Observations on Infanticidal Diarrhoea
Thesis for the M.D. degree presented by

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The great prevalence of Diarrhea of an intractable, and often fatal form among children during the summer months, especially in the large towns, is in itself a fact of such importance that I need no apology for bringing forward any small contributions, which however unimportant they seem, may still form a link in the chain of evidence which may bring about a better understanding as to the cause, and nature of this disease.

These observations are far from complete, several years being necessary for any thing approaching completeness. I hope however to carry on these observations as the opportunity arises, and in time put them in a more definite and cleared form; meanwhile they may draw the attention of others to the points mentioned and from the present chaos deduce a method of treatment which will prevent the present high rate of mortality among the children of our large towns.

The leading article in The Lancet (Aug 5th 1876, Page 194) is alone sufficient to attract
Attention to the subject, such sentences as the following: "It attacks extensively the children of the comfortable and intelligent, and sometimes despite every suggestion of sense and medical science proves fatal. "The months of July and August Hay their thousands. "The question is one of more than professional importance, it is one of scientific and public interest." At any rate infants in the first year of life, and even in the second, die in thousands, while all the rest of the community is enjoying comparative immunity from disease."

What we require seems to be a number of sufficiently minute and careful accounts of the disease, gathered from the various towns where its influence is most felt, loose theories of which we have had a plethora during the last two or three years, are of no use, but careful and thoughtful observations on the various forms of the disease, with as many causes as is possible the cause, or probable cause. These would in a short time give us sufficient evidence on which to base our
our reasoning and deduce a rational mode of treatment — or would at all events show what fallacies to avoid and in what direction our observations should tend.

The hurry and bustle of a General Practice however renders this an all but impossible task: The fight for life too keen; The struggle for very existence among the man of General Practitioners too exhausting;

for that calm, entering observation, which is so necessary when anything in the shape of scientific work is to be done. The parents and friends of the patients are also a bar in the way: you cannot — without offending make the numerous visits and examinations which are necessary; so you have to subordinate as well as you can to compare one case with the other, as they arise from day to day — and obtain first of all a general idea as to the course and origin — and then case by case endeavor to bring out new facts. The difficulties to be surmounted are great, as all cases have to be noted down in your return from a hard day's work, when the mind is exhausted and the body worn out with fatigue.
so that many little points slip the memory which, if noted at the bedside could have been recorded and often serve materially to modify your future course of action.

The following progressive notes were taken hurriedly at first merely for my own satisfaction, and as a means to enable me to note any peculiarity observed, and what treatment answered best. It was only by degrees that the importance of the subject was realized and more minute notes taken on a definite plan. Not post-mortem examinations being the exception many interesting points could not be cleared up. The contents of these observations are noted in this paper and will be considered under the headings of

I. Thermic
II. Irregular and Inversant

Causes, as then were found to be the chief exciting causes of infantile Diarrhoea. They may of course be subdivided, but the difficulty is to draw a hard and fast line as they pass so into one another a Diarrhoea commencing as one and soon after taking one a different type, or one may complicate the other, and the symptoms become confused.

Thermic Causes.
Thermic Causes. The extra sensitiveness of the brain in childhood to impressions from without, especially to heat, is a subject which has been very much overlooked. The preponderance of the nervous system in children and the fact that the infant brain nearly doubles its weight during the first two years of life fully accounts for this extra sensitiveness and is what one would be led to expect from the actively growing brain of childhood. Causes are consequently exaggerated in their effect and what would in the adult produce but a slight uneasiness, will in the infant often result in convulsions and death. This liability of the infant brain to be affected by slight changes in the circulation gives heat a power unknown in the adult, even in tropical climates, where their effects of heat can perhaps be studied to the most advantage. Reports from India, America, etc., where these causes are most usually present, show the terrible infant mortality they produce.

Dr. J. Fawer's remarks in the Lancet (Vol. II 1876, Page 389) (quoted on page ) on diarrheal cases of adults in India, shows that a similar
State of matters produced even in adults, when debilitated from apathy and long continued heat. In acute fevers also where we have a high temperature of the blood, or have similar remits, and these can be judged with reference to the same appearances caused by prolonged exposure to heat especially that of the sun. Convolutions are often the result of a long walk in the sun, whereas do not take the slightest care to shade the children from even the direct rays of the sun; and any one walking through the streets of London or any large town during the summer may see numbers of children of all ages in the blazing sun without have the protection a straw hat covered with muslin gives.

