

The typhoid condition / by J Milner Fothergill.

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tents, hypertrophy of the enclosing membrane, and degeneration of the secretion. If the cysts arose from dilatation of a single sacculus of the racemose gland, an explanation would be given of the entire absence of the black point, as also of the absence of any tendency to open externally.

The photograph from which the plate has been engraved was taken in May by Mr R. Totherick, of Berwick. It represents very accurately the present appearance of the cysts.

ARTICLE VI.—*The Typhoid Condition.* By J. MILNER FOTHERGILL, M.D., M.R.C.P., London.

“No blunder is more common than to misconstrue into typhoid fever a typhoid condition of the system.”—(Da Costa.)

This distinct expression of opinion on the part of one so well and so favourably known in relation to medical diagnosis, will form an excuse at least for the consideration here of that condition denominated typhoid. The condition is one with which all are only too familiar. Still, our positive knowledge of it is quite disproportioned to its importance. As to how it is originated even we are in doubt; indeed, what we know of it consists rather in what we have good reason to regard as probable than in what we can actually demonstrate. It is generally regarded as being due to an increased metamorphosis of blood and tissues. It is therefore a very common and almost, indeed, necessary result of continued fever. The very name suggests this. A typhoid condition is one resembling the condition of typhus fever, where this state almost invariably occurs.

Previous, however, to going into the subject of the typhoid condition, it may not be undesirable to consider briefly the subject of tissue-waste or histolysis. We now know that the temperature of the body is the result of combustion within it. This combustion is maintained by the oxidation of hydro-carbons chiefly, though not entirely, for we have in urea and its allies the nitrogenized waste represented: they are really the ashes or cinders, the non-combustible or non-oxygenizable products of histolysis. There is every reason to suppose that the temperature is maintained by the hydro-carbons, in the form of lactic acid in union with a soda base (Headland), and that this combustion goes on chiefly, if not entirely, in the muscles. The body maintains its temperature almost entirely from the hydro-carbons assimilated from the food, the excess being stored as fat, which is deposited in the connective tissue, which, when so modified, is called adipose tissue; and there remains ready for future uses. When the amount of hydro-carbons requisite for maintaining the temperature are not supplied by food, as in starvation or in Bantingism, these stores are drawn upon, and emaciation by loss of fat results. It would appear that as the blood

deposits fat when the wants of the system are more than supplied, so it reabsorbs it when required. Thus, hibernating animals live during winter on the fat accumulated in summer and autumn. (In all probability circumstances favour this by the animal stowing itself away where its heat is not rapidly radiated off.) Carpenter states that in starvation the temperature is somewhat lower than the normal until the fat is consumed, and that then it rapidly falls. In the experiments of M. Chossat, it was found that, in producing death by starvation, those animals which lost most weight, in which the fat had been most abundant, were also those animals which lived the longest.¹

But while in starvation we have combustion of fat at a normal, or very little lower than normal temperature, in fever we have a very different condition. "It is chiefly the nitrogenous tissues of the body that are consumed during fever. Although there is a decrease in the amount of fat, there is no reason to believe that the rate of its diminution is greater than is accounted for by the state of inanition."—(Murchison.²)

While we have in starvation a combustion in the muscles of the stored-up materials, with a temperature not above the normal, in fever, where the temperature is distinctly increased, we have a melting down of the nitrogenized tissues themselves. It is highly important that this be borne in mind in the consideration of the typhoid condition. The changes in combustion entailed by an increase in the temperature, and the consequences thereof, are very important, for it is upon them, in all probability, that the typhoid condition depends. "The urea or carbonate of ammonia, with other products of tissue-metamorphosis circulating in the blood, give rise to symptoms of uræmic poisoning (typhoid symptoms)." Such is the statement of Murchison ten years ago. Let us see how far this is substantiated by more recent observation. How far it is probably true we shall be better able to judge after reviewing the following considerations:—

1. The association of high temperature with the muscles.
2. The wasting of muscles in fever.
3. The sense of prostration (*debilitas febrilis*).
4. The excess of urea.
5. The condition of the muscular structures before and after death.

To take them in the order in which they stand, we have:

1. *The Association of High Temperature with the Muscles.*—This admits of being regarded from two points of view, one in connexion with the temperature of tetanus, and the other in the heat of the muscles after death in fever.

