LECTURES ON THE PRACTICE OF MEDICINE.

BY

CHARLES MURCHISON, M.D., LL.D., F.R.S.,

Physician to St. Thomas's Hospital, and Joint Lecturer on Medicine at
St. Thomas's Hospital Medical School; etc.

LECTURE II.—PYREXIA.—(Concluded.)

1. *Definition.* 2. *Causes.* 3. *Symptoms*; a. *Increased Temperature*; b. *Alterations in the Organs of Circulation*; c. *Accelerated Respiration*; d. *Dryness of Skin*; e. *Derangements of Digestive Functions*; f. *Derangements of Secretions*; g. *Derangements of the Nervous System.* 4. *Varieties of Pyrexia*; a. *Mild*; b. *Inflammatory*; c. *Asthenic*; d. *Typhoid*; e. *Hectic, Intermittent, Remittent, and Continued Fever.* 5. *Pathology of Pyrexia.* 6. *Diagnosis.* 7. *Prognosis.* 8. *Treatment.*

V. *Pathology of Pyrexia.*—It would be more curious than instructive to discuss the numerous views according to which medical writers have endeavoured to explain the phenomena of fever; to show how the humoral pathologists, headed by Hippocrates and Galen, looked upon fever as the result of a contest on the part of Nature to expel from the system a superabundance of one or other of what were called the four humours—blood, phlegm, yellow and black bile; how, on the one hand, Tweedie insisted that the blood was primarily affected, while, on the other, Christison urged that the first link in the chain of events was derangement of the nervous system; how Brown held that fever was an asthenic state of the system arising from an abstraction of the natural stimuli, or from exhaustion, direct or indirect, of the excitability; how Ploucquet, Beddoes, Clutterbuck, Armstrong, and Broussais maintained that fever was always the result of inflammation or congestion.

It is however, not a little remarkable that modern investigations tend to reproduce in a scientific form certain crude opinions concerning the nature of fever which were entertained by the earliest writers on medicine. The abstract definition of fever given by Hippocrates, Galen, and Avicenna was, “*Essentia vero febrium est præter naturam caliditas*”—and the definitions generally accepted by modern pathologists are very similar. Thus, according to Professor Virchow, “Fever consists essentially in elevation of temperature which must arise in increased tissue-change, and have its immediate cause in alterations of the nervous system”; and according to Traube, “Fever consists essentially in an increased temperature of the blood.” In fact, increased bodily heat is, as we have found, now looked upon as the pathognomonic sign of fever.

The natural heat of the body is due to vital and chemical processes resulting in the oxidation or combustion of nitrogenous and carbonaceous substances furnished to the blood by the tissues, but mainly by the food. The products of this combustion are eliminated from the lungs in the form of carbonic acid, and from the kidneys as urea and uric acid. The oxidation of carbon resulting in the formation of carbonic acid is effected by the corpuscles of the blood; whereas recent researches make it probable that the albumen is transformed into urea and uric acid in its passage through the gland-cells of the liver, spleen, and other glands, and through the cells of the blood itself.* The albumen which is thus being constantly transformed or split up into urea is not the fixed albumen of the muscles, nerves, and other formed tissues; but the so-called store-albumen, which exists in the blood, and is constantly passing thence to the cells throughout the body, and returning to the blood again. From this, also, the organs take what they require, and the waste is made up partly by the effete albumen cast off by the tissues, but mainly by the food.

The preternatural heat of fever is the result of vital and chemical action exalted above the standard of health, assisted perhaps by a disturbance of the processes by which heat is carried away. The proof of this is found in the augmentation of the products of metamorphosis eliminated by the lungs and kidneys, and in the loss of bodily weight far exceeding what can be accounted for by the mere abstraction of food. We have already found that there is an increased elimination of carbonic acid from the lungs in pyrexia, which may in part account for the consumption of fat. It is, however, the increased elimination of nitrogen by the kidneys which has been mainly studied. The amount

