III. Original Communication

AN OUTBREAK OF TYPHUS FEVER

History—By Harvey Littlejohn, M.A., M.B., B.Sc., F.R.C.S.Ed.
Clinical Features—By Claude B. Ker, M.D., M.R.C.P.Ed., Superintendent, City Fever Hospital, Edinburgh.

History.—Murchison in his classical account of the continued fevers makes the remark that a complete history of typhus would be the history of Europe during the last three and a half centuries. With equal truth it may be said that no history of Edinburgh, of its development and of the conditions of life which existed up to a period within the memory of us all, could be written without frequent reference to this disease, which was at one time practically endemic in the Old Town; and annually desolated many homes, not only amongst the poor but also in the ranks of our own profession. Owing, however, to the general increase of trade and the improved social condition of the working classes, which higher and more regular wages produced, as well as to the vast progress which has been made within recent years in all that affects the health of individuals and of communities, epidemics of typhus fever have practically disappeared, and even an outbreak such as we propose to describe must be accounted an exceptional event in the sanitary history of the city.

Accurate information in regard to the prevalence of the disease, previous to the introduction of the Edinburgh Notification Act of 1879, is impossible to obtain, but the following table taken from Murchison gives the number of patients admitted into the Royal Infirmary during ten years, 1862-1871; and when we remember how few of the actual number of cases of the disease could have been treated in that institution, an idea is afforded of how widespread the infection was a quarter of a century ago.

| Year | 1862 | 1863 | 1864 | 1865 | 1866 | 1867 | 1868 | 1869 | 1870 | 1871 |
|------|------|------|------|------|------|------|------|------|------|------|
| Cases | 14   | 74   | 212  | 447  | 847  | 303  | 280  | 259  | 287  | 101  |
Since 1880, however, we have accurate records, and in the table below are given the number of cases and the mortality for each year, while the chart indicates even more clearly the history of the disease during the last nineteen years.

| YEAR | CASES | DEATHS | RATE PER CENT. |
|------|-------|--------|----------------|
| 1880 | 18    | 7      | 39.0           |
| 1881 | 23    | 14     | 60.8           |
| 1882 | 45    | 10     | 22.2           |
| 1883 | 50    | 16     | 32.0           |
| 1884 | 42    | 16     | 38.0           |
| 1885 | 58    | 10     | 17.2           |
| 1886 | 12    | 4      | 33.3           |
| 1887 | 38    | 11     | 28.9           |
| 1888 | 23    | 5      | 21.7           |
| 1889 | 46    | 9      | 19.5           |
| 1890 | 7     | 1      | 14.3           |
| 1891 | 1     | ...    | ...            |
| 1892 | 18    | 3      | 16.6           |
| 1893 | 6     | 1      | 16.6           |
| 1894 | 3     | 1      | 33.3           |
| 1895 | ...   | ...    | ...            |
| 1896 | 10    | 3      | 30.0           |
| 1897 | 3     | 1      | 33.3           |
| 1898 | 79    | 9      | 11.3           |
| **Totals** | 482 | 121 | 25.1 |

During the ten years, 1880-1889, there were 355 cases notified, and in no year was there ever less than ten cases, the
average number being thirty-five. During the subsequent nine years, 127 cases have been notified, being an average of fourteen yearly; while, if we discard for the moment the seventy-nine cases which occurred last year, the average number of cases from 1890 to 1897 was only six, and only twice did the annual number of notifications reach double figures.

A still more remarkable contrast between the first period of ten years and the last of nine years is seen if we compare the death-rates of these two periods. From 1880 to 1889, 102 deaths occurred, equal to a death-rate of 28 per cent.; while in the subsequent nine years there were only nineteen deaths, giving a percentage of fourteen, or exactly half the death-rate for the ten years, 1880-1889. As a result of this gradual disappearance of typhus fever, the younger generation of medical men have little or no acquaintance with the characteristic features of the disease, and few of the students who have graduated in Edinburgh during the last twenty years can have had the opportunity of becoming practically conversant with its clinical aspects. That such want of knowledge may have disastrous results, is exemplified by the experience of last year's outbreak, and by many small outbreaks which have occurred recently in various parts of the country. For this reason, and also because the recent cases present some features of special interest, we venture to bring before you the following account.

