ery few, and composed of bacilli which are quite motile still and are very often seen to separate themselves again. Owing to the activity of the bacilli these small imperfect clumps are seen to alter in shape. As this phenomenon is seldom observed, and as, when it occurs, it does not take place till after several hours have elapsed, it is not (under the conditions explained above) a serious source of difficulty.

When bacilli are kept for days under observation, they multiply, and many of them become very long.

In making these observations it is not necessary to use very high microscopical powers, unless one wishes to study the minuter changes taking place in the bacillus, in which case the best immersion lenses are necessary. The bacilli can very clearly be seen with a magnification of 200 to 300 diameters, and the formation of clumps can be easily recognised with a magnification of 50 or less. In fact, it is quite possible to see with the naked eye a marked change in a drop of a mixture in which the agglomeration phenomenon is taking place.

B. *When the blood tested is that of a typhoid patient* in a suitable stage of the fever (that is, after the third or fourth day from the beginning, and better still after the seventh or eighth day), the phenomena observed differ according to whether the serum is potent or not.

When the serum is potent changes take place so quickly, that, however rapidly the mixture is covered and placed under the microscope, many of the bacilli will already have become nearly motionless, and several clumps will have formed before the preparation can be seen. The greater part of the bacilli, however, will still be actively motile, in fact, they seem very often to be in a state of extraordinary activity, as if they were under the influence of stimulation. Soon however, that is in from two to five minutes, they gradually lose their power of translation, they seem paralysed, and exhibit nothing more than an oscillatory motion, which after a time becomes feeble, and cannot be distinguished from Brownian movement. At the same time clumps are forming rapidly. In from five to thirty minutes hardly any free bacilli remain between the clumps, which may be of various sizes. The presence of the corpuscles does not affect this phenomenon of agglomeration. The corpuscles behave like perfectly indifferent bodies. The bacilli are not attracted by them; they do not seem either to be clearly repelled, but it is worth noticing that clumps very seldom enclose a corpuscle or form against them.

All bacilli do not behave exactly in the same way; some of the very small bacilli, almost coccus-like, very often retain their motion for a longer time than the others. In some parts of the preparation the bacilli remain swarming, whilst in other parts they are already completely agglomerated. I thought at first that this was the result of imperfect mixture, but the perfectly even distribution of the red blood corpuscles (when these are retained) showed that this was not the case. Within a few minutes, however, all these differences may disappear, and the preparation present a uniform appearance.

When the serum has a feeble agglomerating power the changes described above take place much more slowly and less completely. The motility of the bacilli is generally considerably reduced (after being first increased), but it may never be entirely abolished in a $\frac{1}{10}$ dilution.

The clumps form gradually; they are in most cases sufficiently numerous at the end of half an hour to make the diagnosis possible, but in some cases one may have to wait one and even two hours before the preparation takes a very characteristic appearance. These cases are few.

Both in the case of the complete and of the incomplete reactions just described, the agglomeration remains clearly distinct for days after the preparation has been made. In some cases the bacilli remain motionless, but in most cases many bacilli regain their activity.

There is also marked evidence of growth. The bacilli forming the clumps may reach a great length, but the filaments thus formed remained clumped together. In very few cases the bacilli become granular and indistinct; this has usually been observed when the reaction has been intense.

Before concluding, I must add that when the question of applying this test to diagnosis, and the method of collecting the blood had to be considered, I thought it necessary, in order to remove chances of contamination, to recommend (1) that the skin from which the blood was obtained be sterilised; (2) that a needle which had not possibly come in contact

with any other blood, and been thoroughly sterilised, be used; (3) that nothing but blood collected in sterilised hermetically sealed pipettes be sent to the laboratory. Further experience has convinced me that all these precautions are useful.

I will not refer here to the results obtained by Dr. Sidebotham and myself with this method, since it has been applied to the diagnosis of cases occurring in ordinary practice. I may say, however, that they confirm entirely the results obtained in a series of over fifty hospital cases. In applications of this kind the technique must be such that scientific investigations will not suffer from accidental circumstances which would vitiate the results. I have already explained the way in which I have attempted to remove these difficulties.

The administrative part of the work presents difficulties of another nature, but which have to be overcome before the scientific methods can be applied at all in public health work. Dr. Niven has very successfully removed these administrative difficulties in the case of diphtheria, so that now, practically, all possible notified cases of diphtheria are examined bacteriologically. By following the same methods in the case of typhoid fever since the beginning of this year, a similar measure of success has already been nearly obtained in connection with typhoid fever. With the object of assisting others who might wish to carry out elsewhere the same kind of work, I have arranged with Dr. Niven to give shortly a report on the administrative working of the method in Manchester.

REFERENCES.

