

abscesses, more particularly in the heart and kidneys. They are often associated with hæmorrhage, and the smaller ones look like little extravasations, but the presence of micrococci and suppuration can be easily determined in stained sections. The spleen is most often the seat of infarction, and next in order the kidneys. The lungs are usually affected when the endocarditis is on the right side, and there may be suppuration or even extensive gangrene, but even with destructive lesions of the pulmonary valves there may be no suppurative infarcts in the lungs, as in a case of Dr. Church.¹² Or again, as in a case of Dr. Moxon's,¹³ there may be with aortic valvulitis suppurative infarcts in the lungs, and simple ones in the other organs. The gastro-intestinal canal may present very remarkable changes, due to the presence of numerous infarctions, from the size of a pin's head to a split pea. They are slightly elevated, greyish-yellow in colour, often surrounded by a zone of deep congestion or extravasation, and on section may show a suppurative centre. Micrococci are present as in other miliary abscesses, and in several instances I was able to find small embolic plugs in the arteries of the submucosa. The abscesses may discharge and leave a small ulcerated surface. In the stomach there may be similar minute infarcts, and occasionally larger ones. Carrington¹⁴ has described a remarkable case in which there was a gastric ulcer, apparently due to embolic process, in a case of severe endocarditis; and Magill,¹⁵ a case in which the stomach was intensely inflamed, the mucous membrane at the greater curvature being black, almost gangrenous. The liver may present minute abscesses, and in a number of cases in which there has been jaundice degeneration of the cells has been observed.¹⁶ The serous surfaces are often inflamed, pleurisy and pericarditis being not uncommon complications. The pericardium is most frequently affected in rheumatic cases in which endocarditis and pericarditis may occur simultaneously. Pleurisy is met with chiefly in connexion with the traumatic and puerperal cases, and also with pneumonia, which, as I shall show, plays such an important part in the history of this form of endocarditis. The cerebral lesions are of the substance and of the membranes. Embolic softening, simple or suppurative, is extremely common, and in very many cases head symptoms supervene and there is paralysis of one side or the other. There may be a single embolus, producing extensive suppuration or red softening, or there may be multiple infarcts in various regions.

The meningeal complications of endocarditis have not received much attention. Considering the frequency with which it has occurred in the Montreal cases, five instances out of twenty-three, I was quite prepared to find such a large number as twenty-five cases—i.e., somewhat over 12 per cent. In the majority of these cases it occurred in connexion with pneumonia. It is almost always cortical, but many extend to the base and involve the nerves, leading in one case, which I saw with Dr. Ross at the Montreal Hospital, to strabismus, and also to ulceration of the cornea from involvement of the fifth nerve. In rare instances the spinal meninges are involved, and the clinical picture may be that of an acute cerebro-spinal meningitis.¹⁷ Acute suppurative parotitis was noted in three cases.

THE DIET OF THE FEBRILE STATE.¹

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THE search for a perfect diet has been an object of solicitude and study from the earliest times, to the physician and the quack, to the learned and the empiric. From the resulting mass of crude suggestion and ignorant assertion it may not be said that we have gained no positive knowledge, but we should still be far from stating that the principles of dietetics have been reduced to a certainty. To the already vast literature of this subject, the dietetics of health, I have no present intention of adding, but I propose to direct attention to the question of the fitting diet for the febrile

state, a morbid condition of the body which is of the commonest occurrence, and which, as affecting the system generally, may be placed in contrast to that other general state of body we denominate "health."

The problem to the solution of which I am desirous of contributing is that we should aim as far as possible at formulating some general scheme for a febrile diet, to be modified as special cases—e.g., enteric fever—may demand, just as the usual diet of health is modified in certain persons. Clearly, to lay down such a scheme, the principles of a normal diet no less than the nature of the febrile state should be first considered.

Regarding the diet of the healthy state, though much still remains *sub judice*, the profession has succeeded in ascertaining a very definite and useful series of data, that we are accustomed, and I believe with good reason, to accept as true. The one that mainly concerns us is that the essentials of a healthy diet must correspond with the component materials of the body, or, in other words, that the alimentary principles of food must correspond with the proximate principles of the human tissues; and further, that, speaking generally, they should be combined in the following proportions:—

Proteids	4½ ounces	} Free from water.
Hydrocarbons	3 "	
Carbohydrates	14 "	
Salts	1 "	
Water	100 fluid ounces.	

