



Description of *Paradorylaimus dorsocaudali*, New Species (Nematoda: Dorylaimida) with Notes on *Plectus* (*Ceratoplectus armatus*) from Pakistan

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ABSTRACT

A new species of the genus *Paradorylaimus* Andrassy 1969 is described and illustrated from Pakistan. *Paradorylaimus dorsocaudali* new species differ from all known species of the genus in having smaller body length, tail length and odontostyle length. The new species is characterized by 1.3-1.6 mm long female body, lip region truncate, offset by weak depression, odontostyle 21.4-23.2 μ m long is and 2.8-3 μ m wide, twice as long as the lip region width; vulva longitudinal; female tail 5.9-6.6 anal body diameter long, dorsally curved; prerectum 1.7-2.6 anal body diameter long. *Plectus* (*Ceratoplectus*) *armatus* (Butschli, 1873) Andrassy, 1984 is recorded for the first time in Pakistan and is briefly described and illustrated.

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Authors' Contribution

NK conceived and designed the study and drafted the manuscript. MI collected, analysed and processed samples. SF critically reviewed and revised the article.

Key words

Paradorylaimus, *Ceratoplectus*, Nematode, *Plectus*.

INTRODUCTION

During surveys of nematode fauna from different vegetable crops of Pakistan, specimens of undescribed species of the genus *Paradorylaimus* (Andrassy, 1969) was encountered. This species is described as *Paradorylaimus dorsocaudali* new species collected from soil around the roots of sugar beet (*Beta vulgaris* L.).

The genus *Paradorylaimus* was proposed by Andrassy (1969) for the species *P. parafecundus* (de Connick, 1935) (type species). He based its diagnosis mainly on the presence of a short prerectum, 10-20 supplements in male and longitudinally striated cuticle. Later on, Loof and Coomans (1986) considered *Paradorylaimus* synonym of *Laimydorus* (Siddiqi, 1969). The validity of the genus was also considered by Vinciguerra (2006) and Andrassy (2009) once again confirmed his opinion on the validity of the genus *Paradorylaimus* in the subfamily Afrodorylaiminae of the family Dorylaimidae based in the arrangement of labial papillae. Orsello *et al.* (2012) also agree with Andrassy's opinion on the validity of the genus and so far ten species of the genus have been recorded. Emended diagnosis is also provided along with the compendium and key to the valid species.

During the recent survey a new species of the genus *Paradorylaimus* (Andrassy, 1969) was identified from Pakistan. It is described here as *P. dorsocaudali* n. sp.

A known species of the genus *Plectus* (*Ceratoplectus*) *armatus* (Butschli, 1873) Andrassy (1984) is also reported as a new record from Pakistan.

MATERIALS AND METHODS

The nematode were extracted from soil samples by Cobb's sieving and decantation technique (Cobb, 1918) and by a modified Baermann (1917) funnel technique. Nematodes so obtained were killed and fixed in hot 4% formalin, dehydrated to glycerin by a slow evaporation method (Seinhorst, 1962) and mounted on slides in anhydrous glycerin. Measurements were taken using an ocular micrometer and line illustration were made using a drawing tube attached to the compound microscope. Photographs of new species were made by a Nikon DS-Fi 1 camera.

Paradorylaimus dorsocaudali, new species (Figs. 1, 2)

Measurements

For measurements see Table I.

Description

Female

Body of medium length, straight to 'S' shaped. Cuticle with very fine transverse striae, 3-3.5 μ m thick at mid body and 2-2.2 μ m at level of odontostyle. Lateral chords occupying about one half of maximum body diameter.

