



Two New Records of Soil Nematoda (Dorylaimida: Qudsianematidae) from Odisha, India

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Abstract

A number of nematode specimens were collected from the soil samples in the vicinity of Chilika Lake, Odisha, India. These specimens were identified as *Labronema khazariense* (Chesunov, 1985) Andrassy, 1991 and *Eudorylaimus centrocerus* (De Man, 1880) Andrassy, 1959 belonging to the family Qudsianematidae under the order Dorylaimida of soil nematoda. These are being recorded for the first time from India. *Labronema khazariense* was collected from the soil samples in Ganjam district and *Eudorylaimus centrocerus* from the soils of Puri district. To extract the nematodes standard methodologies were followed like Cobb's Sieving and Decantation method, followed by modified Baerman Funnel Technique. *Labronema khazariense* was first described as *Eudorylaimus khazariensis* by Chesunov in 1985 which was later transferred to the genus *Labronema* Thorne, 1939 as new combination by Andrassy (1991). On the other hand, *Eudorylaimus centrocerus* was first described as *Dorylaimus centrtoecercus* by De Man in 1880 and was later accommodated under the genus *Eudorylaimus* by Andrassy (1959). *Eudorylaimus centrocerus* is characterized by constricted lip region and dorsally bent digitate tail in female. *Labronema khazariense* can be distinguished by its medium body with broad and thick lip region slightly off set by constriction and presence of thick odontostyle.

Keywords: Soil Nematoda, Dorylaimida, Qudsianematidae, New records, Odisha.

Introduction

Nematodes are very primitive pseudo-coelomate lower invertebrates which are significant in terms of both beneficial and harmful roles in soil microhabitat. In respect of agro ecosystem they are important from economic point of view as some of them incur crop loss across the world. On the other hand, these micro-organisms are also significantly important for decomposition of organic components (Yeates and Coleman, 1982) and are responsible for nitrogen mineralization and nutrient cycling to maintain a healthy and stable soil ecosystem. They can be categorized as plant feeders, fungal feeders, bacterial feeders, predators and omnivores (Yeates *et al.*, 1993) which later classified into microbial feeder, predatory and parasitic nature depending on different feeding apparatus and types (Hodda, 2022). *Labronema khazariense* was first described as *Eudorylaimus khazariensis* by Chesunov in 1985 which was later transferred to the genus *Labronema* Thorne, 1939 as a new combination

(Andrassy, 1991). On the other hand, *Eudorylaimus centrocerus* was first described as *Dorylaimus centrtoecercus* by De Man in 1880 and was later accommodated under the genus *Eudorylaimus* (Andrassy, 1959). In the present study soil samples were collected from the terrestrial habitat in Ganjam and Puri districts to observe the occurrence of soil-inhabiting nematodes belonging to the order Dorylaimida around the Chilika. The literature review revealed few work on free living nematodes around chilika (Stewart, 1914). Nematodes of saline soil of Odisha and community analysis in rhizosphere of banana in Puri district was investigated (Ray & Das, 1980; Ray & Parija, 1987). Baniyamuddin *et al.* (2010) established a new genus *Ramphidorylaimus* to accommodate two species from Puri district (*Ramphidorylaimus rhamphionus* (Jairajpuri, 1966) Baniyamuddin *et al.*, 2010) and around Chilika lagoon (*R. macrodontus* (Hodda *et al.*, 1994) Baniyamuddin *et al.*, 2010) as two new combinations under the genus. *Labronema khazariense* and *Eudorylaimus centrocerus* are being recorded for the first time from

India. Total 71 species have been recorded under the genus *Labronema* and 260 species have been recorded under the genus *Eudorylaimus* throughout the world (Nemys, 2024) whereas 21 species under the genus *Labronema* and 10 species under the genus *Eudorylaimus* have been recorded in India so far.

Materials and Methods

Soil samples of about 500 gm. were collected from rhizosphere of unidentified grass of different localities adjoining to Chilika Lake in Ganjam and Puri districts, Odisha, India, with the help of a hand-shovel. The samples were taken in a polythene bag and kept closed with rubber band to prevent the loss of moisture in the soil sample. Geographical coordinates were noted with a GPS device and carried to the lab for further processing. The soil samples were processed by 'Cobb's sieving and decantation technique' (Cobb, 1918) where the samples were sieved using different mesh sizes. Later the processed sample with minimum soil particles were used to extract the nematodes by 'modified Bearmann's funnel technique' (Christie and Perry, 1951). Then the extracted nematodes were killed and fixed instantly by Seinhorst's method in hot Formaldehyde-acetic acid solution (FA) solution and were kept in the same preservative. Picking were done and the nematodes were kept in glycerine-alcohol solution for dehydration in the desiccator for 4-6 weeks depending upon the atmospheric moisture. After complete dehydration of the nematode specimens, permanent slides were prepared to examine the nematodes under Nikon Eclipse Ni DIC microscope for taxonomic studies and photomicrography.

