SEPTICAEMIA DUE TO MICROCOCCUS TETRAGENUS AS A CAUSE OF PYREXIA AT THE FRONT

By A. H. BIRKS, R. T. THORNLEY, AND R. A. FAWCUS

IN an admirable work entitled *Les Fièvres paratyphoïdes* Professor Jacques Carles mentions three varieties of blood infection, which produce illnesses clinically indistinguishable from paratyphoid fever.

These three are caused by (1) *M. tetragenus*, (2) *Pneumococcus*, (3) *Bacillus Coli*.

Of these three types of infection, that by tetragenus is apparently the commonest, followed fairly closely by pneumococcal infections.

There is no doubt of the remarkable frequency of obscure cases of pyrexia at the front at the present moment.

Roughly speaking, they tend to fall into two general types: one resembles paratyphoid fever, and the other, in which the fever is intermittent, is spoken of as 'trench fever'.

The object of this paper is to give a certain number of cases with the bacteriological findings, as an illustration of the fact that often these obscure pyrexias are instances of blood infection by one of the three micro-organisms mentioned.

We believe that a very large proportion of the cases of the illness known as 'trench fever' are instances of one of these infections, and that so also are those frequent cases of continuous pyrexia clinically resembling typhoid in which the presence of none of the typhoid group can be established.

While not at present able to exclude the hypothesis that just as in the later stages of phthisis tetragenus may be isolated in the blood as a secondary infection, so in these cases too it may be a sequela to a primary paratyphoid infection, we regard it as at any rate unproved and as extremely improbable.

Of the three infections, that by tetragenus shows some definite characteristics.

Tetragenus Fever.

The *Micrococcus tetragenus* has hitherto been ignored as a pathogenic organism of importance; in a hundred consecutive cases of obscure pyrexia this organism has been isolated from the blood in pure culture on twenty-five occasions.

Mice when injected with this micrococcus die of septicaemia, and the coccus has been regained from the heart's blood; further, healthy mice, when introduced to the cage of the septicaemic mouse, have contracted the disease and died.

Case I. Pte. M., R.F.A. Admitted 10. 6. 16. ? Erysipelas.

The patient began to feel ill with a 'cold' and some headache which gradually got worse; he also had pains in the stomach (colic) and was very constipated.

Condition on admission. Temperature 101°. Confluent macular eruption over each malar surface, extending down the cheeks and behind the ears; tongue covered with a brown fur; and marked catarrh in the throat, nose, and eyes; some bronchitis. Abdomen full, no spleen to be felt; pain and tenderness over transverse colon.

Course of illness. Continuous pyrexia—complained of pain in legs (marked over the course of the tibia) and back (lumbar).

Steady and gradual improvement; the macular rash remaining for a week, then gradually fading: a patch appearing on the back of the left wrist similar in character; no diarrhoea.

Blood count. R. B. C. 5,870,000, W. B. C. 7,000 per c.mm.

The patient looked anaemic towards the end of his illness. Urine normal.

Inoculation. Typhoid vaccine, two doses within a year.

Bacteriological reports. April 16. *Micrococcus tetragenus* present in blood.

Widal negative to typhoid and to paratyphoid A and B.

Case II. Pte. T. Admitted 31. 4. 16. German measles.

The patient started his illness with a sore throat for about a week; a rash appeared over the face, arms, and chest.

Course of illness. German measles rash disappeared on the third day. The patient had a remittent pyrexia for twelve days, complaining of very little except pains in the knees running down the calf to the ankles. The spleen was found to be palpable. There was no diarrhoea.

Blood count. R. B. C. 5,364,000, W. B. C. 16,000 per c.mm.

Inoculation. Two doses of typhoid vaccine.

Bacteriological reports. 6. 5. 16. *Micrococcus tetragenus* in blood and faeces. 15. 5. 16. *Micrococcus tetragenus* present in blood.

Widal positive $\frac{1}{25}$ to typhoid, negative to paratyphoid A and B.

Case III. Pte. C. Admitted 31. 4. 16. The patient was feeling unwell for four days, and then his headache became worse and he felt generally weak and faint, and on the fifth day of his illness reported sick.

On admission. Temperature 101°. The patient looked ill and flushed, tongue swollen and covered with a white fur. The chest and abdomen had scattered rose spots. The spleen was considerably enlarged.

