Punjaub prior to the war; there was no record of any case prior to embarkation, nor were there any cases amongst the crew or S. and T. Corps natives on the "Edavna."

The voyage from Karachi to Marseilles took just one month, with a four days' break at Cairo. The men were exercised as far as possible during the voyage, and had the usual rations. Conditions which might have led to the onset of the disease were overcrowding, with a hot steamy atmosphere due to "swabbing" between decks, especially in the Red Sea, and presumably some error of diet.

It would prove of interest if other officers, having had similar experiences, would send in their notes.

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A CASE OF PARATYPHOID A FEVER.

By Major G. H. DIVE, D.S.O.
Royal Army Medical Corps.

And a Note by Lieutenant-Colonel J. C. Kennedy.
Royal Army Medical Corps.

The following case is briefly described both in illustration of certain diagnostic points, and also in view of its possible bearing on certain cases of fever of uncertain origin.

The patient, a healthy adult, aged 32 years, who had been inoculated with the mixed T.A.B. vaccine in 1916, 1917 and 1918, left Mesopotamia early in June, 1921, and touched at Aden and Suez en route for the United Kingdom; by the end of the month he developed fever with general pains and malaise. Under quinine this was partially controlled. He was admitted to the Queen Alexandra Military Hospital on July 8, with fever, ranging from 101° to 103°F. every evening, and falling to normal almost every night. No abnormal physical signs were detected, and blood examinations both as regards culture, malaria and agglutination for the typhoid group and the Micrococcus melitensis were negative except as stated below.

No organisms were found in the urine, no cysts in the faeces, and all attempts to isolate any of the typhoid group failed.

As regards the general state, extreme weakness was the most marked feature; there was neither diarrhoea nor constipation, and the stools were normal.

On July 11 some doubtful rose spots were noted. The fever continued until August 15, a total period of some seven weeks.

In the absence of clinical data the diagnosis turned on the laboratory findings, in this case a series of agglutinations by Dreyer's method; the results are tabulated below, end points only being given.

<table>
<thead>
<tr>
<th>Date</th>
<th>B. typhos</th>
<th>B. paratyphos A</th>
<th>B. paratyphos B</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.7.21</td>
<td>1 in 125</td>
<td>1 in 25</td>
<td>1 in 450</td>
</tr>
<tr>
<td>18.7.21</td>
<td>1 in 900</td>
<td>1 in 450</td>
<td>1 in 900</td>
</tr>
<tr>
<td>26.7.21</td>
<td>1 in 250</td>
<td>1 in 250</td>
<td>1 in 250</td>
</tr>
<tr>
<td>3.8.21</td>
<td>1 in 125</td>
<td>1 in 250</td>
<td>1 in 250</td>
</tr>
<tr>
<td>16.8.21</td>
<td>1 in 250</td>
<td>1 in 1,350</td>
<td>1 in 250</td>
</tr>
<tr>
<td>23.8.21</td>
<td>1 in 250</td>
<td>1 in 2,500</td>
<td>1 in 250</td>
</tr>
<tr>
<td>30.8.21</td>
<td>1 in 250</td>
<td>1 in 2,500</td>
<td>1 in 250</td>
</tr>
</tbody>
</table>

If this is reduced to graphic form the variation in the end point of paratyphoid A is very striking.
Clinical and other Notes

The drop recorded on August 16 was subsequent to the subcutaneous injection of pure paratyphoid A vaccine, fifty millions, on the 13th inst. The temperature fell to normal on the next day, remaining so from that time on. This was probably a coincidence, as defervescence had undoubtedly set in, but I am assured by those with experience of this line of treatment that the injection of mixed T.A.B. vaccine is very effective in controlling such fevers as the one described.

There were no complications, and convalescence proceeded very rapidly.

I am indebted to Lieutenant-Colonel D. Lawson, O.C., Q.A.M.H., for permission to publish this case.

Note by Lieutenant-Colonel J. C. Kennedy.

The case reported by Major Dive, which I saw in consultation, is an interesting example of the value of the agglutination method of diagnosis in a person previously inoculated with T.A.B. vaccine.

In an inoculated person subsequently infected with one of the group, the diagnosis is rendered more difficult by (1) the, in very many cases, modified clinical course of the disease; and (2) alteration in the agglutinin content of the blood not only for the infecting organism but also for other members of the group, necessitating a series of end point observations [1, 2, 3].

In this case, clinical symptoms, apart from the fever and a somewhat slow pulse in relation to the temperature, were wanting; culture of the blood, urine and feces likewise failed to assist in the diagnosis; and it was only when a second observation was made on the agglutinin content of the blood that it could be stated with any degree of certainty that the infection was due to one of the enteric group.

By referring to Major Dive's table it will be seen that the second observation (July 18, twentieth day of illness) showed a marked rise in agglutinins for each member of the group, and the tendency was to consider the rise for "T" as the most significant and accept this as evidence of infection with B. typhosus.

Now it has been my experience, and I believe the experience of most observers, that the "A" agglutinins are the least responsive to an infection by another member of the group, and furthermore that specific agglutinins for "A" tend to appear later than those for "T" or "B."

Hence it seemed to me that the rise in "A" agglutinins between July 9 and 18, though the titre reached was only half that of "T" or "B," was the most significant of the three. This reading of the case was confirmed by the subsequent observations.

The "A" agglutinins rapidly rose to a high titre, whereas "T" and "B," after their early response and a rise to a moderately high titre, soon subsided to a constant level somewhere about their original titre.

These points are brought out in the accompanying graph which affords an interesting comparison between the agglutinin curve produced by a specific ("A") and that produced by a group stimulation ("T" and "B").

Another interesting point brought out by the graph is the marked fall in "A" agglutinins subsequent to a dose of fifty millions paratyphoid "A" vaccine, and which is slightly reflected in the "T" curve.

The extent and duration of this "negative phase" in view of the dose given,
Clinical and other Notes

is rather surprising and is well worth the consideration of those who advocate large therapeutic doses of vaccine (200 to 350 million).

It is now some considerable time [4] since I registered a plea for the use of repeated small doses in preference to large doses in the vaccine treatment of typhoid fever—by small doses, I mean ten to fifty million—and such subsequent experience as has come my way has only strengthened the opinion I expressed at that time.

The graph now shown emphasizes my argument. I believe that we have in vaccine a most valuable therapeutic agent in enteric group infections, but it must be administered in therapeutic, that is to say, non-toxic, doses.

It is to be regretted that in the hands of some observers vaccine treatment has not met with the success that was expected; and in my opinion this is due to the use of too large a dose, a dose which has the effect of increasing the toxæmia and depressing the immunizing mechanism.

REFERENCES.