In the first week of October four cases were sent into the City Hospital suffering from what was thought to be typhoid fever, although in one case the diagnosis was stated to be doubtful. All of the cases came from the neighbourhood of Simon Square, and resided within a hundred yards of each other. In the following week three cases were admitted to the Fever Hospital, two of them from public hospitals, and all resided in the same neighbourhood. One had been notified as a case of typhoid, another as scarlet fever, while in the third the suspicion of it being typhus was mentioned. Unfortunately, all of these patients had been ill for some time, and presented only fading rashes, but their whole appearance raised the suspicion that they were probably cases of typhus, and accordingly they were placed under observation in a separate ward. During the second week this suspicion became confirmed, owing partly to the localised distribution of the cases
and to the negative results of Widal’s reaction. Much valuable time had been lost through the failure of the medical attendants to recognise the disease, and all of the first seven cases were only received into the Fever Hospital when the disease was well advanced, while three of them had been sent in the first instance as patients to other hospitals and kept there for some days.

As a result of this delay, a much wider dissemination of infection occurred than might otherwise have taken place, and the number of cases increased during the remainder of October and in November. During December they again decreased, the patients during this month coming for the most part from already infected houses, and by the middle of January the disease had completely disappeared.

The following table shows the number of cases which occurred during each week:

| Week ending | Cases |
|-------------|-------|
| October 8   | 4     |
| November 5  | 13    |
| December 3  | 5     |
| January 7   | 2     |
|            | 82    |

Origin and distribution of the cases.—A “de novo” origin of the disease may at the end of the nineteenth century be at once discarded, and if one fact was more clearly brought out by our investigation of the present cases than another, it was that practically the disease is only communicated by direct contagion, and that even persons who are residing in the same tenement with an infected family, and who are living under
conditions most favourable to receive infection, namely, dirt, squalor, and intemperance, do not become infected unless they have been in close contact with the patient.

It is true that we are unable to point to the first case of the disease in the City or explain how it was introduced, but this is not to be wondered at, when we consider the kind of life led by the lowest class of the population, their wandering habits and chance acquaintanceships. The time during which the disease must have existed before its true nature was recognised was also a serious obstacle to the discovery of its origin. The presence of the disease in many towns and districts of Scotland about this time is, we hold, sufficient ground for maintaining that the infection was almost certainly introduced from outside into the city, without being compelled to fall back upon a "de novo" theory.

The disease had probably existed for several weeks before it was recognised in October. The grounds for this presumption are the simultaneous occurrence of several cases at the beginning of October, and also the information which was elicited in our investigations, that one or two cases of severe "influenza," which confined the patients to bed and left them very weak, had occurred in the families which furnished the first true cases of typhus. It appeared also that a man residing in one of the worst parts of the infected area died at the commencement of September of "pneumonia," and that a wake which lasted for two days was held in connection with the body. The house where this occurred was small and of the most wretched description, and, according to the account of some of those present at the wake, the room was continually crowded. There is reason for suspecting that the man died of typhus fever, but whether this is so or not, it is a curious coincidence that at least three cases of so-called influenza occurred shortly afterwards amongst those who had been present at the wake, and later on three others were struck down with undoubted typhus.

As regards the distribution of the cases in the city, with a few exceptions they occurred within a radius of a quarter of a mile of Simon Square, and amongst families who were in constant intercommunication.

The cases which occurred outside of this area were for the most part clearly traced to have received the infection from
persons residing within it, but in one or two instances, notably a series of four cases in one family residing in Portobello, no direct communication could be discovered. The man was a hawker, and could give no very clear account of his movements or those of his family, so that the possibility of the disease being connected with the Edinburgh cases could not be excluded.

Age incidence.—The following table shows the ages of those attacked, and the remarkably large proportion of children affected must strike any one acquainted with previous statistics. Children under 10 years of age constitute over a quarter of the total cases, and are more numerous than the patients at the two age periods which usually supply the greatest number of attacks, namely, 15 to 20, and 20 to 25:

| Age Group   | Cases |
|-------------|-------|
| Under 5     | 7     |
| 5 to 10     | 15    |
| 10 to 15    | 6     |
| 15 to 20    | 8     |
| 20 to 25    | 11    |
| 25 to 30    | 8     |
| 30 to 40    | 13    |
| 40 to 50    | 10    |
| 50 and upwards | 4  |
| **Total**   | **82**|

As regards sex, the cases were pretty equally divided, 38 males and 44 females being attacked.

Mortality.—Ten cases, or 12 per cent., ended fatally. This is a very low death-rate compared with the mortality given in connection with former epidemics, and I think it must be attributed, in part at any rate, to the fact that all the cases were treated in hospital, with the exception of two which were too ill to remove, and afterwards died. No death occurred under 15 years of age; indeed, the predominating factor in regard to prognosis was not so much the age of the patient, as the existence of a previous life of intemperance.

