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THE ANTISEPTIC TREATMENT
of
CHOLERA INFANTUM & ALLIED DISEASES.

A THESIS for the Degree of M.D.,

by HUGH DICKIE, M.A., M.B., C.M.

To one whom circumstances have thrust, whether willingly or unwillingly, into the humble but I hope useful position of a general practitioner of Medicine & Surgery in a country district, the choice of a subject for a thesis is one of no ordinary difficulty. Situated as I am, miles away from any city or seat of learning, many avenues of enquiry to which in my student days I looked forward with interest and hope of further enlightenment are necessarily closed. Bacteriology to me is a subject of admiration and interest, but of study in detail and practice out of the question; indeed in this thesis I am compelled to accept as proved the results of the research of others. Work requiring close microscopical investigation is nearly as difficult - certainly to be sustained it is so. Surgery of any more than the minor sort is rare and impossible in the absence of an hospital; while straitened circumstances and keen competition make costly investigations in therapeutics or medicine beyond my powers. I am therefore reduced to either of two courses in order to meet even in a poor way the test of

originality required in an M.D., thesis. Either I must make notes of a few unusual cases which chance has thrown in my way, or tread again a beaten track and try to throw some additional light gained from my experience on some pathway of knowledge not yet to my mind sufficiently illuminated. The former course is the easier as it affords scope for the imagination and the elaboration of a few facts, or shall I say, opinions into a novel and perhaps startling monograph. I prefer not to adopt this course, as the element of luck in seeing cases out of the way has not come to me to a degree that will be of interest to others: if I did give startling facts I would lay myself open, probably, to the charge of mistaken diagnosis or feeble powers of observation. I prefer therefore to devote this paper to a brief account of my experience, failures, and success in the treatment of one of the most cruel and fatal diseases that attacks so commonly, infant humanity.

Gastro-enteritis in children goes by different names and to most medical students it is merely a name. No disease is so little seen at college or hospital, even if the latter be for children; in children's hospitals the disease is often too far advanced - so rapid is its course - before the physician ^{at hand} the student has a chance of seeing and studying its phases. But in any district in any large town or in closely packed, squalid and improvident districts of smaller towns or in unhygienic districts of colliery villages such as those in which my practice partly lies the case is very, very different.

As sure as the summer or more usually the autumn comes round, scores of cases of violent vomiting and purging, followed alas, too often by prostration and death, crop up and we poor medical men are driven to our wits' end to relieve the little sufferers and save them from impending death. It is a disease which, in its worst form, so obstinately resists the treatment that there is, I believe, a true story about an eminent physician of the last generation, who finding his medicines and line of treatment so futile to cope with the malady that he actually, as well as metaph~~orically~~ically, threw his physic to the dogs in sheer despair. Nor can I wonder at it if the treatment was, similar and had similar results to what I found the routine treatment of ordinary general practitioners of the older race. When I began practice as an assistant to a gentleman of considerable reputation (& well deserved) in his district, but of slightly ancient views, I found, without knowing how to improve it, that our treatment seemed practically valueless. Mild cases got better by starvation and through the original strength of the child's constitution, i.e. the *vis medicatrix naturae*. Our drugs seemed rather to aggravate the distressing symptoms and in the acute stage of the disease were often only swallowed to be brought back again. Weakly children invariably went down and those of moderate constitutions would struggle through perhaps for a time, only to lead a life of wretched debility so called marasmus and develop sometimes what we took to be abdominal tuberculosis.

Let me then without further preamble state the scope and

intention of this thesis. It is not my desire to discuss more than is necessary for the proper understanding of my theory of treatment the causation of this disease. Nor again can I hope to add anything of interest to the description of the symptoms. These are only too commonly observed by any practitioner. Nor again is it necessary to enter into any minute differentiation of the various phases of the complaint. What I mean to lay down are the lines, gained by unfortunate mistakes and miserable failures, on which any case amongst children - and adults too - of vomiting and purging, which we have good reason from our observations to believe to be due to ~~fermentat~~ ^{fermentat} ~~exchange~~ in the ingesta, the lines I repeat, on which gastro-enteritis or enteritis alone due to the bacilli of fermentation and their products in the food, is to be treated. I am aware that it is customary to adopt a more or less extensive nomenclature to distinguish different forms or differences of severity of the disease. I have had considerable trouble in choosing a title for this essay for that very reason and am not satisfied that the name I have given it gives a fair idea of its scope. Multiplicity of names may be all very well and useful enough in its way but I have not at present, nor in actual practice, much to do with that. Given a case in which experience has shown me that I am dealing with a fermenting condition of the contents of the stomach and bowels due to the presence of certain micro-organisms and their products, though prognosis and nomenclature may vary according to circumstances, yet my idea is that the treatment should be in essence the same and for the same object.

i. e. the destruction of the bacilli. To account first of all for the presence and virulence of these in the alimentary canal leads me to speak of the causation.

Causation. What are the causes of this disease, or group of allied diseases? First of all the indirect and remote causes are easily and briefly stated. The season of the year has something to do with the prevalence of the disease, hence the vulgar term "summer diarrhoea". It is much more common in summer and autumn, though not unknown in winter. This, I believe, is due to the more rapid fermentation outside the body of the various foods given to the children, e.g.- milk may be actually soured (by *B. Butyrificus*) before it is given as a food to the child, or it may be in a condition very susceptible to fermentive changes. At these seasons, too, unripe or rotten fruit forms a frequent article of diet among children. Examples of such could be multiplied.