In tetanus, where the muscles are kept in violent and prolonged contraction, very high temperatures have been attained. The highest temperature on record is 112·55°, found by Wunderlich in

¹ Principles of Human Physiology, sec. 75.

² A Treatise on the Continued Fevers of Great Britain, 1862.

a case of tetanus. The high temperature of tetanus is not confined to life, but is found for some time after death. Thus, C. B. Radcliffe found the temperature in a case of tetanus to be no less than 111.8° one hundred minutes after death, and, six hours after, to be still 106.25° . In explaining it, he says:—"It seems as if one condition of this rise of temperature might be the removal of some cerebral regulating power; and beyond this it is difficult to see further, except it be that this paralysis, reaching to the vaso-motor nerves, allows the minute vessels to dilate and receive more blood, and that this state of congestion, even though the blood be stagnant, as it is after death, may lead to increased molecular changes, of which the additional degree of heat is the effect."¹ A still stronger evidence of the association of heat with muscles is supplied by Dr Bennett Dowler of New Orleans, who found that, on taking the temperature of various parts of the body of a man who had died of yellow fever, the highest temperature was furnished by an incision into the muscles of the thigh, which gave a temperature of 113° fifteen minutes after death; an hour and forty minutes after death, the temperature of the heart and thigh were alike 109° ; and that, three hours after removal of all the viscera, a new incision into the thigh gave a temperature of 110° . This places beyond all doubt the association of high temperature with the muscles, and not with the viscera, as was once held.

2. *The Wasting of the Muscles in Fever.*—Whether the muscular wasting in fever is the result of an increased temperature, or the increased temperature melts down the muscular structures, may not be positively affirmed, but there exists no doubt as to the fact. After a severe pyretic affection, the muscles of the limbs are often wasted to an extent quite surprising when compared to the adipose layers. The lax and shrunken hand betokens the diminution in bulk of the interossei and other muscles. In hectic fever, the muscles seem sometimes to have almost entirely disappeared ere death, the patient being, as it is called, "only skin and bone."

3. *The Sense of Prostration (Debilitas Febrilis).*—There is no more common concomitant of fever than a sense of muscular prostration; and when the typhoid condition is pronounced, the patient is found lying on his back in the middle of the bed—no matter how often he is lifted on to his pillow, he quickly slips down into the middle of the bed, and into his wonted attitude. The muscular prostration is then complete; but one of the earliest symptoms is muscular weariness. Nor can we wonder at this, when we find how largely increased are the products of muscular waste found to be in these pyretic conditions. Professor Samuel Haughton, F.R.S., in a paper entitled "The Relation of Food to Work done by the Body," taking the amount of urea as the evidence of work done, actually done, by the muscular combustion, says, in speaking of typhus fever, "Your patient lies for nine or ten days supine, fast-

¹ Dynamics of Nerve and Muscle.

ing, sub-delirious—the picture of weakness and helplessness; and yet this unhappy sufferer actually performs, day by day, an amount of work that might well be envied by the strongest labourer in the land.” He regards the animal heat given out in typhus to stand to that of health as 45 to 40. He goes on to say, “If you could place your fever patient at the bottom of a mine twice the depth of the deepest mine in Cornwall, and compel the wretched sufferer to climb its ladders into open air, you would subject him to less torture, from muscular exertion, than that which he undergoes at the hand of nature, as he lies before you, helpless, tossing, and delirious on his fever couch.” After this can we feel surprised at the terrible prostration of the later stages of fever, or at the muscular weariness which tells of the tissue-changes? Can we wonder, either, at some of the violent efforts of delirium occasionally manifested in the earlier stages, which are merely the outcomes of muscular combustion—other forms of force than heat?

