Thesis on

An account of an epidemic fevers

in a seaport, therapeutical,

dietetic, etiological and

sanitary aspects

[Signature]

W.B. 1863
An account of an epidemic of enteric fever in its diagnostic, therapeutic, dietetic, etiological, and sanitary aspects.
In submitting this thesis on an account of enteric fever it is not my intention to present a complete treatise on the disease per se but merely to record the salient features of an epidemic as it came under my own observation and my experiences in dealing with it.

The epidemic whose history I am about to record occurred during the later months of 1893 and early months of 1894 in the Police Burgh of Cultservilow which forms part of the parliamentary burgh of West in the County of Caithness. During this short time 181 cases came under my care and treatment. It is an account of my experiences of these cases and observations on them and an account of the epidemic from the point of view of a sanitarian that I now beg to submit for your consideration.

I propose to treat of my subject under two heads viz:-

I. Medical aspect of the epidemic.
II. The sanitary aspect of the epidemic.
I. The medical aspect of the epidemic
will treat of this subject under the following headings, viz.:

1. Incubation.
2. Diagnosis.
4. Therapeutics.
5. Dietetics.
8. Immunity from the disease.
9. Atypical Cases.

II. The sanitary aspect of the epidemic
This aspect of the epidemic will discuss as follows, viz.:

1. A brief description of the town and the sanitary enactments in force at the time of the epidemic.
2. A plot and plan of the conditions existing in Pulliwey town which are generally regarded as favorable to the spread of enteric fever, referring also to the adjacent Royal Dungeness, which escaped
infection enter. I believe owing to its better sanitary state and strict supervision.
(a) The water supply its origin and mode of introduction, with the facilities for its pollution and the filtration adopted.
(b) The drainage system of the town, with reference also to refuse removal and scavenging generally.
(c) The general character of the houses, with their average number of inhabitants and places of public convenience.
(d) The occupation and habits of people from a hygienic point of view.
(e) Origin and development of the epidemic

Conclusions and general remarks
A medical: F. Sanitary.
The medical aspect of the epidemic

(1) Incubation. In many cases it was extremely difficult and in some quite impossible to ascertain the exact day the patient exposed himself to infection or indeed to definitely determine on what particular day the first began to feel himself unwell. The cause of this difficulty is easily understood when one takes into consideration the, as a rule, very insidious nature of the onset of the disease; how one night the patient may feel rather out of sorts and next day feel comparatively well and, as I have frequently found, he may continue to feel quite well for some days after his first indisposition before having a recurrence of the symptoms.

A sufficient number of cases however in which the date of possible contagion was absolutely certain was obtained to enable me to fix the incubation
period as varying from sixteen to twenty-one days. A few cases in which the probable date of infection could be fixed were a day or two longer in sickness, but, as far as I have been able to ascertain, I believe that the average period of incubation was twenty days.

It is not unwholesome, if notice however that many of those whose attack was attributed as directly due to the milk supply, from which the original infection was derived, did not complain of illness nor come under treatment for from four to five weeks after the infected milk supply to the shop from which they purchased their milk had been stopped. I do not, however, consider that in their case the period of incubation was particularly prolonged but rather that their illness was caused by milk which had become polluted in the milk-shop through being put into insufficiently cleansed vessels or which had become contaminated by other means.
the more especially as this milkshop was in unsuitable premises where few attempts at cleanliness, owing to the nature of the other business conducted on the same premises, could be made and as the milkshops were never in special or looked after by the sanitary authorities, no great efforts in the way of cleanliness were ever put forth.

(2) Diagnosis. In the early stages of the disease and when patient suffering from enteric fever first come under the physician's notice it is difficult and in many cases quite impossible to form any definite diagnosis. As a rule except in particularly well-marked cases a day or two must elapse before any definite conclusion can be come to as to the exact nature of the malady under which the patient labours. In a limited number of cases, indeed, the diagnosis of enteric fever can only be made after a careful process of exclusion.
while some even till the end leave considerable room for doubt. When suspecting a case to be one of enteric fever it has always been my habit as a preliminary measure to enquire carefully into the sanitary surroundings under which the patient is or recently has been living, whether his water supply is unquestionable and whether he gets his milk from such a source that all suspicion of danger from that quarter may be dismistaked. The knowledge that a patient is suffering from a febrile attack coupled with the knowledge that he lives under very bad sanitary conditions or that his milk or water supply are more than likely to contain germs of enteric fever, more especially if other members of the community similarly situated are known to be suffering from enteric fever due to one of these causes, often enables the physician correctly and immediately to diagnose
otherwise rather obscure case as one of enteric fever.

The symptoms and signs which I have found most reliable in coming to a correct conclusion as to the early diagnosis of this disease and which I will refer to more in detail while dealing with the symptomatology of the disease are:

1. The general history of the commencement of the illness.
2. The history of malaise and gradually progressive weakness.
3. The distinctive temperature of the disease.
4. Anorexia and thirst.
5. The state of the bowels—generally constipated in the early stage.
6. The distinctive rose-red rash.
7. The diastolic condition of the pulse.
8. The extreme liability to epistaxis.
9. The condition of the tongue.
10. The general appearance of the patient and the condition of his pupils.
Symptomatology.

Early symptoms. These varied very much both in character and duration. By far the most common symptom however was a feeling of general weakness with an at first slight, but gradually increasing weakness and tiredness of the legs with disinclination for any exertion and a strong desire to pit "over the fire" doing nothing.

Headache was also a very common symptom and often seemed to be the only one for some days. It was frequently only slight but was more often referred to as a sort of weight on the head than as actual pain, especially during the morning but towards afternoon and evening it was apt to become exaggerated into a severe pain causing insomnia.

At this stage the disease the great majority of the patients seem to have resorted to a fugitive in some form
or other, which in some cases undoubtedly had the desired effect. If at least modifying all the symptoms, so much so, that some of those who had ceased work for a day or two were enabled to resume their occupation. This temporary remission of symptoms was, however, frequently also observed in those who had not resorted to the treatment above referred to. Without exception all those who had a temporary remission had a recurrence in an exaggerated form from within two to four days. Indeed it seemed that although the subjective phenomena were in abeyance yet the disease was pursuing its course all the same and consequently on the return of the symptoms the patients fell—probably quite as ill and prostrated as if they had never had any period of intermission. There can be no doubt that this slow and insidious onset of the fever
is one of its most characteristic features. On careful enquiry it can in nearly every case be determined that those cases which at first sight are sudden in their onset are not really so, but that the patient merely dates the commencement of the disease from the period of the recrudescence referred to above, or else the acute symptoms are due to some complicating disease, generally of the lungs, which latter was often caused by the patient, while feeling comparatively well, exposing themselves unwise to conditions favouring pulmonary troubles. As must be admitted patients in the early stages of enteric fever are particularly prone to catarrhal attacks especially of the respiratory and alimentary systems, and often ambition which in health would produce no ill effects, at most merely a passing catarrh, cause in them profound disturbances such as bronchitis.
and pneumonia of the respiratory system and gastro-enteric catarrh of the alimentary system. These and the other complications of the disease will be more fully treated under their appropriate headings.

Backache. This was an almost constant symptom and was in many cases of a most distressing and intolable character. It varied from a dull heavy painful sensation in the lumbar region to a more acute pain closely resembling lumbago in many of its characteristics, with the notable exception however, that in no case did it respond to the ordinary methods of treatment of that disease, but invariably passed off of its own accord on the onset of the more definite symptoms of diarrhoea.

Insomnia. This in my experience was one of the most constant symptoms. It commenced very early in
the course of the disease and very often
on careful inquiry I was able to
ascertain that insomonia had been
a cause of complaint even in the
early period of incubation when in all
other respects the patient was apparent
quite well. Probably this want of sleep
is a primary factor in the production of
the feeling of gradually increasing
tiredness and disinclination to do
any work.
Anorexia. This although a tolerably
frequent symptom was by no
means constant. In most cases when the patient complained of
it its onset could usually be traced to
within from four to six days of the probable
date of infection so that itCadre symptom
early in the course of the disease. It
manifests itself generally more as a
feeling of disinclination to eat food than
merely as a loss of appetite. In all cases where the symptom
manifests itself that the patient were quite fit to take liquid nourishment such as purées, eggs, milk, beef tea, gruel, etc. Nature then indicated the first and most important line of treatment in this disease. It must not be forgotten however that a few of those affected did not suffer from this symptom until the disease had run a considerable part. Of course and many bitter complaints when first put under treatment of being deprived of all solid food. The majority of those thus complaining made a comparative speedy recovery due in great measure, I think, to the stomach and digestive apparatus generally not having suffered very much from the effects of the pyrexia.

First: This was always a constant symptom throughout the early stages especially and was not by any means directly dependent for its
intensity. On the height of temperature reached, indeed it was quite astonishing on those who, only commencing to sicken, had a temperature of from 99°F to 100°F. As on those who putter on in the disease, had temperatures ranging from 102°F to 104°F.

Rigors. All complained more or less of this, or did it was generally expressed as a feeling as if cold water were being poured down the back from time to time, with shivering and general inability to keep warm. This symptom was much more marked, naturally, in those who had struggled against the disease and had followed their regular employment, and who did not come under observation until the temperature was very high and the patient was well advanced in the progressive stage of the fever.

Pain in the Abdomen. This was a
tolerably well marked symptom and
occurred in the great majority of cases
but was by no means a constant
feature, seldom requiring any special
treatment for its relief. It was more
often described as a sort of dull pain
with slight tenderness of pressure
generally referable to the right iliac
and umbilical regions. It is par-
ticularly noteworthy however that it
was a much more constant and urgent
symptom in children where it was
very often the first thing to draw the
guardians' attention to the state of
the child's health. In the later stages
of the disease when the abdomen
became tympanitic, as it did in many
of the more severe cases, the pain naturally
became much more severe and frequent
and required active treatment for its relief.
Here again the younger children were
the chief sufferers, the pain often
being so severe as to entirely preclude
the possibility of sleep, and both on its own account and on this latter it proved a very potent factor in wearing out the already exhausted sufferer, often converting a little-to-mild case into one of extreme gravity.

Physical signs of enteric fever, during the later incubation period and in the earliest stage of the fever, the most characteristic sign was a peculiar tired and worn-out expression borne by the patient. The face was pale and sometimes had the appearance of slight jaundice, which latter, was however more probably due to the natural colour of the skin having become more clearly defined than to any biliours matter having been deposited in it. The pupils were dilated and the eye was clear and glistening, indeed the appearance of the eye was closely analogous
to what would be produced by a medium dose of belladonna. This was a decided tendency to yawning, with its generally accompanying desire to stretch themselves, in all the patients who early came under my observation. The whole aspect of the patient gave one the idea that he was tired and wished to be left alone and not bothered with my questions or examination of any kind. At this stage too the patients were often garrulous and rather inclined to resent the interference of a medical man and to insist that they had no fever but were merely a little out of sorts and would be all right in a day or so. This may perhaps be partially explained by the fact that the epidemic occurred during the fishing season, the time during which the fishermen here rely on making as much money
as well keep them from serving during the ensuing winter, and when, as a matter of course they were very unwilling to lie up if they could possibly go to sea at all. In addition to this there were hired lands-hiaglas men—who had they but suspected that every member of the crew was suffering from an infectious disease would immediately have fled to their native Highlands irrespective of consequences. As a result of this many of the patients did not come under notice for some time after they were actually well advanced in the feversist stage. During the feversist stage, because the signs of the disease were much more pronounced, and a diagnosis could in some cases be at once come to if the symptoms already mentioned were present and especially if accompanied by some or all of the following physical signs.
descenditis, the patients lay on their backs, the eyes partially open and having the peculiar belladonna appearance already referred to. One or both cheeks, generally only one, had a bright red blush on it over the malar bone. The lips were partially open and in the more advanced stages of the disease had pieces of dead epithelium and mucus adhering to them which added greatly to the discomfort of many of these affections. The teeth seemed more than usually white and were perfectly dry over their cusps while their edges and the interseptes were usually covered by brownish colored and more or less peculiar smelling cordes. The skin of the face was often dry and had a kind of feeling similar to that met with in peulidaria after the rash has disappeared. The expression bore the air of languishment and
A general appearance of being tired, with disinclination to be disturbed.

The Alimentary System. The condition of the lips and teeth has already been described in the general aspect and debilities. The tongue in the early stages gave no indication of disease as a rule. Later generally about the second or third day of the fever it began to assume the characteristic febrile appearance. It first became dry then coated, especially posteriorly, with a whitish fur. This gradually extended over the whole dorsum of the organ. The next change was that the centre became bright red while the lateral parts of the dorsum retained the same white appearance, the papillae being only occasionally apparent as bright red specks. The edges throughout retained a red appearance except in the still later stages in severe cases when the whole
organ became dry and shrivelled, the

durium being arched, the tongue then

resembled nothing so much as a piece

of well roasted beef. At this stage the

organ looked only a fraction of its normal

size and was glazed on the surface.

Both speech and deglutition became

now matters of difficulty, as there was

a tendency for the epithelium of the

organ to crack on the slightest

motion, and the whole mouth and

fauces were in a dry, stiff, uncom-

fortable condition.

Throat. In a very small proportion indeed

of the cases was there anything specially

worthily discerned about this. Five or six

patients did complain of their throat

but this on examination generally

drove to be a simple inflammation

of the throat—most probably due to

the patient-wise exposing

himself to unfavourable atmos-

pheric conditions while in the
incubatory or even initial febrile stage of the disease, when as a
natural consequence his frame was not in a condition to withstand
the attacks of any irritant however
slight.

Stomach. The anorexia and thirst which
were constantly present have
been referred to already under the
symptoms. Vomiting was frequent
common at the onset of the febrile
stage and this was usually jabberious
character, the vomited matter consisting
of a brownish green slime substake.
Fortunately it was not of a persistent
character and could usually be
cleared by ordinary methods of
treatment.

The Bowels. The state of the bowels
varied widely in individual
cases but almost without exception
there was a history obtainable of
irregularity with constipation.
Indeed I may say that constipation was the predominant feature here in nearly every case in the early stages and in very many all through the disease with the exception of perhaps one, or in some cases two days, during which there was diarrhoea. The so-called typical diarrhoea of enteric fever did not in my experience commence till the fever was pretty well advanced, usually about the end of the second and beginning of the third week, and in a few cases not until the fever was pretty well advanced. When diarrhoea did appear it was often of the typical tea-bowl character but it was frequently had a greenish tinge. The stools when diarrhoea was present were frequent, averaging from four to ten a day, and had a very feculent odour. When the patient had been long confined to milk diet before the onset of the diarrhoea...
and in severe cases, flakes of curdled milk were usually present in the discharges. It was as a rule very persistent and did not readily yield to ordinary methods of treatment, although it could usually be controlled by moderate doses of Pub. Autae Amenistium Cura Ossis or Pubis Percaeum Ante Collum. In very severe cases, and in a few where diarrhoea was very persistent, blood was a frequent element in the stools and, hence, required special treatment. Regret that owing to limits once it was impossible to examine either chemically, microscopically or bacteriologically the discharges of the patients. It was a notable feature that diarrhoea occurring in the course of this disease was not accompanied by pain previous to a motion of the bowels, but in those cases which were exceptionally severe and when the bowel needed
to be seriously involved from the very first was pain before stool. Particularly complained of and then it was usually amongst the younger members of those attacked. Mildness was noticed in 30% of the cases, but in only a very limited number was it of such a severe nature as to call for any special treatment and in one case only could it be said that it directly contributed towards bringing about a fatal issue to the disease. The diarrhoea when present was very exhausting to the patient but was quite devoid of tenesmus and the many other accompaniments of ordinary diarrhoea, and it is more than probable that the exhaustion which accompanied it was quite as much the result of the severe debil condition giving rise to it and of the disturbance of the patient, as to the actual effect of the diarrhoea itself. The conclusion must come to with
regard to the state of the bowels in enteric fever are:

1. That diarhoea by no means so commonly accompanies this disease as is generally taught and supposed.

2. That in the early stages of the disease, excluding complications, constipation is the rule.

3. That the severity of the diarrhoea, when this sign is present, is a fairly reliable index of the severity with which the bowel is attacked.

