

sweats, the sudoral form of the disease. It is a mistake, I think, to recognize or speak of these as varieties. It is enough to remember that typhoid may set in occasionally with symptoms localised in certain organs, and that many of its symptoms are extremely inconstant—in one epidemic uniform and text-book-like, in another slight or not met with. This diversified symptomatology has led to many clinical errors, and in the absence of the salutary lessons of morbid anatomy it is not surprising that practitioners have so often been led astray. We may recognize, with Murchison, the following varieties:

1. The *mild* and *abortive* forms. It is very important for the practitioner to recognize the mild type of typhoid fever, often spoken of as gastric fever or even regarded as simple febricula. In this form, the typhus *levissimus* of Griesinger, the symptoms are similar in kind but altogether less intense than in the graver attacks, although the onset may be sudden and severe. The temperature rarely reaches 103° , and the fever of onset may not show the gradual ascending evening record. The spleen is enlarged, the rose-spots may be marked; often they are very few in number. The diarrhoea is variable, sometimes it is not present. In such cases the symptoms may persist for from sixteen to twenty days.

In the abortive form the symptoms of onset may be marked with shivering and fever of 103° or even higher. The date of onset is often definite, a point upon which Jürgensen lays great stress. Rose-spots may occur from the second to the fifth day. Early in the second week or at the end of the first week the fever falls, often with profuse sweating, and convalescence is established. In this abortive form relapse may occur and may occasionally prove severe. When typhoid fever prevails extensively these cases are not uncommon. I agree with J. C. Wilson, who states that they are not nearly so common in this country as in Europe.

2. The *grave* form is usually characterized by high fever and pronounced nervous symptoms. In this category, too, come the very severe cases setting in with pneumonia and Bright's disease, and with the very intense gastro-intestinal or cerebro-spinal symptoms.

3. The *latent* or *ambulatory* form of typhoid fever, which is particularly common in hospital practice. The symptoms are often very slight, and the patient scarcely feels ill enough to go to bed. He has languor, perhaps slight diarrhoea, but keeps about and may even attend to his work throughout the entire attack. In other instances delirium sets in. The worst cases of this form are seen in sailors, who keep up and about, though feeling ill and feverish. When brought to the hospital they often develop symptoms of a most severe type of the disease. Hæmorrhage or perforation may be the first symptom of this ambulatory type. Sir W. Jenner has called attention to the dangers of this form, and particularly to the grave prognosis in the case of persons who have travelled far with the disease in progress.

There is a rare and fatal form of typhoid fever, characterized by cutaneous and mucous hæmorrhages.

An *afebrile* typhoid fever is recognized by authors. Liebermeister says that the cases were not uncommon at Basle. The patients presented lassitude, depression, headache, furred tongue, loss of appetite, slow pulse, and even the spots and enlarged spleen. I have no personal knowledge of such cases.

Typhoid Fever in Children.—Epistaxis rarely occurs; the rise in temperature is less gradual; the initial bronchial catarrh is often observed. The nervous symptoms are often prominent; there are wakefulness and delirium; diarrhoea is often absent. The rash may be very slight, but the most copious eruption I have ever seen was in a child of eight. Oddly enough, considering the readiness with which the lymph elements of the intestine in children are involved, the abdominal symptoms are slight. Fatal hæmorrhage and perforation are rare. Among the sequelæ, aphasia and bone lesions may be mentioned as more common in children than in adults. The mortality of typhoid fever in children is low. Forchheimer, in the Cincinnati epidemic in 1888, treated seventy cases without a death.

Typhoid Fever in the Aged.—After the fortieth year the disease runs a less favorable course, and the mortality is very high. Of sixty-four fatal cases, seven were over forty years of age; one was aged sixty-three, another seventy. The fever is not so high, but complications are more common, particularly pneumonia and heart failure.

Relapse.—Relapses vary in frequency in different epidemics, and, it appears, in different places. The percentages of different authors range from 3 per cent (Murchison), 11 per cent (Bäumler) to 15 or 18 per cent (Immermann). In Wagner's clinic, from 1882 to 1886, there were 49 relapses in 561 cases. F. C. Shattuck reports 21 relapses in 129 cases. R. L. MacDonnell 1 relapse in 100 cases. A relapse is a repetition, sometimes only a summary, of the original attack. Von Ziemssen insists correctly that two of the three important symptoms—step-like temperature at onset, roseola, and enlarged spleen—should be present to determine the diagnosis of a relapse. The intestinal lesions are repeated, though with less intensity and regularity. It is to be carefully distinguished from the fever of convalescence—or recrudescence—which has already been described. This is usually transitory, not lasting longer than a day or two. There are occasional instances in which the fever lasts for four or five days without rose-spots, or without enlargement of the spleen, and it may be impossible to determine whether there has been a relapse or not. The true relapse usually sets in after complete defervescence. Irvine noted the average duration of the interval in his cases at a little over five days. In eleven of Shattuck's cases the relapse began before complete defervescence. The onset is usually abrupt, though the step-like ascent is sometimes well seen, as in Chart I. The

