Normal Horse Serum.

Dilutions.	Culture of Coliform Organism (Group III).		Dilutions.	Culture of Coliform Organism (Group III).	
	Hanging Drop (2 Hours).	Capillary Tube (24 Hours).		Hanging Drop (2 Hours).	Capillary Tube (24 Hours).
1-10	Complete agglutination	Complete agglutination	1-160	Nil.	Incomplete (large clumps).
1-20	"	"	1-320	Nil.	Incomplete (a few clumps).
1-40	Incomplete agglutination	"	1-640	Nil.	Nil.
1-80	"	"			

An examination of this table shows at once that the agglutinative actions of the antityphoid serums and the normal horse serum on the coliform organisms were practically identical.

As a final test of the nature of these organisms it was determined to immunise a rabbit with a broth culture of one (B₃) of the members of Group III. This was kindly done for me by Major Leishman, R.A.M.C. The serum so obtained was then tested, in the same manner as before, with a twenty-four hours' agar culture of *B. typhosus*, and a twenty-four hours' agar culture of the same organism which had been used to immunise the rabbit. The results shown in the table were obtained.

Anticoliciform Serum (B₃).

Dilutions.	Culture of <i>B. Typhosus</i> .		Culture of Coliform Organism (B ₃).	
	Hanging Drop (2 Hours).	Capillary Tube (24 Hours).	Hanging Drop (2 Hours).	Capillary Tube (24 Hours).
1-10	No traces of agglutination	No agglutination.	Complete agglutination	Complete agglutination
1-20	"	"	"	"
1-40	"	"	"	"
1-80	"	"	Incomplete	"
1-160	"	"	Nil	Incomplete (large clumps)
1-320	"	"	"	"
1-640	"	"	"	"
1-1280	"	"	"	Only a few small clumps

It is, therefore, clear that the coliform organisms contained in Group III are not typhoid bacilli, though as regards their cultural reactions they differ very slightly from Eberth's organism. It is also evident that the correct interpretation of the agglutination test may be a matter of considerable difficulty. The experiments given show distinctly that there are at least two important factors which enter into the reaction, namely (1) the strength of the serum employed, and (2) the time during which the serum is allowed to act on the microbe, consequently no fixed dilution of typhoid serum can be laid down which will enable the *B. typhosus* to be at once distinguished from coliform organisms. It may be said that an organism which fails to agglutinate with typhoid serum is certainly not the *B. typhosus*; but, on the other hand, it does not necessarily follow that an organism is the *B. typhosus* because it is agglutinated by fairly dilute typhoid serum. With our present knowledge it appears essential to work with a powerful serum, also the suspected organism should be tested with the serum diluted to the highest degree which has been found capable of agglutinating a true *B. typhosus*.

INOCULATION WITH TYPHOID VACCINE AS A PREVENTIVE OF TYPHOID FEVER.

By R. W. MARSDEN, M.D., M.R.C.P., Etc.,
Medical Superintendent, Monsall Hospital, Manchester.

ONE can in these days, without fear of contradiction, make the statement that typhoid fever is only too readily contracted by those who are administering to patients suffering from this disease. From my own experience of an institution where considerable numbers of these patients are treated, I can

affirm that the occurrence of typhoid fever amongst the staff is a not infrequent and a very real cause of anxiety, despite the most explicit instructions for the prevention of infection; whilst the occasional occurrence of a fatal termination casts a temporary gloom over the whole establishment. A consideration of the table given below as regards the 4½ years from 1895 to September, 1899, will only too readily give an idea of the reality of this anxiety.

In September last it seemed to me desirable to offer facilities to the staff for the injection of typhoid vaccine, and I accordingly made application to Professor A. E. Wright, of the Army Medical School, Netley. (I wish to take this opportunity of thanking Professor Wright for the extremely prompt and courteous manner in which he has responded to my requests, and I am all the more sensible of his kindness, seeing that my applications have been made at a time when the Army Medical Department has been more than usually occupied owing to the war in South Africa.)

I am well aware that the time which has elapsed since the adoption of the prophylactic measure is too short to draw any conclusive inference, yet the results so far observed are, I think, sufficiently marked to warrant this report, and even embolden one to hope that, at any rate for a limited period, either an immunity against typhoid can be thus produced, or at least one may give "an increased power of resisting infection by living typhoid bacilli."

Concerning the procedure followed in making the injection, it is sufficient to say that the instructions issued by Professor Wright along with the vaccine were carefully attended to with two exceptions. The first injection revealed the fact that the local tenderness remained after the general indisposition had disappeared, and thus caused discomfort in wearing the natural clothing, so that future injections were made over the insertion of the deltoid.

