THE DIETETIC TREATMENT OF ENTERIC FEVER.*

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In enteric fever the dietary, if it is to be rational, must fulfil the following requirements :—

1. It must be such that practically no solid residue, and certainly none of the least irritating character, enters that part of the intestinal tract where the local lesions are situated.

2. It must be such that fermentation of such a kind as to generate flatus does not take place.

3. Inasmuch as the whole of the digestive functions are below par it must be one which is readily digested and assimilated.

These three requirements are moderately well understood and acted upon by physicians. Many, however, overlook a fourth and highly important necessity, i.e. :—

4. It must be such that the various tissues are provided with proper material for the renewal of that waste of substance and vitality which inevitably occurs in all prolonged febrile processes, and especially such pyrexial conditions as are accompanied by the circulation of toxins.

The physician must, if his treatment is to be successful, pay the greatest attention to detail, and consider daily whether his patient is taking sufficient of *every kind* of food, even of those frequently-neglected principles, salts and water. There must be a daily examination of fæces and a careful watch kept for undigested food. If this be done there will be no need for the so-called "*antiseptic*" *line of treatment*, so vividly denounced by the late far-seeing and trenchant Dr. Vivian Poore, who stated that such treatment resulted in nothing better than the avoidance of the production of malodorous flatus.

I have tried in the most painstaking manner every "antiseptic" method, it is believed, which has yet been mooted. Though originally inclined to agree with their rationale, and though fondly hoping to find in them a solution of the ever-present problems in the treatment of enteric fever, I have now abandoned them as utterly irrational. In my experience neither diarrhoea, tympanites, pyrexia,

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nor healing of the local lesions, has benefited in the slightest degree, even under their prolonged and heroic use. Indeed, this is only to be anticipated, for how much of such antiseptics given *per oram* can one hope to bring into actual contact with the inflamed patches, or the subsequent ulcers? Of that which is probably the best of the series, urotropine or hexamethylenetetramine, the writer is inclined to the view that its action is directed mainly to the kidney, and, moreover, in many patients its use, even in doses of 10 grains thrice daily, produces in a day or two hæmaturia or albuminuria. I must except from my remarks cinnamon oil, which I am now trying, but with which I have not had sufficient experience to enable me to pronounce a fair opinion. When diarrhoea or tympanites occurs in a case of enteric fever the only true remedy is a *careful revision of the dietary*: this cannot be too strongly emphasized.

In cases of enteric fever where the dietary is carefully arranged, constipation usually takes the place of that diarrhoea which is usually typical, but which ought not to be typical at all, and, prior to the routine use of sanatogen, I was driven to adopt the use of small simple enemata every other day in order to relieve this condition, until the temperature had been normal for about ten days, after which time such mild aperients as Apenta water or Tamar Indien were administered; but after the patient has taken sanatogen for about a week there will, in almost all cases, be no necessity for these. Naturally, the use of foods which are so selected as to be almost entirely assimilated before arrival at the lower bowel, tends to produce constipation precisely in the same way as the use of highly compressed or concentrated food extracts, i.e., by depriving the muscular coat of the intestine of the natural excitation produced by the passage of more or less irritating undigested material. But I have found sanatogen an excellent corrective for this; and the cases are indeed rare, in my experience, where, when it is added to the dietary, resort has to be made to any artificial emptying of the bowel.

There is danger, I believe, at the present time, in regarding diarrhoea so much as a thing to be avoided, that constipation is rather welcomed and encouraged. Sir Wm. Moore, and others, many years ago drew attention to the possibility of prolonged constipation being responsible for the occurrence of relapses, by causing the retention in the bowel of what he called "fever poison," said to be subsequently absorbed by glands, which had hitherto escaped the characteristic secondary inflammation of the disease, and which, passing into the blood, set up "an essential, and not a symptomatic fever."

This theory is partially endorsed by Hilton Fagge. I cannot quite subscribe to it, however, simple as it seems, for I have had cases relapse both where the bowels have acted naturally and well, either every day or every other day, and also where they have been carefully regulated by the routine administration of enemata or mild purgatives.

But, whatever the theory of the causation of relapses—whether constipation resulting in auto-infection or not—my own experience is that constipation is to be avoided as carefully as diarrhœa.

Diarrhœa, of course, may persist owing to an atonic state of the intestinal ulcers, and is then apt to assume a most intractable form; but here again dietary is of the utmost importance in preventing this condition. Whether the adoption of a proper dietary induces a healthy activity of the trophic nerves concerned (the very existence of which is now doubted by many authorities), or whether the regulation of the diet prevents the formation of, or removes, some toxic irritant the circulation of which in the bowel is preventing the healing of the ulcerated patches, it is not possible to say. But it may be pointed out that sometimes when the most drastic remedies have failed to stop diarrhœa, I have found a small dose of castor oil *plus* a careful revision of the diet to effect a prompt cure. This would seem to point to the latter theory being the correct one.

