

Description of *Hoplolaimus magnistylus* n. sp. (Nematoda: Hoplolaimidae)¹

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Abstract: *Hoplolaimus magnistylus* n. sp. is described and illustrated. It was found in soil about roots of soybean in Arkansas and Mississippi. It is similar to *H. galeatus* and *H. concaudajuvenicus*. It differs from *H. galeatus* in all stages primarily by possession of a longer stylet. It differs from *H. concaudajuvenicus* by the possession of rounded tails in second-stage juveniles vs. conically pointed tails with acute termini, having fewer subdivisions in female basal lip annules, and the greater distance from female anterior end to posterior end of esophageal lobes. Morphometrics and descriptions of second-, third-, and fourth-stage juveniles are given. A paratype female of *H. sheri* was examined and found to have six esophageal gland nuclei. *Key words:* taxonomy, morphology, new species.

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Soil samples from experimental plots in field G-13 of the Cotton Branch Experiment Station, Marianna, Arkansas, yielded, among other nematodes, specimens of an undescribed species of *Hoplolaimus* Daday. Up to 240 specimens per pint of soil were recovered from these samples taken in May 1980. During 1980, second-, third-, and fourth-stage juveniles and males and females were recovered from the plots. The

plot area has been partially (1/3) in corn (*Zea mays* L.) with the remainder (2/3) in soybean (*Glycines max* L.) in 1979. This species is most similar to *H. galeatus* (Cobb) Thorne (6) and *H. concaudajuvenicus* Golden and Minton (2), but it differs from each in certain characteristics.

MATERIALS AND METHODS

This new species is described with morphometrical data on second-, third-, and fourth-stage juveniles and adults of both sexes presented. Juvenile stages were differentiated by use of stylet length, body length, and genitalia development. The specific name is a compound Latin word: *magni* = great or large, *stylus* = stylet.

The nematodes were killed and fixed with hot 2% formalin and processed to glycerin by a modified Seinhorst rapid

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method as described by Robbins (4). Materials and methods for scanning electron microscopy were as described by Sher and Bell (7). The SEM used for specimen examination and study was an ISI-60. All measurements in the following text are in μm , unless otherwise stated; ratios and counts have no units. The mean is given first, followed in order by the range, standard deviation, and coefficient of variations (as a percentage) in parentheses. Only mean and range are given in descriptive text.

DESCRIPTION

Hoplolaimus magnistylus, n. sp.

MEASUREMENTS (30 ♀♀, Fig. 1A,B, D-H; Fig. 3): Length = 1.58 mm (1.36–1.97; 0.15; 9.7) a = 30.2 (26.4–36.9; 2.4; 8.0); b = 9.1 (7.5–10.8; 0.9; 10.0); b' = 6.6 (5.4–8.5; 0.92; 14.0); c = 54.6 (38.9–82.2; 12.3; 22.4); c' = 0.71 (0.50–1.08; 0.73; 16.4); V = 53.9% (48.4–61.1; 2.65; 4.9); stylet = 55.7 (52–61; 1.9; 3.5); stylet cone = 28.9 (25–31; 1.6; 5.5).

HOLOTYPE (♀): Length = 1.63 mm; a = 31.3; b = 9.1; b' = 6.2; c = 74.0; c' = .55; V = 26.8; 51.3%, 25.3; stylet = 57; stylet cone = 31; right scutellum = 34% of body length; left scutellum = 80% of body length; anterior end to excretory pore distance (ex.p.) = 205; distance of dorsal gland orifice from base of stylet knobs (DGO) = 5; hemizonid = 14 annules posterior to ex.p.; median bulb (m.b.) length = 26; m.b. width = 22; annules = 2.9 wide in neck region, 2.2 wide at midbody; tail annules = 14; tail length = 22, anal body diameter = 40.

