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Typhoid Fever in Children.

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List of Works consulted in preparing this Thesis

Diseases of Infancy & Childhood by Dr West. 1884
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A Manual of Bacteriology. Crookshank. 2nd Edition
Diseases of Children. Meigs & Pepper. Philadelphia
Murchison on Continued Fevers. Third Edition 1870
A System of Medecine. Reynolds. Third Ed.
Aitkens Science & Practice of Medecine 2nd Edition
Cayley on Typhoid. (Croonian Lectures 1880 published by Churchill)
Collie on Fevers 1884.
Treatment of Disease in Children. Angel Money
"Lancet" various numbers
"British Medical Journal" various numbers

It is only in comparitively recent times that the frequent occurrence of Typhoid Fever in children has been recognized in medical literature. Up to the year 1839 there appears to have been an almost universal belief that this disease was found only affecting adults. Towards the end of this year however Rilliet & Barpin published separate memoirs on this subject.(a) & since that time it has been frequently observed & carefully studied. There can be no doubt that in the past many cases of true Typhoid Fever in children have been classified under the head of "Infantile Remittent Fever" a disease which is but rarely heard of now. It does not follow however that every case of Remittent Fever in a child is true Typhoid "Pyrexia in children is prone to be markedly remittent"(b) and we therefore frequently find children suffering from inflammatory affections other than Typhoid Fever, with temperature of a remittent character Hutchison says(c)" According to my experience, idiopathic remittent fever in children is almost invariably

Rilliet. "These de Faculté 1840" and "Maladies des Enfants" i pp 663-739. Barpin. (Journal des connaissances Méd-Chirurgicales.)

(b) "Treatment of Disease in Children" by Angel Money. p 503.

(c) Hutchison on Continued Fevers 1884 Ed. p 595

Enteric" and I think most observers of the present day would corroborate that view. It is however by no means easy to detect every case of this disease in children which comes under our care, & yet when we bear in mind how easily a serious Epidemic of Typhoid might arise from the non detection & isolation, together with the non-adoption of proper means of sanitation & disinfection of a single case of the disease in a child, — the importance of correct diagnosis can hardly be over-estimated. The object of this essay is to point out some of the difficulties which meet us in the recognition of this disease, & to ~~point~~ call attention to some of the more obvious ways in which it differs in type from the same disease in adults. It will be well however at first to offer a few remarks upon the Etiology Pathology of Typhoid Fever.

Etiology

In Nature of the poison.

We do not know much about the actual nature of the poison in Typhoid Fever, - we know something about.

its properties, that it multiplies when it is introduced into the system, that it is contained in the Alvine discharges & that it retains its activity for an indefinite time after it has left the body, if placed under suitable conditions such as moisture & the presence of decaying animal or vegetable matter. Such conditions as I have mentioned are perhaps best found in drains sewers. We do not however know what the poison really is. Many militate to the theory of a micro-organism & the difference in staining reactions between Koch's bacillus & the ordinary bacillus of putrefactive processes appear some evidence towards the possibility of such an organism having already been demonstrated But opinions differ much on the subject. Personally I have made sections of the spleen in a well marked case of Enteric Fever - staining them with Bismark Brown which Koch[a] says is the best re-agent to use for the purpose - but have only met with negative results.

[a] Manual of Bacteriology by Crookshank 2nd Ed. II. p 269

much has been written upon the question whether the poison can arise "de-novo" as was maintained by Dr Murchison or whether it can only arise by continuous propagation as was maintained by Dr Budd.(a) Probably the majority of authorities now agree with the latter, notwithstanding numerous cases related by Dr Murchison where the disease has arisen in isolated districts apparently far removed from places where the disease had already existed.

the point discussed Murchison's Continued Fevers" p. 484 et seq.

The well known Lausen cases appear to me to give strong support to the theory of continuous propagation.(b) Briefly related they are as follows. The dejections of two cases of typhoid fever are thrown into a stream - the water of this stream irrigates large meadows - a portion of this water sinks through the superficial strata passes by percolation 1000 ft under a mountain - it then pollutes an insignificant part in feeding one head of a copious stream which has another head uncontaminated, & yet gives

account of the Lausen case in Dr Sykes Croonian Lecture in 1880

John H. Age 10. TABLE. 1A Irregular 5th day curve

Day of Illness.	Pulse.		Respirations.		Temperature.		Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.		M.	E.	M.	E.	M.	E.
4		118		40		103·4	16			28	28	98·4	97·6
5	124	128	40	44	102·4	104·2	20			28	24	97·4	98·6
6	128	124	40	40	103	103·2	21			28	28	98.	97.
7	128	128	30	30	102·2	103.	22			24	24	97·4	97·6
8	128	124	36	36	×104·8	102.	23			24	24	97·8	98.
9					×98·4	97.2	24			20	24	98	99
10			34	32	100·2	98·4	25			20	20	98	98·2
11			36	36	99·2	101.	26		124	20	20	98	98·6
12			36	36	97·4	102·2	27	124	128	20	20	98	99
13	120	124	36	30	99·4	102.	28	128	128	20	20	98	100
14		124	36	38	102·6	102	29	132	132	20	24	100·6	100·6
15			36	40	100·4	101	30	138	132	24	24	98	98·2
16			34	36	100·6	101·4	31	128		20	20	98	98·2
17			36	36	99.4	100	32	126	128	20	20		
18			36	36	97·6	99·2	33	128	126	20	20		

Table 1A for comparison with Table 1
& 2. sisters of the same

Mary Ann H. Age 9 TABLE. 1

Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.
4	112		24		101	100·8
5	112	112	24	24	100·8	102·6
6	116	104	24	24	102·8	102.
7	116	120	26	24	98	102·4
8	112	120	24	24	99·6	101·2
9	100	112	24	24	101.	101
10	92	100	24	24	99	100
11	92	92	20	20	98·4	99·6
12	88	80	20	20	98	99
13	80	80	20	20	98	99
14	80	80	20	20	97·6	98·4

Table 1.

Selina H. Age 7 TABLE. 2

Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.
5		124		34		103·2
6	120	124	32	34	102·2	102·4
7	124	124	30	40	101·6	102·6
8	120	120	40	36	101.	101·4
9	118	118	36	34	98·8	101.
10	116	116	32	32	100·6	100·4
11	116	114	28	24	99·4	94·6
12	104	108	24	24	94·6	97·4
13	100	104	24	24	97·8	97.
14	100	90	20	20	99.	98
15	90	80	24	20	98	97·6
16	80	80	20	20	97·4	97·4

Table 2

dung heap. Some weeks later 5 people engaged in removing dung from this heap were attacked by the fever, & their alvine discharges were again buried in the same heap. Nine months later one of two men engaged in the complete removal of the dung from this heap, was attacked with Enteric Fever & died.

Cayley mentions a case which came under his own notice where an interval of two years occurred without apparently any fresh importation of the poison.(a)

(a) Cayley on Typhoid (Croonian Lecture) p 13.

There has been much debate & difference of opinion upon the question whether Typhoid Fever is directly contagious or not. Personally I think it will generally be found that in cases where the communication of the disease has been supposed to be direct, from one patient to another, there has at least been the possibility & sometimes even the probability of infection by other and indirect means.