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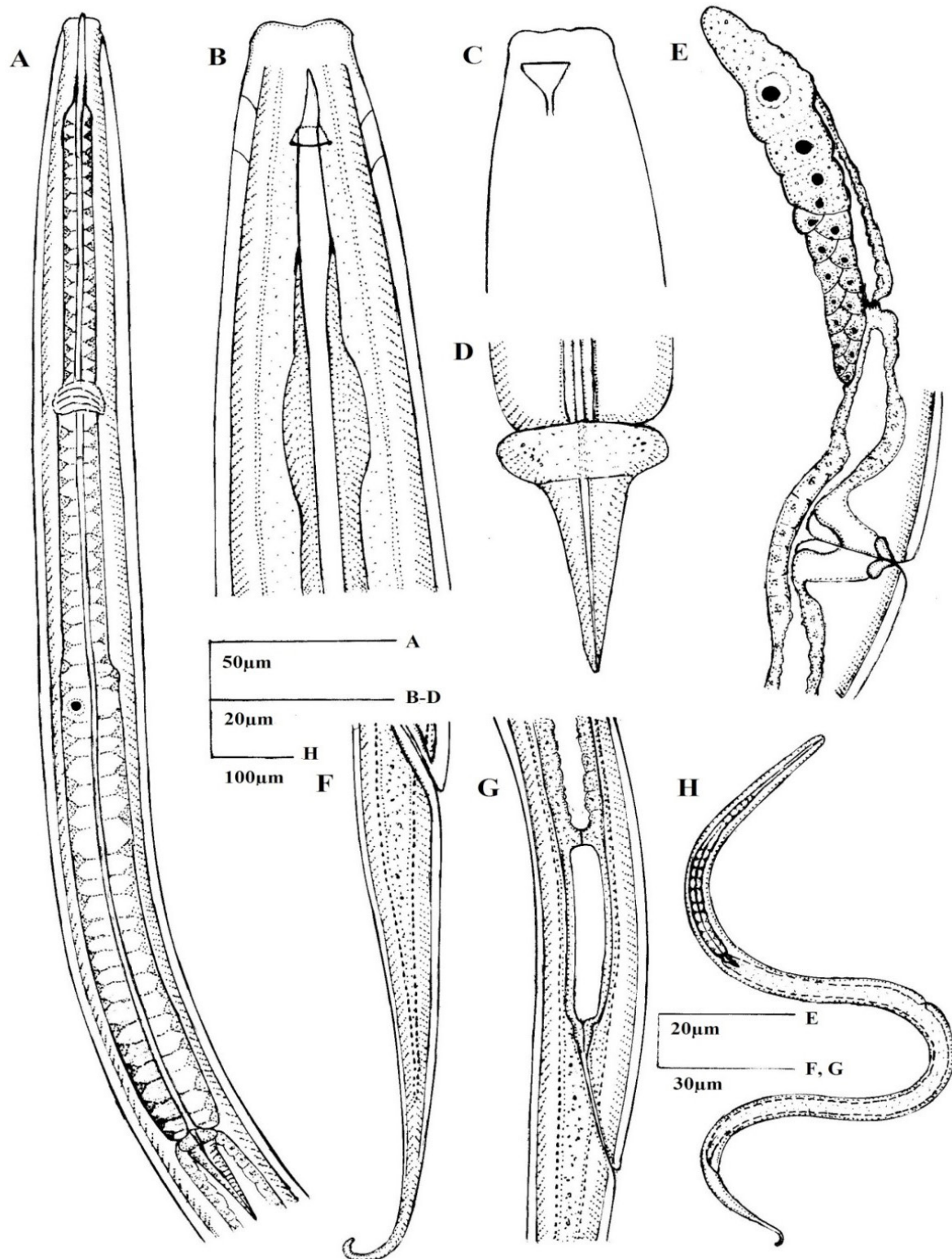


Fig. 1. *Paradorylaimus dorsocaudali* new species. Female, A, pharyngeal region; B, anterior region; C, anterior end showing amphid; D, cardiac region; E, female genital branch (anterior); F, female posterior end; G, female posterior region; H, entire female.

