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*Research Note*

# Helminths of the Wood Frog, *Rana sylvatica,* and Spring Peeper, *Pseudacris c. crucifer,* from Southern Michigan

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ABSTRACT: Eight helminth species (3 Trematoda, 5 Nematoda) were found in 100 wood frogs, *Rana sylvatica* LeConte, and 5 helminth species (1 Trematoda, 4 Nematoda) were found in 88 northern spring peepers, *Pseudacris c. crucifer* (Wied-Neuwied), collected from southern lower Michigan in spring 1989 and 1990. Of the species identified, *Oswaldocruzia pipiens* and *Haematoloechus parviplexus* had the highest prevalence and mean intensity in wood frogs, respectively. *Glypthelmins pennsylvaniensis* had the highest prevalence and mean intensity in spring peepers. Michigan is a new locality record for *G. pennsylvaniensis, Cosmocercoides dukae, O. pipiens,* and *Rhabdias ranae.*

KEY WORDS: *Rana sylvatica,* wood frog, *Pseudacris c. crucifer,* spring peeper, helminths, survey, Trematoda, Nematoda, Michigan.

Parasites of wood frogs, *Rana sylvatica* (family Ranidae), and (or) spring peepers, *Pseudacris* (syn. *Hyla*) *crucifer* (family Hylidae), have been surveyed by Brandt (1936), Rankin (1945), Odlaug (1954), Ashton and Rabalais (1978), Baker (1979), Williams and Taft (1980), and Coggins and Sajdak (1982). However, little information on helminths of these frog species from Michigan is available. Najarian (1955) found 4 helminth species each in wood frogs and spring peepers collected near Ann Arbor, Michigan. This note presents new information on the helminths of wood frogs and spring peepers from the Great Lakes area.

One hundred ($\bar{x} \pm$ SD snout–vent length = 40 $\pm$ 3.8, range 27–47 mm) wood frogs, *R. sylvatica,* 88 (24 $\pm$ 1.6, 20–28 mm) northern spring peepers, *P. c. crucifer,* and 1 (29 mm) western chorus frog, *Pseudacris triseriata* (Wied-Neufeld), were collected in April–May 1990 by dip net from a marsh in the Rose Lake Wildlife Area, Shiawassee and Clinton counties, southcentral Michigan. Sixty-six spring peepers (23 $\pm$ 1.6, 21–31 mm) were also collected from a marsh southwest of Otis Lake in the Barry Game Area, Barry County, southwestern lower Michigan in March–May 1989. Frogs were pithed and all visceral organs, musculature and skin, were examined within 24 hours of collection. Helminths were processed using conventional techniques. Prevalence is the percentage of infected frogs in a sample; mean intensity is the mean number of worms per infected frog, and values are expressed as a mean $\pm$ 1 SD. Values for Brillouin's index for use in diversity and evenness (Pielou, 1975) were calculated using common logarithms for all helminths irrespective of their site of infection. Representative specimens of helminths have been deposited in the U.S. National Parasite Collection (USNM), Beltsville, Maryland (accession nos. 81867–81872).

Eight helminth species infected wood frogs and 5 species infected spring peepers. This number of helminth species found in wood frogs is the largest reported to date. Of the species identified from wood frogs, *Oswaldocruzia pipiens* and *Haematoloechus parviplexus* had the highest prevalence and mean intensity, respectively (Table 1). Fifty-three wood frogs harbored 1 helminth species, 16 harbored 2 species, and 8 harbored 3 species; overall prevalence of infection was 77%. The mean number of helminth species, helminth abundance, Brillouin's diversity and evenness for helminth infracommunities in wood frogs were 1.1 $\pm$ 0.8 (0–3), 3.5 $\pm$ 4.7 (0–24), 0.0434 $\pm$ 0.0846 (0.0266–0.0602), and 0.1195 $\pm$ 0.2232 (0.0752–0.1638), respectively. *Glypthelmins pennsylvaniensis* had the highest prevalence and mean intensity in spring peepers. Of the 21 (24%) spring peepers infected, none harbored more than 1 species. In contrast, Brandt (1936) in North Carolina found 13 helminth species in 60 spring peepers. In our study, there were no significant differences in prevalence (chi-square analysis, $P > 0.05$) and intensity (Student's $t$-test, $P > 0.05$) of parasitism between females and males of each frog species. There were also no distinct increases in infection for each helminth species or in helminth infracommunity descriptors with frog length.

Twenty-three (38%) spring peepers from the Barry Game Area were infected with *G. penn-*

**Table 1. Prevalence and mean intensity of helminths in 100 wood frogs and 88 spring peepers from the Rose Lake area.**

| | Wood frog | | Spring peeper | | |
|---|---|---|---|---|---|
| | Prevalence | Mean intensity ± 1 SD (range) | Prevalence | Mean intensity ± 1 SD (range) | Site of infection |
| Digenea | | | | | |
| *Glypthelmins pennsylvaniensis* Cheng, 1961* | — | — | 10 | 9.0 ± 6.1 (1–20) | small intestine |
| *Glypthelmins quieta* (Stafford, 1900) Stafford, 1905*† | 2 | 1.0 | — | — | small intestine |
| *Haematoloechus parviplexus* (Irwin, 1929) Harwood, 1932*† | 9 | 3.7 ± 5.2 (1–17) | — | — | lung |
| Unidentified metacercariae | 7 | 10.3 ± 8.6 (1–23) | — | — | mesenteries |
| Nematoda | | | | | |
| *Cosmocercoides dukae* (Holl, 1928) Travassos, 1931* | 12 | 2.3 ± 1.7 (1–10) | — | — | rectum |
| *Cosmocercoides* sp. | — | — | 1 | 1.0 | rectum |
| *Oswaldocruzia pipiens* Walton, 1929* | 34 | 2.0 ± 1.4 (1–7) | 5 | 2.5 ± 3.0 (1–7) | stomach, small intestine, rectum |
| *Rhabdias ranae* Walton, 1929* | 23 | 2.6 ± 3.6 (1–15) | 2 | 1.0 | lung, body cavity |
| *Spiroxys* sp. | 15 | 3.2 ± 2.9 (1–10) | 6 | 1.8 ± 0.8 (1–3) | mesenteries, stomach wall |

* Gravid.
† New host record.

*sylvaniensis* with a mean intensity (range) of 10 ± 26 (1–126); no other helminth was found. The single western chorus frog from the Rose Lake Area was infected with 16 *G. pennsylvaniensis* and 4 *Cosmocercoides dukae.*

Most helminths were identified except for 1 male *Cosmocercoides* sp. from a spring peeper. It was similar to *C. dukae,* having 15 rosette papillae in its subventral rows, but total body length, spicule and gubernaculum measurements were within the ranges for *C. variabilis.* Therefore, we cannot determine its specific identity. Measurements of specimens from wood frogs and the western chorus frog fall within the ranges of *C. dukae* given by Vanderburgh and Anderson (1987). *Cosmocercoides dukae* is known to mature in molluscs, but frogs serve as incidental hosts. Anderson (1960) showed that *C. dukae* infections in frogs were of short duration. *Spiroxys* sp. is reported for the first time from wood frog and spring peeper and the recovery of it from tissues may indicate these frog species serve as second intermediate hosts (Hedrick, 1935) or paratenic hosts. *Glypthelmins pennsylvaniensis* was described by Cheng (1961) from spring peepers in Pennsylvania. Since then it has been found in *Pseudacris* spp. from Georgia by Sullivan and Byrd (1970) and Wisconsin by Coggins and Sajdak (1982). The occurrence of *G. pennsylvaniensis* in Michigan is a new locality record and provides additional evidence for host specificity in *Pseudacris.* In the present study, *G. quieta* was found in only 2 wood frogs; Rankin (1945) found *G. quieta* in a spring peeper. The wood frog is a new host record for *G. quieta* and *H. parviplexus* and the western chorus frog for *G. pennsylvaniensis.* Michigan is a new locality record for *C. dukae, O. pipiens,* and *Rhabdias ranae.*

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***Research Note***

# *Parapharyngodon kartana* in Two Skinks, *Emoia nigra* and *Emoia samoense* (Sauria: Scincidae), from Samoa

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ABSTRACT: Examination of 9 *Emoia nigra* revealed the presence of a nematode, *Parapharyngodon kartana* (prevalence 44%, mean intensity 3), in the large intestine and third-stage spirurid larvae in the small intestine. A single specimen of *Emoia samoense* also harbored *P. kartana* in the large intestine. These are new host records.

KEY WORDS: Nematoda, *Parapharyngodon kartana,* spirurid larvae, *Emoia nigra, Emoia samoense,* Scincidae.

The black skink, *Emoia nigra* (Hombron and Guichenot, 1853) Sternfeld, 1920, occurs in the South Pacific on the Caroline Islands, Bismarck Archipelago, Solomon Islands, New Hebrides, Fiji, Samoa, and Tonga (McCoy, 1980). The Samoan skink, *Emoia samoense* (Duméril, 1851) Schmidt, 1923, is known from Fiji, Loyalty Islands, Samoa, and Tonga (Burt and Burt, 1932). The purpose of this note is to report the presence of the nematode, *Parapharyngodon kartana* (Johnston and Mawson, 1941) Mawson, 1971, and spirurid larvae in *E. nigra* and *P. kartana* in *E. samoense.* These findings represent new host records.

Nine *E. nigra,* mean snout–vent length (SVL) 89 mm ± 7 mm SD, were examined. Eight were from Tutuila Island, American Samoa (14°17′S, 170°41′W); 1 was from Upolu Island, Western Samoa (13°50′S, 171°45′W). A single *E. sa-*