

A SURVEY OF THE VISCERAL PARASITES OF
THE RUFFED GROUSE OF NORTH IDAHO

A Thesis

Presented in partial fulfillment of the requirements for the

Degree of Master of Science in the

Department of Biological Sciences

of the

University of Idaho Graduate School

by

John L. Crites

1951

A SURVEY OF THE VISCERAL PARASITES OF
THE RUFFED GROUSE OF NORTH IDAHO

BY

JOHN L. CRITES

INTRODUCTION

Grouse as most birds and other animals are infested by animal parasites. From the population studies of the birds it has been demonstrated that the population will increase over a period of years, reach a peak, then decrease. Many causes have been brought forth for these cycles. Over the past one hundred years several extensive surveys, including parasitological studies, have been made into many of the possible causes of these fluctuations. As yet, no one has been able to supply the correct answer.

Northern Idaho has a rich population of the Ruffed Grouse (Bonasa umbellus), and a well regulated hunting season is maintained each year. The present survey of the visceral parasites was conducted at the request of and in cooperation with the University of Idaho Wild Life Research Unit. This Unit has in progress an extensive study of the population cycles of the Ruffed Grouse of Idaho.

The present parasitological study includes only the ruffed grouse (Bonasa umbellus Linnaeus) as it is the most common in the northwest and fluctuates to a greater extent than other game birds. The work was undertaken when the grouse population of north Idaho was decreasing from the

maximum. The results put forward were based upon the examination of forty ruffed grouse.

PURPOSE

Each year a number of outdoorsmen discover, for the first time, that their favorite game bird is infested by various parasites. Are they important, how do they affect hunting? Every hunter would like to know because, to him, it is of vital concern.

The research worker is interested in the distribution, relative pathology and identification of parasites. The parasites of grouse have been studied in the east and middle west but there is no record for those of the birds in Idaho and the far west. The purpose of this investigation is to determine what parasites are present, what their relative pathology is and to further information as to their distribution.

LITERATURE SURVEY

Cobbold in 1873 described a new species of nematode, Trichostrongylus pergracilis, and attempted to show that the nematode was responsible for epidemics among the English red grouse (Logopus logopus scoticus). An English investigation in 1911 showed clearly that epizootics in the red grouse were caused by this parasite in that country. Publication of important findings of this committee, stimulated workers to investigate the parasites and diseases of game

E. E. Wehr ('40) found that the large intestinal roundworm in the ruffed grouse was a separate species from Ascaridia lineata which had previously been reported. He called the worm Ascaridia bonasae and gave an accurate description. Since previous workers may have encountered this worm and believed it to be Ascaridia lineata the distribution now needs to be checked carefully.

METHOD AND MATERIALS

Method of collecting birds

The grouse were collected over a period of two years, 1949 and 1950. During the summer months June, July and August, specimens could not be obtained for examination. Hunting throughout these months is more difficult, due to increased vegetation, and the State Fish and Game Commission refuses to permit the taking of birds during the breeding season or while they remain together in coveys. The majority of the birds were taken during the open seasons in October of 1949 and in September of 1950. Therefore no check could be made on seasonal variations.

In all cases, the birds were killed and the viscera removed by trained collectors. Mr. K. E. Hungerford of the University of Idaho Wild Life Research Unit was responsible for the bulk of the material. During the open seasons, students of the Zoology Department and members of the Zoology faculty aided in the collection. Several of the birds were taken by State Conservation Officers and

two were road kills. Eighteen birds, the greatest number from any one area, came from the University of Idaho experimental forest two miles north of Troy, Idaho. Birds were collected in the following north Idaho counties: Latah, Bonner, Benewah, Shoshone, Idaho, Clearwater and Lewis counties. Very few if any ruffed grouse are found in Nezperce county, thus none were included in this study.

Method of examination

The internal organs were removed as soon as possible from the bird and the body cavity examined. When immediate examination was impossible, the viscera were placed in freezing containers and refrigerated until the earliest possible examination date.

The examination was carried out in the following manner. The viscera were stripped, separated and organs detached. This material was placed in decanting dishes containing a nine tenth percent salt solution. The organs were then dissected, placed in petri dishes and examined in detail under a wide field microscope. All dishes were checked for parasites that might have floated free into the salt solution.