That is to say, for an average adult with average exercise of mind and body. We have further learned that we cannot sacrifice *one* of these substances without doing harm; all must be present, and though of course it would be practically impossible to maintain existence on these crude principles, they nevertheless are the important essential components of the various articles of diet that form the food of mankind. Since no single article of diet contains the necessary alimentary principles in the proportions required for an adult, they have to be distributed among the various food stuffs in such a way as to furnish the desired amount. Doubtless we are in the habit of exceeding the absolutely necessary quantity, and the effect and destination of our surplus ingesta is a question of the greatest interest, both in health and disease, though apart somewhat from the present subject. It is further significant that a monotonous adherence to a diet, however complete, is insupportable, and results in starvation, though some articles of food are capable of being longer tolerated than others. It is interesting and pertinent to the question to note how these data were arrived at. The quantity and quality of the alimentary principles may be said to have been determined partly by the experience of mankind based upon instinct, but more recently by the accurate methods of tissue analysis, which demonstrates the structures which have to be repaired, and the excreta analysis, which equally shows what has to be supplied to make good the deficit and maintain the balance. I shall have occasion to consider how these methods are further applicable, or indeed have been applied to the subject in hand. But, however exact we may in time come to be in our results, however accurately we may demonstrate the nature and source of the excreta, and thence with equal certainty define the requisite ingesta, there will still remain a factor with which we must cope, and which has been termed "idiosyncrasy." There can be no doubt that a very considerable difference exists between what may be termed a theoretically perfect diet and the diet which best suits a given individual; and I think Dr. Austin Flint has done good service in drawing attention to the harm that may be done from a too rigid adherence to a presumed scientific dietary based on chemical analysis, to the exclusion of what appetite, experience, both personal and general, and common sense would dictate.

A further consideration preliminary to my subject is the destination of such a diet as I have mentioned; in short, the need for the food, or the object of its ingestion. That the energies manifested by a living being are the resultant of an alteration in the physico-chemical condition of some of the materials of its structure is now regarded as an axiom; and it necessarily follows therefore that, if the manifestation continue, the material, to changes in which it is due, must be as continually renewed. Hence, we are in the habit of saying that our need for food is to repair the tissue consumed in the production of living energy. The distinctive forms of energy that characterise living beings, and that in

¹² Path. Soc. Trans., vol. xxvi.

¹³ Ibid., vol. xix.

¹⁴ THE LANCET, vol. i., 1884.

¹⁵ Brit. Med. Journal, vol. ii., 1884.

¹⁶ Schnitzler, Wiener Med. Presse, 1865.

¹⁷ Hunolle, Bull. de Soc. d'Anatomie, 1874; and Heineman, Med. Record, New York, vol. ii., 1881.

¹ A paper read at the annual meeting of the Medical Society of London, March 2nd, 1885.