Overcrowding is a predisposing cause, as like bad ventilation, insufficient drainage, and other unhygienic surroundings it so weakens the child's health that the mucous membrane of its stomach and intestines cannot resist the attacks of the actual poison.

Ignorance on the part of the mother or nurse is a predisposing cause of the utmost importance. I have noticed that the disease is more common among the children of the poor and half educated classes than among those of the higher. And really the ignorance and perverse, almost criminal, stupidity of many half educated and careless women in the feeding of their

offspring is colossal. Children of a few months and even weeks old I have seen stuffed with such food and drink and cooked in such a way as the cast iron stomach of a healthy ploughman could scarcely dispose of safely. I repeat, mothers of the lower classes shown to put it mildly, great carelessness and want of thought in feeding their offspring. Young children on the bottle are allowed to suck the unwashed india-rubber teats, and the milk is often sour and fermented when introduced into the bottles, or allowed by the presence of dirt (i.e. micro-organisms) about the bottle and tubing to become fermented before ingestion or at least before digestion. Moreover, many have no idea of the proper proportion of cow's milk and water to be used according to the age of the child. Even the youngest children are forced to swallow unwholesome (for them) masses of boiled milk and bread porridge, bread soaked in tea, and many more unlikely articles. Children of maturer months are allowed to partake freely of "what is going on" at the family meals and even if they display abnormal and precocious tastes for bacon, eggs, gravy, fruit or suet puddings, are encouraged in their vitiated tastes by the desire to cut short the howl which refusal to supply the strange craving inevitably produced.

The period of dentition is a specially trying time for children and the sympathetic disturbances of the system and nervous and ailmentary lays them more than usually open to the attacks of the microbes of these diseases.

Children brought up on the bottle are notoriously liable

to this complaint. This, I attribute in some cases to the imperfect cleansing of the bottles and the presence of fermented milk in the india-rubber tubing of the common feeding bottle; also to the child being allowed sleeping and waking to lie with such a teat in the mouth. Partly also it is due to the changing of the quality of the milk as the cows are changed in their dietary; or again the change from one form of milk or infant's food to another. These causes give one a hint of the details of correct treatment and I have mentioned them at some little length so as to indicate, if below I omit to express it, how the general lines of preventive treatment ought to run.

The direct causes, I take it, have already been hinted at. To begin with permit me to quote Dr. Rotch whose book on "Hygienic & Medical Treatment of Children" is the most recent I have been able to obtain says "We can suppose that these disturbances (i.e. fermental diarrhoea) may be due to nervous conditions which may act alone or may render the tissue vulnerable to bacteria. These bacteria act either of themselves or through their products". Without seeking to carry differentiation to a pinpoint, I am attempting to deal with the latter class or group of diseases. Some of the above predisposing causes, or more than one acting simultaneously, tend to permit of the active generation of bacilli in the stomach and secondarily in the bowels. These remote causes produce acute or sub-acute dyspepsia as a first stage of the complaint and thence bacilli are allowed to multiply in the stomach. Obviously my means of accurate bacteriological study on my own

account are of the smallest, but I have every reason and the best of authority for calling the principal of these microbes, *B. lactis aerogenes* and *B. bulgaricus*. These, with their confreres, and the resulting products set up the disease I am dealing with. I take it that there is always a possibility of these micro-organisms and their brethren of less importance but equal virulence, being mixed with the milk digesting in the stomach of an infant. But in ordinary health the natural secretions of the stomach are sufficient to neutralize them and prevent their proliferation. More explicitly, the hydrochloric acid secreted by the stomach is a natural germicide. But not only in infants is the secretion of Hydrochloric less free than in adults (vide, W. Soltan Fenwick, M.D., Assistant Physician to the Eveline Hospital for Sick Children) but in cases of bad feeding, illhealth and the resultant dyspepsia, the amount secreted may be far too little for the germicidal purpose I suggest this (rather than affirm it) as the natural direct cause of acute fermentive dyspepsia and its subsequent complications. It is only a theory to me but the few writers whom I have been able to consult and who attempt to go to the root of the matter are of sufficient standing to give me confidence in accepting this theory. Certainly it is a theory which has proved so far satisfactory to me that it has met the circumstances and symptoms of each case and great proofs of its correctness are that it is on the lines of modern bacteriological investigations; and secondly, that treatment based on it as a foundation satisfies me as the only successful one.

I have not been able personally to make any P.M. of children dying from any of this group of diseases, at least in the acute form. I am quite ready to accept the descriptions of the conditions of the stomach and intestines and their contents as laid down by more fortunate observers in hospitals, etc. I am prepared to accept them literally and confess that they exactly show what I would expect, viz, great congestion and functional disturbance without much or any organic change, at least at first. Still I would rather not prolong the preliminary part of this thesis unduly by quotations which I cannot verify, but prefer to proceed to what I have observed in my own experience. The appearances will vary according to the rapidity of the course of the disease. If the child has been of weakly health or the poison of unusual virulence the pathological changes will obviously be fewer than if the patient has made a long fight and only succumbed to exhaustion after the disease has reached its chronic stage. In the first stage there seems to be merely a *dyspeptic* catarrh with sometimes *hyperaemia* of the whole mucous membrane of the stomach and bowels: I may have to refer to this again in discussing the treatment of the various stages of the disease.