4. That the macroscopic characters of the stools in this condition by no means invariably present: the classical "Pea soup" appearance, but are quite as often of a greenerish hue.

5. The stools are, however, irrespective of appearance always very offensive.

6. That pain before or during a motion of the bowels is rather an exception than the rule, and that tenesmus is seldom or never present.
(1) That at times it is difficult or even impossible to stop the diarrhoea but that it can be pretty easily controlled by the ordinary remedies.

(2) That in cases where the stools do not exceed from two to four in the twenty-four hours it is not at all advisable to try to stop it as a moderate amount of diarrhoea seems to act as a means of reducing the fever rather than of adding a complication to the disease. Constipation as already stated was far a more common symptom in the early stages and when it is frequent it, frequently persists throughout the disease it requires treatment for its relief. Otherwise, after a few days if it there is always a notable rise of temperature in my opinion directly attributable to its cause. (See Chart 33 – 36)

The most probable cause of this exacerbation of temperature is that decomposition products are absorbed
from the bowel and these, which in a healthy subject would cause nothing further than a feeling of uneasiness or loss of appetite, when acting on a system already debilitated by an exhausting fever readily affect either the heat-governing or heat-producing centre or both, thereby causing the rise of temperature.

Abdominal distension generally occurred in the later stages of the disease. Although present in a lesser degree in nearly every case, it was seldom so severe as to call for active treatment for its relief. It is, however, a sign of considerable value in doubtful cases, but since, as I have said, it rarely required special treatment, I am inclined to regard the severer forms of it as rather of the nature of a complication and will treat it more fully under that heading.
The spleen is the organ chiefly affected in this system. The cause is usually the spleen, about 25 per cent. However, made and complaints of pain most commonly localised in the spleen, so that as a symptom, pain in the spleen is of little or no value. The ordinary physical sign of enteric affection of the spleen was swelling, but this also is of comparative little value. From a diagnostic point of view, we may note:

(a) The comparative difficulty of defining its borders.
(b) The fact that the spleen does not in my experience become early affected in this disease, but is rather a sign of the later stages, and becomes the more an index of the severity of the attack and consequent, more of the nature of a symptom than a diagnostic sign.
(c) So much disturbance of the patient is necessary to correctly estimate the
size and condition of this organ that it is in many cases neither justifiable nor practicable to make any minute examination of it.

In every case particularly examined for affection of this organ it was found to be distinctly enlarged and slightly tender. The tenderness, however, varies from the slightest degree of discomfort to acute pain on manipulating it. In only four cases did splenic pain become so pronounced as to require special treatment for its relief.

Symphatic System. The sympathetics were affected in two cases only coming under my observation but as this occurred very late in the disease I will refer to it more particularly under the psychosis.

The Condition of the Blood. The blood in all cases was very markedly deteriorated in quality. The corpuscular element was much

reduced while the watery element remained much as before. The result of this change in the relative con-
stituents of the blood became very noticeable whenever haemorrhage occurred, when it was observed that not only did the pled blood appear thin but that it did not readily clot and thereby tend towards its natural arrest. As further proof of this watery condition of the blood it is noteworthy that all cases examined, especially in the later stages, exhibited a more or less pronounced anaemic murmur in the cardiac pulmonary area. The condition of the urine also gave destitute evidence of the enormous destruction of blood corpuscles constantly going on while the fever lasted.
Circulatory System. As a rule, in the early stages
there were no marked subjective phenomena such as faintness &
complaint of, but as was only to be expected faintness because a
very marked cause of complaint during the early period. Nevertheless,
more especially in these cases where
the temperature had for a lengthened
period continued very slight, or
where haemorrhages from the bowel
or elsewhere had been either bro-
tuse or frequent. This faintness,
however, seldom occurred except
when the patient first began to
sit up in bed or to get out of bed
for the first few times.
The heart. No particular changes were
noticeable in this organ until the disease
was well advanced, when as was
only natural, the muscular
elements began to suffer similar
to the other organs from the special
malnutrition. When so affected
his rate was increased, generally out of all proportion to the abdominal fever present. The sounds were weak, and frequently intermittent, while in well-marked cases a soft blowing murmur was audible at the pulmonary area due, however, in my estimation, quite as much to the deteriorating condition of the blood as to the condition of the heart itself.

The pulse gave comparatively little, or no, evidence of the amount of fever present. It was only towards the end of the first week that it began to assume the character which are so typical of it in this disease. Its rhythm was mainly affected in the most severe cases, in many of which it became extremely irregular and jerky.

The CHARACTER OF THE PULSE. When cases first came under
observation as previously stated, the characteristic of the pulse was not markedly affected; indeed, the surprising fact was that there were no little disturbances in the pulse. When, however, late in the disease, the heart began to suffer from the general malnutrition and hypoesthesia, this condition of affairs was greatly altered. What up till now had been a comparatively slow, regular, full pulse now became quick, often irregular, very markedly compressible, and above all distinctly diastolic. Indeed, to one first seeing a case of typhére fever at this stage, this presents one of the most characteristic features of the case, without exception this diastolicism was present in a more or less marked degree in every individual case.
which came under my notice and treatment; less marked certainly in the milder and abortive cases but: nevertheless always to be easily detected, even when the case was well advanced in convalescence. The main peculiarities of the pulse at this stage are its rapidity, markedly contrasted to its condition at an earlier stage, its great compressibility and its very declining diastolic tonus. The blood vessels. These also suffered from the general malnutrition and the prolonged fever as evidenced by the frequency of epistaxis which occurred in twenty-five per cent of the cases, and in a few by its profoundness became rather a serious complication requiring immediate surgical treatment in to arrest. So frequently was epistaxis noted during this epidemic
I enter on that, when compared with the relative infrequency of its occurrence in epidemics of other fever, some one is justified in designating it a sign of the disease. When it was moderate in degree, it was rather beneficial than otherwise, since it generally occurred in those in whom headache was most marked and invariably had the effect of relieving at least temporarily this distressing symptom. Respiratory system. Of eighty-five per cent. of the cases under my observation at some period or other of the disease I noted some well-marked pathological condition of this system. In not a few cases the patients were first brought to consult a medical man owing to some chest affection. In two especially typical cases the initial symptoms and physical signs
were absolutely identical with those of acute capillary bromelitis, so much so, that a correct diagnosis could only be come to after carefully watching the morning and localized variations of temperature, together with the other symptoms of enteric fever which later developed in these cases. A large number of the sufferers on first coming under observation complained of a head cold which could only be called by ordinary catarrh of the larger bronchial tubes and which generally disappeared to a great extent after the first day or two in bed. Later in the disease however more serious affection of the respiratory organs was estimated common, pulmonary congestion of a hypertensive nature being found in at least seventy-five cases of the cases met with. The symptoms and signs of this
often occurred almost suddenly in cases otherwise quietly uncomplicated, and which until such an onset had been progressing favourably. The frequency of the respirations when the lungs themselves were not affected gave no indication of the amount of fever present, and it was nothing unusual to find a patient with a temperature from 103.9 to 104.1 whose respiration showed no divergence from the normal either in rhythm or frequency. The only other sign worthy of notice with respect to the respiratory system, which was present amongst the patients during this epidemic, and which is I consider peculiar to enteric fevers, was the peculiar odour of the breath. This odour, which is quite characteristic and rather difficult to describe in words was noticeable in nearly every one as affected. It is best be described as a heavy astrigent smell.
odours which however must be smelt to be correctly appreciated.

Integumentary System. The skin was usually dry, but not very markedly harsh, and seldom gave any indication to the palpating hand of the actual amount of fever present. This peculiarity, in very many cases, was particularly noticeable, so much so, that no reliance whatever could be placed on this rough and ready method of estimating degree of temperature and the use of the clinical thermometer became absolutely necessary to enable one to form even a rough estimate of the patient's true condition. This dry condition of the skin, although invariably present at some stage, did not persist throughout the disease. It was more especially noted at the commencement of the attack and later during convalescence. The sunburned, moist condition of the skin
During the continuance of the fever, was, however, in my opinion directly attributable to the methods of treatment adopted. As it present at all it was certain far from being so apparent in those who had not come under any treatment until the commencement of the second or even third week of the fever. The dry condition of the skin was certainly most marked during the period of convalescence. At this period it usually became dry, flaky, and pealed, the scales coming off in large flakes quite unlike the dry branny scales of the pre-convalescent condition.

Rash. The rash was the sign most common met with and indeed in difficult cases it was only on its appearance that one could definitely diagnose the case as one of enteric fever.
It consists, as is well known, of small, bright rose-pink, papules situated over the joint, more particularly over the sides of the abdomen, and occasionally over the front of the throat. The papules are slightly raised above the surface of the skin and their bright colour disappears to a considerable extent on pressure by the finger. The duration of an individual papule is generally from three to five days, but they may fade earlier and they then leave no trace of their ever having existed. The peculiarity however about the papules is that they appear in successive crops so that although the individuals of one crop only exist for a few days, the rash may continue by successive crops for the remaining period of the fever after their first appearance.
This rash generally makes its appearance between the seventh and twelfth days of the disease. In some cases its onset was apparently delayed but this might be due to its presence not having been detected on its first appearance. As previously stated its commencement was on the flanks, front of the abdomen, or throat, but in one case which ultimately proved fatal, and which from the commencement was of a severe type, only one or two spots could be detected situated on the back just below the angles of the scapulae. From consideration of this case I have come to the conclusion that in those cases where the appearance of the rash was apparent so long delayed there was in all likelihood a previous crop of crops of spots situated
some such unusual position as that just referred to, and which
forewarned; if sufficient careful examination, may have escaped
my notice.

while holding that the case is
very important and an almost
conclusive proof. The presence
of enteric fever does not mean
to say that cases where normal
appearance are not cases of that
disease, as in about three per
cent. of those which came under
my observation, and which were
undoubtedly cases of enteric
fever, no rash could ever be
elicited even on the most careful
scrutiny from first to last.

other Rashes met, until during the
course of the epidemic, were
Sudamina. An outbreak of this kind
was pretty frequent
more especially in those cases who
Perspiration was excessive. Its presence was of little practical importance and Deamour says that it added very little even to the discomfort of the patient.

Scarlatiform Rash. Two cases, both young children, aged respectively six and five years, brother and sister, exhibited this peculiarity rash so closely resembling that of scarlatina and referred to by Eggle in his "Principles and Practice of Medicine" Vol. I, Page 172. These two cases on my first visit presented what appeared to be the typical rash of scarlatina. Every visible part of the patients was of a bright "boiled lobster" colour. The eyes were suffused and the conjunctivae looked congested. In addition to this and further adding to the difficulty of coming to a correct diagnosis were sore throat of an inflammatory nature was present in both cases and the tongue, the "unripe strawberry"
Appearance as typically characteristic of early scarlatina. There were naturally at first diagnosed as scarlatina but by next morning all this rash had disappeared; the sore throat was almost gone and the tongue had begun to assume the characteristics commonly met with in commencing enterie fever, but above all the temperature continued to rise which at once convinced me that the diagnosis was wrong. Both these cases turned out to be of a very virulent nature and in several weeks the prognosis was of the gravest; although in neither did a high temperature long persist. In both the nervous system was particularly affected, especially the higher intellectual centers. Indeed in the case of the girl the condition was bordering on characteristic B acute mania and remained so for almost a fortnight after the complete subsidence of the fever. See Case II below.
In two cases which came under my observation at this time I note about the fifth day a peculiar mealy rash very closely resembling the mulberry rash of typhus. Coincident with this rash one could make out without difficulty the characteristic cutaneous fever spots, and indeed these latter seemed to be brighter and more pronounced than usual. The mealy rash faded in four or five days leaving behind the unmistakable cutaneous fever spots of febrile fever. The occurrence of such a rash undoubtedly adds to the difficulty of diagnosis so much so that in a neighboring district an exactly analogous case occurred, it was in due course actually notified to the medical officer of health as being one of typhus fever, but which eventually turned out to be one Renterie fever. Both of my cases proved to be unusually
severe ones, and on coming across any
similar ones I could certainly give
a very guarded prognosis. The temperature
chart in my cases proves very valuable
in aiding the diagnosis as it both
showed characteristic of enteric
fever and showed none of the characteris
tic plus.

Urinary system. No abnormal
conditions specially
characteristic of enteric fever were
noted as accompanying the urinary
system. The urine merely presented
the typical appearance of that
met with in all acute febrile
conditions. It was comparatively
small in amount, loaded with
wastes, and of high specific gravity.
Albumen was detected in a few of
the cases examined towards the
end of the disease but it was rather
exceptional. Incontinence during
was very seldom met with and
only in those cases which were of a very severe type, and when the patient remained more or less unconscious for a longer or plastic period. In these cases it was observed that whenever the patient rallied, were slightly, control of the vesical reflex was immediately regained, thereby indicating that the incontinence was purely the result of the general weak condition of the patient and not of any special affection of the vesical center. Little is seen in the brain or spinal cord. I observed no cases of retention of urine nor of suppression.

Reproductive System. All reproductive functions as might be expected were in abeyance after one opportunity of observing the effect of the disease in a woman during pregnancy and the abortion as no other cause for the abortion.
General procedures were also new.

Pain was also a problem, along with weakness and
attacks of diarrhea. Girl, actually, always
wished he had more to do and something
to explain the events. Eolpho was always constant, precautionary,
and always careful, never allowing any
injuries, delays or lapses in any way.

As a result, always 70 percent unity
and no one necessary, not buying anything.

So the determination always grew,
and some analysts thought it was
possible to come to an understanding.
A very constant symptom and was due mainly to varying degrees of otitis. In some it amounted to merely a slight deafness while in others it assumed a more severe form accompanied by tinnitus and often ended in middle ear suppuration.

Temperature.

Taste. The taste was vitiated in every case. No matter what the substance was taken if it was uniformly pronounced to have a bad taste, but this peculiarity was more probably due to the condition of the mouth and tongue, containing as it did large quantities of purulent decomposing secretions than to the actual state of the gustatory apparatus.

Smell. The organs of smell seemed to be similarly affected to those of taste and everything seemed to have very much the same smell.
which as far as James Gatter was far from pleasant. These abnormal nervous sensations were not in any case of a lasting nature and generally speedily disappeared on defeverence taking place.

Motor Functions. With regard to the motor functions nothing especially noteworthy was observed. The organic reflexes with the exception of these cases which have previously mentioned and in which the patient involuntary forced his evacuations in bed, were not particularly affected, but in one case which from the first was severe and which ultimately proved fatal there was for a time considerable difficulty in swallowing. This condition however did not persist long and did not in my opinion have much to do with the ultimate result of the case.
The skin reflexes however showed some points worthy of notice. The hypogastric and cremasteric reflexes, and to a lesser extent the epigastric, also, were very markedly exaggerated. The exaggeration was most distinctly noticeable on the right side. This peculiar condition was generally present from the earliest stage of the disease and persists till its cessation. Vasoconstrictor and nutritive functions. She localized hyperaemia of the cheeks has already been noted. In addition to this there was also the very common condition of hypostatic congestion at the base of one or both lungs. The hypostasis previously noted was probably the result of the general trophic disturbance as specially affecting the sympathetic nervous system, while the small abscesses noted in one case were probably due to the disturbance of the trophic mechanism of the parts affected.
Red lines, although rare seen in this epidemic, added much to the general discomfort of those affected with them, and are now generally admitted to be due to the malnutrition of the foot, both vascular and nervous.