DESCRIPTION OF FEMALES (paratypes): Body cylindrical, vermiform, tapering slightly at ends. Midbody width 52 (45–59). Head definitely set off, with massive cephalic framework, usually bearing 5 (4–6) lip annules and the oral disc. Labial region exhibiting sexual dimorphism, lower and more conical than male's when viewed laterally, and circular en face (SEM) (Fig. 1, Fig. 3). The oral disc is surrounded by a lip annule which is separated into six sections—two subdorsal, two subventral, and two reduced lateral sectors. Posteriorly, the head region is mostly tessellate. The basal

lip annule is subdivided into 28 (22–34) (n = 6) unequal blocks with occasional blocks subdivided horizontally (Fig. 3). Cuticular annulation at midbody distinct measuring 2 (1.8–2.2) wide; subcuticular annulation distinct, about half as wide as outer cuticular annules. Lateral field 15 (13–16) wide, areolated, and has four lines most of length, narrowing to two at level of ovate metacarpus, ending near level of stylet base. Stylet long and robust, basal knobs tulip shaped 8 (7–9) long, 9.5 (8.5–10) wide (n = 10). DGO about 5 from base of stylet knobs. Esophageal glands with three nuclei. Esophago-intestinal junction extends 175 (140–198) from anterior end. Esophageal lobes extend 248 (210–298) from anterior end, lobes extending 78.2 (50–120) beyond esophago-intestinal junction in prime specimens, atrophied in older specimens. Distinct nerve ring encircles isthmus. Cephalids present on anterior portion as illustrated (Fig. 1A–C). Excretory pore prominent, 190 (156–210) from anterior end. Hemizonid large, about two annules in length, located one or two annules anterior to excretory pore. Hemizonion small, located 13 (9–17) annules posterior to excretory pore. Scutella (phasmids) large (5–6) and conspicuous, variable in position. Right phasmid located anterior to vulva on two-thirds of the specimens. Vulva prominent, near midbody, a deep transverse silt. Epiptygma generally absent; if present, inconspicuous. Ovaries two, outstretched (amphidelphic). Spermatheca round to oval, usually with many sperm. Tail hemispherical to conoid-hemispherical, 30.1 (20–42) in length.

MEASUREMENTS (20 ♂♂, Fig. 1C, I; Fig. 4): Length = 1.49 mm (1.32–1.63; 0.09; 6.0); a = 30.5 (27.3–34.1; 1.8; 6.0); b = 8.7 (7.8–9.5; 0.5; 6.1); b' = 6.1 (5.2–7.3; 0.5; 8.1); c = 42.9 (36.6–53.4; 5.1; 11.9); stylet = 50.8 (46–57; 2.2 4.4); stylet cone = 27.2 (24–31; 1.6; 6.0); spicules = 53.9 (52–58); 2.1; 3.9); gubernaculum = 27.2 (24–30; 1.5; 5.6).

ALLOTYPE (♂): Length = 1.57 mm; a = 29.6; b = 8.7; b' = 6.4; c = 43.6; stylet = 52; stylet cone = 28; spicules = 55; gubernaculum = 28; right scutellum = 31.1% of length; left scutellum = 82.5% of length; DGO = 5; hemizonion = 12