One of the most troublesome matters to be dealt with in the case of enteric fever is the craving for solid foods; and I cannot but think that this is not merely a cry from the stomach, but is a distinct cry from the tissues. It is one which the physician frequently hardens his heart against, and steadily plods on with milk, beef-tea, and the like, comforting his patient with promises in the meantime. In spite of the success which has attended its adoption, one does not always like to adopt the heroic line advocated so ably by Dr. Barr; and the suggestions I have to offer are, therefore, intended as an aid to the hesitating practitioner in cases in which he desires to proceed more cautiously. Of late years I have cast about for some means of satisfying this craving without going further than any cautious man would care to go, and I submit a list of dishes which I have tried in cases of all descriptions, and with the best possible results. Until I hear this craving voiced, I use merely the fortified whey alluded to later: so soon as the patient's voice is heard asking for more, or so soon as I see signs of deficiency in nutrition, I supplement the dietary.

1. Benger's and Mellin's foods made with, or without, milk, and fortified with cream, will satisfy for a time, but for a time only. So

will jellies, bread crumbs isinglass or rusks in beef-tea, light puddings, such as custard, vermicelli, cornflour, etc.

2. Bread-jelly may be made by soaking a fairly thick slice of well-baked stale bread for five or six hours, then pressing out the water, and allowing the pulp to simmer gently for one to two hours. Afterwards well strain through muslin, and allow the "filtrate" to set. It may then be mixed with milk, and sweetened and flavoured. About two tablespoonfuls of the jelly suffices for one feed.

3. Raw meat pulp must be most carefully prepared, and every trace of skin, gristle, fascia, etc., removed. A piece of the sirloin undercut is the best part to use, and it should be scraped into small shreds, and afterwards pounded up, care being taken not to lose the juice. If it has not been well scraped it may need rubbing through a hair sieve. Then it is sprinkled with salt, and again well rubbed up. It may be given in the form of little balls the size of a marble, to be eaten with a rusk, about half a dozen of such making a very satisfactory early morning lunch.

4. Junket may be prepared by adding a teaspoonful of sugar and about two teaspoonfuls of essence of rennet to a pint of fresh milk, which is slightly warm: the mixture is then stirred gently, and set aside in a warm place (not too warm) until the curd sets, then put in a cool place till required for use. A little cream may be added afterwards, or, if a stimulating effect be desired, brandy may be added before the rennet.

5. Suet puddings—though I have frequently heard cries of amazement when I have mentioned them—may certainly be given in cases of enteric fever within a few days of the temperature reaching normal, and in mild cases before this, if they are made with two precautions. Firstly, the suet must not be merely chopped, but must be carefully shredded in very thin slices, and all fibre removed; secondly, wheat flour should not be used alone, but mixed with an equal quantity of maize. The pudding should, of course, be well cooked, and may be eaten either with sweet sauce or with gravy. The reason for the admixture of maize is, that maize differs from wheat flour in not containing much gluten and, therefore, bread, pastry, or puddings made with it are more easily disintegrated, and therefore more easily attacked by the digestive juices than such articles prepared with wheat flour.

6. In the matter of fish, the whiting ("the chicken of the sea"), haddock, or North Sea cod are amongst those most suitable for the invalid. The fibre of the whiting is shorter and more loosely knit, I

believe, than that of the others; the fibre of the sole is closely knit, and careful boiling alone will render it fit for invalid use, though it is, perhaps, the most frequently prescribed.

7. *Modified Milk Diets*.—In the boiling of milk, if the rules laid down in Swithinbank and Newman's *Bacteriology of Milk* (p. 10) are followed out, scarcely any alteration in flavour will be perceptible, and there will be practically no formation of scum :—

“ 1. Use an ordinary double milk-pan, or a smaller covered saucepan containing the milk placed inside a larger one containing the water.

“ 2. Let the water in the outer pan be cold when placed on the fire.

“ 3. Bring the water up to boiling point, and maintain it at this for three or four minutes without removing the lid of the inner milk-pan.

“ 4. Cool the milk down quickly by placing the inner pan in one or two changes of cold water without removing the lid.

“ 5. When cooled down, aerate the milk by stirring well with a spoon.”

There are many persons who pooh-pooh the suggestion that the boiling of milk in some manner changes its chemical composition. Barlow, as we all know, many years ago put forward the view that children fed exclusively on boiled milk were inclined to develop a scorbutic tendency, and now most authorities are agreed that it is not wise to ignore the idea. It is certain that any heating of milk up to 70° C. or over brings about a change in the albumin; about 70° C. it is not precipitated, but is “converted into a form which is easy of precipitation by acids, magnesium sulphate,” etc. A little below 80° C. the enzymes undergo a change, as may be shown by the reaction with hydroquinone and hydrogen peroxide (Swithinbank and Newman, p. 11).

