor, or convulsions. Headache, for example, is a normal deviation from the feeling of health in the first week or more of typhus, and we know that it alone, although severe, is not a sufficient cause for alarm at this period. But headache, coming on at an advanced period of the disease, is an abnormal symptom, and of more or less serious importance, according to the special cause, as indicated by the associated nervous symptoms. The same remark holds good with respect to vomiting, which is salutary at the invasion of fever, and almost certainly fatal at its close; and which, occurring at different periods during fever, may be pronounced more or less unfavourable, according as the associated symptoms show that it has a cerebral, renal, enteric, or bilious origin.

Hysteria is another example. It occasionally ushers in a favourable crisis, while, on the other hand, it sometimes occurs as one of a group of most unfavourable nervous symptoms, those, namely, which are referable to the medulla oblongata, and accordingly has been pronounced fatal by such high authorities as Cheyne, and subsequently by Graves. Lastly, hæmorrhage from the bowels, so serious, often so fatal, a sign of intestinal ulceration in typhoid, has been observed to be, occasionally, a favourable crisis in typhus, by H. Kennedy and others. These examples may suffice to convince you, that you cannot pronounce safely on the value of a sign or symptom, regarded singly, without reference to its cause, and to its conformity to type.

But it is in your daily clinical study of fever, that you will derive the most important prognostic indications from the course and progress of the disease. It is by close and daily observation, that you will be able to measure the patient's power of resisting the influence of the disease, to judge of the conformity of symptoms to the type of the special form of fever, and to ascertain the nature and extent of secondary complications, and the effects of treatment. Following the plan of investigating each function successively, you will first collect the indications which present themselves on a review of the external condition of the patient. You note the colour of the surface, the expression of the face, the eye, the decubitus, the eruption, the temperature;* each of which affords indications favourable, or the contrary, according to their conformity or otherwise to the type of fever; or, according as they indicate a healthy state of the blood and vital organs, irrespective of fever; or, on the other hand, as they give evidence of secondary blood contamination,

* Dr. Grimshaw sums up the results of numerous thermometric observations on typhus in the following propositions, all bearing on prognosis:—

1. Temperatures above 104° in middle or advanced life, indicate (*a*) a serious case; (*b*) a serious complication.

2. Sudden rises in temperature with eruption remaining stationary or declining, indicate complications.

3. Long continued high temperature, usually indicates a complication, generally arachnitis or delirium, especially the latter.

4. A low range of temperature, other symptoms being serious, is a bad sign.

5. A sudden fall in temperature, other bad symptoms remaining the same or increasing in severity, indicates (*a*) death; in which case there is often a rise before the fatal event; (*b*) complications, especially diarrhœa.—*Dublin Quarterly Journal, May*, 1867.

(septicemía), of severe visceral congestion, or of an unusually depressed condition of the nervous system. You have examples of the value of a change of colour as a prognostic sign, in the sudden occurrence of a jaundiced or sub-jaundiced hue of the surface in low forms of pneumonia, in gastro-hepatic congestion, and in many cases of septicemia or pyemia. You read in the half-closed injected eye—dry, or coated with a film of mucus—one of the most unerring signs of sinking of the vital powers and approaching death. A glance will show you the condition of the capillary circulation; if active, or retarded by weakened left ventricle, or by obstructive congestion of the right cavities of the heart; whether the eruption is bright and healthy, dark, becoming prematurely ecchymotic, or, as in some of the worst cases, if it has appeared several days before the usual time, and has rapidly passed into that condition. You will note if the patient lies tranquilly on his side, with his limbs moderately flexed; or, as in unfavourable cases, on his back, with the limbs stiffly stretched out; or, as in equally hopeless cases, with the legs firmly flexed, and the heels pressed against the buttocks, the arm being, perhaps, spasmodically flexed on your touching the wrist, or falling passively or heavily when lifted. You note, moreover, in serious cases, occasionally, a tendency to jactitation, rolling of the head on the pillow, and sliding out of bed.

The following are the prognostic signs derived from observation of the respiratory and circulating systems:—

Favourable, if the respiration be easy, and not hurried, or attended with frequent sighing. Unfavourable, if hurried and laborious, irregular and interrupted by frequent sighing; or if it be that form of ascending and descending

breathing, described by Dr. Stokes as occurring in cases of fatty degeneration of the heart; if cerebral as to its character, it is, at the same time, noisy and nasal; or persistently stertorous; or is also accompanied by coma, as in renal disease. If, on physical examination of the chest, you find dulness on percussion of its inferior regions from hypostatic congestion, well marked at an early period of the fever, and varying with change of position, especially if this does not disappear during the early period, but continues till a more advanced stage, the prognosis is unfavourable, as it indicates failure of the pulmonary capillary circulation. It is likewise gloomy, if the signs of extensive and extending capillary bronchitis or pneumonia are present, conjoined with bloated, livid face, and injected eyeballs, and a tendency to stupor. Aphonia from laryngitis or œdema glottidis, when occurring in typhus or typhoid, is also a prognostic sign of the gravest possible import, as well as an indication for prompt and decided treatment.

The signs derived from the circulating system of a favourable character are, a moderately strong impulse, with healthy sounds of the heart; a perfect correspondence between the heart's impulse and the radial pulse, the latter neither very much above or below the natural standard; an active state of the capillary circulation; and lastly, absence of congestion of the right cavities of the heart at an advanced stage of the fever.

On the other hand, few recoveries from typhus take place with a pulse over 120 in the early period, more especially if a daily increase is observed in its rate; you may usually draw an unfavourable prognosis from a daily progressive increase in the frequency of the pulse—bearing in mind that it may rise considerably on the eve of a

favourable crisis—more especially if this co-exists with a want of correspondence with the heart's action, the impulse of the latter, previously weak, becoming abrupt, strong, and jerking, and the pulse weak and thready. In such a case, you will often observe the same disproportion between the action of the carotids and the radial pulse. If there be a want of correspondence between the number of beats of the heart and pulse, with other signs of mitral disease; if the cardiac sounds and impulse become so faint as almost to disappear; or if there be a distinct cardiac intermission, and a marked slowness of pulse, conjoined with stupor or coma, the prognosis is most gloomy; as it also is when the heart falters, becomes irregular in its rhythm, and unequal in the force of its beats.

The favourable signs derived from the digestive system, are—a tongue not too clean, but conforming to the type of the fever, protruded regularly on being moistened, and withdrawn with promptness; normal thirst; willingness to take nourishment and wine, and even a relish for them. Abdomen soft, and not tympanitic. Bowels not too free in the advanced stage of typhus, or in the third or fourth week of typhoid, the diarrhea which we regard as a normal, perhaps a salutary symptom in the early stage of this disease, being now indicative of extensive ulceration of the intestinal follicles.

Among the signs of danger are, a black and dry tongue, which the patient cannot protrude, or one morbidly moist clean and tremulous throughout the fever, or shrivelled dry and black; or, worst of all, a cold and retracted tongue.

Absence of thirst and disgust of food, with disinclination to swallow wine or other drink, are of bad omens;

still worse, if with these there is dysphagia, the patient coughing on each attempt to drink, and the fluid returning by the mouth or nostrils, or, in states of unconsciousness, running out of the mouth without any attempt at swallowing. Vomiting at a late period is a fatal symptom, more especially if it has been preceded by meteorism, and by loud gurgling on swallowing liquid. "In nonnullis," says Hoffman, "peculiare hoc funesti ominis symptoma visum, quod liquidum assumptum et in stomachum delatum, accidente leviore corporis commotione vel erectione tantum, iterum in os cum murmure ac borborygmo ascenderit." And Burserius mentions an epidemic of typhus in which "one would have thought the patients were affected with hydrophobia. Such was the tendency of the stomach to spasms, that they fell into convulsions on touching anything liquid, and everything they drank was immediately rejected." Among the most unfavourable signs may be mentioned, a change from diarrhea to dysenteric stools; hæmorrhage from the bowels; obstinate hiccup; sudden and severe pain in the abdomen, with tympanitic distension; green vomiting, and other signs of peritonitis. In very protracted cases of typhoid, a retracted abdomen with diarrhea, is a sign of the worst possible augury; and in the advanced stage of typhus, there sometimes occurs a sudden and copious liquid evacuation by stool—a true colliquative discharge—shortly before death.

The normal urine of fever is of high colour, and high specific gravity, containing a larger proportion of urea than in health; whenever this gives place, in the progress of fever, to a limpid colourless fluid of low specific gravity, the prognosis is *pro tanto*, unfavourable. The other unfavourable signs derivable from the urine, are, prolonged

retention; albuminous urine of low specific gravity; suppression; bloody urine; the two last, if associated with cerebral symptoms, are, I may say, invariably fatal. I can add nothing on this subject, to that which I have already advanced in my lecture upon the secondary blood contaminations, especially the urinemic.*

The perversions of the special senses are signs of great prognostic value, more especially those of sight, hearing, and the cutaneous sensibility. Taste is sometimes morbidly acute, or rather perverted; but more frequently it is totally lost in serious cases. It is always a favourable indication when the patient retains his relish for wine and beef tea; recovery has, in many instances, been heralded by an urgent demand for a draught of cold water. On the other hand, the obstinate refusal to take wine under circumstances demanding its administration, is one of the most unfavourable symptoms.

Loss of sight and double vision are most unfavourable signs; loss of hearing has been generally considered the contrary. This latter may be questioned, unless it is regarded as a contrast to morbidly acute hearing, which is decidedly unfavourable. There can be little doubt, that deafness coming on at a very early period of typhus, is decidedly unfavourable.

Cutaneous anesthesia and hyperesthesia, are both unfavourable prognostics, when occurring in combination with other symptoms indicating lesion of the nervous

* Burserius enumerates among the fatal signs "thin crude urine not depositing a sediment, and not turbid; or black urine; or having a black or reddish sediment, in consequence of its mixture with blood. Likewise, permanent suppression proceeding from defective secretion."—*Institutes*, Vol. iii.

system, as, when hyperesthesia is accompanied with green vomiting and muscular rigidity, in cases complicated with cerebro-spinal arachnitis; or, when anesthesia is present with absence of thirst, dorsal decubitus, dusky skin, stertorous breathing and stupor. In the worst cases, we sometimes meet with a combination of both anesthesia and hyperesthesia; the patient being insensible to cold or to thirst, to the action of the bowels or to that of the bladder, as well as unconscious of the presence of surrounding objects; yet screaming when handled, or when an attempt is made to turn him in bed.

In order to draw any prognosis from the alterations in the consciousness, or the intellect, you should carefully distinguish between those which are due to the simple operation of the fever-poison on the brain, and those—far more formidable—which arise in cases of active congestion, or in secondary blood contaminations. Much and careful observation will be required to enable you to recognise these several states; however, I shall not now repeat what I have already said on nervous complications, but merely enumerate some of the most unfavourable symptoms of this class. I may remark, then, that heightened states of consciousness, such as excited manner, watchfulness, acute hearing, &c. are considered of unfavourable omen. The same may be said of delirium, if combined with cerebral respiration, with cerebral vomiting, spasmodic rigidity of muscles and cutaneous dysesthesia; if it be violent in the early periods of typhoid, or the latter periods of typhus; if associated with convulsions, or with stupor—a frequent combination in some of the worst cases—or with prolonged watchfulness, more especially when the patient has been previously subjected to some severe

mental or emotional excitement, or depressing influence; if it is of a hysterical character, in the case of a female in whom menstruation has been arrested or suspended, at about the period of access of fever, by mental shock or exposure to cold; or, lastly, most unfavourable when it is associated with symptoms of lesion of those important centres, which preside over the automatic movements of the heart, the diaphragm, and the stomach, and which regulate the temperature. I need not tell you, that you will recognise these latter in the sinking of the temperature of the body, the irregular and sighing respiration, the weak, fluttering, and irregular pulse, with, probably, a jerking tumultuous action of the heart; also, in the tympanitic belly, hiccup, and dysphagia of the advanced stage of fatal typhus—all pointing to lesion, more or less profound, of the automatic nervous centres, rather than to the less serious derangements of the cerebral hemispheres; and justifying the observation, that of all the local lesions in typhus, the most fatal is that involving the medulla oblongata.*

The signs which portend a fatal termination from septic condition of the blood, are, musky or cadaveric odour of the body; changes in the colour of the surface, to yellow, livid, or leaden tint; or a mixture of these. Conversion of the fever rash into petechiæ, often, after the rash has

* "Although the patient should be insensible to all external objects; although he should sleep very little, or scarcely at all; yet if the deglutition and respiration remain unimpeded, the patient is not to be despaired of; it happens even most commonly that he recovers. But if he respires with great difficulty, or hardly at all; or if the deglutition be almost totally prevented; or if attempting it throws the patient into convulsive contractions, he rarely survives."—*Fordyce, Third Dissertation on Fever, p.* 111.

disappeared, giving rise to the idea of a fresh eruption; subcutaneous extravasations of blood; hæmorrhages from mucous membranes; sudden discharges from the bowels of copious fœtid liquid stools; extreme tympanitic distension of the abdomen, hiccup, &c. &c.; all point to a fatal end; and whether occurring in typhus or typhoid, the prognosis is equally lethal.