of urea and uric acid voided in the urine is, as we have seen, largely increased in fever. There is evidence, also, that the increased excretion of urea precedes any rise of temperature; and although the amount of urea cannot be measured by the degree of heat, there is a direct relation between the two. As a rule, the temperature is highest, and the quantity of urea greatest, in the early stages of a fever; and when there is an unusual elevation of temperature, there is an unusual amount of urea. There are, no doubt, exceptions. The temperature is modified by the amount of evaporation going on from the surface of the skin; and the urea may be lessened by albuminoid matter, more or less changed, being retained in the blood. In badly nourished persons, also, it has been found that comparatively little urea is eliminated notwithstanding the rise of temperature; but the latter is also less than in the robust and well fed, and may be due to an increased formation of carbonic acid.—In one respect, the source of temperature in fever differs from that in health. In health, the elimination of nitrogen is entirely regulated by the amount entering the body with the food, as has been well shown by Parkes and other observers; but the increase of nitrogen eliminated in fever does not come from the food, for it is out of all proportion to it. The fixed albumen of the muscles, brain, and nerves breaks down into circulating albumen, to be in its turn transformed into urea and other nitrogenous excreta. Hence it is that the muscles waste and the brain becomes atrophied. The large amount of cerebral fluid so common in protracted fevers is merely thrown out from the blood to fill the space vacated by the brain, and is not of inflammatory origin, as was once believed. In all fevers the muscles become wasted, and, on microscopic examination, the muscular fibres can often be seen in the act of disintegration. The granular and waxy degenerations of the muscles found by Zenker in enteric fever occur in all severe fevers, and in typhus the cervical ganglia of the sympathetic have been shown to undergo a granular degeneration. The impaired nutrition of the heart and of the nitrogenous tissues accounts in part for the weakened cardiac action and for the stagnation of blood in the capillary circulation, which are so common in the advanced stages of fever. The only parts of the body that do not waste in fevers are the glandular organs, and especially the liver, spleen, kidneys, and lymphatic glands, which become enlarged and congested from the increased functions thrown upon them, the enlargement being greatest in the young and robust, who have most tissue to spare for conversion into urea. The gland-cells of these organs become swollen with minute granules; and a similar appearance is often presented by the white corpuscles of the blood, which are usually increased in number.

The large amount of nitrogenous detritus formed in fever may be all eliminated by the kidneys or bowels, or a portion may be retained in the blood, either as urea or as some half-transformed albuminoid matter, and then the temperature may be elevated without a corresponding augmentation of urea in the urine. Critical deposits of lithates in the urine are chiefly observed in those cases of fever where, from the symptoms, it might be inferred that there has been a retention of nitrogenous detritus in the system. The urea, or other less oxidised products of metamorphosis circulating in the blood and permeating the tissues, gives rise to symptoms of uræmic poisoning, or to the typhoid state already referred to; this condition being in some instances aggravated by the non-elimination of carbonic acid, consequent on the congested condition of the lung.

There are good grounds for the opinion that this is the true pathology of the typhoid state. 1. All modern pathologists are agreed that the cerebral symptoms of most fevers are independent of any appreciable structural lesion of the brain or its membranes. 2. The typhoid symptoms of febrile diseases often closely resemble those of uræmia resulting from disease of the kidneys. The two conditions are, in fact, often mistaken for one another; and excepting that the temperature is increased in the one case and not in the other, it may be sometimes difficult to distinguish them. The symptoms in both cases are probably due to the presence of similar morbid materials in the blood, the difference being that in pyrexia these materials are generated in excess, while in renal disease the kidneys are unable to eliminate the normal quantity. 3. In the course of these lectures I shall have occasion to tell you that in many fevers presenting typhoid symptoms—such as typhus, relapsing fever, yellow fever, and the secondary fever of cholera—urea has been actually found in the blood and in the cerebral fluid.* 4. Lastly, the advent in fever of grave cerebral symptoms, and in particular of convulsions, which may be regarded as the acme of both uræmia in kidney-disease and of the typhoid state in fever, is often preceded by albuminuria, or by a marked diminution, or even suppression,

* On this, and on the whole subject of the pathology of pyrexia, the reader will do well to consult Dr. E. A. Parkes's “Croonian Lectures on the Elimination of Nitrogen.”—*Lancet*, 1871, vol. i.