On this point Murchison says[a]
"Although Enteric Fever is communicable
in experience is entirely opposed
to the view that it is contagious
in the strict sense of the term".
The fresh evacuations of typhoid patients
are probably free from infectious properties,
but there can be no doubt that the
time necessary for the development
of infectious properties in the stools
is very short. Cayley from observations
made by him in the Middlesex
Hospital[b] is disposed to think that
this period does not exceed twelve
hours & may possibly be shorter.
As regard the vehicle by which the
poison of Typhoid fever may
be conveyed we know that it
can be communicated through
the agency of water, milk or
sewage gas, - and it would
seem by the outbreaks at Andelfingen
in 1839, Thalwil in 1845. & at Aloten
in 1878 that it may sometimes
be caused by the consumption of
diseased meat.[c]
The last point I shall refer to in
connection with the Etiology of the
disease is the period of incubation.

[a] Murchison on Continued Fevers 1884. p 465.

[b] Murchison on Continued Fevers 1884. p 467.

[c] See Cayley on Typhoid 1880 p 21 - 23.

Almost any period from a few hours to several weeks has been recorded. But in many cases of supposed short incubation there is reason to believe that the premonitory stage has been included in the actual fever. Especially is this apt to be the case in children (in ~~which~~ whom the short incubation periods have been most frequently noticed), where a very easily stimulated nervous system may convert what in adults might be mere symptoms of general malaise, into well marked phenomena of severe febrile action. Dr Cayley in Murchisons "Continued Fevers" says the most common period of incubation is from 10 to 15 days. & that he cannot find a well authenticated case of

Murchison 1884 p 470

less than 5 or more than 22 days.[a]

Pathology. The morbid lesions occurring in Enteric Fever in children, are in every way analogous to those found in adults. The most manifest

lesions are those of the intestine & mesenteric glands. Taking the statement of Liebermeister (quoted by Milton Fagge) (a) as being for the majority of cases fairly accurate, we find in the first week of the disease swelling & infiltration of the lymph glands of the bowel. During the second week these infiltrated & swollen glands begin either to slough or subside. & the third week any sloughs that may have formed become detached, so that by the end of all the ulcers have clean floors, - and in the fourth week the ulcers begin to heal.

This may be taken as a fairly accurate account of the sequence of events in a typical case of the disease. But there is abundant testimony to hand, showing a much less regular sequence in many cases, the various pathological changes occupying a much longer or it may be a shorter time. According to Rilliet. (b) ulcers of the intestine in children form more slowly, are smaller in size, less numerous than

Fagge's Principles Practice of Medicine Edition II. Vol I p 168

Rilliet. loc. Cit. Cited by Meigs & Pepper "Diseases of Children" 1870 p 776

in adults. The changes occurring in the mesenteric glands are enlargement, softening & increased vascularity - three glands are most affected which are nearest the intestinal lesions, & as the latter are most numerous near the ileo-cæcal valve, it is near that situation we find the mesenteric lesions best marked.

Ulcers of the mucous surface, eg the Pharynx Larynx. are more rarely met with in children than in adults.[1a] The spleen is usually enlarged & softened, but I have recently made a post mortem examination on two well marked cases of Typhoid fever in adults, in which although there was considerable softening there was no enlargement. The intestinal ulcerations in Typhoid are as a rule limited to within two or three feet of the Ileo-cæcal valve. In rare cases however they extend lower than this, sometimes even to the Rectum.

In illustration of abnormal situations for ulcerations in Typhoid fever I record a case which

[1a] Hepper on Diseases of Children p 776.

in its later stages was under my care & on which I made a post mortem examination. A girl aged 19 was admitted to the Chester Fever Hospital on Sept 19 1858 with well marked symptoms of Enteric Fever. For the first 23 days of her stay in hospital the progress of the case presented no peculiarities, except some purpuric looking spots which appeared on the arms which a few days after admission & soon disappeared On Oct ~~3~~ 9. 23 days after admission she had slight haematemesis & epistaxis On Oct 14 (28th day) she vomited nearly 1/2 a pint of pure blood. I had previously examined her lungs found no pulmonary lesion of any consequence. On the morning of the same day she had severe haemorrhage from the bowels. ~~On Oct 14~~. On Oct 15 there were 4 movements of the bowels each time with copious haemorrhage. The haematemesis continued at frequent intervals. On the next day there were 6 motions each with haemorrhage & no abatement

of the haematemesis. The temperature rapidly sank from 103°4 to 99°4. & on the next day Oct 19 - she died at 6 am.

At the post mortem inspection I found the Heart pale & fatty, Spleen small, but friable & congested. - I made sections of the latter staining them for the bacillus typhosus, with negative results. The Stomach presented a very peculiar appearance, being completely studded (on its interior) by haemorrhagic spots, usually about the size of a pea - to some of which a clot adhered. These spots could not be called ulcers for there did not appear to be any destruction of the mucous membrane. There could be no doubt that these haemorrhagic spots were the source of the blood vomited in such large quantities. In the intestines Peyers Patches & the solitary glands showed typical typhoid lesions in various stages. The intestinal ulcerations were numerous near the caecum, but became still more numerous in the Colon both Ascending Transverse & Descending - they were present at the Sigmoid

pleura & also in the rectum, but in the latter there also appeared small hæmorrhagic spots, of almost exactly similar appearance to those found in the stomach.

The mesenteric glands were generally enlarged. The lungs showed some hypostatic congestion but no other marked lesion.

I have mentioned that purpuric spots had been noticed on this patient soon after admission, & from her relations I ascertained that she frequently suffered from Hæmorrhoidal Epistaxis.

In bringing this case before the Clinical Medical Society, I stated that I was inclined to look upon this severe hæmorrhage from both stomach & bowel as purpuric in nature, & this view was supported by most of the members present at the discussion.

I mention this case in my Thesis because I have not met with a similar one recorded in the literature of Typho-it Fever. Leaving the intestinal lesions I wish

for a moment to refer to the nervous system. In the recent outbreak of Typhoid Fever it has struck me how much more severe the nervous symptoms have been in the children than in the adults attacked - there were of course exceptions to this - but still most of the children had rather severe delirium, some of them very violent - with loud cries - resembling the meningeal cry. Most cases had well marked Cache Cerebrale. It is interesting to find[2] that post mortem examination in children rarely reveals any more marked cerebral lesion than some congestion of the vessels & membranes, with perhaps a little subarachnoid effusion - and this even in cases where the most violent nervous symptoms have been present during life.

[2] Diseases of Children Eggs & Pepper. p 777.

There appears to be no relation between the morbid appearances found in the brain after death from Typhoid Fever, & the intensity of the cerebral symptoms during life.[1]

[1] Sir Burchison on Continued Fevers. 1884 p 641.

I shall postpone reference to the other more marked pathological phenomena of the disease eg. the condition of the Urine - the Rash &c, until I take up in detail the symptoms of the disease as it occurs in children.
But before leaving this part of the subject I wish to call attention to certain secondary pathological phenomena which have been very clearly considered in Dr Gayleys Croonian lecture already referred to, (a) which seem to me to be of primary importance in relation to treatment whether we are dealing with children or adults.

(a) Gayley on Typhoid 5 et seq.

(1) The first of these secondary phenomena is a granular or albuminous infiltration affecting the cells of most of the glandular organs - especially the liver, kidneys, salivary organs - pancreas & gastric glands. A similar change also occurs in the striped muscular fibre both of the heart & voluntary muscle. Exceedingly minute granules, soluble in acetic acid, appear in the cells & fibres giving them a clouded appearance & obscuring the nuclei. This is often the first stage towards

fatty degeneration. Probably a similar change also occurs in the nerve cells of the central nervous system. — they become granular with an increased deposit of pigment. Excluding the cases which die from direct infectious lesions such as perforation or haemorrhage, the most frequent cause of death in Enteric fever is failure of the heart with congestion of the lungs. or failure of the central nervous system.
It is highly probable that this cloudy degeneration is an important factor in bringing about these deaths from cardiac or nervous asthenia.

