THESIS.

FOR THE DEGREE OF

DOCTOR OF MEDICINE.

"ENTERIC FEVER WITH SPECIAL REFERENCE TO DIAGNOSIS BY BLOOD CULTURE."

BY

Joseph Green m.B., ch.B.

M.D. 1911
SUMMARY.

INTRODUCTION.
Decline in mortality and prevalence chiefly due to improved water supply and methods of sewage disposal.

Influence and function of Isolation Hospitals

ANALYSIS OF 55 CONSECUTIVE CASES NOTIFIED AS ENTERIC FEVER

METHODS OF ISOLATION AND IDENTIFICATION OF BACILLUS TYPHOSUS.

AGGLUTINATION REACTION

BACTERIOLOGICAL DIAGNOSIS
(a) By Widal test (55 cases)
(b) BY BLOOD CULTURE (21 cases)

COMPLICATIONS.

TREATMENT AND DIET.

GENERAL CONCLUSIONS.

ABSTRACT OF CLINICAL NOTES (55 CASES)
England and Wales
Enteric Fever, Death Rates per Million in Quinquennia
Chart 1
INTRODUCTION.

During recent years there has been recorded in England and Wales a remarkable reduction in the death rate at all ages from all causes, and in particular, from Tuberculous phthisis and from Enteric Fever. The death rates (per million) from Enteric Fever in successive quinquennia and in the last four years were as under:

<table>
<thead>
<tr>
<th>Years</th>
<th>Death Rates</th>
<th>Years</th>
<th>Death Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1871-75</td>
<td>374</td>
<td>1901-05</td>
<td>113</td>
</tr>
<tr>
<td>1876-80</td>
<td>277</td>
<td>1906</td>
<td>92</td>
</tr>
<tr>
<td>1881-80</td>
<td>216</td>
<td>1907</td>
<td>67</td>
</tr>
<tr>
<td>1886-90</td>
<td>179</td>
<td>1908</td>
<td>75</td>
</tr>
<tr>
<td>1891-95</td>
<td>174</td>
<td>1909</td>
<td>60</td>
</tr>
<tr>
<td>1896-1900</td>
<td>175</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the Registrar General's Report for 1909, the corrected annual death rates from Enteric Fever are charted from the year 1896 onwards. It is pointed out that "The Statistical history of Enteric Fever mortality can be divided into three main periods: into two of decline) (A) from 1869 to 1885 inclusive and (B) from 1900 to the present date, and into one showing no decline from 1886 to 1889. The first period (1869-1885) may however be subdivided into two portions, (1) that prior to and including 1875, the
date of the Public Health Act, which shews very slight decline and (2) from 1876 to 1885 inclusive which shews a sudden and relatively enormous reduction in the mortality."

The diminished mortality must either be ascribed to a diminished fatality i.e. to a milder type of disease or to diminished prevalence. The statistics of the Metropolitan Asylums Board (1875-1909) are as follows:

<table>
<thead>
<tr>
<th>Years</th>
<th>Admissions</th>
<th>Deaths</th>
<th>Case Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1875-79</td>
<td>1828</td>
<td>390</td>
<td>21.3</td>
</tr>
<tr>
<td>1880-84</td>
<td>2157</td>
<td>405</td>
<td>18.8</td>
</tr>
<tr>
<td>1885-89</td>
<td>1734</td>
<td>257</td>
<td>14.8</td>
</tr>
<tr>
<td>1890-94</td>
<td>2761</td>
<td>470</td>
<td>17.0</td>
</tr>
<tr>
<td>1895-99</td>
<td>4329</td>
<td>322</td>
<td>16.7</td>
</tr>
<tr>
<td>1900-04</td>
<td>5994</td>
<td>398</td>
<td>15.0</td>
</tr>
<tr>
<td>1905-09</td>
<td>2665</td>
<td>387</td>
<td>14.5</td>
</tr>
</tbody>
</table>

and it is seen that there has been a considerable reduction in the case Mortality which fell nearly 30 per cent in the interval between 1875 and 1909.

The death rate at all ages however fell nearly 60% in the same period.

It must therefore be concluded that the reduction in Mortality from Enteric Fever which has been recorded
in England and Wales is chiefly due to the diminished prevalence of the disease, though a lower case-mortality has not been without its influence.

It must be remembered however that the removal of patients suffering from Enteric Fever to Isolation Hospitals has been facilitated and encouraged and the later statistics might reasonably be anticipated to be more favourable than the earlier. But if the Notification Returns of Enteric Fever be examined, it will be found that of recent years the number of cases notified per 100,000 inhabitants has fallen very considerably, and I quote the figures for the City of Liverpool.

In that City the notification of Infectious Diseases Act of 1889 was adopted as early as was possible, so that complete returns are available from the year 1889 onwards.
<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Per 100,000 population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1889</td>
<td>670</td>
<td>128</td>
</tr>
<tr>
<td>1890</td>
<td>506</td>
<td>97</td>
</tr>
<tr>
<td>1891</td>
<td>588</td>
<td>113</td>
</tr>
<tr>
<td>1892</td>
<td>699</td>
<td>134</td>
</tr>
<tr>
<td>1893</td>
<td>1396</td>
<td>272</td>
</tr>
<tr>
<td>1894</td>
<td>1350</td>
<td>259</td>
</tr>
<tr>
<td>1895</td>
<td>1306</td>
<td>200</td>
</tr>
<tr>
<td>1896</td>
<td>1063</td>
<td>161</td>
</tr>
<tr>
<td>1897</td>
<td>991</td>
<td>149</td>
</tr>
<tr>
<td>1898</td>
<td>863</td>
<td>129</td>
</tr>
<tr>
<td>1899</td>
<td>988</td>
<td>146</td>
</tr>
<tr>
<td>1900</td>
<td>731</td>
<td>107</td>
</tr>
<tr>
<td>1901</td>
<td>864</td>
<td>126</td>
</tr>
<tr>
<td>1902</td>
<td>1026</td>
<td>144</td>
</tr>
<tr>
<td>1903</td>
<td>681</td>
<td>95</td>
</tr>
<tr>
<td>1904</td>
<td>434</td>
<td>60</td>
</tr>
<tr>
<td>1905</td>
<td>325</td>
<td>44</td>
</tr>
<tr>
<td>1906</td>
<td>491</td>
<td>66</td>
</tr>
<tr>
<td>1907</td>
<td>482</td>
<td>64</td>
</tr>
<tr>
<td>1908</td>
<td>447</td>
<td>59</td>
</tr>
<tr>
<td>1909</td>
<td>278</td>
<td>37</td>
</tr>
</tbody>
</table>
And the death rate from Enteric Fever declined proportionately to the diminished prevalence.

Table 4.

<table>
<thead>
<tr>
<th>Years</th>
<th>Mortality per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1876-85</td>
<td>21.5</td>
</tr>
<tr>
<td>1886-95</td>
<td>28.4</td>
</tr>
<tr>
<td>1896-1905</td>
<td>19.3</td>
</tr>
<tr>
<td>1906-09</td>
<td>9.0</td>
</tr>
</tbody>
</table>

While the death rate in England and Wales for the three quinquennia 1886-90, 1891-95, and 1896-1900, remained almost stationary, there was in Liverpool an increased death rate—the mortality for the decennium 1896-1905 being 32 per cent higher than for the preceding. The difference in case-mortality was however comparatively small. In 1896-1905, it was 16.87 per cent and in 1906-1909, 15.90 per cent; more than 1 per cent higher than the mortality in London during the same period.

The decline in the prevalence of Enteric Fever and the associated reduction in its mortality must be attributed to the same factors which have reduced the death rate from all causes and from Phthisis—i.e., to the general improvement in the sanitary conditions of the people—
the result of progressive civilisation, of education of increased material prosperity tending to a higher standard of comfort, to better food and to improved housing. And although this improvement is largely due to an unconscious effort on the part of the people, to the indirect influence of education, it has been encouraged and fostered by the more efficient sanitary administration inaugurated by the Public Health Act of 1848 and largely extended by the Act of 1875 and by much other general and special legislation.

Pre-eminent among the measures which directly tend to the diminution of Enteric Fever, are (1) the provision of an adequate, and even abundant, supply of pure wholesome water by the Public authorities and (2) efficient public scavenging and sewage disposal, especially the adoption of a water-carriage system. The water-carriage system of sewage removal involves, of necessity, improved drainage: and so permanently lowers the level of ground water.

(1) The invariable effect of the provision of a pure water supply is, the reduction of the mortality from Enteric Fever and Diarrhoeal Diseases. The statistics issued by the Massachusetts Board of Health some years ago illustrated graphically the intimate relation which exists between the prevalence of Enteric Fever
and the water supply. It was found that as the proportion of the inhabitants of Massachusetts which derived its water supply from the public authorities increased, the prevalence of Enteric Fever diminished just in the same proportion. In other words, as private wells and public pumps were closed, so did the mortality from Enteric Fever fall.

Table 5.

<table>
<thead>
<tr>
<th>Period</th>
<th>Death from Enteric Fever per 100,000</th>
<th>Proportion of population NOT supplied with public water</th>
</tr>
</thead>
<tbody>
<tr>
<td>1856-65</td>
<td>92.90</td>
<td>75.44</td>
</tr>
<tr>
<td>1866-75</td>
<td>80.80</td>
<td>58.94</td>
</tr>
<tr>
<td>1876-85</td>
<td>47.40</td>
<td>31.75</td>
</tr>
<tr>
<td>1886-95</td>
<td>36.40</td>
<td>13.93</td>
</tr>
</tbody>
</table>

(2) the influence of drainage, of improved scavenging and of the adoption of a water-carriage system of sewage removal is not less obvious and conspicuous. An extreme example of the relation between the method of sewage disposal and the prevalence of Enteric Fever is found in the City of Nottingham.

Table 6.

<table>
<thead>
<tr>
<th>Period</th>
<th>Rail closet houses</th>
<th>Water closet houses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1887-1898</td>
<td>1 case in 120</td>
<td>1 case in 558</td>
</tr>
<tr>
<td>1899</td>
<td>&quot; &quot; &quot; 70</td>
<td>&quot; &quot; &quot; 296</td>
</tr>
<tr>
<td>1909</td>
<td>&quot; &quot; &quot; 295</td>
<td>&quot; &quot; &quot; 1189</td>
</tr>
</tbody>
</table>
Enteric Fever is more than four times as prevalent in houses with Pail closets than in those provided with water closets.

In 1909, there were in Nottingham 36,318 pail closets and 21,397 water closets, so that pail closets still serve more than half the houses. It is unnecessary to discuss here the means by which the infection is spread but it may be pointed out that a striking reduction in the mortality from Enteric Fever as well as from Diarrhoea and Enteritis follows the substitution of the water-carriage system for the conservancy system of sewage disposal. In Leicester the pail system has been completely abandoned and the following comparative table of Mortality from Diarrhoea in Nottingham and in Leicester illustrates decline in Mortality which can be explained by no other cause.

Table 7.