In the second place, as the nurses are usually only employed in the typhoid fever ward for a period of three months, the inoculations have only been repeated on two occasions. The inoculation has not been made compulsory upon the staff. I have simply recommended it to those attending the typhoid patients, and I have not been disappointed in the ready manner in which it has been accepted.

During the six months concerned 22 nurses have been engaged, of whom 14 received the typhoid vaccine. Of the remaining 8, 4 had previously been under my care for typhoid fever contracted during the performance of their duties, whilst the other 4 did not wish to submit to inoculation.

In general the clinical symptoms have agreed with those detailed by Professor Wright, but I should be inclined to add that headache has been consistently present in all; in several it was accompanied by general pains or aching, whilst one nurse complained of "cramps in the legs and feet." Frequently also there was nausea, and on two occasions vomiting. At the end of thirty-six hours the constitutional symptoms had disappeared, but local tenderness sometimes persisted for two or three days longer. By inoculating, therefore, in the evening the nurses were allowed to have one day in bed, and returned to duty on the following day.

Taking now the occurrence of typhoid fever amongst the staff since 1895, the following table shows the number of typhoid patients admitted in each year and the number of attacks contracted during the corresponding periods.

TABLE I.

Year.	No. of Patients Admitted.	Cases of Typhoid in Staff.
1895	229	3
1896	238	3
1897	302	4
1898	426	8
To end of September, 1899 ...	163	5
From September, 1899, to March, 1900	146	0

Concerning the 5 cases occurring in 1899, it should be men-

tioned that during the season 1898-99, typhoid fever was more than usually prevalent, and that 3 of the 5 cases occurred in the early part of the year. But as typhoid is so markedly a seasonal disease, probably a closer, more accurate, and weightier comparison is made, by considering the different autumnal and winter epidemics, since one may justly state that the typhoid inoculations have been performed during the season 1899-1900. Omitting, therefore, the cases which have in past years occurred during the spring or summer, the following list gives the seasonal occurrence:

TABLE II.

Season.	No. of Nurses Who Contracted Typhoid.
1895-6	3
1896-7	2
1897-8	8
1898-9	6
1899-1900	0

The numbers are, of course, very variable, largely dependent on the severity of the epidemic, and the consequent number of patients under treatment, still it seems a significant fact that the season 1899-1900 should be only one during which no undoubted case of typhoid has been contracted by the staff, even though the epidemic during the last autumn and winter has been exceptionally light.

It may be that in both instances the figure 0 is not strictly accurate, as one of the nurses inoculated in the first week of October, 1899, suffered from an indefinite febrile attack in January of this year. The facts are as follows:

During the second and third weeks in January she felt tired, lost her appetite, and complained of "chilliness." On January 18th she had headache, and on January 21st there was slight cough, epistaxis, and shivering. I saw her on January 22nd, when the temperature was 100.6° F. The abdomen seemed a little full, but there was no pain nor tenderness; the spleen was slightly enlarged to percussion and just palpable, and the tongue was red and moist. There was persistent frontal headache, a pulse of 88 per minute without any peculiar features, and an examination of the chest failed to disclose any physical signs to account for the slight cough which existed. The evening temperature was 103° F., the physical signs being unaltered. Next day—that is, January 23rd—as the headache continued, 10 grs. of phenacetin were given. This was followed by profuse perspiration, whilst the temperature fell rapidly, and with the exception of 99.4° on January 24th was not raised on any subsequent occasion. On January 26th there seemed to be some injection of the nasal and pharyngeal mucous membranes, but with this exception no other symptoms or signs were observed. On January 30th an examination failed to show any enlargement of the spleen either to percussion or palpation, and it is this fact, coupled with the history, which necessitates the consideration whether one had to deal with an abortive attack of typhoid fever.

Unfortunately the presence or absence of the Widal reaction loses its diagnostic efficacy in such cases after the use of typhoid vaccine. But supposing one granted that this ephemeral fever was a genuine attack of typhoid, then I think its very mildness and evanescent nature would speak only too strongly for the contention that there is "an increased power of resisting infection by living typhoid bacilli," and certainly the occurrence of such attacks would never be a cause of anxiety.

NOTE.

¹ Two of these four nurses were for different reasons only kept in the typhoid ward for short periods of two and three weeks.

ANTITYPHOID VACCINE.

By T. WILSON, L.R.C.P.

My experience of the use of the antityphoid serum of Professor Wright, of Netley, among troops in South Africa, is that if it does not render the typhoid bacilli innocuous, it at

least will modify favourably an attack of typhoid fever. In my opinion it is advisable for all who are going to the seat of war to be treated by it.

