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The Etiological Rôle of Bacteria in Bile Peritonitis. An Experimental Study in Dogs.*

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According to the prevalent view "bile peritonitis" is due to the toxicity of bile. Horrall[1] observed that when bile was allowed to drain continuously into the peritoneal cavity the dogs died within 24 hours. He attributed the cause of death to the toxicity of the bile salts. In order to gather additional data on the mechanism of "bile peritonitis" the following experiments were performed.

In a series of 20 dogs, peritonitis was produced by allowing bile to drain into the peritoneal cavity. Determinations of bilirubin by the Van den Bergh method and bile salts by the quantitative Pettenkofer reaction developed by Aldrich[2] were made on blood drawn from the femoral veins of these dogs, 4 and 18 hours after their operations. No increase of bilirubin or bile salts could be detected by these methods even though the animals were dying as the result of their peritonitis. At necropsy the peritoneum was acutely inflamed, the surfaces covered with a thin layer of fibrin and a few small areas of fat necrosis were observed around the pancreas. The peritoneal cavity contained a serosanguinous exudate in which were observed polymorphonuclear leukocytes and Gram positive bacilli. This organism was cultured from the peritoneal exudates of all of the 20 dogs studied. The source of this bacillus was the next problem to be solved. Was it entering the peritoneal cavity with the

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1 Horrall, O. H., *Arch. Int. Med.*, 1929, xliii, 114.

2 Aldrich, M., and Bledsoe, S. M., *J. Biol. Chem.*, 1928, lxxvii, 519.

bile or was bile altering the permeability of the viscera containing bacteria to permit them to invade the peritoneal cavity?

Cultures of bile removed from the gall bladder at the time of the operation were all sterile except one in which grew a short Gram negative bacillus. A 10% solution of bile salts, filtered through a Berkefeld filter, and shown to be sterile when introduced into the peritoneal cavity produced a peritonitis identical with "bile peritonitis" except that fat necrosis was more extensive. Of the 20 dogs in this experiment smears and cultures of the peritoneal exudate showed the same Gram positive bacillus in 19. In one no growth occurred.

Twenty cubic centimeters of an 18 hour broth culture of this bacillus when introduced into the peritoneal cavity produced a peritonitis identical with "bile peritonitis" except that areas of fat necrosis were absent. From the peritoneal exudate the same gram positive bacillus was cultured.

The bacillus, a strictly anaerobic organism, grows readily in broth and produces stormy fermentation within 18 hours in milk. The colony is large on an anaerobic blood agar plate, varies its color from yellow to brown and is surrounded by a wide zone of beta hemolysis. It stains well with methylene blue and positively by Gram's method. It varies considerably in length, is broad, square ended and has an occasional subterminal spore. In smears it appears singly, in pairs or in short chains. This organism is either *B. welchii* or some other bacillus closely related to it.

These observations show that bile peritonitis is an infection which is produced by *B. welchii* or some other anaerobic bacillus closely related to it.

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The Variation of Anesthetic Efficiency of Procaine Hydrochloride and Procaine Borate With pH.

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Experimental evidence obtained both in the laboratory[1] and in the clinic[2] shows that the borate of diethylamino ethyl p-amino-benzoate,

[1] Benedict, Dailey and Arnim, *Dental Cosmos*, 1929, lxxi, 866.

[2] Freeman, *Dental Cosmos*, 1929, lxxi, 949.