Wasting was here as in every other case of this disease a very marked feature, all the patients became considerably emaciated; some of them extremely so, and this generally irrespective of the amount of nourishment taken, which in some cases was a good deal more than is generally considered to be sufficient for an adult doing ordinary work.

Perspiration. This symptom in cases not being treated with a carbolic acid usually only made its appearance during the periods of delirium or insensibility, when it was occasionally profuse and sometimes of a cold clammy nature sometimes but rarely only affecting limited areas.
If the body, but as a general rule it may be said that it is never as excessive in this as in many other acute febrile diseases.

The gland secretions were to a great extent suppressed as instances of the any hot stimuli as if present, the dry mouth indicate.

Cerebral and mental functions. As might have been expected the abnormal conditions of the cerebral and mental functions varied widely and seemed to be to a large extent influenced in the particular abnormality that presents by the mental and cerebral development as well as by the type of constitution of the patient affected. For instance in those of phlegmatic or bilious diathesis the cerebral symptoms if any took the form of a cold or slow delirium from which the patient could be comparatively easily
rouses. From the first such patients seemed very apathetic and indifferent to their fate, and often great difficulty was experienced in persuading them to take their nourishment. Whereas when those of nervous and neurotanical temperament developed cerebral symptoms they were more frequently of a violent delirious character generally accompanied by exhaustion of the mental functions. I was unable to come to any definite conclusion as to the result of the fever on highly developed and well educated brains owing to the great majority of the cases occurring amongst uneducated and poorly educated persons. In all cases they early but certainly at some stage of the disease the normal intelligence of the patient was far below par, and this was specially observable in the cases, all of which soon became practically imbeciles. Of these, two, after a long
and trying convalescence, recovered, while one dies having passed from the state of imbecility to one of coma when the symptoms pretty closely resembled those of meningitis. In case IV, Page 123, memory so far as was able to elicit was always more or less impaired especially with relation to the things which had occurred during the course of the illness and which the patient was perfectly cognizant at the time.

Speech was often of a slow, hesitating character and gave one the idea that the patient had greater difficulty in perfectly expressing his ideas than any difficulty in the actual act of speaking.

Sleep as already stated was often absent for a considerable time and was often specially complained of in the very earliest stages of the disease and then constitutes a very troublesome and intractable symptom.
When sleep was procured it was generally fitful and unrefreshing, but of which the patient awakened in a more or less stupid and sleepless condition.

Locomotory system. In common with all the other structures of the body those of the locomotory system suffered from the general febrile condition. With the exception (vide case v. page 125) no special lesion of this system was observed. There was only the rapidly progressive weakness with its accompanying wakeful condition and in a few cases fibrillar twitching of the muscles. Staccato was observed in three or four cases, all very severe, two of which however happily recovered. In only one case was pain of a crampy nature complained of which occurred to a boy aged nine years, and who for several days and nights kept crying out.
owing to very severe crampy pains in the calf muscles. These pains were very severe and persisted, persisting all methods of treatment. The general muscular weakness was most apparent when the patients began to get up, often from a week to ten days elapsed before they were sufficiently strong to walk even the shortest distance unaided. The general wasting of the muscles was of course manifest due to atrophy from want of use as well as to the high temperature and the general malnutrition of the tissues.

(4) Therapeutics. The therapeutics of enteric fever is a subject about which much difference of opinion exists. Ever since the microscopic nature of the disease was definitely demonstrated various drugs of a more or less powerful antiseptic
characters have been advocates of different writers on the subject. Sublimides of mercury and mercurials generally, salol, carbolic acid and a host of other antiseptics too numerous to mention have all had their advocates.

Personally I have tried Calomel, Salol, salacetol, salicylate of soda, salicylic acid, Quinina and its derivatives and carbolic acid, and as a result of my experience, I am unhesitatingly state that in my opinion carbolic acid holds the first place as a medicinal agent in the treatment of this disease, and to its influence I attribute the extremely small percentage of deaths occurring in my practice during this epidemic.

I administer the drug in doses varying from a half to two minims according to age, suspended in mucilage and syrup of orange. The cost is paid as commonly dispensed by chemists.
Seemed to be not nearly so reliable, probably owing to some of the drugs becoming evaporated, or else to their passing through the intestine unchanged. In nearly every case the temperature showed an almost immediate depression after the commencement of the treatment, and this lowering of the temperature generally continued till the normal line had been reached. It is also noteworthy that the oscillations of temperature so commonly noted towards the close of this disease, were nearly always conspicuous by their absence. Indeed, from my experience gained during this epidemic, I have come to the conclusion that there is no safer nor more reliable antifever in enteric fever than carbolic acid, given in carefully regulated doses, every three or four hours according to circumstances. Apart from th
proof of the efficacy of the drug as indicated by the fall of temperature and the comparatively speaking rapid recovery noticed, several of the patients experienced so much relief after taking their medicine that, had they had it in their power they would have taken it. Fever taken was prescribed. In proof of the action of the drug in this disease I append chart No. 1 to 32 which in my opinion clearly show the remarkable effects which rapidly follow its administration.

In no case of all those treated was any symptom, such as delirium,狂暴, or of evil effects from the treatment ever observed. But it was observed urine was only seen in one or five of the cases and these had no other symptoms which appeared to indicate that this particular medicinal treatment should be stopped.
Before leaving the consideration of the action of this drug, as at least a palliative in enteric fever, I think it worthy of notice that many cases exhibiting dysentery, with more or less of the general symptoms commonly accompanying the sequel of this disease, and where there was suspicion was strongly in favour of the being active cases, as having occurred in cases already infected, especially if there was any fever or being at once full on CarCulose acid treatment, thereby leading one to suppose that when given sufficiently early in the disease it was capable of maintaining the fever to abort. In further proof of this many of the cases which, where as treated just an extreme of mild course, and some of them came to have a normal temperature long before the usual period of defervescence.
It is an interesting fact that the antipreteties proper, so called, had estiukes little effect—if any—in alleviating the distressing pains or in lowering the temperature in this fever. Of all the more common powerful antipreteties however, penicillin undoubtedly holds the first place since it both quickly lowers the temperature and alleviates pain causing but very moderate sweating and never in my experience unduly depressed the heart action. The medicinal treatment of the complications met with will be detailed when considering the complications themselves.

(5) Dietetics. The enormous importance of properly dieting patients suffering from interie fever has long been recognised. In my cases whenever suspicious symptoms of
this fever were recognised the patient was immediately confined to a strict liquid diet consisting at first entirely of milk, either raw or boiled according to circumstances and more or less diluted with lime or barley water, and beef tea, which latter, however, occasionally had to be stopped for a time, as when diarrhoea was a prominent feature, it seemed to increase it. Valentine's meat juice or Bovrine was then substituted for the beef tea and often with the best results. Indeed in all cases deemed that Valentine's meat juice is much preferable to the ordinary beef tea, more especially in those cases where disgust at all kinds of nourishment, or sickness is a very prominent feature, since the patient can then generally be got to take a supply of highly concentrated and easily absorbable nourishment.
If a palatable nature and which does not, as a rule tend to cause either nausea or sickness. Chicken tea, when more easily obtainable, was often substituted for beef tea, and of the whole was preferable to it, since it may be taken either way, in the form of tea, or cold in the form of a jelly, thus giving some variety to the dietary. Plain mutton broth also furnishes us with a nutritious, palatable, and very safe diet, and in many cases it was decidedly more relished by the patient than either beef or chicken tea. Alcohol, this generally with a form of well-matured Scotch whiskey, was prescribed sooner or later in every individual case—often from the very first day of the patient coming under observation—oral not only for its action as a stimulant—but also
for it is now generally admitted sugar as a food. The quantity used daily varied according to the requirements of the patient, some getting as much as from twelve to fourteen ounces in the twenty-four hours with marked benefit. Both to their comfort and nutrition, as a hypnotic and as a corrective of the deficiency present in many cases it proved to be most serviceable. It also had a marked effect in relieving the headach and general weakness of the patient. Of its extreme usefulness in this disease there can be no unprejudiced observer in the least possible doubt. In my opinion it is preferable to all other stimulants now in general use. It is easy and ready to administer, and generally to be got in every house, and consequently always at hand in cases of emergency. It is rapid and sure in its action and its effects although comparatively
fleeting can always be maintained by carefully regulating and repeating doses.

For the relief of thirst, often such a distressing symptom, water, either cold or hot, barley water, and the various aerated waters such as lemonade, soda and other drinks were given in moderate quantities. See also quinine, although relieving the symptoms of thirst temporarily further tended to increase them after its cooling effect had passed off. Acid or this account, although often asked for by the patients, I neither discouraged nor use. A simple and acceptable and often very successful method of satisfying thirst was lemon water, made by slicing one or two lemons and putting them into a jug of boiling water and letting stand till cold. The decanted liquid was then
administered in quantities of about a wineglassful at a time. Barleywater, flavoured by the addition of a few drops of lemon juice, made also a very tastable and successful drink. In some cases however all efforts at alleviating thirst were unsuccessful and it constituted one of the most harassing symptoms throughout the course of the disease. This then constituted the whole and only diet allowed to the patient throughout the whole febrile phase and not until perspiration complete disappeared both morning and evening for several days was any change permitted, during the phase of convalescence great difficulty was experienced in refeeding and in restricting the patient to a suitable diet.
Bunge's food. I found this to be very useful as a dietetic when the pyrexia had subsided but if given whenever even a slight degree of pyrexia existed it almost invariably caused a rise of temperature. It is nutritious and palatable and was invariably relished as a welcome change from the usual milk and beef tea diet which, however, quickly from the Physicians' point of view, speedily becomes monotonous. In a pregnant to the patient. When this was taken with skim milk for some days the next meal reads, 'Brown tea with rum service was added to the diet. In all names a raw egg, well whipped up in milk with or without the addition of brandy and sugar. This was heated always well borne and relished. It was prepared whipping up a fresh egg in a little warm water and adding to it half
a tumbler of warm milk and a varying quantity of brandy and sugar to take. Half of this was given in the forenoon and the remainder in the afternoon. If this did not show signs of raising the temperature, disagreeing with the patient—a little "bed-meal" porridge and milk—was then allowed morning and night and this certainly proved to be a far safer food in such cases than such substances as cornflour arrowroot, which are more commonly given. Cornflour is in my experience a most unsuitable food for those convalescent from enteric fever, as in nearly every case in which it was given, there was an undoubted rise of temperature which generally speedily fell on its sub-
stitution by warm arrowroot or better still by "bed-meal" porridge in small quantities and well boiled.
In my later cases I treated disorders in the same article of diet until convalescence had well advanced. This effect of convalescence may probably be due to the comparative larger percentage of fat than is present in the other dietary substances mentioned in a farinaceous nature. Charb. 70. 2. 7. 11. 12. 13. 14. Well illustrate this point.

Brown rice well boiled with milk often proved a very suitable diet. When such substances as stated above could be tolerated without bad effects the diet was gradually extended to such as chicken broth with boiled rice added. Fresh white fish boiled or brandade and later chicken, tripe, and such like easily digestible articles were gradually added to the scale of diet, and not till from twenty to twenty-four days after all symptoms of fever had subsided entries were a return to ordinary everyday diet permitted.
The complications met with are the treatment adopted.

(1) Sleeplessness. This was a frequent occurrence and did not present itself as a formidable complication and was generally successfully treated by giving a small quantity, varying from a tea to a tablespoonful, of whiskey or brandy as toddy at their ordinary bedtime. When this was not successful a dose of fifteen to twenty grains of strychnine or calomel given about 8 or 9 o'clock P.M. with spirits and water was all that was necessary to ensure a comparatively good night's sleep.

(2) Delirium. This was pretty common met with in the later stages when the system had become worn out by the long continued fever. It was usually easily subdued and sleep induced by regular doses of stimulants, alcoholic or otherwise, and only in one case, namely that of an adult...
who positively refused either medicine or alcohol, did it assume so severe a character as to constitute a grave complication. This patient became very violently delirious and required the utmost efforts of two or three attendants night and day, but especially at night, for several days, to keep him from injuring himself and others. As the result of this absolute refusal of all kinds of food and medicine, I attribute the severity of his symptoms to nervous exhaustion. In some cases this was extreme especially towards the termination of the febrile stage and could only be counteracted by the free administration of cooling liquid nourishment combined with alcoholic stimulants. (d) Dissel: This as previously stated constituted a very alarming symptom often resisting all methods of treatment. G. B. page 69.
(2) Pain in the abdomen. This was often so severe as to actually amount to a complication, and when present was generally most benefited by hot turpentine pustules or mustard poultices, and when associated with constipation, by the administration of a gentle laxative or simple enema.

(3) Swelling. This was rarely present.

When it did present itself however it was rapidly easily overcome by some simple gargle or by frequent painting the parts occasionally with equal parts of tincture of perchloride of iron and glycerine.

(4) Hearing Complications. As already stated deafness in a more or less severe form was very often noticed. This was occasionally complicated with easy 

bleed and was most probably due to malnutrition of the auditory nerves if not of the hearing centre itself.
In a few cases however it seems to be the result of inflammatory processes of the auditory apparatus which occasionally occur in the middle ear. For the former condition no special treatment was adopted but when suppuration supervened the ordinary treatment, such as syringing the ear with warm soap solution and after drying, insufflating a little dry powdered iodoform, was adopted and when pain was severe the instillation of a 10% quinine solution of cocaine, or of a few drops of Liquor Strychninis Batti was found useful with perfect satisfactory results. In none of my cases had permanent deafness resulted which latter I attribute in this complication to neural probably due to the complicated mixed nature of the attack than to the treatment adopted for its remedy.

Dizziness and Vomiting. Fortunately the
was rarely so severe or continued as to constitute an actual complication of the disease but, in a few instances it was with difficulty overcome. For its treatment the most successful remedies in my hands were Brandy and Coquina water, Rips I very cold water, ice, and such drugs as Bismuth, Calcium, Potassium, Sulphuric Acid, Cocaine, Liquor Bismuth; sedatives, morphine and several others. Often in addition to the medicinal treatment a small mustard puritice or mustard leaf was applied over the stomach and the combined treatment here indicated could generally be relied upon to put a stop to this troublesome and long continued dangerous affection.

(1) Buboes. This when not excessive I do not regard as adding a complication to the disease but rather perhaps it may be regarded
as curative on the ground that nature by this means carries the poison out of the system. In several cases however it was excessive and then it became necessary to try if not to stop it, at least to lessen its frequency. For this purpose I find a combination of Ultris spearmannae, Cimicifuga and Pulvis Canthareus aromaticus cum officinae with Culis fragilissima very serviceable. Another valuable combination for checking this diarrhoea is a mixture composed of Chlorodyne, Cinchona Kino, Cinchona Calchena, Cinchona Canadicae and Peppermint water. In every case however where diarrhoea was present when the patient first came under observation no treatment (such as I have indicated above) was adopted, since I have repeatedly observed that when Carbozinc acid was administered this symptom rapidly abated without any treatment - especially
A direct towards stopping it and to the fact of carbolic acid treatment having been so largely adopted by me in this epidemic is probably due the relatively small number of cases which occurred where the diarrhoea could really be spoken of as adding a complication to the disease.

2. Haemorrhage. Haemorrhage from some part of the body was very frequently observed and in a few cases became so profuse as to constitute rather a grave complication.

3. Epistaxis. This occurred in 25-70% of my cases (see page 34) and was undoubtedly the form of haemorrhage most frequently met with. In a few cases only did it prove so serious as to require any special treatment for its arrest. The method I found most useful for effecting this purpose was to make the patient sniff powdered natuca leaf and...
This was generally quite sufficient, but in one case of severe recurrent epistaxis, plugging of the nares led to its performance as a last resort.