* Even were urea not invariably found, it would not follow that the typhoid symptoms were independent of non-elimination by the kidneys. Urea cannot always be detected in the blood and cerebral fluid after death from “uræmia” induced by renal disease.

of urine. When stupor, delirium, and coma show themselves in the course of a contagious fever, it is the custom to refer them to the action of the fever-poison on the brain; but the cerebral functions are more probably deranged, not by the fever-poison, which was the first and necessary link of the pathological chain, but by the accumulation in the blood of the products of metamorphosis, and the consequently perverted and defective nutrition of the brain and nerves. Hence it is that the symptoms in the advanced stages of many fevers and local inflammations (the typhoid state) are closely assimilated, although the primary maladies have been widely different. The precise grouping of the symptoms will vary in different cases of the same disease, while in diseases essentially distinct it may be identical.*

It is difficult to say why the nitrogenous detritus is excreted in some cases and retained in others; but its elimination appears to be often prevented by some morbid condition of the large glands, and especially of the kidneys, either of old standing or consequent on the febrile attack. Disease of the kidneys is a serious complication of all fevers. As long as the kidneys are equal to the increased work thrown upon them, the blood is properly deputed, and the typhoid state is warded off. But if the kidneys be unequal to the task, either from the large amount of effete material to be eliminated, from previous disease of the secreting tissue, or from congestion and other changes resulting (as they often do) from their increased work, then the blood becomes polluted, and convulsions or the typhoid state supervene. This explains why albumen so commonly appears in the urine in the course of all acute diseases of a severe form, and why it is so justly regarded as an unfavourable symptom. It also explains why albuminuria is looked upon as a contraindication to any serious surgical operation. The surgical fever which follows an operation is attended by an increased metamorphosis of the blood and tissues; and if the kidneys be diseased, the products of this metamorphosis will be partly retained in the blood, and induce the typhoid state with all its dangers.

Another probable result of the non-elimination of nitrogenous products in fever is the development of local inflammations. The half-changed albuminoid matters circulating in the blood seem sometimes to be deposited in different organs, and there to excite secondary inflammation. Cases of idiopathic fever have been observed in which a sudden diminution in the amount of excreted urea has been followed by an attack of pleurisy or other local disease, the quantity of urea again increasing as the local complication has receded.

When convalescence from fever is fairly established, and the patient is regaining weight, the elimination of nitrogen and also the temperature are often below the normal standard.

The metamorphosis of nitrogenous matter which occurs in health is under the control of the nerves, and so the augmented metamorphosis of fever appears to be due to some abnormal state of the nervous system. According to the well-known experiment of Claude Bernard, an elevation of temperature to the extent of from 7 to 11 deg. Fahr. is produced on one side of the face of an animal, when the trunk connecting the sympathetic ganglia on the corresponding side of the neck is divided, the sensibility of the part becoming greatly excited and the vessels dilated and hyperæmic. This elevation of temperature must be ascribed to the hyperæmia and increased metamorphosis in the part, which had before been held in check by the sympathetic nerve. The

converse of this experiment has been performed by Waller, who found that contraction of the dilated capillaries, diminution of vascular injection, and reduction of temperature followed the irritation of the divided sympathetic by the transmission of an electric current. Experiments on the vagus nerve have led to equally important results. Section of the vagus is followed by increased rapidity of the heart's action, and an increased lateral pressure of blood in the arteries; whilst irritation of the cut nerve by an electric current reduces the number of beats of the heart and diminishes the lateral pressure in the arteries. These and other observations make it probable that the increased metamorphosis, the elevated temperature, and the increased frequency of the heart's action in fever, are due to paralysis of the sympathetic nerves and the vagus. Many clinical facts show that the nervous system exercises a powerful influence on the early phenomena of fever, such as the rigors, the pain, the languor and prostration, which are among its earliest phenomena.

The facts and arguments bearing on the pathology of pyrexia now laid before you may be summed up as follows.

1. A morbid condition of the blood, due to the entrance of some poisonous matter from without or generated within the body, or to some local injury or inflammation, exercises a paralyzing influence on certain portions of the nervous system, and particularly on the sympathetic and the vagus.

2. Increased rapidity of the heart's action is one of the earliest results.

3. A second result is a rapid disintegration of the nitrogenous tissues into substances of a simpler chemical construction, while little or no fresh material is assimilated to compensate for the loss. Increased temperature, great muscular prostration, and loss of weight are the natural consequences.

4. The non-elimination, from any cause, of the products of this disintegration gives rise to cerebral (typhoid) symptoms or local inflammations.