(21). The changes in the heart muscle are of great importance, — these have been carefully studied. In addition to the granular change already described in the cells & fibres, there is evidence of an irritative lesion as shown by proliferation of muscle-nuclei & small celled infiltration between the fibres. These changes are frequently scattered in patches through the wall of the heart & are often well marked in the

muscular papillares. The symptoms of this heart degeneration are found in the feeble cardiac impulse & altered first sound. It is probable that the want of tone in the muscular papillares is the cause of the systolic apex murmur which is occasionally to be heard. The pulse is correspondingly affected becoming very dicrotic & irregular in force.

(3) In addition to the cloudy degeneration alluded to, there may be a waxy degeneration, especially of muscular fibres (rarely in the heart).

(4) There is diminution in number of red blood corpuscles

(5) There is general wasting of the body due to two causes viz Diminished ingestion & assimilation of food & increased consumption due to febrile processes.

VII. Description of a typical Case of Typhoid Fever in a child.

I will first describe the symptoms of an ordinary case of the disease in a child, & then the symptoms in

a case of greater severity.
In the majority cases there is a prodromal stage - presenting symptoms indefinite in character often unnoticed by the parents; - & lasting from 3 or 4 days to about a week. The child becomes languid - disinclined to play - & loses its appetite. It is restless during sleep. The skin becomes dry & hot. The appearance of health leaves it. There may be complaints of abdominal pain & there is usually head-ache. In this early stage the bowels may be already loose, or if not, the administration of a purge - which is almost certain to be administered by the parents, probably sets up a persistent diarrhoea.
These symptoms having lasted for a few days, the attack fairly begins. Febrile action shows itself, but this for the first 5 or 6 days is rarely continuous. The temperature rests in a very marked manner & it may be only at night that the temperature runs up - the pulse & respirations quicken - & the skin becomes hot. Languor & drowsiness

by day are replaced by restlessness
& perhaps a little delirium at
night. It is this character of
vomiting that gained the name
of Infantile Remittent Fever for the
disease. West states that in some
instances he has noticed two
distinct exacerbations & remissions
in 24 hours.(a) loss of appetite continues
- thirst is experienced & vomiting may
occur after food. The tongue is furred
- a creamy white fur in the centre, with
clean edges & tip. The bowels either
continue loose or become so for
the first time. - the abdomen becomes
swollen & tympanitic & there may
be tenderness & gurgling on pressure
in the Right Iliac fossa.
At the commencement of the first
week the child will probably
object to being kept in bed but
after the first 2 or 3 days rarely
shows much desire to get up.
The respirations are hurried & the
pulse quick but rarely more than
110 beats per minute at this stage.(b)
There may be slight cough.
There is no relation between the heat of the
skin & the rapidity of the pulse.(c)

Diseases of Infancy Childhood. 1884 p 818

Diseases of Children & Pepper. p 777

West. Diseases Infancy. p 818.

The restlessness at night now becomes more marked, & there may be ~~signs~~ of considerable cerebral excitement, such as delirium, shrill cries & unmeaning talk. At the end of the first week the eruption generally appears - Rilliet[a] says usually from the 6th to the 10th day. It is however frequently absent. When seen it is in the form of small flat oval spots of a rose colour, disappearing on pressure & rapidly returning - first seen usually on the upper part of the abdomen & coming out in successive crops.

Quoted from West Lectures of Infancy & Childhood p 820

During the second week all the symptoms take on a more severe character. The temperature ranges from about 102° F to 105° F in different cases, & although remissions may still occur the fever is more continuous. Occasionally there are profuse perspirations which do not however appear to be of any particular significance. The pulse may now range from 120 to 140 or even 160 beats per minute. West[c] has known it continue at 140 per minute for several days together in a boy aged 8.

b Diseases of Children Meigs & Pepper p 778

West. loc. cit. p 820

The Respirations are quicker, & if

pulmonary complications exist are rapid & shallow. with short hacking cough. In such cases auscultation reveals ~~too~~ moist rales at the bases of the lungs. Vomiting if it existed in the earlier stages will now have ceased & liquid food will generally be readily taken. The tongue becomes more heavily furred & is perhaps dry & glazed in the centre. Diarrhoea continues, & the stools are very offensive & of a light ochre-yellow colour, depositing a sediment of debris on standing. Frequently however diarrhoea is absent, & constipation may often be so marked as to require special treatment. The belly is generally tympanitic. The urine is scanty & of high specific gravity - both it & the feces may be passed involuntarily. In some cases the eruption may become more abundant, but this rarely happens - more often it is so scanty as to be difficult to detect. Enlargement of the spleen probably almost always occurs, but its detection is no easy matter, especially with a distended abdomen, & as an aid to diagnosis I regard

it as of doubtful value.
Sudamina are often present. The mind becomes more dull, but the child can generally be roused when spoken to loudly. There is usually delirium especially at night - & even in what are really mild cases the latter may be a severe symptom - with loud cries & wild expression of face.
St. loc. cit p. 821 Floccitatio & Subsultus are rarely noticed[a]
Convulsions sometimes occur. West mentions a case where they recurred on two successive days, succeeded by hemiplegia
loc. cit. - the child eventually recovered[b].
In favourable cases. between the 15th & 21st day the grave symptoms begin to abate. The tongue cleans - the abdominal distension disappears - Pulse & respirations fall. The temperature again resumes the remittent type. Delirium & stupor vanish - appetite returns & convalescence begins.
Convalescence is often a tedious & lengthy process - The exhaustion & emaciation have been so great that weeks may elapse before there is a return to normal health. Especially is there often delay in the clearing of the mental faculties:- but fortunately

complete mental restoration generally
comes sooner or later.
Sometimes the fever while commencing
in the mild form may take on
a more grave type in the second
week. But as a rule the severe
cases have a proportionately grave
commencement; there is generally
a shorter prodromal stage, perhaps
an initial rigor or severe attack
of vomiting at the onset.
Next gives great drowsiness as an
early symptom of importance in
severe cases & mentions the case
of a boy who fell asleep 2 or 3
times during breakfast.(a)
(a) Cit p 819.
There may be great vertigo & inability
to walk steadily - if these latter
symptoms are accompanied by
constipation, we may be led
to suspect cerebral disease.
The disease may be at its full
severity by the end of the first
week with a temperature of from
103.° to 105° F. With the second week
may come profound stupor lasting
10 or 12 days - with low muttering
delirium - involuntary evacuations
- perhaps retention of urine -

- tympanitic abdomen + light coloured offensive evacuations. In such case the patient may emerge from this typhoid stage, after 10 or 12 days + proceed to gradual convalescence. or death may occur early from violence of the attack or later from some complication.

IV Special Features of the Disease in Children

I shall next take up some of the points of the disease, which are apt to differ in children from similar features in adults.

1. Age.

The youngest case of Typhoid Fever observed at the London Fever Hospital in twenty three years was that of an infant aged 6 months.(a)

Murchison on Continued Fevers 2nd. p. 439.

It is comparatively rare between the ages of 3 + 8. + attains its maximum of frequency in childhood between the ages of 8 + 11.(b)

Diseases of Children Meigs + Pepper. p. 775.