<table>
<thead>
<tr>
<th></th>
<th>1889-93</th>
<th>1894-8</th>
<th>1899-1903</th>
<th>1904-8</th>
<th>1909</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nottingham</td>
<td>100</td>
<td>139</td>
<td>145</td>
<td>119</td>
<td>96</td>
</tr>
<tr>
<td>Leicester</td>
<td>100</td>
<td>115</td>
<td>89</td>
<td>78</td>
<td>48</td>
</tr>
</tbody>
</table>

The decline in the Diarrhoea rate in Leicester was 52 per cent whereas in Nottingham it was only 4 per cent.

In Birmingham since 1903, a rapid conversion of pan
closets into water closets has been taking place. Coincident with this conversion, progressive yearly decrease has occurred in the number of Enteric Fever cases notified. There seems little doubt that the progressive decline of typhoid fever is causally related to such conversion. Between 1897 and 1909 inclusive, 20,392 pan closets were converted into water closets and I summarise the statistics in the following table.

Table

<table>
<thead>
<tr>
<th>Years</th>
<th>Average Number of pan closets converted</th>
<th>Average Number of Notifications</th>
<th>Average Death rate per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1897-1902</td>
<td>359</td>
<td>660</td>
<td>23.0</td>
</tr>
<tr>
<td>1903-1908</td>
<td>2752</td>
<td>239</td>
<td>8.5</td>
</tr>
<tr>
<td>1909</td>
<td>1763</td>
<td>95</td>
<td>4.0</td>
</tr>
</tbody>
</table>

The arrest of the decline in Mortality from Enteric Fever (1886-1889) has been accounted for by a succession of years characterised by deficient rainfall and of Autumns with high temperatures. The total deficiency in Rainfall 1886-1900 (from the average of 60 years) amounted to no less than 17.7 inches.
Nottingham Weekly Report

Notifications of Enteric Fever.

Nottingham Weekly M.O.H report

Notifications of Enteric Fever.
Let \( D \) represent the ground level, \( A F, BG, CH \), three levels of ground water. \( O \) and \( Q \) two cess pools and \( P \) a well (surface) \( KLMN \), the upper surface of the first impervious stratum.

As long as the water remains at the level \( AF \) the well is not likely to be polluted to any extent by the Cess pool which drains into a depression and not at all by cess pool \( Q \) owing to the onward flow of the ground water.

If the cesspool water falls to \( CH \) and then rises, to fall again, the well \( P \) is polluted by leakage from the cesspool \( Q \). If the water level be low originally at the level and if it rises and then falls the well is polluted by leakage from the cesspool \( O \).
Table 8. RAINFALL

<table>
<thead>
<tr>
<th>Year</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1836-90</td>
<td>3.7 inches</td>
</tr>
<tr>
<td>1891-95</td>
<td>2.4 &quot;</td>
</tr>
<tr>
<td>1896-1900</td>
<td>11.6 &quot;</td>
</tr>
<tr>
<td>1901-05</td>
<td>1.7 &quot;</td>
</tr>
<tr>
<td>1906-09</td>
<td>Excess 0.1</td>
</tr>
</tbody>
</table>

The seasonal prevalence of Enteric Fever, well illustrated by the tracing of the weekly incidence of the disease in Nottingham (obtained by the charting of the Notification certificates) is related to the fluctuating levels of subsoil water and to temperature. Let it now suffice to point out that the prevalence of Enteric Fever is more closely related to fluctuations in the level of the ground water than a sustained high level. The inconsistency noted in different districts, in some i.e. Berlin and Munich an outbreak is noticed with a fall in the level following a rise and in others e.g. Buda Pesth with a rise following a fall is explained by the contour of the first impervious stratum. In the recently issued report of the Local Government Board 1909-10 on "Shellfish in relation to Disease," there is collected evidence to shew that the ingestion of polluted shellfish would appear to account for a not inconsiderable portion of the Autumnal rise of Enteric Fever.

Attention must be directed to the influence of Isolation Hospitals on the prevalence of Enteric Fever. The increased provision of such hospitals and the

*See diagram.*
Enteric Fever
Liverpool
1889-1909.

Cases notified
Cases removed to hospital
greater use of them in the reception of patients suffering from Enteric Fever must necessarily exercise influence on the prevalence of the disease. For a source of infection is withdrawn from among the general population. Multiple infections of the same household are prevented and the danger of the transference of the disease from the one locality to another is minimised.

In Liverpool the percentage of removals of notified cases has increased remarkably and almost continuously during the past 20 years so that in 1909, fully 83 per cent of the notified cases were treated in hospitals.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases notified</th>
<th>Removed to hospital</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1889</td>
<td>670</td>
<td>302</td>
<td>45</td>
</tr>
<tr>
<td>1890</td>
<td>506</td>
<td>296</td>
<td>58</td>
</tr>
<tr>
<td>1891</td>
<td>588</td>
<td>350</td>
<td>59</td>
</tr>
<tr>
<td>1892</td>
<td>699</td>
<td>345</td>
<td>49</td>
</tr>
<tr>
<td>1893</td>
<td>1396</td>
<td>723</td>
<td>52</td>
</tr>
<tr>
<td>1894</td>
<td>1350</td>
<td>745</td>
<td>55</td>
</tr>
<tr>
<td>1895</td>
<td>1306</td>
<td>662</td>
<td>50</td>
</tr>
<tr>
<td>1896</td>
<td>1063</td>
<td>539</td>
<td>50</td>
</tr>
<tr>
<td>1897</td>
<td>991</td>
<td>559</td>
<td>56</td>
</tr>
<tr>
<td>1898</td>
<td>863</td>
<td>585</td>
<td>67</td>
</tr>
<tr>
<td>1899</td>
<td>988</td>
<td>668</td>
<td>67</td>
</tr>
<tr>
<td>1900</td>
<td>731</td>
<td>450</td>
<td>61</td>
</tr>
<tr>
<td>1901</td>
<td>864</td>
<td>567</td>
<td>65</td>
</tr>
<tr>
<td>1902</td>
<td>1026</td>
<td>670</td>
<td>65</td>
</tr>
<tr>
<td>1903</td>
<td>681</td>
<td>462</td>
<td>67</td>
</tr>
</tbody>
</table>
Enteric Fever percentage of removals to City of Liverpool Hospitals.

Enteric Fever percentage of removals to City of Liverpool Hospital.
Table 9, continued

<table>
<thead>
<tr>
<th>Year</th>
<th>cases notified</th>
<th>Removed to hospital</th>
<th>Per cent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1904</td>
<td>434</td>
<td>296</td>
<td>68</td>
</tr>
<tr>
<td>1905</td>
<td>325</td>
<td>235</td>
<td>72</td>
</tr>
<tr>
<td>1906</td>
<td>491</td>
<td>360</td>
<td>73</td>
</tr>
<tr>
<td>1907</td>
<td>482</td>
<td>332</td>
<td>77</td>
</tr>
<tr>
<td>1908</td>
<td>447</td>
<td>360</td>
<td>80</td>
</tr>
<tr>
<td>1909</td>
<td>273</td>
<td>223</td>
<td>83</td>
</tr>
</tbody>
</table>

In consequence of the diminished prevalence of Enteric Fever, and the increased percentage of removals of notified cases to Isolation Hospitals, the function of such hospitals is becoming materially extended. For it is essential to the success of any attempt to control the prevalence of any infectious disease that accurate diagnosis should be made early and that isolation should be prompt. In no disease is there such difficulty in clinical diagnosis at an early stage as in Enteric Fever. The disease may even run its course and a certain diagnosis be impossible. A large number of patients will therefore be received in which it will be necessary to revise the diagnosis and with a diminishing prevalence of Enteric Fever the proportion of such cases will tend to rise. Out of 55 consecutive cases (to which I make detailed reference) in no less than 17 (or 31 per cent) the original diagnosis was faulty.
The admission of such cases in Isolation Hospitals ought to be encouraged rather than deprecated. For the best hope of success depends upon a cordial co-operation between the private practitioner and the Public Health Authority.

The cases to which reference has been made were generally of a severe type. But another class of cases, much more numerous, occur. A patient is ill without presenting any very definite symptoms and recovers without the cause of the illness being recognised; such mild and obscure cases of Enteric Fever are a grave source of danger to the community for by them the disease may be conveyed and spread.

A thoroughly equipped isolation hospital affords a means whereby both classes can be readily diagnosed by bacteriological methods.

The cases admitted can be diagnosed almost with certainty by means of the blood-culture method within 48 hours. Unfortunately it is not possible to use it in the majority of cases occurring in private practice. The recognition of the rôle played by Typhoid "carriers" in the propagation of the infection throws an additional onus on the Medical officer.
For little public protection is afforded by the isolation of a patient suffering from the disease in an acute phase if, when convalescent, he continue to excrete Typhoid bacilli. The number of such cases is by no means insignificant and many outbreaks of Enteric Fever have already been traced to this cause. Before a patient is discharged from an Isolation Hospital, it is necessary that his excreta should be free from the infective bacilli. Theoretically therefore the excreta should be examined in every case before discharged from the Hospital.

This would necessitate an increase in the medical staff.

Only by the early isolation of doubtful cases and the careful examination of convalescents will the full value of isolation hospitals in the safe guarding of the Public Health from Enteric Fever be obtained.
My Thesis "that the isolation of the Bacillus Typhosus from the blood of patients suffering from Enteric Fever affords the best and most satisfactory means of diagnosis especially in the early stages of the disease, and that the recovery and recognition of the organism is conclusive evidence of the nature of the disease" is based upon observations made in 55 consecutive cases, notified as Enteric Fever, and admitted for isolation and treatment, within a period of eighteen months, at the Liverpool City Hospital, Grafton Street, at which I am Resident Medical Officer.

Of the 55 cases admitted, blood was taken for purposes of cultivation from 21 cases.

It is a well recognised fact that the early diagnosis of Enteric Fever is often impossible by the ordinary means at the disposal of the general practitioner.

In the majority of cases few, if any, of the outstanding signs, which together form a clinical picture of Enteric Fever are present in the early stages of the disease and there is no one feature of the disease which, taken by itself, can be said to be pathognomonic.
Formerly, when Enteric Fever was rife and practitioners were constantly on the look out for it, the diagnosis of a first case occurring in a family or institution was not so likely to be overlooked. At the present time when, in many towns and districts there are only occasional sporadic cases it is no uncommon thing for secondary infections to occur before the primary case has been recognised as Enteric Fever.

In connection with cases admitted to the above mentioned Hospital within a period of eighteen months, I have seen at least four instances of this fact, involving a total of 13 cases of Enteric with four deaths. Eight of these cases were admitted to this hospital, including one primary case, and of the eight cases admitted one died.

In one of the four above mentioned instances, 3 cases and 2 deaths occurred in the same family; death occurring in the first and third cases. It is highly probable that had an early diagnosis been arrived at in the first cases, in all four instances, followed by hospital isolation and nursing, the nine secondary cases and four deaths would have been prevented.
Not only is early diagnosis essential for the preventive measures, but it is equally necessary for a good prognosis which is very greatly dependent upon careful nursing from the first.