4. *The Excess of Urea.*—After pyretic conditions we have increased quantities of urea, etc., in the urine. It might appear more correct to have said “during” than “after,” but “after” is probably more correct in relation to the causation. “There is found, too, on the whole, a direct relation between the temperature and the amount of urea,” says Murchison; and again he says, “According to Brattler there is a close correspondence between the amount of urea and the temperature, the greater the amount of urea the greater the temperature.” Not only is urea found to be increased in typhoid fever, but uric acid, and the other products of histolysis, are also found in excess. This increase in the waste products, or, as denominated above, the ashes of histolysis, is very considerable. Vogel and Warnecke found 1065 grains of urea excreted in 24 hours in a case of typhoid fever, the normal amount of urea being about 400 grains. In a case of pyæmia, 1235 grains of urea were excreted in one day. The amount of uric acid excreted daily is about 8 grains, but in a case of fever, Handfield Jones has found it as high as 23·76 grains. Dr Parkes has given great attention to the relation of urine to temperature, and in a case of typhus he examined the urine for eighteen days consecutively, and found the proportion on the average to have been 530 grains as compared to a normal of 400 grains. The increase was found every day. The relation of urine solids to temperature cannot yet be regarded as finally settled, but such indications as are warranted by the present state of science will be referred to again shortly.

5. *The Condition of the Muscular Structures before and after Death.*—As might fairly be deduced from the foregoing considerations, the muscular structures after death are much affected in pyretic affections. Laennec long ago pointed out the changes that are undergone by the voluntary muscles in typhus, and his observations have been followed out by others, notably Zenker, on the muscles after typhoid; and his observations, in turn, have been

followed out by Buchanan in typhus. The changes are not so marked if death have taken place early in the fever, but after the third week, or later, the degeneration is well marked. "There are two forms of degeneration, the granular and the waxy. The granular form consists in the deposition of minute highly refracting granules in the contractile tissue, giving to the fibres a dark appearance by transmitted light, and obscuring the striæ. This muscular deposit is not wholly composed of fat. The degenerated fibres are very friable. The waxy form consists in the transformation of the sarcolemmal tissue into a homogeneous colourless mass, glittering like wax, and causing a complete obliteration of the striæ and nuclei of the fibres, the sarcolemma remaining intact. The waxy cylinders thus formed crack up into numerous fragments, which crumble down into a finely granular detritus, and this is gradually absorbed."—(J. Harley.) Rindfleisch gives two engravings of this myositis typhosa, which show these changes under the microscope. These changes in the muscular structure of the heart in relapsing fever, where the temperature is high (105.8° to 107.6°), form one of the principal dangers in this not very fatal form of fever; and sudden death from effort during convalescence, as in perambulating the ward, has been known, from cessation of the heart, enfeebled by this degenerative change.

Nor are these changes in the muscular structure either of a post-mortem character or confined to fatal cases. By means of the modern invention of "harpooning" muscles, portions of voluntary muscle have been procured for the purpose of microscopic observation, and the changes just mentioned have been found to exist during the lifetime of the patient.

From these different considerations we may fairly assume that in pyretic affections, and especially in continued fevers, we have such chemical interchanges going on that the muscular structures of the body are seriously affected; that, in fact, we have changes going on which can be visibly demonstrated, and that these changes are of the character of tissue-decay, the fatty portions of the albuminous tissues being left; and along with this we have a distinct increase in nitrogenized waste, as seen in the urinary solids. These changes are accompanied by great and increasing muscular prostration during the febrile state, and by a great diminution in the bulk of the muscles after the febrile condition has passed into convalescence. The conclusion to which these facts point is inevitable, or nearly so. Further testimony can be brought to associate these changes even more pointedly with excess of urea and the typhoid condition. Buchanan (article "Typhus Fever," in Reynolds's *System of Medicine*) says, "In cases of typhus terminating fatally through the intensity of the disease itself, prostration, subsultus, and carphology increase, and low delirium passes into complete coma. The pulse and temperature continue to rise." In speaking of the daily excretion of urea, he says, "The increase is found at the earliest

