Coelomic helminths in the Northern Cat-eyed Snake, *Leptodeira septentrionalis* (Serpentes: Colubridae) from Costa Rica

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Information on metazoan parasites and their life cycles in Neotropical hosts is limited (Salgado-Maldonado et al., 2000). For example, of the 133 species of Costa Rican snakes (Savage, 2002), metazoan parasites are known from just 17 (13%) (Goldberg & Bursey, 2004). The purpose of this paper is to report coelomic metazoan parasites from the Northern Cat-eyed Snake, *Leptodeira septentrionalis*, from Costa Rica and to establish an initial parasite list for this species. *Leptodeira septentrionalis* (Fig. 1.) ranges from extreme southern Texas through Mexico and central America to northern Colombia and northwestern Peru and has been reported to feed on frogs, toads and some lizards (Savage, 2002).

METHODS AND MATERIALS

Fifty-two *L. septentrionalis* from Costa Rica (mean snout-vent length = 416.5 mm ± 124.5 SD; range = 159-617 mm) in the Natural History Museum of Los Angeles County (LACM), Los Angeles, California, USA, were examined. Permission was given to examine only the posterior third of the body cavity. The body was opened by a longitudinal incision. Organ surfaces and mesenteries in the posterior third of the body cavity were examined visually for parasites. The lumen of the digestive tract and the lungs were not examined. Nematodes were cleared in a drop of glycerol on a glass slide, cover-slipped and identified under a compound microscope. Cestodes and acanthocephalans were regressively stained in hematoxylin and studied as whole-mounts in Canada balsam. Voucher helminths were deposited in the United States National Parasite Collection (USNPC), Beltsville, Maryland, USA.

RESULTS AND DISCUSSION

Found were one species of Cestoda represented by tetrathyridia of a species of *Mesocestoides*; one species of Nematoda represented by larvae in cysts of a species of *Porrocaecum*; one species of Acanthocephala represented by cystacanths assignable to the family Oligacanthorhynchidae. Selected specimens were deposited in the United States National Parasite Collection as: *Mesocestoides* sp. (USNPC 101172; *Porrocaecum* sp. (USNPC 101173); Oligacanthorhynchid cystacanth (USNPC 101174. Infected *L. septentrionalis* by Costa Rica Province were as follows: *Mesocestoides* sp. (Puntarenas, LACM 151817, 151823); *Porrocaecum* sp. (Guanacaste, LACM 151797; Limón, LACM 151783, 151821; Puntarenas, LACM 151813, 155788); Oligacanthorhynchid cystacanth (Cartago, LACM 155793, Puntarenas, LACM 151794).

The life cycle of species of *Mesocestoides* is thought to require three hosts, thus it is unique among cyclophyllidean cestodes: The first larval stage thought to occur in ants: The second larval stage, tetrathyridium (Fig. 2), has been found in vertebrates representing more than 200 species, including amphibians, reptiles, birds and mammals; the strobilar stage occurs in mammals, rarely in birds (Rausch, 1994; Padgett and Boyce, 2005). A list of amphibian and reptilian hosts of tetrathyridia was provided by Goldberg et al. (2004). It appears that *L. septentrionalis* becomes infected by ingesting prey harbouring tetrathyridia and, as Bolette (1997) suggested for snakes in general, also serves as a paratenic host. Prevalence of infection in *L. septentrionalis* was 2/52 (4.0%), which is similar to the rate of infection by tetrathyridia (1-4%) in

small mammals (Gubanov & Fedorov, 1970). *Leptodeira septentrionalis* represents a new host record for tetrathyridia of *Mesocestoides*.

Species of *Porrocaecum* are intestinal parasites of birds; eggs ingested by earthworms hatch and develop to third stage larvae; vermivorous animals act as paratenic hosts (Anderson, 2000). Larvae of *Porrocaecum* spp. in cysts have previously been reported in the coelomic cavities of snakes

Figure 1. *Leptodeira septentrionalis*, Limón Province, Costa Rica. Photograph by Todd R. Lewis.

from Costa Rica (Goldberg & Bursey, 2004). Presumably snakes acquire larvae of *Porrocaecum* by ingestion of infected food items; these larvae re-encyst without further development. Prevalence of infection in *L. septentrionalis* was 5/52 (10%). *Leptodeira septentrionalis* represents a new host record for larvae of *Porrocaecum* spp.

All acanthocephala utilize an arthropod intermediate host in which larval development proceeds to the cystacanth stage that is infective to the definitive host (Kennedy, 2006). As in the cases of tetrahyridia of *Mesocestoides* and larvae of *Porrocaecum*, snakes most likely become infected with cystacanths by ingesting prey items that had ingested infected insects. The presence of cystacanths in snakes from Costa Rica has previously been reported (Goldberg & Bursey, 2004). Prevalence of infection in *L. septentrionalis* was 2/52 (4%). *Leptodeira septentrionalis* represents a new host record for Oligacanthorhynchid cystacanths.

Figure 2. *Mesocestoides* sp. (tetrathyridium). Photograph by Charles R. Bursey.

Snake coelomic parasites would appear to form a group in which neotenic capabilities, i.e., prolongation of the larval state, are integral to the life cycle. Thus, during the life of the parasite, rather than truncation of the life cycle, additional opportunities to gain the definitive host can occur.

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