As my explanation of the etiology would lead one to expect the disease is the result of dyspepsia more or less chronic, and the symptoms like the cause originate in the stomach. The food entering the stomach, say it is milk - and no more fruitful basis for the generation of bacilli exists than milk - becomes fermented and irritating to the mucous membranes. Some of it

may enter the duodenum and intestines in this poisonous condition. If the gastric symptoms be less marked or for the time absent we get the more prominent enteric symptoms, that is to say pain in the bowels, violent *peristalsis* and diarrhoea. The motions are at first choppy and greenish in colour due to the presence of undigested food and the accompanying hyperosmia may be, in this stage, so great as to bring about the presence of blood in the motions. This is the local condition of infantile diarrhoea: the constitutional symptoms of malaise, pain, *anorexia* temperature, emaciation, though interesting do not require special description. Let this be accepted as my ordinary reading of the ordinary cause of infantile diarrhoea in ordinary experience. With rarer cases and complications I do not attempt to deal; I only wish to clear the ground of infantile diarrhoea as a separate disorder so as to take it with us in the discussion of the general treatment of the whole class of diseases of this sort. I wish to point out that in by far the greatest percentage of cases, and in all cases except where the symptoms are obviously due to some specific cause other than dyspepsia (and these are rare) the *focus of origin* lies in the stomach. Thus for etiological reasons as well as therapeutic considerations I am entitled to class infantile diarrhoea with the other form, and so I may now briefly, with advantage, indicate the cause of gastero-enteritis and its more severe and rapid form, cholera infantum.

After a longer or shorter period of abdominal discomfort the child has signs of actual pain followed by violent and repeated vomiting. The temperature rises, and restlessness,

uneasiness, and above all thirst, extreme and insatiable thirst manifest themselves. The vomiting is severe and even such alleviants as iced water, etc., are rapidly and violently ejected. Then shortly diarrhoea sets in, at first of undigested food, green, choppy or flaky motions: and eventually this becomes replaced by dirty rice water stools of alarming copiousness. In the severe cases which may be called cholera infantum the emaciation and collapse is very rapid from the enormous depletion and loss of fluid from the abdominal *veins*. The temperature of the surface of the body is low and even sub-normal *at such a time* but the thermometer placed *well* into the rectum may show such readings as 103°, 104°, or 105° or even higher. It is well always to take the rectal temperature in these cases. The skin is become pale and even bluish, the face drawn and pinched and the eyes deep sunk in the sockets. The *fontanelles* are shrunken and depressed. If the child should sleep, the eyelids are half closed and the face death-like. The appearance caused by this condition of the face, especially of the eyelids, in sleep is most curious and very characteristic - so much so that it can be easily recognised after death. The abdomen is slightly swollen at first and soft to the touch but later becomes retracted. The discharges which in the milder form or more especially in the less severe and more chronic stages are foul and offensive, in the very acute form I am describing are as a rule serous and non-odorous. The pulse is weak and very rapid and the respiration shallow, quick and superficial. The child at first cries feebly and intermittently from pain, but soon sinks into listlessness or

stupor. In less severe cases, call them if you like gastro-enteritis proper as opposed to cholera infantum, the same symptoms are present in a less marked degree, and the result be it good or bad is less rapid. If the very acute stage be passed and the child be of sufficiently strong constitution to fight it out; or on the other hand if the virulence of the disease be less marked or through some other reason the disease becomes chronic the symptoms alter, but only slightly. The vomiting becomes less frequent or disappears, while diarrhoea continues, less copious but becoming offensive in smell and colour. This is due to the longer retention and further decomposition of the ejecta or more probably to some organic change as ulceration of the mucous membrane of the stomach and bowels following the more acute but functional stage. In concluding my description of the symptoms, I may repeat that I have not chosen to describe in a differential way infantile (summer) diarrhoea, gastro-enteritis & cholera infantum as distinct however useful such a distinction may be for purposes of prognosis. My reasons for treating these subjects together are that for all practical purposes and in essence the treatment is the same: and secondly I fail to see that a differentiation is necessary as all shade into one another in symptoms and all are due to the same cause, the presence of bacteria & fermenting process in the stomach. Indeed cholera infantum is generally preceded by the milder form and the differences in the motions and the constitutional symptoms are ones of degree rather than kind. To me as a plain general practitioner and one also

distressingly ignorant of bacteriology it is a matter of indifference whether the bacteria in the three cases be the same or specifically different. I cannot tell and I don't care very much. They are these I know, and my task is to treat the disease and kill the polypyllic microbes whatever and wherever they be and this I attempt to do in the following way:

