

Research Note

Helminths of the Prairie Rattlesnake, *Crotalus viridis viridis* (Serpentes: Viperidae), from Western South Dakota

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ABSTRACT: One hundred prairie rattlesnakes, *Crotalus viridis viridis*, from western South Dakota were examined for evidence of helminth parasites. Twenty-one percent were infected with 1 of 6 parasite species. The following species were recovered: *Manodistomum* sp., *Mesocestoides* sp., *Physaloptera* sp., 2 different species of oligacanthorhynchid acanthocephala, and an unidentified species of acanthocephalan. The occurrences of oligacanthorhynchid acanthocephala and *Manodistomum* sp. in *C. v. viridis* represent new host and locality records. A natural infection of *Mesocestoides* sp. tetrathyridia is documented in this host for the first time.

KEY WORDS: *Crotalus viridis viridis*, *Manodistomum* sp., Acanthocephala, *Mesocestoides* sp., *Physaloptera* sp., South Dakota, survey, Prairie rattlesnake.

Only a few helminth parasites have been reported from the prairie rattlesnake, *Crotalus viridis viridis* (Rafinesque, 1818) (Serpentes: Viperidae). Surveys from Colorado (Widmer, 1967; Olsen, 1980) and New Mexico (Pfaffenberger et al., 1989) indicate that this snake species harbors limited helminth fauna. In an effort to compare helminth populations from this host in western South Dakota with other areas, we examined 100 adult prairie rattlesnakes for helminths. In October 1995, 16 (8 male, 8 female) and 20 (4 male, 16 female) *C. v. viridis* were collected in Jones County (43°95'N, 100°68'W) and Stanley County (44°40'N, 100°74'W), South Dakota, respectively. In October 1994, 64 (32 male, 32 female) specimens were collected from various counties within western South Dakota. These were collected for their skins prior to consideration of this survey, so precise locality data were not documented. Snake carcasses and viscera were frozen at -20°C until examination of host tissues was performed. Visceral lengths ranged from 62 cm–91 cm (mean, 78.5 cm). The following tissues were examined for evidence of helminth infection: muscle fascia, coelomic cavity, mesentery, distal

esophagus, stomach, small and large intestines, distal trachea, reticular and membranous lungs, pericardial sac, heart, and gallbladder. The serosal surface of the gastrointestinal tract, liver, and kidneys were examined for evidence of encysted parasites.

Helminth parasites were collected between January and June 1996 and preserved initially in either 10% buffered formalin or AFA fixative. Trematode, cestode tetrathyridia, and acanthocephalan cystacanths were stained in borax-carmin, dehydrated in ethyl alcohol, cleared in xylene, and mounted in Canada balsam. Nematode specimens were either cleared and studied as temporary mounts in glycerin or stained with methyl green and mounted in Hoyer's mounting media, as described by Grundmann (1955).

Twenty one percent of the 100 prairie rattlesnakes examined from western South Dakota were infected with 1 of 6 helminth species. Infection rates of host specimens collected in 1995 are as follows: 0 of 8 (0%) males and 0 of 8 (0%) females from Jones County, South Dakota, and 1 of 4 (25%) males and 4 of 16 (25%) females from Stanley County, South Dakota, harbored helminth parasites. Of the 64 snakes collected from unspecified counties in 1994, 7 of 32 (22%) males and 9 of 32 (28%) females were infected.

The most prevalent helminth occurring in the prairie rattlesnake in this survey is *Physaloptera* sp. (Nematoda: Physalopteridae), with an intensity of 1 to 7 (1.7 mean intensity) specimens infecting a total of 11% of the hosts. Specimens were all nongravid females, found primarily between the rugal folds of the stomach mucosa, with one specimen being removed from the lumen of the distal esophagus, proximal small bowel, and distal large bowel of individual hosts. Species determination could not be made because of the absence of male specimens. Previous reports of *Physaloptera* sp. in *C. v. viridis*

have been recorded in New Mexico and Colorado by Pfaffenberger et al. (1989) and Widmer (1967), respectively.

Mesocestoides sp. tetrathyridia (Cestoidea: Cyclophyllidae) were harbored in 6% of the snakes examined, with an intensity of 1 to 56 (23.3 mean intensity) tetrathyridia per host. These were all encysted within the host mesentery and showed no evidence of asexual proliferation. *Crotalus viridis viridis* has been used numerous times as an experimental host for the metacestode stage of this parasite (Widmer et al., 1995; Engen and Widmer, 1993; Widmer and Specht, 1991; and Hanson and Widmer, 1985). This represents the first reported case of natural infection of *Mesocestoides* sp. tetrathyridia in *C. v. viridis*.