5. The impaired nutrition of the heart itself and of the rest of the body, in conjunction with the polluted state of the blood and the nervous paralysis already referred to, induces in severe cases of fever great weakness of the cardiac contraction, and stagnation of blood in the capillaries in different parts of the body.

Why it is that the febrile process once lighted up should ever become arrested, and in many instances after a definite duration, is a problem in medical science of which no satisfactory solution has yet been offered.

VI. *Diagnosis*.—From what has been stated, you will understand that mere quickness of the pulse does not constitute pyrexia, but that its diagnosis must depend upon the presence of an elevated temperature. It is this that constitutes the great value of the clinical thermometer in diagnosis. It enables you to say positively whether a patient is suffering from fever or not. Against one fallacy in diagnosis I wish to put you on your guard. A patient may be suffering from pyrexia; and at certain hours of the day, which may correspond to those of your observations, the temperature may be perfectly normal. In any case of doubt, then, it will be necessary, before excluding the existence of pyrexia, to note the temperature at two or three different hours in the course of the day. In phthisis, for example, and in certain cases of enteric fever, the pyrexia is often for a time distinctly intermittent.

VII. *The Prognosis* in any case of pyrexia will of course be greatly influenced by its cause; but, irrespectively of the cause, there are certain conditions which must always be regarded as of serious import.

1. In grave fevers the prognosis is worse in robust full-blooded persons with abundance of muscle and fat than in those of spare habit, because in the former there is more material to spare for disintegration during the febrile process. In scarlatina it is a matter of daily observation that the plump and ruddy child succumbs, while the spare and more delicate-looking child pulls through. And in adults it may be said that all fevers are grave in proportion to the development of muscle and fat.

2. The prognosis is always bad when severe fevers attack individuals in whom the defæcation of the blood is naturally imperfect—for example, in persons of a gouty diathesis.

3. The danger in any case of fever is increased by the fact of the patient having a naturally weak heart, not so much from the presence of valvular disease as from weakness in the contracting power of the muscular walls. Its strength may be sufficient for the ordinary work in health; but when fever occurs, the work is increased while the organ is further weakened, and then it is apt to break down.

4. The danger is always great when there is evidence of antecedent renal disease. To the kidneys we must look for the elimination of the large amount of nitrogenous detritus resulting from the febrile process; and, when the eliminative power of these organs is impaired by disease, the peccant material is retained in the system, with the deleterious con-

* On this subject, see a Clinical Lecture published by me in the *BRITISH MEDICAL JOURNAL* for January 4th, 1868, "On the Pathology of the Typhoid State."

Dr. Charlton Bastian attributes the delirium and stupor of the typhoid state to plugging of the minute vessels in the grey matter of the brain with masses of white corpuscles; but these coagula, if constant, are perhaps only one of the results of the morbid state of the blood and circulation above referred to.—*Path. Trans.*, 1869, vol. xx, p. 8.

Again: it is contended by Liebermeister (*Deutsch. Archiv für Klin. Med.*, 1866, i, 174) and others, that the cerebral symptoms in pyrexia are due to the direct action of the elevated temperature on the central organs of the nervous system. Liebermeister declares that a temperature of 107.6 deg. is followed by speedy death; and, according to Wehardt, a temperature of 108.6 causes the blood in the vessels to coagulate. That the danger is always great in proportion to the intensity of the pyrexia as measured by the thermometer, there can be no doubt; but it is not so clear that the danger is the result of the high temperature, and still less that this is the cause of cerebral symptoms. In relapsing fever, I have often known the temperature reach 106 or 107 deg. F., without any cerebral symptoms, and with a favourable result. Of 89 cases of relapsing fever observed by Obermeier at Berlin, the temperature rose in 3 to 107.6 deg.; in 6 to 107.7; and in 2 to 108.5 deg. In all these cases, no special danger attributable to the high temperature could be discovered, nor even a single circumstance in which they differed from other cases. Of 70 cases of relapsing fever at St. Petersburg, Zorn found that the temperature in the axilla rose to 108.5 deg. in 12, of whom only 4 died. Tennant at Glasgow found in many cases of relapsing fever the temperature as high as 107 deg., while in two it reached 108 deg., yet these cases of high temperature were in no way notably different from others. In scarlatina, also, the temperature may reach 107 deg. or 108 deg., without a fatal result. On the other hand, most severe cerebral symptoms and a fatal result may occur in typhus, although the temperature has at no time exceeded 103 deg. or 104 deg.; while cerebral symptoms, indistinguishable from those of pyrexia, may result from disease of the kidneys when the temperature is not above the normal standard.

sequences already described. Here, again, the kidneys may be sufficiently sound for the due performance of their functions in a state of health, although they are quite incompetent to discharge the additional work thrown upon them in pyrexia.

