Thesis.

Typhoid Fever in Children.

T. Henry Jones.
Carlisle.

April, 1899.
Typhoid Fever in Children.

Based upon records of 140 cases, which were treated in the Liverpool Pediatric for children during seven years - 1888 to 1894.

Typhoid fever as it occurs in children is worthy of special attention, apart from the disease occurring at all ages, because its symptoms, like those of most diseases of children, are greatly modified by the patient’s age, and its cause differs markedly from its cause in adults.

Though young people - at ages between 15-30 - are most liable to the disease, it is comparatively rare in children, say up to 15, and quite rare in infants under 2 or 3. Statistics of the ages at which the disease occurs are always liable to a certain amount of fallacy, because they are generally compiled in hospitals, where only a tenth of all the cases go, and those the more severe cases, or generally those occurring among the poorer classes. Indeed there are probably many mild cases of typhoid fever in children which appear to parents to be simply attacks of dyspepsia or intestinal derangement, which are
not throughout their course treated by a doctor. So that it must be presumed, in any arguments based upon records of hospital cases, that the age statistics are only relatively accurate, & that all general statements are likely to be made to include chiefly the more severe cases, leaving out of account to a certain degree, milder ones.

The ages at which the disease occurred in this series of 120 cases may be tabulated thus:

Between 10 & 14 years .......... 42 ............... (55)

“ 5 & 10 .............. 79 ............... (143)

“ 3 & 5 .............. 17 ............... (85)

Under 3 .............. 2 ............... (8)

Any figures agree with Henoch's, which I have inserted in brackets to the right of my own figures above. The youngest patient I have seen suffering from the disease was an infant of 2 months old, infected from its mother.

**Initial symptoms** are very varied, often widely different from those of adults. Of course the enumeration of them by mothers depends largely upon their observation & care of their children. The initial symptoms given below were those mentioned by the patients' guardians, before
* Herodotus, "Lectures on Children's Diseases."
Article on Pygmalion Fever.
any questions were asked of them; they may be tabulated as follows:

Abdominal pain in ........................................... 43 cases
Headache ......................................................... 43. "
Cough .................................................................. 38. "
Drowsiness ........................................................ 34. "
Deafness ............................................................. 33. "
Vomiting .............................................................. 33. "
Feverishness ..................................................... 30. "
Pains in back, limbs etc ...................................... 29. "
Thirst .................................................................. 18. "
Sleeping badly ................................................... 12. "
Rumbling at night, delirium etc ............................ 11. "
Sore throat ......................................................... 8. "
Shivering ............................................................. 7. "
Passing little water ............................................. 3. "
Bleeding at the nose ........................................... 1. "

The onset was almost invariably insidious,
there were however two marked deviations from this rule:


Illness began 2 days before admission with re-
vere vomiting & shivering. No deafness. Fa-
ther died previous day of typhoid. Temperature
on admission 104.4°.
Litho S. act. & Adm July 5, 1853.

Illness began the day before admission, with
headache, vomiting, shivering, pain all over,
& delirium at night. Temperature on adm. 103°.

The frequency of the various initial symptoms
in this series is very similar to that noted by other
observers. Frontal headache & cough are generally
regarded as the most common initial symptoms
in children. All authorities agree in stating that
the disease does not begin suddenly, but that ner-
vous symptoms are seen. Regis are regarded
as very rare, but in each of the two cases noted
above regis was obviously one of the initial
symptoms. In children, whose nervous systems
are unstable, nervous symptoms might be ex-
pected to be more frequent at the beginning of
an attack, but in the whole series resembling
at night & delirium were only mentioned 11
times, can always occur.

Taking all the cases together the disease
began insidiously, i.e. the patient had been ill
several days before being brought to hospital,
on an average of the whole number 5 days.
This was in beginning, & the absence of frequent
mention of feverishness, of nervous symptoms such as occur at the onset of the other continuous fevers in children, is only a confirmation of what has been observed in adults as well as in children.

Diagnosis. In children it is far more difficult to make an early diagnosis than in adults. I have been unable to discover within how long after admission to hospital the diagnosis was definitely made in all the cases of this series; as a rule it was made by the end of the first week from the onset of the illness.

Often a child may have a feverish attack, with gastric and intestinal symptoms lasting a few days, but the fever and other symptoms quickly pass away, & the child is as well as ever. It is not always easy to say definitely whether or not such a case has been one of typhoid fever, unless there have been undoubted cases in the house or neighborhood.* Ashby draws attention to the fact that it rarely attacks an infant first in a household. Stransse Smith remarks that a large proportion of cases formerly known as "Infantile Remittent Fever" were no doubt cases of typhoid.

*
"Diseases of Children". Ashby th' Wright. Mt. Eutenic Fever.

*Eustace Smith in "Diseases in Children". Chapter on Typhoid Fever.*
Moreover attention has been drawn of late to the occasional occurrence of typhoid fever without the characteristic intestinal lesions, cases which have been confirmed not only clinically, but by bacteriological examination. Osler, in the latest edition of his "Practice of Medicine," insists specially upon this fact, and states that "Typhoid fever is no more primarily intestinal than is small-pox primarily a cutaneous disease." He classifies the disease into 4 groups:

1. Ordinary typhoid fever, with marked intestinal lesions.
2. Typhoid septicemia, a general infection with the bacilli, without special local manifestations.
3. Typhoid fever with localizations other than intestinal, where lungs, spleen, kidneys, or cerebral spinal meninges may be chiefly attacked, with either very slight or without any intestinal lesions.

Dr. J. H. Bryant* has still more recently recorded a case "without any lesion of the intestine, which gave the Widal reaction during life, & from which the bacillus typhi abnormally was obtained by culture from the enlarged mesenteric
* Osler’s “Principles & Practice of Medicine” Ed. 1898. Article on Pyrexia Fever.

