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## Helminths of Lagomorphs in South Dakota

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There are no published reports on the helminths of lagomorphs in South Dakota. Although there are five species of lagomorphs in the state according to Hall (1981, Mammals of North America, Vol. I, John Wiley and Sons, New York, pp. 292-328), multiple representatives of two of these species and a single representative of a third species were examined. The purpose of this study was to determine the species of helminths associated with these lagomorphs, and to determine their prevalence and distribution.

Between October 1982 and June 1983, 54 lagomorphs, including 35 white-tailed jack rabbits (*Lepus townsendii campianus* Hollister), 18 eastern cottontail rabbits (*Sylvilagus floridanus similis* Nelson) and one desert cottontail rabbit (*S. audubonii baileyi* J. A. Allen), were collected by shooting and were examined for helminths. The gastrointestinal tracts were cut longitudinally, washed in a black tray partially filled with water and the helminths recovered. The body cavities and viscera were also examined grossly for parasites. Cestodes were fixed in AFA, stained in Harris hematoxylin and mounted in Canada balsam, while nematodes were fixed in 70% ethanol, cleared in glycerine-ethanol and stored in vials of glycerine jelly.

The results are presented in Table 1. White-tailed jack rabbits were parasitized by two species of cestodes and one nematode, while eastern cottontail rabbits had three cestodes and two nematodes. The single desert cottontail rabbit was infected

by one species of cestode and one nematode.

Coenuri of *Multiceps serialis* (Gervais) were the most conspicuous parasites found in white-tailed jack rabbits. The two coenuri, 63.5 mm and 51.0 mm in diameter, were recovered from the skeletal muscles of the internal lumbar region and left thigh, respectively. These sites of encystment have been reported previously (McC Campbell, 1926, Colo. Agric. Coll. Cir. No. 52, Fort Collins, Colo., Part 2, pp. 9-12; Voth and James, 1965, Proc. N.D. Acad. Sci. 19: 15-18).

The cysticerci of *Taenia pisiformis* (Bloch) were recovered from the abdominal mesenteries and sites surrounding the rectum of six eastern cottontail rabbits and the desert cottontail. The most intense individual infection was in an eastern cottontail from Stanley county in which 16 cysticerci were found.

The helminths recovered most frequently were cestodes of the genus *Mosgovoyia*. Eastern cottontails harbored *M. variabilis* (Stiles) and *M. pectinata* (Goeze), while white-tailed jack rabbits were infected with only *M. pectinata*. *Mosgovoyia variabilis* was collected in all months between November and April, with the exception of December when no rabbits were examined. *Mosgovoyia pectinata* was collected in the same period with the exception of March. During the 10-day period between 11 and 21 January, three rabbits were collected in which no mature cestodes were found. The small cestodes that were recovered, however, resembled *M. v. angusta* (Stiles, 1896, Proc. U.S. Nat. Mus. 19: 145-236) and the undeveloped forms of *M. pectinata*. A total of 88 of the

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TABLE 1. Helminths from 54 lagomorphs collected in South Dakota between October and June, 1982–1983.

Host and parasite	Prevalence (%)	Intensity		Distribution <sup>a</sup>	USNM
		Mean	Range		Accession no. <sup>b</sup>
<i>Lepus townsendii campantius</i> (n = 35)					
<i>Multiceps serialis</i> (coenuri)	5.7	1.0	1	B	78059
<i>Mosgovoyia pectinata</i>	8.6	2.0	1-4	B	78063
<i>Obeliscoides cuniculi</i>	2.9	1.0	1	B	78055
<i>Sylvilagus floridanus similis</i> (n = 18)					
<i>Taenia pistiformis</i> (cysticerci)	33.3	5.3	1-16	BMS	78061
<i>Mosgovoyia variabilis</i>	77.8	9.1	1-59	BHMPs	78062
<i>Mosgovoyia pectinata</i>	55.6	3.8	1-7	BHMS	78064
<i>Dermatoxys veligera</i>	22.2	26.0	5-70	BPS	78058
<i>Obeliscoides cuniculi</i>	11.1	1.0	1	M	78056
<i>Sylvilagus auduboniti baileyi</i> (n = 1)					
<i>Taenia pistiformis</i> (cysticerci)	100	13.0	13	P	78060
<i>Dermatoxys veligera</i>	100	7.0	7	P	78057

<sup>a</sup> Brookings, Hughes, McCook, Pennington and Stanley counties in South Dakota correspond to B, H, M, P and S, respectively.