5. In most fevers the prognosis is bad in proportion to the intensity of the pyrexia, as measured by the thermometer. With few exceptions, a case with a temperature of 105 deg. must be looked on as severe; and one with a temperature of 107 deg. as highly dangerous.

6. In any case of fever the prognosis will be bad in proportion to the intensity of the typhoid state; and when convulsions occur in the typhoid state, recovery is rare.

7. In any case the prognosis will be bad in proportion to the weakness of the heart, and the tendency to stagnation of blood in the capillaries of the lungs and other parts of the body.

VIII. *Treatment.*—If the views which I have laid before you respecting the pathology of fever be correct, our objects in treatment ought to be as follows:—

1. To remove, when possible, the cause on which the fever depends.
2. To promote elimination, not merely of any morbid poison, but of the products of exaggerated metamorphosis in the blood and tissues.
3. To reduce the temperature and the frequency of the action of the heart.

4. To maintain the nutrition of the tissues and stimulate the action of the heart by appropriate food and stimulants, taking care, at the same time, not to excite congestion or increase the work of the already overtasked glandular organs.

5. To relieve dangerous and distressing symptoms.
6. To obviate and counteract secondary complications.

How these indications are to be fulfilled will be discussed under the head of individual febrile diseases, but a few general remarks on the treatment of fever in the abstract will not be out of place here, and may save repetition hereafter. You are not to imagine that each fever has a treatment of its own. According to the predominance of certain symptoms, the appropriate treatment will vary greatly in different cases of the same fever, while in fevers widely different in their causes it may be identical.

1. Unfortunately, it is not often that we have it in our power to remove the cause of pyrexia; but the object is one always to be kept in view, and sometimes the main efforts of our treatment must be directed to secure it; as, for example, when pyrexia depends upon pent-up pus, an obstructed bowel, or gouty, syphilitic, or periosteal inflammation.

2. The elimination of any morbid poison, as well as of the products of exaggerated metamorphosis, will often be promoted by the judicious employment of diaphoretics, diuretics, purgatives, and emetics. The old practice of commencing the treatment of pyrexia by giving a purgative to unload the portal circulation and promote the action of the liver, is undoubtedly a good one, and is particularly advisable in persons of robust habit, or who live too well. In mild cases of pyrexia, the only treatment necessary consists in the avoidance of any chill, and in the administration of a mild aperient, followed by frequent doses of diuretics and diaphoretics, such as the citrate of potash, or the liquor ammoniæ acetatis with spirit of nitrous ether. Elimination will also be promoted by a plentiful supply of fresh air, which will favour the escape of carbonic acid from the lungs, and by the free use of diluents, which will help to wash away through the kidneys the products of tissue-waste. In all grave cases of fever you will remember the importance of maintaining the action of the kidneys, and of keeping a good watch on the state of the urine; noting carefully not so much its colour and the presence or absence of lithates (both of which characters will depend much on the quantity), but the quantity and the presence or absence of albumen. When the quantity becomes notably diminished, or albumen appears, advantage will often be derived from hot poultices to the loins, aperients, diaphoretics, diluents, and diuretics. But while you promote elimination, you must take care that the means for this end do not weaken too much the action of the heart; and you must remember that, in some fevers, the natural processes of elimination are excessive, and conduce to dangerous exhaustion and death.

3. For reducing the intensity of the pyrexia, different measures have been proposed.

Blood-letting was at one time universally resorted to for this object, but in this country it is now entirely discarded, because it was found to increase one of the great dangers in pyrexia, viz., failure of the heart's action. There are few accurate observations on the effects of blood-letting on the temperature of pyrexia; but we know that, when a copious bleeding from the nose or the bowel takes place in enteric fever, although the temperature may fall to below the normal standard, it speedily regains its former height, or rises above it.