our present state of knowledge are not regarded as correlated to the physical forms of force, however much they may come to be shown to be but "modes of motion," are muscular force or contractility, nervous irritability, and gland force. An arrangement of tissues and organs that liberates these is undoubtedly living and probably an animal. But be it observed that in addition to these, heat and electricity are evolved at the same time, and these are precisely identical in nature with the same named forces that we can develop from non-living material. The exact relationship of animal heat to the producing organism needs to be set forth. It is well-known that the tissue metabolism underlying the manifestation of the vital energies above mentioned is invariably accompanied by a rise of temperature; the contractions of the muscles are associated with heat production, the secretion of glands the same to a less extent, the activity of nervous tissue to a still less degree, and an infinitely small amount of heat is liberated by the slight changes in the protoplasmic constituents of the connective tissues. Observations and analysis have shown that muscular contractility, and almost as certainly nervous energy, are not produced at the expense of the actual nitrogenous constituents of muscle and nerve cell, since the resulting nitrogenous waste is not proportioned to the work done; but in all probability they are due to the oxidation of some hydrocarbon material intimately involved and incorporated with the protoplasmic substance, the latter suffering a wear and tear (also in the nature of oxidation) comparable to that of the bars of a furnace, the fuel contents of which are the actual source of the heat produced. In accordance with this view the oxidation of the hydrocarbon included in the muscular fibre results in the liberation of a form of energy which, under the influence of the complex, unstable, nitrogenous protoplasm, is translated into what we call "muscular contractility;" but at the same time there is evolved a certain amount of heat, also due to the oxidation of the same material. The heat, then, is an accompaniment, or bye-product, of the same process, and may be produced at the expense of so much muscular energy, just as in mechanical arrangements heat is developed by friction in the operation of the various parts, often at a positive detriment to the total result, and certainly not being the object for which the machine is worked. The other aspect of the relationship of the animal heat to the body is that for the manifestation of the activities of the living tissues a certain temperature is necessary, since many chemical decompositions will only take place under the influence of heat. This obviously is, if I may so say, the necessity for the body temperature, and the question at once arises whether the total quantity of heat requisite for this purpose is derived from the metabolism of muscular, glandular, and nervous tissue (including therein the extremely small increment derived from the oxidation of the protoplasmic structure); or whether there be any special combustion of certain of the ingesta for heat-production only, and if so where may this take place? The general opinion would seem to be that the heat under conditions of health is derived entirely from the tissue disintegration accompanying the liberation of the specific vital energies. There is not much doubt that the destination of the various fat, sugar, and starch ingesta is to maintain the supply of the hydrocarbon material by the oxidation of which the living energies and the heat of the body are produced. There is good reason to suppose that the carbohydrates ultimately reach the site of their combustion as hydrocarbons, although the exact chemical steps of the conversion are as yet unknown. Nor are these thought to be the sole sources of the fuel. It is very generally believed that only a small portion of the total nitrogenous ingesta is ultimately concerned in the restitution of the protoplasmic waste; in fact, that far more proteid material is taken as food than is actually required to make good the proteid decomposition, although on grounds of experience, and for other reasons, such an amount as that above stated is found most suitable. The excess of such substances in all probability undergoes a decomposition, perhaps in the liver, which results in the formation of some carbohydrate (glycogen) or fat, leaving a nitrogenous residue akin to urea, which is excreted, the other directly or indirectly helping to furnish that hydrocarbon which is oxidised in association with the living tissue. Among the many interesting questions which surround this part of the subject, I might mention the value of the nitrogenous ingesta apart from their constructive function, as seen in the influence they exert over fat accumulation,

and the exceedingly important inquiry as to the existence and conditions of the "reserve pabulum." With such a conception of the relation of the energies produced to the tissues of the body, it only remains for me to say that calculated upon the waste resulting from the disintegration of these tissues, as excreted by kidneys, lungs, skin, and bowels, is the quantity and quality of the diet that experience also shows is most consistent with a healthy existence.

Turning now to the state of fever, although we must admit our knowledge of its intimate pathology to be deficient, we are nevertheless in a position to affirm that it is a general morbid state characterised by a marked perversion of function, and associated with an equally marked alteration in the quality and quantity of the excreta, itself a material index of abnormal tissue change, the actual existence of which within certain limits the microscope reveals to us. The most prominent and obvious functional perversion is an elevation of temperature, and I think it worthy of notice that whilst this, the most characteristic feature, is excessive production of a by no means peculiarly vital force, but on the contrary of the most widespread form of energy known to us, those more distinctly characteristic features of living tissue—contractility, nervous irritability, and gland force—are all diminished in their manifestation. The muscular power of the febrile patient is deficient, his nervous energy is impaired, and the secretions are diminished. Whatever doubts one may entertain as to the seat of origin of pyrexia, whether the fever consists in disorder of the nervous centres whereby there is a diminished loss of heat from the body, with a consequent retention, and so elevation of temperature, or whether the process commences in the protoplasmic tissues generally, and only secondarily brings about the systematic disturbances, the broad fact remains that there is an undue consumption of material. We recognise this in the wasting and loss of body weight; adipose tissue, muscles, and even the bones suffer. Nor is the evidence of loss confined merely to gross alterations that may be measured by the scales. Analysis of the excreta shows the extensive disintegration of tissue that accompanies the pyrexia, and at the same time indicating the proximate principles of the tissues, the combustion of which liberates the heat, suggests the food that is demanded for their supply, just as we infer the materials of a normal diet from the nature of the excreta in health.