Infectiousness.—Typhus is very infectious under certain favourable conditions, but its "striking" distance is very short. This point was repeatedly brought before us by the fact that a patient in a crowded tenement was not a source
of danger to other families, so long as members of these households did not actually enter the room where the patient was lying. In all the cases where the source of infection was traced, the patient was found to have been in actual contact with a previous case, while, without exception, families living in a common stair, in which there was an infected house, escaped the disease so long as no direct communication with the patient took place. Members of the patient's family might mix with other families in the stair or outside the house, apparently with impunity. This is an interesting fact, but it must not be used as an argument against the isolation of all cases of the disease in hospital, since in the class of the population amongst which typhus fever occurs, visits from relations and friends to the infected house are constantly taking place, and are difficult to prevent.

An illustration of this was afforded in a striking manner by what occurred to the following family:—

One of the first cases in October was a woman who lived along with her husband and family of six children in Paul Street. Little information could be obtained as to the existence of any friends or relations, who might have visited the infected house, and whom it was therefore important to keep under observation. The required information was, however, soon forthcoming by other means, as the following family tree indicates, and the dissemination of infection to which this patient gave rise was the means of discovering the intricacies of a family relationship, of which even the members themselves had lost count.

The wife infected her husband, and five of their children subsequently suffered from the disease; the husband's mother, living in Richmond Place, the families of his three brothers and of two sisters, all residing in different streets—one of the former lived as far off as Portobello—were all infected, as well as the family of a sister-in-law.

In all, twenty-two members of the family suffered from typhus fever, and seven died. They resided in eight different tenement blocks, each crowded with inhabitants, and yet in one instance only did another family living in the same tenement become infected, and in this case it was fully proved that this was the only family in the tenement which had entered the infected house, and was on friendly terms with the inmates.
Dirty houses, deficient cubic space, and want of ventilation greatly increase the infectiousness of typhus; while, under the opposite conditions, the risk of anyone taking the disease from a patient is much reduced. In support of this proposition, it was observed that the great majority of the cases occurred amongst people who were living under the most insanitary conditions of overcrowding and uncleanness, and that the fever was much more frequently spread to others from these cases than it was from the cases which occurred in clean and well-ventilated houses. The experience of the fever hospital also bears this out. Notwithstanding the fact that seventy-eight cases were treated there, not one of the staff, who came into contact with the cases, caught the disease, a result which is at variance with the usual experience of hospitals where typhus fever is treated, and which must, we think, be ascribed to the great care bestowed upon the personal cleanliness of the patients, and to the free ventilation maintained in the wards.

That "fomites" may convey the infection must be admitted, although they are not nearly so active in this direction as is commonly supposed. This was shown by the apparent absence of danger to those who mixed with inmates of infected houses in tenement buildings, and the non-conveyance of infection by persons residing in infected houses, to those with whom they came in contact at their work and elsewhere. That fomites, however, may convey infection, was proved by the case of one of the inspectors of the health department, who contracted the disease from a mattress which he cut up, preparatory to burning it, and which had been taken from a very dirty house, from which a patient had been removed. This inspector had not been exposed to infection previously, and he sickened with the fever thirteen days afterwards.

Preventive measures.—The means which ought to be adopted to prevent the dissemination of the disease are—(1) Isolation of the patient in hospital.—This is essential under all circumstances. (2) All persons living in the same house, and all friends or neighbours who have been in close communication with the patient, should be removed into quarantine for fifteen days.—This is the best means of stamping out the disease quickly, and as a rule, amongst the class of people with which one has to deal, little objection is offered to this procedure, provided some small compensation is given to cover the house rent, and an arrangement is
Italics denote cases of typhus fever.
effected whereby the men do not lose their employment during their detention. If removal to quarantine is not carried out, then all persons who have been exposed to infection should be frequently visited at their homes, so as to discover as soon as possible any symptoms of illness appearing amongst them. In many instances where the people could not be taken into quarantine they were removed for a few hours to hospital, while their houses were disinfected, and they themselves received a bath, and had their clothes passed through the steam disinfector. (3) Disinfection.—This should be effected by removing all textile articles from the house and disinfecting them by steam—or, in the case of old mattresses, burning them—thoroughly fumigating the rooms with sulphur, or, better still, spraying them with formalin or perchloride of mercury solution; and, lastly, by the plentiful use of soap and water, fresh air, and the whitewashing of the ceilings, stairs, etc.