* British Medical Journal, April 1, 1899.
glanss found at the necropsy." He mentions 15 cases recorded by various observers between 1887 and 1898, in which the diagnosis of typhoid fever was arrived at by the discovery of the bacillus, in some cases by Widals reaction, where no intestinal lesions existed. They occurred at various ages from 1/2 to 60 years. Henoch recorded a similar case in a boy 9 to 10.

Cases in which the intestinal lesions are absent, as above recorded, or cases in which they are present but secondary to some other more severe lesions caused by the same poison, only serve to make the diagnosis more difficult.

In my series there were 2 cases in which the intestinal symptoms were masked by others more severe:

Thomas J. act 44.

who had been ill a few nights before admission, it was brought to hospital with the complaint of swollen belly, breathing badly, pain in left side, cough, diarrhoea, loose offensive dehiscences. On admission he was found to have left pleurisy pneumonia. The aftercures developed meningitis. The chest trouble was not obvious on admission, but 200 spots were not
observed until 3 days afterwards. The temperature curve was typical. Discharged cured.

Section IV. act 7.

was brought into hospital after having been ill a week, with the complaint of severe cough, pain in the left side, delirium 2 days. On admission the symptoms pointed to broncho-pneumonia, which was judged by its course to be tubercular. Temperature 102°, mom. to 103°-104°, reg. Constipation, &c. somewhat rectified subsequently. no spots found, spleen not palpable.

In 3 days she was delirious, afterwards she developed stupor, going into coma; which persisted until death - on the 8th day after admission. Typhoid fever & tubercular meningitis were suspected, in addition to the first diagnosis. At the post-mortem examination definite intestinal lesions were found; all the affected Peris patches were ulcerated, pointing to a late stage of the disease.

In the second of the two cases recorded above there was no definite symptom during life to point to typhoid fever in conjunction with the broncho-pneumonia. In the first case the appearance of 20 spots after admission, together with the temperature
chart gave sufficient grounds for diagnosis.

Formerly, such manifestations of the typhoid fever elsewhere than in the intestinal canal were not looked upon as complications; but, according to the view set forth by others, they are to be regarded as integral parts of the disease.

In the whole series the only case which gave real difficulty was that of Edith W. (mentioned on p. 8): it illustrated the difficulty that may arise in deciding whether a case is one of acute pulmonary tuberculosis, a tuberculous meningitis, a typhoid fever. Gastro-intestinal ulcer may also cause difficulty in diagnosis. Suttor Smith suggests also chronic tuberculous peritonitis, Dr. Ashby adds pyaemia secondary to bone disease without an external wound, to which Pucher and Fagee have also alluded. I have not seen any cases in which difficulties such as the two latter arose.

For making a diagnosis no single symptom is sufficient. Careful 4-hourly taking of the temperature is the most valuable precaution. The rash is the most characteristic single sign; it and the temperature curve together give sufficient ground for a diagnosis. An enlarged spleen gives added certainty.
In addition to the clinical signs, Widal's test is now of course available; it was not used in any cases of this series. Other points out that the reaction may be absent throughout when all the clinical symptoms are present, and that other observers who have found the same thing isolation of bacilli from the blood and stools during life is difficult.

Symptoms: The initial symptoms complained of when the patient were brought to hospital have been enumerated. I propose now to consider the symptoms observed while the patient were in hospital.

Temperature: Its rise, as far as could be observed, for most cases came under observation when the temperature was already high, was gradual. Its maximum was not as a rule very high: counting hyperpyrexia as above 104° it occurred in 31 of the 140 cases; the highest temperature recorded in the series was 106.5°. This observation confirms Ashby's statement that hyperpyrexia is rare in children.

I give in tabular form the highest temperatures in the 140 cases:
Above 104°. ........................................ 31
From 102° to 104° .................................. 96
Not higher than 102° ............................... 6
   "    "  101° ................................. 5
   "    "  100° ................................. 2

Though such a record is not of the value it might have been had the cases been under observation from the beginning.

The temperature in a child as a rule rises gradually, being always highest in the evening; it reaches its maximum on the 4th or 5th day; remains so for 10 or 12 days, with evening remissions of 1° or 2°; besides by lepis, the remissions in the morning being more marked at first, then the evening temperature falls somewhat each day, and finally it reaches normal before the end of the 3rd week. While this is the usual course, there are many mild cases which attain a normal temperature towards the 14th or 15th day, in a way which is rare among adults. Constance Smith records a case to show that the minimum temperature may be non-fibrillar, even subnormal during the attack.

I give in tabular form the stages at which the temperature fell permanently to normal or below:
Permanently dead, clearing from tone of edema:
Before the end of 1² weeks ........ 47
  2²  .........  41
  1²  .........  24
  4 ²  .........  12
  8 ²  .........  6
  6 ²  .........  6

Never down ........ 4.

This table again is only of relative value, for it was impossible to take account of the times before admission.

When the die are begun suddenly with a rise, the temperature does not mount gradually in the manner which is required as characteristic, but may rise at once to 103° or 104°. In hospital cases it is not by any means the rule to see the typical range of Wunderlich, because the first rise is not generally brought in at the beginning of the illness.

Sudden falls of temperature are, of course, signs of danger, being generally due to peritonitis, or intestinal hemorrhage.

A high evening temperature is often due to constipation. When the temperature has gone down almost to normal at a time when its fall
may be expected, but does not quite reach normal, it remaining 1 or 2° above it. Though the patient appears to be convalescent otherwise, it is generally due to constipation, or to errors in diet, through it may be taken some complication, such as multiple abscesses. Sometimes, however the temperature may remain slightly elevated in this way during convalescence in children when nothing can be found to account for it. Thus, suggests that it is in such cases due to nervous causes, may be disregarded. He also draws attention to the fact that “during convalescence the temperature may be subnormal in the morning, even in the evening, until nourishment and digestion are properly re-established.”

