

correlation between the weight of the posterior lobe and age ($r = \pm 0.22 \pm 0.06$). Hence in the case of the whole gland, the correlation with age is small, negative, and only of probable significance ($r = -0.19 \pm 0.06$).

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Ruffed Grouse Are Susceptible to Tularemia.

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The diminution in number of wild rabbits and ruffed grouse has occurred simultaneously in Minnesota during the last 4 years. Human cases of tularemia have occurred in Minnesota during the same period. The occurrence of specific agglutinins in the blood of many of the wild rabbits still remaining has been indicated by studies which we are carrying out in Hubbard County. This finding points to tularemia as the cause of the disappearance of the rabbit. The susceptibility of the ruffed grouse to tularemia has been studied, as it was felt that there was some relationship between the disappearance of grouse and the disappearance of the rabbit. At the outset of the work it was found that Parker and Spencer¹ had considered the possibility of grouse susceptibility, and produced an infection in blue grouse. They demonstrated that the rabbit tick *Haemaphysalis leporis-palustris* is an important carrier of tularemia, and further pointed out that this parasite is found on both rabbits and game birds. There is, therefore, a possible natural carrier of the disease between rabbits and grouse.

The grouse used in our transmission experiments were ruffed grouse (*Bonasa umbellus*) and were trapped wild in Hubbard County. Before inoculation they were tested for agglutinins and their blood did not agglutinate *Bact. tularensis* antigen in dilutions of 1-10 or above.

The strain of *Bact. tularensis* used for inoculation was obtained from a human case of tularemia originating in Hubbard County from the bite of a deer-fly. The organism was grown in pure culture on rabbit blood-cystin agar. At the beginning of this work it was inoculated into a guinea pig, which died on the 3rd day with

¹ Parker, R. R., and Spencer, R. R., Sixth Biennial Report of the Montana State Board of Entomology, 1925-1926, 30.

liver and spleen studded with nodules. Material from this guinea pig was used to inoculate grouse No. 1.

Grouse No. 1. Inoculated subcutaneously and intramuscularly with spleen emulsion. The bird was dead on the morning of the 3rd day. There was slight infiltration of tissue at the site of inoculation. The peritoneal cavity contained about 3 cc. of slightly bloody fluid. All internal organs appeared normal macroscopically. Material was inoculated into 4 guinea pigs as follows:

No. 1. Peritoneal fluid. Dead on 2nd day without typical lesions. An exudate was present over abdominal wall which was inoculated into another guinea pig, which died with typical lesions of tularemia.

No. 2. Spleen. Died on 2nd day. Inguinal glands enlarged and exudate over abdominal wall similar to No. 1.

No. 3. Heart's blood. Dead on 3rd day. Enlarged nodes, spleen and liver typical of tularemia.

No. 4. Emulsion of breast muscle. Died on 3rd day. Enlarged nodes. Spleen and liver typical of tularemia.

Two control guinea pigs were inoculated at the same time and with the same material as grouse No. 1. Both died on the 3rd day with lesions typical of tularemia.

Grouse No. 2. Inoculated subcutaneously with spleen from guinea pig which had been inoculated with heart's blood from grouse No. 1. Grouse No. 2 died on the 9th day. No lesion formed over site of injection. Liver and spleen did not show any lesion grossly. All internal organs appeared normal macroscopically. Three guinea pigs were inoculated subcutaneously with material from grouse No. 2, as follows:

No. 1. Heart's blood. Died on 4th day. Inguinal glands, liver and spleen typical of tularemia.

No. 2. Spleen and kidney. Died on 4th day. Inguinal glands enlarged. Liver only slightly involved. Spleen typical.

No. 3. Liver. Died on 4th day. Inguinal and axillary glands enlarged. Spleen typical.

Grouse No. 3. Inoculated by abrasion through skin of back with dilute heart's blood of grouse No. 2. Grouse No. 3 died on the 6th day. No definite ulceration or gross expansion of the initial lesion was noticeable. Liver and spleen showed no nodules. All internal organs appeared normal macroscopically. Four guinea pigs were inoculated subcutaneously with material as follows:

No. 1. Heart's blood. Died on 5th day. Inguinal and axillary nodes enlarged, spleen and liver typical of tularemia.

No. 2. Spleen. Died on 4th day. Inguinal glands enlarged. Spleen typical.

No. 3. Liver. Died on 5th day. Inguinal glands enlarged and spleen typical.

No. 4. Lung. Died on 5th day. Right inguinal and right axillary glands involved. Spleen typical of tularemia.

It would appear that the ruffed grouse succumbs to an experimental infection with *Bact. tularensis* with the same regularity as the guinea pig and the rabbits. There appears to be little tendency for the formation of a local lesion. Although guinea pigs and rabbits usually develop macroscopic lesions by the 4th day, no lesions were visible in the grouse which died even as late as the 6th and 9th day. That the organism produces a true septicemia is indicated by its wide distribution in the body and its isolation from normal appearing tissues, such as lung. It would appear that the occurrence of tularemia in grouse as a natural disease is a probability. They are highly susceptible to the disease and subject to infestation by a natural insect carrier, common, according to Parker and Spencer, to grouse and rabbits. If the disease does occur as a natural infection in grouse, its presence might easily be overlooked at necropsy by the absence of gross lesions of the disease. It appears that no well defined human cases of tularemia have been reported as the result of cleaning grouse. This would not appear to invalidate the possibility of the natural infection of grouse, as few such birds are killed and cleaned compared with the number of rabbits. The indications justify a diligent search for tularemia in grouse dying from disease. *Bacterium tularensis*, already of great importance because of its ability to produce infections in numerous species of mammals, becomes even more remarkable by its ability to produce at least experimental infection in birds.

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Significance of Reticulocyte as Index of Regeneration in Different Types of Experimental Anemias.

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A new emphasis has recently been placed on the reticulocyte count of the circulating blood through its introduction by Minot and Murphy as a convenient check of the effects of a liver diet in Pernicious