The infective agent of typhus does not appear to be difficult to destroy, and even free exposure to fresh air alone seems to have a great effect in inhibiting the spread of infection. In none of the houses which were disinfected, according to the above method, was there a recurrence of the disease.

THE CLINICAL FEATURES.—The whole subject of typhus has been so completely and admirably treated in the great work of Murchison, and has been so thoroughly summarised and brought up to date in Moore's book on the infectious fevers, that I feel it is necessary to apologise before entering on this paper. The only excuse that I can offer is, that it is so long since we have had so many cases together in Edinburgh, that it may be of some interest to describe the fever as we saw it in the wards of the City Hospital, and see if there has been any change in its characteristics since the time when it was endemic in the Old Town.

It is not in my province to speak of the predisposing causes of typhus; and of the exciting cause, almost certainly a micro-organism, we as yet know absolutely nothing. Various germs have been isolated by different observers without any absolute proof that they are the cause of the disease. During the recent outbreak, two former assistant medical officers of the hospital were good enough to undertake a bacteriological
research; but though they have had some very interesting results, it is too early to say if they are to be fortunate enough to clear up the mystery which at present enwraps the origin of the fever.

**Incubation period.**—It is generally admitted that the period of incubation in typhus may vary considerably in length, being in some instances only a few days, whereas in others it may be prolonged for nearly three weeks. During the recent outbreak the patients have for the most part lived in such intimate relations with each other, and have been exposed on so many occasions to the contagion, that it is absolutely impossible in the vast majority of the cases to define the length of the period. In one instance, however, the patient had only one chance of exposure, and his first symptoms occurred thirteen days afterwards. One of our ambulance attendants fell ill twelve days after destroying infected fomites. Another case took over seventeen days to develop his fever. During this time he was kept in quarantine, and certainly was not exposed to infection. On the other hand, though the statutory period of quarantine adopted was only fourteen days, and many persons were discharged after that interval, none of them returned to us with the disease.

**Invasion period.**—The onset of typhus is very sudden, and

![Fig. 1](image-url)
often accompanied by actual shivering. Pains in the limbs and back are also frequently felt, and at least two of our cases were from this cause diagnosed as rheumatic fever. It is usually stated (Murchison and Moore) that, while nausea is frequent, vomiting is rare. It is therefore of some interest to note that in my cases vomiting was a quite common symptom, occurring in three-fourths of the children and in nearly half the adults. Rigors were not very common. As regards the relative frequency of the other symptoms, it may be said that headache was practically invariable; that a feeling of chilliness was noted in 80 per cent. of the cases; and, lastly, that the three symptoms—headache, chilliness, and vomiting—were combined in 37 per cent. of the admissions.

The temperature commences to rise at once, and in most cases reaches the acme in three days. Occasionally there is a sudden rise to a high level on the first evening, but this only occurred in two out of eleven cases watched from the inception of the disease, all the others mounting comparatively slowly. In the case of two children and of one adult there was actually a fall to normal on the second day.

Even at this early stage the patient often may be diagnosed by his appearance. The face is usually conjested and stupid, while the eyes are pink and watery. Great depression is always felt, and it is quite exceptional for a typhus patient to keep on his feet after the third day.

Period of advance and eruption.—This period may be said to start on the fourth day. The patient has taken to his bed, and suffers chiefly from headache, thirst, and insomnia. The temperature in an average case is 103° or 104°, and the pulse is accelerated in proportion to this elevation. The tongue, which during the period of invasion has been covered with a close, white fur, now becomes dry and yellow, and sordes appear on the lips and teeth. There is always great confusion of ideas, and the patient suffers from deafness. There is often slight delirium at night. As a rule, the bowels are constipated.

The rash in my cases was usually well out by the fourth day. It may be said to consist of three main elements. First, spots appear on the surface of the skin. These spots are at first very like those of enteric fever. They are rose-pink in colour, and fade easily on pressure, and for the first few hours.
of their existence are distinctly raised above the skin. After they have been out for a couple of days, they become a dirty brown in colour, and do not disappear on pressure. In distribution this rash is present all over the body except the face. The spots are somewhat irregular in outline, and give a measles appearance to the patient. The second element of the typhus eruption consists of similar spots lying, not on the skin, but faintly seen as it were beneath it, and causing what is known as "subcuticular mottling." This is best seen on the trunk, and perhaps best of all in the axillae. Lastly, true haemorrhage may occur into either the cuticular or subcuticular spots, giving rise to dark purple petechiae, exceedingly like flea-bites, but lacking the central point.