The prognostic indications derived from the effects of treatment, past and present, may be briefly mentioned:—

If the patient has been subjected to active lowering treatment, more especially to continued purging before he comes under your care, be very guarded in your prognosis. I have very often known a fatal result quickly produced by a large dose of salts, sometimes by a violent emetic, administered several days after the commencement of fever. The indications which you obtain from observing the effects of your own remedies, will be chiefly derived from those of wine, or other stimulants; of opium, or other narcotics. If wine agrees with your patient, as evidenced by a fall in the pulse, increased warmth of the general surface, tendency to sleep, &c., he will, in all probability, do well. If, on the contrary, it produces poisonous effects, such as increased determination of blood to the head, the extremities becoming cold and the head hot, the heart's impulse strong and jerking, and the pulse weak and thready, it is a bad omen. The same may be said of opium. I never remember to have seen a patient recover, in whom furious delirium resisting the calmative influence of opium, passed into stupor resembling that caused by its poisonous action; realising Hoffman's description of the effect of narcotics in fever: *ad mortem aditum parant, placidum quidem, sed certum.*

Another indication which deserves mention, is the inefficiency of blisters, which is sometimes observed in states of profound insensibility. Lastly, I may again mention, the fatal sign of rejection of nourishment or wine, by vomiting, at an advanced period of typhus.

It only remains for me to enumerate a few prognostic signs observable at, and subsequent to, the period of crisis.

In typhus—a disease so variable in its accidental complications, and so subject to exacerbations at its critical period—while we bear in mind, that the result can never be determined before decisive crisis, we augur well of the issue of the crisis, if it occurs at a normal period, if the eruption has previously faded, and if the heart has not become abnormally excited. Prognosis is also favourable, if, at the period of crisis, no excessive evacuations by the skin and bowels occur; if the patient falls asleep, and continues to sleep with little or no interruption for many hours, showing, in his waking intervals, a sensibility to thirst, to cold, and other external impressions; and if, at the same time, he freely swallows. A desire for cold water at this period is a most favourable prognostic sign; another, is the voluntary drawing-up of the bed-clothes over the shoulder. Even before the patient has become conscious of the sensation of cold, a favourable augury has sometimes been drawn, from the contraction of the dartos upon exposure of the surface.

The following are also favourable signs at this period. Should the patient, on awakening, be found to have lost the expression of drunken slumber characteristic of typhus, the eye being bright and intelligent; the features placid, and the muscles no longer tremulous; if the heat is

natural; the skin soft; the respiration easy; the pulse soft, full, and less frequent; and the tongue protruded steadily, expanded and moistening at the edges.

Similarly, in typhoid, during the third and fourth week, we anticipate a favourable change, when delirium subsides and sleep becomes tranquil and prolonged, diarrhea ceasing, and the daily eruption of rose spots declining at the same time. A favourable termination is also to be expected, when the bronchitic affection of this period is moderate, and the pulse loses its dicrotous character, and becomes distinct, full, and soft; when the urine presents well marked deposit, the tongue becomes clean at the edges, and the skin gently moist; and, lastly, if there be no fulness or pain of the belly or tenderness over the ileo-cæcal region, and no tendency to return of diarrhea or vomiting.

But in typhus, should critical evacuations occur prematurely or to an excessive amount, without resolution of fever; should visceral complication, cerebral or pulmonary, remain after a decided critical effort; should obstinate pervigilium and impulsive delirium, with tremor or subsultus, or obstinate diarrhea with increasing emaciation, follow upon crisis; or should petechiæ appear after crisis, the prognosis is unfavourable.

In typhoid, it is, in like manner, unfavourable, when the intestinal affection continues with severity after the fever. Perforation is then too apt to occur, but even without this lesion, the symptom is most formidable, especially if accompanied by a harsh, dry condition of skin, and wasting of the body. Should the catarrhal affection, after having yielded, re-appear, with a rapid pulse and a tendency to hectic, the supervention of acute

phthisis is to be apprehended, more especially, if the physical signs of dulness on percussion, sibilant and crepitating râles, &c. present themselves.

Of the prognosis in the two forms of fever, at this period, it may be said, that of typhus is simple, easy, and certain, as compared with that of typhoid; for the latter involves, besides other risks, the conditions and termination of an affection latent in its symptoms, and little influenced for good by treatment—ulceration of the intestinal follicles. Perhaps more cases of perforation occur during convalescence than during fever, and then when least expected; thus, of twelve cases reported by Chomel and Louis, two only occurred in severe fever, ten in the milder form. I remember a fine, previously healthy country girl, who had passed through mild typhoid fever in hospital. She was, one day, sitting in bed combing her hair, and was in the act of laughing at something said by a fellow-patient, when she was suddenly seized with a sharp pain in the abdomen, indicating the occurrence of perforation, and the commencement of peritonitis, of which she died on the following day.

Dr. Anderson relates that, on one occasion, there was a patient in the Glasgow infirmary, who appeared almost convalescent. He was visited by the doctor in the evening, and made no complaint; the first person who entered the ward in the morning found him dead. On inspection, his death was discovered to have arisen from peritonitis, in consequence of a perforation of the bowel, "which," says Dr. Anderson, "must have happened after the evening visit."

These, and similar facts, should make you very guarded in your prognosis in all cases of typhoid fever, as well as

most careful in your treatment, and strict in your injunctions with regard to food and management. I should not omit to mention that you will sometimes derive valuable assistance at this period from the thermometer. Thus, Dr. Aitken states, on the authority of Dr. Parkes, "that a sudden and marked reduction of temperature, has indicated the occurrence of hæmorrhage from the sloughs of Peyer's patches, in typhoid fever, several days before blood appeared in the stools." The same writer also warns us, that the morbid process in fever cases has not terminated, till the normal temperature of the body returns and remains unchanged in the evenings and throughout all periods of the day. The persistence of a high evening temperature in typhus or typhoid fever, and its incomplete subsidence after crisis, indicates incomplete recovery, supervention of other diseases, unfavourable changes in the products of disease, &c. The onset of even a slight elevation of temperature during convalescence, is a warning to exercise careful watching over the patient, and a due control over his diet and actions.

Of the prognosis at and after the critical period, in relapsing synocha, it is not necessary to say much. I may remind you of the risk of fatal uremic poisoning, arising from what may be termed excessive *perturbatio critica*, and the consequent accumulation in the blood of effete material —the product of excessive disintegration—to an amount which the excreting organs cannot eliminate, and this, notwithstanding a perfectly healthy condition of the kidney. You should also remember, that no matter how complete the crisis may appear to be, relapse may occur again and again. I believe that you will not, in any case, be able to say it may not occur, but that there is a

condition in which you can say, with all but certainty, that it will do so. I refer to the continuance, after crisis, of congestive enlargement of the spleen. The prognosis in the second attack is, of course, more doubtful than it was in the original fever; and the data will differ, if, as not unfrequently happens during the epidemic periods, the relapse assumes the character of typhoid fever.

I think I have now enumerated most of the data, upon which you should found your *estimate of the tendencies* to one or other termination in any given case of fever; and, in conclusion, I would urge you, to devote much of your attention to the study of prognosis in this sense, rather than in that of *predicting results*. You may collect, from observation or books, a large number of empirical prognostic symptoms and signs, and, by employing these judiciously and fortunately, you may acquire an ill-founded reputation for prescience and sagacity. On the other hand, the study of rational prognosis, as I have endeavoured to set it before you, will enlarge your knowledge, and render it accurate with respect to the phenomena of the disease, its laws, and the conditions which influence the patient's resistance to it; and with the development of that knowledge will most certainly increase, your care and caution in the treatment of the emergencies arising during the course of fever, and in your calculations of the chances of recovery or death.

To sum up our observations on this portion of the study of fever.

I. In fever, as in all self-limiting diseases, rational prognosis depends upon our combining the most comprehensive diagnosis of the disease in its nature and tendencies, with an estimate of the amount of resistance to its

action of which the patient's constitution is capable; and with a similar estimate of the influence of surrounding hygienic conditions and medical treatment.

II. That with regard to the disease we have especially to keep in view—

(*a*) The character of the epidemic.

(*b*) The type of the fever, and what complications are most likely to occur during its course.

(*c*) The dose of the poison, in other words the severity of the disease *per se*.

(*d*) The conformity of the symptoms at any given time to those of the typical fever at the same period; any exceptional or unusual symptom being an unfavourable prognostic sign.

(*e*) The occurrence of secondary lesions.

(*f*) The phenomena of crisis, and the existence of symptoms indicating a tendency to one or other termination at this period.

III. With regard to the patient's power of resisting the operations of the disease, and surmounting the perils of crisis, our data comprehends—

(*a*) The age, habits, and occupation of the patient.

(*b*) His present moral, mental, and hygienic conditions.

(*c*) The condition of the vital organs, at the time of seizure.

(*d*) The state of the nutritive functions, more especially with reference to the balance between waste and repair of the entire system, or of any particular organ.

(*e*) The previous medical treatment, if any.

IV. You should bear in mind, that with all your care to avoid miscalculation of the probabilities in any given

case of fever, its result will frequently fail to correspond with your anticipations.

No matter how comprehensive may be your review of the conditions which influence the patient or the disease; or how great your caution in estimating the vital energy and power of resistance of the one, or the gravity of the other, and of its secondary lesions; you will often experience the truth of the well-known axiom: that, "Inasmuch as it is impossible to predict anything with certainty, so long as we remain unacquainted with any of the conditions of a given event, and ignorant how they may act in a particular instance: and, *as in the living body, no occurrence or effect ever does take place constantly, or in the same manner at all times; we can never with perfect certainty predict any occurrence or effect whatever.*"*

* Œsterlen, Medical Logic, p. 129.

LECTURE XIV.

TREATMENT.

In entering upon the last portion of our subject, namely, the consideration of fever, as presenting rational general indications of treatment common to all forms, and special indications for different forms and complications,* I have again to remind you, that these lectures are not didactic descriptions of fever or of its treatment. Therefore, you must not expect from me a code of directions for the management of each species of the disease. In other words, you must not expect that I shall lay down a routine system, such as you will find in class books, or offer you suggestions for every emergency that may arise in the progress of a given case. All that I propose is, to offer you a guide to the study of treatment at the bedside, by placing before you the principles upon which the management and general medical treatment of each form of fever is founded; and the special indications which are presented by each secondary lesion or complication. Thus far only can definite rules of practice be observed; for in no disease will you be more frequently compelled to depart from routine, and to accommodate your measures to the exigencies of the case, taking these, and principles, as your only guides.

As a preliminary step to this study, you must divest

* Lecture (I.)

your minds of the idea, that we possess any means of curing fever in the strict sense of the term.

It has been justly said: "You can no more cure a fever than you can quell a storm; but you can guide a case, as you would guide a vessel through the danger."

It may be your duty in some cases, to attempt to cut short the disease, in the period of access, by a shock; while in others, the patient may be saved by active interference during the last paroxysm. But these are exceptional instances; and during the course of the fever, your duty will be to watch its development, and to wait upon nature; abstaining from all injudicious interference with her operations, while you carefully note any aberrations from the normal type of the disease, and meet such complications as may, from time to time, occur; always remembering the axiom, that, in the treatment of fever, "The physician has constantly to bear in mind, not only what he *now has* to do, but also what he *may have* to do."

The general management of a case of fever seems based upon the consideration of its nature as a morbid poison; its conformity to the laws of such; and its tendency, under certain conditions, to be aggravated by secondary blood contaminations during its course.

The special treatment of any case will depend upon, (*a*) the special affinities of the poison; (*b*) the nature and extent of the secondary lesions; (*c*) the tendency to one or other mode of termination—which will peculiarly influence the treatment of the last paroxysm, or period of crisis. The management and treatmeut of the period of convalescence also demands our special consideration.

The term poison, naturally suggests the idea of an antidote. As, however, the action of the fever-poison is not,

like inorganic poisons, definite and limited in extent and duration, but is the result of a catalysis—setting up a change in the blood, which, extending to every molecule of the body, increases and perpetuates itself—there can be no antidote in the true sense; in the manner, for example, that lime-water is an antidote for oxalic acid, or white of egg for corrosive sublimate. We endeavour to dilute and render the poison harmless, by the free admission of pure air: the oxygen of which, moreover, combining with the products of regressive metamorphosis, prevents their accumulation in the blood, and thus averts the consequent secondary contamination of that fluid, which constitutes a great source of danger in the advanced periods of the disease.

But admitting that we have no antidote, the question arises, have we any means by which the operations of the poison, once set up, may be arrested, shortened, or modified, if these measures are employed at an early period.

