the right lobe, slightly raised, irregular patches of a light yellow colour were seen; these were extremely hard to the touch, as was also the adjacent liver tissue. On section these patches were whitish in colour, and extended down into the liver tissue, forming tumours, which varied in size from a gooseberry to a medium-sized potato; the large tumours had a tendency to be soft in the centre; there was no umbilication on the surface of these tumours. These growths permeated nearly the whole of the left lobe, and were also present in the adjacent parts of the right lobe. The remainder of the liver tissue was deeply stained with bile; the gallbladder was distended with bile of a dark colour, and consistence of treacle. The pancreas consisted of a number of growths similar to those found in the liver; these were so numerous as to almost obliterate the normal pancreatic tissue. The stomach was normal, except for a number of small petechial hemorrhages which existed in the mucous membrane along the greater curvature. The other abdominal organs were healthy.

A portion of the liver and pancreas were forwarded to the laboratory at the Station Hospital, Rangoon, and the specimens were examined microscopically and declared to be sarcomatous in character; the growths in the liver were chiefly of the large spindle-celled variety, and those in the pancreas of the round-celled variety, and in some parts mixed.

From the history of the case, the late development of jaundice and the slight inconvenience caused by the disease at the onset, I fancy the growth began primarily in the pancreas and extended to the liver.

A CASE OF DOUBLE AND SIMULTANEOUS INFECTION BY THE ORGANISMS OF ENTERIC AND OF MALTA FEVER.

By Captain J. Crawford Kennedy.

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It has long been discussed whether it is possible to have a simultaneous infection by Bacillus typhosus and by Micrococcus melitensis. Undoubted cases have occurred where one disease has followed so closely on the other as to make one suspect that the infection was simultaneous; in these cases the blood serum reacts first to one disease and then to the other. In other cases the blood serum is said to react to both diseases from the first, but so far as I am aware there is no record of this being confirmed by post-mortem examination. I am now able to place on record a case in which both organisms were obtained from the spleen after death.

No. 9308 Acting Corporal B., Rifle Brigade, was transferred to my ward on November 13th, 1904, three days after admission to hospital.

History.—Admitted to hospital on November 10th, 1904, from Fort Manoel. He said that he felt unwell three days before, and complained
Clinical Notes

of pains in the head and back, some diarrhoea, and slight pains in the stomach. He had been under B. H. treatment for syphilis since June 6th, 1904, on which day he was discharged from hospital, where he had been under treatment from May 6th, 1904, for syphilitic ulceration of the tonsils and uvula. He arrived in Malta in April, 1904. No history of fever since his arrival can be obtained.

Clinical History.—From the first the patient presented a typical picture of a mild enteric. Bowels open once or twice a day, and the stools pea-soup in character. There was no tumidity, nor were spots observed. The blood serum was taken on the 13th, and tested for Widal's reaction. A dilution of one in ten was used, with a time limit of one quarter of an hour. Enteric gave an incomplete reaction, and Malta fever none. The case was clinically a straightforward enteric of a mild type, with no complications, and the blood serum was therefore not tested again. The complication of Malta fever was not suspected. Everything went well and the prognosis was excellent until November 17th (the eighth day in hospital), on which day he complained of pain, and some localised peritonitis was detected in the hypogastrium; there was also some tumidity. Next day (the 18th) perforation occurred, and patient died on the morning of the 19th.

Post-mortem Examination.—The post mortem was conducted twenty-four hours after death, and merely as a matter of course. Typical ulcers were found in the ileum, round the ileo-caecal valve, and also in the caecum, the majority having cast their sloughs and being well on towards healing. The ulcer which had perforated was situated 1½ feet from the ileo-caecal valve. The spleen weighed 9½ ozs., and was preserved for bacteriological examination. There was nothing to be noted about the
other organs except that the liver was enlarged (febrile enlargement) and weighed 60 ozs.

**Bacteriological Examination.**—The spleen was seared and cut in three places, and cultures were made on six agar slopes, two from each cut, one loopful of spleen pulp to each tube. After incubating for twenty hours only one tube contained a growth, and they were all returned to the incubator. On examining them again, four and a-half days after, it was found that one tube contained no growth, one tube contained a growth resembling Bacillus typhosus, three tubes contained pure growths with all the appearance of Micrococcus melitensis, one tube contained Micrococcus melitensis and a slight contamination.