Skin.

Rash. The characteristic rose spots may often be seen in great abundance in children. In my series, their presence was noted in 84 of the 140 cases, i.e., 60%. In many of the cases in which the rash was not observed in hospital, it is probable that it had entirely faded away before admission. In no case of the series can I say positively that there was no rash from beginning...
to end of the illness. Henoch says that he can assert most positively that in 19 cases observed through out, no morula was ever found. Enface Smith & Murchison say that it may be entirely absent in children, Ashley says that it is present in 75% of the cases; on the other hand Fage doubted that it was ever absent.

The rash appears just as it does in adults, generally from the 7th to the 10th day, though, when the temperature rises very rapidly, it may appear as early as the 3rd or 4th day. The number of the spots is smaller in children than in adults as a rule; cases may often be seen in which only 6 or 8 spots are present, but one may be in doubt as to the character of the eruption. In 3 cases of my series there was an unusually copious eruption, over the neck, thorax, abdomen, back, & thighs, & in one of these cases there were spots on the face. The rash generally appears on the abdomen & lower part of the thorax, less commonly on the back & thighs.

If 5 relapses in the series 3 were accompanied by new spots. A true relapse is generally, but not always, accompanied by a fresh eruption.

Desquamatin, in a slight degree is not
uncommon; it was noticed in 10 cases of the series.

Bedsores are less common in children than in adults, their absence depends largely upon the carefulness of the nursing; none were recorded in my series.

Copious sweating and sudamina may occur.

Alimentary System.

Tongue. It generally shows coating & dryness, though it may occasionally remain moist throughout. It has nothing characteristic as a rule, its appearance is that inevitable in a prolonged fever. It is not fissured & covered with horn scale, so often as in adults; when this does occur it is generally in conjunction with the apathetic condition, in which the patient lies with his mouth open.

Thirst is a very common symptom in children.

Parotitis occurred in 1 case of my series; it is comparatively rare, Hinchliff saw it only 4 times. Swollen glands of the neck & under the jaw of the jaw occurred in 2 of the cases.

The throat as an initial symptom was present in 8 cases; marked congestion & enlargement of the tonsils was found in 2, while in hospital
Vomiting is far more frequent in children than in adults; it occurred in 33 of the cases. Henoch notes its occurrence in 42 out of 200 cases. It generally occurs at the beginning of the disease, during the first week or 10 days after food or drink; its spontaneous occurrence is suspicious of meningitis.

Intestinal symptoms are not, as a rule, as severe in children as in adults. Diarrhoea has always been regarded as a symptom of great importance both for diagnosis, for judging the severity of the intestinal lesions, but in children it is not usually a prominent symptom. There may be cases in which the motions are quite normal all through the illness, thus:


Stools were well formed normal in appearance during the whole time he was in hospital. No history of diarrhoea before admission. Coproclysis, eruption, Spleen 1 1/2 inches below costal margin. Henoch out of 200 cases found the motions perfectly normal in 24. Wilson says that diarrhoea is frequently proportional to the severity of the case, but that is not an absolute rule.

In my series there were diarrhoea only in
"Reatting's Cyclopedia of Children's Diseases:"
Chapter on Typhoid Fever by J.C. Wilson, M.D.
35 - 15. \( \frac{1}{4} \) - of the cases; severe diarrhoea, requiring treatment, was only noted 6 times. In the cases in which diarrhoea occurred the motions were not always typical, "pea-soup" stools were noted only 24 times. Eustace Smith says that the stools are generally "pea-soup" in character.

Constipation was almost as common as diarrhoea in the series; it is more common in children than in adults. Of the 140 cases 30 suffered from marked constipation, & in 21 cases it was so obstinate as to require enema treatment. Hence I found that in 22 out of 200 cases there was constipation throughout requiring treatment. He observes also that there was frequently constipation at the beginning, which was replaced by diarrhoea. Constipation is generally troublesome during convalescence, & frequently accounts for slight rises of temperature. Diarrhoea is rare during convalescence without some appreciable cause.

Abdominal distension to a marked degree was noted in 41 of the cases; it generally came on at the end of the first week, & subsides when the temperature fell. In several mild cases there
there was no distension of the abdomen. Eustace
Smith points out that the swelling of the abdomen
is due to the accumulation of flatus through de-
composition of food, or inability of the bowels to ex-
pel the gas. The loss of conscientious is from lack of
nerve power, or local injury from ulceration; conse-
quently, in the third week, if there is much
ulceration + great prostration, the distension of
the abdomen may be intense.

Abdominal pain was one of the most pre-
frequent of the initial symptoms in my series; al-
so there was marked abdominal pain in 14 cases
while in hospital. Tenderness on pressure occurs
in most cases; tenderness in any particular re-
gion, such as the right iliac fossa, is more diffi-
cult to estimate in children than in adults.

Gurgling in the right iliac fossa is not a
sign of any importance; I have frequently found
it in children suffering from slight diarrhea, or
even in quite healthy children.

Intestinal hemorrhage is very rare in chil-
dren: in none of the 140 cases was there hemorrhage
recorded; in 3 cases there was slight hemor-
hage, to the extent of about 37, followed by recovery,
and in several cases there was an occasional streaking of the motions with blood. Ashley records 3 severe cases, all ending in recovery; McKenzie saw it only 9 times, of which cases it was only slight. The fact that intestinal haemorrhage is so uncommon is generally connected with the rarity of extensive intestinal ulceration in children. The percentage at all ages has been given by McKenzie as 3.77, but by others as from 3 to 5.