The following is an analysis of the 55 notified cases admitted to hospital.

55 Total Cases.

38 (69%) proved to be Enteric Fever.

17 (31%) proved to be suffering, not from Enteric Fever, but from other diseases, which were as follows:

- Acute Pneumonia
- Broncho-Pneumonia
- Pleurisy
- Pulmonary Tuberculosis
- Tuberculous Meningitis
- Tonsillitis
- General Peritonitis
- Malaise (undiagnosed)

17 Total

These cases illustrate therefore some of the diseases which are mistaken for Enteric Fever, and, to some degree, the extent to which mistakes occur, owing usually to the difficulty in early diagnosis.
Of the seventeen negative cases, a definite and immediate corrected diagnosis was possible in eleven at the time of admission to hospital.

In the remaining six cases the diagnosis was, at first, uncertain, and blood was therefore obtained from each patient with the object of isolating the Bacillus Typhosus if present.

The method will be described later.

A negative result was obtained in all six cases, and they subsequently proved not to be Enteric Fever. They were as follows,

Case Number 26, Pleurisy---------1
  "  " 35, Meningitis--------1
  "  " 46, Pneumonia--------1
  "  " 52, Pneumonia--------1
  "  " 48, Tonsillitis------1
  "  " 50, Malaise--------1
  (i.e. undiagnosed)

Total 6

The case of Malaise (number 50) was a sailor boy age 13 brought from an "Enteric-infected" ship, complaining of sudden onset of headache, vomiting, abdominal pain, and rigor commencing on the day previous to admission. When admitted his temperature was normal
but the spleen was enlarged and palpable, otherwise there was nothing abnormal to note.

The Widal reaction and blood culture were both negative. Next day he was apparently quite well.

He was kept under observation, but no further symptoms or signs developed.

Of the 38 cases which proved to be Enteric Fever as notified, the diagnosis was straightforward in 28. Blood cultures were nevertheless taken in 9 of these cases to test the reliability of the method.

There remained ten cases in which the diagnosis was not certain on admission. Some of these appeared to be probably Enteric, and others were doubtful.

Blood was obtained from six of these patients and in 5 cases the Bacillus Typhosus was isolated.

In the one exception, case 55, blood was not obtained until the temperature had practically settled.

Thus in 14.93 per cent of Enteric cases the Bacillus was found, and in 6 cases from which blood was taken in the first week of illness, a positive result was obtained in each =100 per cent.
TABLE OF CASES SENT INTO HOSPITAL AS ENTERIC FEVER, FROM WHICH BLOOD WAS TAKEN ON ADMISSION.

<table>
<thead>
<tr>
<th>Case</th>
<th>Day of Disease</th>
<th>Widal Reaction</th>
<th>Typhoid Bacillus Diag.</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>8</td>
<td>Positive</td>
<td>Positive? Enteric</td>
</tr>
<tr>
<td>24</td>
<td>7</td>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>21</td>
<td>Negative</td>
<td>Pleurisy</td>
</tr>
<tr>
<td>29</td>
<td>8</td>
<td>Negative</td>
<td>Positive Enteric</td>
</tr>
<tr>
<td>30</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>12</td>
<td>Positive?</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>11</td>
<td>Negative</td>
<td>Meningitis</td>
</tr>
<tr>
<td>42</td>
<td>13</td>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>3</td>
<td>Partial</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>5</td>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>14</td>
<td>Partial</td>
<td>Negative Pneumonia</td>
</tr>
<tr>
<td>47</td>
<td>16</td>
<td>Positive</td>
<td>Positive Enteric</td>
</tr>
<tr>
<td>48</td>
<td>2</td>
<td>Negative</td>
<td>Negative Tonsillitis</td>
</tr>
<tr>
<td>49</td>
<td>3</td>
<td>Negative</td>
<td>Positive Enteric</td>
</tr>
<tr>
<td>50</td>
<td>3</td>
<td>Negative</td>
<td>Negative Malaise</td>
</tr>
<tr>
<td>51</td>
<td>8</td>
<td>Partial</td>
<td>Positive Enteric</td>
</tr>
<tr>
<td>52</td>
<td>3</td>
<td>Positive</td>
<td>Negative Pneumonia</td>
</tr>
<tr>
<td>54</td>
<td>6</td>
<td>Partial</td>
<td>Positive, Enteric</td>
</tr>
<tr>
<td>55</td>
<td>19</td>
<td>Positive</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Total Cases--------21
Total Enterics--------15

B. Typhosus found in------14=93.3%

Nos. 25 and 31 In each of these cases (both in the second week of illness) a motile bacillus was seen in hanging drop from the broth-blood culture but owing to faulty technique the organism was not recovered.
CULTIVATION OF THE BACILLUS TYPHOSUS FROM THE BLOOD.

METHOD OF OBTAINING AND ISOLATING ORGANISM.

On admission to hospital the patient's arm, at the bend of the elbow, is prepared by washing with soap and water followed by the application of a carbolic fomentation (1 in 40). This renders the skin as far as possible antiseptic, and also acts as a local anaesthetic.

Apparatus always kept ready

(1) 20 cc glass and metal syringe, with metal piston, and needle with sharp point.
(2) Tubes, each containing 10 cc 1/2 sodium citrate solution in normal saline (sterile)
(3) Tubes, each containing 10 cc of sterile ox-bile

The bile is obtained from the slaughter house in the gall bladder intact (roughly 1/2 litre of bile in each gall bladder.)

It is filtered, placed in tubes, and sterilised in a Koch Steriliser at 100°C for 20 minutes on three successive days.

Withdrawal of blood.

A bandage is applied to the upper arm sufficiently tightly only to impede the venous return and so cause
the veins to swell. It is sometimes necessary in addition, to instruct the patient to open and close the fist as a further aid to engorgement of the veins. The skin over the median basilic vein is drawn towards the operator by the left forefinger and the needle (attached to syringe) is plunged obliquely through the skin and into the vein, with the eye of the needle looking upwards.

There is no difficulty as a rule in striking the lumen of the vein, except occasionally in patients with very fat arms, or feeble circulation, or in very young children. In the latter it may be necessary, first to expose the vein by skin incision.

Having entered the vein, 15 cc of blood are withdrawn by making gentle traction on the piston. Next loosen the bandage, remove the needle, and seal the prick with collodion.

Beyond occasional slight ecchymosis I have never seen the slightest ill effects follow the "Blood culture". The blood mixture is now transferred 4 cc at a time, into each of 5 bile tubes. Up to this point the work is performed at the bedside.

The tubes are at once placed in the incubator at 37°C. At the end of 24 hours (or thereabouts), ten Petri dishes having been prepared with solidified agar medium
1 c.c. of the blood-bile mixture from each tube is plated out (0.5 c.c. on each plate).
by means of sterile glass pipettes fitted with rubber teats. The dishes are then incubated at 37°c for 12 to 24 hours according to convenience.

**METHOD OF IDENTIFYING ORGANISM OBTAINED.**

The colonies, which are usually numerous, are then picked off with a platinum needle and subcultured into the following media.

1. Agar (sloped)
2. Peptone water.
3. Litmus milk.
4. Litmus Glucose broth.

At the same time a hanging drop is made and examined for motility.

Also films are made and stained:

1. By Methylene Blue.
2. By Gram's method.
3. For Flagella (not essential)

Later the organism is tested against the serum of a rabbit which has been inoculated with a known strain of B. Typhosus.

In my earlier cases the blood was placed into broth tubes (10 c.c. each) and at the end of 24 hours plated
out into melted agar at 40°C. This was found unsatisfactory, for on two occasions (Cases 25 and 31) although feebly motile bacilli could be seen on examination the broth by hanging drop method, the organisms were not recovered in culture. The blood probably inhibited the growth of the organisms in spite of being diluted in broth. Ox-bile was next used as recommended by Coleman and Buxton (Am. Jour. Med. Sciences, June 1907) on the assumption that bile neutralises the inhibitory effect of the blood. After 24 hours incubation, plates were made on Mc Conkey's solid medium and also on solidified agar plates. The colonies were always more numerous on ordinary agar and that medium was consequently used solely for plating out purposes. Contamination by staphylococcus albus occurred occasionally and chiefly in my earlier cases through imperfect preparation of the skin and want of skill in striking the vein the first time.

**Duration of Time Before Organism Isolated and Identified.**

Usually 48 hours to isolate organism which can then be tested at once against another treatment patient's serum, or against a typhoid rabbit's serum if available. Later the further cultural tests can be applied.
AGGLUTINATION REACTION of organisms isolated against a rabbit's serum which gives positive Widal reaction with a known Bacillus Typhosus when diluted 1 in 100 and also clumping (but not a completely positive reaction) 1 in 500.

<table>
<thead>
<tr>
<th>Name</th>
<th>1 in 100</th>
<th>1 in 500</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Typhosus Positive</td>
<td>clumping</td>
<td></td>
</tr>
<tr>
<td>24 Olive B.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29 Mabel McC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 Henry P.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 Walter B.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42 Hans K.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>43 Gerald Q</td>
<td></td>
<td></td>
</tr>
<tr>
<td>44 Gerald M.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45 Susan B.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>47 Archib. F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>49 Robert P.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51 Frank W.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>54 John S.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Time limit 2 hours Room Temperature.
LABORATORY METHOD OF PERFORMING AGGLUTINATIONS.

Blood, from a rabbit previously inoculated with Bacillus Typhosus, is withdrawn from a vein on the posterior surface of the ear (after shaving and cleaning) into a drawn out glass pipette. The ends are sealed off and the blood is centrifugalised. A file mark is then made on the blood tube and the top broken off. The clear serum is pipetted off and placed in a clean test tube and from it various graduated dilutions are made with sterile normal saline into separate test tubes. Each test tube is supplied with a glass pipette fitted with a rubber teat. A few drops from each dilution are placed in separate watch glasses, and into each is stirred a very minute quantity of a 12 to 18 hours agar culture of the organism under examination. At the same time a control emulsion is made in normal saline in the same way. From each watch glass a hanging drop preparation is made and the slide is marked with the time and name.
Method of performing Widal reaction for clinical purposes, in the cases referred to above as distinct from the Laboratory method already described.

Required.

(1) 18 to 24 hours broth culture of Bacillus Typhosus, on solid medium.

(2) Wright's tube containing patient's blood.

Method.

Place blood-tube in centrifuge and whirl till serum separates.
Take up a loopful of serum and place at one end of a clean glass slide, and around this place nine drops of Typhoid culture.
Mix intimately on the slide = 1 in 10 dilution.
Further along the slide place one drop of 1 in 10 dilution, and surround it by five drops of broth culture.
Again mix = 1 in 60 dilution.
From each dilution make a hanging drop preparation, and mark the slide with the time and degree of dilution.
Serum

Broth culture of B. Typhosus.

Drop of 1 in 10 dilution.