While it is usually stated that the rash is not visible before the fourth day, I noted that the subcuticular element was as a rule present in my cases on the third, and in one or two instances quite recognisable, though very faint, on the second. It was present more or less distinctly in all my adult cases, and was observed in all the children except two. Unless the petechial element is very marked, the rash begins to fade in the second week of the fever, though staining occasionally persists for some days after the crisis.

At the end of the first week the patient is apt to suffer from restless delirium. He appears very drunk, and probably tries to get out of bed. In severe cases, especially if they have been alcoholic, the excitement may be intense, the so-called delirium ferox setting in. It is this wild delirium which occasionally causes patients to throw themselves from windows, and when it has developed it is safer to use straps or some other method of restraint.

By the time the patient enters the second week of his fever, he is usually too exhausted to continue wildly delirious. He is now more likely to be lying helpless on his back and muttering only. If at all severe, he has subsultus tendinum, and picks at the bed-clothes. In this helpless state he drifts through the remainder of his fever, passing his evacuations under him, and often taking his nourishment only with difficulty. The face is now more drunken and bloated than ever, the eyes are blood-shot, and the pupils are contracted. The tongue, if not properly attended to, becomes crusted and black, and may be shrivelled and pointed. The pulse loses its tone, and is apt
to run. There is nearly always some hypostatic congestion of the lungs.

![Graph](image)

**Stage of defervescence.**—Towards the middle or end of the second week there is often a considerable improvement. Cases which are going to recover seldom reach the fourteenth day without some amelioration. On the other hand, fatal cases get progressively worse during the second week, though most of my own cases did not die before the fourteenth day.

The termination of the fever may be expected about the thirteenth, fourteenth, or fifteenth days. The crisis is in some cases exceedingly well marked, but it is not as a rule very rapid. In this group of cases it never took less than two days to bring the temperature to normal, and in the majority took three. The improvement of the patients with the fall of temperature was very striking, and, as a rule, there was not much sweating during the process, nor was there much tendency to collapse. After the temperature fell it usually remained subnormal for nearly a week, and during that time the pulse remained slow and shabby, with a tendency to intermit. As soon as the fever was over, the patients took their food ravenously, and put on weight rapidly.

If, on the other hand, the termination is going to be a fatal one, the temperature instead of falling gently from the middle of the second week, remains level, or may show a tendency to rise. Six of the fatal cases died just at the fourteenth day, and with rising temperatures. The remaining three survived their crisis to die of exhaustion in a few days later.

While the above may be taken to be a rough sketch of the average course of the fever, it may be of some interest to give
a more detailed analysis of the cases of this outbreak. First, as regards the duration of the disease, the evening temperature of my adult patients became on an average steadily normal on the fifteenth day. The children ran a shorter course, attaining the normal on an average in eleven days and a half.

The nervous system is always severely affected in typhus, and my cases showed no exception to this rule. Delirium occurred in forty out of fifty-one adult cases. It was chiefly of the low, muttering type; but three cases, all males, and all of which ended fatally, had true delirium ferox about the end of their first week. Persistent insomnia was another very common symptom, complicating nearly half the adult cases. Subsultus tendinum was noted in over a third of the adults. Twitching of the muscles of the face occurred in six cases only, and in two of these there were actual convulsions of a choreic character, starting in the face and spreading to the upper extremities. Incontinence of urine was also frequently present, nineteen of the fifty-one adult patients suffering from this condition. Twelve adults showed retention of urine, and nearly all these required the use of the catheter for several days.

The urine in nearly all the adult cases contained albumin, thirty-eight out of the fifty-one having this complication as long as the temperature remained up. In only a few of these, however, was it present in any considerable quantity. Fifteen cases were examined for Ehrlich's diazo reaction, and every one of them gave it well, showing conclusively what little
reliance can be placed on that test as a differential diagnosis between enteric and typhus.

The bowels in all my cases were very constipated for the first week. About the tenth day, however, there is a slight tendency to looseness. This is a point of some practical importance, as one is very tempted to use purgatives, and one given at this juncture is very apt to set up an intractable diarrhœa. In fact, I am far more careful about the administration of aperients in typhus than even in enteric.

I was fortunate enough to have one case which illustrated the fact that it is possible to suffer from this fever twice. A woman, who was treated in the hospital six years ago for typhus, and who at that time undoubtedly had a severe attack of the fever, contracted it a second time, and walked into the hospital saying that she had it. We were a little incredulous, but the result proved she was right.