The external use of cold water is one of the most certain means of reducing temperature in pyrexia, and in certain cases is attended with good

results. The attention which this practice is now attracting will justify the following remarks. In the seventeenth century, the brothers Hahn, of Leipzig, treated fevers by the external use of cold water, but their observations were soon forgotten. Towards the end of last century (1787) cold affusion was proposed by Dr. Currie, of Liverpool, both for arresting and mitigating fever. The patient was seated naked in an empty tub or bath, and several buckets of water, of a temperature of 40 or 50 deg. Fahrenheit, were poured from a height of one to three feet, or more, over the head and chest. He was then hastily dried, and restored to bed, and, in most cases, the operation was repeated once or twice daily. It was stated that, in many cases, if resorted to during the first three days, this treatment arrested the disease; while, in others, it reduced the pulse and temperature, relieved many of the distressing symptoms, and particularly the headache, restlessness and delirium, and conducted the disease to a safer and speedier issue. The affusions were employed at any stage of the fever; but the effects were always most salutary at an early stage. They were said to be contraindicated when the temperature of the skin, ascertained by the thermometer, was not much above the normal standard, or when, notwithstanding an elevation of temperature, the patient complained of chilliness, or suffered from severe diarrhoea or profuse sweating. The wonderful results obtained by Currie were confirmed by numerous observers in different parts of the world, whose testimony is recorded in the third edition of his work, published in 1804.* But in the British epidemic fever of 1817-19, the practice was followed by many with great perseverance, and the general result, according to Sir Robert Christison, was that in very few cases, if any, was the disease arrested by it; that although an abatement of febrile heat and restlessness occurred almost invariably, it was of short duration, and not to be made permanent by any frequency of repetition; that as much good eventually was attained by frequent cold or tepid sponging, together with cold applied to the head; and that often the cold affusion occasioned for a time after each application an intense feeling of pressure and weighty feeling in the brain, which could not be regarded without some uneasiness.† These statements, backed by professional and popular prejudice, account perhaps for the subsequent neglect of the cold-water treatment of fevers. But the observations made of late years by Brand of Stettin, Jürgensen of Leipzig, Liebermeister of Basle, Ziemssen of Erlangen, and H. Weber and Wilson Fox of London, show that, although the practice may not shorten the fever, and is often inapplicable, yet under certain circumstances it is useful not only for reducing the temperature, first of the surface and then of the interior of the body, but for relieving headache and other distressing symptoms, removing congestion of the kidneys, warding off delirium and coma, and rousing the nervous system in cases of excessive stupor. The circumstance has perhaps been too much lost sight of that cooling the body may not influence the conditions on which the development of heat depends; but with reduced heat it may be assumed that there will be diminished metamorphosis, to the non-elimination of the products of which many of the dangers of fever are due. In point of fact, Schroeder of Dorpat has ascertained that cold baths effect a marked diminution in the excretion of carbonic acid and urea in fever;‡ and as this was not attended by any aggravation of the general symptoms, it is fair to attribute it to a retarded metamorphosis of tissue.

Statistics have been appealed to to prove the great success of the cold-water treatment of fevers (particularly of enteric fever) as contrasted with that of an expectant method; and, although other conditions not stated may have helped to influence the result, they suffice to show that the practice is not beset with the dangers commonly imagined. But the most conclusive facts in favour of the practice are those observed in certain cases of hyperpyrexia by Dr. Wilson Fox§ and others, where its employment was followed by recovery from an elevation of a temperature (110 deg. Fahr.) which under every other method of treatment has been speedily followed by death. At the same time there are many cases of pyrexia in which the cold affusion or immersion would be unsuitable or injurious. It is likely to be of most service when the temperature is unusually high; and in all cases the practice is contraindicated when the temperature is under 102 deg. Fahr., or when the extremities are cold, although the temperature of the central parts of the body be high; and it must always be employed with caution when there are the signs of weakened cardiac action or of stagnation of blood in the capillary circulation, although it may be noted that in one of

* *Medical Reports on the Effects of Water, Cold and Warm, as a Remedy in Fever.* By James Currie, M.D., F.R.S. 1804.

† Article, "Continued Fever" (*Library of Medicine*, vol. i, 1840).

‡ Ueber die Einwirkung kalter Bäder auf die CO_2 - und Harnstoff-ausscheidung beim Typhus.—*Deutsch. Archiv f. klin. Med.*, 1869, Bd., vi, s. 385.