Broth culture.

1 in 60.

MICROSCOPIC APPEARANCES AND CULTURAL REACTIONS
OF ORGANISMS ISOLATED.

<table>
<thead>
<tr>
<th>Case</th>
<th>Methylen Blue</th>
<th>Gram stain</th>
<th>Hanging drop motility</th>
<th>Litmus milk</th>
<th>Peptone water for Indol</th>
<th>Litmus glucose broth</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 C.B.</td>
<td>Bacillus (2\mu) to (4\mu) (\times 0.5\mu)</td>
<td>Negative</td>
<td>Positive</td>
<td>Acid. No clot</td>
<td>Negative</td>
<td>No clot Acid.</td>
</tr>
<tr>
<td>29 M McC</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>30 H.P.</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>32 W.B.</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>42 H.K.</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>43 G.Q.</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>44 G.M.</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>45 S.B.</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>47 A.F.</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>49 R.P.</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>51 F.W.</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>54 J.S.</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
</tbody>
</table>
Ehrlich's method of testing for Indol (Journal of Hygiene). Solutions required.

**Solution 1.**
Paradimethylamido Benzaldehyde. --------- 4 parts
Absolute Alcohol.-------------------------- 330 "
Concentrated Hydrochloric Acid.----------- 30 "

**Solution 2.**
Saturated watery solution of potassium persulphate.

**Method.**
To a 24 hours old peptone water culture of the Bacillus under examination add

5 C.C. solution i
and 5 C.C. solution ii

using separate pipettes for each solution.

If indol be present a pink colouration appears in a few minutes.
Claims for Blood culture method of diagnosis in Enteric Fever.

(1) Early diagnosis (at latest within first week)
(2) Absolute Diagnosis. (if the organism be found)
(3) Rapid Diagnosis. (result obtained in less than 48 hours

Objection.

Method is not adapted to general practice unless employed by clinical bacteriologist, but blood may be drawn into ordinary capillary tubes and sent to a laboratory for incubation and examination.

The organism has been recovered by this method but the percentage of successes is low.
Other Methods of Bacteriological Diagnosis.

(1) From Rose Spots.

The rose spots are incised and the scrapings placed in various media. The bacilli are found in the lymph, the pink colour being caused by bacillary irritation. The method is painful, and uncertain in result. Moreover rose spots do not usually appear before the end of the first week and roughly 25% of cases have no exanthem at all.

(2) By Puncture of the Spleen.


(3) By Puncture of the Lung.

The B. Typhosus has been obtained by puncture of the lung in cases of Enteric Fever with Bronchitis. The few drops of the bloody serum obtained in the syringe are mixed with broth and incubated. The method is painful and not always successful.
Bancel of Paris obtained organism in 6 out of 15 cases by this method. (Jour. de Phys. et Path. Gen 1903, Vol V.)

(4) From the Urine.

Bouchard in 1881 first isolated the B. Typhosus from the urine. The method is of small value however from a diagnostic point of view, as it can rarely be obtained before the end of the second week, and in a large proportion of cases (about 2/3) it is not recovered at all.

It is found intermittently in "Carrier" cases and in this connection is of considerable value.

(5) From the Feces.

This method is uncertain in result from the point of view of early diagnosis.

The results are by no means always positive.

The method is slow, laborious, and unpleasant.

Some observers (Jour. A.M.A. Vol. LI. 1908. No.12) consider the gut contents to be a bad medium for the B. Typhosus and that the organism gains access to the feces from the gall bladder, and that this accounts for the fact that the Bacilli are only found in the feces from time to time.

They consider Enteric Fever to be primarily a Septicaemia with a secondary infection of gall bladder.
and intestines. This is to some extent supported by the opinion of other observers Drigalski &c., who consider the tonsils to be the site of inoculation and instance this by isolating the organism from the sore throats which occur in many Enteric cases at the commencement of the disease, often as an initial symptom. I examined bacteriologically the throats in two of my cases but failed, in both, to obtain the Typhoid Bacillus.

Dean (B.M.J. Nov. 12 1910) is able by means of the complement fixation method to detect the presence of small quantities of Typhoid Bacilli in the mixed growth obtained on plates inoculated with an emulsion of feces. The method is hardly suitable for the clinical bacteriologist in dealing with Enteric Fever in acute form, but is valuable in discovering "carrier" cases.

(6) By "Lumbar Puncture"

Cases are reported in which the organism has been isolated from the cerebro-spinal fluid obtained by Lumbar puncture. These methods have now more historical than clinical value for they are superseded by that of direct culture from the blood.
Widal Serum Diagnosis.

An indirect method of bacteriological diagnosis. It is based upon the fundamental investigations of Pfeiffer and his pupils, originally undertaken in the study of immunity.

They studied the action of the blood serum of animals immunised to Cholera and Typhoid upon the respective organisms. They showed that Pfeiffer's well known Cholera reaction was applicable also to the Typhoid Bacillus—namely the serum of animals immunised to Typhoid, when placed in the abdominal cavity of a healthy guinea-pig, together with an amount of Typhoid culture (experimentally found to be fatal) not only protected this animal against the action of the Bacilli; but also caused breaking down and finally solution of the Bacilli. The next step was to establish the fact that this method could be used to differentiate various organisms especially the Typhoid from the Colon group. Next it was discovered that the reaction could take place in the test tube.

Gruber and his pupils (Grünbaum &c) later showed that the blood serum of a human being behaved in the same way as the blood serum of an immunised animal. Thus blood serum from a patient after an attack of Enteric Fever if brought in contact with Typhoid Bacilli
in a test tube was found to cause clumping and sedimentation.

Gruber and his pupil Grunbaum therefore first called attention to the fact that this method not only differentiated the Typhoid from other allied Bacilli but also furnished proof in the human being of a previous attack of Enteric Fever, and to them belongs the credit of pointing out the diagnostic usefulness of the agglutination test (Sitzungsb. D. Weisbadener Congress. F. Inn Med. April 1896, and the Lancet Sept. 19, 1896)

Later Widal (Sem. Méd. 1896, No 33) pointed out that the serum showed agglutinating power during an attack of Enteric Fever as well as after recovery.

**Time of appearance of the reaction.**

Most frequently not before the end of the first week (from the 7th to 10th) day. Sometimes it is delayed till later.

Complete absence is very rare. The reaction has been found to occur occasionally in normal serum and in serum from patients suffering with other diseases (e.g. Tuberculous Meningitis, &c.)

At the John Hopkins hospital a standard of dilution of 1 in 50 and a maximum time limit of one hour are employed.
The reaction is to be considered positive if in every field there are numerous clumps, and the Bacilli have lost their motility, but the presence of a few motile Bacilli does not render the test negative.

A negative result does not necessarily imply that the patient is not suffering from a Typhoid infection.

In my cases a positive result was obtained in 35 out of 38 cases or 92%, and in 7 cases a positive result was obtained when the patients were suffering from other diseases— one of whom had had Enteric Fever seven years previously.

I here summarise objections to the Pfeiffer-Gruber-Grünbaum-Widal reaction.

(1) It is usually late in appearances and very occasionally absent entirely.

(2) It is not always specific of Enteric Fever

   (1) Sometimes positive in other diseases.

   (2) Patients may have had a previous attack of Enteric Fever.

   (3) Patients may have had anti-typhoid inoculation.

   (4) May obtain in infections with allied organisms.

   (Paratyphoids, Gaertner, &c.)
Typhoid Fever was until comparatively recently regarded as "a continued fever of long duration, usually attended with diarrhoea, and characterised by peculiar intestinal lesions, an eruption of small rose spots and enlargement of the spleen."

Even after the recognition of the B. Typhosus, it was believed that Enteric Fever, was, like Cholera, an intestinal disease. But through the demonstration of the presence of the Bacillus in the blood by improved methods of culture, the disease is now regarded as a septicaemia, the chief portal of invasion being the Alimentary Tract, more especially its lymphatic tissues, which are readily infected by the Bacillus.

It has recently been shewn by Drigalski that in a very large proportion of cases - (40 per cent) the invasion is attended by sore throat. He found the Bacilli frequently in the tonsils.

From the lymphatic tissues of the Alimentary Tract the Bacilli gain access to the blood and so are distributed generally throughout the body.

Multiplication need not of necessity occur in the blood, but growth appears to be active, not only in the tissues already referred to but also in the
mesenteric glands, the spleen and the bone marrow. The blood infection is thereby intensified. The Bacilli present in the tissues act as irritants, and local inflammations and necrotic foci may develop in various parts of the body. (e.g. Liver, Kidney, Lungs, and spleen). The ulceration of the Peyer's patches is thus explained.

There is a remarkable similarity in the aetiology and pathology of Enteric Fever and Tuberculosis more especially in the more modern conception of the two diseases. In Tuberculosis, the presence of the Tubercle Bacillus has recently been demonstrated in the blood: and the importance of the lymphatic invasion chiefly by way of the Alimentary Tract (to the exclusion of inhalation) prior to the development of a general septicaemia is now recognised.

The septicaemic nature of Enteric Fever being acknowledged, it follows that the method of diagnosis by means of blood cultures is theoretically rational and I have shewn that, in practice it surpasses all the other methods hitherto adopted for the diagnosis of Enteric Fever by its absolute certainty as well as by the early date at which it is available.
SUMMARY OF CASE REPORTS.

The following symptoms and complications were recorded.

Otorrhoea (2), Inflamed Glands (1), Mastoiditis (1), Prostatitis (1), Mastitis (1), Phlebitis (2), (both legs were affected in one case), Sore Throat (5), Pleurisy (1), Bronchitis (7), Hypostatic Pneumonia (1), Pneumonia and Gangrene (1), Oedema of ankles (1), Hyperpyrexia (1), Delirium (4), Retention of urine (1), Epistaxis (1), Haematuria (1), Profuse sweating (2), Slight abdominal pain (20), Slight distension (29), Tympanites (2), Meteorism (1).

In 17 cases the bowels were loose on admission and in 13 cases constipated. In two cases only was there diarrhoea whilst under treatment in hospital.

The Spleen was palpable in 24 cases, enlarged but not palpable in 6 cases, and not enlarged in 8 cases. Relapses occurred in 7 cases; Haemorrhage in 3 cases. Collapse, with severe abdominal pain (? partial perforation), 1 case.

The pulse was dicrotic in 17 cases, not dicrotic in 14 cases.

Rose spots were present in 36 cases, absent in 2 cases.
In 17 cases, spots were many and in 9 cases few.