Complications.—Except for the very frequent occurrence of hypostatic pneumonia, the cases suffered from very few complications. Two women were admitted pregnant, at the eighth and fifth months respectively, and both recovered without abortion. Two women had true lobar pneumonia, and one of the fatal cases was complicated with a severe bronchitis. Three cases, all women, had otorrhœa, and this in one instance was followed by Bell's paralysis. In seven cases diarrhœa was serious enough to assume the importance of a complication. As regards sequelæ, one man had parotitis, another a sharp attack of nephritis, while boils and small abscesses of the nature of those which occasionally retard convalescence of enteric fever gave considerable trouble to three patients.

Mortality and prognosis.—Nine of my cases proved fatal out of a total of seventy-nine. This gives a mortality of nearly 11\(\frac{1}{2}\) per cent., the exact figure being 11.39. Age, as all observers have agreed, seems to have a great influence on the death-rate. Thus of twenty-four individuals below 12 years of age none died, and of thirty-five under 20 years only one, giving a rate of 2.8 per cent. Of thirty patients from 20 to 40 years of age, four died, a rate of 13.3 per cent.; and the increase in the percentage of deaths is still more marked in the fourteen remaining cases of more than 40 years of age, of whom no less than four succumbed, the death-rate rising to 28.5 per cent., or more than double that of the preceding group.
As regards sex, females are admitted by most authorities to have a lower death-rate than males. Of the nine fatal cases which occurred in the City Hospital, seven were men. Murchison has suggested that the greater muscular development of men offered, as it were, more material for the disintegration caused by the fever process, or, as we might say nowadays, more pabulum for the unknown germ that causes the disease. He also pointed out that male patients were more likely to be alcoholic. I think my own few cases bear out this theory very well, as all the men who died were, without exception, large, heavy, and very muscular men, and five of them were distinctly alcoholic cases. The adult males that survived were, it is true, in many instances alcoholic, but only two or three of them were physically the equals of the seven who died. It would almost seem that a fine physique is a distinct disadvantage to a man starting an attack of typhus. Mere body weight appears to have something to do with it, as the most severe cases among the women were those who were fattest and heaviest. The figures relating to sex death-rates are as follows: Of thirty-eight males of all ages, seven, or 18.4 per cent., died; of forty-one females of all ages, two, or 4.8 per cent., died; whereas, if we take merely the adult cases, the percentage death-rate of males is 26 per cent., while that of females is only 7.14.

The prognosis of the fever, then, must be largely influenced by questions of sex and age. After this, probably the most important aid to prognosis is the condition of the nervous system. A patient who sleeps well, who has no subsultus tendinum, and who is able to be roused sufficiently from his lethargic condition to put out his tongue when asked, will be likely to recover. On the other hand, severe nervous symptoms, especially either wild delirium or coma, are of evil omen. The rash also gives a direct indication as to the severity of the case; profuse rashes, with many petechiae, showing that the case is likely to be a serious one. Without being a very ardent believer in the old views about critical days, I am inclined to think that there is something to be gained in the way of prognosis by a careful study of the temperature about the seventh day. A very large number of my charts show a slight fall of temperature at that period, and some cases seem to start, as it were, a very slow lysis from that time to the thirteenth day, when the fall
becomes more abrupt. Such a gentle decline of the fever is always a good sign.

**Diagnosis.**—A history of exposure to the disease, a sudden onset and early prostration, accompanied by mental confusion, should, if there is an epidemic, suggest the fever. The congested face and red eyes are also very suggestive. The presence of the rash is of course final, but it may be exceedingly difficult to see in the dark rooms usually the home of typhus patients; and, again, a good wash is often required before it becomes visible. Many of our cases were sent in as enteric fever, and when the rash is badly developed that is the most natural mistake. To distinguish the two fevers, as I have mentioned above, there is no assistance to be got from Ehrlich’s reaction. Widal’s reaction is the best method to use if in doubt. I am quite satisfied that it is to be relied on. Previous to this epidemic I found it present in two cases of typhus out of ten examined. I believe that this apparent inconsistency is due to the cases in question having suffered from typhoid at some previous date. During the recent outbreak I used the reaction in all cases where a differential diagnosis was required. In all the ten cases of undoubted typhus the reaction was not present. There should be little difficulty in distinguishing the disease from measles, the history of or the presence of a rash on the face pointing to the latter. As regards acute lobar pneumonia, the differential diagnosis may be exceedingly difficult. In uncomplicated typhus there is often dulness at the bases of the lungs, but this is not restricted to the limits of the lobe, and tubular breathing is not present. The respirations, moreover, though accelerated, are usually only slightly more rapid than the temperature would account for. Perhaps the most difficult cases of all to differentiate are bad influenzas, and, as I have said above, acute rheumatism may have to be remembered.