(2) Haemorrhage from the bowel. This was present in five per cent. of my cases. In three or four it proved a very serious complication indeed and was only controllable by very energetic measures. Towards this end tannin, ergotamine, tannic acid, dilute sulphuric acid and strychnine were employed, separately or in mixture as occasion required. Tannin seemed to me to be especially serviceable here, as well as particularly reliable in addition to which it has no bad after effects and is easily taken.

Haemorrhage from the bowel was more or less directly responsible for death in one case a short account of which will be found at page 115 Case I.

In all the cases where haemorrhage...
occurred the patient became very prostrated and required very careful nursing to pull them through their long and trying convalescence. The diet also in such cases had always to be regulated with more than ordinary caution. Of course absolute rest and quiet in the recumbent position was strictly insisted on whenever any suspicion of the advent of such a complication was formed. In this complication, also, some of opinion that the administration of Carabolic acid in a liquid form is remarkably useful both as tending to check the bleeding when present, and in preventing its recurrence if its antiseptic action on the ulcer from which it took place.

2) Haemorrhagia was observed in one case — a fatal one. This case may, from the amount of haemorrhage which took place, be pretty safely described as one
Haemorrhagic typhoid. For its treatment, intramuscular injection of ergotamine citrate in doses of 1/20 grain was employed with speedy and satisfactory results.

Bleeding from the gums was seen in a few cases but this was usually caused by the patient picking at their gums with their nails when more or less unconscious in their semi-reflex attempts to remove the encrusting pordes adhering to their mouth and teeth. It never constituted a serious complication and could always be prevented by careful attention to the toilet of the mouth. For removing pordes and forfreshening the mouth generally I used to direct the mouth to be frequently pointed with glycerineum acidi boracic or with eudora officinalis and glycerine three parts. Both of these gave great relief to the patient and completely removed the often slight disagreeable
(3) Small petechial haemorrhages into the skin and mucous membranes were once or twice met with, but these did not personally complicate the disease nor call for any particular treatment, although they were perhaps of value as an indication of a severe attack, as it was only in severe cases in which they were met.

(4) Cardiac failure. This was pretty frequently met with, especially in cases where there had been much haemorrhage and always presented an alarming symptom then calling for prompt and vigorous treatment. Stimulation in such cases became urgent, necessitating the use of whiskey or brandy in its strongest form in which this stimulation was effected. It was occasionally necessary owing
To the inability or the absolute refusal of the patient to swallow anything to administer this by the bowel, and in such cases I came to the conclusion that the results obtained were equally as satisfactory and not nearly so evanescent as when given by the mouth. This was most probably due to the more gradual absorption from the bowel and probably also to the rather larger quantity taken at a time. Indeed in most cases, especially in those when digestion is weak and when anaemia and sickness is severe, but for the inconvenience of the process, I should strongly recommend that most of the alkaloidal stimulants should be given in this way. In four cases which seemed almost hopeless and where the pulse was imperceptible at the wrist, Digitalis Hypodermically, 1/80 with Stippling sulphate 1/400 with some pleasing to say results for surpassing my most sanguine
anticipations. All of these four cases
rallied for a time although unfortunately
two of them ultimately succumbed to
the disease, but in all four there were
a multiplicity of complications. The
two who died were children who had
never been robust, while the other
two were fair strong adults— a male
and a female. In less severe cases of
threatened cardiac failure digitalis
glycoside and arsenie spirits quinaria
were mainly employed to relieve the
condition. I did not find so reliably as digitalis and said certain
incline to place the latter far before
it as a cardiac tonic and stimulant
in this disease.

Pulmonary Complications. As already
mentioned these were
very common, often at the commencement
of the disease, and thereby adding
a degree of difficulty to making a
correct diagnosis, though as could be
expeeted, they were very much more frequent, met with towards the end of the febrile stage when passive pulmonary congestion was almost always to be detected in a greater or less degree. Pneumonia or bronchitis or both were frequently present from the first and those so affected often remained in a very precarious condition for many weeks, having, as it were, two or even three diseases to contend at one time.

The treatment adopted was generally only palliative and consisted of the addition of mild expectorants to the ordinary treatment adopted for the fever itself. The passive congestion unless very severe and causing much dyspnoea, did not call for any special measures being taken for its cure. When it was severe, alkalotic stimulants with or without the addition of digitalis, carbonate of ammonia and spirits of nitrous niter were usually tab
the effect of pretty rapidly cleaning it off. Pustules, blisters and such like applications were rarely resorted to as the necessary disturbance of the patient for their application seemed to be more productive of evil than good.

Cases bronchial affections and symptoms referable to the respiratory tract generally were almost universal, but usually as slight compared with the grave disease as to call for no special treatment, although, in a few isolated cases, cough without any apparent definite cause for it requires some sedative for its relief owing to its interference with the patient's rest.

(6) Scurvy scurvy as being a skin disease not particularly common in enteric fever may be referred to as having occasionally been met with but do it causes little or no dis- Comfort—no special mode of treatment was necessary for its relief.
P) Bedsores. Eos. Fortunately, were very seldom seen as complications to the disease probably owing to the careful daily nursing of the patient and to the care taken to keep them dry whenever incontinence of urine was present.
In a few cases however, usually in those which were very severe and protracted, bedsores formed in spite of every precaution.

The treatment adopted for these was the application of some thick tarsaceous ointment and placing the patient on an air or water cushion of suitable shape to relieve the pressure on the injured part. Combined careful attention to the toilet.

Generally.

Q) Ulcers. In only one case, that of a girl of seventeen, was ulceration in any form obtained. In this case a large ulcer was found to have developed on each labium majus. These ulcers were very extensive and caused considerable
distinction of tissue and at first-look resembles nonavulvi so rapidly death spread. On careful consideration of this case however does inclines to the view that they were tuberculous in nature, more especially, since they occurred in a tuberculous subject; and also, that the remarkable rapidity of their extension was due to the great lowered tone of the system. Why ulceration of this nature took place in this particular spot it is impossible to give a definite reason, but it is just possible that owing to want of deciduousness there may have been some previous destruction of tissue thereby allowing of the entrance of the tubercle bacilli, and which, when the general vitality became decidedly lowered, began to develop with more than their usual rapidity.

These ulcers which were slow healing caused a great deal of pain and inconvenience to the patient—especially during micturition and made: prostatic for condensation.
the treatment—owing to the very weak state of the patient—had to be entirely palliative and antiseptic due regard being paid to the cleanliness of the part. A mixture of zinc and iodide combined with a small quantity of precipitated soda, or croceine absorbent wool was applied or lint, or flax, twice in twenty-four hours and always after menstruation while a pledge of croceine absorbent wool was inserted to keep the labia apart—thus giving great relief to the patient. (R) Abortion as a complication has already been referred to (Page 50) but, as I had only one pregnant woman suffering from enteric fever throughout the epidemic under treatment, I cannot give any statistic or draw any reliable deductions as to the effects of this fever on those pregnant. In one case which had the opportunity of observing a certain abortion during her attack of fever and whose previous given it as my opinion that the abortion was directly due to the disease, but it
is our right to state that this particular patient, previous to being herself attacked, had nursed four of her children through an attack of the same fever, in addition to attending to her ordinary household duties, so that she was very considerably exhausted both physically and mentally before she herself took to bed. The abortion in her case at the end of the second week and consequent at the height of the fever. After the abortion the temperature gradually fell in the usual way to normal. The ordinary treatment in such cases was adopted.

(5) Joint affections. Probably the most extraordinary complication of the disease of all those meet with during this epidemic, was that occurring in the cases fortunate of only two cases then the elbow joints and the tissues immediately surrounding it were the
bars, particularly affected, and in both cases, curiously enough, the right elbow was the one attacked. Both these cases developed the fever in the ordinary way and were pro-gressing quite favorably, when, suddenly without at first any apparent cause, there was a reemergence of hypopresia. In the course of a few days, however, acute pain was complained of in the affected joint. On examination the joint and the soft parts immediately below it were found to be extremely tender and movement of it caused acute pain. Swelling of a hard, more or less irregular, form appeared in the course of a day or two and persisted in one case for about fourteen days and in the other for nearly eight weeks after all other symptoms of the fever had subsided. The swelling seemed at first confined to the joint, duty and chiefly resembles...
Synovitis but eventually it spread to the periosteum and muscles in the immediate vicinity of the joint. In one case the more severe of the two there was certain a deposit of new bone on the upper end of the radius and ulna, while there was induration brawny hardening of the muscles arising from these parts as also from the condyles of the humerus in the region of the joint. The acute symptoms did not long persist, but as stated above resolution was slow and tedious.

In another case was there any sign of history or injury to the parts affected. What the determining cause or the exact pathology of the condition was was quite unable to say. Both patients had previously been perfect health and had never suffered from even slight rheumatism. Indeed in the more severe case the patient had barely come to the time of life when rheumatism that plague of the
middle ages, and aged begins to make its presence felt: he being only five years old.
The treatment was entirely palliative and directed towards alleviating the pain and supporting the strength.
The after history of the milder case which occurred in the older patient is very interesting. The patient, a solicitor by profession, is a stately, healthy, young man of twenty-eight years and has not up till this time had any serious illness. Some six or eight weeks after his apparent complete recovery he was playing golf, and while in the act of driving, produced a simple transverse fracture of his right humerus at the junction of its middle and lower third. The fracture was produced by muscular action alone, and if itself constitutes a very rare injury.
I have never seen any reference to this
as being one of the dangers of the "Royal
and Ancient Game" now so popular.
(4) Sequelae and their treatment.

The most important of these were — extreme and
sometimes long continued weakness,
Anaemia, Secrecy of the bowels,
Insomnia, Various, Lacerated nervous
reactions, Mental aberration and
with dwelling of one or more limbs.

Weakness. Normally this feature was
present in every case during
convalescence, but it is rather those
cases where it continued in a severe
form for a lengthened period after
practical recovery from all febrile
symptoms to which I now wish to
direct attention. The patients so
affected often for periods varying from
four to six weeks or longer after all
symptoms of acute fever had
disappeared continued extremely weak
and did not gain strength as the
majority fortunate did. They were quite unable to concentrate their energies, either physical or mental, on any particular object for any length of time. They remained thin and courteous, were generally anaemic and frequently were subject to swelling of the legs and feet, there indicating both a spent condition of the blood and a want of tone in the circulatory system. Headache, giddiness, dizziness, with tenderness to vomiting and occasionally want of appetite were common symptoms in such cases. Pallor taken with varying degrees of breathlessness were also frequently complained of.

Treatment adopted for such cases was a tonic and stimulating nature. Iron, Aleoetine, digitals, stypics, and alcohol, with a thrifty and nourishing diet were usually successful, in a longer or shorter...
period in restoring the patient to his former state of health. A valuable combination for combating such a condition is that of Phosphoric Acid and Elixir Balsam, in equal parts, given in doses regulated to the age and condition of the patient. Port and other wines when the condition of the patient permitted of their being procured were also prescribed as well for their stimulating as for their nourishing effect.

Anaemia. This was probably in some cases one of the most important causes of the condition of weakness above described. In a few cases however it constituted the only apparent sequel of the disease. It was as a rule quite amenable to treatment which generally consisted of the administration of a combination of Pilula Ferri (Bland) with Liquor Arseniealis (Fowler) in the form of capsules as prepared by Duncan Stockland Co., Edinburgh.
(c) Irregularity of the Bowels.

This was a very common sequel and was occasionally very troublesome. It generally took the form of obstinate constipation, but in a very few cases irritability of the bowel with more or less frequent diarrhoea was experienced.

For the treatment of constipation, CASTOR OIL, or PEG MEGALOSYRUP, was given in small doses at bedtime, or at other times as required, in order to regularize the stools.

In cases of diarrhoea, a purgative was sometimes administered, such as CARRON PILLS or NUX VOMICA, and HYPERICUM was used more serviceably.

The diarrhoea could usually be checked by carefully regulating the diet, and when this failed, the administration of small doses of CHLORODYNE or PULSIO SPEEACULARIS COMPOSITUS generally had the desired effect.
Insomnia as a sequel was not very common and as a rule not so severe as to require any special medical treatment. Plenty of outdoor exercise and a good deal of fatigue was found to be the best remedy for it, while in more obstinate cases a little whisky toddy at bedtime generally gave excellent results.

Perverted nervous sensations. In two cases especially was this very prominent—even when the patient had in every other respect completely recovered. In one case the patient, even till this day, has absolutely no sensation of pain or trouble on the outside of the right thigh for about five inches above the knee, while the inside of the same thigh for a corresponding area he says he feels is very uncomportable, lot; and he further affirms that
frequent profuse perspirations occur in this area. This patient had a very severe attack of the fever and in the space of two weeks lay practically on the verge of death. In his case no other abnormal condition was left and he now expresses himself as stronger and heavier than ever he was and his only complaint is this peculiar nervous condition, which I have described. Having no proper opportunity to make observations on him, but it is worthy of note that he says the affected part is often almost too hot to keep his hand on it and when in bed he cannot suffer the other leg to touch it.

The other case referred to was that of an adult male, son, up to the time of his leaving hospital and unfortunately also becoming lost to observation, con-
plained of a feeling of perneciation in both feet and legs whenever he attempted to stand or walk.
Both these cases were treated in hospital and owing to the limited accommodation and the consequent urgency of sending those who were well enough to travel home as soon as possible, to make room for others, much regret was felt - no special observations on their progress were made and no treatment could be directed towards the cure or relief of their symptoms. However accidentally came across the first patient referred to some five months after he left hospital and he then told me that the same peculiar condition of his limbs still existed but that otherwise he was in better health than he had ever formerly enjoyed.
A mental aberration this presented itself in three cases of these
coming under my notice. In two the symptoms developed during the febrile stage and continued for some two weeks after convalescence had become established. The condition took the form of a mild maniacal attack with strange perversity of their natural character. Both were children who formerly had been apparent patterns in the way of obedience, but during the later stages of the fever and for some time after convalescence there was, to use their mother's expression, "no doing with them." They became obstinate, self-willed, and would do nothing except what pleased themselves thereby making their treatment all the more trying. A further account of these cases will be found under Case 47, page 119, 122.

The other case was that of a healthy young adult male. This patient passed through a typical course.
the fever, the only noteworthy fact perhaps being that constipation of a very decided nature persisted throughout his illness. Convalescence in his case was without any incident worthy of note, and just when he seemed well again he gradually began to develop a tendency to hypochondriasis. This condition still persists, although it is now four months since he was otherwise quite well and stronger and leaner than he ever was previous to his attack. It is noteworthy that his hypochondriacal ideas had all reference to the state of his bowels and digestive system generally, and as far as we can tell, all forms of treatment—generally resorted to for such conditions have proved unsuccessful. Medicines, with absolute change of scene, surroundings, friends, and occupation alike have equally and signally failed to give any permanent relief in his case. His morbid character seems
also to have undergone a considerable alteration for the worse, and, unless some change for the better comes soon, I am afraid he may yet add a new to our already alarming asylum population.

4. While swelling of one or more limbs.

In two cases this pathological condition was observed and resembled in all respects the condition seen in hydrophthalmia alba dolorosa and post-parturition, with the exception of the slight pain and prolonged stage of emollientence following on it. It did not constitute a very formidable complication. Both cases occurred in adult males and they ultimately got quite well.

The affected limbs were merely wrapped in cotton wool and bandaged and no other treatment was found necessary.

