

**BOTHRIOCEPHALUS SCHILBEODIS n. sp. (Cestoidea:
Bothriocephalidae), an Intestinal Parasite of
SCHILBEODES INSIGNIS¹**

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During the summer of 1958 a preliminary survey was undertaken to study the helminth fauna of the fishes in the vicinity of Mountain Lake, Giles County, Virginia. As a part of this survey, ten specimens of the madtom, *Schilbeodes insignis*, from Sinking Creek, were examined. One specimen of a cestode was recovered from the small intestine of one fish. This tapeworm was sexually mature and quite lively when removed from its host. It revealed sufficient differences from the previously described species of the genus *Bothriocephalus* Rudolphi, 1808, emended Luehe, 1899, to warrant its description as a new species.

The genus *Bothriocephalus* with *B. scorpii* (Mueller, 1776) as the type, at one time served as a receptacle for a large number of doubtful forms of pseudophyllideans; however, several attempts have been made to clarify this situation. Among these, the most outstanding has been the work of Cooper (1918). Wardle and McLeod (1952) listed seven species, *B. claviceps* Goetze, 1782, *B. cuspidatus* Cooper, 1917, *B. formosus* Mueller and Van Cleave 1932, *B. manubriiformis* (Linton, 1889), *B. occidentalis* (Linton, 1898), *B. rarus* Thomas, 1937, and *B. scorpii* (Mueller, 1776), which have been reported from North America. All the North American species are intestinal parasites of fishes except *B. rarus* which is a parasite of *Triturus*

¹Through personal correspondence with Dr. William S. Woolcott, Department of Biology, University of Richmond, Va., it was learned that the generic name *Schilbeodes* Bleeker is considered by some to be synonymous with *Noturus* Raf., although the synonymy is not universally accepted; hence the name of the Eastern banded madtom is either *Schilbeodes insignis* or *Noturus insignis*.

viridescens. No species has ever been reported from *Schilbeodes insignis*.

Essex (1928) reported the life history of *Bothriocephalus cuspidatus* in which was demonstrated that *Cyclops brevispinosus* serves as the intermediate host. Thomas (1937) gave the life history of *B. rarus* in which *Cyclops vulgaris* serves as the intermediate host. Assuming that the members of the same genus possess parallel life cycles, the pattern for all the known species apparently involves only one intermediate host, and in both known cases, this has been *Cyclops* spp.

Cooper (1918) and Thomas (1937) considered *Bothriocephalus* a member of the family Ptychobothriidae Luehe, 1902, emended Meggitt, 1924, emended Thomas, 1937, which was originally erected with *Bothriocephalus* as the type genus; however, Luehe (1902) recognized the fact that the original family included bothriocephalids, ptychobothriids and amphicotylids. Wardle and McLeod (1952), in their definitive systematic study, considered *Bothriocephalus* the type of Bothriocephalidae Blanchard, 1849, emended. This interpretation appears to be the most natural since to the Bothriocephalidae have been assigned the genera *Bothriocephalus*, *Taprobothrium* Luehe, 1899, *Onchodiscus* Yamaguti, 1934, *Parabothriocephaloides* Yamaguti, 1934, and *Parabothriocephalus* Yamaguti, 1934, all of which are closely related forms and can be separated from the genera of Ptychobothriidae by the presence of an apical disc on the scolex. Furthermore, the genera of Bothriocephalidae can be distinguished from those of Amphicotylidae Nybelin, 1922, emended Beaver and Simer, 1940, by their medially situated genital atrium and pore. The genital atrium and pore are lateral among the Amphicotylidae.

The species of *Bothriocephalus* are similar to one another; however, their respective body dimensions, shape of the ovary, shape of the scolex, apical disc and bothria are generally considered as reliable characteristics in separating the species.

The authors have chosen to base the description of *Bothriocephalus schilbeodis* on the single specimen in their possession since it is felt that there is sufficient difference between the new species and the other members of the genus to warrant this action. They are of the opinion that one good specimen, which is markedly different from the known species of a genus, constitutes a valid type for a new species.