It has been demonstrated by several observers (Berdez, Raczkowski, and others), that the sterilization of milk destroys the lecithin contained in it, and that it loses lecithin by being heated only up to 60° C. for half an hour. Though I am one of those who hold that milk is an article intended by nature to be consumed in the raw state, yet the condition of our milk-supply is such that no physician can put a patient with lowered powers of resistance on a prolonged diet of raw milk without running grave risks. Accordingly, the milk given to my enteric-fever patients (and, for the matter of that, scarlet-fever patients too), is always boiled, and the loss of lecithin is made good by the addition of sanatogen. I have tried, but only with a fair amount of success, a mode of administering milk recommended by Brigade-

Surgeon Quill, which consists in adding to each pint of sterilized milk one ounce of an alkaline mixture composed of:—

Sod. Bicarb. $\frac{1}{2}$ oz.—Sod. Chlorid. 60 grains—Aq. 12 ozs.

This plan certainly has merits, inasmuch as the milk thus prepared is very slightly salt and agreeable to the palate, and, what is of more consequence, there is little, if any, tendency to the formation of large curds.

But during the past twelve months or so I have abandoned this method, and trust entirely to boiled and cooled milk with sanatogen added to it in the proportion of about two grammes (31 grains) to the pint. In this proportion it is imperceptible to the patient, and I feel confident it adds materially to its nutritive value. I strongly recommend it to those who are concerned with the question of milk diet, and particularly to those who have the medical care of children's hospitals. I regularly allow the addition of cocoa, coffee, and tea to the milk of my typhoid patients, particularly in the case of adults, who always find it most grateful.

8. *Traitement à Vide*.—A short time ago I read with the greatest interest a description of a system of dietary in the *British Medical Journal* of December 9th, 1905, by Dr. William Ewart. I studied the method carefully, and at very considerable trouble in preparing foods myself, and in instructing the nurses, carried it out in ten successive cases, beginning it as soon as they entered the Hospital, and continuing it for several weeks. I am bound to say that, although it has every appearance of being scientifically correct, I was not successful with it. I have not abandoned it, for I have had too much experience with typhoid fever either to praise or decry any particular method of treatment on such small data, and I feel sure that it is a method which will ultimately win its way to favour. It is certainly my intention to give it a prolonged further trial. The method consists in supplying a sufficiency of every one of the essential articles of diet—salts, organic and inorganic, carbohydrates, fats, and nitrogen, but supplying these in a soluble form, and so as to leave no residue. The essentials of this dietary are “plenty of food” and “no fæces.” Common salt is given in whey along with sugar (20 to 30 grs. of common salt per pint of whey and from 2 to 3 oz. of sugar per 24 hours); the strained juices of fruits and vegetables, or fruit jellies alone are used; nitrogen is supplied in the form of peptonized whey, by genuine artificial peptones, or by white of egg; carbohydrates are administered in the form of clarified honey and maltine, and fat

in the form of cream. This diet is a little complicated and, therefore, I have followed out a similar idea, but have simply had regard to the fact that whey contains only the salts and sugar of the milk, the fat and casein having been removed. I have found it sufficient to add cream to it to make good the loss of fat and to supply the missing casein in the form of sanatogen. This mixture is readily digested, and assimilated by the weakest stomach. It contains all the necessary diet-elements, and makes no great demand on the nurse in the way of preparation or administration. To my mind, we have thus a simple and perfect diet for the early stages of enteric fever; the only thing to be further regulated is the amount to be given, and I may say at once that for an adult from $2\frac{1}{2}$ to 4 pints per 24 hours of this prepared whey is adequate.

9. *Other useful Foods.*—Though it is often rather like “taking a hair of the dog that bit you,” there is real merit in the oyster for cases of enteric fever; but I have never given more than four at a meal at the most. I have given them at all stages of the illness, except when there has been much pyrexia. Naturally, their source should be quite above suspicion.

Eggs beaten up and taken, either alone or added to milk, etc., are too well known to call for remark. It is not, however, so generally known (or at least it is not so generally put into practice if known), that cream added to soup or beef-tea improves the flavour, and adds to the food-value. Since I discovered this by experimenting, I find that it is a fact well known to cooks who, indeed, frequently do it in the case of thick soups.

Glucose forms a very useful addition to beef-tea (one teaspoonful to about 10 oz.), and frequently patients take a decided fancy to it. I might add that it is an excellent food for anyone who has hard mental work to do and wants an easily assimilable article; the glucose has a splendid emergency food-value.

10. Gelatin has been recommended by Dr. R. M. Harbin (*Med. Record*, November 9th, 1904), as a useful dietetic adjuvant in enteric fever. According to Dr. Harbin, gelatin “serves three purposes: It adds to the relish of the various liquids, lessens the nitrogenous waste from the system, and prevents hæmorrhage.” Its nutritive value, however, is said to be *nil*, and it acts like all albuminoids, merely as a sparer of the albuminates.

