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## *Thelastoma endoscolicum* sp. n. (Oxyurida: Nematoda) a Parasite of Earthworms (Oligochaeta: Annelida)

GEORGE O. POINAR, JR.

Department of Entomology and Parasitology, University of California, Berkeley, California 94720

ABSTRACT: *Thelastoma endoscolicum* sp. n. (Oxyurida: Nematoda) is described from the intestine of the earthworm, *Eudrilus eugeniae* Kinberg (Oligochaeta: Annelida) in Africa. The new species can be separated from existing members of the genus *Thelastoma* by the position of the excretory pore, absence of lateral alae in the male, the nonoffset lip cone and female tail spike, tail length and relatively large size of the eggs. This is apparently the first example of a representative of the Oxyurida occurring in a member of the Annelida. Considering the evolutionary primitive status of the annelids and nonspecialized characters of *T. endoscolicum*, it is suggested that this nematode is one of the most primitive members of the family Thelastomatidae and one of the earliest known animal parasitic nematodes.

During an investigation of the nematodes associated with African earthworms, a member of the genus *Thelastoma* was discovered living in the intestine of *Eudrilus eugeniae* Kinberg. This apparently is the first time an annelid has been found serving as host to an oxyurid nematode. The invertebrate parasitic members of this order normally occur in the intestinal tract of insects and millipedes.

The nematodes found in the intestine of *E. eugeniae* were studied and found to be undescribed. The present paper describes this species, compares its morphology with other members of the genus, and discusses its evolutionary position.

### Materials and Methods

Specimens of *Eudrilus eugeniae* Kinberg collected from a ditch outside the laboratory at Bouaké, Ivory Coast, West Africa were maintained in a container of soil and periodically dissected in a 1.0% NaCl solution. Nematodes removed from the intestine were heat-killed, fixed in TAF (triethanolamine, formalin, and water) and processed to glycerin.

### Results

Nematodes removed from the intestine of *E. eugeniae* were found to be a new species in the genus *Thelastoma* and are described

below. In the quantitative portion of the description, the first figure after the character represents the average value for that character, while the numbers in parenthesis represent the range. All measurements are in microns unless otherwise specified.

*Thelastoma endoscolicum* sp. n.  
(Thelastomatidae: Thelastomatoidea:  
Oxyurida)

**ADULTS:** Head with eight labial papillae and paired amphids; lips united into a mouth cone which is not set off from the rest of the body; stoma reduced; pharynx lacking median bulb; basal valvated bulb present; vulva located slightly anterior to middle of body; ovaries paired; spicule present; male with four pairs of genital papillae; lateral alae absent.

**FEMALE** (N = 10) (Figs. 1, 3, 4): Body covered with cuticular annulations approximately 7.5 (6.5–9.1) microns apart; total length 2.39 (2.00–2.54) mm; width near vulva 132 (120–140); lip cone small, not set off from remainder of head; height of lip cone 5.3 (5.0–6.0); width of lip cone 19.6 (18.2–31.0); lip cone bearing eight papillae and two lateral amphids; length of stoma 6.9 (6.5–7.8); width of stoma 7.0 (6.5–7.8); length of pharynx 378 (323–450); distance from tip of head to nerve ring 154 (138–175); distance from tip of head to excretory pore 312 (269–362); percent vulva 41 (30–46) from head; length of vagina 149 (133–170); length of tail 514 (440–640); tail gradually tapering to a fine point; vagina directed anteriorly; amphidelphic; both ovaries directed posteriorly; eggs 77 (71–92) by 50 (46–58); phasmids inconspicuous.

**MALE** (N = 4) (Figs. 4, 5, 6): Total length 620 (560–680); greatest width 41 (39–49); length stoma 3.0 (2.6–3.9); width stoma 2.6; length of pharynx 131 (124–149); distance from tip of head to nerve ring 76 (71–87); distance from tip of head to excretory pore 162 (150–171); length of genital cone, 9.3 (6.2–12.4); length single spicule 27 (26–29); testis single, reflexed; tail with four pairs of papillae, three pairs on genital cone and one pair located further down on the tail; length of tail 68 (65–74); length of tail spine 67 (65–74); distance from base of spine to fourth

pair of papillae 22 (21–34); distance from fourth pair of papillae to tip of tail 43 (37–55); lateral alae absent; phasmids inconspicuous.