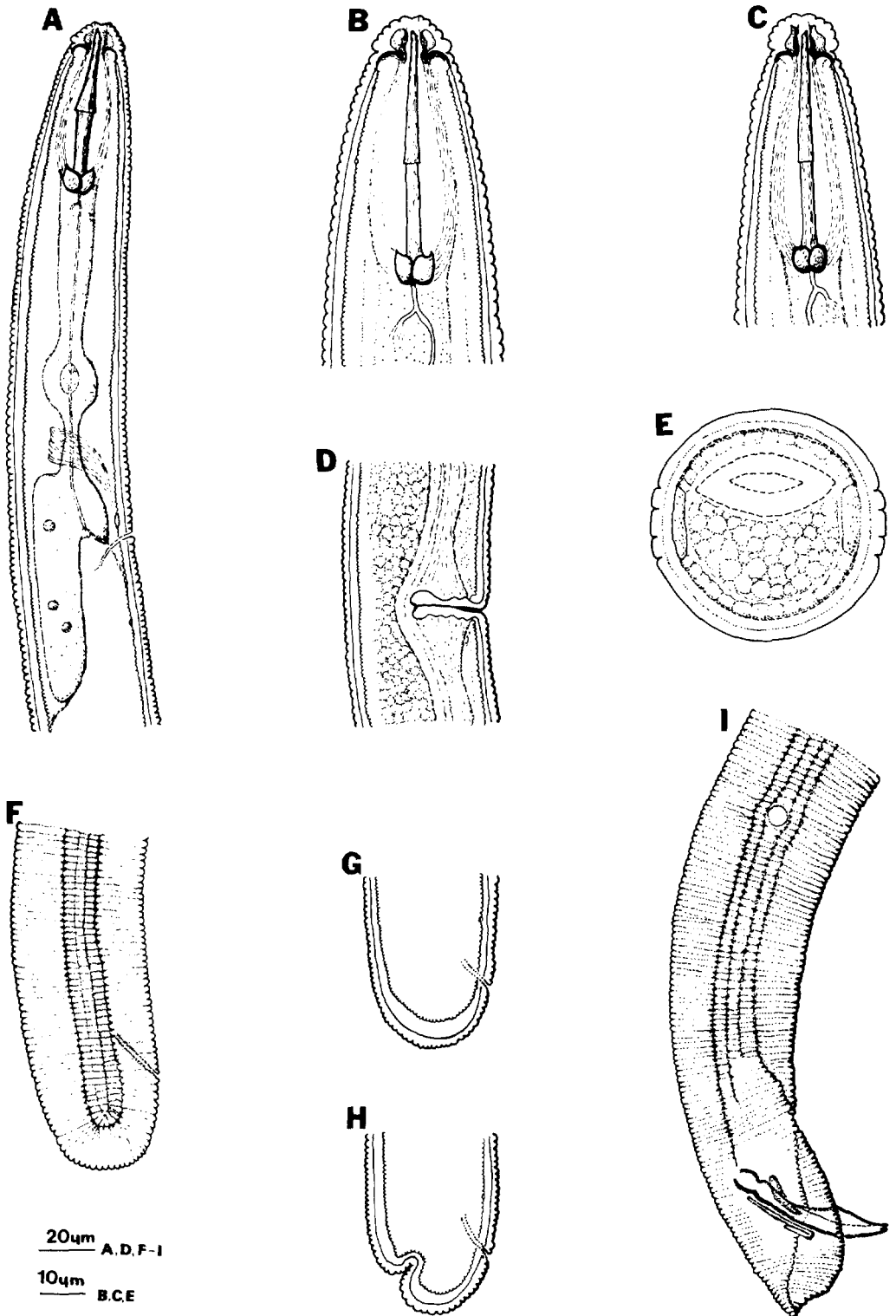


Fig. 1. *Hoptolaimus magnistylus*, n. sp. A) Anterior of female. B) Female head. C) Male head. D) Vulval region. E) Cross-section through uterus (upper half of drawing) and intestine (lower). F) Female posterior. G-H) Female tail variations (H is abnormal). I) Male tail.

annules posterior to ex.p.; m.b. length = 25, width = 20; annules = 2.9 wide in neck region, 2.2 wide at midbody; tail length = 36.

DESCRIPTION OF MALES (paratypes): Body shape similar to female. Midbody width about 48 (42–53). Labial region showing sexual dimorphism, higher and rounder than female's when viewed laterally, squarish when viewed en face by SEM (Fig. 4). Cuticular annulation at midbody about 2 wide, distinct. Lateral field areolated, four lines. Testis one, outstretched anteriorly. Spicules, gubernaculum, and bursa large and conspicuous. Right scutellum was anterior to left scutellum in all paratype males observed (other collections had either scutellum anterior).