eruption may be seen as early as the third or fourth day. The attack is usually less severe and of shorter duration. Of Murchison's fifty-three cases the mean duration of the first attack was about twenty-six, of the interval eleven, of the relapse fifteen days. The mortality of the relapse is not high. The relapse may be repeated, and a third and fourth relapse may occur.

The relapse is a reinfection from within, but we are still quite ignorant of the conditions favoring its occurrence. It is not at all likely that any special methods of treatment favor the relapse, though hydrotherapy has labored under this reproach.

Diagnosis.—If the patient is seen from the outset there is rarely any difficulty in diagnosing typhoid fever of typical course. In the prefebrile period the headache, weakness, loss of appetite and epistaxis are extremely suggestive, and, with an ascending pyrexia, scarcely need the distinctive rash to clinch the diagnosis.

The early and intense localisation of the symptoms in certain organs is a frequent source of error in diagnosis.

Cases coming on with severe headache, photophobia, delirium, twitching of the muscles and retraction of the head are almost invariably regarded as cerebro-spinal meningitis. Under such circumstances it may for a few days be impossible to make a satisfactory diagnosis. I have thrice performed autopsies on cases of this kind in which no suspicion of typhoid fever had been present; the intense cerebro-spinal manifestations having dominated the scene. Until the appearance of abdominal symptoms or the rash, it may be quite impossible to determine the nature of the case. Cerebro-spinal meningitis is, however, a rare disease; typhoid fever a very common one, and the onset with severe nervous symptoms is by no means infrequent. Fully one half of the cases of the so-called brain-fever belong to this category.

I have already spoken of the misleading pulmonary symptoms, which occasionally develop at the very outset of the disease. The bronchitis rarely causes error, though it may be intense and attract the chief attention. More difficult are the cases setting in with chill and followed rapidly by pneumonia. I have brought such a case before the class one week as typical pneumonia, and a fortnight later shown the same case as undoubtedly one of typhoid fever. In another case, in which the onset was with definite pneumonia, no spots developed, and, though there were diarrhoea, meteorism, and the most pronounced nervous symptoms, the doubt still remains whether it was a case of typhoid fever or one of pneumonia in which severe secondary symptoms developed. There is less danger of mistaking the pneumonia which develops at the height of the disease, and yet this is possible, as in a case admitted a few months ago to my wards—a man aged seventy, insensible, with a dry tongue, tremor, ecchymoses upon the wrists and ankles, no rose-spots, enlargement of the spleen, and consolidation of his right lower lobe. It was very

natural, particularly since there was no history, to regard such a case as senile pneumonia with profound constitutional disturbance, but the autopsy showed the characteristic lesions of typhoid fever.

In malarial regions typhoid and remittent fevers are very frequently confounded. I confess myself unable to differentiate certain cases of malarial remittent from typhoid fever, without the blood examination. I have repeatedly, both in Philadelphia and Baltimore, sent cases to the wards as typhoid fever which subsequently proved to be ordinary malarial remittent. The patient comes with a history of *malaise*, weakness, diarrhoea, perhaps vomiting; the tongue is furred and white, the cheeks are flushed, the spleen is slightly enlarged, temperature 102° or 103° . There may indeed be delirium, and the clinical picture of the early stage of typhoid fever may be complete. On at least two occasions I have shown such cases to my class as typhoid fever, and several times patients have been sent to the wards with instructions to have the head shaved and to begin the baths. The only safeguard against error is the examination of the blood, which should be done systematically in regions in which malaria prevails. The presence of Laveran's organisms is distinctive and absolutely diagnostic.

Acute miliary tuberculosis is not infrequently mistaken for typhoid fever. The points in differential diagnosis will be discussed under that disease. Tuberculous peritonitis in certain of its forms may closely simulate typhoid fever.

Puncture of the spleen for the purpose of obtaining cultures is justifiable only in exceptional circumstances.