H. Adams. In one case this was a very distressing feature causing
many a sleepless night till opiates had eventually to be resorted to for the relief of the pain. Even now some six or eight weeks after an otherwise complete recovery, these crampy pains are still occasionally complained of in the calves of the legs causing much annoyance and pain to the patient and resisting all treatment other than by opiates. The patient is a fairly well nourished boy of fifteen with no hereditary tendency to rheumatism or any other disease likely to predispose him to such an ailment.

5) Relapses. For the sake of convenience I will treat of this subject under the heading of sequelae. These unfortunate were comparatively frequent in the cases under my observation, occurring as they did in fifteen per cent. Some attributed however to attribute this rather high
percentage to the ignorance and if I may so style it—self-willedness—of the attending on the sick, rather than on the actual tendency of the disease itself to relapse, as in no case where the instructions given to the nurse were carefully and efficiently carried out did such an occurrence take place. The relapses were in nearly every case due to error in diet generally in the direction of giving unsuitable food which had been prohibited or by giving too large a quantity at a time if that allowed by the medical attendant. Indeed I may say that nearly every case was due to the probably well-meaning but ill-directed attempts of those ignorant of the exact nature of the malady to restore the patient to his former state of health and strength by giving him strong and not easily digestible food and such as was absolutely unsuited for a person convalescent.
from such a disease.

With regard to the treatment of the relapse, I can confidently state that it taxed all the resources and ingenuity of the physician. Indeed, in every case that relapsed the patient was placed in the position of not only having to face practically a fresh attack of the fever, but to recover from his former attack at the same time. It is indeed an anxious and trying time for the medical attendant when such a relapse takes place as in the event of any complication such as haemorrhage taking place he may be sure, that apart from the weakening effects produced by such haemorrhage, before being discovered he will have the greatest difficulty in checking it. Indeed haemorrhage occurring during a relapse can only be stopped with the greatest difficulty, as with haemorrhage so with every other complication occurring during fa
relapse, their dangers are increased tenfold, and it is only by the most
painstaking and frequent examination
of the patient that such can be early
detected, and before they have done
much damage, and appropriate
treatment adopted with any chance
of success.

Prompt and energetic remedial
measures for complications occurring
during a relapse are of the utmost
importance and any tempering or
half measures are dangerous in
extreme, as it must be borne in
mind that the already exhausted
system does not permit of much
delay in checking anything leading
still further to exhaustion.

In many cases indeed it will be found
that even the most generally reliable
and potent drugs at our command
fail to produce even their minimum
therapeutical effect; consequently
leaving us comparatively powerless to cope with complications which had they occurred in any other simple disease or even during the primary attack of this fever could have been pretty easily subdued by their aid.

8) Immunity from Enteric Fever.

while it is difficult to form any definite conclusions from the results of this epidemic under this particular head it is not unprofitable of note that out of a large number of cases where there were infants in only one of these was there an infant affected, and this was a very mild case which speedily recovered.

considering the large number of infants which were being reared on cows' milk, and that only one was affected, it seems one can only conclude that the very forms are peculiarly exempt from this as far
some other epidemic fevers.

One case in particular seems to point to this. Here, the mother, a very poor woman, who could barely afford the absolute necessities of life struggled through a typically severe though uncomplicated attack of the disease and endured her infant—the whole time without any evil result befalling it. In this case, although the mother's milk must have been of very poor quality and the child constant, living in an atmosphere saturated with the germs of enteric fever, sleeping and indeed living in the same bed as its mother, it as already said it too well seemed to thrive fairly well.

As far as pointing to the real

influence of infants from this
disease. As it well would seem
that in the vast majority of cases
where there were infants under afflic...
families, the mother acts as nurse both to the infant and to the sick person, so that the infant was of necessity almost constantly in the sick room and, as was frequently observed, was given drink from the utensils used by the patient, not withstanding stringent directions to the contrary. Indeed I have frequently seen the spoon used by the patient given to the child as a plummet when nothing else was handy. When also one considers that it was no uncommon procedure for the mother or nurse to handle the patient, and when bacteriologists lead us to believe almost certainly, some disease germs would be adhering to her hands or clothing without taking any antiseptic precautions whatever, it starts feeding her infant or to prepare her milk in the ordinary way. It is not only
he concluded that the very young have a decided and happy immunity from this disease.

As regards the temperament of those who were attacked there was nothing noteworthy except that the neurotic seemed to suffer more when actually infected, nervous symptoms being more marked in them than in those of more phlegmatic temperament.

In this relation it may not be out of place to mention that alcoholics when attacked seemed to suffer more, but, owing to their being comparatively few cases when the alcoholic element came in, I am unable from experience to draw any reliable conclusions as to the effects of alcoholism in this disease.

From cases that I see I consider that alcoholics, other things being equal, are not more prone to this fever than others; but when once they
have acquired it— they suffer severely
and their convalescence is tedious
and trying.

Previous attacks. In only two cases
was a definite history of a previous
attack made out. Both were persons
of rather poor physique but—notwith-
standing this, the disease ran a mild
form almost always abortive course, stop-
quilt definitely enough to leave no room
for doubt as to the correctness of the
diagnosis. From my experience during
this epidemic have inclined to believe
that once a person has had cutaneous
fever he is in a certain measure protected
from future attacks, and that, if he does
again contract the disease, it is usually
of a mild nature and quickly recovered
from.

Des apparemment has no influence in
determining the liability to this fever
both being equally affected.

Age. The old and the young of either
status,
the very young are those who enjoy maximal immunity from it. I met with no case of the disease in anyone over 65, nor with the one exception referred to above under three years of age. The vast majority of my cases occurred in persons between the ages of twelve and twenty-five years and this I find is the period of life in the experience of others where one is most susceptible to enteric fever.

9. Aneurysmal Cases.

Case 1. C. B. This case, that of a girl aged nine years, was in many respects of a unique character. From the first hemorrhage seemed to be the predominant feature adding gravity to an already serious febrile condition, occurring in a weak and but poorly nourished girl.

The early history of this case was that the child complained of severe headache with general unfitness for
ejection of any kind, a strong tendency to "sit over the fire" and disinterested for food. At the same time her mother specially remarked that she on one or two occasions had pretty profuse menses from the nose. This with her other symptoms aroused the mother's suspicion that she might be suffering from enteric fever -- there being other three cases in the house at the time. The child, however, being self-willed always disappeared about the house before my visit, and it was not until she was unable longer to go about that she came under observation.

At this time she was very prostrated (temperature 102.4°F. on chart). Pulse very weak, thready and irregular. Vertigo and abdominal distension were well-marked and nourishment of any kind was badly borne.
This was intense, while anything taken by the mouth for its relief was generally vomited. The vomiting under suitable treatment partially subsided, and nourishment in its most acceptable form was occasionally retained. Carbolie Acid mixture was however invariably rejected. On the 24th, however (sudden) severe epistaxis came on which very considerably weakened the patient, although for the time it had the effect of considerably relieving the intense headache. On the 30th there was an extreme degree of pulmonary congestion especially affecting the posterior aspects. Both lungs, causing very rapid respiration with cyanosis and cough and laboured haemoptysis. On October 2nd there was rather a profuse haemorrhage from the bowel with great abdominal
Case II Chart No. 24. K. M. This case as also that of her brother have already referred to as presenting the peculiar peculiarity rash occasionally noticed in this fever at its onset (See page 46). The characteristic features of the onset will be found on the page above referred to. It is more particularly the peculiarities occurring in one of these cases that I wish here to emphasise. This patient was one of those who exhibited mental aberration in a marked degree, see pages 102-103. The previous disposition of this child has always been cheerful. She was bright and intelligent, and obeyed at once the slightest request of her parents. At the commencement of her attack nothing abnormal mentally was noticeable, with the exception of course that she was dull and apathetic and exhibited no desire for any form of amusement and took little
interest in her surroundings. She was obedient and ready to persuade to do or take anything at this stage, but later, viz. on the tenth day of her disease, a very marked change in her mental condition took place. On this day she for the first time refused to take either medicine or food, and it was only with the greatest difficulty that she could be got to take a quantity of concentrated nourishment barely sufficient to maintain life. Her whole character and demeanour seemed to have changed. She became fretful, self-willed, disobedient, and extremely obstinate. She would lie and cry out, for no appreciable reason for hours at a time. Although repeated efforts were made to distract her with books or toys, she would not leave the blanket over her for a single moment unless carefully watched, and, on the slightest opportunity, would get out of bed.
The manner was abortive and it was
with difficulty that an answer was
he got to any question put to her.
This condition was not, however,
one of delirium such as was common
meet with during the epidemic
but rather one of mild mania
with complete perversion of moral
ideas. It lasted till long after
Convalescence was well established
and indeed it was not till about
the thirty-ninth day of the disease
that any appreciable sign of
improvement in her mental condition
could be detected. Even now, six
months after her seizure, she still
exhibits some abnormal mental
symptoms. Her mother says she
is not as bright as formerly and
often gives ridiculous answers to
simple questions, and at times
laughs or cries without any ap-
parent reason. Another peculiari
symptoms exhibited by this patient—
that a peculiar and distressing
pain in the thorax which absolutely
resisted all treatment—tries. At
the present time she still occasionally
complains of this. Her bodily health
to now all that could be desired but
there is undoubtedly and probably
lasting deterioration of her mental
faculties.

Case III
Char. No. 3. L. 73. This case
that of a girl of nine
years closely resembled in many respects
that of just described. In this case
however the febrile stage was rather
more prolonged and on the average the
temperature was higher than in her
Case. Very similar mental symptoms
though less persistent—developed in this case on
the thirteenth day of the fever and
practically disappeared with convalescence.
Seepness here also very marked, due to
stasis media which ultimately ended in suppuration lasting for nearly three weeks. The patient had a slow convalescence but eventually made a complete recovery and is now stronger and slimmer than before the outbreak of the fever.

Case iv. J. C. Schoolboy, aged 9 years.

I have to regret that the chart of this case (one of my fatal ones) was destroyed by an interfering and overzealous sanitary inspector who burned it, or common with many other articles which were in the sick room. The case at first presented no noteworthy feature, with the exception that the temperature remained persistently high and did not, like most other cases, come down on the administration of Carbolic Acid. The pulse and respirations were both rapid. At the end of the third week, however, when everything seemed to be improving,
prettily favourably peculier nervous symptoms began to develop.
The patient became restless, with twitching of the muscles, and spasmodic
movements generally. Freqent cries
out and was more or less unconscious.
From this time the condition of the
patient went from bad to worse till
coma, which lasted till death came on which latter took place five days
from the change for the worse. During
the period of coma all nourishment
was administered in the form of
nutrient enemata, and to the careful
administration of these was undoubtedly
due the prolongation of his life under
the existing conditions. The case
latter presetea symptoms identical
with those of cerebral meningitis,
and but for the early history and the
undoubted fact that the characteristic
signs and symptoms seueriac
fever were also present, would
probably have been diagnosed as such. Case V: Jno. Cooper, aged 43. This case is one worth special notice from the peculiar nature of its onset. The patient was one of the first to be attacked and the cause was directly attributable to the milk supply. Incubation in his case took as nearly as could be ascertained, fourteen days. The onset was sudden in character. The first symptom was a severe rigor which came on one night on his return from work, and later that same evening he had swelling and intense pain in his right ankle joint. On my first visit to him I found him bathed in perspiration, with a temperature of 102.7, and complaining of great tenderness in the right ankle which was red and swollen. Later his left wrist was affected in the same way as that it seemed quite reasonable
to diagnose the case as one of acute arthritis rheumatica. The bowels were constipated, tongue furred and there was great thirst and complete amnesia. He was first treated by a purgative and calomelate of soda without any marked change on his condition.

The temperature persisted to rise in the manner pathognomonic of this fever, and in a few days foul-smelling "tea-soup" diarrhoea came on. Aust. lat. he had a copious eruption of rose-red spots appearing in successive crops. Prostration became more and more marked as the case advanced. Extreme tenderness of the spleen, with great swelling of the gland, developed towards the close of the third week. This continued for a period of two days resisting all methods of treatment and adding very considerably to the discomfort of the patient. In the case being subsequent diagnosed
as one of enteric fever the patient was ordered 719 doses of carbolic acid every four hours which speedily alleviated all the symptoms, and as in the other cases, caused diaphoresis, diuresis, and steady depression of temperature. From this time the case took an ordinary course and convalescence was uninterupted. The temperature chart of this case is quite misleading owing to the irregular hours of my visits to time (please note ink). 

Case IV Chart No. 4. O. McL. same peculiar.

Aged 21. This case at first more closely resembled that of A. M. No. V. simulating as it did acute enteric pneumonia. Here however the rash appeared unusually early viz. at the end of the first week while diarrhoea of a typical character was present. From the time the patient first came under observation he was first ordered Puls. Cатat. Arsen. cum 0.15 fr. 2 dr. every six hours without
much effect and on the 92nd day of the disease was ordered Acid Carbolic 3% every six hours which at once checked the diarrhoea and very rapidly reduced the temperature, while at the same time great alleviating all the symptoms. On Sep. 21st, the 18th day of the disease he complained of severe pain in the left side and on examination the spleen was found to be very much enlarged and tender. For the relief of this he had Cinchonines applied with the best results. On the 24th the Carbolic treatment was discontinued. On Sep. 29th he was eating grapes. Contrary to orders, and otherwise taking liberty with himself which causes an alarming rise in temperature giving me the idea that some grave complication was coming on or that it was going to have a relapse. The Carbolic treatment was immediately resumed
with the result—believe?—cutting short what promises to be a severe relapse (as clear) from this time to made an uninterrupted and good recovery.

Case VII

Th' H. T. Schoolboy, aged 7.

This case saw a better prospect come although the temperature was always kept in check by the internal administration of carbolic acid in the manner already indicated. Oscillations of temperature throughout were con.

spicuous & their absence and very clear did the morning and evening variation exceed half a degree Fahrenheit.

The main peculiarity in this case was the large number of small abscesses which formed during the later stages of the fever and during early convalescence their formation gave rise to no symptoms of pain or uneasiness.
As a rule they affected the superficial tissues only but the first indication one had of their presence was when they showed through the skin as clear yellow fluctuating globules. They were as stated small clype, varying in size from a castor oil capsule to one containing cascara. On bursting or being lacerated recovery was rapid and as a rule painless. They contained thin yellow pus and no necrosed tissue such as was present in an ordinary boil was ever found in them. I was unable to account for the formation of these abscesses—commonly or hist—_in all affecting as they did indiscriminately all parts of the body from the scalp to the sole of the foot_ unless under the supposition that they were due to detached colonies of the typhoid.
bacillus which has taken up their abode in such an unusual situation. I regret that I had no opportunity of bacteriologically examining the pus from these abscesses as this alone would definitely have cleared up the point.


This, one of the fatal cases, proved to be of a very severe type. The temperature on her first coming under observation was very high and remained persistent throughout, with the exception of the morning and evening. Treatment by salicylic acid in this case was of little service although it is just possible that, by its aid, the temperature was controlled to a certain extent. Certainly it is that after each dose perspiration...
was very free as was also diuresis. The case at first presented considerable difficulty in the way of making a correct diagnosis and indeed for several days I was undecided whether it was a case of cerebral meningitis or typhus fever. Headache was extreme, severe and persistent from the first. The pupils were widely dilated, and the eyes looked clear and glossy. There was great restlessness and the patient tossed about giving occasional short sharp cries. Her intelligence was markedly impaired, and she seemed to be able to recognize her parents only. From the tenth day of her fever till her death she was never sufficiently conscious to speak or answer questions. On the seventh day enteric fever was diagnosed and this diagnosis
was subsequently proved cruel as on the eleventh day of the disease foul-smelling diarrhoea of a pea soup character with greenish tinge came on and lasted for several days, being practically uninfluenced by treatment. On the twelfth day an unmistakable typhoid spots was discovered on the back between the scapulae. The pulse was very rapid and diastolic and about one the temperature was typical of enteric fever. The main feature of interest in this case is that the nervous system seemed from the first to be most profoundly affected. These symptoms were present from the first and for a period of fourteen days the became practically an automaton, all voluntary movements being practically suspended. For the last two
day of life, Acts which for a few days previously had been performed reflexly, such as swallowing, became impossible, so that rectal stimulation and feeding had to be resorted to. Whiskey, with equal parts of warm water, alternates with Valentine's meat-juice were injected into the rectum, while hypodermic injections of digitalis and strychnine were employed to further stimulate the failing heart. In spite of all treatment, the temperature commenced to rise on the 21st day and continued rising till 106° F. were registered a few minutes before death took place.