day at which the urine has been examined. In three fatal cases it did not diminish in quantity during the time that the urine could be procured." And further on again, "Convulsions in typhus are almost always associated with albuminous urine, and in a few cases, where this has been investigated, with urea in the blood." In the article, "Typhoid Fever," Harley says, "The quantity of urea and uric acid excreted, appears to be proportionate to the degree of fever; when the pyrexia is at its height, the quantity of these constituents excreted in twenty-four hours is usually doubled, sometimes trebled." We will now see how far the experience of Murchison has led him to similar conclusions. "As in other febrile conditions, the increased formation of urea, notwithstanding the diminished supply of food, is evidently the result of an exaggerated disintegration of the muscular and other nitrogenous tissues. As long as the urea continues to be eliminated by the kidneys, its effects are comparatively trifling; but if the quantity be excessive, and still more if, from any morbid condition of the kidneys, either antecedent to or resulting from the febrile attack, its elimination be interfered with, it accumulates in the blood, and gives rise to uræmic (typhoid) symptoms. If the urine be completely suppressed, as sometimes happens, death speedily ensues, under symptoms of coma, and sometimes with uræmic convulsions; but if the suppression be less complete, it may still give rise to delirium, stupor, and coma." He then gives cases from Michael Taylor, Christison, and Frerichs, where, after death from typhus with marked cerebral symptoms, the kidneys being found healthy, urea was found in the blood, and that too in considerable quantities, during life. These cases he corroborates from his own experience; saying, in conclusion, "The observations which have been made in relapsing and pythogenic fevers also support the opinion that the head symptoms in typhus are due, not to inflammation, as was once believed, nor to the presence of the original fever poison in the blood, but to the circulation through the brain of urea, carbonate of ammonia, or other products of disintegrated tissue."—(Pp. 146, 147.)

There seems little doubt but that in febrile affections there results such waste of tissue as produces a typhoid condition. But is this typhoid condition a consequence of the fever, as a specific fever, or is it due simply to the rise of temperature? For this is really the question at issue. If the typhoid or uræmic condition is the result of tissue-waste, as we have just seen it stated to be, what we have to do is to connect excessive nitrogenous waste with non-specific high temperatures, and then the reason why we have a typhoid condition occurring more or less frequently in such affections is not far to seek.

Unruh¹ made an examination of the urine, as to the excretion of nitrogen, in twenty-eight cases of pyretic affections; nine were cases of pneumonia, four of typhus, ten of enteric fever, two of relapsing

¹ Sydenham Society's Year-Book, 1869-70.

fever, two of syphilis, two of acute rheumatism, one of trichinosis, and the remaining six of local inflammations. On the average of the twenty-eight febrile cases, the excretion of nitrogen was half as much again as in health; in some of the cases, it was twice as much.

Naunyn¹ made experiments on dogs, in confirmation of the views of Traube, Jackman, and Vogel, as to the increased secretion of urea in fever in men. His first set of experiments having proved this, he proceeded to inquire whether the increased secretion of urea is primary, and the cause of the increased temperature, or whether the latter is the cause of the former, and from fresh experiments he concluded that the increased secretion of urea (and other compounds containing nitrogen) occurred in consequence of the increase of temperature.² Thudicum states that in all febrile conditions, however caused, the following changes take place:—(1) Temperature, and (2) disintegration of albuminous substances are increased, etc.³ If then we have increased nitrogenized tissue-waste in these conditions—and it would appear that there is such tissue-waste in these conditions, as Naunyn's experiments very conclusively tell, even when that febrile condition is produced under the simplest conceivable circumstances—it follows that typhoid symptoms may also then occur.

It does not necessarily follow that they must occur.

Great waste may be met by great renal activity, as in Vogel's case mentioned before, and consequently there may be no accumulation of the products of tissue-metamorphosis in the blood. It is very obvious that any pre-existing condition of renal inefficiency will conduce to accumulation of these waste products in the blood, under conditions where the increase is but slight; and that, on the other hand, renal activity, which almost implies integrity, will prevent the occurrence of a typhoid state in cases where the temperature and the tissue-changes are both much increased.

Accumulation may alike arise from non-elimination as from excessive production. This is a conclusion about which we may feel pretty sure after the foregoing considerations. But let us see how the matter actually stands, how far such conclusions are corroborated by clinical experience. Murchison, in speaking of prognosis in typhus, says: "The gouty diathesis, from its being so often associated with disease of the kidneys, is a very serious complication. I have never known a gouty person attacked with typhus recover." He has also found that suppression of urine, or a fall in its specific gravity, are the precursors of coma and convulsions, while a highly

¹ Sydenham Society's Year-Book, 1869-70.

² Naunyn found that when heat was retained within the body of a dog by placing it in a warm atmosphere saturated with moisture, the temperature in the rectum rose $7\frac{1}{2}^{\circ}$, and the urea rose in the next 24 hours from 6.7 to 9 grammes.—*Journal of Anatomy and Physiology*, May 1871, p. 408.

