

ENDOPARASITISM IN RUFFED GROUSE NEAR
HANOVER, NEW HAMPSHIRE

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FROM previous investigations the Ruffed Grouse (*Bonasa umbellus*) is known to harbor a variety of parasites, several of which are definitely pathogenic. Living in a region where enthusiasm for bird hunting, especially grouse hunting, runs high, the sportsmen as a group are extremely interested in the welfare of the grouse, and have awaited with considerable apprehension the predicted arrival of a cyclic disease. Thus, when the authors became interested in comparing the incidence of parasitism in local grouse with the incidences reported by other workers in the East, the sportsmen cooperated with us by contributing the entrails of their freshly killed birds.

During the hunting seasons of 1935 and 1936, seventy grouse, all shot within fifteen miles of Hanover, New Hampshire, were examined for parasites of the alimentary tract, but no birds sick or dead from disease were obtained. In other investigations of grouse problems, the birds have been obtained from large areas, usually including several States, and many of the specimens sent in were sick or dead from disease.

Of the seventy birds examined, it was possible to obtain blood smears from but six which were shot by the writers. No blood parasites were found in any of these birds. While Clarke (1936), who examined 162 Ruffed Grouse from Ontario, recorded seventeen species of animal parasites, he states that "the only organism found to be significantly associated with the cyclic diminution and compatible with its characteristics was a blood protozoan, *Leucocytozoon bonasae*." As far as determining the presence or absence of *Leucocytozoon* in this vicinity is concerned, our few blood smears are, of course, practically worthless. Not only were the smears few in number, but from the nature of the infection there was slight chance of finding the parasite at the time of year that our examinations were made. It is a disease of young birds, striking usually during the months of July and August. Infected birds soon perish, or become carriers of a latent infection. In such carriers it appears, according to Clarke (1936), that the gametocytes found in the peripheral blood gradually decrease in numbers with the approach of winter, and disappear during the cold months, only to reappear in the spring. Thus by the time our examinations were made, November, infected birds would either have perished or become carriers, so that in the latter condition detection of the parasite from a single smear becomes extremely unlikely.

Microscopic examination of the contents of the alimentary tract of

fifty-eight birds revealed fifteen infections of the caeca with the flagellate, *Trichomonas bonasae*, an incidence of 26%. This organism has no known pathogenic effect on its host.

A gross examination of the alimentary canal produced only the nematode, *Ascaridia lineata*. This parasite occurred in twenty-two of the seventy birds examined, an incidence of 31%. The number of worms found in the parasitized birds varied from one to seventeen, with an average of three worms per bird. Only one bird carried more than six worms, and fourteen of the infested birds had less than three worms each.

In most of the infested birds *Ascaridia* was found only in the small intestine, but in four cases worms were found in the body cavity. We could find no evidence that the worms had made their way into the body cavity through the shot holes. In one instance a mature female worm was found at the table, having survived cooking in a rather perfect state of preservation. It lay along the bone of the leg, between the muscles. Gross (1930) suggests that the larvae of *Ascaridia lineata* on hatching from the ovum and penetrating the mucosa of the intestine may enter the blood vessels and be carried by the blood stream to other parts of the body, there developing and thus accounting for the presence of these worms, in a few cases, outside of the intestinal tract. It appears to us, however, that adult *Ascaridia lineata*, just as *Ascaris lumbricoides* of man, may occasionally penetrate the unbroken intestinal wall and migrate into the body cavity, and, as in the case of the single worm in the leg, stray to other parts of the body as well.

Gross and Allen (1926) reported an infestation with *Ascaridia lineata* in 29% of the grouse examined. Clarke (1936) reported *Ascaridia* infestations in 20.9% of the grouse examined by him. Though our records show an incidence of 31%, the parasite load per bird was small, an important consideration in such infestations where the degree of damage done is to a considerable extent proportional to the number of worms carried. Since over thirty different parasites and diseases have been reported from the Ruffed Grouse, it would seem that with the exception of *Ascaridia lineata*, the birds in and about Hanover are remarkably free from animal parasites.

Our records show that there was no appreciable difference in the number of parasites found in 1936 as compared with 1935, yet it has been reported by observers in Hanover, as was noted elsewhere throughout the East, that the numbers of grouse had decidedly decreased during the year 1936. Our investigation shows no evidence of animal parasites that might be responsible for this sudden diminution. In spite of our negative evidence, we are not, however, dismissing the possibility of animal parasites as a cause of fluctuations in numbers of grouse. The importance of the blood parasite, *Leucocytozoon bonasae*, in grouse populations should not be overlooked.

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SUMMARY

Seventy Ruffed Grouse, shot by sportsmen in the vicinity of Hanover, New Hampshire, during the hunting seasons of 1935 and 1936 were examined for internal parasites. Twenty-six per cent of the fifty-eight birds examined for intestinal protozoans were infested with *Trichomonas bonasae*. Thirty-one per cent of the seventy birds examined for worms were infested with *Ascaridia lineata*. No other parasites were noted.

Observers reported a marked decrease in the numbers of grouse in this vicinity during the season of 1936 as compared with that of 1935, but the diminution cannot be attributed to parasitism, *Leucocytozoon* excepted.

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