Case IV A. C. A. Schoolboy, age 18.

This case, also a fatal one, admirably illustrates the extreme danger patients run in not allowing themselves under
medical care when seized with symptoms of enteric fever. It
was on the ninth day of the
disease that I had an opportunity
of seeing the patient again and to the
actually begin attending him and
using an ordinary diet till
within three days of my first visit. He was then very ill, with
a temperature of 104°F, and was
unable to retain anything in
the stomach. That same evening
profuse diarrhea, which put
the idea of rectal alimentation
out of the question. On the tenth
day he was able to retain a
little by the stomach and vomited
all his medicines and often also
his stimulants.
The diarrhea continued unabated
and stools were now passed
unconsciousness, as was also his
urine. He had a pinched shrunken
appearance, the mouth, teeth, and tongue were thickly coated with black foul-smelling mucus. Swallowing now became difficult and later, on the seventeenth day impossible. He from this time rapid passed into an unconscious state from which he never even slight rallies and died eleven days from first coming under observation. From consideration of this case I cannot help thinking that had he only come under treatment earlier when symptoms enteric fever first manifested themselves the result might have been very different. No doubt the disease had a firm hold. His system from the first sick, from its period of other cases, and inclined to the view that its effects, if not able to the out show, might at least have been considerably modified by suitable treatment.
II

The Sanitary Aspect of the Epidemic

(1) A brief description of the town and the sanitary enactments in force at the time of the epidemic.

Pulteneytown forms the eastern section of the parliamentary borough of Wick from the Royal Burgh of which it is separated by the river Wick. It consists of two parts, an upper and a lower town, the former situated on the higher ground that consists being founded on bedluer clay the upper layer of which is very impervious to water. The latter is at a much lower level at the estuary of the river and founded on a deep layer of sand and gravel the ground water of which fluctuates daily according to the state of the tides and is also affected by the amount of water in the river. (See Table: Appendix)

The Population of Pulteneytown is
according to the Census of 1891, 6302, while that of Wick is 2,962. The greatest part of Ruthvenston is composed of dwelling-houses, while the plots, backs, plots & are situated in the Royal Burgh of Wick. The houses are nearly all built on the same general plan and with few exceptions no arrangements by means of chimneys have been made for the proper disposal of the roof-water, a & no-means unimportant matter. When the nature of the subsoil of the higher part of the town, considered the Royal Burgh of Wick stands on the north bank of the river, and is generally on a higher level than lower Ruthvenston and has a much drier foundation. In many cases it (the Royal Burgh) has enjoyed the privilege of a pure and unquestionable water I abounding quantit while only last spring (1893) a thorough efficient system of sewerage was introduced, and to these two advantages, as also
to its more efficient sanitary supervision, it undoubtedly swept the community from an epidemic which otherwise had every expectation of spreading to it from the adjacent town, since between the two places there is necessary constant communication. At the commencement of the present epidemic the Public Health act was practically a dead letter in Callan town. The notification act was in force, hence the medical officer was absolutely ignorant of the amount of fever which was prevalent in the town, with the exception of a few cases met with in his private practice. In law for the registration of dairies or milkshops was in force, and there was no supervision of the milk supply whatever, hence, when the outbreak of fever did come under the notice of the sanitary authorities...
it took them the best part of a week to find out— all the blame must be laid on the town and had it not been for the accidental circumstance of the infectious milk coming from a small farm in the country, where the notification act is in force, the medical officer of which immediately on being notified of the presence of enteric fever there stopped the sale of milk from that place, there was doubt— well that the primary cases would have been much more numerous when the sanitary authorities of the town did discover the source of the infectious they found that all danger from that source had been past for some ten days before their visit; and, contented with recalling the vendor of the milk, they allowed the fever to spread at its worst until public opinion
expresses both privily, and in the public press, fear that their state of inaction is one of rather futile activity.

Their whole proceedings when carefully looked into gave one the idea that they either were ignorant of the rudiments of sanitation, and of the methods of scientific disinfection, or else, believed as they did merely to blind the people or to arrest the panic which the epidemic had caused. Indeed the method of disinfection adopted was ludicrous in the extreme. Every day for weeks the sanitary inspectors and medical officers might have been seen going around the infected streets with a column of air of importance, the one carrying a wine-glass fixed on a stick, while the other carries a tin of crude carbolic acid.

Their method of procedure was this: On coming to a fully hole the gentleman
Carrying the wineglass gracefully held it but over the hole, while the part with the can of acid filled him out: a bumper glass which was filled with reverence emptied into the cesspool below. This manoeuvre was repeated at each gully-hole till twenty or thirty had been so treated, when they rested from their labours in this direction and applied themselves to house disinfection.

Dearest to my readers to calculate the effect: either germicidal or otherwise of about two ounces of carbolic acid or say to give a low estimate—half a ton of semisolid putrescent sewage.

Their efforts towards house disinfection were however more up to date although their methods of going about it were rather pedantic, as described which would better appear in a humorous story than in a medical thesis.
As the epidemic continued to spread, the medical officer, as a last-resource asked as a personal favor a list of the patients suffering from enteric fever under the charge of the other medical practitioners in the town. This information was readily furnished him and he then was in a little better position to cope with the press of cases against him, but, strange as it may appear, his local authority could not or would not see the advantage of adopting the notification Act; while the sanitary inspector (a great power in the place) solemnly refused to seek its benefits and resisted all attempts to bring it into force on the grounds that it might tread on hospital ground enough to hold all the cases.

What he imagines the effects of the adoption of the Act to be it is difficult to say. It was not until the Board of Supervision...
sent down a strongly worded com-
munication on the subject that they
reluctantly adopted the act—a
method closer resembling that in the
fable of "locking the stable door after
the thief was stolen.

For the Royal Burgh of Wick on the other
hand, where the notification act
had been already adopted at the
urgent request of the Medical Officer,
affairs were very different. There,
immiscibly on a case of enteric
fever being reported, the patient
was at once removed to hospital
or proper precautions against the
spread of the disease were enforced
with the result that—although
two suspect cases were notified
to have occurred within the
area no spread of the disease
took place.

(2) A short skated of the conditions
existing in Ulster, which
are generally regarded as favourable to the spread of febrile fever. These conditions will refer to under the following headings viz—

(a) The water supply, its origin and mode of introduction, with the facilities for its pollution and the filtration adopted.

(b) The drainage system of the town, with reference also to refuse removal and scavenging generally.

(c) The general character of the houses with their number of inhabitants and places of public convenience.

(d) The occupation and habits of the people from a hygienic point of view.

(e) The water supply, its origin and mode of introduction, with the facilities for its pollution and filtration adopted. The water comes from a small shallow rock about one mile long.
by half a mile broad and at its greatest depth only about six feet deep. The lock has a peat bottom and is nearly surrounded on all sides by cultivated land whose drains all empty into it; owing to the shelving nature of the lock and to the peat bottom, whenever there is even a comparatively slight breeze, and there is generally a good deal more than that blowing in Caithness, the water becomes very brown and muddy and light charged with all kinds of decomposing vegetable matter stirred up from the bottom of the lock by the waves. A chemical analysis of the water however when carefully filtered or after suitable climate conditions shows it to be a moderately good potable water, only containing excess of organic vegetable matter. It is well to mention here that the
difference of level between the lock and the settling pond which is situated on the higher ground in the immediate vicinity of the town is only some thirty feet. It matters of very considerable importance under present circumstances.

The lock from which the water is taken is situated rather more than three miles from the town and with the exception of about 130 yards of this distance the water is conveyed in an open shallow ditch. This ditch, the rate of flow of which, is very slow owing to its very small fall, winds through richly cultivated land, across roads, past farmsteads and large numbers of cottages, close to the sanitary surroundings of which are better imagined than described.

In its course, near its commencement it receives the surface and other water from about three quarters
a mile of the County road on which traffic is always heavy. There also, all the sewage from a small farm discharges into the roadside ditch which in turn discharges into the water supply. It was so late as during the month of February of the present year that the farmer of this place was fined £5.00 for allowing all the liquid manure from his farm dungheap to run into the watercourse and thereby polluting the water.

During its course past farmsteads and through fields it is the ordinary drinking-place for horses, cattle and all other animals, while it is a sort of happy hunting-ground for innumerable ducks and geese belonging to the adjacent occupants of the lands. It also acts as a convenient spot for industries downriver to wash their blankets or, affording
as it does both a ready means of getting fresh water and disposal for the dirt. The majority of the land drains on its higher banks also empti into it.

Bad enough as this picture is however, it is comparatively good to what is constantly observed close to the very doors of the people themselves. I may here state that the original object for which this watercourse was constructed was to supply the motive power for a distillery and meal mill in the town. Consequently no precautions were taken during its construction, as not being particularly necessary, to avoid possibilities of pollution. Within 200 yards from the mill a pipe is laid to the watercourse for the supply to the town. — The origin of the pipe — course — setting point — will be seen on referring to the appended map.
This pipe about 1500 yards in length leads into a settling pond.
And above the exit of the supply pipe, the banks of the stream are littered with all sorts of filth, including a not inappreciable amount of human excreta, while in summer it is the very favourite resort for boys and young people generally, bathing and paddling about in.
From these undeniable and generally admitted facts the condition of the water on its entrance to the settling pond may be imagined.
This settling pond, locally euphemistically designated the waterworks, is merely a comparatively shallow pond surrounded by a wall only 2 feet high, and indisputably from the last resting place of what, in its day, may have been a devoted dog or its progeny.
The older inhabitants have a tradition that this place was cleared out once or twice but records as to this are rather uncertain. The beneficial effect of the "waterworks" on the health may be easily imagined. In the centre of the pond there is a circular stone wall which serves to intercept pieces of wood from getting into the legal pipe which takes it away. From here the water is distributed in the ordinary manner by street pumps to the people, while a few, though very few, houses have the water introduced into them. The street pumps are much too far apart so that anything in the shape of too much washing & cleaning with water is generally discouraged owing to the distance the water has to be carried.

Such then is a short account of the water supply to the town and...
after seeing it; or reading an account
of it; one begins to wonder not
that there was a fever epidemic,
but, that the town should ever
be free of fever as long as these
conditions exist.

3) The drainage system of the town
with reference also to refuse
removal and scavenging generally.
The drainage like the water supply
was found to be of a most unsatis-
factory nature. The general scheme of
the system have drawn on the appended
map. The drains are represented by the
red lines drawn in the streets.
The sewers are of the most unsatisfactory,
dangerous, and now practically effec-
tless kind, being simple ditches built with
ordinary stones and that-often without
the addition of either lime or cement.
The gullies are at the edges of the
pavements or practically cesspools. (See diagram Appendix)
Mr. Caufie referred to was an engineer
recruited by the Board of Supervisors
to report on the town.
where liquid and solid putrescent matter is allowed to accumulate for weeks or months until, indeed, the hole becomes clogged and will hold no more. The nuisance caused by such a form of gully hole can be imagined when it is considered that they will hold from one and a half to two cart-loads of the poリスト part of the sewage empties into them during any warm weather such as prevailed here in the summer of 1893 since they got no flushing or cleaning whatever. The smell arising from them was often almost overpowering. These cesspools, like the drains, were dug in the buildings and were not structure shown on the plan. No arrangement whatever was made for flushing the sewers, notwithstanding the fact that Dr. Carpenter was informed to the contrary as will be seen by referring to his report which I append. In this
account, and owing to the nature of the construction of the sewers, they were always in a very filthy state whenever I had an opportunity of examining them when opened. Ventilators there were none of any kind. Their place of outflow also caused only have been decided on in pre-sanitation days (see map). Refuse removal and scavenging generally. The removal of ashes and other solid refuse was performed daily, Sunday excepted, by an ordinary open cart which went around from street to street, and which trotted near the whole day to accomplish its object. By this cart, also nearly all the human excreta was supposed to be removed so that the danger arising from its was during a hot summer like that referred to must have been very considerable. As will be seen later near all the solid excrement was removed by this cart; there being,
as a general rule, neither "W.C." nor privy in connection with the houses. Scavenging was the most menial description and was performed by one man - and to not a very active one - who confined his attention entirely to sweeping the solids and partially liquid pitch in the streets- guttered into heaps which were removed by the aprenentimes car, when it got time to do so.

The streets themselves, in are all made of earth, never being attention given them, with the exception of keeping them in repair. So that they were constantly littered with all sort of animal and vegetable decomposing matter flung there by ignorant and indolent horesmen. Indeed the streets of this town form a happy hunting ground for innumerable seagulls who seem to derive a very respectable existence.
by eating up all the fish refuse and other... life-like thrown on the streets in abundance.

Incredible as it may sound to those accustomed to other conditions of sanitation, yet the fact remains, that I actually on one occasion witnessed a royal fight amongst some two dozen plaquettes for the possession of a coveted morsel lying on the street; and which on closer observation turned out to be what was undoubtedly the remains of an at least six months' human being!
The appearance of the streets was bad enough, but the smell of these baffles description.
There are also numerous back courts of the main streets (see map Plan J and K) these as a rule are covered with flagstones and have a gully hole in the centre and as they are not on the street proper they receive absolutely
no attention from the scavenger, so that their condition was filthy in the extreme. It was with difficulty that one could enter them without being Pickered with the horrible amount of filth lying about in all directions. Indeed, they seemed to serve as places of public convenience for all the children in the neighborhood. And, disgraceful as it may appear, there was plenty of evidence to show that those who ought to have known better than the children were not adverse to avail themselves of the opportunities so afforded for committing dinnance.

While dealing with this matter it may state that these back courts were originally designed for bleaching greens, gardens & by the enginees who drew the general scheme of the town, but as time went on and space became more precious these
sanitary precautions, adopted by him, became abuses and were used as piles for houses and even dammed river to save for pigsties, poultry, loaves and other food—when in close proximity to dwelling houses—nuisances. There was also at one time close accommodation for the several tenants situated in these back places but these have now entirely disappeared leaving the condition of matters presently to be described.

II. The General Character of the Houses, with the Average Number of Inhabitants and the Places of Public Convenience. The vast majority of houses consists of two rooms and a closet. The rooms are small and, as a general rule damp, especially those on the bottom flat. The floors which are usually paved of ordinary flagstones resting on the surface of the ground. Many of the streets...
are built on a slope and no precautions have been taken to clear away the higher ground behind, so that the back walls are often soaking damp. No ordinary drainage of the surrounding soil has been, as a rule, attempted so that all the surface water must soak, either through the walls or under the floors. The houses are situated as to interrupt the flow to lower levels.