Age is a predisposing cause there being more cases in youth + adolescence than in middle or old age.

In twenty three years (1848-70) at the London Fever Hospital out of 5911 cases

58 were under 5 years of age, 558 were between 5 & 9. & 1174. were between 10 & 14. Total number under 14 years of age = (a) 1790 cases. or about 30'4%. Out of 7.348 cases reported to the French Academy, 2.282. or 31 per cent were under 15 years of age. (b)

From Murchison v. p 438. Table 39

Murchison p 439.

In 4 years (1882-88) there were admitted to the Chelsea Fever Hospital 348 cases of Typhoid Fever. Of these 126 were under 12 years of age. or about 36'2 per cent.

(2) Sex. Most statistics show a marked predominance of boys over girls. Thus in the 1790 cases quoted above (a) the males exceeded the females by 148. Of the 126 cases in the Chelsea Fever Hospital 68 were males & 58 females. Only in one year did the girls outnumber the boys, namely, in 1884. when there were 15 girls & only 4 boys.

(3). Period of Incubation & Prodromal Stage. The period of incubation in Typhoid fever is usually about 14 days. In many of the cases supposed short incubation have occurred in children, & as I have

already stated there is reason to believe that in these cases the premonitory stage has been included in the fever.

[a] See. Croonian Lecture Cayley. 1880 p 39

Professor Lunicke of Berlin[a] relates the following as cases of unusually short incubation. Three boys played on successive days: March 13-16 with straw from a mattress which had been soiled by typhoid evacuations. All three took the disease - the first being taken ill on March 22. The maximum limit in this case was 9 days.

Cayley seems to think the incubation period may be affected by the mode of introduction of the poison - that it is shorter when it is introduced by the respiratory system than is the case when the alimentary system forms the mode of entrance. Thus the period of incubation might be shortened if infection took place by sewage gas emanations - lengthened perhaps if drinking water was the infective medium.[b]

[b] Cayley. idem.

There can be no doubt however I think that constitutional peculiarities

in some unknown way affect the incubation period. A case related by Professor Quincke illustrates this point.(a) A number of visitors from all part of Switzerland attended the Federal Gymnastic Festival held at Münsingen. The water supply of one of the Inns where the visitors stayed was contaminated by typhoid evacuations. Many of the visitors were infected & as they went of them left the Inn on the same day must have been infected at the same time. The particulars of 14 of these cases have been ascertained & they show a period of incubation varying from 8 to 18 days in different patients.

Quoted by Cayley Lonian lecture p 42

A protracted period of incubation is a more common occurrence than a very short one, in adults, - but perhaps this is not so with children.

With regard to the prodromal stage of the fever in children, it may, as I have already remarked, be apparently much more severe than in adults. There may be considerable rise in temperature with marked

remissions, & considerable restlessness at night. It is probable however that the easily stimulated nervous systems of the child convert what would be merely vague symptoms of general malaise in an adult into apparent illness of considerable severity.

As a rule however the passage from a state of health to that of the fever is a gradual one, & often unsuspected in its early stages. It may occupy from about 3 to 10 days - being shortest in the severe cases (a).

Diseases of Children. Meigs & Pepper p. 780

4) Eruption. This when it appears presents precisely the same characters as in ~~the~~ adults. It is however more frequently absent & presents greater irregularity in the date of its appearance. Messrs Rilliet & Barthez observe that it is seldom present so early as the 4th day - from the 6th to the 10th day being the most usual date of its appearance (b). In spite of careful examination it frequently cannot be detected at all. Rilliet (c) found it

Dict. Diseases of Infancy & Childhood Vol. 4. p. 820

Meigs & Pepper p. 782

absent in 4 out of 30 cases.
In the London Fever Hospital out of 104 cases under 10 years of age, it was not noted in 34 cases or 34 ½ per cent.(a)

Murchison on Continued Fevers 4. p 513

Distinguished authorities have found difficulty in deciding whether a spot is a true Typhoid rose-spot or an "ordinary pimple".

(5) Temperature - Pulse & Respirations.
12 Cases of "Aborted" Typhoid.

My remarks upon these symptoms will be founded upon observations made on 35 cases of Typhoid fever in children which have been treated to a successful termination in the Chester Infirmary & Fever Hospital at which I am one of the resident medical officers. Many of these cases have for a time been under my own care, & my observations on the others are taken from the temperature chart notes kindly placed at my disposal by the House Surgeon Mr Lees.
I have already remarked on the variable nature of the temperature

Chart in case of Typhoid fever in children. Looking at such chart it would often be rather a bold diagnosis to say "this is a case of Typhoid." - judging from chart alone. Yet this can often be done in the case of adults. The curious resultant character of the fever forms one of the difficulties. - But there is another which I am about to allude to. It not infrequently happens that a case which commences with well marked symptoms of the disease, suddenly stops short before the end of the second week, or near that time, - making a rapid recovery with no relapse. In this subject Hilton Fagge observes. "not a few cases of enteric fever attended with well marked symptoms subside before the end of the third week." (a)

Cases which terminate before the 16th day require special study, because they are apt to be taken for simple febricula - these often form part of house epidemics (b)

(a) Principles & Practice of Medicine. by Hilton Fagge. 1st Edition p 177

(b) idem.

John H. Age 10. TABLE. 1A Irregular 5th day curve

Day of Illness.	Pulse.		Respirations.		Temperature.		Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.		M.	E.	M.	E.	M.	E.
4		118		40		103·4	16			28	28	98·4	97·6
5	124	128	40	44	102·4	104·2	20			28	24	97·4	98·6
6	128	124	40	40	103	103·2	21			28	28	98.	97.
7	128	128	30	30	102·2	103.	22			24	24	97·4	97·6
8	128	124	36	36	×104·8	102.	23			24	24	97·8	98.
9					×98·4	97.2	24			20	24	98	99
10			34	32	100·2	98·4	25			20	20	98	98·2
11			36	36	99·2	101.	26		124	20	20	98	98·6
12			36	36	97·4	102·2	27	124	128	20	20	98	99
13	120	124	36	30	99·4	102.	28	128	128	20	20	98	100
14		124	36	38	102·6	102	29	132	132	20	24	100·6	100·6
15			36	40	100·4	101	30	138	132	24	24	98	98·2
16			34	36	100·6	101·4	31	128		20	20	98	98·2
17			36	36	99.4	100	32	126	128	20	20		
18			36	36	97·6	99·2	33	128	126	20	20		

Table 1A for comparison with Table 1
& 2. sisters of the same

Mary Ann H. Age 9 TABLE. 1

Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.
4	112		24		101	100·8
5	112	112	24	24	100·8	102·6
6	116	104	24	24	102·8	102.
7	116	120	26	24	98	102·4
8	112	120	24	24	99·6	101·2
9	100	112	24	24	101.	101
10	92	100	24	24	99	100
11	92	92	20	20	98·4	99·6
12	88	80	20	20	98	99
13	80	80	20	20	98	99
14	80	80	20	20	97·6	98·4

Table 1.

