his own micrococcus, guided by his phagocytic index. The distance of his residence from London and the absence of grave symptoms induced a continuance of the expectant attitude which was justified by events. Seven months after the onset, when his recovery was complete, his blood still reacted in 100-fold dilution.

The illness of this patient, first designated "influenza" by his local medical attendant, suggested to the physician versed in tropical medicine the consideration of Mediterranean and typhoid fevers, liver abscess, kala-azar, malaria. The absence of parasites rendered ague improbable. The normal leucocyte count was against liver abscess. The absence of leucopenia excluded kala-azar. The negative serum reaction to the typhoid bacillus did not, however, render the diagnosis of enteric fever impossible, but the clumping of the *M. melitensis* indicated the true causative factor, which was subsequently demonstrated by the isolation of the coccus from the blood. The story is not yet complete, for we have not told how the infection was conveyed. On his return to the Sudan, he searched for and discovered the goat which had given his milk supply. He took a sample of its blood and labelled it "Blood of a goat whose milk I drank about fifty-four days before I was laid up with Malta fever." This blood, notwithstanding a delay in transit of two months before examination, clumped his micrococcus in a 20-fold dilution, while the blood of a normal goat was without action on it. The goat whose milk he drank was therefore infected. The period of incubation may appear long, but it is not exceptional. In 8 per cent. of attacks, this extends to eight weeks or over (Reports, *Med. Fever Com.*, Part vii., p. 102). A case is recorded in which the onset occurred six months after infection (*Journal of Royal Institute of Public Health*, December, 1907, p. 748). At the same time he despatched the blood of a native who had suffered from fever for ten months on the Blue Nile, and was slowly recovering, though still troubled with joint pains. The native's serum agglutinated the Soudan *M. melitensis* in 160-fold dilution, and in a 40-fold a Mediterranean variety.

It has now been proved that Malta fever prevails in the Sudan, and that the goat is the agent by which the infection is conveyed to man.

MALTA FEVER IN THE SUDAN.

By Captain L. Bousfield.

Royal Army Medical Corps.

Apparently, up to the present, Malta fever has not been described as occurring in the Sudan, though it has been suspected by various observers for some considerable time.

Dr. J. W. Eyre, in the Milroy Lectures of 1908, does not include this country in the geographical distribution of the disease, but since my return to England, Major W. H. Bray, R.A.M.C., informs me he suspected...
Malta fever in El Obeid (Kordofan Province) in 1904, and mentioned it in an article published in the Journal of the Royal Army Medical Corps, October, 1904. Further, he informs me that at a later date he treated an officer for prolonged fever, and that he had heard subsequently that the *Micrococcus melitensis* had been cultivated from this patient's blood when in Cairo; apparently this case has, unfortunately, never been recorded.

Dr. L. Phillips, of the Kasr-el-tini Hospital, Cairo, reported in 1906 that Malta fever was present in Cairo, and also mentioned the case of an officer who was taken ill in the Sudan while on a shooting expedition. Possibly this may be the same case that Major Bray refers to, but it is unfortunate that no note is made as to whether this officer had stayed for any length of time in the Sudan, nor as to the fact of his having served either in Malta or Egypt, for it must be remembered that many are in their time stationed in these places, and might contract the disease there, and thus give the serum reaction for some considerable period afterwards.

When the Dublin Fusiliers had left Malta and were stationed at Alexandria, cases of Malta fever, probably all contracted in Malta, developed for some considerable period after the move.

On arriving, in June, 1907, at Kassala, several cases were handed over to me as suffering from enteric fever, and at that time they had the appearance of that disease, but their subsequent courses and complications were characteristic of Malta fever. From June, 1907, to June, 1908, nineteen cases of fever were seen which clinically resembled Malta fever. Further, there was in the Military Hospital in June, 1907, a Sudan soldier (No. 2,038), who had been in hospital for four and a half months suffering from fever. On examination of his chart, several distinct waves were noted, and as nothing could be found, after careful examination, to account for his pyrexia, some blood was sent for examination. Lieutenant-Colonel Leishman kindly made this examination, and his reply, dated August 19th, 1907, was as follows: "I tested the blood you sent and am able to confirm your suspicions as to the cases being Malta fever; at least if one is able to decide from the agglutination reactions alone. The serum reacted up to $\frac{1}{16}$ complete and was nearly complete in $\frac{1}{32}$. The cultures were not a success, as after two days growths appeared in two tubes, which turned out to be contaminations." Later, two more specimens from other cases were sent, but arrived "putrid" and failed to give any reactions.