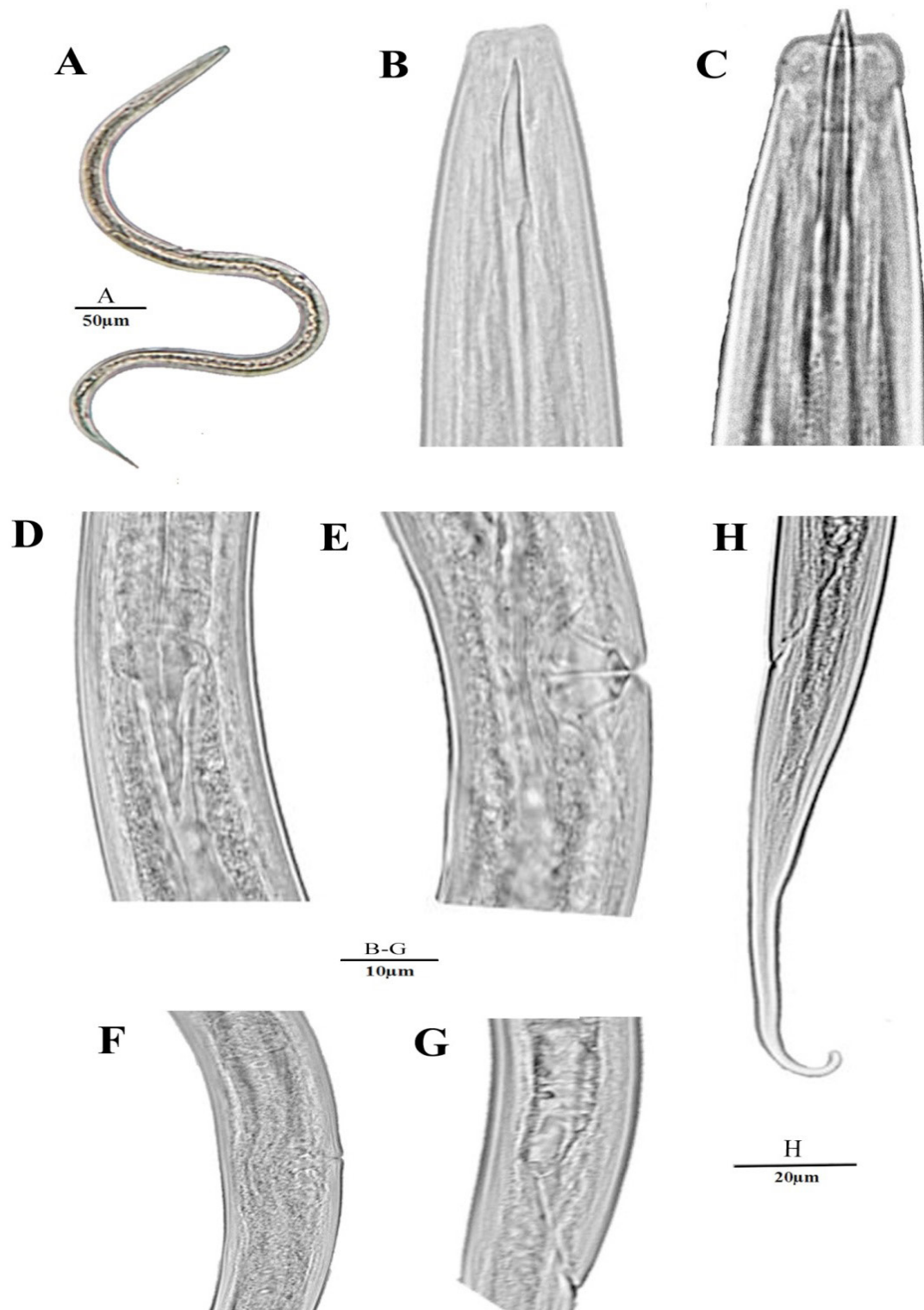


Fig. 2. Light photomicrographs of *Paradorylaimus dorsocaudali* new species. Female, A, whole body; B, anterior region; C, anterior region arrow showing guiding ring; D, cardiac region; E-F, vulval region; G, posterior region showing rectum and prerectum; H, tail region.

Table 1.- Morphometrics of *Paradorylaimus dorsocaudali* n. sp. All measurements in μm (except L.). Values in the form of Mean \pm SD (range).