Days in Hospital

<table>
<thead>
<tr>
<th>Days</th>
<th>Cases</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-7</td>
<td>1</td>
<td>(NO 19 Died.)</td>
</tr>
<tr>
<td>16-14</td>
<td>2</td>
<td>(NO 10. Died.) (NO 20 Died.)</td>
</tr>
<tr>
<td>15-21</td>
<td>1</td>
<td>(NO 55 Transferred.)</td>
</tr>
<tr>
<td>22-28</td>
<td>1</td>
<td>(NO 32. Died.)</td>
</tr>
<tr>
<td>29-35</td>
<td>1</td>
<td>(NO 13. Mild attack)</td>
</tr>
<tr>
<td>36-42</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>43-49</td>
<td>6</td>
<td>(Average duration of 34 cases)</td>
</tr>
<tr>
<td>50-56</td>
<td>9</td>
<td>(Four fatal cases being excluded.)</td>
</tr>
<tr>
<td>71-77</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>78-84</td>
<td>4</td>
<td>— Nine weeks.</td>
</tr>
<tr>
<td>85-91</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>92-98</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>106-112</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Case Mortality.

Four cases proved fatal. 10.5%.

2 cases (NO 19 and 20) died from intense toxaemia
1 case (NO 32) died from gangrene of the lung following Pneumonia.
1 case (NO 10) died from Pneumonia as a complication.
Routine Treatment of Enteric Fever carried out in the above cases.

Diet.

On admission $1\frac{1}{2}$ pints to 2 pints of milk freely diluted with water are given in 24 hours. The patient being fed every 3 hours. The degree of dilution is regulated by the condition of the patient's intestinal tract as to diarrhoea, or vomiting.

Occasionally, according to the type of case, in addition to milk, beef tea is given - 4 ounces at noon and 4 ounces at midnight.

After the temperature has remained normal for 7 days arrowroot is given - thin at first - 1 teaspoonful in 4 ounces of milk increasing to one tablespoonful in $\frac{1}{2}$ pint of milk.

Therefore towards the end of the second week of normal temperature, the patient is getting:

- Morning — $\frac{1}{2}$ pint arrowroot.
- Noon — $\frac{1}{2}$ pint beef tea.
- 4 P.M. — $\frac{1}{2}$ pint milk.
- Evening — $\frac{1}{2}$ pint milk.
- Midnight — $\frac{1}{2}$ pint beef tea.
After a week on the above diet it is changed to the following:

**Morning** ½ pint of Bread and milk (without crust)
well boiled with one egg beaten in.

**Noon.** ½ pint of beef tea with bread without crust
4 P.M. ½ pint of bread and milk as in the morning.
3 P.M. ½ pint Milk.

**Midnight.** ½ pint beef tea.

At the end of the 3rd week of normal temperature the diet is gradually increased with fish &c.

The patient is usually allowed to get up at the end of the 3rd week of normal temperature.

If there be vomiting or diarrhoea on admission, ½ pint or less of peptonised milk freely diluted is given in 24 hours - with 2 hourly feeds

**Sponging**

Should be performed twice in 24 hours all through the course of illness, unless for special reasons it is discontinued. If temperature above 103°F tepid sponging 4 hourly.

**Diarrhoea.**

Very seldom occurs with careful dieting.

Bismuth, Salicylate is occasionally given.

If Haemorrhage occurs no food is allowed for about 24 hours, ice being given by the mouth, and a light
ice cap containing finely crushed ice is applied to the abdomen.

Morphia sub-cutem.

Meteorism.

In one case with extreme meteorism occurring concurrently with haemorrhage, extract of pituitary gland was given sub cutem, with wonderful result and relief.

The Bowels.

Enema every 3rd day if bowels not moved
Aperients not until patients allowed up.
BRIEF NOTES OF 55 CONSECUTIVE CASES NOTIFIED AS ENTERIC FEVER AND ADMITTED TO HOSPITAL.
NO 1. ENTERIC FEVER.

Mary O'T Age 7, School girl.

Admitted. Aug. 5th 1909

Day of illness. 10th.

Onset. gradual, Headache, and slight sore throat followed by Vomiting and Diarrhoea.

On admission. Temp. 102.5, Pulse 120, Dicrotic, Resp. 22.

Tongue. Dry furred, sordes on lips and teeth.

Throat. Inflamed.

Skin. a few Rose spots on abdomen.

Abdomen. Slightly distended.

Spleen. Not palpable.

Bowels. Loose and dark.

Ehrlichs reaction. Positive.

Widal reaction. Positive. 1 in 60

Course of illness. Two relapses. Slight congestion of bases.

Result. Recovery.
Notes of Case.

Name: Margaret A. Age: 10 Disease: Enteric
Result: Recovery

Chart with data points and temperature readings over time.
NO 2. ENTERIC FEVER

Margaret Mc A  Age 10  School girl.
Day of illness. 7th.
Onset.  gradual. Headache and Malaise.

On Admission. Temp. 101.2, Pulse 120, not dicrotic Resp. 22.

Tongue.  Dry, Sordes.
Skin.  Nil.
Abdomen.  slightly distended.
Spleen.  Palpable.
Bowels.  Constipated.

Ehrlich's reaction Positive.
Methylene Blue.  Positive.
Widal reaction. Negative. (Positive on Sept. 26th)

Course of illness. moderately severe, No complications.

Result. Recovery.
NO 3 ENTERIC FEVER.

Day of illness. 10th.
Onset. Gradual, Malaise, and constipation.

On Admission. Temp. 101.4 Pulse. 66 not dicrotic.
Resp. 20.

Tongue. Rurred and dry.
Throat.
Skin One Rose spot on abdomen.
Abdomen. Not distended.
Spleen Palpable.
Bowels. Constipation.

Ehrlich's reaction. Positive.
Widal reaction. Positive. 1 in 60.

-------------------
Course of illness. Fever. sweats
Relapse.
Result. Recovery.
### Notes of Case

**Name:** Norman D.  
**Age:** 21  
**Disease:** Enteric  
**Result:** Recovery

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*Printed and Published by Waddesdon & Co., 57, Gate Street, Lincoln's Inn*
NO 4 ENTERIC FEVER.

Norman D. Age 21 Sailor.
Day of illness. 12th.
Onset. Sudden, vomiting, & diarrhoea.
Tongue. Dry and brown fur.
Throat.
Skin. Two Rose spots.
Abdomen. Not distended.
Spleen. Palpable.
Bowel. Constipation.
Ehrlichs reaction. Positive.
Methylene Blue. Positive.
Widal reaction. Positive.

Cause of illness. Mild.
No complications.
Result. Recovery.
**NO 5 ENTERIC FEVER.**

Robinson M.  
Age 25 Dock Railway man.

Admitted.  
Oct. 28th 1909.

Day of illness.  
10th.

Onset.  
Gradual, with headache and diarrhea.

On Admission.  
Temp. 102.4. Pulse 100 Dicrotic, Resp. 24.

Tongue.  
Dry and brown fur.

Throat.  

Skin.  
Numerous rose spots.

Abdomen.  
Slightly distended.

Spleen.  
Palpable.

Bowels.  
Loose and dark (haemorrhage.)

Méhlich's reaction Positive.

Methylene Blue. Positive.

Widal reaction. Positive.

Blood culture

Course of illness  
Severe.  
Pleurisy.  
haemorrhage.  
Collapse (partial perforation)  
Profuse petechial rash on chest and abdomen. Erythematous rash  
Profuse sweats. Phlebitis both legs.

Result.  
Recovery.
Notes of Case.

Name: William L. Age: 9
Disease: Pneumonia Result: Recovery

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[Graph showing temperature changes over time]
NO 6 Pneumonia.

Walter L.  Age 9  School boy.
Admitted.  Nov. 8th 1909.
Day of illness.  5th.
Onset.  Sudden, Headache, Cough, Pain in Chest, and Abdomen.
On Admission.  Temp. 100.4 Pulse 104. Resp. 44
Tongue.  Furred and moist.
Throat.
Lungs.  Definite physical signs of left lobar Pneumonia.
Skin.
Abdomen.  Slightly distended.
Spleen.
Bowels.  Loose.
Ehrlich's reaction. Positive.
Methylene Blue. Positive.
Widal reaction. Negative.
Blood culture.

Course of illness.  Crisis 7th day.
Result.  Recovery.
No. 7. ENTERIC FEVER.

William A. Age 24 Dock labourer.

Admitted. Nov. 9th 1909.

Day of illness 19th.

Onset. gradual, Malaise, Vomiting, Diarrhoea, Cough, Abdominal pain,


Tongue. Dry.

Throat.

Lungs. cough, Rhonchi in both lungs, a few Rose spots,

Skin. Slightly distended.

Abdomen.

Spleen.

Bowels. Loose.

Ehrlich's reaction.

Methylene Blue.

Widal reaction. Positive (1 in 60)

Blood culture.

Course of illness. Severe Cyanosis. Heart sounds feeble, Delirium.

Copious recurring crops of Rose spots, Profuse sweats.

Result. Recovery.
Notes of Case

Name: Mary C.  Age: 42. Disease: Intestinal. Result: Recovery.

[Graph showing temperature and other measurements over time]
Mary C. Age 42. Housewife.

Admitted Nov. 12th 1909.

Days of illness 7th (?) Onset. gradual. Headache, cough, shivering


Tongue. purred and dry.

Throat.

Lungs Slight cough. Rhonchi in both lungs

Skin.

Abdomen distended.

Spleen.

Bowels. Constipation.

Ehrlich's reaction.

Methylene blue.

Widal reaction. Positive. 1 in 60.

Blood culture.

Course of illness. Relapse.

Result. Recovery.
Notes of Case.

Name: John O'B. Age: 29
Disease: Interm
Result: Recovery

[Graph showing temperature, pulse, and respiration over time with marked data points for days 23 to 30.]
**No. 7. ENTERIC FEVER.**

<table>
<thead>
<tr>
<th>John O'B.</th>
<th>Age 27</th>
<th>Sailor.</th>
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<tbody>
<tr>
<td>Day of illness.</td>
<td>22nd.</td>
<td></td>
</tr>
<tr>
<td>Onset.</td>
<td>gradual, Headache, Vomiting, Diar-rhoea, Cough, Shivering,</td>
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<tr>
<td>Tongue.</td>
<td>Dry and furred.</td>
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<td>Throat.</td>
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<tr>
<td>Lungs.</td>
<td>Cough, Rhonchi in both lungs.</td>
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<td>Skin.</td>
<td>a few fading Rose spots on abdomen.</td>
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<td>Abdomen.</td>
<td>Slightly distended.</td>
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<td>Spleen.</td>
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<tr>
<td>Bowels.</td>
<td>Constipation.</td>
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<tr>
<td>Ehrlich's reaction.</td>
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<td>Methylene Blue.</td>
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<tr>
<td>Widal reaction.</td>
<td>Positive (1 in 60)</td>
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<tr>
<td>Blood culture.</td>
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**Course of illness.** Mild.

**Result.** Recovery.
Notes of Case

Name: Anthony H. Age: 31  Disease: Intoxication  Result: Died

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Printed and Published by Wickersham & Co., 626 State Street, Lincoln, Ne.
Anthony H.  
Age 31  
Sailor.

Admitted.  
Dec. 7th 1909.

Day of illness.  
10th.

Onset.  
Gradual, Malaise, Headache, 
Diarrhoea, Cough, Abdominal pain.

