Helmint Parasites of Pronghorn Antelope
(\textit{Antilocapra americana}) In New Mexico with New Host Records*

ROY E. GILMORE** and REX W. ALLEN

Pronghorn antelope are numerous on the ranges of the Southwest, but little is known of their parasites in this area. In fact, records and reports of the occurrence of helminths in pronghorns from states other than the Dakotas and Wyoming are few.

The literature on helminths of this host was reviewed rather recently by Goldsby and Evelth (1954), who recovered 15 species of helminths, representing nine genera, from 95 antelope from North Dakota. However, they failed to mention the finding of \textit{Thysanosoma actinioides} in New Mexican antelope by Allen and Kyles (1953). Later, Landram and Honess (1955) recorded the lungworm, \textit{Protostrongylus macrotis}, from antelope in Wyoming, Honess and Winter (1956) listed several additional species of antelope parasites from the same state, and Schad (1958) reported the spinose ear tick, \textit{Ototholodon (Otohion) megminii}, from New Mexican pronghorn antelope.

The purpose of this paper is to record additional parasites recovered from this host in New Mexico.

\textbf{Materials and Methods}

A post-mortem examination was made of 18 antelope killed on four ranches in New Mexico. Most of the animals were killed during the regular hunting seasons in October of 1949 and October of 1953. Two were killed in June of 1954. The ranches on which they were killed were used for sheep or cattle or both.

All of the antelope were examined for internal parasites and nine were examined for external parasites. Examinations were made of 11 sets of lungs and 12 livers with their superficial bile ducts. No examinations were made of the esophagus, rumen, reticulum, and omasum. The remainder of the digestive tract of all animals was searched for helminths. In the earliest examinations, microscopic search was made of the contents of the duodenum and macroscopic search was made of those contents of the abomasum, large intestine, and the rest of the small intestine, which were retained on 20 and 40 mesh screens used in combination. This procedure was later modified by taking fractional samples, varying from 1/10 to 1/20 of the total, of the contents of each organ for small worms and screening the remainder of the material through 10 and 20 mesh screens in combination for recovery of the larger species. The latter method was less time consuming, and probably gave more accurate results for the small species. The number of worms recovered (table 1) are therefore based on direct counts in some instances and on estimates from dilution counts in others.

\textbf{Results}

No external parasites were found. Lungs and livers examined were worm-free except for one larval nematode which could not be identified. All other

*From the Animal Disease and Parasite Research Division, Agricultural Research Service, U. S. Department of Agriculture, University Park, New Mexico.

**Present address: 1100 Palmer Road, Las Cruces, New Mexico.
worms encountered were in the abomasum and intestines.

The names of these helminths, the numbers and percentages of the animals that harbored each kind, and the estimated numbers recovered, are listed in table 1. Two cestodes, *Thysanosoma actinioides* and *Moniezia expansa*, and ten species of nematodes, representing seven genera, were recovered. In certain cases, positive specific or even generic identification of female nematodes presents difficulties. Therefore, we tabulated females of *Cooperia* and *Trichostrongylus* separately from males and as specifically unidentified. The combined numbers of *Pseudostertagia-Ostertagia* females are tabulated similarly.

*Nematodirella longispiculata* was the most prevalent nematode and *Pseudostertagia bullosa* also occurred in considerable numbers. The species found in lesser numbers were *Cooperia punctata*, *C. oncophora*, *C. pectinata*, *Haemonchus placei* (tentative identification), *Trichostrongylus axei*, *T. colubriformis*, *Ostertagia ostertagi* and a species of *Nematodirus* which we have also identified tentatively as *N. lanceolatus* Ault, 1944.

Associated with adult *Nematodirella longispiculata* were large numbers of larvae which were loosely coiled in the preserved state. We have identified them tentatively as late third- and early fourth-stage larvae of this species. However, since parasitic larvae of *Nematodirella* cannot be distinguished with certainty from those of *Nematodirus*, we have assigned these specimens to *Nematodirella-Nematodirus*.

**DISCUSSION**

Roberts, Turner and McKevett (1954) found evidence that the “bovine strain” of *Haemonchus contortus* is a separate species from the “ovine strain” and proposed the name *Haemonchus placei* (Place, 1893) Ransom, 1911 for the cattle *Haemonchus*. These authors differentiated *H. contortus* from *H. placei* by several characters, including differences in the measurements of the spicules. A study of the spicules of a majority of the males found by us showed their measurements to be in the range specified for *H. placei*. However, since we have not studied the specimens of either sex with respect to any of the other characteristics, it is felt that our identification of them as *H. placei* should be considered tentative.

We have listed *Nematodirella longispiculata* as such in table 1 and elsewhere in this report; however, lengths of the spicules of 45 of the specimens taken at random showed general agreement with the range given by Dikmans (1935) for *N. longispiculata antilocaprae*, a subspecies he proposed for forms from the pronghorn antelope.