Characters	H	Paratypes
n	-	8
L (mm)	1.62	1.51 \pm 0.1 (1.30-1.66)
a	43.2	38.2 \pm 0.3(35.4-44.5)
b	3.9	3.8 \pm 0.27(3.3-4.1)
c	11.3	11.0 \pm 0.7(9.9-11.8)
c'	6.4	6.3 \pm 0.21(5.9-6.6)
V	49.1	49.7 \pm 1.1(48.6-51.3)
G ₁	8.2	8.6 \pm 0.7(7.4-9.4)
G ₂	9.5	9.5 \pm 0.8(8.7-11.3)
Amphid aperture	5.0	5.0 \pm 0.1(4.8-5.5)
Amphid from anterior end	4.0	3.5 \pm 0.5(3-4)
Lip region width	11.2	11.2 \pm 0(11.2-11.2)
Lip region height	4.0	4 \pm 0 (4.0-4.0)
Odontostyle length	22.4	22.6 \pm 0.6(21.4-23.2)
Odontostyle width	2.8	2.9 \pm 0.1 (2.8-3.0)
Odontophore length	12	12.5 \pm 1.3 (10-14)
Neck length	408	393.1 \pm 20.2(357-420)
Expanded part of pharynx	184	170.4 \pm 11.0(152-184)
Nerve ring from anterior end	132	130.8 \pm 2.4(126-133)
Guiding ring from anterior end	14.4	14.0 \pm 0.37(13.6-14.4)
Cardia length	38	36 \pm 2.72 (32-40)
Body diameter at neck base	36	34.8 \pm 1.77(31-36)
Body diameter at mid body	37	36.6 \pm 2.24 (32-38.4)
Body diameter at anus	23	21.9 \pm 1.41 (19.2-23)
Anterior ovary	96	87.1 \pm 13.5(70-100)
Posterior ovary	120	95.5 \pm 15.5 (74-123)
Vaginal depth	17	16.5 \pm 1.25 (14-17.6)
Vulva from anterior end	800	774.6 \pm 63.4(653-844)
Prerectum length	44	45.4 \pm 3.25 (40-50)
Rectum length	40	38.3 \pm 4.39 (30-43.2)
Tail length	144	138 \pm 5.88 (130-144)

H, holotype.

Two dorsal and two ventral body pores, at odontostyle level. Lip region truncate, slightly offset by depression, lips partly fused, three times as wide as high. Amphid aperture about half of the corresponding body width. Odontostyle dorylaimoid straight, aperture occupying about one third or 25-34% of its length. Odontophore simple linear. Guidingring double, fixed ring located 11-18- μm from anterior end. Pharynx constituted by an anterior slender part, gradually expanding into a wider part which occupies 43-44% of the total pharynx length. Nerve ring surrounding the pharynx at 31-33% of its length. In the pharynx glandularium subventral nuclei small and hardly visible. The location of pharyngeal gland nuclei,

according to Andrassy's formula is as follows: (n=2) DN= 14-16; AS₁=44-54; AS₂= 60-64; PS₁= 124-128, PS₂ 130-130. Cardia composed of a disc like and a conoid part. Reproductive apparatus didelphic, amphidelphic. The reflexed ovaries are generally long occupying 53.3-66% of each genital branch. Oocytes in a single row except at the tip of ovary. Oviduct simple tube, a sphincter is present at the junction oviduct-uterus. Vulva longitudinal with sclerotized tips. Vagina 14-17 μm long and 42-47% of body diameter. Prerectum short 1.78-2.6 anal body diameter long; rectum 1.65-1.9 anal body diameter long. Tail long, gradually narrowing, tail tip dorsally curved, the hyaline part 16-19% of tail length. A dorsal and two ventral pairs of caudal pores are present.

Male

Not found.

Type habitat and locality

Specimens were collected from soil around the rhizosphere of sugar beet (*Beta vulgaris* L.) Islamabad, Punjab Pakistan.

Type material

Holotype (female) Slide No. NNRC 23/1 and paratype slide No. NNRC 23/2-3 (Six females) are deposited in the National Nematode Collection of National Nematological Research Centre, University of Karachi, Karachi, Pakistan. One paratype female have been deposited with the nematode collection at Nematode Taxonomy Laboratory, 24 Brantwood Road, Luton, England, UK.

Etymology

The name refers to the dorsally curved tail tip in females.

Diagnosis and relationships

Paradorylaimus dorsocaudali n. sp differs from all known species of the genus is having smaller body length, tail length and odontostyle length. The new species is characterized by 1.3-1.6 mm long female body, lip region truncate, offset by weak depression, odontostyle 21.4-23.2 μm long and 2.8-3 μm wide, twice as long as lip region width; vulva longitudinal; female tail 5.9-6.6 anal body diameter long, dorsally curved; prerectum 1.7-2.6 anal body diameter long. On the basis of stylet length and 'a' ratio the new species comes close to *P. flagellicaudatus* (Orsello *et al.*, 2012) but differs from it in having shorter tail length, more posterior located vulva and in odontostyle/lip width ratio (Tail length=130-144 vs 465-480 μm ; V= 48.6-51.3 vs 39.7-40.6%; Odontostyle/lip width = 1.9-2 vs. 2.4-2.7).