Although it seems little known it is no doubt a fact that symptoms of sunstroke may come on even tho' the child may have been shaded from the direct rays of the sun and also, even when the sun is partially shaded by trees. The great liability of infants to sunstroke seems to have been overlooked in England and as a cause of death is seldom (in the case of children, I may say never) noted in
the certificate. Many of the cases registered as "Convulsions" may, during the summer months, be put down to Ex. The following case is typical of its symptoms.

E. B. a boy at 2 1/2 years, had a large head, and

hurtler says he has always been a highly nervous child. He was taken out to walk by the nurse on a very hot day in July. He became so cross and fretful that she was obliged to bring him home, carrying him the latter part of the way. When he was left he looked down and lay almost as if the floor - as if interfered with he became very fretful. When seen he was still dozing and if tormented commenced screaming. The pulse was extremely rapid, the breathing quick and irregular, the temporal veins throbbing violently, the face flushed, the eyelids half open showing the conjunctiva as far as they could be examined, contracted and insensitive to light, the skin was dry and burning and twitching of the legs and arms was also noticed. Soon after the child vomited as it had eaten, and as the same time became violently purged, a severe convulsion followed. Some of the motions were examined under the
Microscope and showed besides starchy granules and mucous, numerous white and red blood corpuscles and epithelial cells. Dysenteric diarrhea continued for some time with great violence and was with difficulty checked, often having to return again. The feverish symptoms remained continuing and the child suddenly suffering from pain in the head as it continually put its head to its head at the same time crying out suddenly. It finally died from exhaustion. Dr. Perminin to examine the abdomen could only write great difficulty be obtained. The intestines however presented with marked appearances. The mesenteric membrane of the lower part of ileum was found thickened, soft and red, and studded with dark points near the valve the mucous membrane seemed partly denuded. Bloody patches were also redder than natural. In the rectum and sigmoid flexure the submucous tissue was thickened and gelatinous looking. The mucous membrane was friable and in many places entirely absent, especially in the lower part of rectum which was almost bare. In many cases you can get the history and
The mother tells you that the child has had convulsions; you find many of the symptoms present, but, can get nothing definite, but by taking the case as a whole, you can often even in these cases arrive at a diagnosis.

In some the most prominent symptoms are those of the nervous system and the child may die before any diarrhœa has set in. In others you find the vomiting and purging most marked — much of course depending on the constitutional tendency of the child, the state of health at the time, whether teething or suffering from any gastric or intestinal irritation must also be taken into account, as there and many other causes modify the action of heat on the infant. Again in some, the effects are very slight, merely causing the mother quite to omit almost entirely it is taken, and if fed with other things diarrhœa is usually set up. While others are so very sensitive that even keeping them in a warm room (such as you constantly find among laundresses) may produce vomiting but as the child still seems very nervous the mother keeps giving it milk or perhaps this it
with something solid, "as to stay its wanderings," as they say; hence diarrhoea being of course the result. The rooms are of course not merely warm but oppression. So, having a, is usually the case at any in the middle for treating the disease. (See case A Page 12) In connection with this subject, Tanner says Page 139 Vol II Practice of Physi. "That relaxation of the bowels is common during the summer months owing to the too great heat." In Pract. Med. Animal Vol II 1876 Page 286. Dr. H.C. Wood Philadel. Med. Times says "There can be little doubt that many of the cases reported as cholera infantum, enteritis, etc, are really instances of the "thermic fever, and are curable by treatment as such." "Especially does this seem to be true of those cases in which the disease is popularly said to 'go to the head.' " During the recent hot weather in New York, the incidence of diarrhoea, especially among young infants, was very marked; and its association with the prevalence of the disease is in favor of the theory of the "thermic origin of the disease as gaining advanced. " In the Lancet Vol VII 1876 Page 242. Dr. J. W. MacKenna in a letter to
Infantile Diarrhea; says that it is due to
congestion of the Bowels, caused by the high
temperature, and advocate the use of Ice.
He also gives cases in another letter page 356
which illustrate the effect of this treatment.

Irritant Causes may be Direct and Indirect

The Direct will be in improper
feeding, and the Indirect in the irritation
producing from the process of Teething.
These causes are well known and recognized
as causes of Infantile Diarrhea and consequently
require little notice in this paper.