In other words, does the consideration of the primary actions of the fever-poison—as I sketched them in my first lecture,—and of its tendency to be eliminated by certain excreting surfaces, suggest any measures, which, by producing a shock, shall thus aid the efforts of nature to unload the right cavities of the heart, remove the stasis in the capillaries, restore the balance of the circulation, and, at the same time, arouse the moderating nervous centres from their state of partial paresis—thereby restoring the impaired functions of respiration and molecular nutrition—while the elimination of the poison by its natural outlets, shall be, at the same time, facilitated.

Obviously, if it were possible to effect these objects,

fever would be arrested; or, at least, so modified, as to become slight in amount, and short in duration.

I believe that hundreds of cases of fever have been thus arrested, chiefly by three measures which medical fashion—rather than reason or experience—has long since consigned to comparative neglect. These are, blood-letting, emetics, and cold affusion.

With regard to the last, which may be said to have passed into complete disuse, I think no one can read the statements of Dr. Currie, and entertain a doubt that fever can be, by this means, arrested in its initiatory stage, however much we may doubt the prudence or propriety of the treatment under ordinary circumstances.

Of the efficacy of blood-letting and emetics in arresting fever, Dr. Graves thus wrote:—"If I were called to visit a patient who had been attacked with shivering, headache, quickness of pulse, increased temperature of skin, and lassitude, during the prevalence of an epidemic, or after exposure to contagion, and happened to see him a few hours after the attack, I should certainly bleed him and administer an emetic; and I think he would have a very good chance of escaping the disease."

"I have myself witnessed many cases in private practice, of medical men and students, who had been attacked with symptoms of fever after the exposure to contagion, and who escaped by taking an emetic, and being bled in proper time."*

Having frequently, in the course of my life, employed these measures in the instance of persons suffering the symptoms Dr. Graves here enumerates, and in whose

* Clinical Medicine, Vol. i., second edition, p. 138.

family, fever, at the time, existed, I can state that I have, as a rule, found them to succeed, if employed within the first twenty-four or even thirty-six hours after seizure.

I think that when tried, they should be employed together: first a moderate bleeding, six, eight, or ten ounces, according to age and constitution—and immediately afterwards the emetic. The bleeding should never be employed alone, but, if only one of the measures is chosen, it should be the emetic, and neither ought to be attempted after the period mentioned, as they are then, both, not only useless, but unsafe.

Before I enter on the question of the modus operandi of these measures, I should acknowledge, that high authorities have discountenanced their employment, Thus Sir T. Watson observes—"In the few instances in which emetics or cold affusion have seemed to arrest fever, or to check its progress, that effect has always occurred at the very commencement of the complaint; so that, we cannot be sure (and the probability is the other way) that they were really cases of fever at all, or that they would not have ceased, even although nothing had been done for them."

The late Dr. Todd uses similar language: he says, "All the cases in which it has been said that the typhus has been cut short by a very large bleeding at the outset, or by free vomiting, or by some other means, are fairly open to the strong suspicion, if not to the charge of erroneous diagnosis.

"It is plain, if you think on the subject for a moment, that without an exact diagnosis, this question of the early curability of typhus cannot be settled. Now those who have seen most of this and other maladies, know best how

difficult, nay, how impossible, it often is in the first week or ten days to predicate with certainty of this or that case, that it is typhus fever. And therefore, if you deal candidly with yourself and others, you must not affirm that you can cut short and cure typhus, unless you have the most unequivocal evidence that the cases in question have been examples of that disease."

Another writer of less authority, carries the same argument to an absurd length.

"Emetics may, perhaps, have the effect of sometimes limiting the duration of simple and catarrhal fevers, or may render them milder, but in typhus, they have no such effects, for no unequivocal case of the disease, such as one having the typhoid eruption, has ever been brought forward where such has been the result."

In other words, no case has been produced of typhus with eruption, say on the sixth or seventh day, which had been arrested on the first or eve of the second.

Our answer to the objections of Drs. Watson and Todd, is, that these would be conclusive, if medicine were an exact science; and if the physician was bound, in all cases, to abstain from curative measures until the nature of the disease was ascertained. But such, unfortunately, is not the case; and, inasmuch as our primary duty is to save life, we are bound to disregard reasoning so purely theoretical and speculative, and to attach their due weight to considerations which we may think warrant the practice in question.

One of these, is the great amount of probability, that a person exposed to the contagion of typhus will contract typhus rather than simple catarrhal, ephemeral fever. If under the circumstances I have mentioned, an individual

presents the symptoms enumerated by Dr. Graves, the chances are many to one, that the subsequent illness will be that to which he has been exposed. If to scarlatina, scarlatina; if to typhus, typhus.

The other consideration is, that there is nothing in the nature of typhus which must needs prevent it from being arrested, shortened, or modified, by such measures as are capable of producing the effects, I have before enumerated, upon the heart, the capillary circulation, the nervous system, and the nutrition.

Of the modus operandi of blood-letting in the congestion of the right cavities of the heart, which forms one of the primary conditions in fever, I need only say, that the experiments of Dr. John Reid and other physiologists, have conclusively proved, that the abstraction of even a very small quantity, from the overloaded auricle and ventricle, arouses their contractions, when these are rendered languid or altogether suspended by the action of narcotic poisons; and that there is every reason to believe, the same remedy has a similar efficacy in the overloaded and sluggish condition of the right side of the heart in the early stage of typhus.

The action of an emetic produces, in a different way, a similar effect. During vomiting, the right cavities are unloaded, the pulmonary circulation aroused, and the respiration at the time rendered more perfect.* The influence of this change is at once felt by the systemic capillaries, the capillary circulation being also aroused, and diaphoresis following. The portal circulation is likewise

* It is thus, the remarkable efficacy of emetics in the bronchitis of children, attended with atelectasis of the pulmonary lobules (wrongly termed lobular pneumonia) is to be explained.

stimulated, and increased secretion of bile takes place. The nervous centres feel the influence of the active circulation of a more highly oxygenized and purer blood. I say purer blood, because there can be little doubt, that the action of an emetic, is, to some extent, eliminative of the poison, in consequence of the power possessed by medicines of this class, of attracting the poison to the gastric mucous membrane.

The marked success of the emetic treatment in arresting the progress of typhoid fever, led Dr. Chambers to argue that the poison is carried directly into the stomach with the saliva. "At an early stage," says Dr. C., "even after the virus has begun to act upon the system, the fever may be stayed by emptying the stomach, and thus preventing the whole dose being taken up. Those who have watched my practice, will have witnessed several instances of the success of this treatment; they will have seen the fever cut short, and convalescence entered upon immediately, with its characteristics of painless weakness and emaciation gradually passing away."*

I need not tell you, that while I accept Dr. Chambers' testimony to the success of the emetic treatment, I entirely dissent from his views as to the modus operandi of the remedy.

Of other eliminant medicines, two have been employed, namely, sudorifics and purgatives.

I have long been accustomed to follow up the action of the emetic, in the early stage of fever, by giving, at intervals, a combination of James' powder, and nitrate of potass, usually adding to the first dose a grain or two of calomel.

* Lectures, chiefly clinical, 4th edition, p. 75.

The exhibition of three grains of the antimonial, and ten or fifteen grains of nitre, every four hours after the emetic, is pretty certain to cause copious diaphoresis, continuing as long as the administration of the medicine is persevered in, which should be for at least twenty-four hours.

I have seldom trusted to this measure alone, but have heard of many cases, in the practice of others, in which large doses of James' powder, producing copious and long-continued sweating, had apparently cut short fever.

Once, however, the disease is established, no practice can be more injurious, than either the emetic or diaphoretic, unless it be the purgative.

I think it may be safely said, that no treatment is calculated to do so little good, or so much harm, as the free exhibition of active purgatives at the commencement of fever. By these, I do not mean medicines that simply unload the bowels of their contents, but such as produce copious fluid evacuations, the greater proportion of which is derived from the blood. In and out of the profession, this abuse of purgatives prevails.

Among the worst cases admitted into hospital, are those of patients who have been dosed with salts by themselves or their friends. Of the practice of a certain class of practitioners, you may judge, by a quotation from one of the writers, whose objection to the preventive treatment by vomiting I have already referred to. "In the commencement of the disease," says this writer, "one or two brisk purgatives, such as the compound powder of jalap, with two or three grains of calomel; or castor oil combined with the same mercurial salt, will, if repeated at the interval of two or three days, be found useful in unloading

the primæ viæ, and in promoting several of the secretions; but large doses should not be persevered with, if the patient be of a weak habit of body, be cachectic, or be advanced in years. In ordinary cases, after one or two brisk cathartics, a moderate dose of castor oil, infusion or fluid extract of senna, or other mild purgative, every second day, will be sufficient to unload the bowels, without causing *much watery evacuation.*"

I give you this quotation as an average specimen of the practice of a certain class of medical men. The objections to it are: first, that there is, perhaps, no instance known of fever being arrested by purgatives. Next, that if they modify the disease, they will do so injuriously, by exciting irritation of the intestinal mucous membrane, and thus producing obstinate diarrhea and tympanitis; or, by causing the draining off of the serum of the blood, and thereby producing, in come cases, cerebral exhaustion, manifested, occasionally, by delirium and convulsions; in other cases, by congestion of the kidneys and albuminuria, and, again, in others, leading to the formation of fibrinous coagula in the heart. I have no hesitation in saying that you should never attempt to arrest or shorten fever by the exhibition of purgatives.*

* On this subject, Sir H. Marsh remarks, "Severe purgatives at the commencement of fever have done much mischief. How often do patients, even those of the medical profession, imagine, that if they can but succeed in being well purged, all will be well. Thus is the surface of the intestinal canal often dangerously irritated, great debility induced, and the disease, instead of being mitigated, rendered far more formidable."—*Essay on the Origin of Fever.* Dublin Hospital Reports, vol. iv.

Dr. E. Percival, in his admirable essay on the epidemic fevers of Dublin, observes—"I am far from recommending the practice of purging severely at the commencement of fevers. Some of the

You will, however, have very few opportunities of attempting the arrest of the disease, as it seldom comes under the notice of the physician, until the period of such interference has passed, and when the attempt would certainly be injurious.*

I have said that we have no antidote for the fever-poison. This is doubtless true, and yet our general treatment and management of a fever patient is quasi antidotal; or based upon the *idea* of an antidote. We carry out this idea through the following indications, which may be said to comprise most of the details of such management and treatment.

I. *To prevent the augmentation of the poison in the blood*, by removing the patient from an infectious locality, or from a situation in which he cannot obtain a due supply of pure air. Among the poorer classes, this is done by removal from their wretched, over-crowded, and, too often, filthy dwellings, into the large and well-ventilated fever wards of

worst cases which I have witnessed have been those of young medical students, who, in their eagerness to evacuate their bowels, have brought on hypercatharsis on the second or third day of their fever, with very alarming consequences, &c.;" and Dr. Graves says, "The abuse of purgatives, particularly in the first stage of fever, continues, I am sorry to state, even to the present day, a blot on the character of practical medicine."

This abuse of purgatives, and the reasons for their non-employment, were long ago pointed out by Baglivi, in a passage too long for quotation.—*De Praxi Medica*, p. 135.

* Probably the strongest argument against the employment of the above measures is the difficulty of determining the time of seizure, and the uncertainty of the exact duration of the disease. I should never myself attempt to arrest a fever unless I were satisfied upon these points, by the sudden and marked nature of the access, and the entire absence of previous indisposition.

our hospitals. Among your private patients of the richer class, you will occasionally have to resort to similar measures. For example, by removing them from a close, ill-ventilated, musty-smelling chamber, stuffed with furniture, from which the light and air are excluded by closed shutters and window curtains; and from feather beds covered with thick blankets, the bedsteads four-posted, canopied, and surrounded by curtains—to large and airy apartments, well lighted and free of all unnecessary furniture, there to be laid upon hair mattresses, firm and elastic, not surrounded by curtains, but supplied with firm pillows, and with but scanty bed clothes—at least in the earlier periods of the fever. I have often seen immediate improvement and rapid recovery follow the change thus made; the patient, previously both restless and wakeful, racked with headache and weariness, falling into a quiet sleep, and progressing favourably from that moment. Having thus arranged the bed-room, you have next to lay down rules for the daily management, which should in all cases be carried out, not by the patient's friends, but by trained nurses, whom you should instruct to admit freely air and light into the room; to observe perfect quiet, avoiding all conversation with, or in the hearing of, the patient; and to take care that while daily ablutions are regularly and freely performed, and the bed linen frequently changed, yet, that everything should be done without the least exertion on the part of the patient. The experience of physicians of all ages has proved the importance of this; the only difference being, as to the rationale of the practice. Thus, while Cullen lays down as a rule that "all motion of the body is to be avoided, especially that which requires the exercise of its own muscles," since "it is to

be observed that every motion of the body is the more stimulant in proportion as the body is weaker:" physicians of the present day enforce it, on the ground, that during fever, all exercise of the brain or muscles produces an amount of disintegration of tissue, vastly out of proportion to the amount of such exercise—probably the more excessive the more advanced the fever—by which the secondary blood contaminations of the advanced stage are rendered more formidable and dangerous.