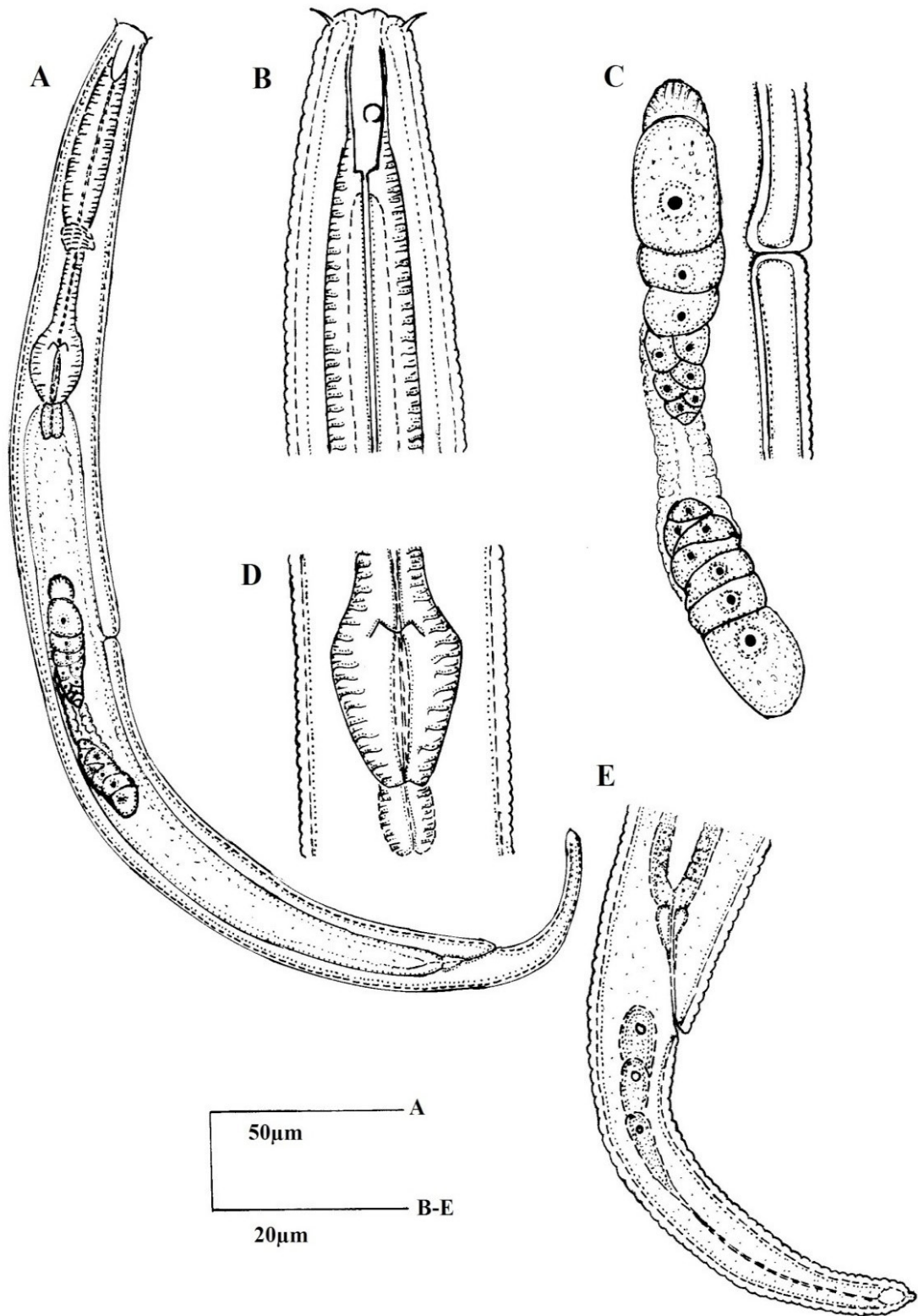


Fig. 3. *Plectus (Ceratoplectus) armatus* (Butschli, 1873) Andrassy, 1984. Female, A, entire body; B, anterior region; C, female reproductive system; D, posterior end of pharynx; E, tail region.