Children brought up by hand, are most liable
to irritation produced by improper food. The
mothers seem not to be able to understand
that if the tubes and bottles are not properly
cleaned out, a very short time in hot water
depends to render them sour and if they then
infect all the food intake, coming in contact
with them. The old fashioned feeding bottle
with the long narrow neck, having the teat
attached directly to the end, seems the least
objectionable form of bottle, and most easily
kept clean. The mothers will not however
use this form as they are obliged to hold it
To the child's mouth while feeding, and
the child cannot be left to go to sleep with
the breast in its mouth. This bottle has also
the great advantage of getting the child
into regular habits and prevents that
continual sucking that children fed by the
ordinary bottle are so fond of. Sometimes
seen the mother's milk gives an irritating
cause as noticed in the case of a young
laundrywoman: She used to pump away
from the hot laundry room, while she was
washing and nurse her baby, which had been
a particularly strong healthy child; she found
that it was a common thing for the child to
vomit up the milk almost immediately it
had swallowed it and yet seem ravenous
for more; and having only a limited time
to spare, she took to feeding it and set up
Marseilles. On examining the milk it was
found to be healthy and perfectly digested by
the child while the mother remained at
home and nursed it, but vomiting again
as soon as the usual two hours gone on with.
The cause was explained to the mother, but
without avail, and when next called the
child was dead, having suffered for some time before from severe diarrhoea, and dying finally in convulsions; the mother stating that it had refused the breast for some days before and she could not get it to take anything.

This is only one among many instances that could be given. The mothers and nurses do not seem to be able to understand that children cannot digest everything, and one continually gets told 'Ok! he is partaking and takes any thing we have.' 'The milk does not seem to satisfy him so we must feed him'—and the poor infant is accordingly fed to death, in spite of the Doctor's and any learning he may gain. The gradual effects of improper feeding in infants often causes them to be overlodged, and to make matters more difficult it is seldom that you can depend on what nurses tell you, as they always having given anything to a child, and yet you find starch granules in the motions, when taxed directly with an instrument. They say 'Oh! I only just gave him a taste.'
Children of a few hours old are almost always fed with such things as buttermilk and sugar, gruel etc., giving pains, restless nights, and a disordered stomach, being the result for which the child is then asked to castor oil etc. This same process goes on continually till the child is thoroughly exhausted, and they then complain that the infant does not thrive, and seems little wasting, passing continually, flatulent windings, with great pain and straining. You have only to examine one of these motions to find them composed of indigestible particles of starchy matter mixed with slime, and in one case examined small particles of strawberry jam were found, which of course every one denied having given the child. The process of digestion is extremely critical and at this time perhaps the greatest number of diseases occur—not so much perhaps from the actual fact that they are teething; but that at this time great changes are going on in the infant economy—the active state of the whole alimentary system being such as to
any slight cause will now produce the
most violent disturbances, in which the
nervous system plays a most important
part. Often a small portion of food which
during the excited state of the system
cannot now be properly digested (although
it has hitherto caused no mischief)
produces the most violent reflex action,
often ending in convulsions. Much to
the astonishment of the parents, who can
not understand that during this excited
state of the whole system, indigestion will
be caused by what has hitherto been
taken with impunity. Parents also
look upon diarrhea during dilution
as the normal state of things, and many
a poor child has been pressed to death
while teething before they knew that
anything is wrong. The persistency
and thirst of children at this time as
well as the heated, irritable state of the
gums make the children continually
cry out for something to drink, and they
never seem satisfied except while taking
something. The slightest cord will also
produce at this time catarrhal symptoms which readily extend to the intestines, and usually continue till the teeth are through the gums. What tends to confirm this is their opinion that looseness of the bowels is proper during dentition, if that very often after long and exhausting diarrhea the diarrhea cease a little before the more prominent symptoms of central disturbance come on; they then say that you have killed the child by checking the diarrhea, and nothing you can say will make them think otherwise - I am often told "Oh! it has not yet diarrhea its bowels are only a little loose." and then asked how many times, you will probably find that every nappy is stained, and that the child is almost at its last gasp.