Course of illness. The patient ran a continuous pyrexia, occasionally remittent, and complained of headache and pains in the back and legs, and became anaemic. The spleen gradually decreased in size. There was no diarrhoea.

Blood count. R. B. C. 3,185,000, W. B. C. 6,200 per c.mm.

Inoculation. Typhoid vaccine, two doses.

Bacteriological reports. 6. 5. 16. *Micrococcus tetragenus* in blood and faeces. 19. 5. 16. *Micrococcus tetragenus* present in blood.

Widal positive $\frac{1}{25}$ to typhoid, negative to paratyphoid A and B.

Case IV. Pte. B. 38½ years.

History of the present disease. The patient felt seedy for a week and went sick on May 25; headache, pains in the legs, and faintness. He was in bed for five days, during which time he was feverish.

Symptoms. Headache; pains in the legs from the knees to the ankles. No sore throat; no diarrhoea.

Physical signs. Well-marked enlargement of the spleen.

Inoculations. Typhoid vaccine, March, 1914, two doses; April, 1916, one double dose.

Bacteriological reports. 8. 6. 15. *Micrococcus tetragenus* present in blood.

Widal negative to typhoid, paratyphoid A, and paratyphoid B.

Case V. Pte. J. Seven months in France. Worked in the wards.

History of the present disease. Pains in the head coming and going; legs and knees a bit stiff for two or three days, but felt better on the evening of the third day. The following morning felt very bad with a headache and pains in the legs.

On admission. Teeth fair; throat slightly injected, no physical signs. Spleen was not palpable. Patient complained of a bad headache and pains in the legs.

Course of illness. Patient ran a remitting pyrexia.

Inoculations. Typhoid vaccine, 1915, two doses; triple vaccine, March 3, 1916.

Bacteriological reports. 8. 6. 16. *Micrococcus tetragenus* present in blood.

Widal positive $\frac{1}{250}$ to typhoid, negative to paratyphoid A and B.

The patient's organisms were clumped by serum of No. II.

Case VI. Pte. F. Seven months in France. Company barber.

The patient came out of hospital five weeks ago and said he had a similar attack then. He never felt well during the five weeks that followed.

History of present disease. On May 6, after lying down in the evening, he got up with a splitting headache, and his legs gave way beneath him so that he could not walk; pains in the legs and generally all over the body; he had a high temperature.

On admission. The patient came in on the eleventh day of the illness; in appearance he looked flushed and had a strained look in the eyes and his face was drawn.

Symptoms. Headache; pains in the legs, back, and neck.

Physical signs. Nil.

Inoculation. Typhoid vaccine, two doses.

Bacteriological reports. *Micrococcus tetragenus* present in the blood.

Widal negative to typhoid, paratyphoid A, and paratyphoid B.

The patient's serum clumped organisms No. II.

Case VII. Corporal H. Eleven months in France.

Previous diseases. Never ill in his life.

History of present illness. The patient felt out of sorts for three days, feeling cold and breaking out into sweats at times.

Symptoms. Headache; pains in legs, knees to the ankles, very marked along the tibia, which was very tender to percussion.

Physical signs. Palpable spleen; rose spots on chest and abdomen.

Inoculation. Typhoid vaccine.

Bacteriological reports. 7. 6. 16. *Micrococcus tetragenus* present in blood.

Widal positive $\frac{1}{250}$ to typhoid, negative to paratyphoid A and B.

The patient's serum clumped the organisms of No. I.

Case VIII. Pte. P. 42. On June 1 the patient collapsed in the trenches, feeling faint and also having a headache, pains in the limbs, knees, and ankles. He ran a remitting pyrexia for sixteen days.

Symptoms. Headache, pains in the limbs and back, cough.

Physical signs. Some bronchitis. The spleen could not be felt.

Inoculations. Typhoid vaccine, March, 1914, two doses; one double dose of triple vaccine in April, 1916.

Bacteriological reports. 10. 6. 16. *Micrococcus tetragenus* isolated from blood.

Case IX. Pte. L. Patient went sick on June 7 with headache and a sore throat.

On admission. Patient looked very ill—membrane on the throat. Diphtheria bacillus was found on the smear and cultivated.

Course of illness. Patient responded well to antitoxin treatment. The temperature subsided temporarily, but was only normal on two occasions for a period of nineteen days.

Symptoms. Headache; pains in the legs and back, developing while in the hospital; the tibia was extremely tender to the touch.

Physical signs. Rose spots on the chest and abdomen. No spleen could be felt.