One would like to see many steps taken to prevent the prevalence and onset of this disease. It is obvious in perusing the list of remote or indirect causes what a number of them - more than in any other disease - are quite clearly preventible. On the other hand it is as a rule out of the doctor's power to deal with these causes in a broad and useful manner. When the ^{cause} of the whole question is seen to be bad dieting of infants and the ignorance of the mothers lies at the back of this, how can we in practice deal successfully with this? We may and I do, try, by little lessons and lectures to patients in our daily rounds, to instil the principles of sound feeding and nursing to the mothers of possible little patients: but alas, our words of wisdom fall too generally on deaf or careless ears. The highest aim of our art ought to be the cultivation of hygienic and preventive medicines but our influence and our teaching talents are all too feeble to cope with a task so appalling as the education of mothers. Our county councils are ready enough to spend money in grants on technical education. Could something more not be done in the education of women on the dietetics of the nursery? Could not lessons on the upbringing of children with careful instruction to actual or

potential mothers on what to give and especially what not to give the young of the nation, be made even compulsory? Could a printed series of hints drawn up by the best authorities not be added to the registration certificate to be superseded by another *in dietetic* for children of somewhat maturer age when the vaccination certificate is sent in?

Infant mortality from these diseases is alarmingly high and investigations made by us in practice show what a great deal of it is quite preventible if even ordinary common sense were used. Cases of death from this disease should be, I further think, cautiously scrutinised and reported to the coronor or other authority when the doctor is satisfied that, as so often, the ignorance displayed amounts almost to criminality. I believe that in France some law exists under which it is criminal to feed children - under 6 months - in a wrong fashion. These perhaps are visionary theories, but the little that a general practitioner can do in the way of instruction should be done, and in this wise. Mothers should be told what alone is the natural food of infants viz: the naturally sterilized fluid from their own breasts and they should be told how long that alone suffices for their offspring; when some farinaceous addition to the food is necessary; when in point of time and under what ^{other} circumstances apart from time, lactation of the child should cease. For no doubt over long suckling the child or suckling it when nature calls a halt is, from its debilitating effect on the child, a predisposing cause of evident importance. All foods but milk at first, and in due

course and in proper sequence, those found by experience to be suitable, should be strictly tabooed. It is but a small point, but the practitioner should set his face against the ordinary form of feeding bottle with its long, easily fouled tube, and its suitability for lazy nurses. We ought to pronounce that form of bottle accursed and recommend some more easily cleaned bottle, such as the boat shaped. By using it the nourishing of the child is always carried on under the eye of the nurse, and the feeding bottle is used only for that purpose, and not, as so often, given to quieten a squalling child while the mother or nurse busies herself elsewhere.

But it is foreign to my purpose to enter upon a more lengthy and minute disquisition on the feeding of children at any or all stages of their growth; on the quantity and proportion of constituents of various infant's food, etc. It is a pathological, not a physiological, crisis that I am attempting to meet in this thesis. All the other predisposing causes which I have mentioned are of a more general kind and are of such a general nature that they are as likely to produce other diseases as the group in question. They are like the poor always with us; in many cases in fact they are due to ~~the~~ poverty and above all the want of education and proper attention to cleanliness, hygiene and common sense. To overcome these, general directions and general intelligence such as would in a great measure prevent all disease and lower vastly our too high infant mortality are required. May the time soon come when the condition of the poor in our towns and their lamentable

ignorance and criminal indifference to all that is purest on earth will cease to grieve the least of all the humanitarians amongst us!

In the actual treatment of gastereenteritis and cholera infantum the usual essential eteteras of healthy, airy room, strict seclusion and all the other hygienic conditions of proper nursing should be of course attended to and insisted upon. Unfortunately among the poorer classes, where squalid dwellings, contracted spaces and large families prevail this is often impossible and the doctor's instructions are "*ut* *et praeter nihil.*"

Next we have, in order, to consider how to feed our patient and what fluid will best meet the requirements of food and drink. The crux of the whole question of treatment, or at least one of the two *main* points lies in this, and it must be carefully studied. What will best replace the rapid loss of vital strength and replenish the veins rapidly being depleted by outflow *per ore et anum*; and at the same time satisfy, without irritating the congested stomach, the awful thirst of the patient. Practitioners that I have met give various fluids as water, iced water, barley water, toast water, lime water, soda or potass water, thin arrowroot and water, milk, milk and lime or soda water, *panada* and other so called *bland* drinks. I daresay there are others that I have not heard of. Now it seems to me - and I follow my views in practice - that if the disease is caught in the very early stage where bacterial fermentation has just begun or is of slight virulence, the best thing to do is to starve the child

for some hours, i. e. to prevent the addition of any more fermentable fluid to the contents of the stomach, and if possible clean out the contents already present. In other words, follow to a certain extent the old routine. If we get the case in hand before the vomiting has set in with great severity, give such an aperient as castor oil or calomel (2 or 3 grains) at the same time withholding nutriment of any sort till it has, *if returned* had time to act. I think it is very essential to lay stress on this point and to give the nurses strict injunctions to withhold food from the patient at the outset as long as possible, say 6 to 10 hours. Starvation often allows of the emptying of the stomach and bowels of the undigested and perhaps fermented material and recovery may follow without further treatment.