II. You should not only take every precaution to prevent the augmentation of the fever-poison, but also use such measures as may fulfil the second indication, namely, *to moderate the increased disintegration of tissue*, which it is in the nature of this poison to set up. Thus, you should supply the daily waste by suitable nutriment, and at the same time aid, so far as may be in your power, the daily elimination of the products of waste from the blood—bearing in mind the aphorism, "Impura corpora quo plus nutriveris eo magis lædes." Experience abundantly proves, that wine and nutriment best produce their salutary effects, when conjoined with pure air, cleanliness, and cold water; and that they act more or less as poisons when these latter measures are neglected. Given with this precaution, liquid nourishment, such as milk and beef-tea, wine, or brandy, supply the materials of repair, and retard disintegration of tissue. I say liquid nourishment, because the stomach of a fever patient is incapable of properly digesting solid food; with the exception, therefore, of a small quantity of bread given with tea, or of a cupful of panada, we do not administer solid food in fever.

The quantity of food and wine administered to a patient in fever, will, of course, vary with the varying circum-

stances of the case. In the earlier periods, it is a good rule, as laid down by Dr. Graves, to conform to the habits of the patient, and to give food as nearly as possible at the hours at which he has been accustomed to take it. As the disease advances, and the tendency to sinking of the vital powers increases, this rule must be disregarded; and beef-tea and wine must be given at shorter intervals. Even then, however, I think it a mistake to give the former more frequently than every two or three hours; nor need the quantity in the twenty-four hours exceed two pints on the average. To this may be added a cup of tea for breakfast, and milk or whey at intervals.

With regard to the exhibition of wine, no precise rule can be laid down: some patients do not require any, others are positively injured by it; in many cases it is our great remedy, and must be given in any quantity that may be required. Above all things you should avoid giving it by routine; but as in all other forms of treatment, you must be guided by rational indications. Wine seems to fulfil three important indications in fever: (1) to sustain the cardiac and capillary circulation; (2) to exert both a stimulant and calmative action upon the cerebral hemispheres, quieting some forms of delirium by the former quality, and producing sleep by the latter; (3) to sustain vital power at the period of crisis. Besides these, its more obvious forms of operation, we believe that wine, or brandy, fulfils also a most important indication, in many cases, by retarding that increased disintegration of tissue which the decomposing action of the fever-poison sets up in the organism. In accordance with the above views, wine will be found especially useful when the heart is weak, the capillary circulation languid, and the temperature uniformly

low; not, however, that an average range of febrile heat is any objection to its use. In the delirium of exhaustion, or in that form of low muttering delirium, resembling delirium tremens, attended with restlessness, watchfulness, and confused perception of surrounding objects, wine calms the patient and induces sleep. The extent to which it may be administered in the first instance, and subsequently continued or increased, will depend—the one, upon the condition of the patient's circulation; and the other, upon the effects of the remedy. If the heart's action is feeble, the first sound weak and shortened, approaching the fœtal character, the pulse soft, weak, and compressible, wine may be freely prescribed—the more so, if there is absence of any symptoms of active congestion of the brain. Your decision on this point may be strengthened by several concurring conditions. Such are—(*a*) The character of the epidemic; no one who has had long experience in fever, or who has carefully read the records of past epidemics, can doubt, that in some of these wine has been more beneficial and borne in a larger quantity than in others. (*b*) The age, habits, and idiosyncracy of the patient; the child rarely needs it; the periods of adolescence and early manhood are those in which its beneficial effect is the most striking; in the aged it should almost be given, generally, from the commencement, although, with them, its beneficial influence is less felt than in earlier life. As might be, *a priori*, expected, the temperate are the most benefited by it, and its ill effects are the most apparent in the habitual drunkard. (*c*) The desire or aversion of the patient; wine seldom disagrees with one who craves for it, or agrees with those who loathe it. As a rule, the quantity requires to be increased gradually up to the period of perfect crisis, or

commencing convalescence. You will do this with confidence if the following effects upon the circulating and nervous systems are produced: if shortly after its administration the pulse becomes fuller and slower, the heat of surface more equable, and, above all, if the patient falls into a sound sleep. Under these circumstances, should the patient ask for an increased quantity, his wish may be safely indulged. But you will either withhold from the first, or afterwards withdraw wine or brandy, if the patient presents the symptoms of active congestion of the brain—if, for example, the brow is hot and corrugated; if there is green vomiting, a pink sclerotic and injected conjunctiva; if the delirium is violent and impulsive; or if there is a tendency to stupor, with cutaneous hyperesthesia, and spastic rigidity of muscles. Should these, or similar symptoms, come on under its administration, the pulse becoming rapid, and weak in proportion to the heart's impulse, the head hot and the extremities cold, the urine pale or suppressed, the delirium violent, or should a tendency to stupor manifest itself, wine or brandy must be withdrawn at once. It should be observed, that, like food, wine should be given with some regard to the habits of the patient; and that in general it produces its best effects when given in the after part of the day and during the night. Like food also, it should be given at moderately long intervals during the course of the fever, up to the time when its stimulant action upon the nervous system is needed from hour to hour, until the crisis be past.*

* The importance of this change at the approach of crisis cannot be over estimated. "Perhaps," says Sir J. Pringle, "there is no rule more necessary, than not to let the patient, when low, remain long without taking something cordial or nourishing, as I have

Scarcely second in importance to nourishment, in the fulfilling of this indication, is sleep, of which Dr. Carpenter says :—"It is a peculiar feature in the physiology of the cerebral and sensorial ganglia, that their activity undergoes a periodical suspension, more or less complete; the necessity for this suspension arising out of the fact, that the exercise of their functions is, in itself, destructive to their substance; so that if this be not replaced by nutritive regeneration, they speedily become incapacitated for further use."

Taking physiology as your guide, you will, from the first, endeavour to secure the periodic return of sleep; not always by the exhibition of narcotics, but by the judicious management of the patient with reference to this function.

The first and most essential measure, as forcibly insisted on by Sir D. Corrigan, is to preserve the *habit* of sleep, by marking the alternation of day and night; freely admitting light, as well as air, in the day time, and only shading the patient's eyes with a curtain or blind, if the light is uncomfortable to him; avoiding over-heating the bed-chamber—a too common practice with friends and nurses, one certain to give rise to restlessness, and to

seen men once in a promising condition sunk past recovery, by being suffered to pass a whole night without any support about the time of the crisis. In the advanced stage of this fever the sick are remarkably low, and therefore Hoffman rightly advises, in such cases, that they should be kept constantly in bed, and not permitted even to sit up in it. In the last stage of this disease, as well as in that of the sea-scurvy, it should seem that the force of the heart is too small to convey the blood to the brain, except when the body is in the horizontal posture."—*Observations on the Jail or Hospital Fever*, page 318.

prevent sleep. Lastly, perfect silence should be observed during the hours of sleep. There ought to be no fussiness; no creeping about the room adjusting articles on the table, and moving furniture; no conversation or whispering; and the patient must be permitted to rest for at least four hours at a time, during the earlier period of fever, unless in exceptional cases, without disturbing him either to give food or medicine.

As you will find, that the anxiety of the patient's relatives will certainly interfere with the carrying out of the above injunctions, you will do well to supersede them, at all events during the night, and to place your patient under the care of an experienced nurse.

In addition to these points of management, there are some measures likely to induce sleep, which you may employ during the earlier stages of fever. One of these is warm sponging of the head; another, stuping the legs and feet with flannel wrung out of hot water; and a third, is the application of a few leeches to the temples or behind the ears. The latter practice was recommended by Dr. Graves, subsequently by Sir D. Corrigan; and I have seen it followed by the best effects, in calming excitement, relieving headache, and procuring sleep.

The second part of the above indication is liable to misconstruction, and therefore needs explanation. While I maintain that you should facilitate the elimination of the products of disintegration, I wish you to understand that this is not to be done by the use of evacuants during the course of fever. These cannot do it; on the contrary, the class of purgatives most usually employed for the purpose, have the effect rather of increasing disintegration of the

blood itself, and producing the consequences I have before enumerated. The measures you may employ for the purpose are:—First, the constant admission of pure air for respiration, and, so far as may be consistent with the patient's comfort, its admission also to the surface of the body. This is a practice which has been strongly recommended by Sydenham, and other old writers on fever;* and you may at any time witness the striking effect upon the colour of the eruption, and upon the capillary circulation, by removing a portion of the bed-clothes, and leaving the patient covered by a single sheet.

On the other hand, you will see the effects of a deficient supply of oxygen, in the dark colour of the skin and maculæ of patients confined in small, over-heated, and deficiently ventilated rooms; or in crowded ships, prisons, or dormitories; and sometimes in the over-crowded wards of hospitals.†

* Thus Sims observes:—"One of the things which had great and immediate good effects at the height and worst time of the disorder, was the application of cold air. During the first stages indeed, the cool regimen was strictly enjoined, the curtains of the bed were undrawn; the quantity of bed clothes lessened, the drink never suffered to be in the least warmed, the linen changed as often as moistened with sweat; and as the patients often lay in small rooms not sufficiently airy, the door was not permittted to be shut, neither was the chamber allowed to be heated by fire, nor many persons to remain in it at the same time. But in the last and virulent period, these methods seeming inadequate to the greatness of the complaint, a farther and unusual step was taken." The patient was directed to be lifted out of bed, and, with only the covering of a great coat or wrapper not kept tight to his body, exposed to cold air for a considerable length of time, often until an universal shivering or chattering of the teeth gave sufficient tokens of its having taken effect, &c.—*On Epidemic Disorders*, p. 211.

† I well recollect the terrible effect produced by this cause in an

Secondly, we aid the efforts of nature in this direction, by the internal exhibition and external employment of pure water.

The natural instinctive desire of the patient is, usually, for cold water; and I need not remind you, that the experiments of physiologists have shown this to be a great depurator. Its good effect is aided, and thirst relieved, by the addition of hydrochloric, or sulphuric acid; or of the chlorate of potass, of which I usually order two drachms to be given in the course of twenty-four hours. The same object is subserved by frequently sponging various portions of the surface with tepid water, or with vinegar and water. I shall have to refer to several medicines of the eliminant class, when speaking of the complications of the advanced stage of fever.

We have next to consider the special indications which may arise in the course of fever, and which may be due to the difference of species, and to the different pathological phenomena belonging to each.

Taking these in the order of the several functions, you will find, that the difference in the condition of the digestive organs in typhus and typhoid fevers, necessarily involves a marked difference in the dietetic and medicinal

epidemic of typhus in the county of Meath, to which I referred in my Lecture on the Etiology of Fever.

The unavoidable addition of three or four beds in each of my wards, produced an immediate and striking change in the colour of the eruption, and a corresponding influence upon the nervous symptoms, depending on increased blood contamination.

"In every fever," says Heberden, "it is of the utmost importance to keep the air of the patient's chamber as pure as possible. No cordial is so reviving as fresh air, and many persons have been stifled in their own putrid atmosphere, by the injudicious, though well meant, care of their attendants."—*Commentaries*, p. 179.

treatment. I have already mentioned the fact, that wine is seldom borne to the same extent by the typhus and typhoid patient. You see few of the former pass through fever without it, whilst many of the latter do not require any. You must also have observed, that whilst the typhus patient usually takes beef tea freely throughout the disease, our nurses constantly report that, owing to the occurrence of diarrhea in the typhoid cases, they have discontinued the beef tea, and given milk only; broths of all kinds being found to increase such a tendency in many cases of this latter disease.

The special treatment of the intestinal affection of typhoid, varies according to the stage of the fever. It being an essential and normal condition in this form of fever, the duty of the physician seems to be, not to check, but merely to moderate it in the earlier periods. With this view, we usually apply a warm linseed poultice, or a wet bandage, to the abdomen, and give moderate doses of dilute sulphuric acid, with which I usually combine one to two minims of Battley's sedative, according to the age of the patient. At a more advanced stage of the fever, the indications may be, to correct an ill-conditioned, sloughy state of the intestinal ulcer, to arrest an exhaustive discharge, and to avert, if possible, the septicemia with which these are too often combined.

Without entering into minute details, I may mention, that acetate of lead and sulphate of copper, gallic and tannic acids—all, have been employed by various practitioners for the two first objects. But in my experience, oil of turpentine, in doses of from ten to thirty minims, seems superior. Yeast has sometimes been administered with excellent effect, in septicemic diarrhea characterized

by excessive fœtor of the evacuations, which latter, then, often consist of a fluid resembling the washings of flesh, and sometimes appear like mucus streaked with blood, or containing shreddy particles apparently of sloughing mucous membrane. In this condition I have more than once given the bisulphite of soda or magnesia, with the effect, at least, of correcting the fœtor.

At this stage, you will generally find, that while the smallest quantity of animal food, in the shape of broth, will increase the discharge and the fœtor, the patient will be benefited by the free administration of old port, which may be given with spiced water, or may be added to arrow-root or sago, in the proportion of a glassful of the former to a breakfast-cupful of the latter.