We encountered four male specimens of *Nematodirus* whose structure differs from that of the common species of this genus. They resemble the males of *N. oiratianus* Raevskai, 1929, a species known only in European and Asiatic Russia and also are very similar to *N. lanceolatus* Ault, 1944, a species known only in South America. The lengths of the spicules of our specimens from antelope more nearly approximate the range given by Ault (1944) for *N. lanceolatus* than that given by Raevskai (1931) for *N. oiratianus*. We are therefore listing our specimens tentatively as the first mentioned species.

Several female *Cooperia* with a linguiform vulvar process characteristic of *C. bisonis* Cram, 1925, were recovered. However, in view of the following comments supplied by Dr. E. W. Price, we are listing these as *C. oncophora*:

"Mr. Lucke has studied collections of *C. oncophora* from cattle and of *C. bisonis* from the bison. The results, which cannot be related here in full, suggest that Ransom and Cram dealt with a single variable species. Hence,
Table 1. Helminth parasites recovered from 18 pronghorn antelope in New Mexico

<table>
<thead>
<tr>
<th>Parasites</th>
<th>No. of Animals infected</th>
<th>Incidence</th>
<th>Worms Recovered:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nematodirella longispiculata</strong> <em>(M and F)</em></td>
<td>15</td>
<td>83.3</td>
<td>3-4,740</td>
</tr>
<tr>
<td><strong>Nematodirella-Nematodirus</strong>&lt;sup&gt;*&lt;/sup&gt;</td>
<td>16</td>
<td>88.9</td>
<td>2-4,230</td>
</tr>
<tr>
<td><strong>Pseudostertagia-Ostertagia</strong> <em>(F)</em></td>
<td>14</td>
<td>77.8</td>
<td>2-3,200</td>
</tr>
<tr>
<td><strong>Pseudostertagia bulbosa</strong> <em>(M)</em></td>
<td>14</td>
<td>77.8</td>
<td>1-600</td>
</tr>
<tr>
<td><strong>Haemonchus placei</strong> *(M and F)<strong>&lt;sup&gt;</strong>&lt;/sup&gt;</td>
<td>14</td>
<td>77.8</td>
<td>8-111</td>
</tr>
<tr>
<td><strong>Cooperia species</strong> <em>(F)</em></td>
<td>16</td>
<td>88.9</td>
<td>1-120</td>
</tr>
<tr>
<td><strong>Trichostrongylus species</strong> <em>(M)</em></td>
<td>7</td>
<td>38.9</td>
<td>1-46</td>
</tr>
<tr>
<td><strong>T. calibriformis</strong> <em>(M)</em></td>
<td>2</td>
<td>11.1</td>
<td>1-18</td>
</tr>
<tr>
<td><strong>Cooperia punctata</strong> <em>(M)</em></td>
<td>13</td>
<td>72.2</td>
<td>1-40</td>
</tr>
<tr>
<td><strong>Trichostrongylus asci</strong> <em>(M)</em></td>
<td>3</td>
<td>16.7</td>
<td>1-10</td>
</tr>
<tr>
<td><strong>C. pectinata</strong> <em>(M)</em></td>
<td>6</td>
<td>33.3</td>
<td>1-20</td>
</tr>
<tr>
<td><strong>C. oncopliora</strong> <em>(M)</em></td>
<td>4</td>
<td>33.3</td>
<td>1-10</td>
</tr>
<tr>
<td><strong>Nematodirus lanceolatus</strong> *(M)<strong>&lt;sup&gt;</strong>&lt;/sup&gt;</td>
<td>3</td>
<td>16.7</td>
<td>1-2</td>
</tr>
<tr>
<td><strong>Ostertagia ostertagi</strong> <em>(M)</em></td>
<td>2</td>
<td>11.1</td>
<td>1-1</td>
</tr>
<tr>
<td><strong>Thymosoma actinioides</strong></td>
<td>2</td>
<td>11.1</td>
<td>1-1</td>
</tr>
<tr>
<td><strong>Moniezia expansa</strong>&lt;sup&gt;***&lt;/sup&gt;</td>
<td>2</td>
<td>11.1</td>
<td>1-1</td>
</tr>
</tbody>
</table>

*M = male; F = female
<sup>**</sup>Tentative identification.
<sup>***</sup>One additional immature cestode could not be identified.

he is strongly inclined to agree with Travassos' (1937) action in synonymizing these two names . . . ."

*Cooperia pectinata, C. punctata, and Nematodirus lanceolatus* have not previously been reported from the pronghorn antelope. There is no prior report of the occurrence of *N. lanceolatus* in any host animal in the United States.

