Drilomermis leioderma n. gen., n. sp. (Mermithidae:Nematoda) parasitizing Cybister fimbriolatus (Say) (Dystiscidae:Coleoptera)

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Abstract: The nematode *Drilomermis leioderma* n. gen., n. sp. (Mermithidae) is described from larvae of *Cybister fimbriolatus* (Say) (Dytiscidae: Coleoptera) in Louisiana. Diagnostic characters of the genus *Drilomermis* are: medium-sized nematodes with the cuticle appearing smooth (lacking cross fibers) under the light microscope, six cephalic papillae, without mouth papillae, six hypodermal cords at midbody, 2 extremely long spicules (longer than 10 times body width at anus) which are separate and parallel (not twisted), an S-shaped vagina, medium-sized amphids located near head papillae, and postparasitic juvenile with a tail appendage. *D. leioderma* possesses a ventrally displaced mouth, very long vagina, and male genital papillae arranged in 3 double rows in the vicinity of the cloacal opening. Even when containing multiple parasites, about 40% of the hosts survived emergence of the memithids and lived several more days. In nature, some of these hosts may be able to continue their development, which is unusual since most mermithid-parasitized hosts die soon after the nematode emerges. *Key Word:* taxonomy.

Members of the nematode family Mermithidae have rarely been encountered parasitizing beetles in the family Dytiscidae (3). In fact, the only record of such an association was made in 1862, by Laboulbiene (1), who recorded a mermithid emerging from *Dytiscus marginalis* L. Thus, it was of some interest when a species of *Cybister* was found parasitized by a mermithid nematode in Louisiana. The present report describes this nematode and discusses its relationship with other members of the family.

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MATERIALS AND METHODS

Larvae of *Cybister fimbriolatus* (Say) (Dytiscidae:Coleoptera) parasitized by mermithid nematodes were collected from a pond, about 20 m in diameter and 0.5-1.0 m deep in Chloe, Louisiana. This permanent pond was sometimes nearly dry. Most of the surface was covered with water-hyssop [*Bacopa caroliniana* (Walt.) Robins], with soft rush (*Juncus effusus* L.) in the middle and along the borders. Postparasitic stages of mermithid nematodes emerged from

Cybister larvae collected in June 1976 and May 1977. These nematodes were maintained in damp sand at 26-28 C, where they molted, mated, and oviposited. Egg hatching occurred when the damp sand was flooded 2 or more weeks after oviposition.

RESULTS

Mermithids obtained from *C. fimbriolatus* were found to be new to science. A description follows below.

Drilomermis n. gen.
(Mermithidae Braun)

Diagnosis: Medium-sized nematodes with adult cuticle appearing smooth (lacking cross-fibers) under the light microscope; six head papillae; no mouth papillae; 6 hypodermal cords at midbody; 2 extremely long spicules (longer than 10 times body width at anus), separate and parallel; vagina S-shaped; amphids medium in size, located near head papillae; postparasitic juveniles with a tail appendage. *Type species: Drilomermis leioderma* n. sp.

Description: Medium-sized nematode with mouth shifted to the ventral side of the head; 6 cephalic papillae arranged in one plane; medium flask-shaped amphids, not connected by a commissure, opening just behind the cephalic papillae and situated on the dorsal side of the lateral papillae; S-shaped vagina, very long; spicules extremely long, more than 10 times body width at cloaca, paired, separate, narrow; genital papillae arranged in 3 double rows near cloacal opening; postparasitic juvenile with small tail appendage; female tail bluntly rounded.

In the following quantitative description, all measurements are in microns except as specified otherwise. The first figure represents the average value and the range is given in parentheses.

Females: (n = 6) (Figs. 3, 4, 7). Length 4.59 (3.82-5.68) cm; greatest width 310 (280-360); distance from head to nerve ring 326 (280-400); length amphidial pouch 13 (11-15); diameter amphidial opening 7 (6-9); length S-shaped vagina 1093 (800-1200); %V 44 (36-49); greatest diameter of eggs 83 (65-95); remnant cloacal opening 202 (184-216) from tail tip; vestigial excretory pore (?) 365 (308-423) from head; distance from tail tip to posterior portion of trophosome 261 (211-323).

Male: (n = 10) (Figs. 1, 2, 5, 6, 8). Length 1.76 (1.24-2.71) cm; greatest width 184 (140-220); distance from head to nerve ring 275 (200-323); length amphidial pouch 13 (12-14); diameter amphidial opening 5 (4-6); distance from head to vestigial excretory pore (?) 324 (216-385); length of spicules 2130 (1210-2930); width of spicules 3-4; length of tail 155 (128-192); width of body at cloacal opening 136 (107-169).

Preparasitic juvenile: (Fig. 10) (n = 5). Length 1000 (960-1040); greatest width 17 (17-19).

Postparasitic juvenile: (n = 5). Tail bearing a small medium tail appendage 44 (21-71) long.

Type host: Cybister fimbriolatus (Say) (Dytiscidae:Coleoptera).