When I left Kassala there was an English officer very ill with fever, whose case was diagnosed as Malta fever; I have recently heard from him, from a nursing home in Cairo, and he informs me that his blood has been tested and gives a positive reaction to the *M. melitensis*. No serum

diagnosis was attempted at Kassala owing to there being no laboratory and no cultures. However, after some months, some sterilised emulsions of *M. melitensis* and *Bacillus typhosus* were procured from Allen and Hanbury, but these proved useless, for all the bacteria had disintegrated and there was nothing left except granular débris—a condition possibly produced by great heat, combined with the shaking of a journey of 250 miles on the back of a camel.

Though these proofs are but weak, the cases clinically resembled Malta fever, lasting in some cases more than four months, showing either continuous fever or waves followed by periods of apyrexia, the spleen being but slightly enlarged, the blood showing no malarial parasites, and the fever being uninfluenced by quinine. Several cases started with severe fever, rapidly passing into a typhoid condition, but subsequently suffering from relapses and complications such as are met with in Malta fever. Further, the water supply was common to all (wells) and no epidemic occurred, which would almost certainly have appeared had the cases been enteric. Most of these severe cases occurred in May and June of both 1907 and 1908, a period which corresponds to the end of the dry season; those occurring in other months were of a milder character.

The goats at this period, as well as the sheep and cattle, are in bad condition owing to the grazing being very scanty and poor, and therefore they are much more likely to feed off garbage. The difference in the condition of herbivorous domestic animals at the beginning and at the end of the rains is very marked, and one wonders at the former period how the animals exist; for it is usual to see goat after goat attempting to feed off the same small patch of closely-cropped dried grass or scrub, and picking up and eating every imaginable form of garbage. Possibly at this season more goats are infected, or those suffering from the disease pass greater numbers of cocci in their urine and milk, owing to their bad condition, which must presumably lessen their resistance.

In Malta, July and August—the hottest months—are stated to be those in which the fever is most prevalent. I do not know whether at this period in Malta the grazing is poor, but from my short stay there I should imagine it to be so; further, I am not aware if it has been ascertained that an infected goat, when in bad condition owing to poor feeding, passes greater and more frequent floods of micrococci in milk and urine than when well fed. It is noticeable that in Kassala there is practically no greater heat during May and June than during several previous months, but it is a very marked fact that during the whole period from the end of one rains to the beginning of the next the grazing gets steadily worse and worse, until towards the end there is almost none. This is put forward as a possible explanation why there are a greater number and more severe cases during these months than the rest of the year.

Of the nineteen cases only one was fatal, and that was due to a complication (cancrum oris), which appeared in a debilitated Arab soldier who had two severe waves of fever.
The complications observed were:

(a) Intense bronchitis, appearing at onset of disease (2).
(b) Orchitis, unilateral (2). One passed on to suppuration; gonorrhea, syphilis, and tubercle were excluded as far as it was possible.
(c) Inflammation of the sheaths of the extensor tendons of the wrist (2), and extensors of ankle (1).
(d) Cancrum oris. Terminated fatally (1).
(e) Intense localised pain over ilium behind, occurring in small areas and persisting for many days, without any physical signs except crippling and very marked tenderness (3).
(f) Sciatica (1).
(g) Slight and temporary enlargement, pain and tenderness in glands of anterior triangles of neck, unaccompanied by throat symptoms (2).
(h) Albuminuria, persistent for several weeks, the patient showing no signs of chronic renal disease (1).
(i) Severe diarrhoea, not of a "pea-soup" character, and appearing in those with acute and severe onsets (3).

Some cases had several of these complications, one having at different periods orchitis, synovitis, and localised pain over the ilium. Several cases had no complications; two cases, lasting over four months in each case, practically suffered only from fever. Profuse sweating was noted in many cases, especially in those of the severe type.

Thus the Sudan I think, without doubt, should be added to the geographical distribution of Malta fever.

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ABSCESS OF THE LUNG SECONDARY TO ABSCESS OF THE LIVER.

By Major F. J. Morgan.
Royal Army Medical Corps.

A large proportion of cases of abscess of the liver, in which expectoration of the abscess contents is going on, do badly and go from bad to worse, unless the abscess can be drained by operation; but to locate such an abscess by exploration with trocar and cannula is, in my experience, often a matter of difficulty, deeply situated as such a cavity often is in the centre of the upper dome-like part of the right lobe, and small as it may be, on account of continual partial evacuation of its contents.

Post-mortem examination of a certain number of these cases led me to observe that the abscess track in the lung always occupied its posterior half; that in a large proportion it was only separated from the pleural surface behind by an inch or less of consolidated lung tissue; and, in advanced cases, that the posterior part of the lung in its lower third or so was quite broken down, forming an abscess cavity bounded behind by thickened pleura only. It occurred to me that the difficulty of locating and draining these abscesses, vidi the liver, from the front or side might