Perforation of an intestinal ulcer is also rare in children, its rarity is confirmed by all writers. It occurred in 6 cases of my series, once in each case fatal. In 5 of the cases its onset was sudden, accompanied by symptoms of collapse; in 1 case the patient was brought in when very ill. There were no symptoms of sudden collapse, the perforation was only tentatively diagnosed during life. The 6 cases may be tabulated:

<table>
<thead>
<tr>
<th>Name</th>
<th>Age of Ulcer</th>
<th>Age of Perforation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sarah C.</td>
<td>4th week</td>
<td>3rd week in hospital</td>
</tr>
<tr>
<td>Rosamond S.</td>
<td>4th</td>
<td>3rd</td>
</tr>
<tr>
<td>Caroline S.</td>
<td>5th</td>
<td>3rd</td>
</tr>
<tr>
<td>Hannah A.</td>
<td>4th</td>
<td>2nd</td>
</tr>
<tr>
<td>Frank L.</td>
<td>3rd</td>
<td>1st</td>
</tr>
<tr>
<td>Elizabeth P.</td>
<td>5th</td>
<td>5th</td>
</tr>
</tbody>
</table>
Further notes of these cases are given on pp. 30 et seq.

Spleen is probably always enlarged, though Ashby says that it is sometimes found to be of normal size at the post-mortem examination. The difficulty of making out its enlargement during life is frequently very great. Palpation is the only serviceable method of detecting enlargement, percussion may give entirely fallacious results. It was palpable in 61 of the 120 cases. Almost found it palpable in only 55 out of 120 cases, & emphasizes the difficulty of ascertaining whether or not it is enlarged in children. Though its enlargement when made out is of value as a diagnostic symptom, its absence is of little negative value. For example:

In Frank L. the spleen could not be felt during life, but at the necropsy it was found to be greatly enlarged & congested.

In Edith W. aged 7. where the diagnosis was difficult, any positive symptom would have been of value, (the case is more fully mentioned on pp. 8 & 37. ), the spleen was not palpable during life, but was found after death to weigh 4 1/2 oz.
In the 10 post mortem examinations that were made, the spleen was found to be enlarged & congested in 9 cases; in 1 case it was reported to be not enlarged, but the weight was unfortunately not given.

Liver is frequently somewhat congested; symptoms on its part are rare. Jaundice occurred in 1 case of the sick:

John H. aged 10, died March 2, 1891.
Rose spots, enlarged spleen, other symptoms of Typhoid. On 6th day after admission developed jaundice, which persisted for a week. By progressive temperature came down at the end of a fortnight.

Respiratory System:

Epistaxis is said to precede Typhoid fever in adults more commonly than any other fever, & to be not uncommon in children, though less frequently met with them in adults. It only occurred in 1 of the 100 cases. It may sometimes be due to picking, but it cannot then be regarded as true Epistaxis.

Bronchial Catarrh or Bronchitis is a very common accompaniment of Typhoid fever in children, as in adults. Fagg stated that it was
almost always present at all ages. In this series, marked bronchial catarrh occurred in 62 cases during their stay in hospital. The symptoms of bronchial catarrh may often be due to hypertrophic congestion. Bronchitis & pneumonia come on in many of the more severe cases quite independently of a chill, & are due probably to the local action of the typhoid bacillus, as has been pointed out by Ashley & Dohle. They frequently cause death in children; 5 death out of 18 in this series were caused by Bronchitis & Broncho-pneumonia.

Broncho-pneumonia is not uncommon; it occurred in 10 cases of the series. Henoch records it in 18 cases out of 200. He points out that it usually sets in during the acute of the disease. I have not found that to be always the case; it occurred twice in my series before the temperature had reached its highest. Wilson draws attention to a form of "Deglutition or Inhalation Pneumonia," which occurs during the acute of the fever.

Aruppans pneumonia is much rarer than broncho-pneumonia: it occurred in 2 cases of the series: in one case the patient was suffering from it when brought into hospital at the beginning.
of his attack of typhoid, he afterwards developed meningitis; in the other it came on late, during the 3rd week in hospital. These 2 cases illustrate Osler's statement that pneumonia may come on at the beginning, as an early complication of the lungs with the typhoid poison, or occur later, as a complication, in the 2nd or 3rd week.

Pleurisy is said by Fage to be often developed; it occurred in 3 cases, in 1 as simple pleurisy, in 2 in conjunction with pneumonia.

Phthisis occurred in 2 cases of my series: in 1 (the case mentioned above in which typhoid pneumonia occurred as a complication) it followed upon the pneumonia; in the other case it was developed during convalescence from typhoid. Murchison believed that tuberculosi followed typhoid more commonly than any other fever; Fage found no case of phthisis following it in all Guy's hospital post-mortem records.

Circulatory System.

Plethoric cardiac action is very common, though much less so, it less common, in children.
*Principles & Practice of Medicine*. Pagge & Rye Smith.

Chapter on Encephalitis.
than in adults: children are able to do without stimulants throughout far better than adults. The pulse is generally small & easily compressible in children, that need not be regarded as a symp.

tom of weakness. Extreme irregularity of the pulse, the hypertonic congestio of the lungs, are indications for the use of cardiac stimulants. In this series stimulants were required in only 41 of the 1210 cases; the rest of the cases recovered without the help of any kind of stimulant.

Pericarditis did not occur in any case.

Heart murmurs were recorded 3 times, but in only one of these cases was it certain that the murmur was developed during the attack of typhoid. Donald C. died June 15, 1893.

Murmur observed in the 19th., had disappeared by the 27th.

