Judging from the sugar reactions, the organism corresponds most closely with *Streptococcus faecalis*, except as regards raffinose, which is unaffected by *Streptococcus faecalis* as a rule. It grew easily on most media which had a somewhat alkaline reaction. On markedly acid medium I was unable to obtain a growth. It grew well both aerobically and anaerobically, but rather better in the presence of air.

According to Besson, some strains can only be isolated by growing the material anaerobically in the first instance, but once growth is established further subculture can be carried out in the presence of air. It is possible that failure to obtain a growth of the organism may be due to the fact that the observer omits to put up anaerobic as well as aerobic cultures of the material under investigation. This is a point of some importance in looking for the enterococcus.

As regards temperature, it was found to grow quite well as low as 18° C., and was found alive after eight weeks' incubation at this temperature. Growth at a low temperature and prolonged vitality are both considered by French writers to be characteristic of the enterococcus. Indeed, it is said to be capable of remaining alive for years in anaerobic fluid culture.

Agglutination reactions were not thoroughly investigated, but, while the patient's blood and that of inoculated animals caused definite agglutination in certain dilutions, there was an indication that normal blood serum was capable of agglutinating the enterococcus when the former was used in the undiluted condition.

Pathogenicity.

The organism was pathogenic to rabbits and mice, since all but one died about the fourteenth or sixteenth day, and from some of them the organism was recovered from the blood or other fluid.

Opinion appears to be divided on the question of pathogenicity, as very different results have been got by various men. The explanation probably is that the virulence varies in different strains, and the increased virulence of some may be due to a symbiosis with other more pathogenic agents such as *B. typhosus* or *B. paratyphosus*. The virulence probably becomes diminished after repeated subculture.

Several points about the enterococcus still remain to be cleared up. This ought not to be difficult in view of the frequency with which the organism is being found amongst the wounded. The organism is probably at most but a variant of the *Streptococcus faecalis* group.

REFERENCE.

¹ *Journal of Pathology and Bacteriology*, 1914, vol. xviii, p. 469.

DELAYED TETANUS IN CONNEXION WITH INJURIES TO BONE NOT PRESENTING OBVIOUS SIGNS OF SEPSIS.

BY

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BETWEEN November 22nd, 1916, and January 8th, 1917, only three cases of tetanus occurred amongst the troops in the six and a half counties which comprise the administrative area of the Bedford district. In all these cases the incubation period was prolonged, all three had sustained gunshot wounds with fracture, and so far as could be ascertained a primary prophylactic dose of serum had been given in every instance.

CASE I.

Pte. A., Royal Sussex Regiment. Gunshot wound with fracture of right humerus on June 30th, 1916. Discharged from 1st Eastern Hospital, Cambridge, to convalescent home on October 6th, with good union and only a small sinus. This sinus subsequently closed. On November 12th he fell down in the street, and re-fractured the humerus. On November 20th he developed bronchopneumonia. He was readmitted to the Cambridge Hospital on November 21st. On November 22nd twitchings of the limbs were first noticed, followed by trismus. With intrathecal and intramuscular injections of antitetanic serum he completely recovered. A primary injection of antitetanic serum had apparently been given in France, but no subsequent injection in this country. In this case the period of incubation was 146 days.

CASE II.

Pte. B., Bedfordshire Regiment, sustained a gunshot wound with fracture of the left humerus on September 15th, 1916. While on leave at his own home from Bradford War Hospital on December 14th he fell on his arm, which became very painful. He was admitted to the 1st Eastern Hospital, Cambridge, on December 15th. There was then a good bony union, with a small sinus on the inner side of the arm with serous discharge. On December 30th he complained of twitchings and trismus was noticed. With intrathecal and intramuscular injections of antitetanic serum he completely recovered. Subsequent exploration revealed no sequestrum. The period of incubation was 106 days.

CASE III.

Pte. C., Canadians. Gunshot wound with fracture of right femur on October 8th, 1916. On admission to the Northamptonshire War Hospital, Duston, there was about three-quarters of an inch of shortening, with much callus about the seat of fracture. There was a small granulating wound over the great trochanter; no sinus. This wound had healed on December 14th. On January 3rd spasms began in the injured limb, and on January 6th these became general. With intrathecal and intramuscular injections of serum he completely recovered. Shortening of the injured limb increased, and signs of fracture appeared; a considerable quantity of pus was evacuated. One primary injection of serum had been given in France, but none subsequently, owing to the absence of any sign of sepsis. The period of incubation in this case was 86 days.

A survey of these cases illustrates the fact that tetanus can lie dormant for a long time in a wound not obviously septic. In two of these cases the direct injury of a fall would appear to have lighted up a quiescent focus. The injury, moreover, occurred at a time when the immunity conferred by the primary injection had presumably worn off. From a practical point of view, the conclusion to be drawn is, that in injuries of bone the absence of obvious sepsis in the wound affords no surety against the development of tetanus. Regarded in its bearing on the necessity for continued prophylactic injections, this fact points to equal consideration being given to the nature of the injury as to the degree of sepsis present in the wound. The aim of this communication is that repeated prophylactic injections should be given in all cases of gunshot wounds with fracture, irrespective of the amount of suppuration present in the wound.

SMALL-POX VACCINATION BY PUNCTURE.

BY

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YOUR issue of November 4th, 1916, p. 620, carries an account of a method of aseptic vaccination which is good, but we are using a method here in Military District No. 1, Canada, which is still better. It was introduced amongst the civilian population first in 1915,¹ and subsequently became the official military procedure in this district. The method is as follows:

1. The sleeve is rolled up.
2. Orderly 1 washes the arm with soap and water.
3. Orderly 2 washes the arm with rectified spirits.
4. Orderly 3 washes the arm with ether.
5. Orderly 4 breaks the capillary tube of glycerinated vaccine and sets the rubber bulb or other method of expelling contents, handing it to Orderly 5.
6. Orderly 5 expels the vaccine at three (or four) points on the arm, making a triangle (or square) having not less than 2 in. between the points.
7. Orderly 6 sterilizes an ordinary sewing needle and hands it to the medical officer.
8. The medical officer punctures the arm through the drops of vaccine. Six tiny punctures, drawing no blood, are made through each drop, each set of six occupying a space of not more than $\frac{1}{4}$ in. square. The needle is held almost parallel with the surface. Not over one-thousandth of an inch enters the epithelial layer. A peculiar little "snick" is felt as the needle point goes in.
9. Orderly 7 wipes off the vaccine.
10. The sleeve is pulled down.

Notes.

(a) The total time from pulling up the sleeve to pulling it down again need not exceed one minute.

(b) After the orderlies have had a little practice three men per minute can be vaccinated without haste or carelessness.

(c) No after-treatment whatever is required; none should be used; the only direction to the men is *leave it alone*.

The results are:

I. In those not previously successfully vaccinated (and who have not had small-pox) nothing is found for several