Systematic Account of The Species

Phylum NEMATODA Rudolphi, 1808 (Lankester, 1877)

Order DORYLAIMIDA Pearse, 1942

Suborder DORYLAIMINA Pearse, 1936

Superfamily DORYLAIMOIDEA De Man, 1976

Family QUDSIANEMATIDAE Jairajpuri, 1965

Subfamily QUDSIANEMATINAE Jairajpuri, 1965

Genus *Labronema* Thorne, 1939

1. *Labronema khazariense* (Chesunov, 1985) Andrassy, 1991

Genus *Eudorylaimus* Andrassy, 1959

2. *Eudorylaimus centrocerus* (De Man, 1880) Andrassy, 1959

Labronema khazariense (Chesunov, 1985) Andrassy, 1991

(Plate:1)

Material examined: 33 females. India, Odisha, Ganjam dist., Rambha, On the bank of Chilika lake, Lat 19°30.852N and long 85°05.743E; 05.ix.2016, Coll. D. Sen.

Dimensions: Shown in Table 1.

Diagnosis: Female: Body ventrally curved on fixation. Cuticle smooth, its thickness almost uniform all over the body except tail region, cuticle thicker on tail. Lip region clearly set off by constriction, almost same or slightly wider than adjoining body, 17 - 18µm wide or about 1/3.5 of maximum body width. Odontostyle length is slightly more than the labial diameter or about 1.2 - 1.3 labial width, its aperture slightly more than one-third (1/2.7 - 1/2.8) of odontostyle length. Guiding ring 0.7 lip region-width from anterior end. Odontophore rod-like, about 1.4 times the odontostyle length. Cardia elongated conoid. Vulva transverse, almost equatorial to post-equatorial. Vagina sclerotized distally, extending inward about half or 46.9 - 47% of the corresponding body width (length of *pars proximalis* vagina 20.0 - 22.0µm, *pars refringens* 5.0 - 6.0µm and combined width (CW) 10.0 - 11.0µm and *pars distalis* 2.5-3.0µm). Female genital system amphidelphic, both ovaries reflexed, both the gonads equally developed. Prerectum 2.4 - 3.8 and rectum 1.2 anal body diameters long. Tail moderately short, about 0.8 anal body diameter long, convex and uniformly conoid ending in a rounded terminus.

Habitat and locality: Collected from soil around the roots of unidentified grass on the bank of Chilika lake, Ganjam dist.

Distribution in world: Area around Caspian Sea (Fig. 1). Detail distribution in the world is not available.

Remark: *Labronema khazariense* can be characterised by its medium body with broad and thick lip region slightly off set by constriction and presence of thick odontostyle. Chesunov (1985) described the species as *Eudorylaimus khazariensis* from the area around Caspian Sea. This is the first record of the species from India.

Eudorylaimus centrocerus (De Man, 1880) Andrassy, 1959

(Plate: 2)

Material examined: 3 females. India, Odisha, Puri dist.,

Krishna Prasad Garh, on the bank of Chilika lake, Lat 19°39.978N and long 85°15.700E; 05.ix.2016, Coll. D. Sen.

Dimensions: Shown in Table 1.

Diagnosis: Female: Body ventrally curved upon fixation, cylindrical. Cuticle more or less uniformly thick all over the body, more thick on tail. Lip region distinctly set off from body by constriction, slightly wider than adjoining body, 4.5-5.0µm high, 15.0 µm wide or little less than one-third (1/2.9) of the body width at neck base, lips amalgamated. Odontostyle strong, length more than labial diameter, lip 3/4th of the odontostyle length or 0.7 -0.8 times the odontophore length, odontostyle aperture about one-third or occupying about 35% of odontostyle length. Odontophore straight, rod-like, slightly longer than the odontostyle or about 1.2 times the odontostyle length. Pharynx muscular, expanded part of pharynx slightly more than half or 55-58% of the pharyngeal length. Vulva transverse, post-equatorial. Vagina distally sclerotized, extending inward half of the corresponding body width (length of *pars proximalis* vagina 17-18µm, *pars refringens* 5-6µm and combined width (CW) 18µm and *pars distalis* 2.0µm). Female reproductive system amphidelphic, both branches well developed, posterior gonad longer than the anterior. Prerectum 2.8-2.9 and rectum 1.5-1.6 anal body diameters long. Tail short, convex both dorsally and ventrally, 1.1 anal body diameter long, conically ending in a small hyaline digitate terminus bent dorsally with concavity.