Table II.- Morphometrics of *Plectus* (*Ceratoplectus*) *armatus* (Butschli, 1873) Andrassy, 1984. All measurements in μm (except L). Values in the form of Mean \pm SD (range).

Characters	Females (n=3)
L	365.3 \pm 22.4 (0.34-0.39)
a	16.3 \pm 1.35 (15-17)
b	3.7 \pm 0.25 (3.4-4.0)
c	8.5 \pm 0.35 (8.2-8.9)
c'	3.8 \pm 0.2 (3.6-4.0)
V%	47.5 \pm 2.2 (45.6-50)
Labial region width	9.0 \pm 1 (8-10)
Stoma length	15.5 \pm 0.5 (15-16)
Stoma/lip region width	1.7 \pm 0.1 (1.6-1.8)
Amphid location	8.7 \pm 0.40 (8.2-9.5)
Corpus length	42.6 \pm 1.52 (41-44)
Isthmus length	27.8 \pm 0.47 (27.3-28.2)
Bulbus length	20 \pm 1 (19-21)
Cardia length	7.7 \pm 0.46 (7-8)
Nerve ring from anterior end	54.4 \pm 1.95 (52.4-56.3)
Nerve ring (% of neck)	55.2 \pm 2.0 (52.9-56.8)
Excretory pore from anterior end	60.3 \pm 2.5 (58-63)
Excretory pore (% of neck)	62.1 \pm 3.92 (58.5-66.3)
G ₁ %	5.42 \pm 0.12 (5.2-5.5)
G ₂ %	11.3 \pm 14 (9.9-12.7)
Rectum	13.8 \pm 0.49 (13.3-14.2)
Rectum/anal body diameter	1.26 \pm 0.07 (1.1-1.3)

Plectus (*Ceratoplectus*) *armatus* (Butschli, 1873)
Andrassy, 1984
(Fig. 3)

Measurements

For measurements see Table II.

Description

Female

Body small, curved ventrally upon fixation, cuticle thin 1-1.5 μm thick at midbody, finely annulated. Lateral field consist of three incisures 4-4.5 μm wide at mid body or one-sixth of the corresponding body width. Somatic setae thin, scattered. Labial region 8-10 μm wide, low, not set off. Cephalic setae originating on the anterior margin of the first body annule 3.0-3.5 μm long directed forward, distinctly widened on their basis. Amphids about at middle of stoma, oval 2.5-3.0 μm wide, one fourth of corresponding body width. Stoma cylindrical 15-16 μm long, 1.6-1.8 times as long as labial diameter. Oesophagus 95-99 μm long, 27-28% of body length. Isthmus plump

surrounded by nerve ring at its anterior end. Basal pharyngeal bulb strong oval, with simple valve. Cardia embed in the intestine 7-8 μm long, half as long as bulb or shorter. Excretory pore at 58-66% of oesophageal length. Female reproductive system didelphic, amphidelphic, ovary branches almost symmetrical, reflexed. Each gonad 1.0-2.5 times as long as body width. Vagina straight about one third as long as vulval body width, epiptygmata absent, no eggs were observed. Rectum 1.0-1.5 times longer than and body width. Vulva-anus distance e equal to 3-3.4 tail lengths. Tail conical, gradually narrowing, ventrally curved, 42-44 μm long, 3.8-4.0 times anal body width long or 12-13% of body length. Three caudal glands and a terminal spinneret present.

Male

Not found.

Remarks

The genus *Ceratoplectus* was proposed by Andrassy (1984). Further, Zell (1993) and de Ley and Coomans (1994) treated *Ceratoplectus* as a subgenus of *Plectus*, that now includes four species. Recently specimens of *Plectus* (*Ceratoplectus*) *armatus* (Butschli, 1873) Andrassy (1984) was collected from soil around the roots of carrot (*Daucus carrota* L.). Morphological and morphometric characteristics of this species correspond well to the description given by Andrassy (2005).

Statement of conflict of interest

Authors have declared no conflict of interest.

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