On Admission.  
Temp. 103  
Pulse 104  
Resp. 20.  
(Not Dicrotic).

Tongue.  
Dry and furred.

Lungs.  
Cough, Rhonchi in both lungs, creps 
at bases.

Skin.  
A few Rose spots, also sudanimal rash.

Abdomen.  
Distended.

Spleen.  

Bowels.  
Loose.

Ehrlich's reaction. Positive.

Methylene Blue. Positive.

Widal reaction. Positive 1 in 60.

Blood culture.

-------------------------------------

Course of illness.  
Very Severe.
Severe Haemorrhage.
Profuse sweating.
Meteorism.
Hypostatic Pneumonia.

Result.  
Death.
NO 11 ENTERIC FEVER

George H. Age 30. Clerk.


Day of illness. 22nd.

Onset. gradual, Malaise, (2 weeks) followed by Headache, Diarrhoea, Rigor, Sore throat, cough.


Tongue. Clean and moist.

Throat. 

Skin. Rose spots on abdomen and back.

Abdomen. slight distension.

Spleen. Palpable.

Bowel. Constipation.

Ehrlichs reaction. Positive.

Methylene blue.

Widal reaction Positive 1 in 60.

Blood culture. 

Course of illness. Mild. Profuse sweats.

Result. Recovery.
William C.  
Admitted.  
Day of illness.  
Onset.  

11th.  
Sudden Syncope followed by Headache, Shivering, Cough, Pain in Abdomen and back.  

Tongue.  Moist and clean.  
Throat.  
Skin.  
Abdomen.  Distended.  
Spleen.  Not enlarged.  
Bowels.  Constipation;  
Ehrlich's reaction Positive.  
Methylene Blue Positive.  
Widal reaction.  Positive 1 in 60.  
Blood culture.  

Course of illness.  
Result.  Recovery.
Catherine T. Age 34.
Admitted Dec. 16th
Day of illness 9th.
Onset gradual, Headache, Vomiting, Diarrhoea, Shivering, Cough,
On Admission Temp. 99.4 Pulse 90. Resp. 20
Tongue Furred and moist.
Throat
Skin Rose spots (fading)
Abdomen Distended.
Spleen Not enlarged.
Bowels Constipation.
Ehrlich's reaction.
Methylene Blue.
Widal reaction Positive.
Blood culture
Course of illness Mild.
Result Recovery.
Name: George S.  Age: 35  Disease: Ulcer
Result: Recovery

Notes of Case:
George S.

Admitted.

Day of illness.

Onset.

On Admission.

Tongue.

Throat.

Lungs.

Skin.

Abdomen.

Spleen.

Bowels.

Ehrlich's reaction.

Methylene Blue.

Widal reaction.

Blood culture.

Course of illness.

Result.

NO 14 ENTERIC FEVER.

Age 35 Ship Steward.

Dec. 29th

21st.

Gradual, Malaise, Headache, Vomiting, Rigor, Cough.

Temp.. 104.2 Pulse 100. Resp. 22.

Furred and moist.

Rhonchi in both. Cough.

One Rose spot.

Distended.

Palpable.

Constipation.

Positive.

Positive.

Positive.

Severe.

Relapse.

Left Otorrhoea.

Profuse sweats.

Recovery.
Notes of Case

Name: John W.  Age: 17  Disease: Pneumonia  Result: Died

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Printed and Published by Wodderspoon & Co., 602 Fleet Street, London.
NO 15  PNEUMONIA.

John W-  Age 17  Baker.
Day of illness.  9th.
Onset.  Sudden, Headache, Diarrhoea, Cough,
Tongue.  Dry and brown fur.
Throat.
Lungs.  R. apical Pneumonia.
Skin.
Abdomen.
Spleen.
Bowels.  Loose.
Ehrlich's reaction.
Methylene Blue.
Widal reaction.  Positive.
Blood culture.

---------------

Course of illness.  Severe.
Empyema
Gangrene of lung.

Result.  Death.
Name: William R Age: 14
Disease: Pneumonia
Result: Recovery

Notes of Case

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Printed and Published by Widdrington & Co., 5 East Street, Lincoln, Ne.
NO 16  PNEUMONIA.

William R-  Age 14
Admitted  Jan. 1st 1910.
Day of illness.  3rd.
Onset.  Sudden, Headache, Cough, Pain in Abdomen.

              Resp.. 44.
Tongue.
Throat.
Lungs.  Rhonchi in both lungs.
        Comparative dullness. R. Apex.
Skin.
Abdomen.  Slightly distended.
Spleen.
Bowels.
Ehrlichs reaction. Positive.
Methylene Blue. Positive.
Widal reaction. Negative.
Blood culture.

---------------------

Course of illness.  Crisis 7th day.
Result.  Recovery.
NO 17 ENTERIC FEVER.

James H. Age 49.
Day of illness. 7th.
Onset. gradual. Headaches, Vomiting, Rigors
Pain in back and limbs.

On Admission. Temp. 101.2 Pulse 92. Dicrotic,
Resp. 20.

Tongue. Furred and dry.
Throat.
Lungs.
Skin. Numerous Rose spots.
Abdomen. Distended.
Spleen. Palpable.
Bowels.
Ehrlich's reaction. Positive.
Methylene Blue. Positive.
Widal reaction. Positive.

Blood culture.

---------------

Course of illness. Moderately severe.
Retention of urine.
(Enlarged prostate)
Relapse.
Profuse sweats.

Result. Recovery.
No 18 Enteric Fever.

Rachel M.  Age 29


Day of illness.  10th.


Tongue.  Murred and moist.

Throat.

Lungs.

Skin.  Numerous Rose spots.

Abdomen.  Not distended.

Spleen.  Palpable.

Bowels.  Loose.

Ehrlich's reaction. Positive.

Methylene Blue. Positive.

Widal reaction. Positive.

Blood culture.  

---------------------

Course of illness.  Mild. Profuse sweats.

Result.  Recovery.
### Notes of Case

**Name:** Catherine A  
**Age:** 35  
**Disease:** Etioune  
**Result:** Died

<table>
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Printed and Published by Wodderspoon & Co. 8 East Street, Lincoln, Ne.
No 19: Enteric Fever.

Catherine A.  Age 35.
Day of illness.  11th
Onset.  Headache, vomiting, diarrhoea, shivering.

On Admission.

Tongue.  Dyr Brown Fur.
Throat.

Skin.  No Rose spots.

Abdomen.  Distended.

Spleen.  Not enlarged.

Bowels.  Loose.

Ehrlich's reaction. Positive.
Methylene Blue. Positive.

Widal reaction. Positive. 1 in 60.

Blood culture.

Course of illness  Very delirious on admission.
Subsequent coma, cyanosis and hyperpyrexia.

Result.
Death.
P Mortem.
Slight Swelling of solitary glands and Peyis patches.
B. Typhosus recovered from Spleen.
Name: Malcolm B. Age: 30  Disease: Sulfene  Result: Died

Temperature (Fahrenheit)
No 20. Enteric Fever.

Malcolm E.   Age 30  Commercial Traveller.
Day of illness.  7th.
Onset.        gradual, Malaise, Headache, vomiting.

Tongue.     Dry.
Throat.     
Lungs.    
Skin.      Numerous Rose spots.
Abdomen.     Distended
Spleen.   
Bowels. No Diarrhoea.
Ehrlich's reaction. Positive.
Methylene Blue.
Widal reaction. Positive.
Blood culture.

Course of illness.  Very severe toxaemia. Profuse sweats.
Result.         Death.
NO 21 ENTERIC FEVER.

Sarah P. Age 16 years Dressmaker.
Day of illness. 9th.
Tongue. Dry and brown fur;
Throat.
Lungs. Cough. A few Rhonchi in both lungs.
Skin. Numerous Rose spots on trunk and extremities.
Abdomen. Slightly distended.
Spleen. Enlarged.
Bowels. Constipation.

Ehrlichs reaction. Positive.
Methylene Blue.
Widal reaction. Positive.
Blood culture.

Course of illness. Very severe Relapse. Profuse sweats.

Result. Recovery.
Notes of Case.

| Name: Maria S. | Age: 31 | Disease: Enteric | Result: Recovery |

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Day of the Pulse: 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Resp.: 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57

Printed and Published by Woodruff & Co., 508 State Street, Lincoln, Ill.
NO 22 ENTERIC FEVER.

Maria S-  
Age 31  Housewife.  
Day of illness.  17th.  
Onset.  gradual, Malaise, Headache, Vomiting, Shivering, abdominal pain  
Tongue.  Furred and moist.  
Throat.  
Lungs.  
Skin.  A few Rose spots on abdomen.  
Abdomen.  Slightly distended.  
Spleen.  
Bowels.  Constipation.  
Ehrlich’s reaction. Negative.  
Methylene Blue.  
Widal reaction. Positive.  
Blood culture.  

-----------------------

Course of illness.  Relapse.  
Profuse sweats.  
Result.  Recovery.
No. 23 Enteric Fever.

William E-

Age 12 years. School boy.

Admitted

Jan. 22nd, 1910.

Day of illness

22nd.

Onset.

Headache, Vomiting, Slight Diarrhoea And slight cough.

On Admission.

Temp. 102.4 Pulse 108 Resp. 28.

Tongue

Moist.

Throat.

Lungs.

Skin.

Two Rose spots (further crops 25th and 28th Jan.)

Abdomen.

Slight distension.

Spleen.

Bowels.

Loose.

Ehrlich's reaction Positive.

Methylene Blue. Positive.

Widal reaction. Positive.

Blood culture.

Course of illness

Mild Erythematous rash.

Result.

Recovery.
NO 24. ENTERIC FEVER.

Olive B- Age 22 years Nurse Maid.

Admitted. Jan.. 29th 1910.

Day of illness. 7th.

Onset. Sudden, Headache, Rigor; Slight Cough Pain in back and Abdomen.

On Admission. Temp.. 102.4 Pulse 108. Dicrotic.

Resp.. 24.

Tongue. Furred.

Throat.

Lungs. Slight Cough.

Skin.

Abdomen. Not distended.

Spleen. Palpable.

Bowels. Constipation.

Ehrlichs reaction. Positive.

Methylene Blue.

Widal reaction. Positive. (1 in 60.)

Blood culture. Positive.

-------------------------------

Course of illness. Severe.

L. Otorrhoea.

Result. Recovery.
NO 25 ENTERIC FEVER.

Jane B. Age 34 Housekeeper.
Day of illness. 8th.
Onset. Gradual, Malaise, Headache, Vomiting, Shivering,
On Admission. Temp. 102.4 Pulse 100 Not Dicrotic.
Resp. 24.
Tongue. Dry and furred.
Throat.
Lungs. Cough.
Skin.
Abdomen. Distended.
Spleen. Enlarged, (Not palpable until Feb. 5th)
Bowels. Constipated.
Ehrlich's reaction, Positive.
Methylene Blue.
Widal reaction. Positive. (1 in 60-)

Course of illness. Mild.
Result Recovery.
NO 26 Pleurisy.