Inoculation. Typhoid vaccine, February, 1916.

Bacteriological reports. 13. 6. 16. *Micrococcus tetragenus* isolated from the blood.

Widal positive $\frac{1}{50}$ to typhoid, negative to paratyphoid A and B.

Case X. Pte. O. The patient was admitted on June 3 with a history of a rash on the chest; no rash was however present on admission.

Symptoms. Headache. No abdominal tenderness; no diarrhoea; no pains in the legs.

Physical signs. Nil.

Course of illness. The patient ran a continuous pyrexia.

Inoculation. Typhoid vaccine, March, 1915, two doses.

Bacteriological reports. 7. 6. 16. *Micrococcus tetragenus* present in blood.

Widal positive $\frac{1}{50}$ to typhoid, negative to paratyphoid A and B.

Case XI. Sergt. M^cQ. The patient was admitted with a rash like German measles; the rash faded on the second day.

Symptoms. No sore throat; some cough. No diarrhoea, constipation, or abdominal tenderness. Headache and pain over the shin-bones marked.

Physical signs. Some bronchitis.

Course of illness. Patient ran a remitting pyrexia.

Inoculation. Typhoid vaccine, March, 1915, two doses.

Bacteriological reports. *Micrococcus tetragenus* isolated from the blood.

Widal positive $\frac{1}{50}$ to typhoid, negative to paratyphoid A and B.

It seems to be the weaker types, or those who have become run down, who fall victims to this form of fever, and in studying the charts and comparing them with the others they show characteristic features. See chart on p. 5.

No. IX after a time developed the remittent character similar to that of trench fever; in many of these cases the pneumococcus has been found, but in this case the blood was unfortunately taken after the temperature had fallen, so the pneumococcus may have been missed though present as a complication.

Clinically the tetragenus cases closely resemble one another. The onset may be sudden or insidious, the former being more common. Headache and pains

in the lumbar region and down the legs from the knees to the ankles occur in nearly every case; tenderness over the tibia is sometimes extreme. Enlargement of the spleen and rose spots occurred in three of our cases. Anaemia is common, and lethargy is the characteristic mental attitude.

Sometimes nothing but slight headache is complained of and the patient runs a low form of pyrexia for a varying period—sometimes for a very long time.

The agglutination of the *Micrococcus tetragenus* by the serum of these patients is a striking feature and clearly indicates that the patients have resisted the infection of the micrococcus.

There is some evidence of the infectious nature of this disease, as orderlies in hospitals are liable to contract it. We have no post-mortem reports of this disease as no fatal case has occurred in our series; but in view at once of its frequency and long duration, it appears to us to be of very great military importance.¹

Note on 'Coccal' Infections.

Two other well-known cocci—the pneumococcus and the streptococcus—are also common causes of obscure pyrexia at the front. All these three organisms are closely allied in their cultural characteristics, and all produce septicaemia of the same sort of severity, though of different clinical types. The pneumococcus is apparently the cause of the intermittent fever which has been frequently described out here. It also causes another type of illness in which abdominal

¹ The characters of *Micrococcus tetragenus* which we have used for identification are: (1) Profuse growth on ordinary media, sticky and tenacious, without liquefaction; (2) failure to haemolyse blood; (3) strongly Gram-positive rounded coccus, usually in fours with a well-marked capsule; (4) it is very pathogenic to mice and rats, causing fatal septicaemia with some oily pus at the site of injection.

pain, headache, and splenic enlargement, all occurring within the first day or two, are the characteristic symptoms. Thirdly, it may produce a type of fever less distinguishable from tetragenus septicaemia. The streptococcus infection tends to be milder and more chronic, though in its severer forms it is hard to distinguish from the pneumococcal type. In all three fevers splenic enlargement is common. Mixed infections may occur. Probably four out of five cases of obscure pyrexia that we see here are due to one of these three infections. Tetragenus fever is the commonest and most characteristic, and presents the clinical appearance described.

The conclusions we would draw from these and similar cases are the following:

1. The most prevalent type of illness at present at the front in France is a group of continued or intermittent pyrexias of obscure origin.
2. This group tends to divide itself into two general types, of which, apart from bacteriological evidence, one clinically resembles paratyphoid and the other is called trench fever.
3. A large proportion of all these pyrexias are septicaemias.
4. Of these septicaemias the most common is tetragenus fever, which appears to have some characteristic features.