***Bothriocephalus schilbeodis* n. sp.**

Description: Comparatively small cestode; body 66.7 mm. long, 1.9 mm. wide; scolex subrectangular, 0.566 mm. long, 0.291 mm. wide; apical disc present, 0.306 mm. wide; two bothria present, one on each flat surface, each bothrium 0.459 mm. long, 0.031 mm. wide, shallow, with a slightly pinched off area near terminal end; neck region absent; first proglottids subrectangular, without distinct enclosures; other proglottids up to the ninety-ninth, rectangular, 0.28 to 0.333 mm. long, 1.36 to 1.4 mm. wide, with

distinct testes and ovary but no eggs in saccular uterus; total number of proglottids 191; testes, 80 to 96 per segment, divided into two subequal masses, one on each side of genital pore and ovary; mature proglottids commence with the 100th segment, these measure from 1.4 to 1.576 mm. in width and 0.413 to 0.5 mm. in length; 48 to 60 testes in each lateral field, each testis measuring 0.032 - 0.044 mm. by 0.027 - 0.021 mm.; vitellaria occupying same lateral fields as testes, follicles singular; ovary as horizontal mass, 0.185 - 0.199 mm. by 0.110 - 0.122 mm.; uterine sac distended with 24 to 30 eggs; eggs, 0.032 - 0.051 mm. by 0.024 - 0.031 mm., non-operculated and not enclosing embryo; cirrus pouch small, in area of genital atrium and pore. Last three proglottids narrower and longer than rest, testes horizontally elongate, 0.153 mm. by 0.034 mm.; eggs occupy all of space between genital atrium and ovary. In the last proglottid, which is semi-circular in outline, eggs are few and only 0.023 mm. by 0.012 mm.

Habitat: Small intestine.

Type host: *Schilbeodes insignis* Hubbs and Raney.

Type locality: Sinking Creek, Giles County, Virginia.

Type specimen: USNM Helminth. Coll. No. 38387.

DISCUSSION

Luehe (1899), in giving the emended diagnosis for *Bothriocephalus*, stated that the middle segments were square; this is not the case in *B. schilbeodis* where the middle segments are definitely rectangular, approximately three and one half times as wide as long. The subdivision of one proglottid into secondary segments, as is commonly found in the other species, is present in *B. schilbeodis*. Figure 2 shows such a condition where one distinctly limited proglottid is subdivided into two secondary segments, each with its set of reproductive organs. This condition, however, is not seen in egg-bearing proglottids.

A review of the literature revealed that *Bothriocephalus schilbeodis* most closely resembles *B. scorpii* (Mueller, 1776). The arrangement of the internal organs and the shape of the scoleces are comparable. *B. schilbeodis*, however, can be distinguished from *B. scorpii* by its body dimensions (66.7 mm. by 1.9 mm.) which are appreciably smaller than those of *B. scorpii* (950 mm. by 6 mm.), and by the position of its uterine sac which is distad from the scolex end rather than closer as it is in *B. scorpii* (see Cooper, 1918: 224, Fig. 71).

Bothriocephalus schilbeodis differs from *B. claviceps* Goetze, 1782, by its smaller body dimensions (540 mm. by 2-3 mm. for *B. claviceps*); however, these two species can be readily separated by the difference in the arrangements of the vitellaria. In *B. schilbeodis* the follicles are limited to the two lateral fields and do not intermingle along the medial line, while in *B. claviceps* the follicles form a continuous band across the width of each proglottid. *B. schilbeodis* differs from *B. cuspidatus* Cooper, 1917, by its smaller body dimensions (180 mm. by 2.75 mm. for *B. cuspidatus*); however, the most pronounced difference lies in the absence of the deep notches on the apical disc in *B. schilbeodis* and which are present in *B. cuspidatus*. *B. schil-*