Alfred H.  
Age 30  Sea Cook.

Admitted.  
Feb. 10th 1910.

Day of illness.  
21st.

Onset.  
Gradual, Pain in right side, with Slight Cough, Shivering.

On Admission.  
Temp. 98.4 Pulse 96. Resp. 24.

Tongue.  
Dry and furred.

Throat.  

Lungs.  
Comparative dullness, in right axilla, with pleuritic rub.

Skin.  

Abdomen.  

Spleen.  
Not Palpable.

Bowels.  

Ehrlich's reaction. Positive.

Methylene Blue.  

Widal reaction. Positive.

Blood culture. Negative.

Course of illness. Mild.

Result. Recovery.
Name: Gladys W.  Age: 15  Disease: Intemé  Result: Recovery
NO 27. ENTERIC FEVER.

Gladys W- Age 1 years 6 months.
Day of illness. 14th.
Onset. Sudden, vomiting, diarrhoea and cough.


Tongue.

Throat.

Lungs.

Skin. (a few Rose spots Feb. 19th)

Abdomen. Distended.

Spleen. Enlarged.

Bowels. Loose.

Ehrlich's reaction.

Methylene Blue.

Widal reaction. Positive.

Blood culture.

Course of illness. Mild.

Result. Recovery.
George B- Age 10.

Admitted Feb. 22nd 1910.

Day of illness. 8th.

Onset. gradual, Pain in legs, Headache, slight cough.


Tongue. Dry and clean.

Throat.

Lungs. Slight Cough.

Skin. (2 Rose spots Feb. 23rd.)

Abdomen. Not distended.

Spleen. Palpable.

Bowels. Constipation.

Ehrlich's reaction. Positive.

Methylene Blue. Positive.

Widal reaction. Positive. 1 in 60.

Blood culture.

Course of illness. Mild.

Result. Recovery.
NO 29 ENTERIC FEVER.

Mabel McC. Age 22 years  Trained Nurse.
Day of illness.  8th.
Onset.  gradual, Headache, Vomiting, Diarrhoea, Shivering, Cough.

Tongue.  Furred and moist.
Throat.
Lungs.

Skin.  Numerous Rose spots on trunk and extremities.

Abdomen.  Distended.
Spleen.  Enlarged (not Palpable.)

Blood culture.  Positive.

Course of illness.  Delirium, Oedema ankles, sweats. Diarrhoea, Abdominal pain

Result.  Recovery.
Henry P. Age 6 years School boy.
Admitted. Feb. 9th 1910.
Day of illness. 9th.
Onset. Sudden, Vomiting, Abdominal pain, Cough and Shivering.

On Admission.
Resp. 32.

Tongue. Furred and moist.
Throat.
Lungs. Cough, Rhonchi in both Lungs.
Skin.
Abdomen. Distended.
Spleen. Palpable.
Bowels.

Ehrlich's reaction. Positive.
Methylene Blue. Positive.
Widal reaction. Positive.
Blood culture. Positive.

Course of illness. Severe.
Conjunctivities.
R and L Adentis
Albuininuna.
Profuse sweats.
Catherine R.  | Age 26  | Housewife.
---|---|---
Day of illness.  | 12th.  
Onset.  | gradual, Headache, vomiting, Diarrhoea, shivering, Cough, Abdominal pain.
Tongue.  | Dry and furred.  
Throat.  
Lungs.  | Cough, Rhonchi in both lungs,  
Skin.  | Numerous Rose spots on chest and abdomen.  
Abdomen.  | Distended.  
Spleen.  | Not palpable.  
Bowels.  | Loose.  
Ehrlich's reaction.  | Positive.  
Methylene Blue.  | Positive.  
Widal reaction.  | Positive.  
Blood culture.  | Positive.  

Course of illness.  | Moderately severe.  
Relapse.  
Left Otorrhoea.  
Profuse sweats.  
Result.  | Recovery.
NO 32 ENTERIC FEVER.

Walter B- Age 15 Apprentice Ironmonger.
Admitted Feb. 9th 1910.
Day of illness 7th.
Onset. Sudden, shivering, sore throat, Cough.

Tongue. Moist and furred.
Throat. Inflamed.
Lungs.
Skin. (Rose spots later)
Abdomen; Not distended.
Spleen. Palpable.
Bowels. Constipation.

Ehrlichs reaction. Positive.
Methylene Blue. Positive.
Blood culture Positive.

--------------------------

Course of illness. Very severe.
Delirium.
Severe Haemorrhage.
Left basal Pneumonia.
Gangrene of Lungs.

Result. Death.
NO 33. PNEUMONIA.

Austin McC

Admitted. March 7th 1910.

Day of illness. 8th.

Onset. Sudden, Headache, Vomiting, Cough, Pain in abdomen & back.

Diarrhoea, Shivering.


Tongue. Furred.

Throat.

Lungs. Well marked, left basal Pneumonia.

Skin.

Abdomen.

Spleen.

Bowels.

Kirch's reaction. Positive.

Methylene blue. Negative.

Widal reaction. Positive.

Blood culture.

Course of illness. Crisis 9th day.

Result. Recovery.
Notes of Case.

Name: Leslie J  
Age: 20  
Disease: Pulmonary TB  
Result: Recovery

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Printed and Published by Westmorland & Son, Street, Lincolnia, Ian.
Leslie I Age 20 Clerk.
Admitted April 5th 1910.
Day of illness 16th.
Onset Malaise, Shivering, Slight Cough.
Tongue.
Throat.
Lungs Slight comparative dullness at left apex.
Skin.
Abdomen.
Spleen.
Bowels.
Ehrlich's reaction Positive.
Methylene Blue Positive.
Widal reaction Negative.
Blood culture.

Course of illness Slight cough.
Result Discharged (with a cough.)
Walter G.  
Admitted.  
Day of illness.  
Onset.  
On Admission.  
Tongue.  
Throat.  
Lungs.  
Skin.  
Abdomen.  
Spleen.  
Bowels.  
Ehrlich's reaction.  
Methylene Blue.  
Widal reaction.  
Blood culture.  

NO 35 Tuberculous Meningitis.

Age 16.
April 18th 1910.
11th.
Gradual, Headache, Vomiting, Shivering Slight, Cough, Abdominal pain.
Furred.
No Rose spots.
Not distended.
Constipation.
Positive.
Positive.
Positive. 1 in 60.
Negative.


No 36 Pneumonia.

Phillip T.  Age 8
Day of illness.  (35th.
Onset.  No history obtainable.
        Taken ill at sea.
On Admission.  Temp., 100.6  Pulse 120.
              Resp., 32.
Tongue.
Throat.
Lungs.  R. Apical Pneumonia.
Skin.
Abdomen.  Slight distension.
Spleen.  Not enlarged.
Bowel.
Ehrlich's reaction. Positive.
Methylene Blue.  Positive.
Widal reaction. Negative.
Blood culture.

-------------------------------

Course of illness. Termination by Lysis(abut)
       6th day.
Result.  Recovery.
Notes of Case.

Name: Catharine V. Age: 6
Disease: Pneumonia
Result: Died

Temperature (in degrees) over time:

- Days: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
- Dates: April 11, 13, 17

Catharine V.  Age 6 years  School girl.
Admitted.  April 21st 1910.
Day of illness:  2nd.
Onset.  No history obtainable.
Resp.: 36.
Lungs  Broncho Pneumonia.
Skin.
Abdomen.
Spleen.
Bowels.
Ehrlichs reaction.
Methylene blue.
Widal reaction.
Blood culture.

-----------------

Course of illness.  Temp. fell by crisis 10th day
Two days late.  Well marked.
basal Meningitis.

Result.  Death.
P Mortem Examination.  
Confirmed diagnosis.
Notes of Case.

Name: Arthur G. Age: 15 Disease: Pneumonia Result: Recovery

Temperature

Day of

I N S I D E

Printed and published by Waterman & Co. 8 East 3rd Street.
NO 38. PNEUMONIA.

Arthur c.  
Admitted. April 21st 1910.
Day of illness. 3rd.
Onset. Sudden Headache Rigors, Pains all over body.

On Admission. 
Temp. 101.2 Pulse 140 Resp. 36
Tongue. Furred
Throat.
Lungs. Slight cough, otherwise nothing to note.
Skin.
Abdomen.
Spleen.
Bowels.
Ehrlich reaction. Positive.
Methylene Blue. positive.
Widal reaction. Negative.
Blood culture.

----------------------
Result. Recovery.
NO 39  GENERAL PERITONITIS.

Ida L.    Age 11 years.  School girl.
Admitted. May 7th 1910.
Day of illness.  3rd.
Onset. Sudden, Vomiting, Diarrhoea, Pain in Abdomen.
On Admission Temp. 103.4  Pulse 126  Resp. 36.
Tongue. Furred and moist.
Throat. Normal.
Lungs.
Skin.
Abdomen. Distended and tympanitic.
Spleen.
Bowels. Loose.

Ehrlich's reaction. Positive.

Methylene Blue. Positive.

Widal reaction. Positive 1 in 50.

Blood culture.

Course of illness. Laparotomy.
Pneumococcus isolated from pus.

Result. Death.
<table>
<thead>
<tr>
<th>Time</th>
<th>Temperature</th>
<th>Respiration</th>
<th>Pulse</th>
<th>Bowels</th>
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**Notes of Case:**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Disease</th>
<th>Result</th>
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<tbody>
<tr>
<td>William W, Age 11</td>
<td>Pneumonia</td>
<td>Died</td>
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</table>
NO 40. PNEUMONIA.

William W. Age 11 years. School boy.
Admitted. May 11th
Day of illness. 3/rd.
Onset. Sudden, Vomiting, Shivering,
On Admission. Temp. 104.2 Pulse 130. Resp. 22

Tongue.
Throat.
Lungs. Well marked left basal Pneumonia with cyanosis and failing heart.
Abdomen.
Skin.
Spleen.
Bowels.
Ehrlich's reaction.
Methylene Blue.
Widal reaction.
Blood culture.

------------------------

Course of illness.
Result. Death.
NO 41  PNEUMONIA.

John T. Age 37 years. Dock Labourer.
Admitted. May 12th 1910.
Day of illness. 7th.

On Admission. Temp. 101.8 Pulse 120. Resp. 44.
Tongue. Murred.
Throat.
Lungs. Well marked, left basal Pneumonia.

Skin.
Abdomen.
Spleen.
Bowels.
Ehrlich's reaction.
Methylene Blue.
Widal reaction. Negative.
Blood culture.

Course of illness. Crisis 8th day.
Result. Recovery.
Hans K-

Admitted.

Day of illness. 13th.

Onset. Slight Malaise, followed by severe Headache.

On admission.


Resp. 20.

Tongue. Furred.

Throat.

Lungs.

Skin. Numerous Rose spots on trunk and extremities.

Abdomen.

Spleen. Palpable.

Bowels. Constipated.

Ehrlich's reaction.

Methylene. Blue.

Widal reaction. Positive.

Blood culture. Positive.