Prognosis.—The mortality ranges from 10 to 30 per cent. Of the enormous number of deaths analyzed by Murchison, the mortality was nearly 19 per cent. The death-rate at the Montreal General Hospital, for twenty years, was 11.2 per cent. In recent years the mortality in typhoid fever has certainly diminished, and, under the influence of Brand, the reintroduction of hydrotherapy has reduced the mortality in institutions in a remarkable manner, even as low as 5 or 6 per cent. Especially unfavorable symptoms are high fever, delirium with toxic symptoms, hæmorrhage—though by some this is not thought very unfavorable—and peritonitis.

Sudden Death.—It is difficult in many cases to explain this most lamentable of accidents in the disease. There are cases in which neither cerebral, renal, nor cardiac changes have been found, and instances too in which it does not seem likely that there could have been a special localisation of the toxic poisons in the pneumogastric centres. McPhedran, in reporting a case of the kind, in which the post-mortem showed no adequate cause of death, suggests that the experiments of McWilliams on sudden cardiac failure probably explain the occurrence of death in certain of these cases in which neither embolism nor uræmia is present. Under conditions of abnormal nutrition there is sometimes induced a state

of *delirium cordis*, which may develop spontaneously, or, in the case of animals, on slight irritation of the heart, with the result of extreme irregularity and finally failure of action. It occurs more frequently in men than in women, according to Dewèvre's statistics, in a proportion of 114 to 26. It may occur at the height of the fever, and, as pointed out by Graves, may also happen during convalescence.

Fat subjects stand typhoid fever badly. The mortality in women is greater than in men. The complications and dangers are more serious in the ambulatory form in which the patient has kept about for a week or ten days. Early involvement of the nervous system is a bad indication; and the low, muttering delirium with tremor means a close fight for life. Prognostic signs from the fever alone are deceptive. A temperature above 104° may be well borne for many days if the nervous system is not involved.

Prophylaxis.—In cities the prevalence of typhoid fever is directly proportionate to the inefficiency of the drainage and the water-supply. There is no truer indication of the sanitary condition of a town than the returns of the number of cases of this disease. With the improvement in drainage the mortality in many cities has been reduced one half or even more. One of the most striking instances is afforded by the city of Munich. Von Ziemssen has published charts illustrating the extraordinary reduction in the prevalence of typhoid fever since the completion of the drainage system of that city. The average yearly number of admissions to hospital of cases of typhoid fever was, between the years 1866 and 1880, 594, while from 1881 to 1888 inclusive, the average has been only about 100. During this same period the typhoid mortality of the whole city presented a yearly average of 208, but from 1881 to 1888 the yearly average was only 40.

By most rigid methods of disinfection much may be done to prevent the spread of the infection.

The following procedures, suggested by Fitz, should be carried out in hospital practice, and, with modifications, in private houses:

1. "Mattresses and pillows (when liable to become soiled) are to be protected by close-fitting rubber covers.
2. "Bed and body linen are to be changed daily. Bed-spreads, blankets, rubber sheets and rubber covers are to be changed at once when soiled. Avoid shaking any of the articles.
3. "All changed linens, bath-towels, rubber sheets and covers are to be immediately wrapped in a sheet soaked in carbolic acid (one to forty). Remove them to the rinse-house as soon as possible, and soak six hours in carbolic acid (one to forty). Then boil the linen for a half-hour, and wash with soft soap. The rubber sheets and covers are to be rinsed in cold water, dried, and aired for eight hours. The bed-spreads and blankets are to be aired eight hours daily.
4. "Feeding-utensils, immediately after using, are to be thoroughly cleansed in boiling water.

5. "Dejections are to be received into a bed-pan containing half a pint of carbolic acid (one to twenty). The nates are to be cleansed with paper, and afterward with a compress cloth wet with carbolic acid (one to forty).

6. "Add two quarts of carbolic acid (one to twenty), in divided portions, to the contents of the bed-pan; mix thoroughly by shaking and throw the liquid into the hopper. The bed-pan and hopper are to be cleansed with carbolic acid (one to twenty) and wiped dry. The cloth used for the above purpose is to be at once burned.

7. "The corpse is to be covered with a sheet wet with carbolic acid (one to forty).

8. "After the discharge of the patient from the hospital, the mattresses are to be aired every day for a week. The bedstead is to be washed with corrosive sublimate (one to one thousand).

9. "These directions are to be followed until the patient is free from fever."