11. In the matter of fruits and vegetables choice must be made with the very greatest care. Such things are usually omitted entirely from the dietary of enteric fever, but I think if they are, something

should always be done to supply the organic acids in another form. I have almost always given lime-juice, or the strained juice of other fruits, as a daily drink, but latterly I have very gradually and cautiously admitted vegetables and fruits themselves to the list of permissible articles. The following, when carefully selected, prepared, and cooked, may be given: The white core of cauliflower, asparagus, the pulp of baked apples, very young or forced rhubarb, potatoes, vegetable marrow, etc. All of these leave more or less solid residue, but of a kind which I do not think is hurtful to the alimentary tract.

12. *Drinks*.—The question of drinks is one which frequently calls for the exercise of considerable ingenuity on the part of the physician. Cold water I always allow in abundance, provided it is not given at such times, or to such an extent, as to unduly dilute the digestive juices.

A most agreeable drink, and one which has a distinct food-value, may be made from apples. To make it, cut up a pound of apples into quarters, add half a pound of sugar, place in a bowl, and pour over the mixture half a gallon of boiling water; allow this to stand till cool, and then remove the apples, which are now softened, and pulp them. Pour the fluid from the bowl over the pulp, mix well, and allow to stand for an hour; then strain carefully. For a parched palate there are few drinks more grateful than this.

In the preparation of all foods and drinks containing sugar it is wise to make a *solution of sugar* first, and allow this to settle for about six hours; then decant off all except the bottom portion. This bottom portion will, in the case of most sugars, and especially the white crystallized varieties, be found to contain a fine sediment, which is composed mainly of *ultramarine*, a substance added to give the sugar a dazzling white appearance. The composition of ultramarine is somewhat as follows, according to Mr. W. Thomson, of the Royal Institution Laboratory, Manchester, to whom I am indebted for the information:—

Silica	..	..	..	..	37·90
Alumina	..	..	..	..	29·30
Soda (Na ₂ O)	..	..	..	..	22·60
Sulphur	..	..	..	..	7·85
Earthy residue	..	..	..	..	2·35
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Again, in the making of barley-water, I would strongly advise

the frequent and thorough washing of the barley beforehand, for it is usually whitened artificially by being coated with mica.

These two things, ultramarine and mica, are closely allied in chemical composition; and I submit that the introduction of such substances into an inflamed and possibly ulcerated intestinal tract can only be productive of mischief. My attention was first drawn to the point by a manufacturing chemist in this town, who stated that even when the finest white lump sugar was used in the preparation of syrups he could not prevent the occurrence of a certain muddiness, which was detrimental to the appearance of the syrups, and which he ascertained to be due to ultramarine.

Copious water drinking has been tried, and apparently with success, by Drs. Cushing and Clarke at Cleveland, Ohio. Four ounces of aq. dest. were given every 15 minutes during the waking hours, each patient taking from 8 to 14 pints every 24 hours. Patients had besides this 6 oz. of milk, and 6 oz. of albumin water every 2 hours during the day, and once or twice during the night. The amount of urine passed was very large—from 8 pints up to 2 gallons per 24 hours. Treatment by cold baths was carried out at the same time in some of the cases. I am bound to say the system does not commend itself to me; the results indicate that there was less headache, restlessness, and delirium, but relapses and hæmorrhage were about the same as in other cases not put on the water diet, and the febrile period lasted equally long in both classes of case; the mortality was only half in the water-drinking cases of what it was in the others, but mortality figures in enteric fever are always to be accepted with great reserve.

13. On the question of alcohol I fear I can say little or nothing new. I firmly believe in saving it up until one has definite signs that the system needs outside help. On the appearance of any odour of alcohol in the breath I follow, I think it is Sir William Broadbent's advice, and stop its use. In the case of patients over forty, or in what one might term "young-old" people, it is wisdom to begin its use early enough. An excellent way of administering it is to give 20 drops of sp. camphoris in a small glass of port wine. During convalescence it is difficult to determine when to stop its use, but I have been able to discontinue it at a much earlier period in cases where the patient has been taking sanatogen in his milk or soup for ten days or so; in fact, such patients scarcely seem to require alcohol at all; the sanatogen takes its place. I believe that alcohol is not at all a good thing for patients who present that marasmic condition

alluded to later; I have more than a few times found patients so suffering make a complete recovery when the alcohol was discontinued.