If hæmorrhage from the bowels occurs, the indications are threefold, viz.: to arrest the bleeding; to support the strength; and to correct the probable septicemia. Ice, given internally, and applied locally; the astringents mentioned above—in addition to which may be suggested alum, Ruspini's styptic, and ergot—are the measures to be most relied on for the first indication. At the same time, enemata of acetate of lead, tannic acid, or oil of turpentine should be administered. For the second indication, wine freely administered, as also, brandy, opium, and beef essence. For the third indication, if such a condition coexists with hæmorrhage, little can done; but you may try large doses of the tincture of the perchloride of iron, of dilute sulphuric acid and sulphate of iron, or of the bisulphites of soda and magnesia.

You will find treatment of any kind of little avail, in the event of perforation of the bowel causing peritonitis. The indications, you should bear in mind, however, are:—

if possible, to arrest the escape of the contents of the bowel into the peritoneal cavity; to circumscribe the inflammation of the serous membrane; to support the patient's strength, and relieve pain when present. All these indications are best fulfilled by opium, which should be administered in full doses, and frequently repeated. Opium controls and retards the peristaltic action of the intestine. More than any other therapeutic agent, it limits the extension of the inflammation of the serous membrane. It relieves pain, procures sleep, and acts as a cordial, supporting the patient's strength while it lessens his sufferings. When its good effects are most marked, it seems to produce the least narcotism; and, on the other hand, when it rapidly narcotises, it does no good.

If you are so fortunate as to succeed in limiting the peritonitis, in a case of perforation, you should be careful to avoid the mistake of administering an aperient for many days afterwards. Some lives have been lost by means of this practice, which is directly opposed to the indications above enumerated.

The indications for the treatment of the thoracic complications, vary, of course, with the nature and seat of the lesion. I have already said enough on the treatment of congestion of the right cavities of the heart. That of the weakened left ventricle consists, as you are aware, in the free exhibition of wine and nourishment. The simple congestion of the lung, which is the rule in typhus, cannot be said to admit of any special treatment. Following, as it does, upon the altered attractions between blood and tissue, as well as upon the weakened condition of the right ventricle, its subsidence will depend upon the removal of these its causes. Occasionally, however, this

congestion merges in hypostatic pneumonia, requiring the use of suitable measures; such as dry cupping, blisters, senega, carbonate of ammonia, and not unfrequently of mercury, which, in these cases, may be combined with quinine and carbonate of ammonia. In less severe cases, turpentine epithems may be applied freely to the chest as a substitute for blisters; and when the vital powers are much depressed, bark, in infusion or decoction, with sesqui-carbonate of ammonia, may be substituted for the above-mentioned remedies, and wine may require to be supplemented by brandy or whiskey punch.

These latter, however, are more generally indicated in the more serious complication of suffocative bronchitis, which, at some seasons, constitutes the prevailing type of disease—catarrhal typhus. In this affection the patient's life will often depend upon the energy and watchfulness of the physican. Decoction of senega with carbonate of ammonia; boluses of camphor and carbonate of ammonia; oil of turpentine, in doses of half a drachm to a drachm; and, in desperate cases, tincture of cantharides, in thirty to forty drop doses in combination with the turpentine, have been the remedies most successful in my experience. With these should be conjoined the most liberal allowance of brandy or whiskey, in the form of punch; and the use of every possible mode of external stimulation, as sinapisms, turpentine epithems, and blisters — more especially flying blisters, applied over the course of the par vagum, as recommended by Dr. Graves. I recollect a patient whose life was saved by my pouring boiling water upon his legs, after all the above-mentioned means had failed. He was fast sinking into the fatal coma in which these cases terminate, and could not be aroused by any measures which had

been previously employed. The pain produced by the scalding water, however, did so most effectually, and under the use of the turpentine and cantharides mixture he eventually recovered; the only bad consequence being a large superficial sore on the calf of each leg, which, however, rapidly healed.

LECTURE XV.

TREATMENT — CONTINUED.

The indications derived from the urinary functions are referable, either to the bladder, or to the kidneys.

Your daily attention is required, to prevent the ill consequences arising from retention of urine, and with this view, you will occasionally find it necessary, to introduce the catheter twice or three times in the course of each twenty-four hours.

It is equally important that you should, from time to time, observe the qualities of the urine excreted, since daily increasing observations show, that the most serious symptoms of the advanced stage of fever are, frequently, owing to deficient elimination, by the kidney, of the products of disintegration of tissue.

There can be no doubt that the uremic poisoning which occurs, manifestly, and as a rule, in the stage of reaction or secondary fever of cholera, occurs also, exceptionally, and, for the most part, in a more latent form and milder degree, in many cases of relapsing fever, in typhus, and even in typhoid fever; the difference being, that while total suppression of secretion occurs in the one, the danger in the others is more frequently connected with a change in the quality of the fluid secreted. The observations of the older writers, as to the great danger of pale limpid urine in the advanced periods of fever, and its connexion with the

most formidable nervous symptoms, are thus fully confirmed and explained, and the proper treatment of such cases is at the same time indicated. This, however, is by no means the only form of deranged urinary secretion you may be called on to treat, in fulfilling the indication of restoring the healthy balance between increased disintegration of tissue and elimination of its products.

I may here remind you of the conditions under which the symptoms, due to the retention of urea in the blood, may occur. They are—(1) Acute inflammation or congestion of the kidney, arising, either from out of the exciting cause of the fever, such as cold applied to the loins; from the direct action of the fever-poison on the blood and on the capillaries of this organ, as in congestive typhus; or from septicemia. In these cases the urine will be either suppressed, or bloody; smoky from the presence of hematin, or albuminous.

(2) Pre-existing disease of the kidneys; in which case, the urine will probably be of low specific gravity or albuminous.

(3) The disturbed balance may be due, less to any affection of the kidney, than to sudden and marked increase of disintegration with diminished elimination. The urine not being albuminous in all such cases, but sometimes merely deficient in urea.

This condition is met with, more especially, after the crisis of relapsing fever; or in the course of typhus or typhoid, when the patient has either lived luxuriously, or has been exposed to excessive muscular exertion at or about the period of the invasion of fever,* or, as I have

* "The quantity of urea secreted at any given period of life," says Dr. Carpenter, "seems to depend mainly on two conditions:

seen in several cases, has had excessive bilious evacuations by stool in the early period of fever.

(4) Any two of the foregoing conditions may co-exist in the individual; indeed, in no case can any one of them be expected certainly to occur as a simple and solitary phenomenon, since the complex and varied pathological conditions of fever will decidedly influence them in various ways.

In all cases, the altered relations between the blood and nervous tissue will co-operate to render the cerebro-spinal centres more susceptible to the poisonous action of the retained urea; and, probably, to undergo that change in their composition suggested by Dr. Oppler.*

namely, the degree of muscular exertion previously set forth, and the amount of azotized matter ingested as food."—*Physiology*, p. 619.

* After arguing, at some length, that his own experiments disprove the theory of uremic poisoning by decomposition of urea into carbonate of ammonia, Dr. Oppler adds:—

"In the second place, chemical examination of the blood and of the muscles has supplied me with two positive facts, which may serve as a foundation for a different explanation of the uremic phenomena. The facts I allude to are—the enormous increase of extractive matters in the blood, and the large quantity of kreatine and leucin found in the muscles.

"As I discovered, on examining the blood of animals, which had not survived the operation more than forty or fifty hours, that the extractive matters often reach the amount of 18 or 19 in 1000, I entertain no doubt that this very considerable increase, does not depend upon a simple mechanical retention of matters, which in the normal condition should be excreted by the kidneys; but that it is in great part occasioned by decomposition going on in various organs, in consequence of a change in the composition of the blood.

"In order to arrive at certainty upon this point, I examined muscular flesh, because the products of its decomposition are best known, and are most readily submitted to chemical examination.

Another mode in which fever exercises an influence on the patient, previously suffering from chronic nephritis, is, in the arrest of healthy molecular nutrition; a stop being thus put to the depuration of the blood by some

The result was unequivocal; and the large quantity of kreatine (34 grains in two pounds) and leucin, showed distinctly that abnormal decomposition has been taking place. That the large quantity of kreatine was not merely the result of the impeded secretion of the kidneys, and of that normally contained in the muscles, is clearly proved by a comparison with the experiments of Schlossberger and Neubaner, the former of whom found five grains of kreatine in two pounds of human muscle, while the latter found that the quantity of kreatine secreted by the kidneys in twenty-four hours was 7¾ grains.

"As it accordingly appears undoubted that, in consequence of the arrest of the functions of the kidneys, products of decomposition are formed and accumulate to an abnormal extent in the muscles, it may almost with certainty be assumed that, in the central organ of the nervous system, which is also exposed to be affected by the abnormal constitution of the blood, similar changes in its chemical composition must take place, although the products of the decomposition of the organ are as yet so little known, that we cannot submit them to accurate chemical demonstration as in the case of the muscles. If, therefore, we assume that products of decomposition are formed and accumulated to an abnormal extent in the brain and spinal marrow, we have, I think, a perfectly satisfactory explanation of uremic phenomena. The occurrence of important chemical changes is quite sufficient to explain the derangement in the function of the brain, and to account for the characteristic symptoms, such as giddiness, dull headache, unconsciousness, stupor.

"I therefore consider it an error, to explain the occurrence of uremic phenomena by the supposition that one or other of the elements of the urine, or of its decompositions, is retained in the blood, and acts on the brain in a deleterious manner; but I believe that a chemical change in the central organs of the nervous system is to be considered as the most probable cause of uremia."*

* *Edinburgh Medical Journal*, October, 1861.

form of vicarious secretion, a process by which the fatal result is occasionally warded off for a length of time. Such cases invariably terminate fatally when fever supervenes and arrests this process.

In some instances a complex morbid condition is set up, resulting, partly, from the toxic action of the fever-poison; partly, from congestion or inflammation of the brain or medulla oblongata; and in part from uremia. A good example of this is narrated in the ninth lecture of this volume.

A review of the conditions above mentioned will show you, that in the third alone, when it exists uncomplicated with any affection of the kidney, is there a reasonable prospect of benefit from any medical treatment.

In the first condition, the measures which have sometimes been found to succeed in the suppression of urine following the collapse of cholera, may be tried. These are, cupping over the region of the kidneys; turpentine epithems and linseed poultices; the vapour-bath; James' powder and nitre, or other diaphoretics, followed, in some cases, by the administration of mercury. But, in truth, I cannot recommend such, or any other, measures, with confidence, as I have never seen recovery occur in fever under these circumstances. Neither have I ever witnessed successful treatment, in the case of pre-existing chronic disease of the kidney. In the uremia following the perturbatio critica of relapsing synocha, however, and in the deficient excretion of urea which sometimes occurs in the later periods of typhus and typhoid, the indications above mentioned have, sometimes, been successfully carried out, the secreting action of the kidney being increased, and the proportion of the urea being suddenly and largely

augmented; a change which has been rapidly followed by amelioration of the patient's condition.

I believe it is to Dr. Henderson, of Edinburgh, we owe the observation, of the connection between convulsions following crisis in relapsing fever and the presence of urea in the blood; and also, the suggestion, that this complication should be treated by the administration of saline diuretics—nitrate of potass in particular.*

I shall give you Dr. Henderson's account of this observation in his own words:—

"It was not till August, that I began to entertain a suspicion that the function of the kidneys was liable to be affected, to an extent that was capable of producing the most serious consequences. The suspicion was suggested by the following circumstances: A patient of mine in the hospital, three or four days after the crisis of a paroxysm of fever, was seized with convulsions; and my friend, Dr. Moir, informed me, that in a family which he attended, two members were also seized, after a paroxysm of fever had ceased, with convulsions, and that one of them died in the convulsive state. In none of these cases was there jaundice to account for the attacks of convulsion. In October, I was requested to see a young gentleman who had had the crisis of his first attack of fever the day before. When I saw him, at noon, his respirations were reduced to twelve in the minute, and his pulse to fifty-eight; he was very languid and oppressed, and had transient attacks of confusion of mind, and a peculiarly uneasy sensation in the head. As he had no jaundice I

* Dr. Henderson seems to have been anticipated by Baglivi who says, "In ardentibus febribus sal prunell specificum est."—p. 146. The febris ardens of the ancients was our relapsing synocha.

inquired into the state of his urine, and learned that he had passed none since seven the previous evening, and it was since that time that the symptoms that I have mentioned had come on. He was directed to have ten grains of nitre every hour till three doses should be taken. Whether in consequence of the medicine or not, he passed some water half an hour after the first dose, and repeatedly considerable quantities in the course of the day and succeeding night, so that at seven next morning he was found to have passed altogether at least four pounds of urine. He was much relieved by the evening of the day on which I had seen him first; his pulse had risen to seventy-two, and his uneasiness in the head and tendency to delirium had ceased. Next day he was perfectly free from every unpleasant symptom. This last case determined me to pay more attention to the condition of the urine in future, and it was not long before an opportunity occurred of making more particular researches on the subject than I had previously done, and of having the suspicion I have mentioned amply confirmed."—(*Ed. Med. and Surg. Jour.*, vol. lxi.)

