inosite and galactose are fermented when the test medium is composed of 0.3% Liebig's extract, 0.5% Difco peptone and 1% carbohydrate. No gas is liberated, but the change in pH is marked. In many of the sugars a final pH after 4 days incubation is 4.6 to 5.0. *Cl. botulinum* Type D is the only strain thus far encountered which fails to produce gas from carbohydrate. It also differs from other strains in its action on sucrose and lactose. Toxic and non-toxic variants may be isolated from fluid cultures.

The susceptibility of various animals for the toxin is briefly as follows: Chickens and dogs are non-susceptible to subcutaneous injection of 100,000 guinea pig M.L.D.'s; 5 guinea pig M.L.D. subcutaneously are fatal to a rabbit in 72 hours; 1,000 M.L.D. for a rat in 7 days; 100,000 M.L.D. for a pigeon in 24 hours. Contrary to the observation of Theiler, mice are susceptible; a toxin which was fatal for guinea pigs in a dilution of 1:20,000 fatally poisoned mice in a dilution of 1:50,000. The ratio of the M.L.D. by subcutaneous injection to the M.L.D. *per os* is 1:1,000 for guinea pigs, 1:200 for mice and >1:3,000 for rabbits. Suitable suspensions of the *Cl. botulinum* Type D are not agglutinated by any of the type sera available in this laboratory but are readily clumped by a homologous antiserum.

The anaerobe isolated from lamziekte carrion is a non-ovolytic and non-sarcolytic organism which produces a highly potent neurotoxin. Pharmacologically the poison acts on small laboratory animals like the botulinum toxin. It is not neutralized by any of the known Type A, B and C antitoxins. The bacterium should therefore be designated *Cl. botulinum* Type D (Theiler and Robinson[1]) and should be definitely separated from the ovolytic *Cl. parabotulinum* Type A and B.

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Susceptibility of Macacus Rhesus Monkeys to Botulinum Toxin Type B, C and D.

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Thus far no cases of botulism due to *Cl. botulinum* Type C have been reported and nothing definite concerning the susceptibility of man to this toxin is known. On the other hand since the great sus-

ceptibility of monkeys to *Cl. parabotulinum* Type A toxin is now established through the studies of Dack and Wood[1] it appeared not unlikely that comparative tests on these animals with non-ovolytic and non-sarcolytic strains might permit of certain deductions concerning the liability of man to botulism poisoning by the ingestion of Type C and D toxins.

Such tests became imperative since Bengtson[2] considers the monkey very susceptible to the toxin of *Cl. botulinum* Type C and the reports of Theiler and Robinson[3] contain no information concerning the effect of Type D toxin on apes. A series of monkeys was therefore injected or fed by stomach tube with varying doses of different toxins.

The tests confirm the early observations of van Ermengem[4] and Römer and Stein[5] that monkeys are very susceptible to *Cl. botulinum* Type B toxin (produced by a strain recently isolated from a ham in Germany) by feeding. In the animal poisoned by this type, toxin was demonstrated in the blood and throughout the entire intestinal tract but not in the brain. Although readily intoxicated by subcutaneous injections with Type C and D toxin the *Macacus rhesus* resist very large doses of the same poison *per os.* The first visible symptoms in the animals injected subcutaneously appeared only 60 to 90 minutes before death. Since the number of the experiments here presented is small, one may merely conclude that the susceptibility of man to Type D and in all probability to Type C toxins is low.

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[1] Dack and Wood, *J. Infect. Dis.*, 1928, xlii, 209.

[2] Bengtson, *Pub. Health Rep.*, 1922, xxxvii, 164.

[3] Theiler and Robinson, 11th and 12th Reports, Director of Vet. Educ. and Res., Union of S. Africa, Dept. of Agri., 1927, II, 1099; *S. African J. Science,* 1925, xxii, 141; *Z. f. Infektionskr. d. Haustiere,* 1927, xxxi, 190.

[4] Van Ermengem, *Z. f. Hyg. u. Infectionskrankh.*, 1897, xxvi, 1.

[5] Römer and Stein, *Arch. f. Ophth.*, 1904, lviii, 291.