Selina H. Age 7 TABLE. 2

Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.
5		124		34		103·2
6	120	124	32	34	102·2	102·4
7	124	124	30	40	101·6	102·6
8	120	120	40	36	101.	101·4
9	118	118	36	34	98·8	101.
10	116	116	32	32	100·6	100·4
11	116	114	28	24	99·4	94·6
12	104	108	24	24	94·6	97·4
13	100	104	24	24	97·8	97.
14	100	90	20	20	99.	98
15	90	80	24	20	98	97·6
16	80	80	20	20	97·4	97·4

Table 2

Hilton Fagge Vol 1 p 177

Jurgensen mentions an outbreak at Kiel in which 14 out of 20 persons had an abortive attack of the disease.(a) Now out of the 35 cases I have mentioned I find 12 which appear to me to be of this abortive type. A glance at the temperature chart which I have copied shows their irregular character. Taking these cases as a basis for statistics we should have about 34·2 per cent of cases in children of this aborted kind. It has been remarked that this class of case often forms part of a house epidemic & from personal knowledge I can say that this was so with 5 out of the 12 cases.

The two first abortive cases Tables 1 & 2 were sisters of the case John H. Table 1 A. These 3 patients were first seen by me at their own homes from thence sent by me to the Chester Town Hospital.

The house in which they lived was one of the most wretched squalid in the city. They were all taken ill within a few days of one another. The boy J. H.

Table I A. was sent in first. The onset of the fever in I H & Schia H Tables I A & 2. was very similar. Both had temperatures of about 103°F in the evening & copious diarrhoea. In the first 5 days of the boys stay in hospital he had 30 motions. In the case of Schia H, Table 2, diarrhoea was severe on the 3rd & 4th day of admission. In both cases there was great delirium both by day & night. The other sister Mary Table I, had a much milder attack less delirium & lower temperature. All three had a well marked eruption of rose spots.

It is interesting to note the difference in progress of the fever in the three case - all falling ill about the same time - all probably infected from the same source

The boy John had a most severe & prolonged attack. His life is in immediate danger on the 8th & 9th day of his illness. A morning temperature of 104·8°F declines rapidly to 98·4°F on the following morning. Diarrhoea with

some slight haemorrhage is the apparent cause. He is much collapsed - the pulse cannot be counted by the nurse. He remains in this collapsed condition for many days - unconscious, with muttering delirium. The temperature after the first sudden drop remains for about a week, & by the end of the third week of the illness assumes a subnormal type. The recovery of this boy was very slow - a large bed sore formed which only healed very slowly. His intellect was slow in clearing & it was not until the 8th week after the onset of the fever that he was sufficiently recovered to become out-patient.

The contrast between this case & that of the sister Sylvia H. Table 2. was very great. The onset of the disease in the latter was indeed very severe, but by the 10th day of the illness the fever has practically disappeared.

The third case Ivory Conn H Table 1. was altogether milder in type. Constipation prevailed instead of

Thomas E. Age 11 — 3 TABLE.

Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.
4		110		24		101
5	114	118	24	24	101·4	101·4
6	116	116	24	28	101·4	102·4
7	116	120	28	28	100·4	101·4
8	116	104	28	28	99·8	102.
9	108	100	28	28	98	100·2
10	100	100	28	28	97·8	100·8
11	100	108	24	24	97·6	97·6
12	100	104	24	24	97·6	99·8
13	100	100	24	24	98.	98
14	90	90	20	20	97·4	98·6

Table 3.

Margaret E. Age 4 — 4 TABLE.

Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.
7	116	118	26	20	101·8	102·6
8	108	124	24	24	101	103·4
9	120	120	20	20	101.	100·4
10	112	104	20	20	100	99·2
11	100	110	20	20	99.	101·6
12	108	112	20	20	100	100·2
13	104	100	20	20	99	99·2
14	100	100	20	20	99	98·4
15	94	94	20	20	99	98·4
16	94	90	20	20	98	98.

Table 4

Mabel E. Age 9 — 5 TABLE.

Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.
5		128		24		102·4
6	120	116	24	20	100·2	100
7	104	110	20	20	98·4	99·6
8	100	116	20	20	100·2	99
9	112	100	20	20	99	98·6
10	108	110	20	20	100	98·4
11	104	100	20	20	98·4	97
12	100	104	20	20	98·6	98
13	100	100	20	20		
14	100	100	20	20		
15	90	90	20	20		

Table 5.

diarrhoea, but rose spots were present & abdominal pain. I think it was an undoubted case of Typhoid aborting about the 10th day.

Cases 3 & 4. are 2 cases out of a family of 5. - a mother & 4 children all of whom had Typhoid fever, the mother dying of the disease at her own home. The 4 children were admitted to the Fever Hospital & there 2 had very slight attacks aborting before the 16th day.

Case 5 hardly looks like a Typhoid chart, but the mother died of the disease in hospital & this child had symptoms which were I think rightly considered to be those of a mild attack. The temperature was normal on the 10th day.

These 5 cases formed part of "house epidemics".

I next give copies of the charts of the remaining 7 cases about which I have not much to say except that they were cases of a fairly mild type

6

6 Ethel N. age 5 TABLE.

Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.
9	116		24		102·6	101
10	108	124	24	20	99·4	99
11	140	120	20	20	100·8	99·2
12	124	132	20	20	99·8	100
13	144		24	24	103·8	100·4
14	124		24	24	104.	103.
15	140	132	24	20	102.	101·8
16	120	120	20	20	101	98
17	100	100	20	20	98	98

Table 6

9

Ellen Jones age 11 TABLE.

Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.
3.		106		40		102.
4	110	112	26	28	99	100·8
5	120	106	28	22	99·8	101·4
6	120	112	24	22	100·2	101.
7	126	120	26	26	98.	101
8	124	120	24	22	101.	100·6
9	108	112	22	24	99·8	100·4
10	120	118	30	24	99.	100·6
11	112	120	24	26	99·8	100·2
12	120	104	24	22	99.	99
13	108	116	26	26	98	98·6

Table 7

7

John D. Price 9 TABLE.

Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.
5		120		24		102·4
6	126	118	36	30	102.	100·2
7	110	108	28	26	99·2	99·8
8	90	100	28	28	99·4	100
9	100	110	24	20	99·2	101·4
10	100	90	20	24	101·6	101·4
11	80	108	24	24	100·4	102.
12	100	100	24	24	100	101
13	90	84	24	24	99·2	100·4
14	80	90	24	24	100·2	99·4
15	94	94	24	24	100·4	98·8
16	84	90	24	24	98·8	98.

Table 8

10

Robert Skinner. Age 13 TABLE.

Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.
5	120	120	40	40		103·4
6	116	120	40	36	101	101
7	104	112	36	40	100·6	100·8
8	90	110	32	34	99·2	99·8
9	90	116	28	34	96·6	102·4
10	104	90	32	30	98·8	97·8
11	80	100	32	32	100·4	98·2
12	100	100	32	30	99	98·2
13	90	90	30	30	98·8	98·4

Table 9

8

Charlotte R age 5 TABLE.

Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.
4		120		24	101	101·6
5	128	120	24	24	100·6	102·4
6	120	120	24	24	101·4	102·8
7	120	124	24	24	100·6	101
8	120	124	28	28	101·6	101·6
9	128	124	28	24	100·4	100·6
10	120	120	28	20	100	101
11	120	120	20	20	99·4	98·8
12	116	116	20	20	99.	98·8
13	104	100	18	18	98·2	98·6
14	100	100	18	20	98.	98·6
15	90	100	20	20	98·2	98
16	90	90	20	18	98.	98

Table 10

11

William H. age 11 TABLE.

Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.
5.		108		24		103
6	112	104	28	28	101·6	101·4
7	110	116	28	28	101.	101·6
8	108	112	28	32	99	101·2
9	110	114	30	32	100·2	102.
10	100	108	30	30	100·4	101·8
11	90	80	28	24	99·2	100·6
12	94	98	24	24	99·6	100.
13	88	100	24	24	99·2	101
14	80	90	24	24	98·4	100
15	80	80	24	24	98·6	99·6
16	80	84	24	24	98·4	99·2

Table 11

presented few complications.
Rose spots were not demonstrated in all, but other typhoid symptoms were well marked, always excepting diarrhoea, which as I am about to show was generally the exception among the children attacked in the two outbreaks with which I am now dealing.
I now append a few statistical details of these 12 cases.

(1) Date at which the temperature fell to normal.

In 1 case temp normal on 10th day.
9 " " " 10th to 14th.
2 " " " between 14th & 21st.
12

(2) Highest pulse rate recorded in each case

In 1 case 144 beats per minute.
1 " 128 " " "
2 " 124 " " "
7 " 120 " " "
1 " 112 " " "
12

(3) Condition of the bowels

Diarrhoea but not excessive in 2
Diarrhoea excessive " 2
Constipation prevailed " 8
12

Charles L. Age 6 — 12 TABLE.

Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.
6		124		28	1022	102·2
7	124	120	28	28	102·2	100·6
8	120	120	28	28	99·6	101
9	124	128	28	28	100·6	102
10	124	120	28	28	101·4	101·2
11	120	116	28	28	98·6	99·2
12	112	108	28	24	97·6	98·6
13	110	108	24	24	98·2	98·4
14	104	90	24	24	99	98·4
15	94	100	24	24	98·6	100
16	100	104	24	20	98·2	99·4
17	100	100	24	24		
18	90	90	24	24		
19						

Table 12.

(4) Highest temperature recorded in each case.

1	case reached	104°.
2	"	103·4
1	"	103·2
1	"	103.
2	"	102·8
3	"	102·4
1	"	102·2
1	"	102
12		

With regard to these abortive cases, I think that the views of Cayley (a) on the nature of the fever may throw some light on them. He considers there are 2 distinct fevers in the disease, the first being due to general infection of the system with the poison - a true specific febrile disease. But added to this there is a septicaemic fever due to the ulcerative process which is taking place in the intestines. He shows how, when the ulcerative stage is reached the temperature must take on a special character, how it is more than probable I think that in children (where the intestinal lesions are believed

(a) Croonian Lecture 1880 p 72. (Quoted by Churchill)

to be often less serious than in adults), thus ulceration of intestinal glands is frequently absent altogether, & that we therefore have the abatement of the fever at or about the 10th day - that is, the septicaemic fever is absent. It would be difficult to say why children should have their Peyers Patches & solitary glands less affected than adults - but that this is the case, is I think shown by the remarkable tendency to constipation exhibited by children suffering from typhoid.
Possibly a young organism can more readily absorb inflammatory products than can an adult, so that there is less chance of ulceration occurring.

I next give a few statistics as to the whole 35 cases including the 12 abortive cases already referred to.

(1) Pulse. In no case did the pulse rate exceed 144 beats per minute. The pulse rate reached 140 per minute in 4 cases

It reached between 130 & 140 per minute in 9 cases.
Between 120 & 130 in 17. cases
Between 100 & 120 in 5. cases

(2) Respirations.

They exceeded 40 per minute in 8.
" reached 40 " " " 5
Between 30 & 40 " " 11
" 20 & 30 " " 11
35 cases

(3) Temperature

In 13 the temperature exceeded 104°F.
" 4 " " reached 104°
" 11 " " was between 103° & 104°
" 7 " " did not exceed 102°F.
35 cases

(6) Digestive Symptoms.

Some of the most important symptoms in the early stage of the disease are referable to the digestive system. The appetite fails thirst is troublesome, the latter symptom remaining until the patient becomes dull & unconscious

but even in this condition the child will generally take cold water if it is offered to it. The tongue is covered by a whitish yellow fur throughout the disease, but the edges & tip generally remain clean. In grave cases it becomes dry brown & sordes collect round the teeth. Transverse fissures may occur on the tongue, giving much pain & discomfort. Case may prove fatal where the tongue is never dry & brown[a]. The lips often become dry & cracked, a condition in children aggravated by picking. Vomiting is frequently present at the commencement of the illness, "but perhaps not more so than in adults"[b]. It may persist into the second week of the fever. The vomited matter usually consists of bilious fluid. Chomel mentions one case where it contained blood[c]. Diarrhoea is the rule in Enteric fever when it exists the stools consist of a yellow-ochre coloured fluid - which if left to stand deposits a sediment of mucous, epithelium, & undigested food. They sometimes contain blood. In the outbreaks from which the 35

Murchison on Continued Fevers 1884. p 522

Diseases of Children. Sirs Pepper p 781

Murchison p 523.

cases I have alluded to were taken.
22 out of the 35 suffered from constipation, & there was excessive diarrhoea in only 9.
When constipation occurs together with vomiting the case may lead one to suspect Tubercular Meningitis.
Abdominal pain is difficult to detect in children – but when they are capable of describing their sensations it may generally be detected by pressure in the Right Iliac fossa.
Tympany is generally present in children & I have never seen a case where it has not occurred at some period of the fever.

VI. (7) Urinary Symptoms

The following are the principal characteristics of the urine in Typhoid Fever.[a]

(1) The amount of water is diminished
(2) The Specific Gravity is increased
(3) The amount of Urea is increased during the fever & diminished in convalescence
(4) The amount of Chloride of Sodium is diminished
(5) Uric Acid is increased
(6) The amount of pigment is increased

(a) [Th]ese statistics [are] from Aitkens [Scie]nce & Practice [of M]edicine Vol II p 390

(4) Albumen is sometimes present
(8) Renal epithelium casts are sometimes seen.
The urine is occasionally passed involuntarily. Retention is rare in children but a case is recorded[a] of a boy aged 5 where catheterization was required on several successive days. The patient recovered.

Diseases of children. Ings & Pepper p. 780

VII (8) Epistaxis is frequent in children, occurring in the majority of cases, often increased or brought on by picking the nose. – it is however rarely excessive.

IX (9) Nervous Symptoms.

Headache is an early symptom and is as common in children as in adults[a] It is often accompanied by some degree of deafness. Delirium rarely occurs in a marked degree before the second week. when it frequently becomes very violent – the child crying out loudly – not infrequently the cry resembles that of Meningitis. I have frequently noticed this in the cases under my care, & as the Sache Cerebrale is generally

Murchison on Continued Fevers 84. p. 534

to be demonstrated at some stage of the fever, I think these two symptoms, the "cry" & the "Jacke") have led observers to put down meningitis as a complication in their cases. I have already alluded to the fact that post mortem examination of cases where there has been well marked severe violent delirium rarely reveals any very pronounced brain lesion. Jaquin noted acute delirium in 44 out of 118 cases in children[a]. Rilliet only observed it in one third of his cases. Delirium is rarely continuous & is most marked at night. Somnolence follows the same rule in children as in adults. West has known it to be so overwhelming at the onset of the disease that the child fell asleep two or three times during breakfast.[b] Muscular Agitation. Carphology & Subsultus are less frequent in children than in adults. Barthez & Rilliet note Carphology 4 times & Subsultus 4 times in 104 cases[c]. They also allude to 2 cases where Choreic symptoms

Churchison 4 p 537

West 1884 p 819

Barthez & Rilliet T. II. 681 & 714

occurred. West says "Even when the disease is most severe neither Subsultus nor Jactitatio is frequent"[1a]

West 1884 p 821

Convulsions are rare in children, but West records a case where they occurred on 2 successive days, followed by paralysis of one side - the child eventually recovered[1b]

idem.