From considerable experience of this eliminative treatment, I can recommend you to adopt it, in those cases in which the symptoms due to retained urea present themselves in the course of typhus and typhoid fever. The combination I usually employ is that of nitrate of potass, nitric acid, and nitrous spirits of ether. The effect I have observed, has been, increased flow of urine of a higher specific gravity, with corresponding relief of nervous symptoms.

I recently attended the son of a professional friend, in this city, during typhoid fever contracted after excessive and

prolonged muscular exertion. The nervous symptoms were unusually marked from the commencement; and about the end of the second week, they assumed many of the characters peculiar to uremic poisoning, such as noisy, irregular breathing, constant moaning, facial twitching, &c. On examination of the urine, which had become pale in colour, the specific gravity was found to be 1·015, and on the day following—the nervous symptoms having meanwhile become more marked—it was 1·009 only. In consultation, it was agreed to give a mixture containing nitrate of potass, nitric acid, and nitrous spirit of ether.* On the day following, the nervous symptoms were less marked; the facial spasms, in particular, had ceased; the specific gravity of the urine had risen to 1·017, and it continued to increase day by day, till it mounted to 1·029. The patient's condition continued, for many days, to be one of great danger, but from different causes; nor was there, at any time subsequently, any return of the peculiar nervous symptoms connected with deficient excretion of urea.

The indications derived from our study of the cerebro-spinal lesions, in fever, are of the highest importance, and should be regarded in connection with these lesions. You may be called upon to treat nervous symptoms singly, and, as it were, quite independently of the fever in which they occur; but you should endeavour to keep in view the pathological conditions from which they arise, and those with

* The reader will observe, that this mixture is nearly the same as the combination recommended by Dr. G. Symes in tonsilitis; and I have no doubt, that the remarkable success attending its employment by Dr. Symes and others, was, in a great measure, due to its eliminative action on the kidneys; the affections of the tonsils depending in most cases upon some form of blood-contamination. Scarlatina, diphtheria, syphilis, are examples of this.

which they may be associated. They usually occur in groups, but such groups do not admit of any exact or arbitrary arrangement, as they will vary in their component symptoms in different cases.

Thus, the headache of the earlier period, associated with pain in the back, weariness and restlessness, is a condition widely differing in its nature and treatment, from the headache of a later period, which ushers in fierce delirium, stupor, or coma. In like manner the convulsions, which sometimes attend the crisis of fever in the hysterical female, are altogether different from the convulsions of uremia.

You should not, therefore, regard any individual symptom as demanding a special, positive, and invariable line of treatment; in other words, as admitting of a routine treatment; but you should, in every case, stop to consider—first, what are the pathological conditions upon which it depends; and, in the next place, what are the indications suggested by it.

These last will naturally fall under the following heads:—

I. To neutralize, or moderate, the toxic action of the fever-poison upon the cerebro-spinal centres, more especially those of the cerebral hemispheres.

II. To arouse the failing functions of circulation and innervation, and to avert the dangers arising from venous congestion and exhaustion.

III. To moderate arterial excitement, and subdue existing active congestion or inflammation.

IV. To avert the nervous symptoms, caused by various forms of secondary blood contamination, by eliminative treatment.

In fulfilling, so far as is possible, the first indication, wine is our great agent; and, if the case is one of simple uncomplicated typhus, due attention having been paid to those principles of general management, which I have already enumerated—by which the balance betwen disintegration and elimination is preserved—you will often be struck by its wholesome influence upon the nervous system and the circulation; the pulse becoming slower and fuller after its administration, delirium abating, and sleep following; effects thus tersely summed up by an old writer:—"Magna quantitate sumptum, omnem vehementiam sedat, nam qualitate narcotici colligit sensus, somnum consiliat, deliria et dolores acutissimos capitis imminuit."

The same indication is fulfilled to some extent by opium, and under the same conditions.

I have already remarked, that while, as a rule, wine may be more freely administered with advantage in typhus; opium is borne with safety, to a much greater extent, in typhoid. Many cases will, however, occur of both forms of fever, in which one or other, or both these remedies will be contra-indicated. They are so, for example, in active congestion of the brain, and when there exists a great amount of blood contamination. I think I may venture to assert, that in every case in which such symptoms occur, as I have enumerated in a former lecture, indicating the existence of active cerebral congestion, more especially if associated with an abrupt, excited, jerking action of the heart, you will find opium—when given in the first instance—to act injuriously. I have too often seen its exhibition followed, in such cases, by stupor, coma, rigidity of muscles, stertorous respiration, and death. Nor will it

be less injurious, if the blood is highly charged with carbon, whether from deficient supply of pure air, or from imperfect respiration, as in catarrhal typhus; or if it is contaminated to any extent, by the retained products of disintegration. In these cases opium seems to have a two-fold injurious influence. It retards elimination, and so increases the mischief already existing; and it also directly aggravates the cognate poisonous influence upon the nervous centres, of substances to which its own action is analogous.

I have no doubt that these objections may be lessened, even sometimes altogether obviated, by the addition of tartar emetic, the eliminative action of which, was conspicuously marked in many of the cases published by Dr. Graves. But even so, it is a two-edged remedy, and should never be pushed to any extent, unless you are satisfied that the objections I have mentioned do not exist. If they do, you will be more safe in trusting to the less certain action of large doses of hyoscyamus in combination with antimony and camphor, given at moderately long intervals until sleep is procured.

If, however, the heart's impulse is weak, the first sound indistinct or inaudible, the head cool; if there is no muscular rigidity, no tendency to stupor; if the urine is copious, and of good colour—perhaps depositing lithates—you may safely push the exhibition of the opium and antimony, no matter how noisy or impulsive the delirium, or how rapid the pulse, and even although the pupil may be contracted, and the eye red from want of sleep.*

* Dr. Graves mentions the pin-hole pupil as a contra-indication to the use of opium. Such, however, is by no means always the case; for it, as well as the injected eye, is frequently caused by

A short abstract of one of many cases, in which I administered this combination in the typhus epidemic of 1839-40, will illustrate this. James Caffray, aged twenty-seven, was admitted on the tenth day of typhus, much maculated, delirious, and swallowing with difficulty. Wine was ordered, also a blister to the nucha.

On the eleventh day, he became violently delirious and unmanageable. He was given half ounce doses of a mixture, containing four grains of tartar emetic, and a drachm of acetum opii in eight ounces of camphor mixture. After the second dose he slept for a short time, but on awaking, the delirium returned, accompanied with much subsultus. He was ordered a blister to the shaven scalp, and an increased quantity of wine.

On the twelfth day he had not slept; the delirium was so violent as to require restraint; he bit his nurse, swore and sang constantly; had involuntary evacuations, general tremor and dysphagia. An enema was administered, containing 15 minims of tincture of opium, 20 grains of musk, and 5 grains of sulphate of quinine; ale was also given, from time to time, in addition to the wine.

On the thirteenth day he had had no sleep for forty-eight hours, and required the constant attendance of the nurse to keep him in bed; he had general tremor and subsultus; his heart was weak, and the first sound inaudible; the pupils were contracted to a point; the extremities were cold, notwithstanding the application of hot water and sinapisms. In short, nothing could be more unpromising than his condition. Under these circumstances I deter-

want of sleep. Like every other symptom in fever, its true meaning can only be ascertained by viewing it in association with other cognate symptoms.

mined to push the exhibition of the tartar emetic and opium to the fullest extent, and I accordingly directed an ounce of the above mixture to be given every hour. Seven doses were thus administered, after which he fell asleep, and continued to sleep for many hours, having been awakened at intervals to take wine or nourishment. He rapidly and completely recovered.

I may take this opportunity of reminding you, that while the patient who *falls into a natural sleep* at the time of crisis may safely be allowed to sleep for a considerable time, the patient who, after prolonged watchfulness, *sleeps under the influence of opium*, should be awakened at intervals of two or three hours, to receive wine or beef tea, as, otherwise, there is danger of sudden sinking. I may also mention, that in some cases in which opium does not act quickly, or in a satisfactory manner, you will find chloroform a most useful adjuvant. Some of you may remember the case of a former student of this hospital, who passed through typhus in our private ward two years since; and in whom, after the mixture of tartar emetic and opium had been given for a couple of days with little effect, the inhalation of a small quantity of chloroform sufficed to procure sound and long-continued sleep. I should recommend you never to trust to this measure alone, but to employ it as a subsidiary to opium in cases such as those to which I have alluded.

It is in fulfilling the second indication, that opium in small doses, and repeated at intervals, will be found a useful adjuvant to wine and brandy. The patient has, perhaps, contracted fever after prolonged mental or bodily exertion; has had long-continued headache and sleeplessness; has delirium of a low, hysterical character; has

been freely purged; the heart being weak, the temperature low, the urine abundant. The case often presents many of the features characteristic of delirium tremens. Under such circumstances, wine, brandy, and diffusible stimulants being generally indicated, the influence of opium as a cordial and a hypnotic will also be found most beneficial. In these cases, the frequent repetition of from one to three drops of laudanum in an ounce of cardiac mixture, is the form of administration which I most prefer.

The third indication will arise under special circumstances, and at certain epidemic periods. I have no doubt, that, at times, there exists an epidemic tendency to active congestion of the brain, just as at others, there is a tendency to cerebro-spinal arachnitis, of which, as a complication of typhoid, you have witnessed examples during the last two years in this hospital, the same having been observed in the other hospitals of the city.

In the epidemic of typhus of 1839–40 I observed a tendency to active congestion of the brain, and I think we find evidence of a similar tendency, at different periods, in the writings of Armstrong, Southwood Smith, Laycock, and, above all, in those of Dr. Graves, who says, in reference to the epidemic of typhus of 1836–40:—"Most of the fatal cases of typhus at present die of cerebral disease; but in the majority of instances you find that these were cases in which the head was neglected, and in which the appropriate remedies were used too late."*

* The following observations of this great physician deserve attentive consideration:—

" . . . . for the production of cerebral symptoms in typhus, there must be something more than mere congestion or inflammation of the brain; but you are not to infer from this that

Apart from epidemic influence, the special circumstances under which the indication arises are, after exposure to great solar heat at the access of fever, more especially if great muscular exertion is conjoined with that exposure; after fever ensuing upon mental excitement, or upon a debauch; and, occasionally, after exposure to cold, while the body is heated by exercise.

I do not hesitate to advise you to pursue a decided and energetic treatment in all these cases. Guided by the action of the heart—which as a rule you will find jerking and forcible, as contrasted with the feebler contractions of the left ventricle usually met with in fever—you should abstract blood in a mode, and to an extent, suited to the peculiar nature and amount of the lesion. Thus, in cases of cerebro-spinal arachnitis, relays of leeches to the mastoid process will be the mode preferred; while in the active

there is no necessity for taking any steps to obviate or remove congestion of the head in fever. On the contrary, I am of opinion that in typhus one of the principal sources of danger is connected with the head, and that the cerebral symptoms should be always watched with the most unremitting and anxious attention. . . . . I am also of opinion, that when there is any evidence of determination to the head, the best way of preventing dangerous cerebral symptoms is to deplete the head by the application of a sufficient number of leeches, and then to proceed to the use of blisters; . . . . one of the best modes of doing this is to apply six or eight leeches behind the ears, and repeat them every six hours until relief is obtained. You should then order the head to be shaved, and kept constantly covered with cloths wet with warm vinegar and water, and, at the same time, have recourse to the internal use of tartar emetic and nitre, or blue pill and James's powder. Should this plan fail of giving relief, you have a powerful aid in the application of blisters to the scalp, and this must be done extensively and at once."—*Clinical Medicine*, second edition, vol. i., p. 175.

congestion of typhus, arteriotomy seems, on the whole, to be most useful. Take as an illustration the following case published in Dr. Cheyne's account of the epidemic of 1817.* "A young man, an apothecary, whom I had been called upon to visit in typhus fever, had passed several days in a state of maniacal delirium, attended with complete loss of rest. His afflictions were considerably heightened by the warm atmosphere of a small apartment, to which he was confined, loaded with bed clothes, and scrupulously excluded from the benefit of cool air; his mental irritation was not a little augmented by the restraint imposed on him by a pair of stout guards placed over him. I directed his room to be freely ventilated, and immediately opened the temporal artery; when a few ounces of blood had been drawn he expressed great satisfaction, hoped as he was so much relieved at that side of his head that I would open the other artery; which was done according to his desire. He became immediately composed, passed several hours in calm sleep, and speedily recovered."