¹For fuller accounts of other points, not referred to here, see S. Delépine, *Medical Chronicle*, October, 1896; *Lancet*, December 5th, 1896; Delépine and Sidebotham, *Lancet*, December 12th, 1896. ²With regard to diseases prevalent in this country, the one which has, so far, given me results as good as typhoid fever is glanders; Professor MacFadyen some time since announced a similar result in the *Journal of Comparative Pathology*. ³F. Vidal, first communication to the Société Médicale des Hôpitaux de Paris, Séance du 26 Juin, 1896, *Semaine Médicale*, July 1st, 8th, 29th, etc.; *Presse Médicale*, July 29th, 1896; *Lancet*, November 14th, 1896. ⁴*Comptes Rendus et Mémoires de la Société de Biologie*, November 23rd, 1889, p. 667. ⁵R. Pfeiffer, *Zeitschrift für Hygiene*, 1894, xviii, p. 1, *ibid.*, 1895, xix, p. 87; R. Pfeiffer and Kolle, 1896, xxxi, p. 203. ⁶E. Metchnikoff, *Annales de l'Institut Pasteur*, 1894, pp. 714-16; 1895, p. 433, etc. ⁷J. Bordet, *ibid.*, 1895, p. 462, 1896, p. 191, etc. ⁸Durham, *Journal of Pathology and Bacteriology*, July, 1896, p. 13; Gruber and Durham, *Münch. med. Woch.*, March 31st, 1896. ⁹A. S. Grünbaum, *Lancet*, September 10th, 1896. Although this paper was published over two months after Vidal's results were generally known, Dr. Grünbaum was already working with Gruber during the month of March.

A CASE OF TYPHOID FEVER TREATED WITH ANTITYPHOID SERUM: RECOVERY.

By ERNEST A. T. STEELE, L.R.C.P.LOND., M.R.C.S.ENG.,
Honorary Medical Officer Plaistow Maternity Charity, etc.

A NURSE, aged 29, of somewhat delicate constitution, who had lately been engaged in nursing a case of typhoid fever, complained of feeling ill and unable to do her work on February 10th, 1897. She said that she had been feeling poorly and tired with some headache for a week or ten days. Her tongue was slightly furred. The temperature in the morning was 101° F., but rose at night to 104° F.; she had a slight sore throat. She was sent to bed, and, as the bowels had not acted for two days, an aperient was given.

Temperature Table.

Date.	Morning.	Evening.	Date.	Morning.	Evening.
Feb. 10	101.2	100.2	Feb. 22*	98.2	100.8
" 11	99.6	100.2	" 23	68.2	99.6
" 12	100.0	101.4	" 24	97.2	98.2
" 13	101.8	102.2	" 25	97.4	98.6
" 14	102.0	102.0	" 26	97.6	99.6
" 15*	98.4	100.2	" 27	99.8	99.2
" 16	100.6	101.8	" 28	98.2	97.0
" 17*	100.0	102.4	Mar. 1	97.2	99.6
" 18*	99.0	101.2	" 2	98.0	98.6
" 19	89.4	98.0	" 3	97.0	97.2
" 20*	98.4	101.0	" 4	97.0	97.2
" 21	98.2	100.8			

* 10 c.cm serum.

On February 11th she felt a little better, but still had headache, and the tongue was dry.

On February 13th she complained much of her head. The tongue was dry and slightly brown in the centre; the abdomen was tender, and there had been one relaxed and offensive motion.

On February 15th she looked dull and listless, and complained of headache and feeling very tired; wandered a little in the night. The tongue was dry and brown, the abdomen tumid and tender. The urine gave a very well-marked Erlich reaction. A sterilised pipette was filled, with all proper precautions, with blood from the finger, and sent to the British Institute of Preventive Medicine to be examined for Vidal's serum diagnosis. That evening 10 c.cm. of antityphoid serum, which was obtained from Messrs. Burroughs and Wellcome, were injected into the subcutaneous tissues of the abdomen.

On February 16th her general appearance was markedly better, and she said that she felt better—her headache and tired feelings were nearly gone, the tongue was not so dry, and the abdomen less tumid. A few rose spots had appeared.

On February 17th her general condition was the same, but she had had one relaxed motion. The report from the British Institute of Preventive Medicine stated that the result of their examination was typical of typhoid fever; 10 c.cm. antityphoid serum was injected as before.

On February 18th the general improvement was maintained, and she had one yellow motion slightly formed; 10 c.cm. of serum were again injected. On February 19th she had one relaxed motion, the tongue was moist, and the patient stated that she felt well. On the evening of February 20th she was not so well; she complained again of feeling tired, and of a bad headache. The tongue was dry and the pulse 108; 10 c.cm. serum were injected; and on February 21st there was a great improvement. The headache was gone and the tongue moist; the abdomen also was much less tender. The evening temperature was 100.8°. She had had one relaxed motion during the day.

On February 22nd she looked and felt well, but had slight headache; 10 c.cm. serum were injected.

On February 23rd she felt much better, the tongue was clean, and the abdomen not tender or tumid. She had passed two relaxed motions, but was beginning to get dissatisfied with her diet and wished for something more substantial.