One snake possessed a single gravid *Manodistomum* sp. (Digenea: Plagiorchiidae) in the lumen of the distal esophagus, which represents a new host and locality record. Species determination was not possible because the distended ova-filled uterus obscured some taxonomic structures necessary for positive species assignment. However, morphological size, shape, and all discernible structures are consistent with *M. naticis* (Holl and Allison, 1935).

Two *C. v. viridis* harbored unidentified oligacanthorhynchid cystacanths (Acanthocephala: Oligacanthorhynchidae), each of which were hosts to different Acanthocephala.

One species consisted of 7 cystacanths whose inverted forms measured 3.7–4.1 mm (3.8 mm) long by 1.2–1.3 mm (1.25 mm) wide, and everted specimens 4.8–5.0 mm (4.9 mm) long by 1.2–1.3 mm (1.25 mm) wide. Proboscis armature was consistent with the Oligacanthorhynchidae. On the basis of proboscis shape, size, and juvenile trunk shape, these specimens appeared most similar to the genus *Oncicola*. Because they were collected from this northern geographical locality, they likely represent *O. canis* (Kaupp, 1909) Hall and Wigdor, 1918, which possess proboscis and hook measurements consistent with the current specimens. However, because of similarities between genera of juvenile forms of the Oligacanthorhynchidae, intraspecific morphological variation, and the inability to transfer specimens to an experimental host, these specimens are best documented as unidentified oligacanthorhynchid cystacanths.

The second species of encapsulated oligacanthorhynchid consisted of 2 specimens from the

mesentery of 1 host. Both specimens possess trunks in the inverted form, which are folded posteriorly at the midline within their cysts. Inverted form measured 5.4 mm long by 1.2 mm wide; with the everted specimen 5.9 mm long by 0.7 mm wide (trunk distorted during mounting process). The proboscis and hooks were larger and more robust than those possessed by the specimens discussed previously. These characteristics and trunk shape appeared most similar to some members of the genus *Oligacanthorhynchus*, but for the reasons given above, specimens must remain unclassified within the family Oligacanthorhynchidae.

A third single cystacanth was recovered from the mesentery of a separate host that remained inverted and, though probably an oligacanthorhynchid, was unidentifiable.

The only occurrences of oligacanthorhynchid cystacanths in the Serpentes suborder from the western United States are reported in a colubrid and viperid snakes from Texas and Arizona (Bolette, 1997a; 1997b). This report of oligacanthorhynchid cystacanths in *C. v. viridis* documents new host and locality records.

It appears from the observations of Meggitt (1934), Baker (1987), Pfaffenberger et al. (1989), and Widmer (1967) that the prevalence of helminth infections among wild populations of *C. v. viridis* is relatively high. However, the percent of this species harboring helminths in western South Dakota (21%) is substantially lower than *C. v. viridis* reported in New Mexico (66.6%) by Pfaffenberger et al. (1989) and in Colorado (72%) by Widmer (1967). Moreover, the helminth fauna recovered from *C. v. viridis* between these geographical areas appears different. Host populations studied previously by Pfaffenberger et al. (1989) and Widmer (1967) are infected with *Physaloptera* sp., as are hosts of the current study. However, these authors recovered adult specimens of *Oochoristica osheroffi* and *Kalicephalus inermis* from the intestines and a *Rhabdias* sp. from the lungs of this host species from New Mexico and Colorado. These parasite species were not recovered in this survey. Bowman (1984) reported studying a *Hexametra* sp. (probably *H. leidy*), (United States National Parasite Collection No. 28248) recovered previously from a captive *C. viridis* at the San Diego Zoo. However, this may represent an accidental infection of a captive host, since

this species of *Hexametra* is reported in *Crotalus horridus atricaudatus* from Louisiana.

Representative parasitic voucher specimens were deposited in the United States National Parasite Collection, Beltsville, Maryland: *Manodistomum* sp. (USNPC No. 86975), *Mesocestoides* sp. tetrathyridia (USNPC Nos. 86979, 86980), *Physaloptera* sp. (USNPC Nos. 86981-86983), Oligacanthorhynchid cystacanth (USNPC Nos. 86977, 86978), and unidentified cystacanth (USNPC No. 86976).

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