No remarks about the diagnosis of typhus would be complete without some allusion to the characteristic odour of the fever. This odour has been compared to that of mice and also to that of rotten straw. I think personally that it is peculiar and unpleasant enough to be acknowledged as an odour *sui generis.* It appears to be given off from the skin of nearly all typhus patients at some period or other of the disease. Its development is, I am certain, entirely independent of the cleanliness of the patients, as I found it unmistakably present in
patients who had been three weeks and more in hospital at a time when they were well advanced in convalescence. It is of undoubted value in diagnosis, as, if it is noticed at all, it cannot possibly be mistaken for anything else. It is usually more appreciated by nurses than by doctors, probably because their sense of smell is not impaired by smoking. In two instances I was able to pick cases out of my enteric wards, which, having mild symptoms and very badly developed rashes, would have been missed altogether, had it not been that their very suspicious smell attracted my attention.

Treatment.—In an acute fever that runs a definite course there is seldom much to be done in the way of active treatment, and typhus is no exception to this rule. In the first place, care was taken to keep up the patient's strength. The liberal use of strong beef-teas and various meat-juices saved the hospital a considerable outlay on stimulants. The staple diet was milk, and this in some cases was supplemented by Benger's food. The milk was invariably given in measured quantities in the form of small meals every two hours, and cold water was given to, and indeed forced on, the patients between times. As soon as the patient had a normal temperature, fish, bread and milk, and eggs were allowed.

The question of stimulating in fevers is always interesting. Typhus is one of those that seems in most cases to require stimulants. While in every case meat-juices were first given a trial, nearly three-quarters of the adult cases and nearly a third of the children required alcohol at some period or other of their course. Whisky was used in each instance except in one case, where stimulants of all kinds were badly borne, and brandy and champagne were used without effect.

As to cardiac tonics other than alcohol, I cannot say that we found them of much service. Strophanthus in two or three cases seemed to do good, but was exceedingly disappointing in others. Strychnine, perhaps, had the best effect on the pulse, but increased the nervous excitement in several cases so markedly that it had to be stopped.

Nearly half the adult patients required one or more doses of a hypnotic. I found I got the best results by giving hypnotics early and freely. Waiting too long meant frequently failure of even a very heavy dose to act. Both sulphonal and paraldehyde were found useful, the former causing a much more
prolonged sleep, but often seeming to increase rather than diminish the ataxic symptoms of the patient. In the cases where there was much facial twitching I used chloral cautiously, and in one or two instances undoubtedly to good effect.

Great attention must always be paid to the condition of the bladder, especially in the case of delirious patients. A routine percussion of the organ twice daily will save a great deal of subsequent trouble with the catheter. When the use of an instrument becomes imperative, it is advisable to draw off the urine at least every twelve, and preferably every eight hours.

The temperature was in no case interfered with by drugs. Even in those cases which ran continuously at a level of 105°, the most that was done was the frequent use of tepid sponges. No case suffered from hyperpyrexia. This may have been possibly due to the fact that the wards were kept at a very low temperature, and the patients allowed only one sheet and one blanket as long as their temperature remained up. In addition to this, many of the sharper cases, if they were passing their evacuations under them, were left naked, in order to save them the exhaustion undoubtedly caused by the frequent changing of soiled night shirts. It is almost needless to say that there was no complaint of cold from patients suffering from high temperatures, and I am inclined to believe that this method of surface cooling has to a certain extent the effect that would be obtained by cold baths, while it is much easier to carry out. It is in fact the treatment by “the ambient air,” recommended by de Souza as a substitute for baths in enteric fever. The ward temperature never exceeded 60° F., and was much more often 55° F. in the daytime, while at night it was frequently below 50° F. As the outbreak occurred in the winter, there was no difficulty at all in maintaining this low level, by keeping open all the doors and windows at all times. When the crisis had occurred, extra blankets were at once added to the bed, and it was usually found useful to wrap another blanket round the head and shoulders. As soon as possible, also, the patient was removed to a convalescent ward, kept at an ordinary temperature. I may add that there was no instance of a patient catching cold even under these somewhat severe conditions.