Rigidity of the trunk was observed by Rilliet & Barthez in 5 out of 10 cases. All 5 were fatal[1c]

See Buzzard 1884 p 541

Organs of Vision. The conjunctiva is sometimes congested & in all the cases I have seen the pupil has been dilated.

IV Complications

Probably one of the reasons for the mild type which Typhoid fever in children usually assumes, is the comparative freedom from those complications which so often prove fatal to adults

(1) Bronchitis Pneumonia.

Bronchitis is often present as an early symptom - but pneumonia rarely occurs - more often a hypostatic congestion of the lungs, exists tending much to prolong the illness.

2. Laryngitis is rare, but I have known it to occur in one case where tracheotomy had to be done for impending suffocation. I shall allude to this case later on. Several cases have occurred where diphtheritic disease of the throat has been a complication. Rilliet & Barthez mention 6 cases in children (a)

See. Jurchison 1884. p 558.

3. Emphysema Pneumothorax

Trans Path Soc IX. 34

A case is recorded by Dr Wilks (b) of a boy in whose case emphysema resulted from the sloughing of an ulcer in the larynx.

Greigs & Pepper p 783

4. Pleurisy. is rare in children (c)

5. Perforation. is more rare than in adults; but the symptoms are the same & the result as fatal - Sometimes its occurrence is marked by an attack of convulsions (d)

Rilliet - quoted Greigs & Pepper p 783.

Jurchison records 73 cases of perforation as occurring at the following Ages (e)

Jurchison 568-9

6 cases	under 10 years		5 cases	under 39 years	
8 "	" 14 "		2 "	" 44 "	
18 "	" 19 "				
21 "	" 24 "		2 "	" 49 "	
6 "	" 29 "				
5 "	" 34 "				

Barthez & Rilliet 1853. II 701.

Barthez & Rilliet met with it in only 3 out of 232 children under treatment[a]

(6) Haemorrhage is comparatively frequent.

Meigs & Pepper p 783

Rilliet observed it in 4 out of 30 cases[b]. I have observed it in several of the 35 cases quoted, but never in excess. When it occurs in any quantity it is of grave significance but it is not unusual to find a little blood in the motions at times, especially in the early stages of the disease, when it is probably due to the congestion of the intestinal glands

(7) Otorrhea is not an uncommon

Barthez & Rilliet.

complication or sequela in children[c]

(8) Noma or Cancrum Oris is a rare complication & only occurs in children.

Griesinger p 232

Griesinger[d] found it in 1 out of 600 cases & 2 cases are recorded by

West. 1884 p 613

West[e]

(9) Albuminuria is rare, Rilliet records

Meigs & Pepper p 784

a case associated with anasarca[f]

(10) Other Eruptive fevers are rarely associated with Enteric in children – but Variola Measles & Scarletina, have occurred during convalescence

(11) Tuberculosis.

Aitkens Science & Practice of Med. Vol I. p 402 1863

Aitken[(a)] says this frequently occurs as a complication of Typhoid fever, I do not think this is true of adults & certainly not of children. Occasionally however the debility induced by an attack of the fever may favour the development of tubercle. Probably cases which were tubercular in their nature from the first have been set down as Typhoid

~~XI~~ VI A case of Typhoid Fever in a child with several complications

"Lancet" April 6 1889 p 683.

This case occurred at the Chester Infirmary during my residence there & was reported by the House Surgeon in the "Lancet" for April 6 1889.[(b)] A girl aged 7 was admitted on Dec 19th 1888 suffering from Typhoid fever. Two sisters & a brother had also been attacked. The symptoms on admission were well marked. She had been ill at home 14 days before admission. The case progressed favourably until

Dec 31st when she had haemorrhage losing about half a pint of blood. This was treated by hypotine & Opium with ice externally.

Jan 2 1889. Haemorrhage again occurred but not so profuse as before.

Jan 6th. A small strumous ulcer on the left middle finger became inflamed & was rapidly followed by cellulitis of the forearm with free suppuration.

Jan 21st. The respiration was difficult & stridulous and in spite of the treatment pursued, progressed to such an extent that on Feb 14th suffocation was imminent. The larynx on examination was swollen and oedematous, with some small ulcers on the vocal cords. Tracheotomy was performed under chloroform and the patient rapidly improved. On the fourth day the tube was removed but had to be replaced on the sixth owing to a return of the former symptoms.

On the eighth day the tube was permanently removed.

On the twentieth day the wound was quite healed & the patient practically well.

This is a good case to show the train of complications which the physician may have to cope with in the treatment of the disease. So long as a patient can survive after such complications as severe haemorrhage, extensive cellulitis & oedema of the glottis necessitating tracheotomy we may be satisfied that medical treatment in typhoid fever is not so useless as some would lead us to suppose.

XVII VII

Relapses.

Relapses are not so frequent in children as in adults. I find only 3 cases of true relapse out of the 35 I have referred to as occurring at Chester
One of these is interesting owing to the length of time the temperature had kept normal.
J. B aged 6. was first seen by me at his own home suffering from diarrhoea & sickness. I watched the case for a few days. & eventually diagnosing Typhoid sent him to the Fever Hospital on the 4th

Jerome Boyle Age 6 TABLE. 13.

Day of Illness.	Pulse.		Respirations.		Temperature.		Day of Illness.	Pulse.		Respirations.		Temperature.	
	M.	E.	M.	E.	M.	E.		M.	E.	M.	E.	M.	E.
7		104		28		100·4	Note true relapse after apparent recovery + interval of 16 days						
8	104	108	24	24	98.	98·2							
9	110	112	24	24	101	99·6							
10	104	110	24	24	100	101·4	37.		134		32		104·2
11	112	118	24	24	1024	102·6	38	134	130	32	32	103·6	103·8
12	110	116	24	24	101.	102	39	128	128	30	30	103·6	102·6
13	104	108	24	24	99·6	99·6	40	128	130	32	32	102·6	103.
14	110	108	24	24	98	99·4	41	128	128	30	30	101	103·4
15	104	108	24	24	99·6	99·4	42	128	128	30	30	102·4	103·4
16	100	100	20	20	99	98·2	43	130	128	30	30	101·6	102·2
17	100	104	20	20	98	99·2	44	128	130	30	32	100	103·4
18	100	100	20	20	98·4	99·6	45	128	132	28	28	100	103·4
19	100	100	20	20	992	97·6	46	130	128	20	20	100	103·2
20	110	80	20	20	98	96·6	47	124	120	20	20	102·8	103
							48	120	120	20	20	101	99
							49	114	116	20	20	98·4	98
							50	110	100	20	20	97	97

Table 13. Case of relapse after apparent recovery + interval of 16 days.

day of his illness. The next day the temperature was normal or sub-normal but again rose on the 9th day, falling to subnormal on the 14th & after remitting for a few days ~~remained~~ remained at or below normal. The child made what was apparently a good recovery & had begun to take solid food when on the 34th day - 18 days after the permanent (apparently) fall of temperature, was seized with a rigor the temperature running up to 104·2°. A copious eruption appeared & for the next 14 days. He had a severe attack of the fever - the temperature becoming typically remittent towards the end of the first week of the second attack. I can give no reason for this second attack unless it was due to a bad habit the boy had of bolting his food without proper mastication. It was more probably due to re-infection from some unhealed ulcer.