Males: Not found.

Habitat and locality: Collected from soil around the roots of unidentified grass near Chilika lake, Puri dist.

Distribution in world: Holland, Germany, Denmark, Sweden, Czechoslovakia, Australia, Hungary, Romania, Spain, France, Russia, Lithuania, Georgia, Uzbekistan, Khzakhstan, Turkmenia, Zaire, Jamaica, Java, Congo, Ivory Coast, Kenya. Widespread in Europe and Asia (Fig. 1).

Remark: *Eudorylaimus centrocerus* is characterized by its tail shape, convex conoid, digitate towards terminus and bent dorsally in female. De Man (1880) described the species as *Dorylaimus centrtoecerus*. This is the first report of the species from India.

Discussion

Morphometric analysis of specimens of *Labronema khazariense* and *Eudorylaimus centrocerus* have been shown in Table.1. The difference in physical variance in the species is less significant which indicates towards a homogenous population in case of *Labronema khazariense* where as *Eudorylaimus centrocerus* shows the same tendency but cannot be concluded precisely because specimen number is less. Distribution of these species have been shown with new records from India (Fig. 1). Feeding habit of both the species is predatory omnivorous.

Table – 1: Morphometrics of *Labronema khazariense* (Chesunov, 1985) Andrassy, 1991 and *Eudorylaimus centrocerus* (De Man, 1880) Andrassy, 1959 All measurements in µm (except L and body ratios, L in mm.) and in the form: mean ± standard deviation (range).

	<i>Labronema khazariense</i>	<i>Eudorylaimus centrocerus</i>
Characters	Female (n=33)	Female (n=3)
L	1.82±0.08 (1.76-1.88)	1.35±0.03 (1.33-1.38)
a	29.3±3.25 (27-31.6)	26.6±0.14 (26.5-26.7)
b	4.35±0.21 (4.2-4.5)	4.4±0 (4.4)
c	62.85±9.68 (56-69.7)	48.5±1.41 (47.5-49.5)
c/	0.85±0.07 (0.8-0.9)	1.1±0 (1.1)
V %	54.45±1.06 (53.7-55.2)	50.5±0.42 (50.2-50.8)
G1 %	24.85±0.77 (24.3-25.4)	24.55±0.77 (24-25.1)

	<i>Labronema khazariense</i>	<i>Eudorylaimus centrocerus</i>
G2 %	26.65±0.49 (26.3-27)	29.45±1.34 (28.5-30.4)
Length of odontostyle	23±2.82 (21-25)	20.5±0.7 (20-21)
Length of odontostyle aperture	8.25±1.06 (7.5-9)	7.25±0.35 (7-7.5)
Length of odontophore	33.5±3.53 (31-36)	25.5±2.12 (24-27)
Width of odontostyle	3.25±0.35 (3-3.5)	2.25±0.35 (2-2.5)
Guiding ring from anterior end	13±1.41 (12-14)	10.75±0.35 (10.5-11)
Maximum body width	62±4.24 (59-65)	51±1.41 (50-52)
Length of Pharynx	418.5±4.94 (415-422)	307±7.07 (302-312)
Length of Expanded Pharynx	231.5±33.23 (208-255)	173.5±10.60 (166-181)
Lip height	6.25±1.06 (5.5-7)	4.75±0.35 (4.5-5)
Lip width	17.5±0.7 (17-18)	15±0 (15)
Body width at vulva	62±4.24 (59-65)	51±1.41 (50-52)
Lip adjoining body width	20.35±0.91 (19.7-21)	46±2.82 (44-48)
Cuticle anterior end	3.2±0.28 (3-3.4)	2.25±0.35 (2-2.5)
Cuticle at mid body	3.2±0.42 (2.9-3.5)	2±0 (2)
Cuticle on tail	7.2±0.84 (6.6-7.8)	5.25±2.47 (3.5-7)
Vulva from anterior end	990±31.11 (968-1012)	687±9.89 (680-694)
Length of vagina	29.25±1.76 (28-30.5)	25±1.41 (24-26)
Length of <i>Pars distalis</i> vagina	2.75±0.35 (2.5-3)	2±0 (2)
Length of <i>Pars refringens</i> (CW)	5.5±0.70 (5-6)	5.5±0.70 (5-6)
Length of <i>Pars proximalis</i> vagina	21±1.41 (20-22)	17.5±0.70 (17-18)
Length of anterior gonad	454±35.35 (429-479)	334±2.82 (332-336)
Length of uterus	97.5±10.60 (90-105)	101±9.89 (94-108)
Length of oviduct	223.15±15.76 (212-234.3)	120.5±14.84 (110-131)
Length of ovary	133.55±9.12 (127.1-140)	112.5±27.57 (93-132)
Length of posterior gonad	484.5±30.40 (463-506)	398±5.65 (394-402)
Length of uterus	50.6±3.67 (48-53.2)	119±5.65 (115-123)