On February 25th the temperature was normal morning and evening; the motions were still yellow and relaxed. She was allowed a little Allen and Hanburys' food and oxtail soup.

On February 27th, as the bowels had not been open, a simple enema was ordered, and acted once.

On March 1st the patient looked and felt well, and was growing more hungry every day.

On March 2nd the urine was examined for Ehrlich's reaction, with a negative result.

The further progress of the case has been towards uninterrupted recovery, and she is now well.

REMARKS.

Although it is impossible to say what would have been the result of this case if the antityphoid serum had not been used, I feel sure that its action controlled the severity of the disease and shortened its duration.

One feature was especially noted, not only by myself, but by all who saw her—that is, the change in her general appearance on the morning after her first injection. On the evening of February 15th the patient had all the appearance of one going in for a severe attack of typhoid, but by the following morning she had quite altered for the better. After each injection there was immediate relief to the distressing headache and aching of the limbs, and the patient stated that she experienced a feeling of comfort.

It is of interest to notice that on February 20th, and to a lesser degree on February 22nd—that is, when she had been forty-eight hours without an injection—the temperature began to rise, and the headache, etc., to return, and on both occasions the serum brought about an improvement by the following morning.

Five injections of 10 c.cm. each were given; beyond a slight urticarial eruption on the abdomen there were no ill-effects from the serum, or from the punctures, which were all made in the skin of the anterior abdominal wall.

I have to thank Miss Geddes, the Resident Medical Officer

of the Plaistow Maternity Charity and District Nurses' Home, of which institution the patient was a nurse, for the care and attention she bestowed upon the case, and for keeping the notes.

A METHOD OF STAINING FLAGELLA.

By DAVID McCORRIE, L.R.C.P. AND S. EDIN., F.E.I.S.,
Bacteriologist, Glasgow Royal Infirmary.

Of the different methods of staining flagella which have at different times been described, Van Ermengen's, in my experience, gives excellent results, but takes too long to accomplish; while Loeffler's, as well as Nicolle and Morax's modification of the same, is very uncertain. Pitfield's method gives good results, and is quickly accomplished, but the flagella are, as a rule, very faintly stained. The method which is now commonly adopted in this laboratory is somewhat similar to Pitfield's, but we use a different stain, and invariably we get both bacilli and flagella more distinctly stained than by Pitfield's method. The dye we use is an aniline blue which is known commercially as "Night Blue," from the fact that it shows as well in artificial as it does in sunlight. The formula which we find to give the best results is:

- 10 c.cm. of a concentrated alcoholic solution of "night blue."
- + 10 c.cm. of a 10 per cent. solution of alum.
- + 10 c.cm. of a 10 per cent. solution of tannic acid.

The addition of 0.1 to 0.2 g. of gallic acid would seem to add to the value of the mordant stain, but excellent results can be obtained without this addition.

The method we adopt is this: A drop of sterilised water is placed on an absolutely clean coverglass, held in a Cornet's clip, and carefully inoculated with the smallest particle of a twenty-four hours' agar culture. The coverglass is moved in such a way that the drop of water is distributed over nearly its whole surface, or a suspension may be made in a watch-glass and a thin film spread upon a coverglass. It is then placed in the incubator until thoroughly dried (two minutes). A small quantity of the mordant stain is then poured on, and the coverglass again placed in the incubator for two minutes, or held for that time 2 feet above the flame of a Bunsen burner. The excess of stain is now washed off by running water, the coverglass dried in the incubator, and then mounted in Canada balsam. The mordant stain can be used either filtered or unfiltered; it does not necessarily require to be made fresh each time, as we find that the stain is quite as efficient after a fortnight or so as on the first day of use. The whole process can be accomplished in a few minutes.

MEMORANDA:

MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, Etc.

IDIOPATHIC BLEEDING FROM UMBILICUS IN AN INFANT: RECOVERY.

A WELL developed boy was born on January 10th, 1897, to a primipara after an unusually easy labour. On January 16th the cord separated naturally, but on January 19th a spot of fresh blood was seen on the navel. On January 20th, at 8 A.M., I found the child lying in clothes saturated with blood, the mother's bed being much soiled by the hæmorrhage. Over the navel was a very soft clot; oozing had ceased, and a graduated compress of lint was applied tightly. At 8 P.M. I found the clothing once more soaked with blood, and the child apparently dying. A few ounces of hot water were put into the bowel and a compress reapplied over the navel, hamamelis being used as styptic.

On January 21st, at 3 P.M., bleeding recurred, and I transfixed the umbilicus with two harelip pins at right angles. Round these a figure of 8 ligature was applied, and a ligature encircling the navel *en masse*. At 9 P.M., bleeding having recurred, I cut the ligatures and relied upon one of thick silk, encircling the umbilicus, which I tied as tightly as possible. There was no recurrence.