§ *On the Treatment of Hyperpyrexia by Means of the External Application of Cold.* London: 1871.

Dr. Fox's patients, who was apparently rescued from death, the face was cyanotic and the radial pulse imperceptible.

There are different plans for employing cold water in the treatment of pyrexia, such as the cold affusion practised by Currie, packing in a cold wet sheet resorted to by Brand, or immersion in cold baths. The last is the method now most in fashion. The patient is placed in a bath having a temperature of from 50 deg. to 70 deg. Fahr., or better, as Ziemssen recommends, in one whose temperature is about 10 deg. below that of the body, but which, after the patient's immersion, is gradually cooled down to 68 deg. by adding cold water. He should remain in the bath for half an hour, or until shivering comes on, and all the time he is in the bath his limbs ought to be rubbed by assistants. He is then to be hastily dried and put into a warm bed. For some time after the bath, the temperature in the rectum continues to fall as the trunk parts with its heat to the extremities; but as soon as the temperature in the rectum rises again to 104 deg., the patient ought to have another bath. In the early stages of the fever, as many as seven or eight baths in the day may be necessary. When cold affusion or immersion is contraindicated or inexpedient, frequent sponging of the surface with cold or tepid water will also help to cool the body, and is often a source of much comfort to the patient.

Quinine in large doses has an undoubted influence in lowering the temperature of pyrexia. In most cases of severe pyrexia, ten, fifteen, or twenty grains will, within an hour or two, cause a fall of the temperature to the extent of three or four degrees, and to a less degree of the pulse.* It is true that the effect passes off after a few hours, and that there is no good evidence (except in malarious fevers) of its cutting short the natural course of the attack; but the effect may be maintained by a repetition of the dose; and the remedy has often appeared to me to be of signal service when a pyrexia was at its crisis, and when the temperature was rising in place of falling.

Digitalis, Aconite, and Veratrum Viride have a marked power in reducing the pulse, and, to a less extent, the temperature in pyrexia, and are, in my opinion, too much neglected for these objects in practice. *Veratrum viride* is largely used in America in the treatment of fevers, and its effect upon the pulse is speedy and most decided; the only objection to its use in private practice which my experience suggests is its liability to induce sudden nausea and faintness, but these symptoms are transient, and cease on the administration of a stimulant. Ten or fifteen minims of the tincture may be given every four or six hours. *Aconite* is a remedy of great value for reducing the pulse and temperature in fever, and especially in the pyrexia resulting from local inflammations, and is much less used than it deserves to be. *Digitalis* is another remedy which I have often found very serviceable in various forms of pyrexia. While increasing the force of the cardiac contractions, it diminishes the frequency of the pulse, reduces the temperature, and increases the flow of urine. Lastly, *antimony* reduces, in a marked degree, the frequency of the pulse in pyrexia, and promotes diaphoresis and mucous secretion. It was at one time largely used in all fevers, but in many it is contraindicated by its tendency to weaken the contracting power of the heart.

4. The nutrition of the body must be maintained by appropriate food, in the form of milk, beef-tea, eggs, and farinaceous articles. Not long ago it was the custom to starve fevers; and you may probably have heard that the late Dr. Graves, of Dublin, who was mainly instrumental in doing away with this objectionable custom, expressed a wish that his epitaph might be, "He fed fevers." The modern tendency, however, is perhaps to over-feed fevers, and especially to give too much nitrogenous food. Dr. Parkes has shown that there are theoretical objections to a purely nitrogenous diet in fevers. It is doubtful if the disintegrating nitrogenous tissues can be fed; and in that case the albuminous food must be got rid of by the already over-tasked glandular organs. Milk is in most cases preferable to beef-tea as an article of diet in fevers.

In many cases of fever it will be necessary to give stimulants. You must not give stimulants simply because a patient has fever. Many patients with fever do better without them. But you must not refrain from giving stimulants when the heart shows signs of weakness, as happens in the advanced stages of most protracted fevers. The heart may be artificially stimulated by sinapisms and other irritating applications to the skin, but better by the internal administration of ammonia, ethers, and alcohol, in quantities proportioned to the weakness of the heart and pulse.