The following tests were applied to these organisms to prove them:

1. **Bacillus Typhosus.**—
   - (a) The sub-culture on agar slopes, after twenty-four hours, appeared as a thin, moist, translucent greyish-white growth.
   - (b) It emulsified readily in normal saline solution, and under the microscope appeared as a short motile rod.
   - (c) It did not retain Gram's stain.
   - (d) It was agglutinated by serum from an enteric fever case, diluted to 1 in 200.
   - (e) It grew on glucose litmus agar with slight acidity.
   - (f) It grew on potato with characteristic snail-track appearance.
   - (g) In lactose medium no gas was produced.
   - (h) After eight days' incubation in litmus milk no coagulation was produced, and slightly less than 5 per cent. of acid was found after testing with 1/15 alkaline solution.
   - (i) In Witte's peptone and salt solution, after incubating for seven days, it produced no indol when tested for by means of potass. nitrite solution and sulphuric acid; on standing over-night a faint rose tint was observed.

2. **Micrococcus Melitensis.**—
   - (a) It had taken four days to appear in the tubes.
   - (b) It emulsified readily and appeared as a tiny coccus.
   - (c) It did not retain Gram's stain.
   - (d) It was agglutinated by monkey's serum, diluted to 1 in 2,000.
   - (e) Sub-culture on agar slope was typical.
   - (f) No acid was produced on glucose litmus medium.
   - (g) No gas was produced in lactose peptone medium.
   - (h) In litmus milk, after incubation for a week, there was no coagulation and there was a very marked alkaline reaction.

There can, therefore, be no doubt as to the nature of the organisms isolated from the spleen; and the double infection is conclusively proved. It remains to determine the probable date of infection, and to prove that they were as nearly as possible simultaneous.

**The Injection by Enteric Fever.**—Judging from appearances found at the post mortem, the disease must have been well on in the third week (say the twentieth day). That would make the first day of invasion about October 30th. Taking ten to fifteen days as the accepted period of incubation, the infection must have been contracted between October 15th and 20th.

**The Injection by Mediterranean Fever**—The following facts go to prove that there was no previous infection by Malta fever: (1) Nothing to sug-
gest it in his previous medical history; (2) the man's own statement that he had been perfectly well up till three days before his admission to hospital; (3) negative Widal's reaction to Malta fever on the 13th, the supposition being that a reaction would have been present had he been previously infected by Malta fever.

We have therefore three facts to work on: (1) No previous infection; (2) negative Widal's reaction on the 13th (six days before death); (3) the proportion of *Micrococcus melitensis* to Bacillus typhosus found in spleen ;; 4 : 1.

Putting aside all theories and suppositions as to the hiding of the agglutinating reaction in double infections, we will suppose that the 13th was not yet the fifth day of the disease (because one usually reckons on obtaining a reaction on the fifth to the eighth day of invasion), but taking into account the cultures obtained from the spleen six days after, it could not be far off it. We will say, therefore, that November 13th was the fourth day of invasion. Calculating from this, and allowing fifteen to twenty-one days as the incubation period for Mediterranean fever, we are brought back to the period between October 18th and 24th as the probable date of infection by the *Micrococcus melitensis*. This corresponds very closely to the date of infection by the *Bacillus typhosus*, and therefore for all practical purposes we may say that the infection was simultaneous.

There is one very interesting point in this case alongside the one of double infection. I mean the fact that Widal's reaction to Malta fever was negative in a dilution of 1 in 10, and yet, six days after, abundant growth of *Micrococcus melitensis* was obtained from the spleen, and at the same time the *Micrococcus melitensis* was more abundant than the *Bacillus typhosus* (presumably a more rapid-growing organism) which had given an incomplete reaction. I much regret that no repetition of Widal's test was performed, but there was nothing in the clinical aspects of the case to suggest it.

This raises the very interesting and extremely difficult question of what effect a double infection by two such diseases has on the body's resistive powers, as evidenced by Widal's reaction. At this time I dare merely to touch on this, and that with some diffidence, but do so because, though short has been my experience, I know that much is to be learned from this aspect of double infection, and that any contribution to so interesting a question is worth recording.

Two other points I should like to draw attention to are in connection with the previous medical history of the case: (1) He was suffering from syphilis and had been under treatment by mercury for some months. This had undoubtedly some effect in lowering the body's resistance. One of the most acute out of half-a-dozen cases of the meningeal type of Malta fever that I have seen was that of a man with a similar history. Whether it is the syphilis or the mercury, or both factors working to-
gether, that have this effect, I cannot discuss in this paper. (2) He had ulceration of the tonsils and uvula. It has always been my idea that the tonsils are a very likely point of entrance for infection of Malta fever (see Royal Army Medical Journal, April, 1904, page 501).

This is only one of several cases that I could bring forward with a distinct history of previous inflammation of the throat or tonsils.

I do not apologise for bringing this case to notice, because apart from the fact that I believe it to be the first time that the two organisms have been isolated from the same spleen, I consider that it is extremely important to recognise that the two diseases may exist together, especially in view of the treatment. In such cases the serum diagnosis is not absolutely to be relied on, and it is quite possible to imagine a case treated as Malta fever in which the enteric may have been masked until it evidences itself by the fatal results of a too liberal diet.