In inoculating the men belonging to the City Imperial Volunteers I made them

1. Abstain from alcohol for three days.
2. Take an aperient on the morning of the fourth day. On the morning of the fifth day I inoculated.

The men were arranged daily in batches of about 40 in number. The first lot to be inoculated were rather funky; and a few almost fainted while waiting for their turn. These I kept back until the following morning, when they appeared to be all right. I was fortunate enough to get assistance from Staff-Surgeon Bradley and Miss Jessie Southwell, Nursing Sister.

The following case will illustrate the course of illness after inoculation:

A gentleman travelling by the *Garth Castle* to South Africa with his regiment was inoculated with antityphoid vaccine on January 24th. He was 35 years of age. He weighed 155 lb. and had always enjoyed good health. The loin was the place selected for inoculation; the part was cleansed well by soap, then washed with solution of perchloride of mercury. The syringe and needle were sterilised as directed with boiling olive oil, the syringe filled with antityphoid vaccine, the loose skin caught between the forefinger and the thumb of the left hand, the skin punctured in the centre of this fold by the needle, and $\frac{1}{2}$ c.cm. injected. The needle was then withdrawn and the part dressed with absorbent wool and flexible collodion. (At this stage the patient is apt to faint, and it is necessary to order rest for twenty-four hours.) Six hours after inoculation the temperature was 99.6° F., pulse full, bounding, face flushed, slight frontal headache, suffered from loss of appetite. At 10 P.M. (six hours later) the temperature was 101° F. He complained of thirst, severe headache, rigor, and darting pains in the groin, back, chest, and axilla; the tongue was dry and furred. There was a red patch surrounding the seat of inoculation. Thin red lines running to the groin and axilla were very distinctly marked and tender to the touch. On the morning of January 25th the temperature was 102° F. He had passed a restless night, the headache was worse, and the tongue was dry and thickly furred. He felt thirsty and complained of pain on movement in bed; the lymphatic glands were still inflamed. The temperature in the evening was 99° F. He felt much better, suffered only slightly from headache, and the tongue was almost clean. On the morning of February 26th the temperature was 98.6° F., the headache gone, the tongue clean, the red lines (lymphatics) had almost disappeared, and the patient partook of a hearty breakfast and walked on deck before noon feeling fit and well.

The following case in which the antityphoid serum appeared to have a favourable effect on gonorrhoea is of interest:

A member of the City Imperial Volunteers on his way to Capetown consulted me complaining of great pain on urination; the lips of the meatus urinarius were red and swollen; there was a copious discharge of a thick yellowish green colour. I had arranged to inoculate forty volunteers on the following morning with antityphoid vaccine, and the patient's name was on the list. At 10.30 A.M. on January 25th I inoculated the patient in the groin with $\frac{1}{2}$ c.cm. of antityphoid vaccine; perfect rest was ordered for the two following days. The temperature in the evening was 100.8° F., and on the following morning 98° F. The lymphatics of the groin and penis were red, swollen, and painful to the touch. The glands penis was red, swollen, and of a bright red colour. There was no longer pain on urination. The discharge had ceased to flow on the evening of the inoculation. After three days the inflammatory trouble disappeared, and when I last saw the patient on February 4th the parts were perfectly healthy.

In the following case of chronic gleet the serum had a beneficial effect, and I believe recovery would have been permanent had the patient carried out instructions:

A gentleman consulted me about a chronic gleet which troubled him very much. I tried the usual remedies for a week without any definite result, and as he was going on active service (Modder River) I proposed inoculation with antityphoid vaccine. The result was at first very satisfactory. The temperature was 100.4° F. the same evening, and on the following morning 97° F. The running ceased, and the lymphatics were only marked around where the needle entered. On the second day after the inoculation he celebrated his birthday too well but not wisely. He drank several whiskies and soda and a bottle of champagne (against strict instructions to the contrary), and the third day the old symptoms reappeared.

EPIDEMIC LARYNGITIS AND TRACHEITIS AMONG TROOPS ON THE VOYAGE TO SOUTH AFRICA.

By CHARLES GIBBS, F.R.C.S.,

Surgeon to the Langman Field Hospital; Assistant Surgeon to Charing Cross Hospital; Surgeon to the Lock Hospital.

On board the steamship *Oriental* we had 600 of the 3rd Royal Scots Militia, a draft of Essex men, a draft of Warwickshire men, and a draft of Royal Engineers, making more than 1,000 men all told. We had also 60 officers. After the first day's sail we settled down to medical work, which was under the administrative charge of Major Drury, R.A.M.O. The non-commissioned officers and men of the Langman Hospital