One may suspect that the strain of the disease is playing havoc with the heart muscle when one gets a transversely enlarged area of præcordial dulness, an outward displacement of the apex beat due to engorgement of the right chambers, general or local anasarca, rapid and compressible or dicrotic pulse, and a short and feeble first heart sound, and one must never forget the possible consequences of this degeneration of cardiac strength in the occurrence of hæmorrhagic infarcts of lungs, spleen, kidneys, etc., and venous thrombosis, together, of course, with malnutrition of areas of distant blood-supply. It is only reasonable to suppose that this decrease in functional activity is due primarily to the action of toxins, but I cannot but think that defective nutrition considerably aids it, and, therefore, when I see any signs of its occurrence I at once cast about for some mode of improving the dietary. The one cause is beyond our control, but with the other it is in our power to do something. Other indications for alcohol as a temporary adjuvant and for careful enquiry into the dietary are afforded by the existence of constant restlessness, delirium, or sleeplessness, accompanied by feeble pulse, dry brown tongue, and tremulousness, or of a continual feeling of depression and exhaustion. Pure grape brandy is undoubtedly one of the best forms in which to administer alcohol, though in many cases champagne alone appears to do good. Many is the time that I have secured for a patient on the verge of violent delirium a comfortable night's rest by the administration of brandy punch. (Here, by way of parenthesis, I should like to remark that for a condition of this kind it is unwise to use any but the most carefully prepared tincture of strophanthus; I have tried some which, even in large doses, had apparently no effect at all, and I have tried others which even in small doses produced an irregular, infrequent, and weak pulse, the result of over-stimulation of the cardiac ganglia and myocardium. Now I use only Sir Thomas Fraser's mixture, or that prepared by Parke, Davis & Co., as, so far as I can ascertain, these are the only two reliable ones on the market, though there may be others I do not know of.)

Marasmus.—To my mind nothing is more disheartening than to find on the close of the acute stage of the illness convalescence interrupted, it may be for months, by the occurrence of what can best be described as marasmus, i.e., a progressive emaciation with anæmia, and a sustained general low vitality, which at times renders the patient an easy victim to tubercular infection. Fortunately,

the complication is comparatively uncommon, but I have quite recently had three very troublesome cases of it following close upon one another, and in which I have had most beneficial results from the preparation to which I have already drawn your attention.

Case I was that of a male patient, aged 27, who confided in me that prior to marriage he had led a dissolute life, and was even now tainted with syphilis. He had also a very doubtful area under his left clavicle, which I could never quite satisfy myself was not tubercular. Several examinations of the sputum all yielded negative results. Recovery from the acute part of the illness was attained slowly in about $4\frac{1}{2}$ weeks, but after that the patient did not seem to progress. The usual auxiliary food-stuffs had practically no beneficial effect; cod-liver oil, virol, hypophosphites, malt extracts, hæmoglobin preparations, all failed of their usual effect.

Finally, I determined to try some of the extra-pharmacopœial remedies, and began on plasmon with considerable hope, but after a fortnight's trial, checked by careful weighings, etc., I found no appreciable benefit. Next I tried a preparation containing lecithin (ovaltine) for eight days again with no apparent benefit. Finally, I tried sanotogen, at first given in small doses in ordinary foods, but after a week increased in dose, and given separately in water or milk. At the end of the twelfth day the patient's weight and strength had materially improved. As he was in a fit state to be discharged from hospital, I carefully instructed him in the preparation of the substance, and asked him to take it regularly, and let me know how he progressed. I heard from him three weeks afterwards in person; he then was, and had been, for ten days at work, and was looking perfectly healthy; he informed me that he had gained 5 lbs. weight in the last fortnight, weighing himself on the scales in his shop.

Case II.—Nurse E., aged 28 years. This patient was very anæmic, and stated that she had always been so since she could remember. The illness commenced very gradually indeed, and with symptoms so vague that its nature was only cleared up by obtaining a Widal reaction. Subsequently a typical attack developed. The patient, though like many nurses, somewhat fanciful in her choice, took food readily, and was usually eager for it, but it frequently caused slight indigestion of a flatulent type, and on two occasions diarrhoea ensued which, but for a careful watch on the temperature, I should have put down to relapse. The patient's strength, however, did not return, and her weight remained stationary. I again tried various auxiliaries to ordinary diet, but with no visible good result.

Sanatogen was tried over a period of sixteen days whilst she was in hospital, but did not quite come up to my expectations, for during the last week in hospital she lost $1\frac{1}{2}$ lbs. in weight. I determined then to send her away to stay with some friends at the seaside, and on my advice she went there, and took sanatogen regularly for nearly a month; on her return a few weeks ago she had gained 13 lbs. in weight, and was looking the picture of health; her anæmia had so completely disappeared that, as she said, "her complexion did not now seem to suit her."