But supposing, as too often happens, the mere dyspepsia has become actual fermental gastro-enteritis and no aperient can be retained, i. e. if these slight preliminary measures are ineffectual or too late, what then? After careful trial, I find that nothing is so useful as a nutrient and alleviant to the thirst, while at the same time tending to soothe the irritation, as milk, well diluted, sterilized and partially peptonized. I can hardly remember the steps by which I arrived at the conclusion that this was the best preparation to use in my cases but I find that peptonized milk is a long way ahead of any other preparation as the staple diet of patients suffering from gastro-enteritis. Nor is this the only disease in which I can speak with confidence of its

merits. As a food and the only food possible in very acute dyspepsia such as that sometimes accompanying chlor^osis or in stomach ulcer and *still again* in diarrhoea of adults, acute or chronic, *still again* every, I could quote cases to show how useful it is.

I may incidentally mention that I have seen cases of diarrhoea and dysentery in adults accompanied by pain, which obstinately resisted all medicinal treatment by the usual contingents and anodyne, yield to a strictly ~~spartan~~ diet of peptonized milk alone. The pain disappeared very rapidly, and with, and even without, the help of an astringent the case would begin to recover. I have also used peptonized milk with excellent results in enteric fever where there was much diarrhoea or haemorrhage, or pain with a tendency to perforation. But this is foreign to the subject in hand. Peptonized milk is par excellence the proper nutriment to use in fermented diarrhoea in any of its forms; the other things given are rather to be classed as etceteras.

There are many methods, I suppose, of peptonizing milk, and I have tried one or two of them. After ~~experiment~~ I have found no preparation better adapted for the purpose than the Zymine powders (Fairchild's) made by Burroughs, Wellcome & Co. It is a simple method and one easily understood by the nurse, cheap and thoroughly efficient. The following are the directions laid down. "Into a clean vessel pour a pint of fresh milk, a teacupful of warm water and add the contents of a Zymine peptonizing tube (Fairchild) set the vessel in a warm

place, or in water as hot as the hand can bear, for ten minutes, stirring occasionally. At the end of this time it should be quickly boiled or placed on ice." Further or more thorough peptonization than is got by the above routine is unnecessary as a rule except in cases of extreme debility and is open to the objection of rendering the milk somewhat bitter. I prefer to recommend instant boiling after partial peptonization because so often ice is obtainable and moreover nurses not knowing the reason of it don't understand how properly to preserve the milk in ice. Moreover the boiling process has this advantage that while it destroys the peptonizing ferment it sterilizes the milk completely and prevents any more bacilli at least entering the stomach. Ice merely intermits peptonization without sterilization. The peptonized milk after boiling should be cooled down and administered to the patient with or without lime water and if sweetening is required a sufficiency of Saccharum Lactis or plain loaf sugar added. But as a rule there are unnecessary ~~assure~~ fluidity seems enough to a patient suffering the torments of thirst of the acute stage of this disease. As to the quantities in which the peptonized milk is to be given the principle of "little and often" should be adopted as far as possible. By giving the little patient a little at a time say one or two mouthfuls every quarter of an hour or so, distension of the stomach, pain, etc., are more apt to be avoided and more will be absorbed; the vomiting will be less severe and the work to be done by the mucous lining of the stomach lessened. It is impossible to give exact quantities as the symptoms, the thir~~st~~ and vomiting vary in each case.

If this severely plain and simple diet be persevered in, in spite of initial failures (i.e. vomiting) I am confident that it will meet the requirements of the case better than anything else. One must be careful to forbid strictly anything else but this and the medicine, of which I shall presently speak, to be given and also to encourage the nurses to stick to it, this line of action alone in spite of all seeming failures at first, and in spite of the croaking suggestion of the sapient Sairey Gamps who are prone to gather round and in their reactionary stupidity condemn anything new or unknown to them. Sometimes it is expedient to add a little lime water to the peptonized milk: nurses have great faith in it, and I have ~~none~~ specially. It gives them a link between what they know and what they don't understand, and so encourages them. I can't say lime water does either good or harm and it certainly, to my mind, does not enter into the list of drugs essential to my line of treatment. It is not a germicide. To sum up: in the acute or early stage of this disease there is nothing equal to peptonized milk, cool and when possible iced, in small quantities and given frequently. Of the additions to be made in the more chronic cases or in later stages or when stimulation is necessary, I shall speak hereafter.

The drugs that have been used in checking the vomiting and purging of this group of diseases are as numerous as their proved inefficacy would lead one to expect. I notice that the most inveterate diseases are those which in books of therapeutics have the longest list of drugs referred to as suitable

for treatment. The older routine treatment by certain old fashioned drugs I have already spoken of only to condemn them and that after careful trial and experiment. The authority of older practitioners for the use of cathars, opium, chl^k and bismuth is not to be set aside lightly. We country practitioners are ~~an~~^o~~trio~~^u~~ously~~ conservative- we dare not be other wise- and it is only after numerous hart breaking failures and after coming to the conclusion that cases did quite as well if not better without these drugs at all that I was compelled to abandon them. Certainly some of the older drugs are useful still if used intelligently and with a clear view of the object aimed at; but they should not be used blindly and without a due appreciation of the reasons for their use namely; their germicide properties. I refer in this connection point^ely two subnit^rates of bismuth and and that potent drug in many children's affections, our old friend Cal omel. Calomel is useful for two reason, first from its action on the duod^um and so indirectly on the liver; it certainly empties the bowls and so clears away toxic material from the elementary tract (vide use of castor oil in the early stages ^{sup^{er}}). Secondly however it is partially converted in the stomach into perch^loride of mercury which is a powerful germicide and anti^{sp^{er}} and so acts in the desired manner on the bacteria of ^{at}ferment^{at}ion. Thus there is much to be said for the propriety of adminis^etrating a smart dose of calomel at the outset of (gastro-enteritis) of this sort; moreover, being a heavy powder it is not easily vomiting. If however, I elected to treat the child with calomel as I occasionally did I did.