Mailiary Causes - are also very much neglected little or no notice having been taken of this important cause of infantile diarrhea. It is often obscure and complicates other causes of diarrhea, and can only be discovered with difficulty. The state of the intestinal glands, so often found in
Intractable and fatal Diarrhea points to some such cause. It is also during the warm weather that insanitary causes act with most violence and in the combined effects of heat and unsanitation can be found the cause of the great increase of Infantile Diarrhea during the summer and autumn months. Children are also much more sensitive to sanitary defects than adults; slight sanitary defects will produce symptoms in them which are out of all proportion to what is shown expect. You find that Infantile Diarrhea is most common in those climates where you are exposed to great heat combined with unsanitation; the heat being the agent that develops the latent cause. The greatest mortality will be found to occur during very hot weather following close or heavy rains. Here all the organic matter, disturbed by the rain, is free in its most active form, heat and moisture tending to develop the germs with the greatest rapidity. During the summer of 1876 which was unusually fatal to children. This fact was noticed three or four times; after the heavy clay soil had become saturated with moisture a few hot
Keep would develop a regular epidemic of diarrhoea of a very fatal form, as could be seen by the monthly report of the Registrar General. It is to be noted in connection with all observations as to the prevalence of a diarhoea that our statistics are founded on the death rate, which is but a small proportion of the number of cases occurring during any period, and this, not in themselves fatal, so that the children and complicating other diseases, that the mortality from every cause is much increased. The great difficulty there is in distinguishing between the different forms of children’s diarrhoea, and the tendency they have to run one into the other renders all observations very difficult and liable to error. A simple diarrhoea often beginning suddenly, cease, with great nervous excitement, which may end in coma or convulsions; more often however, the diarrhoea takes on a chronic action, and goes on from bad to worse, all exhaustion setting in, and the child dies in the course of a few weeks, in spite of the greatest care in diet, and the most appropriate remedies. In Port Morton on those cases you will usually find that Barytes, phthisis, are a good deal implicated, the mucous glands
also are increased in size. In some cases you have
distinct alteration of Oages patches and thickening
and dilution of the mucous membrane near the
ileo-colic valve; the solitary gland showing as
white spots on the thickened mucous membrane.
In one case examined the mucous membrane was
much thickened and reddened round the solitary
gland, which could be felt projecting as small
points above the surrounding surface, and in
some places the mucous membrane appeared to
have been pulled off. In this case there had been
severe diarrhoea till within a short time of death.
The diarrhoea was developed soon after a field in
front of the house had been top dressed, the smell
was exceedingly unpleasant, but produced
comparatively little effect, till after a cool
day when almost immediately a similar case
occurred, in fact every child, almost, living
near the field in question was more or less
affected, and in several cases the diarrhoea became
chronic and ended fatally. This had been
noticed several times during the last two years
the diarrhoea increasing and gradually developing
serious symptoms whenever the fields had been
top dressed - among the adults also many cases
Of diarrhoea and sore throat were noted.
In another instance a family of four children
are always sitting, suffering almost constantly
from diarrhoea and sore throat when living at
home; finally they are attacked with some
scarer from, the throat symptoms being most
vivant, always preceding in verence
in these cases. They were then attacked, moved
from their nursery and put into a large room
in the front of the house and disinfectant
freely used - bicarbonate of soda was given
but seemingly without effect. Saturated
solution of calomel of potash was applied to
the throat and found to act most beneficially.
In relieving the throat symptoms, it was also
soon internally combined with stimulants,
which from the low state of the system were
required from the first. When convalescent
they were all sent to the sea side and a through
inspection of the house recommended:
The sanitary confirmed the suspicion that
the children were suffering from mephitic
vapors. The stiles in the closets were all
connected with the soil pipes by means of
short untrapped pipes, the soil pipes having
no ventilating shafts. Three winds acted as the
outlet for all the bad odours. The lower filters
from which the the fumigating water was chiefly
taken was near the Servants' closet, which
had no window, a small 12 inch hole in the
wall having been carefully stopped up with
straw and sealing - The over-flow pipe was
trapped and connected directly with the
drain; and from this pipe there was a strong
updraught of what from the smell was no
smoke sewer gas - The upper filters which
supplied all the closets and suite, was placed
under the floor of the nursery in which the
children had slept, the bed being placed exactly
and the trap in the floor - Here also the over-flow
pipe was trapped and ran directly into the
soil pipe. A strong updraught of foul air could
be felt even by the least hole, and almost
extinguished the taper - Where one of the
closets was used the foul gas could be seen
bullying up from the supply pipe and from
the overflow pipe. The general smell was intense.
I need hardly mention that the water was
fated and stinking, having a nasty, gran
shine on its surface - and when as was

Afterwards
Afterwards discovered the nursemaid, to have herself tremble, often drew the water for the nursery from one of the taps supplied by this system. The wonder is that the children ever recovered since their defects have been remedied, and the home kept in a thoroughly sanitary state. There has been no illness or the mentioning and the bleak January, ailing children of a year ago, are now strong and healthy and growing rapidly.