**Nervous System:**

Most observers agree in stating that severe nervous symptoms in children are extremely rare, though Oster says that they are often prominent in children. Night delirium at night is a common occurrence. Severe delirium, accompanying
hyperpyrexia, occurred in 5 cases of my series, at ages 5, 7, 8, 10, 11.

Henoch says that the older children are the more liable to develop nervous symptoms, points out that the physiological changes do not set in when the temperature is falling, so that one can only regard them as forms of "de-licium ab lixanite". He contends Liebmannert, Velio, that the nervous symptoms are due simply to the high temperature. As was mentioned above, the 5 cases in my series occurred during hyperpyrexia, contrary therefore to Henoch's view.

Aphthas on the other hand is a common symptom in children.

Mental weakness followed the illness in 4 cases, but gradually passed away as the patient grew stronger. Dr. West drew attention to the fact that the patient is unpushed intellectually as well as physically by his illness. Dr. Smith thinks these cases are sometimes due to defective action of the kidneys, to impeded urine, observed a copious flow of urine was brought about, the intellect was restored.
Aphasia is not uncommon in children, it is much more frequently met with than in adults. The prognosis is good. One case of complete aphasia occurred in my series:

Girl, age 8. Sore attack of typhoid, high temperature, frequently 104° - 106.5°, persisted for 5 weeks. During 4 weeks complete aphasia; treated in usual manner. Aphasia supervened, persisted for 4 weeks. The power of speech returned gradually & completely.

Meningitis is a rare complication, it occurred in 2 cases of my series:


Ill 10 days before admission. When he came in he was suffering from typhoid with left pleuro-pneumonia. After being 10 days ill, while the temperature was still high, he developed high meningitis. Cured.


Illness began with headache, delirium, vomiting, dyspnea all over. All symptoms of typhoid present, temperature 103°. On July 9 developed twitching, senseless vomiting, & other symptoms of meningitis. Temperature down in July 18. Cured.
Otitis media occurred in 2 cases of the series; it is not uncommon at all ages (2.5% in Henscht's collected cases, quoted by Osler). Incurable deafness followed in 1 of the cases; Enstice Smith says that deafness is common.

Urine.

During a continuance of high temperature there is generally a slight degree of albuminuria. There was marked albuminuria in 10 cases of this series which passed off, leaving no ill results.

In 1 patient, who had been in hospital a year before for acute nephritis, blood and tube casts appeared in the urine during the attack of typhoid fever; a slight degree of dropsy accompanied it. Henry saw dropsy in one instance, mentions that cases of dropsy without any abnormality of the urine have been observed by Griesinger, Stoeber, Rilliet, and Banthev.

Pyuria occurred in 2 cases; it passed off without ill results. Osler says it is a not uncommon complication at all ages.

Incontinence of urine occurred in 2 cases; it is frequently met with in children.
Bone lesions: in four cases of the series there were abscesses connected with periostitis, two over the tibia, one on the forearm, one on the lower jaw. Oster states that bone lesions are very common in adults, still more common in children.

Multiple subcutaneous abscesses followed 6 of the cases, accompanied by slight rises of temperature; they occurred on the face, arm, leg, back of hands, wrists, etc. Oster considers that they are due to post-typhoid pyrexia, & remarks that boils frequently follow hydrotherapy; one girl of this series, who was subjected to the tank treatment certainly developed a large number of boils, (her case is mentioned on pp. 26, & 46.)

Relapse:

There is the same tendency to relapse as in adults, there may be more than one relapse. In my series there were 5 true relapses - coming on after complete disappearance - , one of which terminated fatally. Statistics vary as to their frequency: Billiet & Bontey record 3 out of 113 cases.

Henchel: ............... 38: 302

At all ages, Faye gives 11.90, Munchian 3.9, Plienbeinst in 8.69.
The relapse is supposed to be usually milder than the first attack, & of shorter duration. A true relapse is a second attack due to re-infection, & is frequently accompanied by new spots & an enlarged spleen. Relapses are considered to be more common after attacks of moderate severity than after severe attacks. They generally come on during convalescence, after the temperature has been put normal for a time, — 3 to 10 days on an average, though the period is very variable, in 2 cases Herick noted an appreixial period of only 24 to 48 hours.

The duration of a relapse varies; in the 5 cases, of which I give short notes below, the duration were 10, 11 (temp. never came down), 6, 12, & 13 days respectively. Measles in gave 16 days as an average for all ages.

ill 2 weeks before admission. Temperature down
June 2 to 95. Then relapse, temp. up to 103°,
new spots, enlarged spleen. Remained up for
10 days. Cured.

ill a month before admission. Temp. down by
July 28. Went up again in Oct. 30, hyperpyrexia
Vomiting, incontinence of urine; temp. did not fall again. Death from exhaustion.


Ill a month before admission. Temp.: down on Sept. 28, steady until Oct. 14th, then up to 103°; few spots; Temp.: remained high for 6 days. Cured.


Ill a week before admission. Temp.: down by July 27th. Relapse Aug. 4th to 16°, with several crops of new spots. Cured.


Ill a week before admission. Enlarged spleen, albuminuria, constipation. No spots observed during 1st attack or relapse. (Mother had been ill with Typhoid). Temp.: never rose above 102°, down to normal on May 3rd. On the 5th began to rise again, & on 7th was up to 104.5°, did not come down until 16th. Cured.

Complications, a association with other diseases, occurred during convalescence in the four:

Subacute Nephritis 1. Diphtheria 1.

Pneumonia (in one case) 2. Measles 1.

the cases following Measles) Scarlet Fever 1.
Children pne. Noma, & Pertussis have also been recorded in children.

The complications that were fatal in my series were Diphtheria & Scarlet Fever. Henoch found that Diphtheria was the most formidable complication, in several of his cases it caused death.