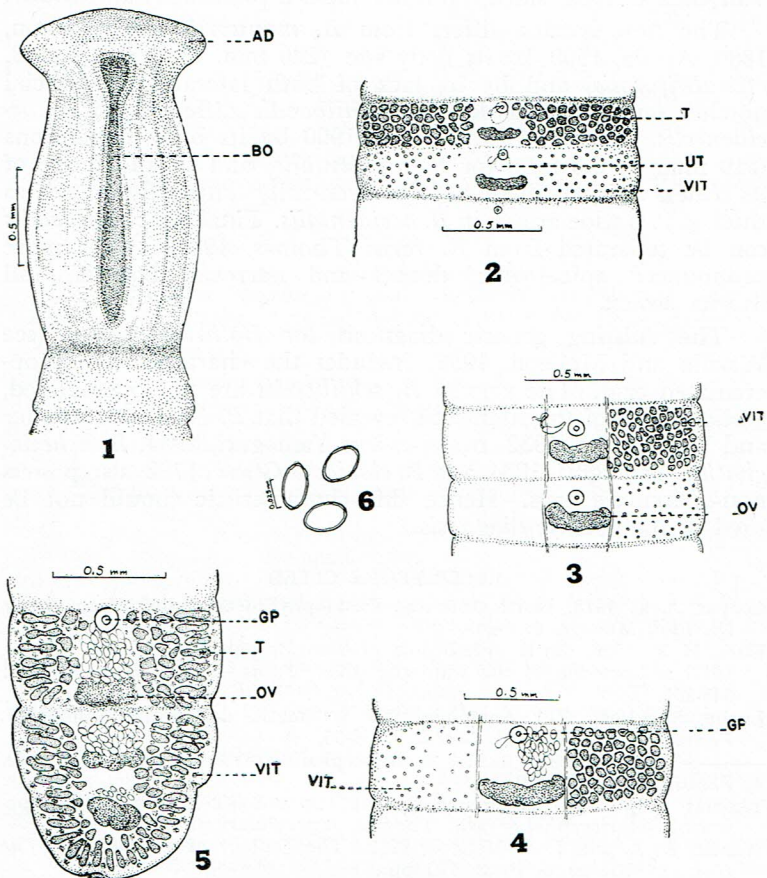


Figure 1. Scolex of *Bothriocephalus schilbeodis* n. sp. showing anterior disc (AD) and bothrium (BO). Camera lucida. Figure 2. Camera lucida drawing of single proglottid of *B. schilbeodis* showing pseudoproglottism. Testes (T), uterus (UT), vitelline glands (VIT). Figure 3. Camera lucida drawing of sexually mature proglottids. Vitelline glands (VIT), ovary (OV). Figure 4. Camera lucida drawing of gravid proglottid showing genital pore (GP), vitelline follicles (VIT). Figure 5. Camera lucida drawing of posterior end of *B. schilbeodis* showing last three proglottids. Genital pore (GP), testes (T), ovary (OV), vitelline follicles (VIT). Figure 6. Eggs of *B. schilbeodis*. Camera lucida drawings.

beodis is easily distinguished from *B. formosus* Mueller and Van Cleave, 1932, since the latter lacks a prominent apical disc.

The new species differs from *B. manubriiformis* (Linton, 1889) Ariola, 1900, by its body size (220 mm. by 5 mm. for *B. manubriiformis*) and by its lack of both lateral and surficial notches on its apical disc. *B. schilbeodis* differs from *B. occidentalis* (Linton, 1898) Ariola, 1900 by its body dimensions (310 mm. by 5.5 mm. for *B. occidentalis*) and by the shape of its scolex which is distinctly dorsoventrally flattened and not as thick as it is wide at it is in *B. occidentalis*. Finally, *B. schilbeodis* can be separated from *B. rarus* Thomas, 1937, by its more pronounced apical disc, deeper and narrower bothria, and shorter scolex.

The existing generic diagnosis for *Bothriocephalus* (see Wardle and McLeod, 1952) includes the characteristic of operculated eggs. The eggs of *B. schilbeodis* are not operculated, and a review of the literature revealed that *B. formosus* Mueller and Van Cleave, 1932, *B. japonicus* Yamaguti, 1934, *B. acheilognathus* Yamaguti, 1934, and *B. claviceps* Goeze, 1782, also possess non-operculate eggs. Hence this characteristic should not be used in the generic diagnosis.

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