**TYPE HOST:** *Eudrilus eugeniae* Kinberg (Eudrilidae: Oligochaeta) (intestine).

**TYPE LOCALITY:** Bouaké, Ivory Coast, West Africa.

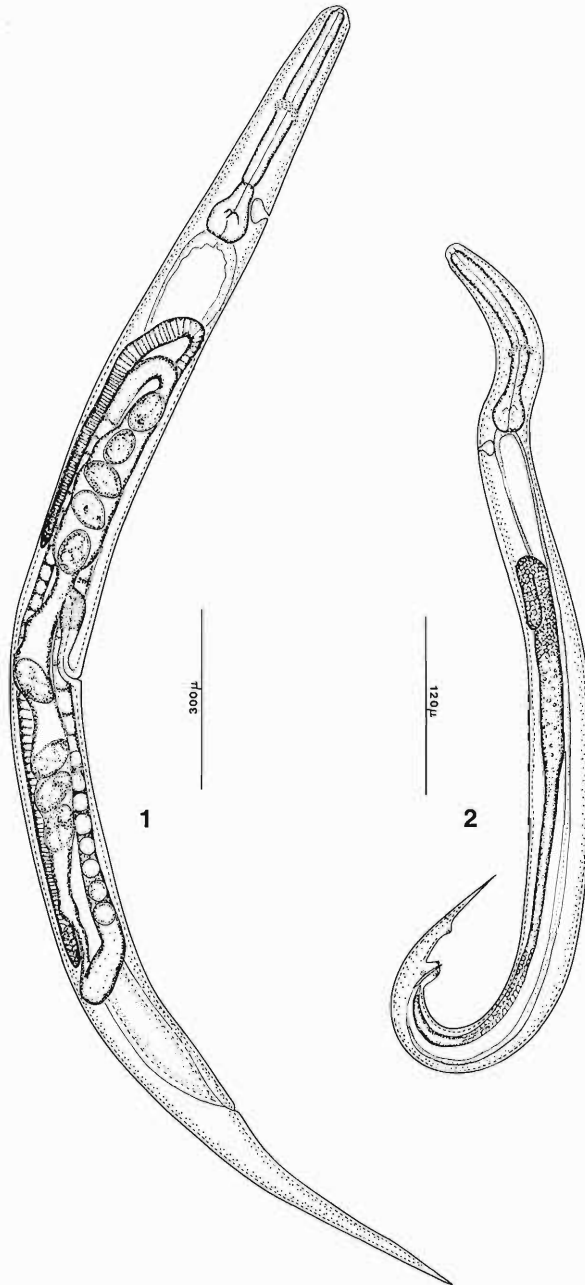
**TYPE SPECIMENS:** Deposited in the Nematology Collection at the Division of Nematology, University of California, Davis, California.

**DIAGNOSIS:** There are approximately 40 species in the genus *Thelastoma*. This genus has been placed in the subfamily Thelastomatinae, family Thelastomatidae, and superfamily Thelastomatoidea by Skrjabin et al. (1966). Diagnostic generic characters for *Thelastoma* are two ovaries, vulva in middle portion of body, male tail longer than anal body width and the absence of metarhabdial teeth, cuticular alae in the female, cuticular scales and egg filaments. *Thelastoma endoscolicum* can be separated from most other species in the genus by the slightly anterior position of the vulva, the lip cone and female tail spike not offset from the rest of the body, the length of the tail in both sexes, the absence of lateral alae in the male, the relatively large size of the eggs, and the anterior position of the excretory pore in the female. The discrepancy in the position of the excretory pore in male and female specimens is commonly found in this group.