³ Sydenham Society's Year-Book, 1869-70.

febrile condition may pass away without danger when the urinary solids are present in great excess. The actual presence of the waste products of tissue-change are but one factor in the production of the typhoid state—so important a factor, however, that a temperature of 107.6° in typhus is said to be incompatible with recovery. The changes caused by a temperature higher than this are followed by death; but even a lower temperature may occasion a condition resulting in death under certain other conditions. “Although the occurrence of cerebral symptoms, and of the typhoid state in particular, be mainly due to the retention in the blood of the products of tissue-metamorphosis, other circumstances probably contribute to their development, such as the abnormal or defective nutrition of the central organs of the nervous system, and the non-aëration of the blood consequent on pulmonary complications.”—(Murchison.) The accumulation of waste products is the important, indeed the essential, factor in the production of a typhoid or uræmic condition.

We have seen that an increase in tissue-waste is a consequence of all febrile conditions, however produced. It follows then that this typhoid state may be found in the progress of such affections as entail a heightened temperature, especially if the increase of temperature be maintained for several days. Such is the experience of all who have given attention to the subject. Were such recognition more widely extended, we would not so frequently meet, hear, and read of the blunder which Da Costa says is so common. It is not the mere avoidance of the blunder, and thus the saving of our self-pride. The true understanding of the conditions under which a typhoid state may arise would not only have spared many a mistake, long and bitterly regretted, but would prevent much that is painful, if not for the patient, at least for his friends; would prevent many steps from being taken which have been taken; and would prevent many an outlay which has been irritating to the patient's family, and been the cause of no little obloquy being thrown on the profession. It is always unfortunate when patients suffering from other affections are sent into a fever hospital as suffering from fever. First, there is the risk of such patient dying from fever caught directly through a diagnostic error, his death actually resulting immediately from the mistake made; and, second, there is the reflection upon the profession which naturally follows, to say nothing of the pain to the medical man himself in such a case. Not that such mistake can always be avoided, for even Murchison himself writes: “It is not surprising that uræmia from renal disease is apt to be mistaken for typhus; indeed, it is sometimes impossible to distinguish the two diseases.” That conditions so allied in their origin should closely simulate each other in their symptoms, can be no matter for surprise. Such being the case, it behoves us to be all the more upon our guard lest we ourselves fall into such error.

Other conditions, as low pneumonia, chiefly of both apices,

pyæmic or septic states, hectic fever, dysentery, erysipelas, meningitis, acute tuberculosis, prolonged local inflammations, etc., as well as conditions depending on renal disease, are found with this typhoid state following or accompanying them. In fact, all conditions of high temperature, whether due to specific fever, or to what are called for distinction exanthemata, or to idiopathic conditions, may result in these typhoid symptoms, especially if the increase of temperature be marked. It has been found, indeed, that a temperature of 108.5° is incompatible with life. A rise, and a rapid rise, often precedes death; but whether the agony is the cause or the result of the high temperature is not yet finally settled; the evidence, however, preponderates in favour of the agony being the result, the rise of temperature often lasting for some time after death.

And now as to the outward indications of the condition whose pathology we have been reviewing at length. In the progress of a fever "it is announced by the decline of the previous more acute symptoms; by the pulse becoming more rapid and soft; the tongue dry and brown, tremulous, and protruded with difficulty; by the incrustation of the teeth with sordes; by the increasing intellectual disorder, indicated by the more constant low muttering delirium, and the greater insensibility and deafness; and by the condition of the muscular system, evinced by muscular tremor and subsultus tendinum, and in some cases irregularity or intermission of the pulse, by the patient lying sunk on his back, or sliding to the foot of the bed, the muscles being unable to support the body even in the horizontal posture."—(Tweedie.) To this graphic sketch there is little to add that is important. When the condition is uræmic rather than typhoid, there is little difference, except that the active brain symptoms preceding coma and convulsions are often wanting. This is probably due to the difference in temperature, which is much increased in the typhoid state, and to some extent to the specific nature of acute zymotic affections; the difference, however, being but slight in acute uræmic conditions, as in the case of acute suppuration of the kidneys given by Da Costa,¹ which was almost undistinguishable from typhoid fever. In uræmia supervening upon chronic renal disease, the delirium is apt to be wanting, at least as a marked symptom, though even here the temperature is affected. Rosenstein² says: "The temperature, as I have found, is considerably increased (*beträchtlich erhöht*) during uræmic attacks, more during the convulsions, but also during coma." In uræmia we find stupor rather than acute delirium, soon passing into coma and convulsions. With such a scene as described above all are familiar, whether occurring during a severe specific fever, or closing the scene in what Bence Jones calls the peroxidizing exacerbations of Bright's disease. Whenever occurring and where, it is ever a serious condition, fraught with grave danger, and indicating, too, that the danger is near at hand. It marks periods of peril from which the patient may or