(2)

not and do not give it in the old fashion of one large dose of 2 to 4 grs. but give it in small doses of $\frac{1}{6}$ th to $\frac{1}{4}$ gr. repeat ~~ed~~ every 2 or 3 hours. I never, however, continue long with calomel even in this way for if not soon effective I am afraid that it in itself depressant and that the resultant product, perchloride of mercury or the calomel may produce toxic effect, or mercurialism.

On adopting the germicide theory and the antiseptic mode of treatment of this group of diseases there are various germicides available for our use. Some are more or less palatable or active and all more or less effective, subject to individual drawbacks. The disease, I have said, begins in the stomach and only passes thence into the intestines. It should therefore be attacked at its fountain in the ~~xxxx~~ ^{contents} of the stomach. It is obvious therefore that ~~xxxx~~ solubility of our drug in the ~~stomach~~ stomach is a desideratum. It is not absolutely necessary that it be so; my experience shows that one of the drugs which is only resolved into its ^{res-} component parts in the intestine is still one of the best for use in all stages of the disorder. I refer to salicylate of bismuth of which salicylate acid is the ^{active} germicide. I am inclined to think that salicytic acid is developed in the disordered stomach, at any rate I can vouch for the efficacy of the drug.

The principle germicides soluble in water are perchloride of mercury, carbolic acid, lactic acid, hydrochloric acid, sodium salicylate and resorcine; these insoluble are calomel, salol, salicylate of bismuth, naphthalin (which I have just tried

and no more) and others such as betol, benzolnaphthol and
βnaphthol which I shall be frank enough to confess are not in-
cluded in my list of tried friends. I cannot discuss each of
these drugs in detail or with equal fulness as some of them I
have not used at all, and with others I have a very trifling
acquaintance. I wish to confine myself strictly to the results
of my own experience.

First of all corrosive sublimate, I have been afraid to
try much for reasons given above, except once or twice in a very
cautious manner. When as in a few of the worst cases (cholera
infantum) I thought it advisable to wash out the stomach before
giving other drugs I did try the use of a weak solution (1 in
5000) of corrosive sublimate, with good results. It is a very
active germicide as every one knows, and used in this way it
can do no harm but only good. I can well suppose that it
would be an excellent germicide in our disease but it would be
risky on account of its toxic effects to try it too long. I
have not used it as a drug to be administered except in the
shape of calomel. We country doctors have to be more cautious
in experimenting with powerful poisons than our brethren in
hospitals. However to wash out the stomach in very bad cases
by means of a soft rubber catheter, using this drug or some-
thing milder, is a very good step to take.

Hydrochloric acid. I can only say of Hydrochloric acid
that I have not tried it as a germicide yet and should doubt
its being useful especially when there is catarrh of the
stomach. It is of service in the dyspepsia of children but not
as yet much used. As a germicide in cholera infantum I doubt
we could not use it in sufficient quantity or in sufficiently

concentrated form to be any good. It would be too irritant in the state of the stomach at such times to be serviceable. In chronic cases or rather during convalescence it is very valuable to a weak digestion.

Lactic acid is I think too weak to be of any service. Carbolic acid is one of the drugs I have most commonly used. Not however for long did I continue to use the pure acid. It is too unpleasant in smell and taste and I suppose is dangerous, though I never pushed it far enough to find out that. Still I can vouch for its efficacy as a germicide and its utility in the diseases in question though my experience of the pure acid dates from two or three years ago.

Supphocarbolate of soda is to my mind and in my practice a great and powerful destroying agent of fermentation in the stomach. Its use in gastric dilatation and the destruction of ^{of saccharine} ~~saccharine~~ in adults first led me to try it in fermental diarrhoea of infants of whatever degree of severity. Given in small doses say about 2 grs. for a child under a year and repeat it every 2 hours for a time it has a most salutary effect upon the actively fermenting contents of the stomach. It is soluble, fairly palatable and what of disagreeable it may contain is easily disguised by some aromatic water. I usually give it with the addition of bismuth generally the sub-nitrat^{and} a little diluted hydrocyanic ^{acid} and aromatic, e. g. aq. cinnamon. Just as in the case of the pure acid attention must be paid to the urine while using this drug for any time lest toxic effects be seen. To guard against this I usually change the mixture for some of the other germicides if the first