The houses are of two stories and often have an attic in addition, different families occupying the various flats, and all entering by the same door. There is, with extreme few exceptions, no attempt whatsoever to provide accommodation so that all dishwashing, culinary preparations and housework generally has to be performed in the same common living and sleeping room. Some of the houses consist of
only one room with or without a small closet; so that here the condition already described becomes intensified. Frequently a man, his wife and large family, some of them well grown up, may be found all eating, occupying, and sleeping in a room not larger than 15 4/12 feet by 20 large, with the meal as well. Such a condition affairs leave letters to deal. The population of the Pigeon Bank is Putney town in the Census return of 1891 is stated to have been 5,550 but there has been a slight decrease since that date. The Census tables fail however to give even a slight idea of the amount of overworking which takes place. This is due in a great measure to the time of year at which it is taken, since this happens to be the idle time amongst the fishermen and the greater part of the population.
Pulmonary fever is composed of these, and when consequently large numbers of the inhabitants are from home, either on holiday or engaged in some other occupation requiring their residence elsewhere.

From personal knowledge derived while on professional duties shall he inclines to estimate the average number of inmates per room in the class of houses in which the fever was commonest as 3.4 or 5.

I have come to this conclusion on general observations made in at least 91.0% of the houses of the town. I necessarily exclude from this the families living in better class houses.

It is noteworthy that, without exception, none of these latter, living under the better hygienic conditions, were affected, although several of them were exposed, in all other respects, exactly the same risks to infection.
Putney town being, as one may roughly say, uni- or mainly populated, one cannot draw any deductions as to the relative frequency of the cases in the more congested districts compared with the more sparsely populated places.

The reason that all of the better-class families escaped was probably owing to their better attention to cleanliness and hygiene generally, to their having adopted precautionary measures such as boiling their milk, filtering and boiling their water, etc., and to the draining of their houses having been modelled in the results of recent sanitary researches.

In the ordinary fisherman's houses, however, there is absolutely no closet or privy accommodation, so that every variety, including the night-soil, is simply cast into the gutter, or as quite as frequently is the case, on the streets themselves. The
danger of infection resulting from such a state of matters during the presence of an epidemic such as enteric fever must be apparent to every one conversant with sanitary affairs. While the filthy state of the streets caused by such pure accidents of necessity was, and still is, a standing disgrace to any community and local authority supposed to be abreast of the times in sanitary matters. At the back of the houses there were usually the back courts already described, and these, instead of tending to counteract the horrible conditions existing at the front, rather added another and if possible more deadly breeding ground for all sorts of poisonous germs. Under such conditions one wonders naturally expect to find a large number of public privies and urinals throughout the town, but, apart from the sanitary conveniences,
on the harbour quay which affords accommodation for a limited number of those residing in their vicinity; in the town itself there is only one manual and three small privies. The position of these is shown on the map and it can be readily seen that their situation is such that they fail to fulfill the object for which they are intended.

One of them has recently been reconstructed on modern principles and is of the automatic self-flushing variety. The others are on the old fail system. Without exception but more especially the fail ones are filthy in the extreme, while the smell arising from them in hot weather needs to be smelt to be appreciated. How anyone with any nasal organs can use them or even go near them is a mystery. The failing are frequently never emptied for weeks at a time, so that the filth is allowed to accumulate
on the floors and about the peak in a manner that might well frighten all but the most needy from entering them. They are never washed out and the walls, which are of rough stone and lime, are seldom or never whitewashed. The immediate surroundings of these places is simply a mine of polis and liquid urine, feces and mud, which poorer are deposited there by those who are not bold enough or who do not dare to enter within.

From the condition of matters just described it will be evident that the female inmates, the younger children, and all invalids are quite unprovided for in the way of clothing or proper accommodation. Hence there was always a large quantity of night soil to be disposed of, much of which was often retained in the houses till after nightfall and eventually got
The occupations and habits of the people from a hygienic point of view. Pulicat town, being a place entirely dependent on fishing and its allied industries, it is but natural that by far the largest number of its inhabitants are fishermen, coopers, ropers and others following occupations directly depending on the fishing industry.

During the herring fishing season the men live on their boats from Monday till Saturday morning, when as a rule, they come ashore till the following Monday. With the exception of during bad weather the men...
never occupy their houses during the week. Their wives and the grown-up female portion of the family are also as a rule badly employed during the fishing season at fish curing!

During a good season the Cure is often busily engaged from the time the fish is landed—generally about ten a.m. till far on into the night—laboring but a few minutes interval for meals.

As a natural consequence the houses at such a time are left entirely under the charge of the younger or very old members of the family, who are either unwilling, unable, or not intelligent enough to do anything in the way of house cleaning, beyond perhaps the emptying of closets and removal of refuse. Hence the condition of the houses at this time is often of a very filthy nature and would require a good deal more energy than the already tried-out wife can exert to put them in order.
The general disorganization of household arrangements occurring at these times unfortunately in some instances tends
to become chronic, especially if, as sometimes happens, the husband or
wife or both bury themselves in
getting rid of both their health and
their hard earned money at the same
time in the neighboring whiskey shop.
It is also the custom here during the
fishing season for householders to have
two, three, or more men who work as
lumber hands on the boats lodging with
them, so that it can easily be seen
that the poor wife can take very little
time during the Sunday and Monday,
both to cook for and attend to all the
innocents of the house, in addition
to working up a week's arrears in
housekeeping. However, willing or
may he to do so.
As can be gathered from the foregoing
remarks the overcrowding at such
a reason must be enormous and as an example may be permitted to give one out of the many cases that came under my notice.

One day I was called to see a patient whom I found to be suffering from enteric fever. He was lying in a garret about ten feet by thirteen feet, at the apex of the roof, ten feet. The floor space of this apartment was completely occupied by other lodgers, and as completely was space economized that those who were unable to find room to lie on the floor were accommodated in hammocks hanging from the rafters. A small skylight, replastered and whitewashed, gave light to this apartment, while the air necessary to supply the inmates got in as best it could. The atmosphere in such a den in the morning would delight cause the boldest to hesitate before inhaling it.

Such a picture as above describes
is by no means uncommon here, and who can doubt that such a state of matters is very favourable to the spread of any contagious or infectious disease. Yet, although all this was perfectly well known, it seemed to give absolutely no concern to the sanitary authorities of the town.

The personal hygiene of the people is also sadly defective. Ablutions are never carried beyond the occasional washing of hands and face, and this is only natural, considering the crowded state of the houses, and the entire absence of public baths or other conveniences for more thorough cleansing of the person. The food of the people consists to a large extent of fish and potatoes and bread and tea. Of the use of the great majority of vegetables they are complete ignorant, while such
admittedly wholesome articles of diet—such as porridge and milk—eat.
Cakes, buns, broth &c are practically unknown.
Who then can be astonished at the rapid spread of any infectious or
contagious disease in such a community? And the epidemics the
history of which Stane-now writing
is by no means the only or the most
credulous one that has appeared in
the place.

(3) Origin and development of the
epidemic.

As have previously stated the epidemic, as far as Putney town
was concerned, originated in a small
farm in the country where three of
the children occupying the house
from which milk was supplied
to a milkshop in the town were
suffering from enteric fever.
The source of infection to this place
was in all probability a farm place situated on the higher grounds. The whole sewage from this place ran into the mill race which discharged into a small stream running past the house from which the fever was eventually introduced into the town.

Some time previous to the children here being affected there had been cases of enteric fever at this farm (the mid on the higher level) the cause of which was not very apparent; but the most probable theory is that it arose from some virus which has for a long period lain dormant; and in these days the plots and refuse generally were cast out at the backs of the houses where they were allowed to lie till opportunity
arrived for their removal. Some five or six weeks previous to
the pestilential outbreak at this place
the proprietor made improvements
on the houses in which the fever had
been prevalent before, and in doing so,
he removed a large quantity of earth
from the backs of the houses in
order to make a footpath there, as
he intended altering the doors so
that the previous back doors became
the front of the house. The earth,
so removed, he placed on a piece
of vacant ground which, unfortunately,
lay at a higher level than the well
which supplied water to the families
occupying these houses. This well
earth was deposited about 80 yards
from the well, and the geological
strata had a very decided dip in
its direction.
My assumption then is that the
genus Plasmodium fever, long
Armant were by this disturbance aroused into activity and by some means got into the feet of those attacked or that they gradually crept through the soil and eventually reached the well water and so set up the disease in those using it.

When investigating the cause of the outbreak here Dr. Alexander the Medical Officer of Health for the County caused the water from the well to be analysed and it was then reported to be unsuitable and even dangerous as a potable water from the amount of albuminoid ammonia it contained no bacteriological analysis of the water was made else some very interesting and instructive information might have been derived.
Conclusions and General Remarks.

A. Medical

B. Sanitary

A. Medical. After experiencing such an epidemic as the one described, the first thing that impresses itself on one is the great difficulty of diagnosis, and as there is no previous indication of positive diagnosis can only be made after careful and painstaking examination of all other causes. A feverish condition in the absence of any definite symptoms. This difficulty becomes all the greater if influenza happens to be also epidemic at the time, since many of the symptoms and physical signs of the two diseases are identical, and the differential diagnosis may for a period varying from a week to ten days be impossible. For although it is undoubtedly true that the majority of cases of influenza have a history of sudden onset, yet this
is not invariably the case and in the
other and a small percentage of cases
of enteric fever seem to have a sudden
deterioration. Also,
Another disease closely resembling
enteric fever and rendering diagnosis
for a considerable time very difficult or
difficult to impossible is tubercular
meningitis, especially when it
affects more particularly the brain
meninges.
During this epidemic I met with a
few of these and they presented a
period of symptoms closely
resembling those of enteric fever
that the differential diagnosis
was extremely difficult, and until
paralysis, or other symptoms and
unquestionable signs of meningitis
developed, often quite impossible
to diagnose. Already when treating of the state
of the bowels mentioned that constipation
is very much more common at the commencement of the disease than diarrhoea, a fact which I believe is not sufficiently recognized by students and others who have not had actual experience of the disease. Moreover I have stated that this symptom frequently persists throughout the whole course of the disease and that diarrhoea of any kind may be absent from beginning to end so that anyone relying on this so-called distinctive sign of enteric fever might in such cases be unable to form a correct diagnosis. Amongst my appendices Charts will be found several showing that constipation was in some instances more typical of the disease requiring laxatives for its relief than diarrhoea.
Constipation in enteric fever I cautiously recommend that it should be relieved either by a suitable dose of cascara sagrada or of castor oil preferably the latter when it can be borne.

My experience of the treatment of this complication, if it can rightly be called a complication, quite agrees with the teaching of Unna who gave 30 or more drops of castor oil every two or three days when necessary, and should quite a different opinion from those who said that no laxatives should be given in this disease, and in this list we have such an eminent physician as the late Dr. Fagge, who says: 'He that has not a disease in enteric fever would think of giving ordinary laxatives in a case of enteric fever.'
Indeed, many of my chart show the evident value of a slight laxative, because as invariably happened on constipation being obliterative, the temperature began to rise, so immediately after an evacuation of the bowel it was sure, deferred, unless some injury had been inflicted on the gut itself by the pieces hardened packed.

The value of careful examination for a rash in doubtful cases cannot be overestimated as it is often by the aid of this sign alone that a positive diagnosis can be given on quick reading the case, and appropriate treatment adopted, while at the same time immediate precautions towards preventing a spread of the disease can be taken. Early and correct diagnosis becomes of course a
matter of the very utmost importance in all cases occurring, say in dairies or other places from which the public obtain their milk and milk supplies. The early history of the case and the movements of the patient prior to the onset of his illness are also points that should be carefully enquired into as they often throw considerable light on an otherwise obscure case.

With regard to the conclusions I have come to in the matter of treatment, I think I have made it pretty clear that I regard Carbolic Acid as the most efficient and at the same time safe drug to use with the view to alleviating all the symptoms, preventing complications and ultimately leading to cure. I would here again specially refer to its remarkable
power of reducing the temperature. From these observations made on its action in enteric fever I believe it to be very distinctly antipyretic and also, though to a lesser extent, diaphoretic, diuretic and analgesic, and that its toxic action need never present itself with even moderate care.

My experience with other drugs used for the same purpose as the Carbolic Acid was not such as to induce me to again repeat their administration in like cases in preference to the Acid. Hence in considering the dietetic side of the question of treatment given me as my opinion that Corn flour is not a suitable article of diet for those convalescing from this disease and that it was meal given as
Porridge is far more suitable while Arrowroot, Rago and ground Rice are also of much value and may be given without unpleasant results.comparing crops after the temperature decreases. Beng's food has also been mentioned and I again say that I have every confidence in recommending it or similar preparations to be given immediately the febrile stage comes to an end. Several German physicians have recently advocated a much more liberal and varied diet than that which I have employed in my cases but Tannen do not see that such could possibly be called for and Johnson certainly hesitates before giving the amount of solids recommended during convalescent period.
With regard to the treatment of the several complications of this disease, fortunate as my experience during this epidemic was comparatively limited. The most serious actually encountered was haemorrhage, either from the nose or bowel, and with regard to the treatment of this I may again say that I consider ergotinine and next to it hexamethione to be the safest and best drugs for its arrest. The former may be used either by the mouth, locally or hypodermically, with equally satisfactory results, while the latter may be used locally, where circumstances permit, or by the mouth.

In concluding my remarks on the medical and dietetic treatment of the disease I am happy to say that it was comparatively seldom necessary to employ any medicinal agents beyond in a few cases, simple tonics to bring the patients back to their former
strength and vigour. Indeed with the administration of plenty of good
nourishing food combined with, when
possible, change of air and scenery.
I found that as a rule they got faster
up to their former standard of health,
and many have subsequently
ascertained express themselves as
being in much better health now
and more robust in every way than
they were before they had the fever.
With regard to the age of those who
suffered undoubtedly the great-
majority of the cases occurred amongst
the juvenile and adolescent but this may
be partially explained by the fact
that they were necessarily much
more exposed to infection, since
every person who had reached an
age at which they were able to do
any work was engaged either in
giving to sea or the fishing boats,
or else was employed at fish-curing.
in the fields, and necessarily spent a large portion of their time out of doors and away from the immediate vicinity of the infected area. This certainly was a very fortunate circumstance, since those patients who had got beyond the age of puberty were much more severely affected than those younger.

Infants and the very young did not in my experience, which are exceptions, become affected, and this is the more remarkable considering the large part milk occupies in their diet. The only conclusion I can come to is that the very young enjoy a special immunity from this disease as also apparent do the aged.

Mortality: It is with the utmost satisfaction that I can produce irrefutable evidence of the success of the treatment which I have been advocating. Out of my 181 cases up
I do not blame my fellow citizens for four deaths giving a percentage of 3 deaths over 2.2, a result which future time will very favorably compare with that of the any method of treatment just tried in this disease.

3. Sanitary. On carefully considering the sanitary aspect of the question, one cannot help thinking that such an epidemic was entirely preventable.

The first, that here we had all the conditions favorable for the development of enteric fever epidemic viz. A bad water supply, open at nearly every point to pollution of all pools, drainage system of the most antiquated and wholly inefficient; places of public convenience few and far between and very dirty, while scavenging and cleansing generally, speaking, were compeions of their
absence. Then there exists the almost entire absence of any attempt towards personal hygiene; add to which was the dilapidated state of the houses, as also the extreme overcrowding present. Here then indeed we had a typically prepared soil for breeding such a disease; and who knowing these facts can wonder that once the disease was introduced it spread with amazing rapidity throughout—every quarter of the town—

Slave indications on the map the original foe of the disease as known to me personally and it is a point of great interest that the spread of the disease was almost invariably in the direction of the sewers from the higher to the lower levels. This surely is a very significant fact tending as it does to show that the sewers were to a certain extent at least directly responsible for the spread of the disease.
On what other grounds can the direction of the spread of the disease be explained? Secondary fei was often in man. Probably the ordinary gutters at the sides of the streets had as much to do with the actual spread of the disease as anything else. Since liquids and semi-solid filth was constantly being thrown into them and because this went floating down past the other houses and must always have left some infective particles adhering to the stones, which in time became dried up and when at the stage it takes no considerable effort of the imagination to transfer some dried, impalpable, seric laden matter from the street to the inside of the house, and from there to some such suitable medium for its further development as milk or unclean drinking water.
Once the object was gained and the almost inevitable results to those using the milk or water thus infected could be pretty definitely looked for to follow.