XXII VIII

Differential Diagnosis

The principal diseases which the

practitioner has to bear in mind in diagnosing Typhoid Fever in children are. (1) Simple Gastro-enteric Catarrh. - often accompanied by a typically remittent temperature. (2) Tubercular & simple ulceration of the intestine. (3) Tubercular peritonitis (4) Acute Tuberculosis. (5) Tubercular meningitis. (6) Pyaemia from ulcerative endocarditis Periostitis. (1) Attacks of simple Gastro-enteric catarrh if accompanied by a remittent temperature may closely resemble Typhoid Fever. The chief point to aid us in forming a correct diagnosis are (1) the age of the patient - typhoid is rare under 2 years & specially frequent in children over 5 years of age. (2) The onset, generally very gradual in Typhoid - & the absence of any exciting cause such as may often be found in a simple enteritis (3) The vomiting & diarrhoea are not so marked as in Typhoid (4) The fever in Typhoid is more intense (5) The child in Typhoid is dull during the day restless at night. (6) Absence of the special

symptoms of Typhoid fever.

(4). Confirmation of a diagnosis of Typhoid is afforded by the existence of an epidemic of the fever at the time.

2. Tubercular & simple ulceration of the intestine, & tubercular peritonitis have a less definite & more straggling course than Typhoid. There is no enlargement of the spleen in simple ulceration & an absence of the special Typhoid symptoms

3. Tubercular meningitis may have a gradual onset, but the deep coma of meningeal inflammation is rare in Typhoid. Constipation is more frequent in meningitis & Optic neuritis or Tubercle of the choroid may point to the true nature of the disease.

Constipation & flat belly point to meningitis

4. Of all diseases acute Tuberculosis is the most likely to be confounded with Typhoid. In cases where the tubercular deposit affects the lungs. brain & intestinal canal, the distinction between the two may be impossible. In such cases, the child may be

enjoying good health & may
be suddenly struck with illness.
- rapidly losing health & strength.
There may be a remittent temperature
vomiting diarrhoea & tympanitic
abdomen, & possibly a large
tubercular spleen. There may be
dullness by day & delirium
at night. In these cases we
must bear in mind the
age of the patient - tubercular
may occur at the earliest ages.
Hereditary tendencies must be
considered & the duration of
the illness: In the early stages
of tubercular there is usually
more vomiting & less diarrhoea
than in typhoid. Absence of
rash may help us. Usually the
approach of fever in tubercular
is more slow & less regular than
in typhoid: A consideration
of these points will usually
enable us to come to a true
diagnosis.

5. Pyaemia from ulcerative endo-
-cardetis & phlebitis, may
be excluded by the absence of
the diseases which cause the

Pyaemic symptoms.

~~XIV~~ IX

Mortality

The mortality among children suffering from Typhoid is considerably less than among adults suffering from the same disease.

Of 348 cases at the Chester Fever Hospital of all ages there died 47 which gives a death rate of 13·5 per cent.

On analysing these cases I find 222 were adults[x] & 126 were children under 12 years.

Of the 222 adults there died 35 giving a death rate of 15·7 per cent.

Of the 126 children 12 died, giving a death rate of only 9·5 per cent.

The mortality among the girls was greater than among the boys. Thus of the 126 children 68 were boys & 58 were girls Of the boys there died 5, or 7·3 per cent. - of the girls there died 7 or about 12 per cent.

The mortality in hospitals is probably greater than ~~that~~ in private practice, the cases

[x] instead of "adults" right to say. "over 12 years of age"

as a rule many of greater severity.
Summarizing these results I find
the mortality at Chester as follows

(1) General mortality, for 7 years - all ages. 13·5 per cent
(2) Mortality above 12 years of age " 15·7 per cent
(3) " below 12 years " " 9·5 per cent
(4) " among boys under 12 7·3 per cent
(5) " " girls " " 12 per cent.

West Diseases Children 84 p 822·3

West[a] lost 12 out of 97 cases in children or 12·3 per cent. He does not give the age which was taken as the limit of childhood.

Murchison 4. Table 56 p 606.

Murchison[b] gives the following as the death rate among children at the London Fever Hospital

under 5 years 12·06 per cent
5 to 9 years 11·28 " "
10 to 14 " 12·86 " "

The amount of cerebral excitement may be taken as an indication of the severity of the case as is shown by the following statistics of Liverpool[c].

Quoted by West p 824

1293 cases all ages. 983 no brain disturbance, deaths = 34 or 3·5%
195 Slight delirium " = 38 " 19·8%
176 violent " " = 96 " 54%
43 Coma " = 30 " 70%

~~XV~~ X Treatment

Careful nursing, an essential feature in the treatment of Typhoid, is as important a factor with children as with adults. In children, rest & cleanliness are more difficult to attain than in adults & but they are equally essential to successful & scientific treatment. Among the poorer classes & often among the upper classes, treatment in hospital is to be preferred to home nursing.

The body of the patient should be sponged at least once a day with tepid water. - & I have found this sponging of great avail to reduce temperature in cases of hyper-pyrexia.

In Chester medical treatment is mainly directed towards complications. As a rule a simple diaphoretic & saline mixture containing Citrate of Potash & liq Ammoniæ Acetatis with a little Chloric Ether is at first given. - to which a little Bromide

of Potash is added if there is much nocturnal restlessness; sometimes instead of the saline & diaphoretic mixture, Quinine in small doses with a mineral acid is given. I have not found that any special drugs tend to shorten the duration of the fever. I have had no experience of Calomel administered with this object.

Complications in children require treatment on precisely the same lines as do adults.

Much nocturnal delirium & restlessness is generally kept in check & improved by shaving the head - the application of an ice cap & the administration of Bromides. Haemorrhage calls for the administration of astringents Ergot - Sulphuric Acid - Ergotine - Acetate of Lead - Tannic & Gallic Acids &c. - together with ice applied to the abdomen.

A favourite mixture for Haemorrhage at the Chester Fever Hospital contains Ergot. Opium & Sulphuric Acid. Perforation calls for Opium & complete rest. Great tympany

may often be relieved by small doses of Turpentine - perhaps best given in a little milk.
For diarrhoea - astringents are required - Chalk - Catechu Opium, Lead &c.
A starch enema with a few drops of Laudanum added often proves very efficacious.
Constipation often calls for treatment in children - & I have not seen any harm result from small doses of Castor Oil.
I should be disposed however to try Glycerine enemata.
Hyper-pyrexia is often speedily reduced by tepid sponging.
I have had no experience of the cold bath treatment. Quinine in 5 grain doses - Antipyrin gr X (for a child of 6) would often reduce the temperature quickly, but not often permanently.
I have seen a boy of 6 very much collapsed after 5 grains of Antifebrin.
During convalescence Tonics are indicated.
The most important factor in the treatment of Typhoid

is the diet. I do not think undiluted milk should ever be given continuously to a child suffering from typhoid. Solution with equal parts of Barley or Lime water is good. If it curdles very much it may be previously boiled or even peptonized. Beef tea, veal & chicken broths may be given. Sometimes the first named cause diarrhoea when it must be changed. I think stimulants are generally needed at some stage of the illness, especially if for some reason beef tea & animal broths cannot be given. Brandy - Whiskey or Port wine are the best. In very asthenic cases I have I think seen a life saved by Champagne.

The return to ordinary diet must be very gradual & for many weeks great care must be exercised in the selection of suitable food materials. In convalescence change of air & sea bathing will often expedite the return to health after protracted ~~illness~~ illness leaving great debility.