bottle be insufficient. Apart from this danger, which is somewhat remote, it is a safe and reliable drug and produces excellent results. The vomiting soon ceases and the diarrhoea follows suit. Resorcine is a drug that merits a good deal of confidence as far as I have seen - and I mean to give it a more extended trial. What little I do know of it, and it was only during last season that my attention was specially directed to it, is most excellent. Being soluble and sweetish to taste it is easily taken and I have not seen as yet any bad effects from it. Children seem to bear it extremely well and I did not hesitate to give and with good effect doses much larger than the proportion laid down according to age by the extra Pharmacopeia. Indeed I find the best results and no bad ones obtained by giving to young children 1 to 3 grains every 3 or 4 hours. I find this ^odeage supported by one recent observer at least, Dr. W.S. Fenwick. Though I am inclined to agree with him that this is the very best germicide for our cases, still I have not had long enough experience of it to affirm so as yet. I intend to give it a more thorough trial. As yet my best results have been obtained with sulphocarbolate of soda, salol and salicylate of bismuth. This completes the list of drugs soluble in water and hence active in the stomach.

As for the others, I have already discussed the merits of calomel and expressed my idea of the best method of giving it and under what circumstances and for how long it ought to be tried. It has two actions, first that of an aperient alterative, second an antiseptic. Of the insoluble germicides the only two the somewhat lengthy list that I know much about are salol and salicylate of

of bismuth. Naphthalin I have just tried and that is all and as I find now it was in too cautiously small doses to be of any avail I neither praise nor condemn it. Of the two that I have tried I can speak with confidence as I have used them in a great number of cases during the last four or five years. Salol was practically my first love in the matter of drugs when I began this line of treatment of cholera infantum and its similarly caused allies. I found it fairly efficient when given in fairly large doses according to age - larger that is to say than the proportionate doses of the B. P. It is easily administered and well borne by all, in fact, it was only discarded by me more as a whim and a desire to try something newer, than from a want of faith in its powers.

Latterly I have advocated salicylate of bismuth as my favourite and consider the results obtained by it as more rapidly satisfactory than in the case of any other. Why so, may be asked, seeing it is insoluble in water? It is a heavy powder and seems in the stomach to at least protect the congested mucous membrane: as for its antiseptic action, I believe that even in the stomach the salicylate acid, the ferment-destroyer is evolved: that even before it reaches the small intestine the germicide action begins: that both the palliative and curative actions of the drug are present in the stomach. I cannot prove my contention physiologically but certainly I can vouch for the action of the drug therapeutically in gaster^o-enteritis. If it has no direct effect in this direction while in the stomach then I am forced to admit that experience of my practice is at variance with my theory that the disease begins and is always at its worst in the stomach and that if we can get the

s stomach and its contents put to right, the conditions of the intestines will improve forthwith. The dose of salicylate of bismuth should be pretty smart say 2 or 3 grs. every 3 hours for a child under a year. To sum up, the direct or active treatment by drugs of cholera infantum or gastereenteritis, the routine treatment (though I abhor the word "routine") is - when necessary wash out the stomach not with ~~Hydrochloric~~^h solution but with warm water, boric acid solution or weak Condy's fluid and administer as the staple drug sulphocarbonate of soda or salicylate of bismuth. I find on looking over my day booking prescriptions that I have been using these alternately and in the same case, often beginning with the sulphocarbonate and continuing with the bismuth as the case progressed. I think this a most excellent method where cure and not merely statistics of a therapeutical differentiation is the object aimed at.

There are many little things to be added to a properly detailed account of the treatment, depending on particular symptoms in particular cases. Thus, I may merely mention such a trifle as that when using heavy powders the usual suspending agent may be added to the mixture, so also dilute H.C.N. may be added with some of the usual *carminatives*. In cases ^{where} the patient is racked with pain, sleepless and exhausted, a single dose of morphine, though it has no direct effect upon the disease, may procure some rest to the sufferer; thus though only *washing* the disease it will gain time for the proper drugs to take effect. The morphine may be given by the mouth in one

or two minim doses or by means of a starch and laudanum injection. It is only necessary occasionally and as a rule is *contraindicated*. I certainly never use it in the initial stages. The further treatment of the very acute stage of the disease requires a few words as to further details. What I have to say does not apply to all as a routine but we must judge of their necessity according to the severity of the attack and the constitution and varying conditions of the child. Thus when the disease begins very acutely and presents the symptoms of cholera infantum proper I would in all cases try to get permission to wash out the contents of the stomach freely with a weak antiseptic solution:- I usually employ borie acid and hot water. Then again if the external temperature be falling rapidly (equivalent to shock or from actual poisoning while the internal temperature (rectal) keeps up) I pack the child in hot ~~dry~~ blankets that is to say use the hot pack for about half an hour. Then dry it carefully and put it in hot dry blankets for the same time and keep repeating this procedure so long as necessary to raise the surface temperature. Counter irritation by means of fomentations or mustard blisters over the stomach is recommended. It probably does some good in allaying pain but I do not regard it as a very essential point and certainly constant poulticing of the abdomen is futile. However, a little may be tried for a time, especially as it gives amateur nurses something to occupy their attention, - a very useful thing in general practice.

The question of stimulation leads me on to speak of the method of treating the chronic and convalescent stage of the

disease. When the child is completely ~~poisoned~~^{poisoned} by the disease, struck down and suffering from shock, of course as in other complaints some stimulation is necessary; usually a little brandy is the best and it may be administered by the mouth, or if deemed advisable, per rectum. Every case must be judged by itself and no rule can be laid down, therefore details are unnecessary; it is merely a question of treating symptoms as they arise. A child cannot remain long in the very acute stage of cholera infantum. It must either die, recover completely, or the symptoms may become chronic. If the disease is chronic, the vomiting abates to a very great extent and may even cease, while the diarrhoea continues, less frequent and abundant no doubt but more offensive in character. I find it best simply to continue the anti-fermental drug, preferably salicylate of bismuth and add to it as time goes on some of the ordinary astringents, usually Decoct. Haematoxyli. Tincture of Catechu is also a very useful astringent in children when the case seems to require merely an astringent. I still continue to feed the child for a time on the peptonized milk possibly without addition. Where a stimulant is required in this or at any stage of the illness I have found ^{raw} meat juice, preferably peptonized, of great service. Good old brandy or occasionally by preference a little ~~St. Ignace~~^{St. Ignace} Benedictine is often retained by the exhausted stomach and when given in 10 to 15 drops every hour or so has a most beneficial effect in restoring the vital energies. Cases may occur where the onset is sudden and the poisoning so acute by absorption of the fermentation products that even without very severe external symptoms of vomiting and

purging, the child may be completely from the first struck down with low subnormal temperature and all the appearance of collapse. Such cases obviously require stimulation and the closest attention. They are practically cases of acute poisoning and require such applications as the collapsed state of the patient would in all similar circumstances demand. As for the meat juice I have mentioned above, I have used several varieties, Valentine's, Mosquera, Brand's and *Armonis* amongst others. I hesitate to say which I find best, but can only say that some of them, i.e. Valentine's are much over-rated. I believe the beef meal of *Purkin's* *100. etc.*, contains most nourishment. However, an intelligent nurse can easily make as good or even better raw meat juice by the *maceration* of lean steak chopped fine. This can be peptonized for use by means of *Benger's* *Liq. Pepton* or some of Burroughs *Wellcome's* excellent preparations and methods. I need not quote the details. The raw meat juice is very palatable with the addition of a little salt; it is digestible and during convalescence is of great service. A child recovering from an acute attack must be very carefully dieted for a time. Use the meat juice when expedient as well as the milk and gradually little farinaceous additions to the menu may be made. I generally begin by sanctioning the trial with care of *Benger's* Food for Infants, with the caution that if vomiting recommences a return be made to the Spartam regime of peptonized milk and cold water. The usual hygienic measures in the way of promoting recovery and the building up of the debilitated constitution need scarcely be mentioned. A change of air when the

tient has so far recovered as to bear moving is of course indicated. Tonic medicines of various sorts are useful, of which Dialysed Iron, or Nux Vomica with or without hydrochloric acid, ~~are~~ perhaps the best. In this connection I may say a word in favour of *Angier's* Petroleum Emulsion a somewhat new preparation containing hypbphosphates with the Petroleum. I have found during last season that my little convalescents took this well - better than Cod Liver Oil - daily gained in strength in the chronic and convalescent stages of this disorder

In concluding this paper permit me to make one or two apologies. In the first place I have found it impossible to lay my hands on any detailed literature on the subject. This may be an advantage in some ways but it certainly prevents me from verifying my suggestions by consultation with authorities and more especially from satisfying myself as to the thoroughness of my details. In the second place it will be noticed that I have not thought it advisable either to tabulate statistics of results or to quote any special cases and give names, ages, dates, and clinical histories. It is not for want of materials, which I have at hand if required to use them; at first it was my intention to include lists and case histories in my thesis,. I thought on reflection that that would prove tedious and unnecessary though I have details enough to prove my contentions; these details are somewhat dry reading as well as writing. Statistics can be made to prove anything and clinical histories are monotonous. I am prepared to maintain and stand by the general principle I have laid down, without calling in special witnesses. I can conscientiously affirm

(31).

that my results are most excellent. I can also affirm that I have gradually, step by step, almost without any hints from outside, built up with the help of my assistants a method of treatment of this disease which I am pleased to find has been confirmed in the latest book on the subject, (Rotch U.S.A.) and in the medical journals, - a method of treatment which is of course no panacea and will fail in the case of children previously debilitated, of tubercular taint of very unwholesome surroundings - but still a method which leads to results immensely superior in the way of saving life to any previous one. I am too much out of the way in this little old world village, known in Northumberland as "Sleepy Hollow" to keep in constant contact with my brethren and so abreast of the times. Rust is apt to dim ones professional panoply in such a place. I may, therefore, be laying down principles and making statements that if ~~new~~ are false, or if true so old that they will not be accepted as showing originality. But I repeat "it is a poor thing but mine own". - I am satisfied that though I have not reached the very best possible in this line, and that much remains to be done by others and by me in my humble sphere, so far as in me lies, in improving the dietetics of children in general and especially in the dietetic and medicinal treatment of this disease, a group of diseases, yet I am convinced that I am on the right lines. I feel that I can now cheerfully and confidently in my humble way strive to combat these fell destroyers of our children with some measure of success and so though far from the stimulating intercourse with the busy world continue to carry on hopefully the task to which I have been

set by Providence.