MEASUREMENTS (6 second-stage juveniles, 15 third-stage juveniles, 14 fourth-stage juveniles): see Table 1.

DESCRIPTION (paratypes): Body shape much like female. Successive stages larger than preceding stages. The tails of all observed juvenile stages are hemispherical to conical-hemispherical. Genital primordia four-celled in second-stage juveniles (Fig. 2A). Development of genitalia starting in third-stage juvenile (Fig. 2B, C). Sexual difference in genitalia obvious in fourth-stage juveniles (Fig. 2D, E).

HOLOTYPE (♀): Collected by R. T. Robbins at the Cotton Branch Experiment Station, Marianna, Arkansas, on 2 June 1980. Slide T-352t United States Department of Agriculture Nematode Collection (USDANC), Beltsville, Maryland.

ALLOTYPE (♂): Slide T-353t. Same data and collection as holotype.

PARATYPES (♀♀, ♂♂, second-, third-, and fourth-stage juveniles): USDANC, Beltsville, Maryland; California Nematode Survey Collection, Davis; Department of Nematology Collection, Riverside, California; Nematology Department, Rothamsted Experimental Station, Harpenden, Herts. England; Laboratorium Voor Nema-

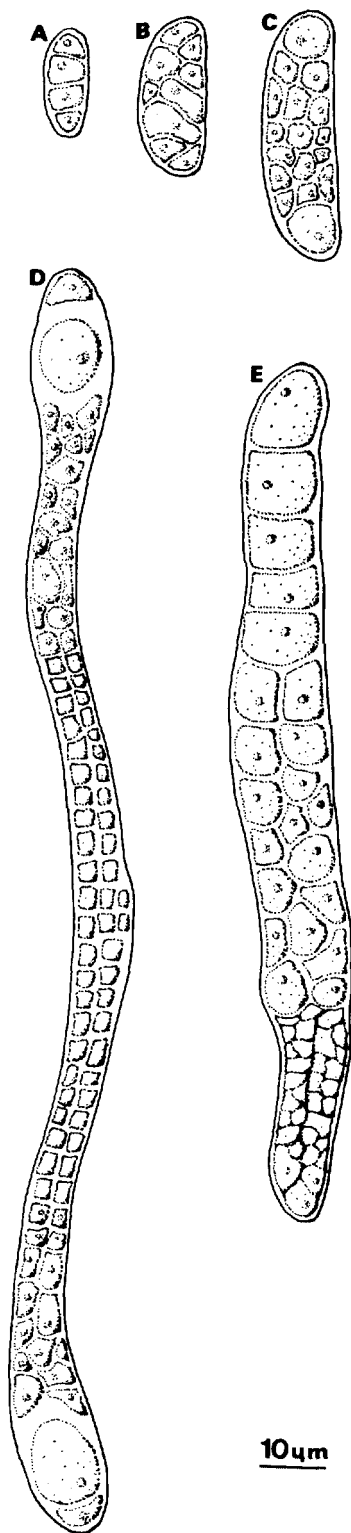


Fig. 2. *Hoplolaimus magnistylus*, n. sp. A) Genital primordia, second-stage juvenile: B-C) Developing genitalia of third-stage juveniles. D) Developing genitalia of fourth-stage female. E) Developing genitalia of fourth-stage male. (Ventral is to the right in these illustrations.)