¹ Medical Diagnosis, p. 471.

² Nieren-Krankheiten, s. 152.

may not emerge, but which he is certainly entering. The clouded consciousness indicates that a dark valley of shadow is being approached, and the only light to guide our prognosis is a dim and feeble ray thrown out by probability. The muscular prostration indicates the gravity of the tissue-changes, and the indications so suggested are corroborated by the thermometer and corrected by examination of the urine. When occurring in the course of acute specific diseases, and perhaps in some of the exacerbations of Bright's disease, there is somewhat less of peril in this condition than when it occurs under other circumstances; but at the best we must never forget that, when this typhoid condition is developed, the patient indeed may be said to be "in the valley of the shadow of death." It marks a disturbance of the equilibrium of the body, either of the amount of tissue-waste or of inefficient power of elimination. When occurring in the course of acute pyretic affections, it indicates such a condition of distinct histolysis as is unmistakable—the tissues are melting down by union with oxygen, and a process inaugurated which is intimately allied to post-mortem putrefaction. The balance of the body is rudely shaken, and the limits gravely approached beyond which restoration to health is impossible; as we see a balance so far overthrown that the few remaining oscillations but delay the inevitable end, and do not admit of the balance being recovered. For, as we find there are limits of temperature which permit of what we term health, any oscillation beyond either its minimum 97° , or its maximum 101.5° , constituting disease, so we find an outer limit within which the oscillations of disease still permit of recovery; but if these limits are exceeded (92° and 108.5°), death must result. But there are other indications which point to the probable result as well as the temperature, such as the persistence of the posture on the back, indicating great muscular prostration; the starting of the tendons, due, of course, to contractions of the muscles in connexion with them, and differing but in degree from general convulsions; the inertness of the sphincters; the disturbance of vision indicated by the picking of the bedclothes; the glazing of the eye; the graver indications even of disturbance of hearing, as the imaginary ringing of bells; the retraction of the brown chapped tongue; the sordes on the teeth, accompanied by the formation of crusts on the lips; by the hissing respiration, so characteristic of this condition, and contrasting with the stertorous breathing of apoplexy; and very frequently by a urinous odour of breath due to ammonia, which forms crystals readily on a glass slide moistened with muriatic acid. Very often, too, in this condition do we find "the phenomenon of Cheyne," the ebbs and flows of respiration, a few deepening breaths marking the flow, and then a gradual shallowing of the respiration to one or two almost indistinguishable inspirations marking the ebb, and then again a gradual deepening until the flow is once more attained. Fifteen respirations, or so, usually complete the

circle. This phenomenon is associated with various grave conditions.

The typhoid state is almost certainly followed by death when it has come on gradually and lasted for weeks, as I have known uræmia do in at least two marked cases. Somewhat of change occurred, as a lightening of the symptoms, and then again a deepening of them, each oscillation marking a graver stage, until death terminated the scene.

When we remember the marked characteristics of this typhoid condition, we can scarcely wonder that, up to a comparatively recent period, the oncome of such a condition was described as the original disease "turning to typhus."