Convalescence in children is surprising, rapid as compared with adults; often children who have been very ill are quite ready to sit up to play as soon as their temperature falls. Children are said to suffer less than adults, both as to the severity of the duration of the disease.

Mortality varies in different series of cases, according to their severity. Typhoid is usually said to be a mild disease in children, with a low mortality, but that in their series of cases, extending over a period of 7 years, even high : 18 deaths out of 140 cases, = roughly 12.8%.

Other gives the average at 5-12% in private, 7 to 20% in hospital practice, at all ages. At Maidstone it was between 7 & 8%. In children, the
mortality was given as 8% at Pendlebury by Ashley, and as 10% by Bartley, Ricketts, and Ziehl, quoted by Ashley.

Of the 15 patients in my series who died, 12 were girls, 3 were boys. The ages at which death occurred were:

- 10-14 in...6 cases
- 3-5 in...2 cases
- 5-10...10 under 3...0...

The stage of the illness at which death occurred calculated as nearly as possible from the beginning was in the 3rd week in 7 cases.

- 4th...4...
- 2nd...3...
- 5th...3...
- 7th...1...

The cause of death was:
Perforation followed by peritonitis in...6 cases
Peritonitis without perforation...1...
Severe bronchitis or broncho pneumonia...5...
Exhaustion from severity of disease...4...
Complications, Scarlet Fever, Diphtheria...2...
I append short notes of the cases in which death occurred: post-mortem examinations were made in 10 of the cases.


Highest temperature had been 104°, went down at the beginning of the 3rd week. Fever, with between 99° to 100.5°. Then fell suddenly to 96°, pain, collapse; died in 48 hours.


Hypothermia (about 104°) while in hospital, typhoid state. At beginning of 3rd week rising perforation, death in 24 hours.

PM. Acute general peritonitis. Lower end of ileum ulcerated in a few places, 4 or 5 small about 2 inches above ileo-caecal valve a small perforation. Intestines highly inflamed. Spleen much enlarged. Nothing else of importance.


Temperature never higher than 104°, fell at
In the beginning of the 5th week, it remains down 2 days. Then symptoms of perforation, death in 50s.

PM: General suppurative peritonitis. He is admitted to consider abdominal wall in right iliac region, where perforation has taken place. About 15 ulcers in lower part of ileum; several with only peri-ileum for flow. Spleen enlarged. Bronchial pneumonia left lung.

James B. Adm July 8, died Aug 10, 1889.
Temperature down at end of 2nd week; remained down for 2 days; then relapse, rose to 105° F. Frequent vomiting; incontinence urine.
PM: Extensive recent ulceration in the ileum; upper part of large intestine. No perforation; no peritonitis. Stomach distended; inflammation, infection of capillaries, no blood.
Spleen very large & contracted. Mesenteric glands enlarged. Hypostatic congestion of lungs.

Robert S. Adm Sept 6, died Sept 11, 1889.
Ill a week before admission. Highest temperature 104.8°. Spots; spleen not palpable, severe diarrhea.
Death from exhaustion.

PM: In lower third of small intestine many perforated intensely, inflamed. Some thinning of muscular layer of commencing ulceration. Mesenteric glands & spleen enlarged. Bronchial catarrh

Came in for Tantalus.  Ensestomy performed on Oct 1.  In Oct 10 temperature rising, & later symptoms of Typhoid developed. (It was after wards found that Typhoid was prevalent in the district from which she had come.)  Found remained healthy.  Urinary pneumonia and pleurisy developed.  Hyperpyrexia.  Vomiting for 2 days before death.

PM.  General congestion of the intestines, esp. especially at the lower end of the ileum.  For 2 feet above ileo-caecal valve swelling & injection of Peyer's patches, solitary lymph glands, a few shreds superficial ulceration.  Nearest the valve many shred distinct ulceration.  No ulcer in large intestines.  Splenic enlarged, covered with loose mesenteric glands enlarged.  Lungs - right, much congestion, consolidation at apex; left, adhesion pleurisy, over upper lobe.  3/4s case colored fluid at base, consolidation of whole lower lobe.  Nothing of importance in other organs.

Hannah A.  Aet 10.  Adm Dec 8,  died Dec 22, 1892.

Temperature was falling at end of 2'd week, but on 20th in early morning symptoms of peritonitis, died on 22'.
Hannah A. (cont.). P.M. Abdomen extremely distended, large quantity of pus in peritoneal cavity; also some semi-solid feces in right ileo-caecal region, partly localized by adhesions. Intestines matted together. Numerous deep ulcerations in ileum, with only peritonitis for floor; one large perforation 3 inches above ileo-caecal valve. Spleen & mesenteric glands enlarged & congested. Nothing of importance in other organs.


At a fair night before admission. Extreme emaciation, hyperpyrexia, lymphoid condition. No collapse, gradually increasing distending abdomen; died in 5 days.

P.M. Peritoneal cavity contained about 0½ p. of foetid yellow pus. Intestines greatly infected, many adhesions. Lower end of small intestine 1 upper 6 inches. Large intestine showed many well marked typhoid ulcers. About 2½ inches above ileo-caecal valve a small perforation, not big enough to admit a half pea. Spleen, mesenteric glands, & liver enlarged & congested. Nothing of importance in other organs.
James F. Act 9. Adm May 2, died May 21, 1894.
Ill 5 days before admission. Hyperpyrexia while in hospital, until last 3 days of life. When temp. varied between 99° and 100°. Cyanosis evident all over body, in jaundice when admitted. May 17, vomiting, so from 17th to 20th gradually increasing abdominal pain & distention. From 20th vomiting matter was bile stained.