Record

A complete record was filed on each bird. The record sheet contains the number given the bird; the date it was collected; the name of the collector; the place it was collected; the age of the bird; the sex; the mode of kill and the date of the laboratory examination. The organs of the bird were listed systematically on the sheet and in a

Department study gives the occurrence of Heterakis bonasae as 1.8 percent in adult birds.

In Minnesota, the gizzard worm was present in 23.11 percent of the ruffed grouse and Levine and Goble ('47) report a 7.8 percent infestation. Boughton gives a maximum of 30 and an average of 3.8 worms. In New York the average was 6, the maximum 45.

Cestode incidence in Minnesota was 4.11 percent, in New York the incidence in adult birds 7 percent. In north Idaho only 2.5 percent infestation occurs.

DISCUSSION AND CONCLUSIONS

The present parasitological survey produced no evidence that there is any correlation between the visceral parasites and the cyclic phenomenon observed in the ruffed grouse. None of the parasites found appeared to produce pathological conditions which seriously affected the health of the birds over their entire range in the northern part of the state.

However some of the parasites may be potentially dangerous. Cram ('30) reported that Cheilospirura spinosa is capable of causing death in ruffed grouse. During this study it was observed that in several of the birds infested with C. spinosa the gizzard lining was materially weakened. In one case where 38 parasites were present, definite lesions and necrosis were evident. The infestation of birds in north Idaho was 35 percent. This is higher than reported

in other parts of the United States and appears to be the parasite of most serious consequence in this area.

Ascaridia bonasae has not been found to produce pathological effects in grouse. Birds containing a maximum of 18 specimens appeared to be in good condition. The harmful effect of Ascaridia lineata infection in young chickens has been described by Ackert and Herrick ('28). They found that definite symptoms of parasitism and death resulted from heavy infections. The greatest injury to the birds took place during the 10th to the 17th day of the infection when extensive tissue invasion and destruction were occurring. Ascaridia bonasae was present in 45 percent of grouse examined, the average number being 6. The incidence of this parasite is also higher than that given for intestinal worms by other workers. Because of its size this roundworm is the one most often seen and rated as important by hunters. In so far as this study is concerned, no evidence was ascertained which would indicate that infection with A. bonasae is a factor in reducing the grouse population of north Idaho. Everett E. Wehr ('41) described Ascaridia bonasae and stated that it was a different species from the intestinal roundworm common in poultry. The distribution of this parasite now needs to be checked as several other writers may have confused the chicken helminth Ascaridia lineata with A. bonasae. Wehr has checked the east and middle west. This investigation shows that the intestinal roundworm of grouse in this state is A. bonasae and this also may be true for other far western states.

The small caecal worm, Heterakis bonasae, was found to be the parasite most widely distributed in the ruffed grouse in north Idaho. This roundworm was found in 95 percent of the birds examined. One bird harbored 587 of these worms and the average number per grouse was 55.5. The percentage of parasites found, however, does not necessarily indicate the importance of the infestation. In spite of the large numbers of caecal worms present, no evidence of injury was uncovered. It is interesting to note that in chickens and turkeys the caecal worm egg is capable of transmitting blackhead (entero-hepatitis); but no case of this disease was encountered in wild grouse during this investigation.

The high incidence of this parasite may be accounted for by meteorological-topographical conditions. Idaho has an abundance of well-shaded forest soils ideal for the longevity of the eggs and the grouse of this area feed generously on earthworms during the summer months which might act as vectors. The experiments of James and Riley have shown that the eggs might well withstand the low temperatures of the winter months. Because of the high incidence of the parasite in this area a further investigation would seem worth-while.

Only one species of cestode was found and this was identified as Choanotaenia infundibulum. Tapeworms frequently deteriorate in material which is refrigerated and it may be that some were missed during this survey for that reason. However in several cases the birds were examined immediately and only the one cestode was found. Tapeworms

if they were present in large numbers might cause a serious pathological condition. Because of probable low incidence of tapeworms in this vicinity they cannot be considered as parasites of importance to ruffed grouse in north Idaho.

During the course of investigations carried on in other parts of the country, a number of parasites have been recorded which have not been encountered in Idaho.