The older physicians, whose recognition of a disease was much more largely founded on mere naked eye changes and appearances than is now the case, and who were not so well acquainted as we fortunately are with both pathology and etiology, really thought that the affection under which the patient laboured was veritably converted into typhus fever. Their idea of typhus was much more comprehensive than ours is, and admitted both enteric or typhoid fever, and what are now regarded as typhoid conditions. Nor can we wonder, such being the case, that when they saw symptoms so allied to those of advanced typhus, and which they regarded as pathognomonic of it, symptoms not only allied to it in appearance, but also in gravity and danger to life, they thought indeed that typhus had supervened. What unfortunate results ensued from this, especially as to fear of infection in the alarmed relatives and attendants, it is needless to say. It is not likely that such error is common now; still there is reason to fear that old impressions linger long after they are supposed to be extinct, and it is possible that there may still remain here and there vestiges of this ancient and erroneous pathology. Should the considerations given here have the effect of rousing some physician connected with a large hospital to institute careful comparisons betwixt the typhoid condition in specific fevers and an allied state in non-specific affections, betwixt these and the condition more distinctly known as uræmia, not only as to symptoms, but as to temperature and the amount of urea, or the suppression of urine—indeed to clearing up the mystery still hanging over this important and interesting subject, and among other things annihilating utterly the old impressions of a disease changing to typhus, it would indeed be well; and the work would form a decided addition to our knowledge.

As to how such elevation of temperature as leads to the institution of increased histolysis is primarily originated, it is not yet possible to speak definitely. The existence of a centre in the cerebro-spinal system which regulates temperature has been hypothecated by Fischer, much as the vaso-motor centre of Traube and Ludwig governs vascular changes; but such temperature centre is yet merely an hypothesis, resulting, however, from both experimentation and

observation. Murchison thinks that "the nervous system (and particularly the sympathetic and vagus) is paralyzed." Virchow puts it thus: "Fever consists essentially in elevation of temperature, which must arise in an increased tissue-change, and have its immediate origin in alterations of the nervous system." About the first half, there is little if any doubt remaining; as to the second half, the conclusion is not so simple. That the nervous system is affected in specific fevers, there is no doubt, but the reverse seems almost equally established. Blandford ("On Insanity") writes: "At one end of my list are those suffering from acute delirium—acute delirious mania—which runs a rapid course to death or amelioration in a week or fortnight. Here we see, for the time, entire sleeplessness, incessant action of brain and body, with the evolution of great heat, speedy emaciation, a quick pulse, tongue coated and soon becoming brown, symptoms pointing to an excessive decomposition of every tissue, and a general excess of brain action, which, if it does not cease by a certain time, leads to death without apparent morbid change." Here we have a condition closely allied to an acute febrile affection; indeed, in these concatenated compound conditions it is not easy to say which change stands first. Does the brain disturbance affect the regulation of temperature? or does the increased evolution of heat stand to the brain disturbance in the relation of cause, and not effect? The question is a fairly legitimate one, and in time an answer of a positive character may be forthcoming.

While the typhoid state is ever a serious one, the seriousness of each case must rest on the peculiar circumstances of such individual case, which must be well weighed, and carefully appraised. No rule-of-thumb can possibly be laid down. But if the prognosis must remain a moot question, are there any indications for treatment to be derived from the consideration of the pathology of the typhoid condition? Most undoubtedly there are, and modern medicine has largely availed itself thereof!

It is obvious that agents which tend to lower temperature are here indicated. Such agents the Germans have found in digitalis, quinine, and alcohol. The observations of Ackerman told him that when the temperature fell the blood-pressure rose; and when the blood-pressure fell the temperature rose. That agents which act on the vaso-motor centre and produce contraction of the two muscular ends of the circulation, the central heart and peripheral arterioles, should lower temperature, is only what might fairly be expected, if paralysis of the sympathetic is the immediate cause of fever. The direct lowering of temperature in febrile conditions strikes at once at the changes which result from an elevated temperature. But it may happen, and probably often does, that the remedial agents are not absorbed well in this condition; or there may be persistent vomiting, or other objection to the use of internal remedies; in such case the excessive heat may be reduced by the external application of cold, or the measures may be combined. The latter treatment is rapidly

gaining ground, and is, after all, but the logical outcome of the doctrines of Sydenham.