Result. Recovery.

NO 42 ENTERIC FEVER.

Age 30 years Sailor.

Nov. 23rd 1910.

Slight Malaise, followed by severe Headache.


Resp. 20.
Name: Gerald A.  Age: 14  Disease: Intestinal  Result: Recovery

Notes of Case

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Day of Illness:
- 3, 4, 6, 9, 10, 11, 12, 13, 16, 17, 18, 20, 21, 23, 24, 26, 27, 29, 30, 32, 33, 34, 35, 36, 38, 39, 40, 41

Printed and Published by W. Woodsworth & Co., 20, Olney House, Lincolns Inn.
NO 43. ENTERIC FEVER.

Gerald Q. Age 14 years Sailor boy.


Day of illness. 3rd.

Onset. Sudden, Headache, Cough, "Feverish".


Resp. 24.

Tongue. Furred.

Throat.

Lungs. Cough.

Skin. No Rose spots (Crops later Nov. 28th and 30th.)

Abdomen. Distended.

Spleen. Not Palpable (Nov. 27th Palpable.)

Bowel. Constipation.

Ehrlich's reaction.

Methylene Blue.

Widals reaction. Not positive (some clumping 1. in 50. 45 minutes.)

Blood culture. Positive.

Course of illness. Mild.

Sudominal rash.

Profuse sweats.

Result. Recovery.
NO 44 ENTERIC FEVER.

Gerald M. Age 14 years, Sailor boy
Admitted. Nov. 29th 1910.
Day of illness. 5th
Onset. Sudden, Cough, Pain in abdomen, Shivering.

On admission. Temp. 98 Pulse 94 poor Resp. 20
Tongue. Furred and moist.
Throat.
Lungs.
Skin. Cyanosis lips and face and extremities.
Abdomen. Slightly distended.
Spleen. Not palpable.
Bowels. Constipated.

Ehrlich's reaction.
Methylene Blue.
Widal reaction. Not positive, slight clumping, 1 in 60 1 hour.

Blood culture. Positive.

Course of illness. Mild.
Result. Recovery.
Name: Susan B.  Age: 21  Disease: Typhoid  Result: Recovery

Notes of Case:

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Day of the Fevers:

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Notes of Case:

- Temperature readings over time.
- Recovery noted after initial fever spikes.

Graph shows fever spikes and recovery phase.
Susannah B-

Admitted. Nov. 29th 1910.

Day of illness. 14th.

Onset. Gradual, Malaise, Headache, Vomiting, Rigors, Pains in abdomen.


Tongue. Furred and moist.

Lungs.

Skin. Several Rose spots on abdomen also subsequent crops.

Abdomen. Distended.

Spleen. Not Palpable

Bowels. Loose.

Ehrlich's reaction.

Methylene Blue.

Widal reaction. Positive.

Blood culture. Positive.

Course of illness. Severe.

Relapse.

Abdominal pain.

Phlebitis.

Result. Recovery.
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<thead>
<tr>
<th>Name</th>
<th>Edward H. Age 37</th>
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<tbody>
<tr>
<td>Disease</td>
<td>Pneumonia</td>
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<td>Result</td>
<td>Recovery</td>
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Printed and Published by W. D. & H. O. WOOD, 69 Fetter Lane, Lincoln's Inn.
Edward H.  
Age 37 years  Carpet maker.

Admitted.  
Dec. 3rd 1910.

Day of illness.  
14th.

Onset.  
Sudden, Headache, Vomiting, Diarrhoea, Cough, Abdominal pain.

On Admission.  
Temp. 92.2 Pulse 96. Resp. 30.

Tongue.  
Furred.

Throat.  
Marked dullness with numerous coarse creps R base.

Lungs.  

Skin.  
? Rose spots on abdomen.

Abdomen.  
Adipose.

Spleen.  
Not Palpable.

Bowels.  
Loose.

Ehrlich's reaction.  

Methylene Blue.  

Widal reaction.  
Negative.

Blood culture.  
Negative.

Course of illness.  
Crisis before admission.

Result.  
Recovery.
Nates of Case

Name: Archibald, Age 31
Disease: Enteritis
Result: Recovery

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Printed and Published by Weedon & Co., 612 East Street, Louisville, Ky.
Archibald P.  


Day of illness.  16th.  

Onset.  Gradual, Malaise & Shivering followed by collapse at work.  


Tongue.  Purred and moist.  

Throat.  Inflamed.  

Lungs.  Infiamed.  

Skin.  (Dec. 8th Rose spots on Chest and Abdomen)  

Abdomen.  Slight distension.  

Spleen.  Palpable.  

Bowels.  Loose.  

Ehrlich's reaction.  

Methylene Blue.  

Widal reaction.  Positive.  

Blood culture.  Positive.  


Result.  Recovery.
Notes of Case:

Name: Frank D
Age: 34
Disease: Tonsillitis
Result: Recovery

Temperature Chart:

- Day of Illness: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31
- Temperature Range: 97% - 107%
- Normal Temperature: 102°
- Highest Temperature: 107°
NO 48. TONSILLITIS.

Frank D. Age 34 years. Sailor.
Day of illness 2nd.
Onset. Sudden, Headache, Shivering, Sore throat, Frontal headache.

Tongue. Wurred.
Throat. Inflamed. Deposit on each tonsil.
Lungs.
Skin.
Abdomen. Not distended.
Spleen. Not enlarged.
Bowels. Constipation.

Ehrlichs reaction.
Methylene Blue.
Widal reaction. NEGATIVE
Blood culture. Negative.

Course of illness.
Result. Recovery.
Name: Robert P.  Age: 9  Disease: Influenza  Result: Recovery
NO 49 ENTERIC FEVER.

Robert Conrad P. Age 7 years. School boy.


Day of illness. 8th.


Tongue. Furred.

Throat. Slight Cough.

Lungs. Slight Cough.

Skin. Two? Rose spots on Abdomen.


Spleen. (Palpable Dec. 11th.)

Bowels. Constipation.

Ehrlich's reaction.

Methylene Blue.

Widal reaction. Positive.

Blood culture. Positive.

Course of illness. Mild.

Result. Recovery.
NO 50 MALAISE.

Leonard H-  
Age 13 years, Sailor boy.
Admitted  
Dec. 17th 1910.
Day of illness  
3rd.
Onset.  
Sudden, Headache, Vomiting, Pain in abdomen, Rigor.

On Admission.  
Temp.. 98.6 Pulse 100, not Dicrotic. Resp.. 20.
Tongue  
Moist.
Throat.
Lungs.
Skin.  
No Rose spots.
Abdomen.
Spleen.  
Palpable.
Bowels.
Ehrlichs reaction.
Methylene blue.
Widal reaction.  Negative.
Blood culture.  Negative.

Course of illness.
Result.  Recovery.
NO 51 ENTERIC FEVER.

Frank W- Age 19 years. Clerk
Day of illness. 8th.
Onset. gradual Malaise, Rigors, Diarrhoea, Sore throat, Pain in abdomen.

On admission. Temp, 101.4. Pulse 100
Dicrotic, Resp 20
Tongue. Brown furred and dry.
Throat. Inflamed.
Lungs.
Skin. Numerous Rose spots on trunk and limbs
Abdomen. Not distended.
Spleen. Not palpable, (Dec. 21st)
Spleen palpable.

Bowels. Loose.

Ehrlichs reaction.

Methylene Blue.

Widal reaction. Positive.

Blood culture. Positive.

Course of illness. Severe.
Delirium

Result. Recovery.
NO 52. - PNEUMONIA.

Henry D.  Age 11 years. School boy.
Day of illness.  3rd.

On Admission.  Temp. 102 Pulse 140. Resp. 42.
  Tongue. Furred.
  Throat.
  Lungs. Comparative dullness R apex.
  Skin.
  Abdomen. Not distended.
  Spleen. Palpable.
  Bowels. Constipated.
  Ehrlichs reaction.
    Methlene Blue.
  Widal reaction. Positive. 1 i 60 (45 minutes.)
  Blood culture. Negative.

Course of illness. Dec. 26th Well marked apical Pneumonia.
  Slight delirium
  Crisis 8th day.

Result. Recovery.
Notes of Case.

Name: April Ot Age: 3 Disease: Intex Result: Recovery

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<tr>
<th>Day</th>
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<th>Temperature (Fahrenheit)</th>
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Printed and Published by Webber & Company, 515 N. State Street, Indianapolis.
Cyril O'D

Admitted.

Day of illness.

Onset.

On Admission.

Tongue.

Throat.

Lungs.

Skin.

Abdomen.

Spleen.

Bowels.

Ehrlich's reaction.

Widal reaction.

Blood culture.

Course of illness.

NO 53. ENTERIC FEVER

Age 3 years.

Dec. 29th L910.

9th.

Vomiting, Diarrhoea.

Temp. 101. Pulse 140 Resp. 24

Furred.

a few rose spots on abdomen.

Distended.

Palpable.

Diarrhoea.

Methylene Blue.

Positive.

R. and L. Otrrhoea

Diarrhoea.
Notes of Case

Name: John S.  Age: 16  Disease: Sputum  Result: Recovery

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<th>Pulse</th>
<th>Resp.</th>
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Temperature (Fahrenheit)

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Printed and Published by Westdrop & Co. 608 East Street, Lincoln, Ne.
NO 54 ENTERIC FEVER.

John S. Age 16 years. Sailor boy.
Day of illness. 6th.
Onset. gradual, Malaise, Rigors, Vomiting, Pain in abdomen.

On admission. Temp 100.4. Pulse 106.
Not dicrotic. Resp. 20
Tongue. Slight fur, Moist.
Throat.
Lungs.
Skin. one? Rose spot.
Abdomen. Not distended, Complains of pain.
Spleen. Palpable.
Bowels. Constipated.
Ehrlich's reaction.
Methylene Blue.
Widal reaction. Negative, partial clumping in 160.1 hr.
Blood culture. Positive.

Course of illness. Mild.
Result. Recovery.
Name: John M.  Age: 20  Disease: Intestinal  Result: Recovery

Temperature Chart:

- **Time:** [Graph with marked dates]
- **Temperature:** [Graph with marked temperatures]
- **Pulse:** [Graph with marked pulse rates]
- **Respirations:** [Graph with marked respiratory rates]

Printed and Published by Waterman A.C. Gates Street, Lincoln.
NO 55. ENTERIC FEVER.

John M- Are 20 years. Sailor.
Admitted. March 16th 1911.
Day of illness. 12th.
Onset. Severe, Frontal Headache, Malaise.

On admission. Temp 100.6 Pulse 80, Resp. 20
Tongue. Furred, Moist.
Throat.
Lungs.
Skin. Numerous small spots on abdomen.
Abdomen. Not distended.
Spleen. Palable.
Bowels. Constipation.

Ehrlich's reaction.
Methylene Blue.
Widal reaction. Not positive. (Slight clumping in 60 hours.)
Blood culture. Negative.

Course of illness. Mild.
Result. Recovery.