As I have previously stated, once the fever was introduced it was allowed to spread at its own sweet will for a considerable time. This was mainly due to the medical officer and sanitary authorities being almost entirely ignorant of the true extent of the epidemic, as may be gathered from the fact that when asked to furnish him with a list of cases under my care I was able to give him a list of 46 the existence of any one of which he was entirely ignorant. Owing to the notification act not having been adopted! As a natural consequence, when the disease had obtained such a hold he was comparatively powerless to deal with it efficiently, especially
as the hospital accommodation was utterly inadequate for such a contingency and the proposition to erect a temporary structure for the accommodation of the more urgent and dangerous cases was immediately turned down. Indeed, the attitude of the Local Authority was distinctly uncooperative. Keeping the whole state of matters quiet and at their meetings, both the doctors and public press were freely denounced for raising alarmist rumours likely to be detrimental to the trade of the town. Despite their statements, however, the people temporarily employed in the place refused to stay longer at the risk of their health and probably their lives, to pay nothing of the expense to which they were liable to be subjected in the event of their being attacked, and threw up their employment and
He states that the summer fishing season was very considerably curtailed. When I consider that this is the great money earning time of the vast majority of the community I think I should describe the attitude of the local authorities in not taking immediate steps, at whatever cost, to stamp out the disease as very short sighted and one of very false economy. 

In notwithstanding this experience was dearly purchased, when, a few weeks later, a few of the more enlightened of them proposed that the notification should be adopted, the medical prolonges and serious opposition on the grounds that it would cost money to put into practice. Fortunately however despite the ignorance and pigheadedness displayed during the discussion of
of the proposition, the act was eventually adopted and, since it came into operation, I am pleased to say the number of cases has gradually decreased although the town has never got quite quit of some cases and it is now nine months since it first made its appearance in the community.

To estimate even approximately the cost to the community of such an epidemic is well-nigh impossible without laying one's statement open to the suspicion of exaggeration, and, as can be imagined, it was very great. To leave out of the question altogether the loss sustained by the fishing community and the contiguity of their reason, there was the loss sustained by the pelot board, and one prominent teacher in the town assured me that the loss by Government grant for non-
attendance of scholars was so great that it would have been infinitely more profitable for the Board to have merely paid the salaries of the officials and kept the schools closed.

Then there were the cases of families where the breadwinner was struck down. As a matter of course sooner or later in nearly every case, both he and his wife and family became dependent on the Parochial Board for their sustenance, so that the end of the epidemic to the Parochial Board alone would have gone a great way towards clearing all expenses connected with the better administration of sanitary affairs. After all the only point for gratification in the estimation was mortality from the fever there being as previous states and four deaths and three more and the fact of striking interest
vigor and the four who died only one was being treated by Carabolic acid, and even she could not always be persuaded to take it.

The practical lessons to be gained from such an epidemic are many, and none may be allowed in conclusion to summarize a few.

There is the definite proof that no amount of skill will bleed enteric fever, since the insanitary condition of enteric fever had remained the same practically for years.

When however the specific virus of enteric fever becomes introduced into such a community living under such conditions as those just been discussing, it tends to spread with alarming rapidity. Unless the first cases are carefully attended to and isolated when possible it—
may become an impossibility to clamp out the disease till it has, as we may say, died out of its own accord.

IV
The ridiculous practice of having a medical officer in charge only as a means of false economy, since owing to the absence of the sanitary arrangements being put in force he may be utterly ignorant of cases of infectious disease within his area and when cognizant of them quite powerless to deal with them for want of proper support by his Local Authority.

V
The absurdity of, as was the case here, trying to stifle the fact that fever was raging instead of putting forth their best efforts to have it checked, regardless of the initial expense of cleanliness in every sense.
both personal and household and proper attention to efficient scavenging.

The proved necessity for UT.

or privies in such numbers that the people may not be required to, let effluent every sort of night soil and fill on the street, or else keep it in their dwelling rooms for perhaps 48 hours till the dust can come out. Have explained how this is the more necessary as far as the women, children and invalid part of the community are concerned.

The necessity under existing conditions of a greater number of convenient and clean places of public convenience so that nuisances of all sorts may be prevented.

The great need of educating the people in the rudiments of modern sanitation. This
Sworn suggest as a very suitable subject to teach in the technical education classes now as common as likely to be infinitely more serviceable to many than some of the subjects presently taught.

The need of inculcating in the young habits of cleanliness and attention to personal hygiene generally. Such could and certainly should be insisted on during school time, and all schools should be provided with suitable lavatories that the "dirty boy" could be compelled to go and wash himself before leaving the premises and before being allowed to associate with his more cleanly and tidy class fellows.

She need not also be impacting to the female portion of the population especially, some of the elementary principles of nursing. This might me-
well be undertaken by the Queen's nurses for a small extra remuneration during their spare time, or by nurses specially engaged for the purpose either by the Local Councils or Local Authorities of towns. I am certain that were such instruction available thousands would avail themselves of it and medical men would then not so often see his best efforts thwarted by possibly well-meaning, but ignorant attempts at nursing the sick while as regards the sick themselves they would have reason to be very thankful that such an institution as one for teaching nursing was ever established while dealing with the subject of nursing I have reason to acknowledge my indebtedness to the Queen's nurses here for the careful way in which
She assists me in keeping my chart and also in the devoler manner in which she attends to her trying duties and in every way carrying out my instructions as regards the treatment of the patients.

Consider the value of a properly trained nurse in such a committee ignorant of even the rudiments of nursing. Simply inestimable.

The days when dietetic treatment alone is mainly to be relied on for patients suffering from certain fevers are now past. And that it is the duty of every up to date physician to try, if some of the tuberculosis agencies are convinced to cut short the life of the bacillus causing this disease and thereby also shorter cutting short of materially mitigating the distressing pain of symptoms accompanying its presence in the human body.
These are a few of the lessons to be learned from such an epidemic, which though it looked black enough at the time may not ultimately prove such an unmitigated evil, since the local authorities, stimulated possibly by the communications sent them from the Board of Supervision, are now apparent awakening to some sense of their duty. More important than all however the people themselves seem to have been so strongly convinced of the evil effects of fever raging in their midst, that they are now as anxious as they were previously indifferent, to save the existing precarious state of matters.

Let us hope then that after all the silver lining is at last beginning to appear and that no one will ever have an opportunity of recording any similar epidemic.
affecting Pulleynstow in the future.

Sam Ellis

with M.B.

April 1894
THE SANITARY CONDITION OF PULTENEY-TOWN.

MR CARRUAE'S REPORT.

The following is the report of Mr Carrae, C.B., who was sent down by the Board of Supervision to inquire into the sanitary condition of Pulteneytown in reference to the outbreak of typhoid fever:

Report to the Board of Supervision on the drainage and water supply of Pulteneytown in connection with the outbreak of typhoid fever there.

In obedience to the orders of the Board, I visited Pulteneytown on the 26th, 27th, and 28th ult., and having made careful inspection I beg to report as follows:

DRAINAGE.

There are seven main sewers with outfall, four into Wick river, two into the harbour, and one into the bay. In addition to this a number of private sewers discharge into the river and harbour. The main and branch sewers are of two kinds—built sewers and pipe sewers. Up till about twenty years ago the sewers were built, but since then the Commissioners have laid pipe sewers. The main sewer in Francis Street is a built one, two feet square, in the track of an old watercourse, with stone sill and cover and side walls built in mortar. The other main branch sewers, in consequence, are contracted at the sill, the cross section varying from 2 ft. 2 in. deep by 1 ft. 9 in. at the top and 9 in. at the sill to 1 ft. 3 in. deep by 1 ft. 5 in. at the top to 9 in. at the sill. The side walls are built and the sill and cover joined with mortar. The main and branch pipe sewers have been constructed to take advantage of the declivity on the streets, and with only two exceptions have good gradients. The exceptions I refer to are the pipe sewers in Barrogill Street, Northcote Street, and West Park. In the Northcote Street sewer there is a good flush of water, and the West Park sewer is flushed regularly from the water main; Barrogill Street sewer is referred to in the next paragraph.

I had the main and branch sewers opened at 10 places to test their cleanliness and sufficiency. In six cases I found them quite clear and free from deposit; in the other four cases, namely, Smith Terrace, Barrogill Street, Vasisthta Street and Wellington Street, there was a little deposit of road debris, but not to such an extent as to render the sewer inoperative. The greatest deposit was found in the 9 in. pipe sewer at the west end of Barrogill Street, where it was about 2 in. deep in the bottom of the pipe. This branch sewer, I understand, is not flushed.

Two built conduits, one for conveying the water after being used at Pulteney mills, the other for overflow water from the mill dam, pass through the east part of the burgh, the former discharging into the harbour, the latter into the bay. In the course of these conduits are carried below dwelling-houses, and opening have been made in them in the back courts into which liquid refuse and filth from the houses are emptied.

The main and branch sewers are not ventilated in any way. Some of the sewers are flushed by introducing water from the clean water conduits or drains, others from scours and sewer plugs on the water mains, but in some cases the branch sewers are not flushed. Generally the main or branch sewers may be said to be in fairly satisfactory order. The built sewers would be better to be substituted by pipe sewers, as they are too large, and the side walls rough, but this would entail a heavy expenditure, and provided they were ventilated and regularly flushed (after any deposit has been removed) I am of opinion they can be kept in a sanitary state.

The surface water gratings in the streets are fixed on the top of the built cesspools with a stone tongue, and connected to the sewer. The cesspools are too large and apt to leak. In many cases the sinks and water closets in the houses are connected with built drains or pipes running into the sewers without proper trapping, and in comparatively few cases are the sink or w.c. pipes ventilated. This is a serious defect, for the main or branch sewers not being ventilated, the sewer gas is sure to force its way into
the dwellings with bad effects. Where there are no sinks in the houses, gratings with cesspools, similar to those of the water channels of the streets, are provided in the back courts, and into these all manner of filth is emptied. The drains from these cesspools are in some cases built and in others piped.

As the result of my inspection and enquiry I beg to recommend:

1. That openings be made at short lengths in the main and branch sewers, particularly those where deposit was found, and the sewers thoroughly cleared of any deposit.

2. All sewage should be excluded from the clean water conduits in the east part of the burgh, above referred to, and as far as possible the water should be used for flushing the sewers and the street channels in the locality.

3. Where any of the main or branch sewers are not flushed, or only so from the fire-plugs or scour-cocks on the water mains, underground tanks should be constructed in the streets with automatic flushing arrangements, and a supply of water introduced into these tanks from the water mains. The connections to the sewers from the fire-plugs and scour-cocks would then be cut off and the scour-cocks discharge openly into the water channel at the side of the street.

4. The main and branch sewers should be ventilated by a sufficient number of open ventilators on the level of the streets; placed in the most suitable situations at frequent intervals.

5. The sewers presently discharging into the harbour should be intercepted and the sewage conveyed past the harbour into the bay.

6. Private sewers from dwellings and back courts should be constructed with salt-glazed spigot and fauces fire-clay pipes made watertight, with cement joints, and properly trapped and ventilated, iron ventilating pipes, the full size of the pipes from the w.c. or sink being taken to the roof of the house. No sewer should pass under any dwelling if it can be avoided.

7. The existing gratings and cesspools in the back courts should be substituted by improved graved boxes with pitched iron gratings.

8. The existing gratings and cesspools in the street water channels should be substituted by cast-iron gully caps with wrought iron gratings, and where the houses are not provided with water-closets or sinks, and the slops, &c., are emptied into the street water channels, these channels should be laid with dressed stones, so that they may be easily cleaned by sweeping.

WATER SUPPLY.

The water supply to the burgh is obtained from Hampirgues Loch, a natural sheet of water situated about three miles to the south-west of Pulteneytown. There appears to be an ample supply of water in the loch; it is of brownish colour, but the results of analysis by Dr Stevenson Macalmon show that it is pure and may be safely used for domestic purposes. A large part of the ground round the sides of the loch is cultivated in regular rotation of cropping, the remainder being peat moss. Between the loch and the mill dam at Pulteneytown, where the water is stored for the use of Pulteneytown Distillery and Mills, the water is conveyed in an open channel. In its course this channel passes close to three cottages, one of which has a stable and barn attached to it, and two farmsteads. In the case of the farm steadings and one of the cottages provision has been made for carrying the sewage below the channel or "wait," as it is called in the district, but as they stand at a higher elevation, there is certain to be contamination of the water in a heavy spate of rain, or at other times.

The water in the "wait" is used at one of the farm steadings to drive a thrashing mill, and is diverted round the steading for this purpose when the mill is in operation, joining the "wait" again at a lower point. After the mill since is shut the lade is not dry, as part of it is one lower level than the point where the lade rejoins the "wait." This water is used as a duck-pond, and in any remains when the mill is again used it will be carried into the "wait."

There are a number of watering places made for
...cattle drinking from the "waist," and several agricultural drains and ditches run into it. A ditch at the side of the public road near the loch also discharges water into it. Along the greater part of its course the fields are under crop or in pasture, and after rain where the ground is higher than the "waist" the water will percolate into it.

At certain times and seasons the contamination of the water in the "waist" with impurities will be worse than at others, but there is little doubt that to a greater or less degree it is constantly going on.

About 60 yards above the mill dam the water is taken from the "waist" for the burgh in a built drain or conduit, ten inches square, and conveyed in this for a little over 200 yards to the reservoir into which it is discharged by a six-inch pipe.

The reservoir is square, measuring 36 feet on the side with a depth of 7 feet to the top of the inside walls. There are dry stone walls two feet thick inside the reservoir, through which the water passes before being drawn off by the outlet pipe. There is no filtering material used, and the only effect the dry stone walls have is to act as a kind of screen and allow the water to settle before being drawn off. The reservoir is enclosed with a wall but is not covered in any way. The outlet pipe from the reservoir, which forms the principal main for the burgh for a distance of 1100 feet, is ten inches in diameter, and the other main and branch main pipes vary from six inches to two inches in diameter. All the pipes are made of cast iron. Previous to 1878 they were not coated with Dr. Angus Smith's patent solution, but subsequent to that date a number of new pipes have been laid and pipes of greater diameter substituted for smaller ones, and these are all coated.

There is only one house in the burgh to the upper flat of which the water will not rise. In May, 1890, there were within the burgh, supplied from the Puldennytown water works, 110 water closets, 178 sinks, 24 baths, and 20 supply pipes for yards and manufactories. Some of the houses in Union Street and Francis Street are supplied with the Wick water. I may add that on 19th July last the Commissioners submitted samples of water drawn from the loch and from one of the public wells in Puldennytown to Dr. Stevenson Macadam, who certified that "they are pure and may be safely used for domestic purposes."

As the result of my inspection and inquiry, I beg to recommend—

1. That the water should be conveyed from the loch to Puldennytown reservoir in cast-iron coated pipes.
2. The water should be filtered either at the loch or at the reservoir before being used.
3. The reservoir should be covered.

I have to acknowledge my indebtedness to Mr. Cormack, clerk to the Commissioners, Dr. Banks, medical officer of health, Mr. Milne, town superintendent, Mr. Petrie, sanitary inspector, and Mr. Miller, builder, for the information and assistance rendered to me when prosecuting my inquiry.

(Signed) GEO. CARFLE, C.E.
The photos are taken in Mediterranean succession. Owing to undisturbed climatic conditions the more distant part of the town could not be included in the picture.
Plan and sections of street gully-tokes and cesspools below, as referred to in text.