	<i>Labronema khazariense</i>	<i>Eudorylaimus centrocerus</i>
Length of oviduct	261.5±14.14 (251.5-271.5)	166±8.48 (160-172)
Length of ovary	173.3±12.86 (164.2-182.4)	113±2.82 (111-115)
Tail length	27.5±0.70 (27-28)	28±1.41 (27-29)
Anal body diameter	32±1.41 (31-33)	25±1.41 (24-26)
Length of prerectum	102.5±36.06 (77-128)	72±2.82 (70-74)
Length of rectum	40±1.41 (39-41)	39.5±3.53 (37-42)

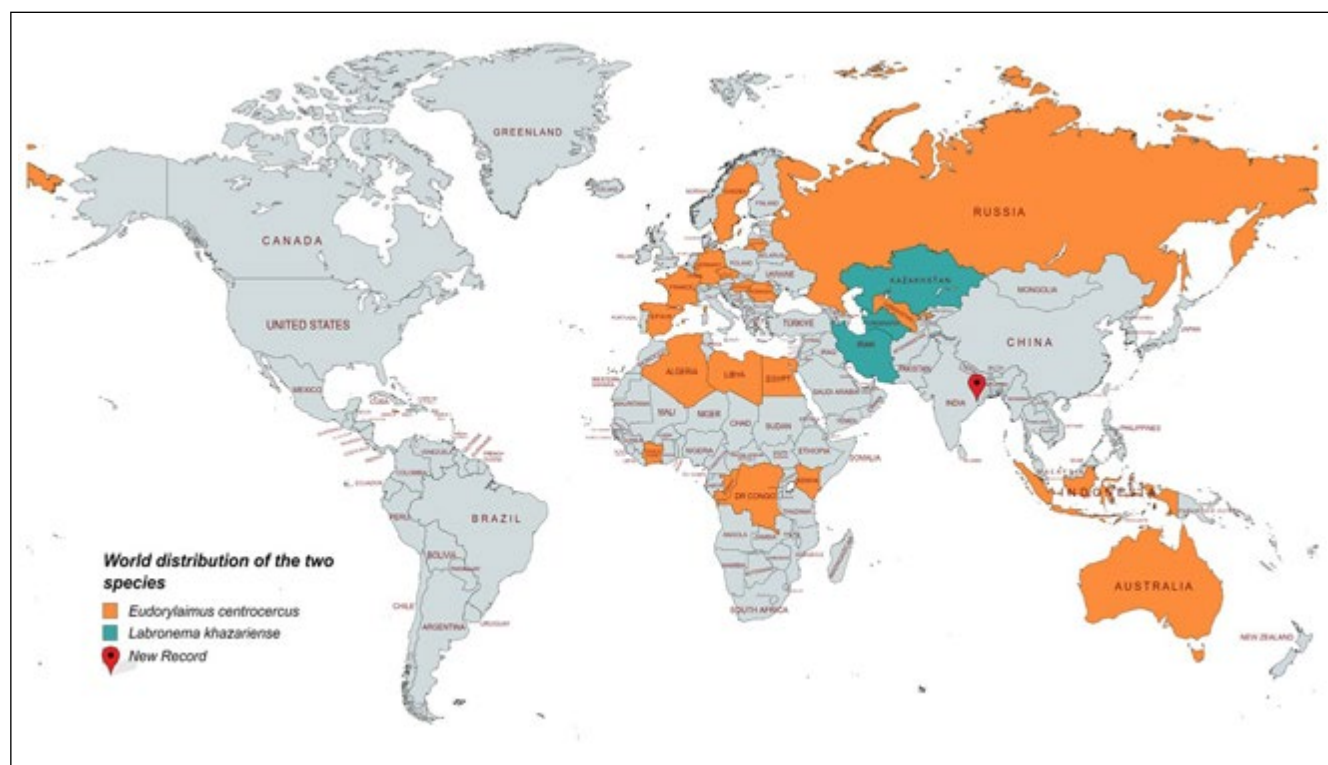


Figure 1. Distribution of the *Eudorylaimus centrocerus* and *Labronema Khazariense* in world and in India