There is a general agreement that the nitrogenous waste represented by urea, which is the most important (although equally true of uric acid and creatinin), is considerably increased, commencing even before the elevation of temperature and continuing throughout the whole febrile course. In so much as we shall see it is only in rare cases that the febrile state is not accompanied by a diminished nitrogenous ingesta, it must follow that the urea excreted must be drawn from the proteid tissues of the body, which undergo a more extensive disintegration than in health, and this should be remembered in reference to those cases where the total nitrogenous waste is absolutely less than that of health with ordinary diet, but is absolutely greater when the same healthy person is put upon a fever diet, which is invariably deficient in proteid alimentary principles. Respecting the amount of CO_2 in fever, much difference of opinion exists. The experiments of Senator on dogs would at least render it doubtful whether there be an increased formation of it, though there may be an increased elimination, since in fever such circumstances as quickened respiration are favourable to excretion; but the observations of Leyden on febrile patients would seem to show that there is an excessive formation. It is noteworthy, however, that there is by no means the marked considerable excess as is the case with urea, and also with water, which is largely increased in the amount lost (not by the urine, where it is diminished, but) by the skin and lungs. Indeed, the loss of body weight is mainly to be attributed to the loss of water. The elimination of salts in fever affects chiefly those of potash, which are excreted in far greater abundance than in health, even to sevenfold; whilst those of soda are, on the contrary, much diminished in amount, and may even be suppressed. Concerning the acids, whilst hydrochloric acid is certainly diminished, phosphoric and sulphuric acids would seem not to be increased. The urinary pigments are largely increased in amount. Of the hydrocarbons usually excreted in the faeces and by the skin, nothing is known in the febrile state. From such general conclusions as to the excreta of the pyrexial condition, conclusions which I have

not attempted to express in figures, we gather that whilst the increased excretion of water may be regarded as a withdrawal of that fluid from the tissues generally, and is but very partially the result of tissue metamorphosis, it is the nitrogenous tissues of the body that give the most positive evidence of excessive disintegration; the increased elimination of urea and uric acid and of potash salts unmistakably indicates an excessive wear and tear of the protoplasmic tissues of the body, nerve, muscle, and gland, as well as the blood-corpuscles. Remembering, as we have seen, that the main source of heat in health is the oxidation of hydrocarbon material, which is intimately associated with the protoplasm, and that only a very small increment of the total quantity of heat produced is derived from the oxidation of the machine itself, it would seem at first sight that in fever we have a reversal of the process, and that we are in face of an excessive oxidation of the nitrogenous material of the tissues ("tissue albumen" of Voit), as indicated by the excreta, whilst the hydrocarbon suffers but little if any increased consumption—that is, if we are justified in estimating the CO_2 formation as being but slightly increased, this gas being one of the chief products of hydrocarbon combustion. In this way we might be inclined to expect the nitrogenous excreta would be a measure of the heat production; were that so, the maximum temperature should coincide with the period of greatest nitrogen formation, and both should correspond. But it is doubtful if this be so, for preceding the period of elevation of temperature the urea excreted is in excess of normal, and the same excess continues for some time after the defervescence. The latter may be in part explained by the continued removal of what had been produced in the body during the period of fever, but this will not account for the prefebrile excess. If, then, in fever we are to base the quality and quantity of our ingesta upon the character of the excreta, as has been done in regard to the healthy body, the nitrogenous alimentary principles should obviously be administered in excess over the normal requirements, whilst there is no very positive indication for an increase in the hydrocarbon or carbohydrate food-stuffs, or, at all events, not to anything like the same extent.