<sup>b</sup> Accession nos. of specimens deposited in U.S. National Parasite Collection, Beltsville, Maryland 20705, USA.

worms resembling *M. v. angusta* were collected from the three rabbits, with 59 being collected from one of them. The immature forms of *M. pectinata* were collected also from two of the same cottontails. There were only 10 of these worms recovered however. The cestodes resembling *M. v. angusta* were collected also on three other occasions, once in early February and twice in mid-April. These observations parallel those of Honess (1935, Univ. Wyo. Publ. 2: 1–10) in that he found also the highest prevalence of infection with *M. variabilis* during the winter months, and that a seasonal trend in cestode maturity may occur. Since the ages of the lagomorphs were not determined, the presence of the immature cestodes may be due to recent infections. If this is the case, the eventual replacement with mature worms would be expected. White-tailed jack rabbits were infected with mature *M. pectinata* only in November and December.

*Obeliscoides cuniculi* (Graybill) was recovered from the stomachs of one jack rabbit and two eastern cottontail rabbits. Since only three female nematodes were

found, and it was not found in North Dakota by Voth and James (1965, op. cit.) or Novlesky and Dyer (1970, Am. Midl. Nat. 84: 267–269), perhaps the northern boundary for transmission of *O. cuniculi* is South Dakota when considering the central Great Plains states.

Collections of adult *Dermatoxys veligera* (Rudolphi) were made from four eastern cottontail rabbits and the desert cottontail. It was noted that the most intense infection was in an eastern cottontail taken from Brookings county in January. This cottontail harbored 70 worms, all of which were free in the caecal lumen.

This is the first report on the helminths of white-tailed jack rabbits, eastern cottontail rabbits and desert cottontail rabbits in South Dakota. The findings indicate that white-tailed jack rabbits are relatively free of helminths, while eastern cottontail rabbits are more intensely parasitized in respect to both numbers and species of helminths. The difference in intensities of helminths may be related to the dissimilarity of the habitats occupied by these two species. White-tailed jack rabbits generally inhabit open areas away from shel-

terbelts, while eastern cottontails are usually found within shelterbelts and woodlots. This relationship would allow for more efficient cycling of helminths

through a population of eastern cottontails than the more free-ranging white-tailed jack rabbits.

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## Cestodes of Freshwater Farmed Fishes in Iraq

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Common carp (*Cyprinus carpio*), buni (*Barbus sharpeyi*), gattan (*B. xanthopterus*) and shabout (*B. grypus*) are probably the main species of fish produced commercially in Iraq. There are a few reports on the distribution of parasites from fish in rearing ponds and other bodies of water in Iraq (Al-Hadithi and Habish, 1977, Bull. Basrah Nat. Hist. Mus. 4: 17-25; Khalifa et al., 1978, Iraqi J. Biol. Sci. 6: 58-63; Mhaisen, 1982, Iraqi Mar. Sci. 1: 1-9; Rahemo, 1982, Bull. Basrah Nat. Mus. 5: 39; Khalifa et al., 1983, J. Wildl. Dis. 19: 145; Khalifa, 1985, J. Wildl. Dis. 21: 312-313).

A survey was undertaken to determine the distribution of parasites in the four above mentioned species of fish. In this report the distribution of cestodes is reported. Fishes were collected from several ponds around the Baghdad area and also from some ponds near Samarra City (about 100 km north of Baghdad). Two cestodes were identified, i.e., *Proteocephalus tu-*

TABLE 1. Prevalence and intensity of cestodes in some freshwater fish species from Iraq.

Host common name	Infected/ examined (%)	Cestode species	Intensity*	
			Range	Mean
Common carp	18/370 (4.8)	<i>P. torulosus</i> <i>B. gowkongensis</i>	ND <sup>b</sup>	ND
Gattan	0/45 (0)	—	—	—
Bunni	4/106 (3.8)	<i>B. gowkongensis</i>	2-10	5.5
Shabout	3/90 (3.3)	<i>P. torulosus</i>	1-5	2.6

\* Number of cestodes per infected fish.

<sup>b</sup> ND = not determined.

*ulosus* (Batsch, 1786) and *Bothriocephalus gowkongensis* Yeh, 1955. Most of the infected carp were infected with both species, whereas gattan were uninfected (Table 1). Voucher specimens have been deposited in the British Museum (Natural History), Cromwell Road, London, England (4 June 1981, Ref. No. DIG/TMJ). This is the first report of these parasites in Iraq.

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