5. In every case of pyrexia, you must combat dangerous symptoms as they arise. Stagnation of blood in the pulmonary capillaries impeding the aeration of the blood is to met by stimulants, such as alcohol, carbonate of ammonia, and ethers. *Digitalis*, by strengthening the heart's action, and turpentine, which seems to stimulate the capillary circula-

tion, are also useful under these circumstances; while advantage will likewise be derived from mustard- and linseed-poultices to the chest, sometimes from dry cupping of the chest, and from warm applications to the feet. When uræmic symptoms predominate, the action of the skin and bowels is to be promoted, digitalis and saline diuretics may be given to increase the flow of urine, sinapisms and linseed-poultices are to be applied over the loins; while attempts may be made to rouse the patient by cold affusion to the head, by blistering the shaven scalp with liquor ammoniac, and by sinapisms to the nape and feet. In many cases of fever you will also be called upon to relieve distressing symptoms—such as diarrhoea, pain, sleeplessness and delirium—which, if unchecked, hasten exhaustion and prevent recovery.

6. You must counteract, as far as possible, secondary complications, which will vary according to the primary cause of the pyrexia, and which always add to the patient's danger.

Lastly, I would caution you against two errors in the treatment of pyrexia.

1. You must take care that the remedial measure which you adopt in no way thwart the natural modes of recovery, or favour the natural modes of death.

2. At the same time, you must not be content with adopting a treatment of pure expectancy. You must not forget that the natural termination of pyrexia may be death, as well as recovery.

ABSTRACT OF A CLINICAL LECTURE

ON

TWO CASES OF COMPOUND DISLOCATION OF THE FOOT,

COMPLICATED IN ONE OF THEM WITH COMPOUND FRACTURE AND DISLOCATION OF THE ASTRAGALUS: RECOVERY IN BOTH INSTANCES, WITH USEFUL LIMBS.

By SPENCER SMITH, F.R.C.S.,

Senior Surgeon to St. Mary's Hospital.

Communicated by MALCOLM A. MORRIS, ESQ., late House-Surgeon to St. Mary's Hospital.

CASE I.—W. S., aged 37, in good health, a gentleman's coachman, was admitted May 31st, 1871. Whilst in the act of mounting a horse the animal took fright, and, finding himself unable to control it, he jumped down and fell with his left leg twisted under him. On admission, the left foot was found to be dislocated inwards, the sole being directed towards the internal malleolus of the opposite foot. The external malleolus projected through a hole in the integument, which grasped it so tightly as to prevent reduction; the laceration extending across the front of the ankle-joint. Protruding from this wound, and lying upon the dorsum of the foot, was seen a large fragment of bone, not quite detached; it formed about two-thirds of the astragalus, was about two inches in length, and about an inch in breadth and another in thickness. Smaller fragments could be felt on introducing the finger into the wound. No portion of the tibia or fibula could be detected; but there was another smaller wound over the inner ankle. As the man represented himself to be in good health, and seemed of a cheerful happy disposition, it was determined to try to save the limb. Chloroform was administered. The dislocated fibula not being reducible without considerable enlargement of the wound, about three-quarters of an inch was sawn off, and the limb readily placed in its natural position. The interior of the joint could now be easily examined, and two more portions and a quantity of pulverised astragalus, amounting to about one-third of that bone, were extracted. Great violence seemed to have been done to the soft parts around the joint. There was considerable hæmorrhage at first, but it ceased as soon as the parts were replaced in their natural position. The cavity of the joint was freely syringed out with carbolic acid lotion (1 part in 20), and the edges of the wound brought together with silver-wire sutures. It was then covered with lint saturated with the same lotion, and oiled silk placed over all. The limb was then comfortably secured upon a back-splint with a foot-piece. The patient appeared to have suffered but little shock.—June 3rd. The sutures were removed to-day; the wound was tolerably healthy. He complained of much pain in the leg and knee, which was swollen.—June 4th. There was a large quantity of offensive discharge from the joint this day. Three or four bullæ appeared over the ankle, with much tenderness still along the leg. The skin was dry, tongue foul, and pulse 112. He was ordered a free allowance of food and stimulants.—June 5th. There was less pain in the knee; the discharge was still foul; the cavity was syringed out

* For evidence on this point, see Report of a Committee (of which I was a member) of the Clinical Society.—*Trans. Clin. Soc.*, 1870, vol. iii.