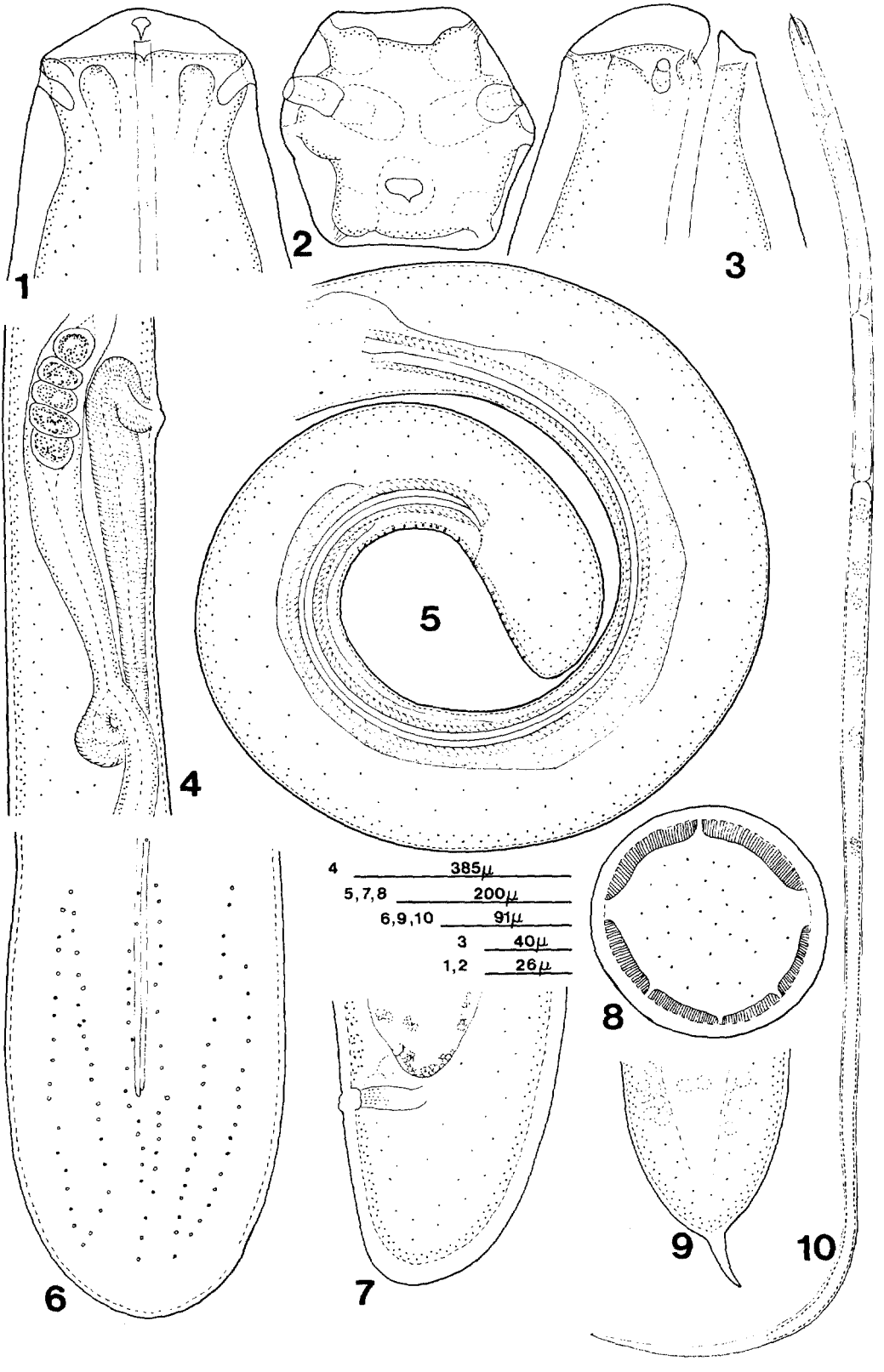
Type locality: Chloe, Louisiana.

Type species and specimen: Holotype (female) and allotype (male) deposited at the Department of Nematology, University of California, Davis, CA. Paratypes deposited in the collection of the senior author.

Diagnosis: A combination of characters—6 cephalic papillae, 6 hypodermal cords, lack of noticeable cross-fibers in the cuticle, 2 long spicules, and S-shaped vagina—clearly separates *Drilomermis* from other described mermithid genera. The genus *Strelkovimermis* Rubstov shares the above characters but has paired spicules about equal to the anal body width. The only genus of mermithids characterized by spicules equal to those of *Drilomermis* is *Amphimermis*. The latter genus, however, contains spicules characteristically twisted around each other, and the cuticle contains visible cross-fibers. Also, all of the species of *Amphimermis* have terminal mouths, except *A. tinyi* Nickle (2), which is incompletely described and for the present must be regarded as a species inquirendarum.

Biological observations: Only larvae of *C. fimbriolatus* were found harboring *D. leioderma* in the pond sampled, and the incidence of parasitism in four separate collections ranged from 33 to 80%.

Parasitic development probably lasts for 3-5 weeks since collected infected hosts were held in the laboratory for up to 3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weeks before the parasites emerged. When hosts had multiple infections, the nematodes emerged over a period of several days. For instance, four nematodes escaped from one host on the first 2 days of emergence, an additional five emerged during the next 6 days, and two more left on the ninth and tenth day. The host died on the ninth day and retained one last nematode. About 40% of the hosts survived emergence of their parasites and lived several more days. In nature, some of these hosts may be able to continue normal development, which is very unusual since most mermithid-parasitized hosts die soon after the nematode emerges.

Parasite densities averaged 5.2 (1-17) per host (one host with 17 worms died prematurely). Though observations were limited (only 15 infected hosts were examined), parasite loads had a noticeable effect on the sex ratios of the emerging nematodes. Hosts with single or dual infections produced only female nematodes, whereas hosts with four or more parasites produced a predominance of male post-parasites.

LITERATURE CITED

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FIG. 1-10. *Drilomermis leioderma* n. gen., n. sp. *1)* Ventral view of male head. *2)* Enface view of male. *3)* Lateral view of female. *4)* Lateral view of vulvar area. *5)* Lateral view of male tail. *6)* Ventral view of male tail. *7)* Lateral view of female tail. *8)* Cross section of male at midbody. *9)* Lateral view of tail of a parasitic juvenile ready to leave host. *10)* Infective-stage juvenile.