

PARASITIC WORMS FOUND IN SOUTH DAKOTA.

By L. G. Atherton.

At the suggestion of Dr. Henry B. Ward, of the University of Illinois, the writer began a survey of several counties in the southeasterly part of the state to learn the prevalence of parasitic worms in animals, both wild and domestic. A careful search of the literature of parasitology showed that very little work had been done in this line in South Dakota. A circular letter sent to the teachers of zoology in colleges and high schools brought out the general statement that such teachers had often encountered parasites in dissections, but that they had no knowledge as to the identification, and had not taken trouble to preserve the specimens. The method used was as follows: Animals of any available species were examined by dissection. The intestine and stomach as well as the abdominal cavity were always carefully examined. In some of the animals dissected, other organs were infected. A card index has been kept with a record of each animal examined. To date the record shows 367 animals that have been examined. Of these 94 were dogs, 31 cats, 5 wild ducks, 12 domestic chickens, 18 hogs, 3 horses, 21 sheep, 40 frogs, 3 English sparrows, 31 mice, 12 rats, 37 rabbits, 14 muskrats, 8 pigeons, 38 fish (Perch). Type specimens have been retained of the different species as they have been identified. Specimens have been sent for identification to the Bureau of Animal Industry, Washington, D. C., and the Department of Zoology of the University of Nebraska. A considerable amount of the material secured has not yet been identified on account of lack of time and literature. A large number of the species have been studied microscopically both in toto and section mounts. The study so far has been limited almost entirely to the identification of the various species of Cestoda. A few Nematoda have been studied and identified. No effort has as yet been made except in a very superficial way to study Trematoda that have been found. The investigation by the writer indicates that parasitic worms of many types are exceedingly common in South Da-

kota. Very few animals have been examined that showed no parasitic infestation.

Parasites of Dogs.

This animal is probably the most universally infested of all the animals studied. Eighty-five per cent of the animals examined have shown some type of parasite. Dogs that have been allowed to "shift for themselves" are usually liberally supplied. One dog examined in our laboratory had in his intestine upwards of six hundred mature *Taenia Serialis*. Other dogs have shown almost as heavy an infestation. Only dogs that are kept in close confinement in homes or otherwise, are free from parasites. The writer examined one dog 13 years of age that had been so kept that showed no parasites of any kind. Among the cestode parasites of dogs studied, the most common was the *Taenia Serialis*. This worm averages about 18 inches in length, and about one-fourth inch in extreme width. It is an armed tape worm having two rows of hooks on the scolex. The intermediate host of this parasite is the rabbit. The intermediate stage is a form of a bladder like cyst found in the muscle tissue of the host. Rabbits are very generally infested with this intermediate stage. Some of the cysts are as large as 10 c. m. in diameter. Both the cottontail and the jack rabbit have been found to be infested. Besides this species the *Taenia Serrata* is often met with. The numbers of the last mentioned species are not as great, however, as those of the *Taenia Serrata*. The intermediate host of this parasite is also the rabbit. The small cysts are found in the liver. The examination of rabbits showed this to be rather uncommon parasitic conditions of the rabbit liver. In addition to these two species a small number of specimens of the *Dipylidium caninum*. This is an uncommon parasite of South Dakota dogs, according to our investigations. The intermediate host of this parasite is the dog flea. This parasite is of importance because human beings may become infested by accidentally swallowing the dog flea in the handling of these animals. Some interesting variations have been found in the study of the cestodes mentioned above. Their description will be made the subject of a spe-

cial research. One of the common parasites of the dog in South Dakota is the *Taenia Coenurus*. The intermediate stage is found in the brain of the sheep. The affection of the sheep is called the "Gid" disease. It causes the sheep to have symptoms called "staggers." The animal walks in a circle which becomes continually smaller until it drops over dead. The disease is quite prevalent on the sheep ranches in the western part of the state. It causes considerable loss every year. There is no practical remedy if the sheep once contracts the disease. The sheep, of course, get the infection from the dog, and the dogs in turn are infected by eating the heads of sheep that have died of the disease. Nearly all of the dogs examined showed the presence of the nematode-*Ascaris canis*. These worms are from three to four and one-half inches in length and about one-eighth inch in diameter. They are very common parasites of the stomach and intestine of both dogs and cats.

The Parasites of the Cat.