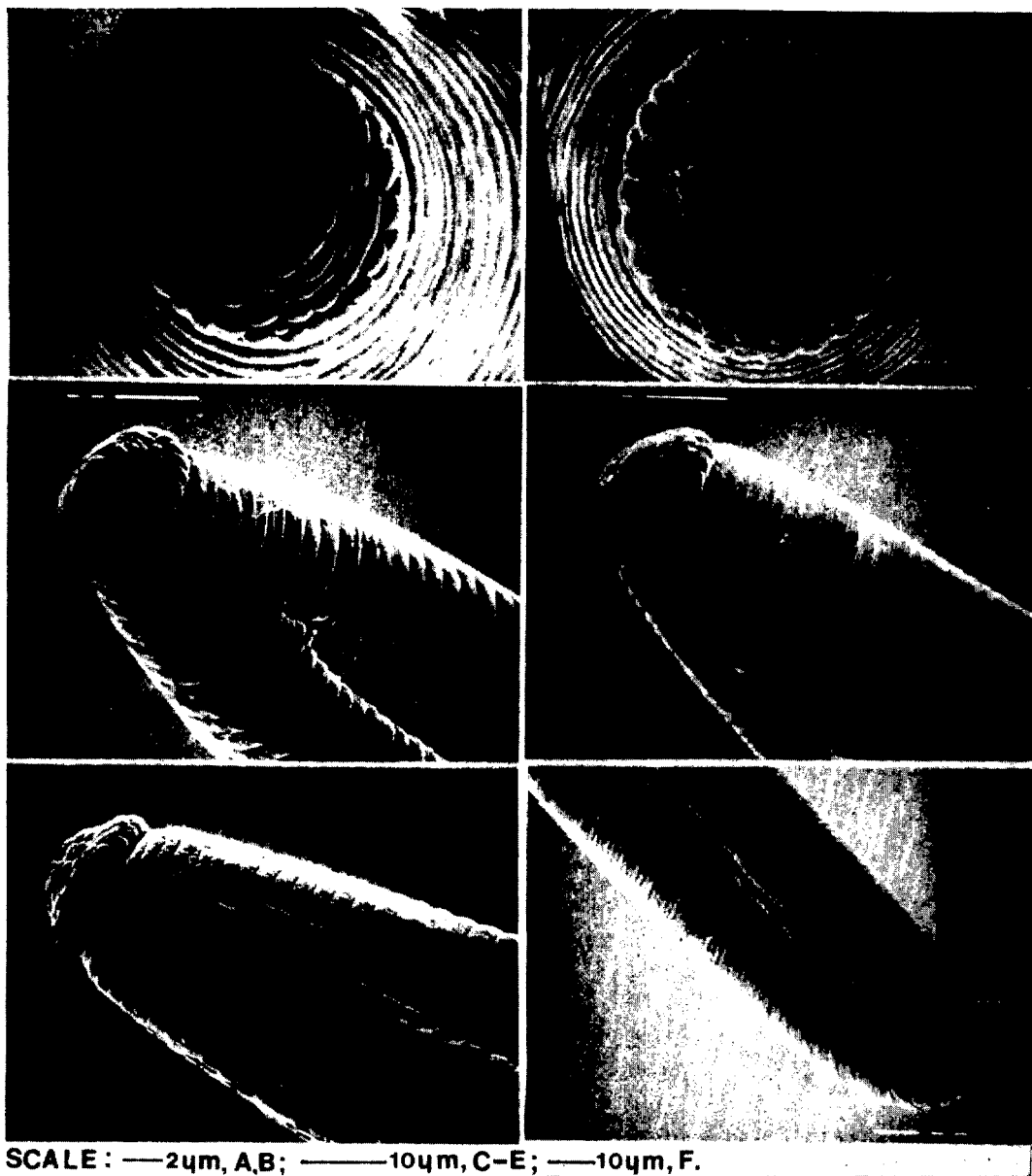


Fig. 3. SEM pictures of *Hoplolaimus magnistylus* n. sp. females. A-B) En face views. C-D) Slightly oblique lateral views of head. E) Lateral view of head. F) Posterior region.

tologic, Wageningen, The Netherlands; Laboratoire des vers, Museum, 61 Rue de Buffon, Paris; Canadian National Collection of Nematodes, Ottawa; the remaining specimens retained in the collection of the author.

TYPE HOST AND LOCALITY: Soil from experimental plots in field G-13, Cotton Branch Experiment Station, Marianna, (Lee County) Arkansas, planted partly in corn (1/3) and soybean (2/3) in 1979.