In another case a daughter near the window of the child's room seemed to be the cause in which the infant was moved away at the front of the house far from the source of infection. The diarrhea which had hitherto been so intractable, was finally checked. The chief point in the diarrhea from this cause, seems to be its tendency to become chronic, and the difficulty there is in checking it. The green slimy, fluid motions often failed, at first with tenesmus, afterward without any apparent effort appear to be characteristic.

The tendency seems to be in diarrhea from insanitary causes to become chronic and end fatally, while in the diarrhea induced by improper feeding or through causes that
is a tendency to spontaneous recovery, whereas complications are more common in the latter and if severe often cause death. Dr. Joseph Tagore, page 384, Vol II, 1876 of the Lancet makes some remarks on the chronic diarrhoea of India and the Tropics, which occurs only in those who have been exposed to climatic influences, which he states are probably material. The description given exactly illustrates a case of this form of infantile diarrhoea. "It is known as 'Diarrhoea alta' or white flux, so called from the grey, white, light or clay coloured evacuations, which are frequent, copious, fluid or semi-fluid, often greeny " etc. (in Latin: "The tongue is dry and smooth, and in advanced stages, it appears contracted and shrivelled, its papillae are obliterated, the surface is red, a pure red streak, glazed and dry, its edges are excoriated, and its mucous membrane the seat of epithem spots" etc. This denotes exactly the appearances often seen, and if the stools are also examined by the microscope they are in a short after the attack, found to
Gentlemen,

In the following remarks, I have

indicated the case concisely and

with this object in view, gave up

the idea of reporting all the cases in

full without any remarks, and

substituted notes on the results

attained with a few illustration

cases which would I thought be

more to the point, and much less

complicated. I have been made

to get up the literature of the subject,

but have given a few extracts from

the Medical Journals, which seem to

confirm my own observations.

Sincerely,

Wm. J. Vanderbilt
To consist of a gelatinous matter mixed with the very light artist's size, numerous epithelial cells and adhering blood corpuscles can be detected together with numbers of fine like cells which however seem larger than true jaws and are at times elongated - if kept for any time in a warm place, sprucefild filaments develop.

In Lancet Vol II 1876 Page 495 2-2 line from top.

Dr Lewis Smith says, in speaking of these causes in America "That Pathologically these cases consist of a condition of enteritis while 'and that they constitute a sort of Infantile Typhus."

In most of the letters to the papers on this subject the writers seem to think that there can only be one cause, and they do not enter into account the probability that it is the combination of several causes which renders diarrhea so very prevalent and fatal during the summer months.

Fermentation changes so much more rapidly at this time, so that greater care and cleanliness is required in the preparation of infants' food - the mother may also of course exert herself and to set up the first.
irritation in the center of the infant's Suckle. 

By means of the altered state of the Suckle, 
The exposure to heat also adds to the danger 
and the sudden changes in the temperature 
During the Night and Early morning 
when the infant, after being exposed to the 
heat, may produce a chills which become 
The staring point of a severe case of Diarrhea. 
The case can be traced to the infection of 
The milk, which had been placed on the 
window ledge above a heating jet, the contents 
of which exuded strongly. The child was soon 
after taking this milk fevered with violent 
vomiting and purging, everything it took 
was vomited and it died in 36 hours' duration. 
It will of course take years to collect and arrange 
cases sufficient to make a thorough investigation 
of Infantile Diarrhea in all its forms; the 
above remarks are however founded on the 
observation of about 500 cases occurring 
chiefly during the summer and Autumn 
months. The cases have been taken down 
promptly at the time, with a view to recording 
them more fully afterwards and arranging 
them in groups - ill health and want of the
Time necessary for such work has prevented this from being done; so that only a few cases have been selected to illustrate the points touched on.

My intention has been to bring out the fact that Infantile Diarrhea is not developed by one or two causes only but that there are other factors, besides teething and improper feeding, which play an important part in the production of the diarrhea. Though there can be no doubt but that for many prisons the tendency to Infantile Diarrhea is greatest during the time of teething.

In conclusion I may say that I have entirely left out the subject of treatment as too complex to admit of proper notice in so short a paper. It has hitherto been carried on according to general principles: The application of Cold in Puerperal cases—Regulation of the Diet with sedatives in Infantile cases and by Antiseptics (Suoplic and Sulphureat of Soda etc) in Diarrheal cases, all at the same time keeping up the vital forces.

Wm. Verheur Brandt

April 1876