P.M. Severe general peritonitis; lymph between coils of intestine, thick layer of lymph covering anterior wall of stomach. No perforation found. On lifting up the intestine many inflamed Peyer's patches found, but nowhere any appearance of ulceration. Enlarged mesentery glands & spleen.

Ill a week before admission, delirium 2 days, severe cough, pain left side. After admission delirium for 2 days, followed by stupor, paralyzing on to coma, for 5 days. Temperature varied between 102° & 104°. Abdomen tense, bowels retracted, no spots. Spleen not felt, constipation. Physical signs general hemophthorax.

P.M. Abdomen - about 3 feet greenish yellow peritoneal fluid. Peritoneal coat
of lower part small intestine much infected, no other sign of peritonitis. Spleen enlarged, weighed 4 1/2 oz. Numerous ulcers found in ileum, in 4 g where the only floor left over peritonitis. In no case was a perisplenic lymph gland involved, lymph nodes, many small patches of broncho-pneumonia distributed all over both lungs; hypostatic congestion at bases. Nothing important in other organs, post-mortem examination could not be obtained to examine the brain.

In the remaining cases, permission to make post-mortem examinations could not be obtained.

Annie M. age 11. Adm. May 1, died May 6, 1888.
Had been ill for 3 weeks before admission; much reduced by debility; while in hospital temperature 103° to 104.6°. Typhoid state. Died on the 5th day without change.

Mary W. age 4. Adm. Feb 14, died March 5, 1889.
Temperature fell at end of 3rd week after an uneventful illness. After 2 days convalescence developed Scarlet Fever, severe throat ulceration, albuminuria, temperature 104.5°, death.
Illness first observed on May 5th while uphill.
Enlarged spleen, chorea, typical motion sickness.
Broncho-pneumonia. Temperature 103°F until the 26th, when it rose to 105°F. Remained high in spite of treatment.

Elizabeth P. act 6. Adm Feb 9, died March 10, 1891.
Illness first observed on Feb 2. Headache, delirium, spots, diarrhoea, bronchial catarrh.
Temp: 102°F on admission, afterwards dyspnoea, was 104°F until the day before death, when it dropped suddenly to 99°F. All symptoms of perforation.

Lily P. act 8. Adm Jan 15, died Feb 8, 1892.
Ill a month. Enlarged spleen, chorea, typical motion, general broncho-pneumonia, dyspnoea, albuminuria. Temp: 101°F to 103°F until Feb 4th, then normal & subsided for the 4 days preceding death; vomited 2 or 3 times daily, during these 4 days.

Emma J. act 3. Adm Feb 24, died March 14, 1892.
Illness 1st observed on Feb 25th. Rose spots, diarrhoea, much enlarged spleen. March 6th-9th many subcutaneous abscesses on head, body, thighs.
Broncho-pneumonia both lungs. Temp. 103°F.

Fever had run a normal course, & temperature was down by the end of 1st week in hospital.
Then developed Typhoid Fever, & which several cases had arrived in the hospital at the time; vomiting, heart failure, death.


At 1st sight before admission, very much reduced by severe diarrhoea; hypothermia while in hospital. Died of exhaustion.

From a consideration of these cases I come to the conclusion that Typhoid Fever in children is not to be regarded by any means lightly, though it is generally stated that children suffer from it in a milder & less complicated form than adults. A mortality of 12.8% in a series of hospital cases, extending over a period of 7 years, is a high one, even when allowance is made for the exceptional severity of some of the cases when admitted.

In the next place, the intestinal lesions may be very severe. In 8 of the 10 cases recorded above, in which post-mortem examinations were made, the ulcers were found to be both numerous & severe; in only one case were there very few ulcers, & there
they were severe, for in one of them a perforation had occurred, causing death; in the remaining case the affected patches were numerous, but had not gone on to ulceration. The results of post-mortem examination cannot give sufficient ground for forming a theory; but, when they occur in a series of cases, they may fairly give ground for the confirmation of a theory already advanced.

Henoch quotes Rilliet as drawing attention to the milder character of the process in children, especially the fewness and smallness of the intestinal ulcers. He had 21 post-mortem examinations out of 302 cases. Among these were 11 with ulceration in the intestine; in the remaining 20 there was only atrophy of the glands, without ulceration, i.e., this was the case where the fever was of long as well as of short duration. He says that "his observations confirm the comparative rarity of ulceration in infantile typhoid; where there were ulcers they were less numerous, flatter, and smaller than in adults. The fact largely accounts for the rarity of perforation of the intestine, and haemorrhage from it in infantile typhoid."

Wilson says that "the lesions in childhood are generally
* Rilliet "de la fièvre typhoïde chez les enfants."
Thèse, 1840.

* "Léchées ou Chlorures diverses." pp. 318-319.
less extensive and conspicuous than in adults, just as the disease itself is less intense. They have been less thoroughly studied because of the low mortality.

Eustace Smith says that children who die of typhoid almost invariably die from perforation, that death from the intensity of the disease is very rare in early life, through there may rarely be excessive diarrhoea or high temperature, 108 or 109. "Their cases certainly do not support these conclusions, the deaths from exhaustion numbered 14, of those from chest trouble 5, altogether one half of the total number of deaths, if they occurred not with other symptoms alone, but at all ages.

In the series 1 case of peritonitis occurred not following perforation. Kennel records a similar case in a boy of 10. Wilson says that "peritonitis may occur through direct extension from the intestinal ulcer to the serous membrane without actual perforation."

The series contained no case in which symptoms of typhoid fever occurred during life, or no enlargement of the intestinal glands was found at the post mortem examination.
Disease in children. p. 76. (51854.)
Treatment:

need be only shortly considered, as the general rule for it are the same in children as in adults.