Our finding of *Nematodirella* and *Pseudostertagia* in rather large numbers in antelope in New Mexico is in agreement with the findings of Goldsby and Eveleth (1954) in North Dakota. *Nematodirella longispiculata* has likewise been found to occur in relatively large numbers in Montana and South Dakota antelope according to an unpublished list supplied by the late Dr. Lee Seghetti and Honess (1949) found a large number in a Wyoming antelope. Although it has been reported from several other wild ruminants (Dikmans, 1939) and has been found in large numbers in moose (Olsen and Fenstermacher, 1942), it probably is primarily a parasite of antelope. Indications are that it definitely is not primarily a parasite of domestic ruminants. It has not been reported from cattle so far as we are aware. The only record of its occurrence in sheep in this country is that of Honess (1951). He found 17 of 90 (19 per cent) Wyoming sheep infected, which harbored an average of only 35 specimens.

The suggestion that *Pseudostertagia bulbosa* is primarily a parasite of the pronghorn was first advanced by Lacker and Dikmans (1945). Goldsby and Eveleth *(loc. cit.*) noted that their results supported this suggestion and our results likewise are in accord with it. Lacker and Dikmans *(loc. cit.*) further indicated that their observations, as well as those of Ransom and Hall (1912), showed a limited distribution and low intensity of *P. bulbosa* infection in domestic sheep. They also suggested that this parasite's occurrence in sheep probably is dependent upon its occurrence in antelope. This view seems to be supported by the observations of Olsen (1950) who found relatively small numbers of *P. bulbosa* in sheep originating in New Mexico in a region where antelope were established. Also, Honess (1951) found only small
numbers of this worm in sheep in Wyoming. Although Allen (1955) found a 44.4 percent incidence of *P. bullosa* in nine New Mexican mountain sheep (*Ovis canadensis mexicana*), these infections likewise were light (10 to 40 worms) and the possibility that they were acquired from antelope cannot be excluded. This species has not been reported from cattle as far as we know.

The ranges grazed by the antelope examined by us were used predominantly by cattle. It was not surprising therefore to find in these antelope several species of worms that generally are regarded as well adapted to bovine hosts; these include *M. expansa, T. colubriformis, C. punctata, C. pectinata, C. oncophora, O. ostertagi*, and the species tentatively identified as *H. placeti*.

Ten of the 18 antelope dealt with in the present report were examined for the fringed tapeworm by Allen and Kyles (1953). Its occurrence in one of these 10 has been reported by them. We found it in one of the remaining 8. Hence, only two of the 18 harbored this cestode, *Thysanosoma actinioides* (table 1). Allen and Kyles (loc. cit.) recorded it from only one of the other nine antelope mentioned in their report. Thus, in all, only three of 27 New Mexican antelope examined have yielded this tapeworm; moreover, two harbored only one specimen each. Our present data support the evidence initially provided by Allen and Kyles (loc. cit.) that *T. actinioides* is undoubtedly better adapted to domestic sheep than to pronghorn antelope.

**Summary**

Eighteen pronghorn antelope from New Mexico were examined for parasites. Nine were examined for ectoparasites. All 18 animals harbored helminths and the numbers of mature worms present ranged from one to 4,740. No ectoparasites were found.

Twelve species representing nine genera were recovered. The most prevalent species were *Nematodirella longispiculata* and *Pseudostertagia bullosa*. The others were *Moniezia expansa, Thysanosoma actinioides, Trichostrongylus axei, T. colubriformis, Cooperia punctata, C. pectinata, C. oncophora, Ostertagia ostertagi*, and two species tentatively identified as *Nematodirus lanceolatus* and *Haemonchus placeti*.

*Cooperia pectinata, C. punctata* and *N. lanceolatus* are reported for the first time from the pronghorn antelope. *N. lanceolatus* is reported for the first time in the United States.

**Literature Cited**


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**Nemic Galvanotaxis**

FIELDS E. CAVENESS and JAMES D. PANZER*

The behavior of nemas in an electric field has, to the authors' knowledge, never been determined. Nemic reaction in this respect is reported herein.

**MATERIALS AND METHODS**

The galvanotactic behavior of *Panagrellus redivivus* (Linn., 1767) Goodey, 1945, was observed on 1 per cent water agar or sandy loam soil in plastic vessels 1.8 cm wide, 15 cm long and 1.6 cm high. The vessels were equipped with a cathode at one end and an anode at the other in such a way that an electric current passed through the substrate.

The source of the direct current was two 6-12 volt rectifiers (battery chargers) and a 6 volt wet cell, also used to stabilize current flow. They were used singly or in series as needed. Amperage was controlled by the use of variable and constant resistors. Appropriate ammeters were used to measure current.

*P. redivivus* were collected on filter paper utilizing a Buehner funnel to remove excess water. Approximately 10,000 nemas were placed at various dispersal points with a probe. These starting points were mid-point of the vessel, 4 cm from the cathode, at the cathode, 4 cm from the anode or at the anode. After 3 hours the agar was divided into thirds and the nemas recovered by agitating with water in a 5-dram vial. Soil, when used, was also divided into thirds. However, the duration of the experiment was 24 hours and the nemas were recovered by use of Baermann funnels. The numbers of nemas were estimated by the dilution method.

*Associate Nematologist and Assistant Plant Pathologist, Respectively, Department of Plant Pathology, South Dakota State College, Brookings, South Dakota.

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