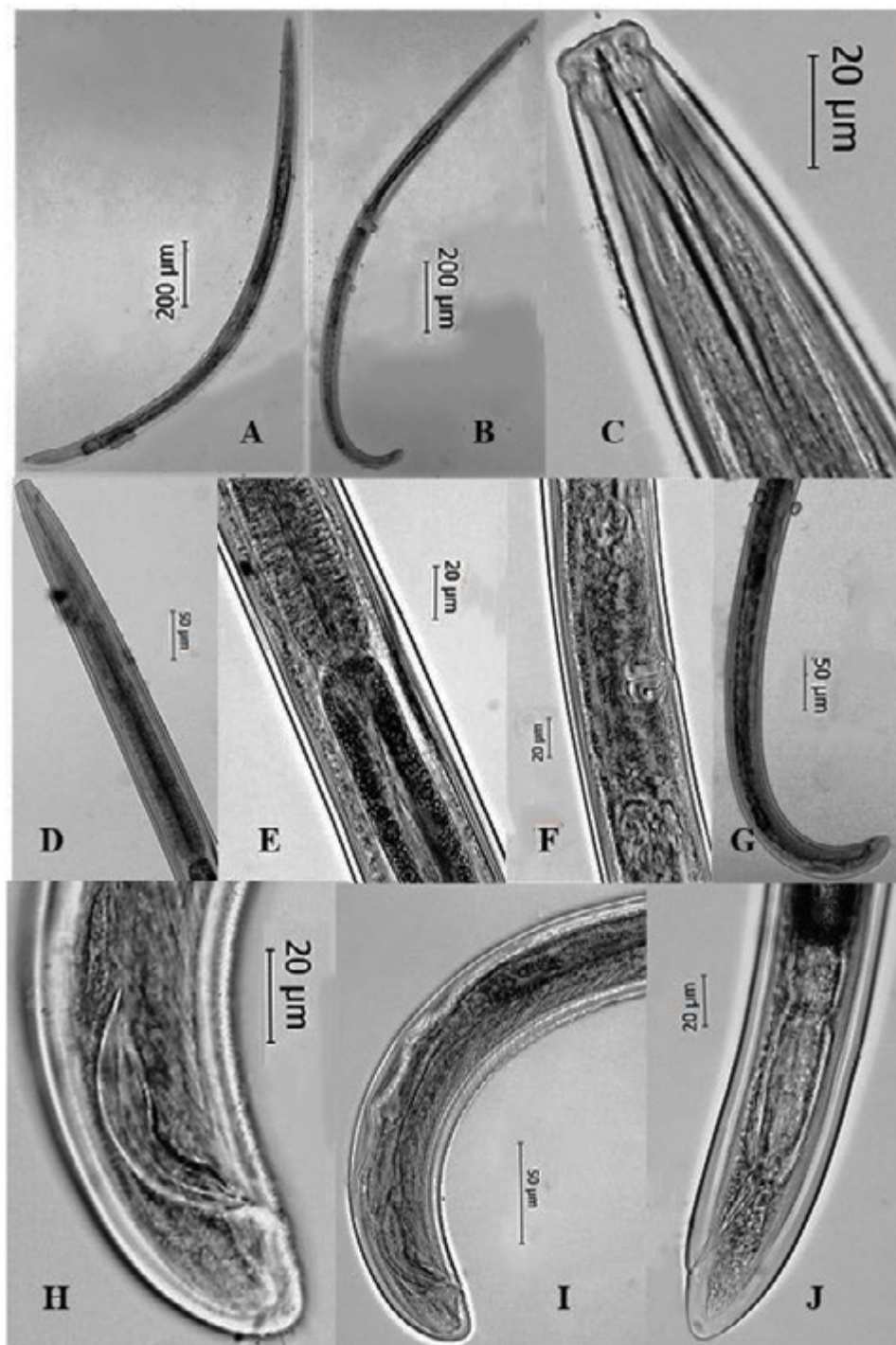


Plate 1 (A-J): Photomicrographs of *Labronema khazariense* (Chesunov, 1985) Andrassy, 1991. A. Entire Female, B. Entire Male, C. Odontostyle of Female, D. Pharynx of Female, E. Cardia of Female, F. Vulva, G. Testis of Male, H. Spicule of Male, I. Posterior end of Male showing Ventromedian supplements, spicule & tail, J. Posterior end of Female showing tail.

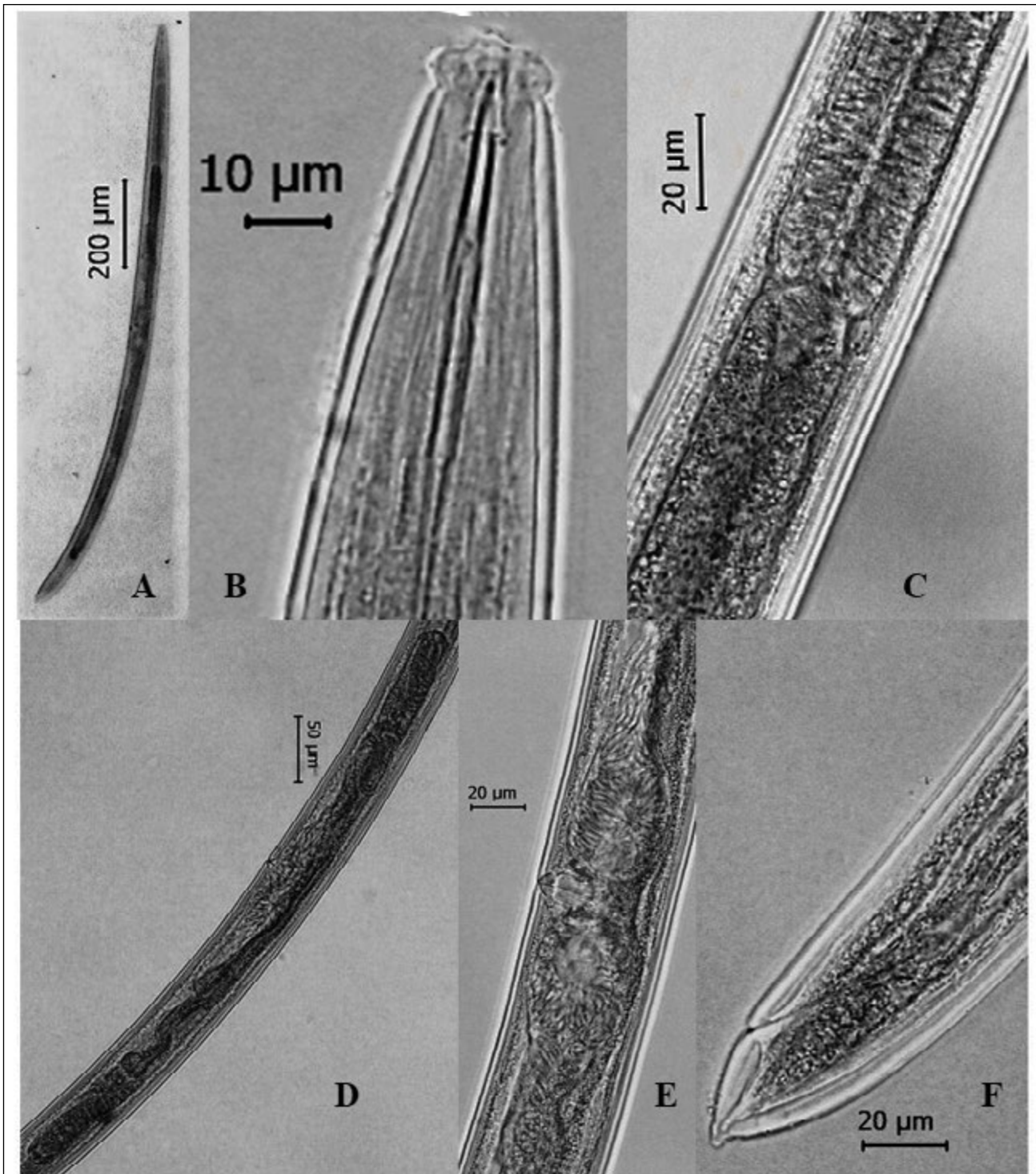


Plate 2 (A-F): Photomicrographs of *Eudorylaimus centrocerus* (De Man, 1880) Andrassy, 1959. A. Entire Female, B. Odontostyle, C. Cardia, D. Gonad, E. Vulva, F. Tail.

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