I may add, as illustrating the beneficial effects of this practice, a remarkable case which occured to me during the epidemic period to which I have already alluded. A young man, on the ninth day of typhus, had, under the use of wine, become restless and delirious; for this state his medical attendant prescribed an opiate, shortly after taking which he fell asleep. On attempting to awake him, a few hours afterwards, he was found to be in a state of unconsciousness, and unable to swallow. When I was called to see him (at 2 a.m.) he had not spoken, and he then lay perfectly motionless and rigid, the eyes directed to the ceiling, the pupils contracted and immovable on the ap-

* Barker and Cheyne's Report, vol. i., p. 493.

proach or withdrawal of light; his jaws were rigidly closed, and he manifested no consciousness when spoken to; the surface was warm, the respiration accelerated, the pulse sharp and rapid, and the heart's action strong, the sounds being loud and distinct. In my hospital practice, I had recently seen several cases in which the same symptoms following the administration of opium, the patient had passed into coma and death; the evidences of arterial congestion of the brain having been discovered after death. I accordingly advised the withdrawal of opium and stimulants, and the adoption of treatment calculated to lower excited arterial action, viz., the abstraction of blood, the application of cold to the head, and the administration of calomel and James' powder;—three grains of each every third hour.

The temporal artery was immediately opened; while the blood was flowing the pupil began to dilate and contract alternately, and before ten ounces had been abstracted his eye followed the movements of the attendants. A few minutes after the bleeding had ceased he spoke. There was a marked increase of delirium on the following evening, for which we prescribed, in addition to the powders, a mixture containing two grains of tartar emetic in eight ounces of camphor julep. There were no further bad symptoms, and he had a favourable crisis about the fourteenth day. When he recovered his intelligence, the patient had no recollection whatever of the occurrences at the time of his being bled, but said that he was, during the whole period, in a state of perfect unconsciousness.

I need add nothing to what I have already said, in a former lecture, on the use of local blood-letting and mercury in the reactive inflammation of the brain or its

membranes, which sometimes occurs in the later stages, and during the post critical period of fever—more especially that of typhoid.

I would earnestly impress upon you, that blood-letting is a remedy which you should neither abuse, by employing it without due discrimination, nor neglect to use when the occasion demands it. Its indiscriminate employment in fever, and its total disuse, are equally to be deprecated. We have had reactions of medical opinion in both extremes at different periods; and the practice has been as extravagantly lauded at one time, as it has been unreasonably censured, or flippantly sneered at, at another. "It is time," to use the words of Dr. Chambers, "that the wave of opinion, which has swelled backwards and forwards to a dangerous height, should settle down into a steady stream. We ought to know clearly *why* we bleed, and then we shall know *when* to bleed."

I entirely agree with this writer, in thinking that the ill effects ascribed to bleeding have been often strictly due to the abstinence enforced at the same time; and I would caution you to repair the waste you thus produce, by administering nourishment; and, also, to obviate the nervous excitement and irritability which so frequently follow the abstraction of blood, by means of opium, and even by wine or brandy. I may refer you to the case of Suttle, and to that of the woman Donnelly (the latter was recently under your observation), as illustrating their good effects. I may also remind you of the remarkable case of myelitis in a man named Byrne, also recently under observation in our smaller fever ward.

You may remember that this man was brought in, suffering from complete paraplegia, with incomplete paralysis

of the upper extremities, and rigid contraction of the fingers; that he had scarcely any thoracic respiration, but breathed almost entirely by means of the diaphragm; that he had also double vision, some difficulty of utterance, with turgid, congested face and eyes. That under these desperate circumstances, he recovered; the treatment pursued having been, repeated abstraction of blood by leeches and cupping-glasses applied over the cervical spine; blistering the spine; and mercury pushed to ptyalism; with which were conjoined full nourishment, and a liberal allowance of wine, together with a nightly dose of Battley's sedative. These latter remedies, are by no means found to be antagonistic to bleeding in their influence on the nervous system. In practice, I have certainly observed them to act in a more salutary manner after general or topical blood-letting than under any other circumstances. Their effects seem to be twofold in such states, viz., to lower nervous action and thus procure sleep, and to diminish the waste of nerve tissue.

Of the last indication, I have little to add to that which I have already said, when discussing the treatment of the urinary lesions. It has always appeared to me, that the marked success of Dr. Graves' treatment by tartar emetic, with or without opium, was in a great measure due to its eliminative action, by which, in most of his cases, evacuation was brought on in several modes; as, by vomiting, purging, and copious diaphoresis or diuresis. These generally occurred about the usual period of crisis, and were followed by the patient's amendment.

I have occasionally seen similar marked effects follow the administration of large doses of oil of turpentine at the same period. It seems to be indicated, in cases in

which there is great tympanitic distension of the abdomen with nervous symptoms, characteristic of blood contamination rather than of active congestion. The following case is an illustration:—

Michael Dunne, ætat thirty-five, a strong, muscular man, was admitted into hospital, under my care, at an advanced stage of typhus. He was, at the time, in a state of profound prostration; his pulse 132, small and compressible; skin cold; tongue dry and shrivelled; belly tympanitic; he had involuntary discharge of urine and fæces.

Wine and ammonia were freely administered, and for the two following days he appeared to improve; but on the third day after admission his condition seemed desperate. He lay in a state of stupor, with a muddy, livid colour, general tremor and convulsive startings, incessant rolling of the tongue, the belly tumid and tympanitic, &c. He had had no evacuation from the bowels for two days, and this, with the tympanitic distension of the abdomen, and the character of the nervous symptoms, led me to try the effect of oil of turpentine, as advised by Copland under similar circumstances. I accordingly gave him three drachms in a castor oil draught. This produced a copious discharge of dark liquid matter. There was no other apparent critical evacuation; but on the following day he was perfectly conscious, all unfavourable symptoms had disappeared, and he was, in fact, free from fever. For a similar instance of the striking effect of this medicine, I may refer you to Dr. Graves' *Clinical Medicine*, vol. i., p. 184, second edition. In this case, after tartar emetic and opium had been given without any beneficial effect, turpentine was administered in two drachm doses. "After the second or third dose," says Dr. Graves, "the patient

had two or three full motions from the bowels, and shortly afterwards fell into a sound and tranquil sleep, from which he awoke rational and refreshed."

In the progress of a case of fever in our wards, you hear the question frequently asked—What day of the fever is this? The question has two objects; one with reference to prognosis, which is much influenced by the conformity or otherwise of the particular case to what may be termed the normal type of the period; the other, with reference to treatment and to the approach of the critical period, as a period during which increased vigilance, and, perhaps, active interference may be demanded.

Upon no subject connected with fever has there been more difference of opinion than that with regard to critical days. The ancients evidently drew their prognostics frequently from occurrences, which, as a rule, took place upon certain days, hence named "judging days," and this is the sense in which we should employ the term. I have already pointed out to you how important it is, that the occurrences in each form of fever should conform to its type in regard to time, as well as in regard to their nature and seat. Now, this rule applies to the phenomena marking the termination of fever, no less than to those occurring during its course. I believe we shall find the observation of these "judging days" to be not less important with respect to treatment; and, that the fate of our patient will often depend upon our recognizing the last paroxysm and suitably treating it.

There have been, from time to time, writers who have treated the doctrine of "critical days" with scepticism, sometimes with ridicule. Their objections seem to me to be founded, either on a want of recognition of the diffe-

rence of species of fever, or on a misapprehension of the rêal meaning of the term "critical day." As an instance of the former, one able writer, whose views on fever and its treatment were derived exclusively from cases of typhoid, failed, of course, to recognize in this disease any conformity to the laws, as to duration, which ancient and modern writers had found to govern relapsing synocha and typhus; and, accordingly, he expressed his doubt in the existence of any definite period to the course of fever.

Another seems to suppose that by a critical day is not meant—as the word implies—a judging day, but one upon which the fever *must* end; and accordingly he says, truly enough in this sense of the word—"There cannot be accorded to any one day more than another any peculiar efficacy in accomplishing a crisis." Though this be admitted, still it cannot be doubted, that there is a tendency in each form of fever to terminate upon certain days. This tendency is well marked in synocha and typhus, but less so in typhoid. Cullen has observed, with respect to typhus, that it is very rare for it to "terminate before the eleventh day;" and, when it does "terminate on this day, it is, for the most part, fatally;" and, that when "protracted beyond this time," he has "very constantly found the termination upon the fourteenth, seventeenth, or twentieth day." The same author likewise observes, "that the tendency of the animal economy is to observe the critical days, and that it is by the operation of some violent and irregular cause, that the course of things is sometimes turned to the non-critical."*

* This truth is well and tersely enunciated by Baglivi:—"Circa septimum, vel quarto decimum, plures acuti morbi solventur, nisi medicus intempestivo ac stulto purgantium diaphoreticorum aliorum que hujusmodi remediorum usu naturæ motus turbaverit."

I commend the chapter on Critical Days, in Cullen's first lines, to your attentive perusal, as containing the clearest and soundest views on the subject with which I am acquainted.

Viewing crisis as consisting of two parts—namely, an exacerbation of the fever, followed by a complete remission; you will be at no loss to understand in what the duties of the physician at this period consist.

Recurring to the comparison, employed by a great physician, of the treatment of a case of fever, to that of guiding a vessel through a storm; I would say, the treatment of the last paroxysm is, in many cases, not unlike the steering of the same vessel through a narrow and shallow passage, with rocks on either side, into a secure harbour. Two dangers are to be avoided—one by careful and skilful steering, the other, by, if necessary, lightening the vessel.

This is a fair parallelism of the duties of the physician in the period of crisis. He has, in all cases, to steer for the channel; in other words, to keep in view the main indication, to support the vital energies of his patient until the paroxysm is over. In the great majority of cases this is his sole duty, and often no appreciable difference of treatment from that pursued during the course of the fever will be requisite for its fulfilment; but in others, where there is an evident tendency to sinking of the vital powers, as marked by signs which I have before enumerated, he must do all in his power to support and stimulate the failing functions of circulation and innervation. The mention of these functions will suggest to your minds the class of remedies to be employed. The internal administration of wine and brandy and of the diffusible

stimulants, the external use of warmth and of revulsives and counter-irritants, are those usually prescribed. Many a patient has owed his recovery to the substitution of a more generous wine, such as Madeira, or of warm brandy and water, for the weaker wine, which had lost its power of sustaining the heart's action. In others, again, a fillip has been given to the failing circulation, by external warmth, and both functions have been aroused by the free use of sinapisms, turpentine, epithems, and flying blisters. You should bear in mind, that there are certain diurnal periods at which your patient is more especially apt to require additional support and stimulation, to avert the tendency to sinking which then manifests itself. Such, for example, are the hours from three to five, a.m., during which a tendency to sinking most frequently occurs.

Occasionally, however, though rarely, you may meet with cases in which the dangers of crisis have been produced by the excessive or too-prolonged use of stimulants. I have sometimes known wine to be continued, day after day, when it obviously disagreed with the patient, producing heat of head, restlessness, watchfulness, and a state of vascular and nervous excitement, incompatible with favourable crisis. In such a case, the patient generally loathes the wine and craves for cold water, and not unfrequently the sleep of crisis has followed upon a hearty draught of the cooling fluid. It may occasionally happen, that more active measures may be required to subdue the excitement thus produced.

On this point Dr. Cheyne, in his report of the fever of 1817, says—"We venture not to say that there may not be some cases to which blood-letting is applicable, as, for example, the following: I found a young man, says our

correspondent, who had been eight or ten days in a very low state, with all the appearances of low typhus. I ordered him to have some wine immediately, together with whatever appeared necessary at the time; but not being able to see him for a few days, and the mother of the young man not paying sufficient attention to my instructions, the wine was continued without intermission, the consequence of which was, that his head became much affected, a serious determination having taken place thither. I immediately saw that no time was to be lost, and in defiance of a host of friends who beset me, and told me I was *murdering* him, I opened the temporal artery, and took away blood pretty freely. The vessel bled twice in the course of the evening, but not to any serious amount; the consequence was, that he was convalescent next day.*

* Dr. Bateman gives the following example of the ill effects of the continued administration of wine under these circumstances:— "I found a middle-aged man, who had been brought in, the evening before, in the lowest conceivable state of collapse, in fact, to all appearance *in articulo mortis;* the extremities were cold, the trunk bedewed with cold sweat, the pulse imperceptible at the wrist; in short, a heavy respiration, and some feeble remains of the power of deglutition, were the principal signs of life. Hopeless as the case appeared, I directed him to be kept warm, and to be supplied at intervals with a teaspoonful of wine or spirits, ether, &c., as long as he could swallow. To my astonishment I found him on the following day quite sensible, and loudly demanding food. The skin was warm, the pulse firm, and he had recovered a surprising degree of vigour. Fearful of withdrawing the support of some stimulus from a person whom I had seen the day before at the point of death, I continued his supply of wine; but on the following morning he was delirious; the eyes soon became red and ferretty, his skin hot, the pulse sharp and frequent, and in a few days he died with all the symptoms of phrenitis terminating in effusion. It is manifest, therefore, that stimulants should be regulated with great caution,

I do not know a case of greater emergency and difficulty than the one we are now considering. It is fortunately rare and exceptional, but it is one which demands the greatest caution and judgment on the part of the physician. On the one hand, if he withdraws the wine or brandy which have been hitherto administered, he does so in contravention of the rule, that the support and stimulation prescribed during the course of fever, must be rather increased than diminished on the eve of the final struggle; while, on the other hand, it is the fact, that in these exceptional cases every ounce of wine does harm, and but increases the dangers of the crisis. These dangers usually arise from some secondary complication, the most frequent being some form of cerebro-spinal lesion. They are not the less dangerous, because they are usually more or less latent. As I have already pointed out in a former lecture, they may occur either in the form of active congestion, existing during the course of the fever, but masked by it; or of reactive inflammation set up at the close of fever; or they may be the effect of secondary blood contamination. In each of these conditions, the mischief, previously latent, is often revealed by the effect of wine and stimulants, as above described.