There were in all sixteen nurses exposed to the fever and four doctors. It is a great contrast from the old days of typhus epidemics in Edinburgh, to be able to report that none of these
took the disease. It is true that one of our nurses died of the fever, but, however she may have contracted it, she was never exposed to it in the wards. I attribute the immunity of the others to the very free ventilation I insisted on maintaining in the wards, and to the great care exercised in the supervision of their general health. They were advised to take particular care of their bowels, to take frequent baths, to secure a healthy action of their skin, and to get regular and frequent exercise in the open air. Any nurse who appeared to be losing her appetite was at once removed from the wards, but I am bound to say that, with the exception of the so-called typhus headaches, from which all of us who came in contact with the fever often suffered, the health of the staff remained very good. I may say here that colds, in spite of the chilly and draughty condition of the wards, were unknown, and that the nurses in no way seemed to suffer from the undoubted discomforts of the temperature to which I felt bound to expose them.

Another precaution, that of frequently sponging the patients with an antiseptic solution, may also have contributed to the safety of the nurses. Every case in the wards, whether acute or convalescent, was sponged twice daily with Jeyes' fluid diluted with water. This not only kept down the odour of the disease so well that it was impossible to appreciate it on entering the ward, but was probably also of some real value as a prophylactic. The toilet of the patients' mouths was also carefully attended to, swabs of Listerine and of an ointment of boracic acid and menthol being used every few hours.

In the wards set apart for quarantine I found it convenient to keep the patients in bed. This may seem at first sight somewhat of a hardship, but curiously enough I had not a single complaint, and therefore am justified in supposing that it did not fall very heavily on the persons secluded. The advantage of such a system depends on the certainty which it gives that any person who develops the fever has not been in actual contact with anyone else in the ward, the chances of the disease being transmitted from bed to bed during the few hours that elapse before the patient's removal being too remote to be seriously considered. The temperature of all persons under observation was taken regularly night and morning, and also at the first complaint of headache or malaise.
The fever in children.—An account of the outbreak would not be complete without some allusion to the course of this fever in children, especially as the number of children affected has been so high. It has been noted above that the mortality of the children treated was nil. And it may be said that the incidence of all the severer symptoms of the disease was much less than in adults. The temperature, though in some cases fairly severe, was in most subacute. The actual duration of the fever was less, several of the cases terminating by crisis about the seventh day. Others, though having good rashes and well-marked symptoms, terminated by a regular lysis, lasting in some instances five or six days. Not one had albuminuria, only two had subsultus, and not more than seven had delirium.

While I have only included in the above notes cases that were undoubted typhus, I had occasion to move two or three cases from the quarantine wards suffering from indefinite temperatures, which lasted only two or three days. There were practically no other symptoms, but I incline, rightly or wrongly, to the belief that the patients, all very young children, were in reality affected with an abortive form of the fever. Unfortunately, it is impossible to prove this theory. The fact that they did not contract the disease when transferred to the typhus wards goes for nothing, as, if they escaped it under the bad sanitary conditions of their own homes, it is highly improbable that they should catch it in our well-aired wards.

Before concluding this paper, I would like to acknowledge
valuable assistance received from Dr Littlejohn in the diagnosis of doubtful cases, and from Dr Wyllie, the consulting physician to the hospital, in the treatment and general management of the patients.

In conclusion, I think that the heavy death-rate among the adult male patients, the heavy incidence of the nervous phenomena, and the severity of the rashes, prove that this outbreak was at least of average severity, and that there has been no change of type since the days when the fever used to infest this city. This view was also taken by senior members of the profession who saw these cases, and who remembered the epidemics of old days. Under the circumstances, then, I think we have to congratulate ourselves, both on the rapidity with which it was stamped out by the public health authorities, and on the fact that none of the persons attending on it lost their lives.

Meeting VIII.—May 17, 1899

SIR JOHN BATTY TUKE, President, in the Chair

The President, before commencing the business of the meeting, made suitable reference to the death of Dr John Moir, who had been a Member of the Society for the long period of sixty-three years.

I. Exhibition of Patients

1. Mr Shaw M‘Laren exhibited—
   (a) A boy, aged 7, on whom he had, three weeks before, operated for CONGENITAL TORTICOLLIS. He mentioned two points of interest: (1) The operation, instead of the subcutaneous tenotomy, was the now more usual “open” myotomy, and the result was perfect without the use of apparatus except adhesive plaster and bandaging; (2) the case showed well the asymmetry sometimes seen, the distance from eye commissure to lip-commissure being about a quarter of an inch less than on the affected side.

   (b) A lad on whom he had operated about eight months before for RUPTURED BLADDER, caused by a cart falling on him. The rupture was extraperitoneal, being near the urethra. The diagnosis was made from swelling above the pubes, pain, and