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Pathogenic Anaerobic Bacillus Not Hitherto Described Cultured From Fatal Operative Wound Infection.

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This organism was cultured post-mortem from the lesion in an operative wound infection. The bacteriophagic study was carried out by two of us (F. L. M. and F. B. H.). The patient was operated on and cared for in another hospital by L. C.

The infection began on the eighth day and caused death on the thirty-fifth day after operation. The only other organism found was *B. pyocyaneus.* The virulence for laboratory animals of the organism to be described tends to confirm the belief that this organism was the cause of the human lesion and is pathogenic for man.

Pathogenicity. It is lethal in small doses for white mice, white rats, guinea pigs, rabbits, pigeons, chickens, cats and dogs. No other animals were tested. In these animals, when injected subcutaneously, it produces an extensive hemorrhagic edema resembling the lesions produced by *C. novyi (B. oedematiens)* and *C. oedematis maligni (Vibrion septique),* but differing somewhat from each of these. The animals succumb to the infection within a few hours or days. The organism may be recovered after death from the lesion, the peritoneum and the heart's blood. The pathogenicity of the strain has been maintained for nearly two years with repeated transplantation on artificial media.

Morphology. It is a gram positive bacillus varying from 1 to 4 mu in length and 0.3 to 0.5 mu in thickness. It is motile in young cultures. It produces spores readily on all media except those containing dextrose. The spores are generally para-central, but many are found free. The vegetative forms have no capsule, but the spores appear to have a thin capsule with the Hiss stain.

Anaerobiosis. Conditions of anaerobiosis for this study have been accomplished by the use of a modification of the McIntosh and Filde jar. The organism requires the same degree of anaerobiosis as *C. welchii.*

Growth on Solid Medium. The solid medium used has been chiefly sheep's blood agar in Petri plates. On this medium discrete stellate colonies are formed which are gray in color and very irregular in outline. Occasionally there is a fernlike spread from one

side of the colony. At first it was thought that this represented a contamination, but such was not the case. There is no hemolysis, but when the colony is scraped off there is slight pallor underneath. Occasionally there is a faint green tinge to the margin of the colony. The growth has a cheezy but not a butyric odor. In deep agar it produces small discrete mossy colonies. In dextrose agar large quantities of gas are formed.

Growth of Fluid Medium. On plain meat infusion broth it grows readily with a mucoid, ropey consistency. On cooked meat medium this quality is less marked at first, but is present in older cultures. The growth is diffuse and on long standing gradually settles to the bottom of the fluid portion of the medium. Gelatin is completely liquified in forty-eight hours.

Fermentation Tests. It is not an active fermenter. Gas and acid are formed with dextrose, but not with lactose, saccharose, salicin, mannite or glycerin. Milk is not acidified except after prolonged incubation.

Proteolytic Tests. There is very slight erosion after long incubation on Loeffler's medium but no real liquifaction. The casein of milk shows very slight digestion after long incubation. The surface of the meat in cooked meat medium becomes dark in old cultures.

Toxin Production. It produces a true exotoxin. This toxin is filterable, thermolabile, has a latent period and is capable of producing an antitoxin when injected into rabbits, either subcutaneously or intra-venously, in sublethal doses. Of this immune rabbit serum 0.05 cc. will protect white mice against 0.45 cc. of toxin. This toxin is produced both in plain broth and in 0.2 per cent dextrose cooked meat medium. The minimal lethal dose of the toxin for 20 gram white mice is 0.02 cc. when injected subcutaneously.

The effect of B. oedematiens and Vibrion septique antitoxin. Potent *B. oedematiens* anti-serum, of which 0.05 cc. will protect white mice against 0.45 cc. of toxin produced by a typical strain of *B. oedematiens,* the M. L. D. of which is less than 0.05 cc., has no effect whatsoever on a minimal lethal dose of toxin produced by this organism. The same is true for potent *Vibrion septique* antitoxin.

The effect of antitoxin for this organism on the toxin or the centrifuged supernatant fluid of a culture typical strains of B. oedematiens or Vibrion septique. Rabbit antiserum which is potent in protecting white mice against this toxin to the degree mentioned above and against infection with the centrifuged supernatant fluid

of a culture of this organism will not protect mice against a minimal lethal dose of *B. oedematiens* toxin, or *Vibrion septique* toxin or against infection with these organisms.

Two other strains exactly similar to this have been recovered from two out of four tubes of catgut from a batch used in the hospital at the time this infection developed.

Summary. An anaerobic bacillus has been cultured from the lesion in a fatal human operative wound infection and from catgut. It is pathogenic in small doses for eight different species of laboratory animals. It produces a lesion in these animals resembling somewhat the lesions produced by *B. oedematiens* and *Vibrion septique.* It differs from these organisms strikingly in certain of its cultural characteristics. Serologically it has been demonstrated to be distinct from both of these. As far as we know it does not correspond to any other pathogenic anaerobe heretofore described. The name proposed for this new species is *Clostridium oedematoides.*

This is a preliminary report.

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General and Local Heat Developed in Living Animal Body by Passage of High Frequency Currents.

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The present wide use of clinical diathermy has led us to a study of the deep heat produced in tissues by the passage of alternating currents of high frequency. Most of our experiments have been made on dogs anesthetized by the intravenous injection of barbital sodium. The deep temperature was measured by means of specially prepared thermocouples soldered to the tips of Luer needles which could be inserted into the body cavities. These thermocouples, which were of copper and constantan, were connected with a galvanometer through a constant temperature junction obtained by a thermos bottle thermostat as described by Clark.[1]

The high frequency current was passed through the body by placing the electrodes usually on the sides of the shaved thorax. Great care was taken to have the electrodes parallel to each other and the thermocouple needles at right angles to the electrical field. This is very important, otherwise there is a concentration of current at the