It is scarcely necessary to emphasize the importance of careful nursing; there should be a day or a night nurse, and it is essential that the nurses selected should be accustomed to children.

The diet should consist only of milk, well diluted with lime, barley, or soda-water, the amount given to depend upon the age of the patient. No other food than milk is required while the temperature remains high; fortunately, children have generally no aversion to it, as many adults have. Ye* recommends the dilution of milk with some alkaline water, e.g., Vichy, or Apollinaris. He also emphasizes the necessity of allowing the patient to drink plenty of pure water.

At the beginning of the disease a small dose of Calomel is often of great service; a combination frequently used was Calomel + Bovis powder in equal doses, with a small quantity of Compound Bismuth powder. Sir William BoadENT in his Cavendish lectures upon "SOME POINTS
"Clinical Therapeutics", L.6 annus Yeo. Typhoid fever.
in the treatment of Typhoid fever" has drawn attention to the value of Castor oil at the outset; Dr. Munro has advocated its use in the Edinburgh Hospital reports for 1894.

Beyond such medicinal treatment at the outset, many cases of Typhoid fever in children will yet go on perfectly well without the administration of any drug or stimulant whatever.

Warm sponging, with carbolic acid added to the water, morning and evening, should not be neglected; it is very valuable in controlling the looseness so often present in children. Special care should be taken to keep the patient's back clean and dry. The mouth should also be regularly washed out with a brush, more especially if the patient be insoluble. Glycerine, or glycerine of boracic acid, is useful for the dryness of the lips.

The stools should be examined regularly, especially with a view to seeing if there be any undigested milk present, in which case the quantity given should be diminished. If milk disappears they may be used. If necessary, the milk may be kept boiled, though that gives it an insipid taste.
Latin, when the temperature is coming down, beef, a mutton, or veal - tea may be given. And, after the temperature has been down a week, the patient may go on to light crust and pudding, and gradually to more solid diet.

For abdominal tenderness, a very light paste is frequently of great service. For sitting in a paste - ice may also be useful, or a cold water compress in a single layer.

Hyperpyrexia depends upon the effect it has upon the patient; in this series, special measures were generally adopted for it when the temperature rose above 104°. The usual remedy was sponging the body, limbs with water at a temperature of about 60°. Often it was found that the use of a wince - bag, to keep the bed clothes off the patient, was sufficient, without having recourse to sponging. If the patient was delirious an ice bag was applied to the head.

Drugs for high temperature were very rarely given.

For persistent hyperpyrexia the use of the graduated bath is often recommended. In the early stages it may be used with safety; later
it is dangerous. It is apt to be depressing, it is always disagreeable to the patient, as well as troublesome.

The tank treatment for hyperpyrexia, in the method advocated by Dr. James Barr of Liverpool, was used in one case where the temperature rose frequently above 106°. The patient was immersed in the tank, reclining on a couch framework on which there was a thick blanket, the head and shoulders were supported by an air cushion. The water was kept at a temperature of 90°-96°. The result in that case was satisfactory, but not more so than ordinary treatment would have been; the trouble entailed in keeping the water at a proper temperature of 90° after the patient was very great. That was the only case in this series for which the tank treatment was adopted. Barr's statistics gave a mortality of 47%.

Deinokok, when excessive, not amenable to diminution in the quantity of milk given, was generally checked by a simple starch, or starch and aminobenzene.

Various intestinal antiseptics were tried.
E.g. Calomel, B. nephthrol, Carbolic acid, Sulpho carbolatina, Salol etc., but they were only used occasionally. Broadbent said in his Cavendish lecture that he had come to rely almost exclusively on mercurol preparations; he gave for diarrhoea due to sepsis: B. Hydral or paralin; with Quinine; he considered Calomel in small doses to be equally good. He recommended for the same purpose the continued use of a solution of free Chlorine, combined with a little Quinine.

Constipation requires treatment more frequently than diarrhoea in children. An enema is the safest remedy for it, it was the only remedy used in this series, before the temperature came down. The enema may be of Glycerine, or Soap and water; the former is the better of the two. When the temperature had come down Castor oil was generally used.

Constipation during convalescence is often a troublesome symptom; it is often due to loss of muscular tone, then Strophanine + Cascara are valuable for it.

Restlessness, if excessive, may need
Opium, best given in the form of hæmorhæa or chloral.

For Cardiac depression & hypostatic congestion of the lungs. Alcohol is the best remedy, given in the form of Brandy or Champange. The stimulant should be given frequently when the depression is severe, every hour, or every 2 hours, as required, best with the milk, or immediately after it. Alcohol is useful too in the later stage of the disease, when the nervous system is exhausted. Sometimes, as Broadbent pointed out, change of stimulant does more good than increase of the dose. Yes regards whiskey, Brandy as best during fever, port or Champange during convalescence.

When the Cardiac depression is severe Ether, digitalis, & strychnine are valuable.

Bronchitis & pneumonia must receive appropriate treatment.

For severe haemorrhage: ice bag to the abdomen, light subcutaneously, the smallest possible quantity of food, absolute rest. Opium may be given if necessary, & lignocainine is valuable.
For a helpless patient frequent changing of position by the nurse is essential, to avoid hypostatic congestion of the lungs.
For perforation cannula was given subcutaneously, 1 gram by the mouth, for diminishing shock & arresting peritonitis. It is almost always fatal: there was no case of recovery in this series; though Ashby suggests that "where cases of peritonitis do recover, no extravasation has taken place, the affected portion has become glutted by means of lymph to another piece of intestine." Liebermeister said that he had 4 cases of perforation followed by recovery; Fage recorded 1 in a boy of 10.

During convalescence port wine is generally very useful. If there be dyspepsia with a rise of temperature, it is, of course, one indication for reducing the diet.