When epidemics are prevalent the drinking-water and the milk used in families should be boiled. These precautions should be taken also by recent residents in any locality, and it is much safer for travellers to drink light wines or mineral water rather than ordinary water or milk.

Treatment.—(a) **General Management.**—The profession was long in learning that typhoid fever is not a disease to be treated by medicines. Careful nursing and a regulated diet are the essentials in a majority of the cases. The patient should be in a well-ventilated room (or in summer out of doors during the day), strictly confined to bed from the outset, and there remain until convalescence is well established. The bed should be single, not too high, and the mattress should not be too hard. The woven wire bed, with soft hair mattress, upon which are two folds of blanket, combines the two great qualities of a sick-bed, smoothness and elasticity. A rubber cloth should be placed under the sheet. An intelligent nurse should be in charge. When this is impossible, the attending physician should write out specific instructions regarding diet, treatment of the discharges, and the bed-linen.

(b) **Diet.**—Those forms of food should be given which are digested with the greatest ease, and which leave behind the smallest amount of residue to form fæces. Milk is the most suitable food. If used alone, three pints at least may be given to an adult in twenty-four hours, always diluted with water, lime-water, or aerated waters. Partially peptonized milk, when not distasteful to the patient, is occasionally serviceable. The stools of a patient on a strictly milk diet should be examined from time to time, to see if the milk is entirely digested. Fever patients often receive more than they can utilize, in which case masses of curds are seen in the stools, or microscopically fat-corpuscles in extraordinary abundance. Under these circumstances it is best to substitute, for part of the milk, mutton or chicken broths, or beef-juice, or a clear *consommé*, all of which may be made

very palatable by the addition of fresh vegetable juices. Some patients will take whey or buttermilk when the ordinary milk is distasteful. Thin barley-gruel, well strained, is an excellent food for typhoid-fever patients. Eggs may be given, either beaten up in milk or, better still, in the form of albumen-water. This is prepared by straining the whites of eggs through a cloth and mixing them with an equal quantity of water. It may be flavored with lemon, and, if the patient is taking spirits, whisky or brandy is very conveniently given with this. Patients who are unable to take milk can subsist for a time on this alone.

The patient should be encouraged to drink water freely, which may be pleasantly cold. Iced tea, barley-water, or lemonade may also be given, and there is no objection to coffee or cocoa in moderate quantities. Fruits are not, as a rule, allowable, though the juice of lemon or orange may be given. Typhoid patients should be fed at stated intervals through the day. At night it depends upon the general condition of the patient whether he should be aroused from sleep, or not. In mild cases it is not well to disturb the patient. When there is stupor, however, the patient should be roused for food at the regular intervals night and day.

Alcohol is not necessary in all cases, but may be given when the weakness is marked, the fever high, and the pulse failing. In young healthy adults, without nervous symptoms and without very high fever, alcohol is not required; but in any case, when the heart-beat is feeble and the first sound becomes obscure, if there is a muttering delirium, subsultus tendinum and a dry tongue, brandy or whisky should be freely given. In such a case from eight to twelve ounces of brandy in the twenty-four hours is a moderate amount.

(c) **Treatment of the Fever.**—The persistent pyrexia is in itself a danger, but perhaps not the chief danger. Cases with high fever alone, without delirium or signs of involvement of the nervous system, are not nearly so serious as those cases in which, with a temperature of 104° , there are pronounced nervous symptoms. For the fever and its concomitants there is no treatment so efficacious as that by cold water, introduced at the end of the last century by Currie, of Liverpool, and of late years forced upon the profession by Brand, of Stettin. In institutions a rigid system of hydrotherapy should be carried out. At my clinic the following plan is followed: Every third hour, if the temperature is above 102.5° , the patient is placed in a bath (at 70° Fahr.), which is wheeled to the bedside. In this he remains from fifteen to twenty minutes, and is then taken out, wrapped in a dry sheet and covered with a light blanket. Enough water is used to cover the patient's body to the neck. The head is sponged during the bath, and, if there is much torpor, cold water is poured over it from a height of a foot or two. The rectal temperature is taken immediately after the bath, and again three quarters of an hour later. The patient often complains bitterly when in the bath, and shivering and blueness are almost a constant sequence. Food is usually given

with a stimulant after the bath. The only contra-indications are peritonitis and hæmorrhage. Neither bronchitis nor pneumonia are so regarded. It is not necessary to renew the water in the bath more than once in the twenty-four hours. The accompanying chart shows the number of

No. *Chas. Washington* ADMITTED *June 7th* WARD *F*