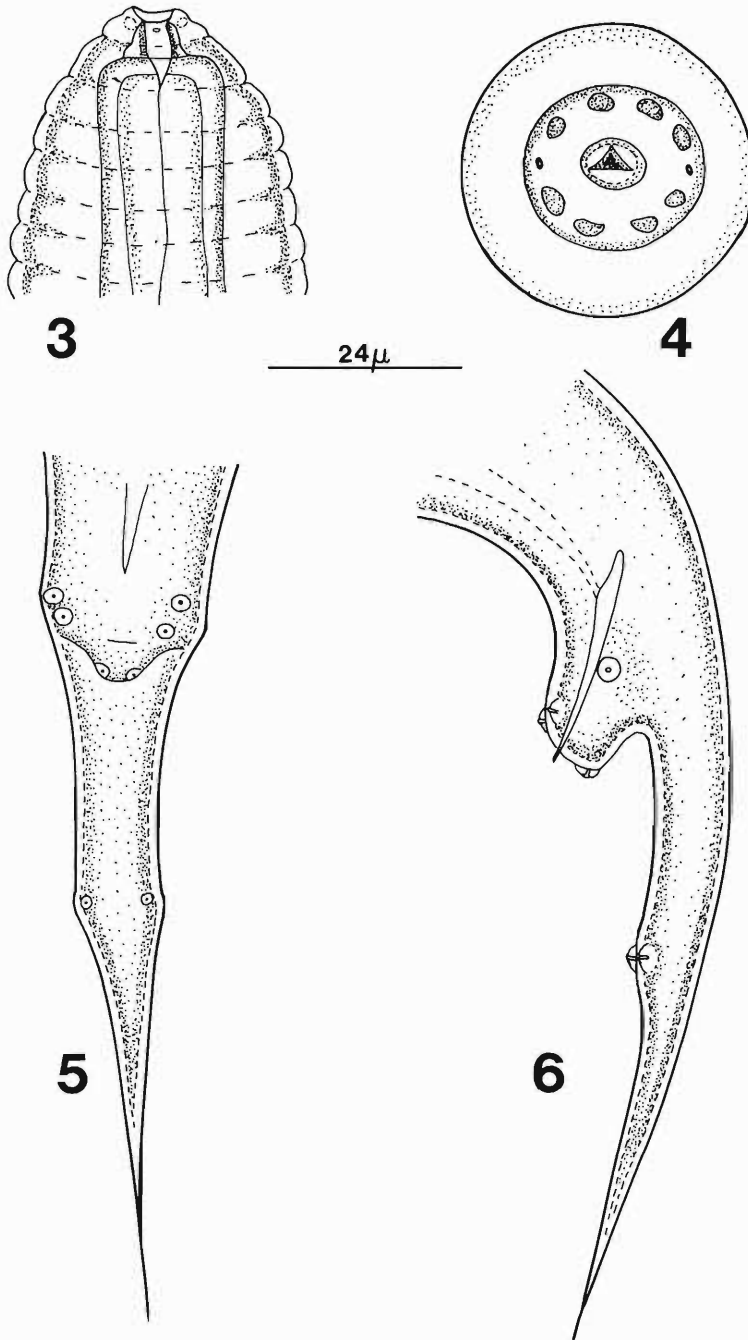
The species of *Thelastoma* most similar to *T. endoscolicum* are *T. palmettum* Chitwood and Chitwood (1933), which possesses a wide bowl-shaped stoma not characteristic of the present species; *T. platyrhaci* (Parona, 1896), which lacks a genital cone and the female possesses a distinct isthmus portion to the pharynx; and *T. rovinjense* Leibersperger (1960), whose genital papillae differ from those of *T. endoscolicum* by having the second pair adjacent to the anal opening and the third pair fused.

**BIOLOGICAL OBSERVATIONS:** Out of a sample of 10 specimens of *E. eugeniae*, five harbored specimens of *T. endoscolicum* in their intestines. Up to five nematodes were recovered from a single earthworm.

The nematode life cycle is probably similar to that of other oxyurid parasites of invertebrates, i.e., eggs passed out of parasitized hosts



Figures 1, 2. *Thelastoma endoscolicum* sp. n. 1. Lateral view of adult female. 2. Lateral view of adult male.



Figures 3-6. *Thelastoma endoscolicum* sp. n. 3. Lateral view of female head. 4. "En face" view of female. 5. Ventral view of male tail. 6. Lateral view of male tail.

serve as the infective stage for healthy earthworms. It is surprising that the relatively large eggs are so thin-walled, however. How this would affect their survival in the soil is not known.

*Thelostoma endoscolicum* shares its location in the intestine of *E. eugeniae* with another nematode belonging to the Drilonematoidea. The description and life cycle of this latter nematode will be presented separately.

### Discussion

Chabaud (1974) raised the Oxyurida to ordinal level and Skrjabin et al. (1966) listed four superfamilies whose members occur in arthropods. To the author's knowledge, the present species is the first example of a member of the Oxyurida occurring in a member of the phylum Annelida. All other invertebrate parasitic species have been found in millipedes and insects.

The Oxyurida represent one of the most ancient groups of animal parasitic nematodes, and the invertebrate parasitic members undoubtedly were the first to arise from terrestrial Rhabditida. Inglis (1965) considers the Thelastomatidae as the most primitive member of the Oxyurida. Since the annelids are the most primitive coelomates known (Raymond, 1950), with fossil remains in the lower Cambrian, whereas insects and millipedes represent the higher arthropods that appeared later in the Devonian, it is possible that *T. endoscolicum* represents one of the most primitive members of the Oxyurida and thus one of the earliest known animal parasites. Unfortunately, the separation of the Oxyurida from the Rhabditida seems to be very ancient with no known transitional forms. Primitive and advanced characters are difficult to judge in the Thelastomatidae, whose members show

little variation. However, the absence of lateral alae, the separation of the third pair of genital papillae, and the absence of an offset lip cone might be regarded as primitive, non-specialized characters which are not commonly found in other thelastomatids. This would support the contention that *T. endoscolicum* is a very primitive member of the thelastomatids.

### Acknowledgments

The author wishes to thank Dr. Bernard Philippon for providing laboratory space in Bouaké, Ivory Coast, West Africa for this study.

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