DISTRIBUTION: Found on sassafras (*Sassafras albidum* [Nutt.] Nees) and wild plum (*Prunus americana* Marsh.) near the type locality (Lee County, Arkansas). Found in soil about the roots of soybean or in soil after harvesting soybeans in Arkansas Nematode Assay Service samples in 1980 or 1981 from the following Arkansas counties: Chicot, Clay, Desha, Phillips, and St. Francis. Found in soil in 1981 about or after soybeans by Mississippi Nematode

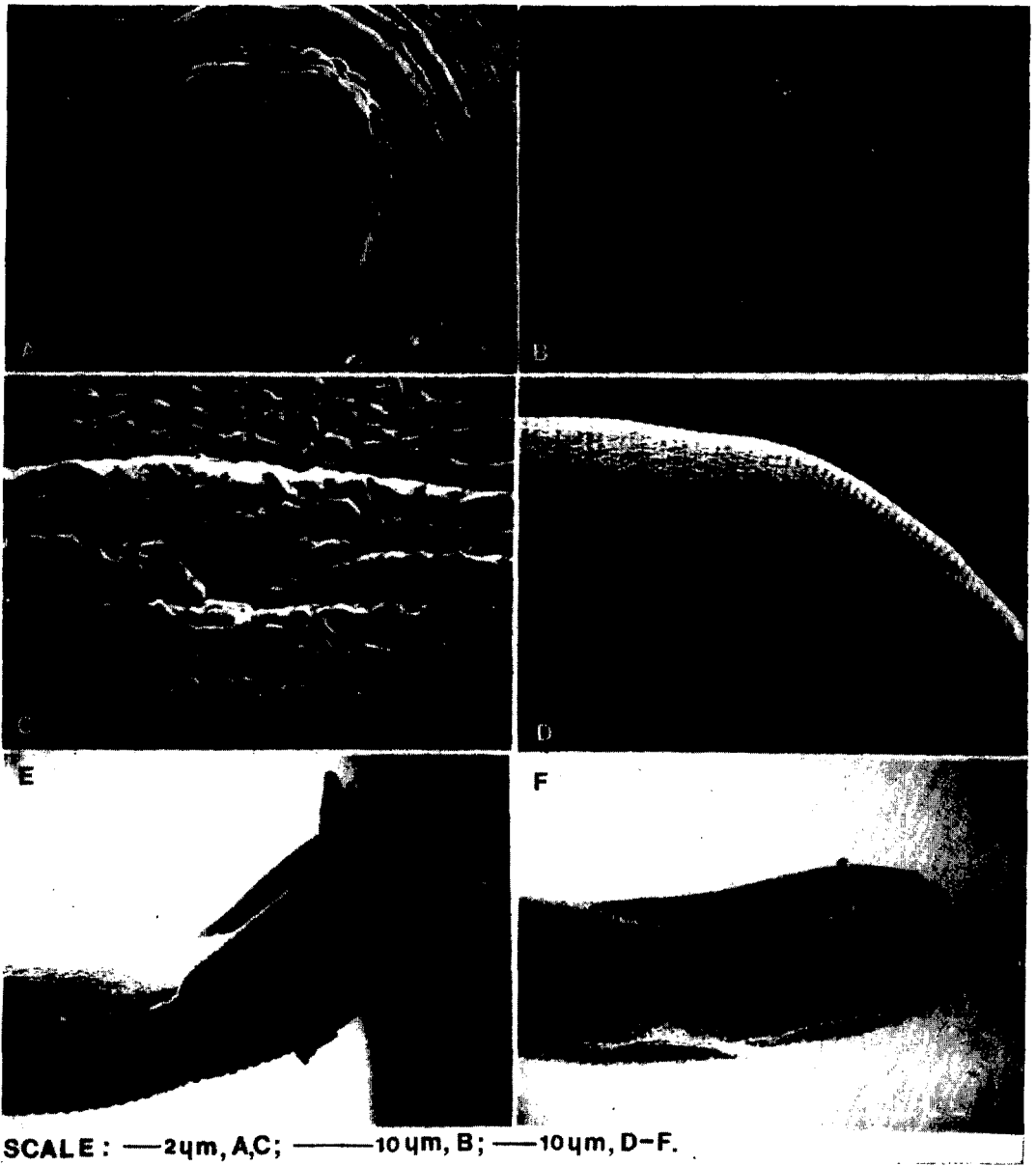


Fig. 4. SEM pictures of *Hoplolaimus magnistylus* n. sp. males. A) En face. B) Lateral view of head. C) Scutellum. D-E) Lateral views of tails. F) Slightly oblique, ventral view of tail.

Assay Service in the following Mississippi counties: Alcorn, Benton, Chickasaw, Hinds, Leake, Lee, Madison, Pontotoc, Rankin, Union, and Yazoo. Also found after cotton (*Gossypium hirsutum* L.) in Union County, Mississippi.

DIAGNOSIS: *Hoplolaimus* with the afore-mentioned measurements and characteristics. There are two closely related species. It differs from *H. galeatus* by (i) a longer female stylet (52-61 vs. 43-52); (ii)

a longer male stylet (46-57 vs. 40-48); (iii) the more posterior hemizonion (9-17 vs. 5 annules posterior to excretory pore); (iv) in lacking or having an inconspicuous epiptygma vs. having a conspicuous epiptygma. It differs from *H. concaudajuvencus* by (i) the longer second-stage juveniles (374 [320-426] vs. 283 [258-312]); (ii) the longer second-stage juvenile stylet (29.5 [28-32] vs. 26.2 [24-28]); (iii) a hemispherical tail terminus in second-stage juveniles vs. con-

Table 1. Measurements, in μm , and ratios of second-, third-, and fourth-stage juveniles of *Hoplolaimus maginstylus*.

