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## 3728

## Pasteurella Avisepticum* Infection of Poultry.

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To extend our knowledge of epidemic diseases, we have undertaken a study of fowl cholera. Its microbic incitant, *Pasteurella aviseptica,* is similar to *B. lepisepticum,* the organism responsible for most of the snuffles and pneumonias of rabbits.[1] This latter disease being primarily an infection of the respiratory tract, suggested the possibility that *Pasteurella aviseptica* infects chickens by way of the air passages, leading to both the general manifestations commonly recognized as fowl cholera and the local involvements of the upper respiratory tract designated as "roup", "colds", etc. We have carried out experiments to test this theory, have made serial cultures of a nasal passage of White Leghorn fowls from 3 commercial flocks over a period of 6 months, and have carried out preliminary studies of the bacterial cultures obtained. This report summarizes the results.

A strain of *Pasteurella aviseptica,* obtained from Dr. Theobald Smith and designated Strain Pa, was administered intranasally to rabbits and mice. 0.01 cc. of an 18 hour rabbit's blood broth culture, dropped through the external nares over the nasal mucous membrane of rabbits, killed invariably within 24 hours. Septicaemia, petechial hemorrhages, and congestion of the lungs were found at autopsy.†

* This organism is known as *Bact. avisepticum, Bacillus avisepticus, Bacillus bipolaris septicus* and bacillus of fowl cholera.

† This characteristic response of rabbits to the fowl cholera organism has been pointed out by many investigators since the time of Pasteur.

Similar procedures usually killed mice; a few survived, however, and carried the virulent organism for more than 6 weeks.

In the natural host, a somewhat different response was anticipated. Groups of chicks, 4 to 5 weeks old, uniform in weight, with no previous exposure to the infection, raised from similar stock and under uniform conditions, were given one drop of culture by way of the nasal cleft. Some died of acute cholera, others survived as carriers; some developed specific blood agglutinins; others seemed entirely refractory. Adult fowls, treated similarly, showed still an additional type of reaction. While some died of typical cholera, some displayed local lesions of the upper respiratory tract, clinically indistinguishable from "roup," "colds," diphtheria, and canker, others became "healthy" carriers. An occasional bird appeared entirely refractory.

No reaction followed the administration of the culture to chickens by mouth. Organisms were introduced into the esophagus by syringe, and by gelatin capsules. The latter method, while insuring against pharyngeal contamination, did no injury to the culture. The occasional fatalities which did occur were traceable to faulty technique. Stool cultures were persistently negative.[1] The results of these tests indicated that chickens were refractory to *Pasteurella aviseptica* given by the gastro-intestinal portal of entry, but susceptible to infection when the organisms were placed on the mucous membranes of the nasal clefts. Under these conditions, the same variations in type of clinical infection were noted as occur in rabbits when infected artificially or spontaneously with *B. lepisepticum.*[2] Hence we examined a number of commercial poultry flocks to discover whether the cholera organisms were carried in the droppings of "healthy" birds or in the nasal passages, and whether they were present in the local lesions, "roup," "colds," etc., as well as in the blood and lungs of typical cases of acute cholera.

Four distinct flocks were examined, 3 owned by commercial poultry men, and one maintained by the New Jersey Agricultural Experiment Station. The technique was essentially similar to that used in the investigation of rabbit snuffles-pneumonia.[1] The results to date are as follows: *Pasteurella aviseptica* was not found in the stools of "healthy" birds; it was present, however, in the nasal clefts of a considerable number. The presence of these carriers was definitely related to the amount of cholera and roup in a flock of young birds and in a flock of non-exposed birds. In a group of hens which had survived an acute epidemic of cholera, the carrier rate was very high (60%) and cases of local infection, roup, etc., were frequent.

A flock showing no carrier birds was free from cholera for the entire period of observation, although other pens on the same farm were infected. Autopsies on cholera and roup-"cold" cases from these flocks yielded organisms bacteriologically similar to those recovered from the nasal clefts of the "healthy" carrier birds.

The various strains from carriers, roup cases, and cholera cases are being studied further. For the most part they are similar, react the same culturally and serologically, and appear identical to the Strain Pa. When administered artificially to chickens, they lead to the same types of reaction as those described above.

We conclude, therefore, that *Pasteurella aviseptica* infection, like that of *B. levisepticum,* is primarily a respiratory disease, with the local manifestations commonly known as roup, "colds," etc., and the general pneumonia-septicaemia phase recognized as fowl cholera. The endemic focus of infection is believed to be the "healthy" nasal carrier or roup—"cold"—case, and the organisms from these various types of clinical disease are considered to be essentially similar.

[1] Hertel (*Arb. a. d. Kais. Gesundheitsamt*, 1904, xx, H. 3) and Müller (*Monatschr. f. prakt. Tierheilk.*, Stuttgart, Enkes Verl., 1910, xxi, H. 9, No. 10) reported similar results.

[2] Webster, Leslie T., *J. Exp. Med.*, 1924-1927.

## 3729

## Bone Marrow as an Organ.

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Before the mechanism of bone marrow as an organ could be analyzed, certain factors had to be clarified, among which are the structure of its vascular system and the maturation of blood cells. Chart 1 shows maturation as a constantly changing process with more than one variable. There are two critical points, (1) where the specific granules begin, and (2) where the last division of the myelocyte has taken place, giving a reduction to a common size and state of maturity, the leucocyte. The myelocytes are classified according to the number of granules, type A, having the first small clump of granules; type B, showing increasing numbers, and type C, the cell with the maximum number.

Supravital differential counts of blood and bone marrow of 5