

ently disappears before a detectable change occurs in the liver. The fact that the antianemic principle in liver for pernicious anemia is present in other tissues, but in less concentration, is analogous to the distribution of vitamins, also that a definite latent period precedes the development of anemia when liver therapy is discontinued, is analogous to the latent period characteristic of vitamin deficiency.

On the basis of the observations of Castle,<sup>1</sup> which indicate that gastric digestion in normal man releases substances from meat that have an antianemic value in pernicious anemia, the most logical interpretation of our results is that the "active principle" of liver is not a fixed or integral part of liver protoplasm and may be stored and released physiologically by the liver *in vivo* to govern hematopoiesis.

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### A New Disease of Moose. II.

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(Introduced by F. W. Tanner.)

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Thomas and Cahn<sup>1</sup> described a new disease of moose (*Alces americana americana*) in northern Minnesota. The symptoms of the disease were described, with the associated blood picture. Transplanting ticks (*Dermacentor albipictis*) from an infected moose to guinea pigs and rabbits produced a disease showing identical symptoms, with the same associated blood picture as in the moose. Profound cellular changes in the blood elements and the presence of bacteria were mentioned. The organism was isolated. The cellular changes will be discussed in the final report; the present paper deals with the isolated organism.

The first recognized bacteria-like organism was found in smears of the intestinal contents of ticks engorged with the blood of diseased moose. With a modified Wright stain these organisms showed a capsulated coccoid bacterium. This intestinal content was cultured on dextrose agar, and the organism isolated. A saline suspension of this pure culture was inoculated intravenously into

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<sup>1</sup> Castle, *Am. J. Med. Sci.*, 1929, **178**, 748, 764.

<sup>1</sup> Thomas, L. J., and Cahn, A. R., *J. Parasit.*, 1932, **18**, 4.

guinea pigs and rabbits, and all of the experimental animals died within 28 hours, exhibiting symptoms similar to those shown by guinea pigs and rabbits infected through the medium of the tick itself. The organism has been repeatedly recovered from the liver, spleen, lungs, heart, kidney, brain, bone marrow and urinary bladder of inoculated and infected animals. This organism has also been inoculated into a bull, a chicken, a ram and a 4-day-old lamb. The chicken and the lamb died with symptoms exactly like those obtained in the guinea pigs and rabbits. In the case of the bull, 5 cc. of the culture was given intravenously. Within one hour after the injection very definite disturbances were noted, including a marked physical depression, listless drooping, labored respiration followed by lung hemorrhages, coughing and bloating. For 3 days the bull ran a high temperature, reaching 105.8°. Four days later the bull was normal to all outward appearances. However, blood smears taken 8 days after the inoculation, reveal a picture typical of the diseased moose and very similar to the blood picture of the infected guinea pigs and rabbits. Blood cultures made at this time yielded an abundant growth of the organism. The work on the ram and the bull is being continued.

The fact that some of the rabbits and guinea pigs died within an hour following the injection of the culture, together with the observations on the bull, lead the writers to suspect the action of a toxin. Consequently a 5-day-old broth culture was filtered and the sterile filtrate inoculated into a rabbit, a lamb and a chicken. The rabbit died within an hour, with symptoms identical with those shown in the rabbits receiving the culture injection. In the chicken the symptoms were identical with those shown by the chicken receiving the culture, for a period of about 2½ hours following the injection; then, however, the toxin chicken showed definite signs of recovery, and in 36 hours was apparently normal. The lamb acted in a manner comparable to that of the bull.

The culture was fed to guinea pigs, and on the 6th day after feeding, one animal showed a periodic paralysis of the hind legs.<sup>1</sup> Subcutaneous injections of the culture produced light symptoms similar to those produced in animals receiving intravenous injections. One pig received the injection along the mid-dorsal region of the back, directly over the spine, and showed more definite symptoms than the one which received the injection in the inguinal region. After 3 days the symptoms gradually diminished. The experiments involving subcutaneous injections and feeding are being enlarged and continued.

The organism has been repeatedly isolated from ticks taken from a diseased moose. It has also been isolated from guinea pigs which died after the tick *Dermacentor albipictis* from a diseased moose had engorged upon them. In every case in which death followed the injection of the culture, the organism has been reisolated. It grows very abundantly on all ordinary laboratory media. Its cultural reactions are now being studied. It may be stated that it is a vigorous fermentor, is capsulated, and that it apparently produces a toxin. The bacterium is a rod form with a tendency to assume a coccoid shape. The growth on agar is excessively mucoid; in broth it grows very well throughout the medium with a great deal of sedimentation. It produces Beta hemolysis on blood agar. Growth is exceedingly rapid, covering the entire surface of an agar slant within 5 hours. Indications are that it may be a member of the *Klebsiella* group.

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**Chemical Changes in Infected Dogs' Gall Bladder Bile.\***

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Previous experiments<sup>1</sup> have been reported showing that bile salts are absorbed faster than cholesterol from the infected dog's gall bladder. The importance of this lies in the fact that it is the bile salts that hold the cholesterol in solution and if the ratio falls below a certain critical level, cholesterol will be precipitated out of the bile. In former experiments the cystic ducts were closed so that no more bile could enter the gall bladder. In the experiments here reported the ducts were not ligated so that it was possible for bile continually to pour into the gall bladder and further concentration of cholesterol to occur, while the bile salts are progressively absorbed.

Streptococci and filtered emulsions of dog feces were used, the latter instead of pure cultures as they represent a better cross section of the intestinal flora. The injections were made by needle punc-

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<sup>1</sup> Andrews, E., Schoenheimer, R., and Hrdina, L., *PROC. SOC. EXP. BIOL. AND MED.*, 1931, **28**, 945.