In this, which I consider the most difficult question concerning the treatment of fever—involving as it does, not only the administration of wine, but also that of opium, in certain cases—I can give you no fixed rules for your guidance. I would, however, remark, that to treat such

even when most essentially required, *and according to their present effects.*" This was, no doubt, a case of latent cerebral congestion or inflammation, not caused, but rendered manifest, by wine and spirits.—*On Typhus, p.* 124.

cases successfully you must not be bound by any routine method; and you must seek your indications in the condition of the patient, and not in any system laid down in books. You will look for them, then, in the state of the heart and pulse; of the temperature; the respiration; the consciousness; and of the nervo-muscular system. Should you find the heart's action jerking and impulsive, while the pulse at the wrist is small and hard; or the heart labouring, and its right cavities and the large veins distended; should the face be suffused, the sclerotic tinged, and the head hot, while, perhaps, the extremities are cold; or should the face be bloated and purplish, and the veins of the conjunctiva congested and dark-colored; if the consciousness is heightened; the hearing morbidly acute; the eye intolerant of light; the brow corrugated; the manner excited and violent; and the patient obstinately watchful; or, on the other hand, if there be a tendency to stupor and coma, with cutaneous hyperesthesia, and spastic rigidity of muscles—all these conditions, *or any of them*, existing at the approach of crisis, are contra-indications to the use of wine; and may be, according to circumstances, indications for general or local blood-letting. These latter measures, by relieving a local congestion which occasionally interferes with the resolution of the fever, give assistance to the vital energies, and allow the law of periodicity, as it has been termed, to come into operation.

Pneumonia, and simple pulmonary congestion, as a rule, are resolved by the crisis; but this resolution may be occasionally aided by moderate local depletion, by blisters, dry-cupping, and by the free application of turpentine. Pleuritis is, as you are aware, an exceedingly rare complication in typhus. I have seen but three instances in the

course of my life, and in one of these the patient's safety was jeopardised at the period of crisis.

This gentleman had complained of a stitch in the lower part of the right side for some weeks before fever (maculated typhus) had set in. No physical signs, however, were discoverable, with the exception of a slight frottement, nor were there any unusual thoracic symptoms during the course of the fever. On the eve of the fourteenth day, however, the breathing suddenly became hurried and difficult, and this difficulty increased so rapidly and to such an extent, as to threaten suffocation. On this account I was summoned soon after midnight to see him. He was apparently dying; his breathing embarrassed to a most painful degree; the trunk and limbs perfectly rigid, so that he could not be raised to the sitting posture, and when turned over in bed, for the purpose of examining the side, it seemed as if we turned a log of wood. I found the right side dull to the spine of the scapula, with perfect nullity of respiration sounds. It was evident that rapid effusion had taken place into the right pleura. Having procured a cupping instrument, I abstracted about six ounces of blood from the side. This was between two and three, A.M. He soon afterwards fell asleep, and at six, A.M. he was breathing easily, and in a profuse perspiration. When I left the house at ten, A.M. he breathed quietly, and had a soft, slow pulse; the fever had terminated by crisis; and not only the fever, but the pleuritis also; for when, on the following day, I examined his chest, no trace of effusion could be discovered.

But even without the existence of any definite local complication, you will sometimes meet with cases in which, to revert to our comparison, it may be necessary to lighten

the vessel, by relieving the blood, by eliminative measures, of the products of regressive metamorphosis which have accumulated in it during the course of fever. This is often done by the unaided natural effort of the constitution. In one case, by a salutary hæmorrhage; in another, by spontaneous diarrhea, or by a copious flow of urine of high specific gravity; in another, the patient, after a hearty draught of cold water, falls asleep, breaks out into a copious warm perspiration, and awakes free from fever.

Without, for a moment, supposing that you can procure crisis by imitating nature's efforts at elimination, you will be able occasionally to give assistance. Thus, in one case, the oppressed brain will be relieved by abstracting a little serum by means of a blister; in another, the same relief will be given by increasing the amount of urea excreted by means of certain diuretic medicines; in another, a timely purgative may effect the object; and in another, the hot dry skin and tongue parched with thirst, will suggest the administration of a copious draught of cold water, the diaphoretic action of which may, perhaps, be aided by an antimonial.

It is not possible to lay down rules for the employment of these measures. In one case the one will be indicated; in another, the other. You must be guided in your selection by principles—keeping the indication constantly in view—and your daily maturing judgment and experience.

It is of great importance that you should not continue the exhibition of wine or brandy—so necessary on the eve of crisis—after this change has taken place. Their gradual and rapid withdrawal is suggested by theory, and justified by experience. We know that at this period

there is enormous waste of tissue, with corresponding increase of elimination of the products of that waste. By continuing our alcoholic stimulants we retard the process, thus acting contrary to the indications of nature, and to the instincts of the patient, who turns with loathing from them, while he craves the more suitable nourishment. In practice, we find this abuse of alcohol followed by heat and dryness of skin, rapid, irritable action of the heart, thirst and restlessness, want of sleep, and return of delirium, subsultus, &c. &c. In this state you will find James' powder, with the addition of a little camphor and nitre, to act most beneficially. Three grains of the antimonial may be given every three or four hours; warm sponging of the head and face, and warm stupes to the legs, being at the same time employed. These measures will generally be followed by sound sleep and copious diaphoresis, together with complete relief of the above symptoms.

The older Irish physicians were well aware of the value of antimony at this juncture; but, according to Dr. E. Percival, they proscribed its use before the eleventh day. This writer thus states his experience of the remedy:— "In those varieties of fever which are protracted by imperfect crisis, where the tongue remains coated, and the skin, though temperate, is dry and torpid, I have employed antimonial powder, in small doses, with great advantage. I have usually combined with it calomel, or opium (or both together), and found them highly serviceable in improving the condition of the secretory organs, and amending the discharges from the liver, the mucous membrane, and the skin. In the dysenteric fever these remedies are an invaluable resource."

I have mentioned, in a former lecture, that crisis is not unfrequently followed, after a short interval, by an access of watchfulness and delirium; especially in the young patient, or in one whose brain has been overworked previous to the fever. In this state you must be careful not to administer wine or stimulants, neither is depletion of any kind indicated. Your treatment should be simply sedative and soothing. Opium or morphia should be administered by the mouth, or by enema, or, perhaps, in combination with antimony. In some cases, hyoscyamus and camphor will answer the purpose of calming the nervous excitement and procuring sleep. These measures will be aided by the withdrawal of all stimuli, such as light, sound, and the presence of friends; and by warm sponging to the head, together with warm fomentations to the extremities.

Sleep, thus obtained, should be kept up by the same measures for many hours, or until complete tranquillity of the nervous system is restored.

While on this subject I may mention, that the delirium after crisis is sometimes produced by the pain and loss of rest caused by excessive blistering—more especially in the young patient. There can be no doubt that fatal consequences occasionally followed from the suffering thus caused. Dr. Graves wisely cautions us against producing this *delirium traumaticum*.

I would also caution you against blistering the shaven scalp, in cases of active congestion of the brain, without having previously moderated arterial action by topical blood-letting and tartar emetic. I have repeatedly known marked increase of delirium, &c. to follow this practice.

If care is required in the management of the typhus patient after crisis, it is still more necessary during the

convalescence from typhoid. You should always remember, that a large proportion of the cases of perforation of the intestine have occurred during this period, and you should be careful to take every precaution in your power to avert such a result.

Absolute rest must be insisted on, stimulants prohibited, and the blandest nourishment, only, allowed to be given. If the diarrhea has been protracted, and if there be pain or tenderness on pressure over the cæcum, it is advisable to employ counter-irritation by means of the repeated application of small blisters in succession, or by tincture of iodine. Irritating purgatives are to be strictly avoided; the bowels being opened every third day by an enema of warm water, or perhaps, occasionally, by a small dose of calomel, or of grey powder combined with opium.

Even although perforation does not occur, the patient may be exhausted by protracted and intractable diarrhea, arising from the persistence of intestinal ulceration. You have, perhaps, treated this patient's diarrhea during the later stages of the fever with port wine and astringents, with advantage. You may have continued these remedies after the termination of the fever, in the expectation that they will be equally beneficial; but, day after day, you learn that the discharge, although checked for some hours during the day, returned at night or early in the morning, and was attended with griping pain and with a feeling of sickness; the stools being thin and brown, or pea-soup colour—or, perhaps, mucous, bloody, or resembling the washings of flesh, and probably having a cadaveric odour.

You note, that the patient is emaciating rapidly; has a quick, irritable pulse, a red eye, and glazed tongue; a skin hot at intervals, and permanently harsh and dry; an

abdomen perhaps tumid, but more usually retracted and concave in its outline. Sometimes low peritonitis sets in, with increase of pain and tenderness, green vomiting, &c.; at other times, death seems to be caused by inanition and exhaustion.

In this condition, I have seen the use of the warm bath, aided by mild diaphoretics, of signal service. With these should be conjoined the exhibition of soothing and sedative remedies, as bismuth, hyoscyamus, morphia, poultices to the abdomen, and, in protracted cases, the administration of medicines calculated to improve the condition of the intestinal ulcers and of the mucous membrane. Of these, nitrate of silver and turpentine are, perhaps, the most worthy of your confidence.

I shall not enter upon the consideration of the numerous sequelæ of fever. You will find their treatment fully described in systematic works on Medicine and Surgery, and these lectures have already extended to a much greater length than I had originally intended.

In bringing to a close the remarks I have offered you upon the general management and special treatment of fever, there are a few principles, or general rules, which I advise you ever to bear in mind.

I. That inasmuch as fever is a disease having a definite course, duration, and termination, undue interference with it is to be deprecated, and the duty of the physician will often consist in watching, and waiting upon, the operations of nature, without interfering.

II. That such expectancy does not preclude the necessity for attention to management and regimen, together with the due regulation of the internal functions of the patient, and his external hygienic conditions.

III. That the first of these in importance—as being both curative and prophylactic—is supplying abundance of air containing its full proportion of oxygen, care being taken, at the same time, that the patient is not subjected to the necessity of breathing the exhalations from his own or surrounding human bodies.

IV. That equally important is the prevention—so far as may be possible—of the accumulation in the blood of the products of disintegration of tissue. This object must be accomplished partly by pure air, the use of diluents and fluid nourishment, and also by wine or alcohol in some cases; and partly, perhaps, by the administration of the mineral acids, chlorate of potass, and other medicines of that class.

V. That, unless in case of necessity, no remedy of the evacuant, or so called eliminative class, should be administered after the period of invasion. But, that such a necessity may arise during the later stages of fever, and in the event of local lesions: either with a view to avert, directly, fatal consequences from the lesion itself, or—in other cases—because that such lesions interfere with the natural tendencies of the fever, and frequently hinder its resolution by crisis.

VI. That whenever it may be considered necessary to employ such treatment in a case of fever, its depressing effect should be carefully guarded against, by the simultaneous employment of measures calculated to repair the waste thus caused, and to support the patient's strength.

VII. That while avoiding routine, we should, as a rule, adopt a different system of management, in some particulars, in different types of fever.

VIII. That, generally speaking, with the exception of

the intestinal affection of typhoid, the treatment of the primary local lesions, or those arising from the affinities of the poison, seldom demands the active interference of the physician. That the secondary lesions may probably demand active measures, which will vary in their nature with the seat and nature of the lesion, and the mode in which each tends to produce a fatal termination.

IX. That the fate of the patient seems, occasionally, to depend upon the treatment adopted in the last paroxysm; at which period, judicious interference by assisting nature, as it were—either by removing local congestion, or by combating increasing asthenia—seems to act more beneficially than at any former stage, and that we have reason to believe salutary crisis may sometimes be thus secured.

X. That unless under exceptional circumstances, and with the above object, there should be as little interference as possible, but that, as a general rule, the support and stimulants, previously administered, should be given with greater frequency and in increased quantity at this period.

XI. That, whereas in typhus our treatment up to the period of crisis was designed to retard regressive metamorphosis, we should be acting in opposition to the operations of nature, were we to continue it longer at a time when a rapid disintegration, and consequent elimination of its products is taking place; and that, accordingly, we withdraw a large proportion of the wine or alcohol immediately after crisis, and administer both wine and nourishment sparingly during the early days of convalescence.

XII. That this rule is doubly important in the convalescence from typhoid, on account of the danger there exists of renewal of disease of the intestinal follicles, and its consequences.

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