Important among these is the stomach or proventricular worm, Dispharynx spiralis. This parasite has been found extremely pathogenic for the ruffed grouse, causing extensive damage to the glandular tissue and muscular layers of the proventriculus. The sow bugs, Porcellio scaber and Armadillidium vulgare, act as intermediate hosts for this worm. These two species of land crustaceans are not found in north Idaho.

Leucocytozoan bonasae is a parasite sometimes found in the red blood cells of grouse. This protozoan was first discovered in Ontario and since has been noted in Michigan and Maine. It is presumably transmitted by the bite of the black-fly (Simulium venustum). Clarke ('34) in studying Canadian grouse considered it "significantly associated with the cyclic diminution" in numbers. O'Roke ('34), who has made a study of the malaria-like disease of ducks caused by Leucocytozoan anatis, also considered it to be a parasite of grouse. Slides prepared from grouse of Latah county revealed no evidence of these parasites.

Several species of trematodes have been found throughout the range of grouse in the United States and Canada.

Harmostomum pellucidum has been encountered in ruffed grouse in Minnesota, New York, New Hampshire, and possibly Ontario. Other flukes which have been reported may be listed as follows: Leucochloridium pricei from New Hampshire; Claphrostomum from Laborador; Echinoparyphium aconiatum from Minnesota; Lyperosomum monenteron in Minnesota; Agamodistomum sp. and Prosthogonimus macrorehis in New Hampshire.

Trematodes require a molluscan intermediate host. Some of the above are probably obtained in eating land snails. Food habit studies of the birds in north Idaho over an eight year period reveal only one case where a land snail was found in the crop. A study by the Idaho Wild Life Research Unit revealed the ruffed grouse in this area almost never drink from streams. They obtain their water from dew and in their food. Thus the ruffed grouse in this area have little if any chance of contacting cercaria in water.

In north Idaho it is seldom that one bird harbors over three different species of parasitic forms. It is also important to remember how few of the organisms mentioned during the preceding sections have been demonstrated to have disease-producing proclivities. The fear that the ruffed grouse of this area may be seriously affected by internal inhabitants has not been substantiated. This study was necessarily limited in scope by time and resources. Considering the size of the area covered, the number of birds examined was small. To justify definite conclusions it would be necessary to perform autopsies on many hundreds of birds over a period of years. More investigation is

found in any one bird and no deleterious effects could be attributed to their presence. This roundworm is Ascaridia bonasae described by Wehr ('40) and not the chicken ascarid, Ascaridia lineata, reported by some previous investigations.

The most harmful parasite encountered in this investigation is Cheilosporira spinosa. It may cause lesions and necrosis of the gizzard lining. The gizzard worm was present in 35 percent of the birds examined.

The harmful proventricular worm, Dispharynx spiralis, was not encountered at any time during the survey. Likewise no trematodes were found. In both cases, the intermediate hosts of these parasites, sow bugs and snails, were not found available to the birds.

No evidence has been uncovered pointing to a strong causative relationship between animal parasites and periodic fluctuations in abundance of ruffed grouse.

indicated, particularly during the summer months and among young birds. The purpose of the immediate study has been accomplished, however. The parasites inhabiting the ruffed grouse of north Idaho have been revealed and identified, their relative pathology has been studied and these helminths may now be added to information concerning the distribution of the parasites of the ruffed grouse over its entire range.

SUMMARY

Since 1920, several studies have been made of the parasites of the ruffed grouse in the eastern and middle western states. The purpose of this investigation was to determine what parasites are present in the ruffed grouse of north Idaho, what their relative pathology is and to further information as to their distribution.

Four parasites were found to infest the birds in this area, the nematodes Heterakis bonasae, Ascaridia bonasae, Cheilospirura spinosa, and the cestode Choanotaenia infundibulum.

The parasite found to inhabit the greatest number of birds was Heterakis bonasae, the small caecal worm. This small roundworm was present in large numbers. The incidence 95 percent is greater than any previously recorded for grouse.

The helminth most commonly observed by outdoorsmen, the large intestinal roundworm, was found in almost half of the birds examined. No great numbers, however, were



Location of Complete Research:

Author & Title: **Crites, John L.**

A Survey of the Visceral Parasites of the Ruffed Grouse of North Idaho

University of Idaho Library:

Call Number- **QL392.C75**

College of Natural Resources:

Department- **Biological Sciences**

Other Sources: