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Helminths from the Hellbender, *Cryptobranchus alleganiensis* (Urodela: Cryptobranchidae), in Missouri, U.S.A.

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ABSTRACT: Two hellbenders, *Cryptobranchus alleganiensis* (Urodela: Cryptobranchidae), from Missouri, U.S.A., were examined for helminths. Three nematode species, *Falcaustra catesbeianae* Walton, 1929, *Urodelnema mackini* (Walton, 1941), and *Kamegainema cingula* (Linstow, 1902) and 1 proteocephalid cestode species were found. This is the first record of *Fa. catesbeianae* from the hellbender. *Kamegainema cingula,* normally a dermal nematode of cryptobranchids, is reported for the first time infecting the body cavity.

KEY WORDS: helminths, *Falcaustra catesbeianae, Urodelnema mackini, Kamegainema cingula,* proteocephalid cestode, hellbender, *Cryptobranchus alleganiensis,* U.S.A., Missouri, Nematoda, Urodela, Amphibia.

The hellbender, *Cryptobranchus alleganiensis* (Urodela: Cryptobranchidae), is a large salamander distributed in certain rivers of the eastern United States (Pough et al., 1998). Helminthological surveys of this amphibian have been carried out since the early twentieth century (La Rue, 1914; Krecker, 1915). However, our knowledge of the parasites of the hellbender remains incomplete. We recently examined 2 hellbenders and recovered 4 helminth species. Herein, we report the results, including a new host and a new infection site record.

MATERIALS AND METHODS

The hellbenders examined were originally collected in April 1987 from the Niangua River, Dallas County, Missouri, U.S.A., by R. F. Wilkinson, Southwest Missouri State University, Springfield, Missouri, U.S.A., for an experimental study of feeding mechanics (Elwood and Cundall, 1994). They were maintained for about 1 wk at Lehigh University, Bethlehem, Pennsylvania, U.S.A., in a flow-through system that had previously contained hellbenders from other sites and were then transported to Harvard University, Cambridge, Massachusetts, U.S.A., where they were housed together in a 400-liter aquarium for approximately 5 wk. Subsequently, hellbenders were housed individually in smaller aquaria for approximately 2 wk during physiological and behavioral recording sessions. When the hellbenders arrived from Missouri, they regurgitated bits of crayfish exoskeleton, but none of them ate for about 1 mo after they were transported to Harvard. After 1 mo they began to eat live baby mice and live goldfish a few weeks before they were killed. After the experiments the hellbenders were killed with tricaine methanesulfonate and fixed in 10% formalin.

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A helminthological survey was conducted on viscera excised from fixed specimens transported to our laboratory. The visceral surface was carefully examined under a stereomicroscope for pathological changes associated with helminthic infection. Then, the alimentary canal was cut open and washed on a 0.07-mm-aperture sieve. The residue left on the sieve was transferred to a petri dish and examined for helminths under a stereomicroscope. The lungs were cut open and examined. Helminths were cleared in an alcohol–glycerol solution by evaporation, mounted on a glass slide with 50% glycerol solution, and observed under a Nikon Optiphot microscope equipped with a Nomarski interference contrast apparatus. Measurements (range values followed parenthetically by mean ± SD) are given in micrometers unless otherwise stated. Specimens are deposited in the United States National Parasite Collection (USNPC), Beltsville, Maryland, U.S.A. The hosts are deposited in the Department of Behavioral and Evolutionary Biosciences, Lehigh University, Bethlehem, Pennsylvania, U.S.A., with accession numbers LU 2377 and 2378.

The following specimens were also examined for comparison—*Falcaustra catesbeianae* Walton, 1929 ex *Rana catesbeiana* Shaw, 1802: USNPC 91246; *Kamegainema cingula* (Linstow, 1902) ex *Andrias japonicus* (Temminck, 1836): personal collection of T. Tochimoto, Himeji, Hyogo, Japan.

Cryptobranchus alleganiensis

Two individuals collected from the Niangua River, Dallas County, Missouri, U.S.A.: one male, snout-vent length (SVL) 29.5 cm; 1 female, SVL 30.5 cm.

Falcaustra catesbeianae Walton, 1929

(Nematoda: Kathlaniidae)

Description: General morphology almost identical with that described by Baker (1986).

Males: (n = 11.) Length 7.18–9.74 (8.04 ± 0.87) mm, width in midbody 267–345 (300 ±