Case III.—Male, aged 48. Occupation, cotton doubler. Commencement of attack very atypical; no Widal reaction obtained till about twelfth day, and then only with the third blood specimen, the first two giving negative results. The day after admission the nurse reported blood in the sputum, and a careful examination of the lungs resulted in the discovery of a fairly large phthisical cavity in right lung. The sputum was subsequently found to contain large numbers of tubercle bacilli. The course of the fever was uneventful. Patient was left in a most hopelessly emaciated condition. He took food well, and had an excellent appetite at first, but after a little while this dwindled, and he often left half his food untouched. I tried capsules of *ol. morrhue c. creasote*, virol, various emulsions of cod-liver oil, and other things, with a little, though not marked, success. Finally, I put him on sanatogen, which I had carefully prepared with thick, creamy milk, and I submit a comparative statement of his progress during the seven weeks of convalescence that I had to deal with him. (I may say that as he came from a very poor home, and was so utterly unfit to be sent back there on account of his weakness, I kept him in hospital an unusually long time.) Height 5 ft. 6 ins.

		<i>Weight in lbs.</i>	<i>Treatment.</i>
Beginning of first week		88	—
End of first week	..	$89\frac{1}{2}$	Cod-liver oil and creasote.
„ „ second „	..	$90\frac{1}{2}$	Do. do. (emulsion).
„ „ third „	..	93	Virol.
„ „ fourth „	..	94	Do.
„ „ fifth „	..	97	Sanatogen alone.
„ „ sixth „	..	101	Do.
„ „ seventh „	..	$105\frac{1}{2}$	Do.

As the patient was then sufficiently convalescent for discharge I sent him home, and gave him some sanatogen to take with him. He

weighed himself at my request at the end of eight days at a railway station, and informed me that he recorded 115 lbs. Being doubtful of the accuracy of this weighing machine, I weighed myself on it a few days later, and checked the weight on the hospital scales, finding it (as one often does with such machines) to the advantage of the individual to the extent of $2\frac{1}{2}$ lbs.; thus the actual increase during the eighth week would be 7 lbs. Since then I have lost sight of the patient. Still, an increase from 94 lbs. to $112\frac{1}{2}$ lbs. in four weeks occurring in a patient suffering all the time from an active and extensive tubercular lung affection is, in my opinion, most remarkable. During the whole of this time the only other medicine taken by him was small doses of Heroin to relieve the hacking cough.

One other case deserves special mention, though it does not come in quite the same category, namely, that of a girl aged 10 (one of a family of five who all had most severe attacks of enteric fever). This child passed through a dangerous illness, having three very severe hæmorrhages and two unaccountable relapses. She was suffering from pronounced rickets with thickened epiphyses, badly curved tibiæ, caput quadratum, etc., etc. For a considerable time after the cessation of the fever diarrhoea continued, and much of the food given was present undigested in the fæces. In spite of attempts to feed the child up she continued in a state of really pitiable debility and marasmus, reminding one, as the nurse in charge remarked, of one of the sad pictures of the Indian famine children. It was evident that the nutritive functions, to use a compendious phrase, were completely deranged. She was tried with raw meat juice, virol, iodide of iron, lactophosphates, cod-liver oil, and even with glycerophosphates of the ordinary type, but with little or no benefit. At the end of the fourth week of convalescence she could only walk a few yards by the aid of holding on to furniture. I determined to give sanatogen a trial, but at first she only took it under protest, saying she did not like the taste. But beginning with small doses, and giving it at first in well-sweetened cocoa, and then in milk with cream and sugar added, she became fond of it, and eventually was able to take it made into a thin paste with plain water. The change in her condition at the end of a fortnight was truly wonderful. Appetite was improved, diarrhoea had completely stopped, the cheeks were rosy, and beginning to fill out, her weight had increased by 1 lb. 10 oz., and she was able to walk the whole length of a long ward without any assistance. I kept her on the treatment for another fortnight, and was then able to send her home a bonny, well-nourished

child. I have seen her several times since, and though her parents have not been able to afford the continuance of the sanatogen, she has gone on improving; the substance appeared to have corrected a degeneration or aberration of metabolism, and now she is able to extract the necessary nourishment from ordinary food substances.

Having spoken so highly of sanatogen, I should say that it is stated to be a combination of pure casein or milk-albumin (95 per cent) with glycerophosphate of sodium (5 per cent); it thus contains a large amount of soluble proteid matter with a quantity of organic phosphorus. This organic phosphorus it is, in my opinion, which makes the substance of such value as a metabolic stimulant, if one may use such a term. "Phosphorus enters into the proteid constitution of tissue just in that portion of the cell which is responsible for multiplication and reproduction, i.e., it is the nuclei of the cell which contain the phosphorus" (Dr. Snowman, *Birmingham Medical Review*, September, 1905). Phosphorus enters into the composition of the lecithins as glycerophosphoric acid, and lecithin exists not merely in nervous tissue, but also in red and white blood corpuscles, etc. In supplying an easily absorbable phosphorus compound, therefore, we are not merely making good what has been lost in the heating of milk, but we are supplying a want of many tissues. The substance is readily taken up by the stomach (Drs. Tischer and Beddies of Berlin found 3 grammes completely absorbed in 55 minutes), even in diseased conditions. The phosphorus contained in sanatogen is practically entirely assimilated by the system (Professor Tunnicliffe, *British Medical Journal*, June 8th, 1906).