The effect of a cold bath on a fever-stricken patient is to restore his consciousness and relieve the sense of prostration,—in fact, to relieve him of the consequences of his high temperature, by aiding in the radiation of his superfluous heat. For, as we saw by Naunyn's experiments, the effect of increased heat is waste of the nitrogenous tissues. Popular impressions will, it is to be feared, long obstruct the general adoption of this direct means of lowering temperature, but the dispelling of them will not be accomplished by passive reasoning, but rather by active measures, leading to conviction by demonstration. While writing this paper I came across a case of typhoid fever with a temperature of 106.8° , successfully treated by cold baths in Addenbrooke's Hospital, Cambridge. Dr Bradbury says, "The immediate change produced by the baths upon the patient was remarkable. Her intellect became much clearer whilst she was in the baths, and she fell asleep after them. The frequency of the pulse was much reduced."¹

While one branch of therapeutics is the attempting to check the excessive formation of these histolytic products, another is the trying to remove them. To attain this it is necessary to maintain the action of the kidneys, and consequently preparations of potash in combination with vegetable acids are deservedly in repute in the treatment of pyretic conditions. The bitartrate of potash in the form of *potus imperialis* forms an agreeable beverage as well as being no mean therapeutic agent. Position, too, can be utilized, as seen in the plan of rolling over the patient from his position on the back, first to one side and then the other. This relieves the congestion of the kidneys alternately, and is found to be practically useful. Another therapeutic measure is to take advantage of the capacity of one emunctory to help another. Thus, free purgation will effect more or less what the kidneys cannot do unaided, and the catharsis so induced will relieve the general condition. Indeed, in uræmia spontaneous catharsis is very common. Under ordinary circumstances the action of the skin supplements the work done by the kidneys, but in pyretic conditions free perspiration is not so easily induced. When practicable, diaphoresis may be found useful. Looked at from a rational point of view, the administration of food and stimulants must also affect this condition; and it would not be discreet to administer anything which would increase the histolytic products already in excess. Consequently the use of the fashionable extracts of meat is not without its objections. These extracts consist of derivatives of flesh which are really in the commencement of histolysis. They are already too far advanced on their retrograde career to be regarded as food, being no longer in a condition where they may be utilized in construction. They are stimulants, and correspond rather to vegetable principles, as *theine*, than to food in its true sense.

¹ British Medical Journal, 14th December 1872.

In conclusion, the writer apologizes to the reader who may have followed him so far, if the material seem defective, or but indifferently arranged. That the evidence is not yet complete, and that there is much yet to be learnt about the typhoid condition, is unfortunately but too true. If the reader finds that the perusal of this paper has tended, however little, to improve his own impressions as to the typhoid state, the writer's object will be largely obtained; if the perusal should lead to some systematic observations which will still further illumine this somewhat obscure chapter in medicine, it will indeed be gratifying.

ARTICLE VII.—*Two Cases of Intussusception in Children.* By
J. O. AFFLECK, M.D.

(Read before the Medico-Chirurgical Society of Edinburgh, 4th June.)

ALTHOUGH liable to occur at any period of life, intussusception is an accident remarkable for its relative frequency in young children, more especially in those under the age of one year. The statistics of the disease show that it occurs more frequently in the first year of life than in the whole of the succeeding twelve years. Its occurrence in early infancy is marked by certain well-ascertained peculiarities which it is of importance to bear in mind, both as distinguishing it from the same affection at later periods of life, and as influencing our diagnosis, prognosis, and treatment. The following facts appear to have been satisfactorily established by numerous observations, and by statistical record of cases:¹—

1. That the seat of intussusception in young infants is almost always some portion of the large intestine, usually the neighbourhood of the ileo-cecal valve.

2. That while a cure by the spontaneous reduction and replacement of the invaginated bowel seems occasionally to be effected, yet that that process of spontaneous cure by sloughing of the bowel and subsequent cicatrization, which is sometimes observed in adults and in children beyond one year, appears almost never to take place in young infants.²

¹ Statistical Researches relative to Intussusception in Children, by Dr J. Lewis Smith, American Journal of the Medical Sciences, January 1862. *Traité des Maladies des Enfants*, par MM. Barthez and Rilliet, 2d ed., tome i. p. 802. Drs Meigs and Pepper on the Diseases of Children, 4th ed., 1870, p. 419. Dr West on the Diseases of Infancy and Childhood, 5th ed., 1865, p. 616.

² In the *Lancet* of 17th May 1873, there is a short notice of a remarkable case of intussusception in an infant of six months old, occurring in the outpatient department of the Victoria Children's Hospital, under the care of Dr Evan. Sloughing and discharge of a portion of the invaginated bowel took place, but death followed rapidly. The history of the case shows it to have been one of a very exceptional character.