These animals are not as generally troubled with parasites as the dogs. Only about one-half of the animals examined revealed tape worms, but a considerably larger number showed thread worms or trematodes. The cestode most commonly met with is the *Taenia crassicolis*. This is a large headed tape worm, about 18 inches in length. In no case have we found more than four specimens of this species in one host. The intermediate host of this parasite is the mouse. The cyst is found in the liver. Our examination of mice did not show this to be a common condition of the mouse's liver. No other species of tape worm has been found by us in the digestive organs of the cat. A very large number of cats examined have contained the nematode parasite *Ascaris canis*.

The Parasites of the Rabbit.

This animal is very subject to parasitic infestation. A very large number of our studies showed the presence of cestodes. The one most commonly met with is *Cittotaenia variabilis*. This parasite has a very small head, is about one-half inch broad, and often as long as twenty-four inches.

The proglottids are very short. It is a very common parasite of the cotton tail as well as the jack rabbit. A few of the rabbits studied were infested with the *Citto taenia pectinata*. This is very similar to the one just mentioned above except it is seldom longer than nine inches. The intermediate host of both of these species are unknown. In our laboratories and field work, we have given considerable attention to this matter, but as yet have found no clue as to what the intermediate host might be. The infestation of the rabbit as an intermediate host for the tape worms of dogs has already been mentioned.

Parasites of Rats and Mice.

In our studies we have examined a large number of these animals. Nearly all of them are infested with some type of parasite. The most common is the *Hymenolepis diminuta*. This is a very slender cestode, usually about ten inches in length, and three-eighths of an inch at its greatest breadth. We have found the intermediate stage of the *Taenia crassicolis* very often in the livers of mice. The number of parasites found in rats and mice has never been very large in any one specimen.

Parasites of Birds.

In this group of animals the studies have not been as carefully made as in some of the others. We have examined domestic fowls, wild ducks, "blue winged teal" and "mallard," English sparrows and quail. In the case of every animal examined we have found a very large number of parasites, practically all of which were cestodes. One six months old chicken was found to have its intestines almost covered in spots with small tape worms. The writer removed eight hundred from this one intestine. There were doubtless as many more, but time did not permit further collecting. Many of the parasites were very small, less than one-half inch in length. A number of them were studied as to species and were found to be *Daivinea* sp.

No doubt there are several species common in the domestic fowl in this region. Lack of time, so far, has prevented further study. From one mallard duck over three

hundred small cestodes were secured. None of them have been identified. There is no doubt in the mind of the writer that the wild birds generally in this section are seriously troubled with intestinal parasites.

Parasites of Sheep.

Our studies of these animals have been made in the local slaughter houses, and occasionally on farms from which complaints have come of losses in farm flocks. About fifty per cent of the animals examined have contained both cestode and nematode parasites. The most common cestode found is the *Monezia expansa*. The average length of our specimens is about five feet. This seems to be a very common parasite of sheep in the central and western part of the state. It causes considerable loss in the flocks. Two other species of cestodes have been secured from sheep, but as yet they have not been positively identified. Numerous nematodes have been found in the intestines of sheep. No identifications have been made. The infestation of the brain of sheep by the "Gid" parasite has already been mentioned.

Parasites of Hogs.

On account of the prevalence of hog cholera the writer has been asked to make a number of examinations of hogs. Practically every animal examined contained nematode parasites. No cestodes were encountered. The nematodes were practically all of one variety. The *Ascaris suum* is the name commonly given to it. Oftentimes the intestine of the pig is literally packed with specimens of this parasite. I have found as many as eight hundred in one hog. According to the best literature this parasite does not require any intermediate host. Animals are infested by eating the eggs from their own bodies, or from those of other hogs. There is no question about the point that has often been made that this parasitic condition lowers the vitality of hogs, and hastens the attack of cholera. Farmers should keep their hogs in as clean quarters as possible to prevent the auto-infestation that undoubtedly exists in this case. We have found occasional specimens of the "thorny headed" worms called the *Echinorhynchus gigas*. This is not as prevalent

as the one mentioned above. It is probably more detrimental to the host than the first mentioned specimen, on account of its thorny head which greatly irritates the intestinal wall.

Parasites of Fish.

The writer has studied many fish from Lake Madison. In the specimens (Perch and Horned Pout) very little infestation with parasites was found. The species obtained have not been identified. At present a survey of the fauna of the lake is being made and a fuller report will be made at a later date. The parasites secured from the other animals examined have been studied so little that no accounts are warranted at this date. The writer will be glad to receive specimens from workers in any part of the state.

Literature used in the preparation of this paper:

Ward—Reports of Nebraska State Board of Agriculture.

Braun—"Animal Parasites of Man."

Neumann—"Parasitic Diseases of Animals:"

Papers by Ward, Barker, Stites, Ransom, Hall and others.