I firmly believe that by the regular use of sanatogen in enteric fever we shall prevent the occurrence of that extreme wasting and debility going on to actual degeneration of the Zenker and Hoffman type, which is so frequent, and which is so desperately hard to combat.

I should like to say, in conclusion, that I have allowed myself to laud this proprietary product only because I feel that it is every one's duty to do so, when he has thoroughly tested any such thing, and found it to fill such a distinct gap as I am sure this does. It is all very well to stick to the Pharmacopœia and Mrs. Beeton's Cookery Book—if one may utter the two in the same breath—but there are excellent things outside both, which the physician has to find out for himself.

DISCUSSION.

DR. KNYVETT GORDON, in moving a vote of thanks to the reader of the paper, stated that he was in agreement with almost every word which

had been read. In his opinion, diarrhoea was not to be regarded as one of the ordinary symptoms of typhoid fever, but was a condition brought about by improper dietary, and particularly by the too rigorous enforcement of a milk diet. He usually found it advisable on the admission of a case to his hospital to put the patient on nothing but water for twenty-four hours, or perhaps albumin water. It was impossible to feed diarrhoeal cases as they ought to be fed, and it was also impossible to feed a patient with a septic mouth. These two things, diarrhoea and septic mouth, were the two first things to be dealt with on the receipt of a case into hospital. Many septic mouths were difficult to get into a properly clean state, for they were frequently the result of carious teeth, and these had sometimes to be extracted. In the case of any patient who had a clean mouth, no diarrhoea and no tympanites, and who was hungry, there was no reason whatever, in his opinion, why he should not be fed on an ordinary invalid diet including solids. His experience was that milk could not be properly digested for more than a week at the utmost; after this a condition of milk dyspepsia set in, accompanied by diarrhoea. When Dr. Barr's proposals for solid diet were suggested it was at once prophesied that relapse and perforation would both increase, but to their amazement they had found that both the relapse and perforation rate had diminished. The cold-bath treatment was in his opinion a most useful aid. It was much easier to feed a patient who was having cold baths than a patient who was not, probably because the bath aided the elimination of waste matters. The result of feeding in the way in which the reader of the paper had suggested was of course that there would be a much shorter convalescence. Further than that, it had been found by most if not all hospitals, that suppurative complications were fewer now than they had ever been, a result most probably due to the adoption of a more liberal and more rational dietary.

DR. A. W. MARTIN in seconding the vote of thanks alluded to an experience of six or seven years which he had had in one particular method of treatment. His district was a somewhat heavy sufferer from typhoid fever, and he himself attended each year anything from 10 to 20 cases. His plan was to rely upon the urinometer more than on the thermometer. He usually stopped all milk and put the patient on a very large quantity of liquid, water, fruit drinks, etc., until the urinometer showed the specific gravity of the urine to have got down to 1010; when that point had been reached he put the patient on almost any kind of food, testing the urine daily, and if it at any time reached a higher specific gravity than 1010 he brought it down again by means of a copious liquid diet. In addition to this he only allowed the patient to have very thin bed-clothing, and frequently suspended tins containing ice inside the bedclothes. In the matter of medicines he relied largely upon pepsin, boracic acid for the mouth, and butter to keep the lips and tongue moist.

DR. W. BERRY (Wigan) said that he had been greatly interested in the paper because he had rather strong feelings on the subject of dietary in typhoid fever. The only matter upon which he would venture to differ from the reader of the paper was in the use of the proprietary preparation mentioned; he thought they could very well do without this if they paid attention to the diet in other ways. He had had many cases of milk dyspepsia, and his treatment was to stop all milk, and to give water or arrowroot and water with a little brandy; occasionally he regulated the bowels by the use of black draught. In his experience, diarrhoea not

infrequently resulted from the use of beef-tea. He agreed with Dr. Young that the craving for food was a distinct indication that the system required it; and when he found that, he gave his patients more food, usually beginning with tea and thin bread-and-butter, or mashed potatoes and beef-tea. Often the temperature went up a little under this alteration of diet, but the nurse in charge had instructions to always stop the added food for a couple of days or so, and then when the temperature had dropped a little to resume it. He was in favour of paying attention to a patient's inclination for any special kind of food, and he would always gratify that inclination if it were not for something absolutely ridiculous.

DR. BRINDLEY (Bury) stated that he had tried the cinnamon-oil treatment, but in his limited experience it was not satisfactory. However, he intended to persevere with it. He thought the reader of the paper might well add bananas to his list of fruits. Milk, he thought, as a sole diet for typhoid fever ought now to be struck out of the text-books. As far as medicines went, he thought private practitioners gave them mainly in order to satisfy their patients and justify their bill of costs. He had tried the preparation mentioned by Dr. Young and was favourably impressed with it.

DR. BARLOW (Bootle) said that he had had a somewhat exceptional experience in the treatment of typhoid fever, having been a resident in a hospital where two honorary physicians of entirely different views were practising. One man gave only about half a pint of milk per day, and usually relied for medicine upon half a grain of calomel. The other was an old practitioner, a man of sixty years' active experience in the profession (Dr. John Cameron), and he always fed his typhoid fever patients the whole of the way through the illness. Whatever amount of credit was due to Dr. Barr for advocating solid foods, he felt quite sure that an equal amount ought to go to Dr. John Cameron. Personally, he almost always fed his patients throughout their illness, giving them bread-and-butter, eggs lightly boiled, minced chicken, and so on. He did not agree with Dr. Knyvett Gordon on the matter of diarrhoea not being one of the typical signs of the disease itself, for he was convinced that when there was a condition of inflammation and ulceration in the bowel there must be of necessity an increased gland secretion and so forth, which would inevitably result in diarrhoea.

DR. YOUNG, in replying upon the discussion, stated that he was pleased to have so many experienced men in agreement with him. He was in absolute agreement with Dr. Gordon as to the necessity for having the mouth thoroughly cleaned, and as nearly as possible aseptic; but as his paper had been concerned with the dietetic treatment only, he had avoided any allusion to this. Dr. Martin was probably getting to the same result as other people by a method entirely his own. He was sorry that Dr. Berry had taken exception to his mention of a proprietary food, and he would like to know whether Dr. Berry himself did not frequently prescribe and use proprietary foods in his practice, for example Benger's, Mellin's, and others of the same class. In a matter such as this they ought to be extremely grateful to any person, public or private, who would come to their assistance by specializing in the question of food products; and whether the article in question were proprietary or not, he had found it to fill such a distinct gap that he intended to go on using it and recommending it. He regretted that he could not altogether approve of the dietary suggested by Dr. Berry, for the whole of the essential principles

of a dietary were not included in it, and he maintained strongly that a patient suffering from typhoid fever required to be supplied with every essential principle of diet just in the same way as they did themselves if they meant to keep in good health. He had paid very considerable attention to the question of milk, and the possibilities of its modification as a diet for typhoid fever and other kindred diseases, particularly summer diarrhoea and diseases in which the patient can take nourishment only in a liquid form. He thought that he had come across a dietary suitable to all requirements in that recommended by Dr. William Ewart, but he had found it so cumbrous and complicated in practice that he had, after considerable investigation and experimentation, arrived at the one recommended, viz., what he called "fortified milk." The whey of milk contained the salts and water; and the fat and casein which had been removed by the process of curdling were made good by the addition of cream and sanotogen; the latter also supplying the phosphorus-containing elements which had been destroyed by the process of boiling. This, *plus* a little fruit juice and sugar, gave one every single dietetic principle necessary for the human system.

NEW MILK TRAINS FOR LONDON.—The London and North-Western Railway Company have recently had built at their carriage works at Wolverton two new trains specially designed and constructed for milk traffic, and these will be put into use between London and the Oxfordshire and Buckinghamshire milk-producing districts. Care has been taken to prevent the possibility of any impurities getting into the milk during transit, and while, on the one hand, the vans are practically dustproof, they are said to be thoroughly well ventilated. The new vehicles when linked up will form corridor milk trains, and it is hoped that the ventilating arrangements will keep the milk at the lowest possible temperature even in the hottest weather.

METHODS OF CONTROLLING CONTAMINATION OF MILK DURING MILKING.—A. L. Haecker and C. W. Melick (*Nebraska Sta. Bul.* 87) exposed Petri dishes under udders which had been (1) sponged with water, (2) sponged with 5 per cent carbolic-acid solution, (3) smeared with vaselin, and (4) merely brushed with the hand. The motions of milking were gone through with, although no milk was drawn. When the exposures were made in the stable the number of colonies which developed in the Petri dishes exposed under udders treated with carbolic-acid solution was 344, under udders treated with vaselin 346, under udders treated with water 483, and under udders not treated 20,500. When the exposures were made in the pasture the corresponding numbers were 86, 92, 120, and 310. In stables having cement floors the air contained a smaller number of bacteria than in stables having wooden floors. The use of bedding increased the number of bacteria in the air. In all, some 200 Petri dishes were exposed.

On account of cheapness and convenience and its almost equal efficiency, sponging the udder with water is recommended for general use. In summer, when the cows are stabled only during milking, it is considered better to dispense with bedding. Milking out of doors in clean yards or pastures is preferable to milking in stables, even when these are kept in the best condition.