Now, let us consider how far experience, or at least practice, supports this conclusion. The dietetics of fever, like many other principles based upon insufficient data, have had their fashions, and opinion has swayed now to starving, now to feeding; we pride ourselves, perhaps, at the present day on maintaining a wise medium. I think I may be fairly stating the case if I say that a patient suffering from any febrile disease is put upon a diet consisting of two to three pints of milk, and one to two pints of beef-tea. It is worth for a moment considering what this really represents in terms of alimentary principles. Taking the milk in round numbers at fifty fluid ounces, that would contain about two ounces of proteids, the same quantity of fats, rather more of sugar, and about half an ounce of salts. In regard to the beef-tea it is well at once to recognise that as a nutriment it holds a very inferior position. Supposing the meat from which it is prepared to contain about 20 per cent. of nitrogenous matter, certainly not more than 1 to $1\frac{1}{2}$ per cent. of the proteids will be extracted by any ordinary process of cooking, but with them there will be as much again, or even more, of the meat extractives, such as creatin, creatinin, &c., which although nitrogenous are not nutritious (i.e., are unable to repair protoplasmic waste) and are members of the large group of bodies vaguely known as stimulants. A very variable amount of fat dependent on the quality of the meat used, and about one-half per cent. of salts, make up the 5 per cent. of solids which ordinary beef-tea contains. Such a diet therefore represents, as compared with the minimum requirements of a healthy adult in ordinary work, about half the proteids and fats, a third of the carbohydrates, and rather less than the necessary salts. This is clearly not in accordance with what we should consider to be called for in the febrile state, did we make the excreta the basis of our calculations; and yet we are accustomed to consider that such a diet is most suitable for the general disturbance of nutrition that fever indicates. Obviously, therefore, some other circumstance has to be considered, and that is the capacity for digestion exhibited by the fever patient. It is one thing to calculate on paper that such and such should be the diet, but it comes to be quite another thing when we are brought face to face with digestive organs that are as a consequence of the existing pyrexia greatly disturbed in their functional capability. The process of digestion essentially consists in effecting in the ingesta a series

of changes of a physico-chemical character which shall enable them to be absorbed into the vessels. By mastication and the movements of the alimentary canal, and by the solvent and fermentative action of the various digestive juices this is brought about. Except with some gastro-intestinal lesions, fever usually tends to constipation, to be explained in part by the diminished power which the muscular coat of the bowel manifests in common with the muscular system generally. It is rarely, however, that this becomes a serious symptom. But with respect to the chemical process of digestion the case is different; here we meet with conditions which are very far from the normal. I need not mention the various parts played by the secretions of the digestive glands, or how the food-stuffs are reduced to a diffusible condition; but it is desirable briefly to consider the changes that have been recognised as taking place in these secretions when produced in a febrile state of body.

It may at once be said that observations distinctly indicate that they are all diminished in quantity—that is to say, the saliva and the gastric and pancreatic juices. The bile occupies a place apart, and of the intestinal juice in pyrexia I am not aware that any observations have been made. The secretion of saliva is so decreased that in many cases it can have practically no effect as a solvent of starch, and even when present, as shown by Mosler, it is far short of the normal juice in fermentative power, not unfrequently being of an acid reaction. Its absence also removes one of the stimuli to the secretion of the gastric juice, a secondary effect that it is regarded as producing when swallowed into the stomach. The recent experiments of Eringer (1882) do not confirm those of Manasséin (1871), which went to show that the acid of the gastric juice is markedly deficient in fever. The former observer, however, asserts the contrary to be the case. But whichever be the truth, the digestive power of the secretion as a whole is far inferior to that of the healthy state; and owing to irregular decomposition induced in the ingesta, decompositions which tend to a putrefactive character rather than to the formation of normal peptones, certain irritant materials are liberated, to which I believe in great part may be attributed the gastritis so frequently accompanying the condition of fever. The pancreatic juice has been made the subject of special study by Dr. Stolinkow,² who by establishing a pancreatic fistula in a dog ascertained the characters of the normal secretion, which he compared with the juice after inducing fever in the animal. A temporary increase both of the fluid and its ferments occurred at first, soon followed, however, by a more prolonged decrease in amount, and impaired proteolytic and amylolytic power. Even admitting that our knowledge of the nature of the digestive juices in fever is very deficient, enough is known to justify the assertion that their capability in one direction or another is seriously deteriorated, affording thereby an opportunity for the formation of decomposition products, many of which are of a most noxious character. The obvious indications under such circumstances are to give aliment that requires the minimum digestion, to prevent as far as possible the delay of the food in the gastro-intestinal tract, and supplementing where we can the deficiencies of the secretions by artificially prepared ferments, acids, and alkalies. Heat, as we have seen, is one of the force manifestations of tissue change, as urea, carbonic acid, and water are some of the material expressions of the same. In fever the heat, the tissue changes, and the excreta are all increased. The demand for increased food is therefore obvious, provided it can be digested or can be administered in such a diffusible form as to require but little digestive change. With secretions that have suffered such considerable alterations as I have described, the digestion of the ordinary articles of diet is impossible, and experience dictates a departure from the usual meals.

I have already criticised what may be called a typical fever diet of milk and beef-tea, and a reference to the general rules laid down and followed by those who are entitled to speak with authority on these points shows a remarkably large proportion of the proteid alimentary principles in the permitted diet relatively to the fats and starches. Such would be quite in accordance with the indications afforded by the excreta, as I have shown; but I rather think the real ground for such exclusion of hydrocarbon and carbohydrate principles (materials which, be it observed, form by far the greatest proportion of the solid

² Virch. Archiv, 1882.

ingesta in a normal diet) is a widespread belief in the incapacity for their digestion by the febrile patient, and the injurious effect of the lactic and butyric acid fermentations that take place in the stomach from the improper fermentation of the amyloids. Some writers are very emphatic on this point, and doubtless with good reason. Quite recently the experiments of Dr. Tchernoff have demonstrated that there is an average of 7·2 per cent. less absorption of fats in a fever patient than in the same person in health, when from 80 to 90 per cent. of that ingested obtains entrance into the vessels, a marked exception to this occurring in the case of enteric fever, where the large increase of leucocytes in the mucosa is regarded as effecting an increased transfer of fat granules from the epithelial surface into the lacteals. But if these fats and starches are to be forbidden, and still more if the heat products of pyrexia be but slightly due to their combustion, one can see good reason for the larger relative share that nitrogenous material should take in the total aliment. But, notwithstanding this, I am doubtful whether there is not a flaw somewhere in the reasoning, and am justified by no less an authority than the late Dr. Parkes, who, in his memorable Croonian lectures on the Elimination of Nitrogen in 1871, spoke on this point as follows:—"Can we foretell from our present knowledge of the chemistry of fever what should be the treatment by diet? I do not think our knowledge is sufficiently precise for this, and practice alone can rightly guide us. Still, some suggestions present themselves. There is in fever a waste of albuminous tissues; it would, therefore, at first sight appear an indication to feed those tissues with nitrogenous food. But it may be questioned whether they can be fed. Some of Huppert's observations indicate that they cannot be, and that the nitrogen is eliminated without being used by the wasting parts. And if so, what becomes of the albuminous food? It must be disposed of by the glandular elements, and add to the work already thrown on those organs. May it not be that, in the height of pyrexia, partial abstinence from nitrogen should be the rule, while the succeeding period of apyrexia is that in which it should be given, when the body retains it, and thus makes up the standard it had lost?" Continuing, the same writer expresses a belief, founded on experience, "that the almost exclusively animal diet sometimes given in fevers is not so useful in sustaining the strength as is supposed, and that if it were not for the loss of appetite which limits the supply, we should perceive more clearly the bad effects," and he has thought that "the vast deposit of urates which sometimes marks the end of fevers might be really caused by excessive animal food," and that he has actually seen "gouty attacks brought on by that system of feeding." Referring to fats and carbohydrates, Dr. Parkes observed "a supply of fat to meet the disappearance of the same from the body is rarely attempted in practice, and yet there is no doubt that if digestible fats are given to fever patients the degree of emaciation is much less, and at the end of the fever the body seems more speedily to recover itself. The fats are often considered hurtful, and are sometimes excluded from fever diets, so that with the large supply of animal food, the patients are brought almost into a state of Bantingism. The starches and sugars are generally given in fevers, and it cannot be doubted that this is right, though probably the amount given is usually far too small. An eminent physician desired for his epitaph the words, 'He fed fevers.' His pride in his treatment was legitimate; but it may be still a question with what they should be fed."

I do not know that we can honestly say we have reached a point much beyond this, even after the lapse of fourteen years; our knowledge is "not yet precise enough," and I am not sure that practice has guided us very far, it having preferred to pursue the old track without much question. I cannot help thinking that the strong objection held to the administration of amyloid food in fever is exaggerated. I am in the habit of insisting upon a fair share of it in the treatment of my patients, and I have not yet seen reason to attribute any ill effects to the proceeding. In the artificially digested foods that we have at our disposal now, I believe we possess alimentary principles that, in the form of partially digested proteids and amyloids, are quickly absorbed, and hence diminish the opportunities for butyric and allied fermentation, and also make less demand upon the digestive secretions. It cannot be too carefully remembered that one object to be aimed at in laying down a diet for fever is to prevent delay of the ingesta in the alimentary canal. Even the blandest and most nutritious aliment may become a

source of noxious decomposition product when acted upon by juices secreted in the pyrexial state, but in reference to this the question of absorption has to be taken into account, and of the effect of fever on that I have no knowledge beyond what I have said respecting fats.

I think I need not further urge the importance of this subject, for clearly to know how to sustain our febrile patients, and, what is of equal consequence, to shorten thereby their period of convalescence, during which the tissues are getting back into their normal condition, would be of extreme value, and although exact information on many of these questions is still wanting, I have endeavoured without seeking to be original, though perhaps suggestive, to give a brief and coherent account of the state of existing views, to indicate what we know and what we do not, to formulate our ignorance no less than our knowledge, and to offer thereby the opportunity for a rational plan of further inquiry.

ONE HUNDRED AND ELEVEN CASES OF LITHOLAPAXY.

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(Continued from page 378.)

CASE 24.—A Mahomedan male, aged forty-eight, was admitted on Jan. 9th, 1883, with retention of urine which had existed thirty-six hours. He had suffered from symptoms of stone for nine months, being much exhausted, with pinched, anxious expression. On passing a full-sized catheter a small calculus was detected at the neck of the bladder, blocking up the urethral passage. This was pushed back with some force and the retention of urine relieved. The patient was at once anaesthetised and litholapaxy performed. The operation lasted only eight minutes; the débris weighed twenty grains.—10th: Passed very little urine since yesterday. Pain in region of the bladder. Catheter passed and a small quantity of urine drawn off. Hot fomentations and hot poultices to the hypogastrium were ordered; also one grain of opium internally every three hours.—11th: Well-marked peritonitis present. Temperature 102° F.; respiration 44 per minute; urine scanty. The catheter was used twice daily.—13th: No pain. Great distension of abdomen; patient very weak; passing a little urine. He died quietly in the evening.

Post-mortem examination.—On opening the abdominal cavity it was found distended with clear serous fluid. The bladder was embedded in a mass of amber-coloured gelatinous lymph, which broke like cold jelly on application of the fingers; congestion of the cellular tissue at the base and neck of the bladder; mucous membrane of the urethra near the neck of the bladder highly inflamed; no congestion of the bladder or kidneys.

CASE 44.—A Hindoo, aged forty-five, was admitted on May 23rd, 1883, with symptoms of stone, the most prominent of which were agonising pain in the region of the bladder and passing of blood and pus in the urine. The symptoms had existed eight years, and the patient was in a very weak state. A large calculus was detected by the sound. On the 25th I performed litholapaxy. Considerable difficulty was experienced owing to the large size and hardness of the calculus, and the operation progressed very slowly, fourteen drachms being removed in seventy-five minutes. No more fragments could be felt by the lithotrite, but on passing the sound a large fragment was detected high up at the fundus of the bladder. As the patient was very much exhausted, I was afraid to keep him longer under chloroform, so I had unwillingly to postpone the completion of the operation to another day.—24th: He had great pain in the region of the bladder the whole of yesterday, which was controlled by one grain of opium administered every three hours. Urine scanty and blood-stained. Temperature 104° F.; great thirst. Fever mixture ordered and opium continued.—27th: Had a severe rigor last night; fever continued all night; patient anxious and depressed. Ten grains of quinine were ordered, and to be repeated in the evening. No pain in the abdomen, but great pain in the left hip.—28th: Abscess forming in the