Measurement or ratio	Stage of juveniles		
	Second	Third	Fourth
length	374 (320-426)	629 (484-745)	976 (801-1158)
a	16.5 (14.5-19.4)	21.0 (17.8-24.5)	24.1 (22.1-26.1)
b	4.1 (3.8-4.5)	4.6 (3.9-4.9)	6.6 (5.0-7.5)
b'	2.8 (2.5-3.1)	3.6 (3.1-4.1)	5.0 (4.1-5.6)
c	20.0 (17.1-22.7)	30.2 (25.5-33.9)	36.1 (27.8-42.9)
c'	1.1 (0.9-1.2)	0.84 (0.73-1.00)	0.82 (0.64-1.25)
stylet	29.5 (28-32)	37.5 (36-41)	46.4 (41-49)
width*	22.7 (22-23)	30 (24-36)	41.8 (34-48)
tail length	19 (18-21)	21.1 (18-27)	27.4 (21-40)

*At mid-body.

ically pointed tail with acute terminus; (iv) having fewer subdivisions in female basal lip annules (22-34 vs. 36); (v) the greater distance from female anterior end to posterior end of esophageal lobes (248 [210-298] vs. 187 [138-235]); and (vi) the smaller female midbody annules (≈ 2 vs. ≈ 3).

DISCUSSION

The genus *Basirolaimus* (5) was recently proposed to include the *Hoplolaimus* species with six esophageal gland nuclei (EGN). M. Luc (3) has since rejected *Basirolaimus*, considering it a junior synonym of *Hoplolaimus*. I fully support the action of Luc.

Hoplolaimus sheri Suryawanshi (8) was described as having five EGN. Baqri and Khera (1), without examining the original specimens, later redescribed *H. sheri* as having six EGN, but used specimens from a different location and host. I recently examined the single paratype female of *H. sheri* on deposit in the USDANC, Beltsville, Maryland. I found it to have six EGN. The specimen is rotated and flattened such that I could not positively distinguish the lateral line(s) throughout the body length.

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