

Description of *Talanema dhritiae* sp. n. (Qudsianematidae : Dorylaimida) from West Bengal, India

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Abstract

In the present manuscript, a new species *Talanema dhritiae* sp. n., collected from vineyard in Chhatna village of Bankura district, West Bengal, India is described based on characters: having shorter body ($L=0.71-0.97$ mm), $a=15.5-20.5$, $b=3.4-4.6$, $c=28.4-35.4$, $c'=0.9-1.1$, $V=44.6-48.2$, transverse vulva, small spherical cardia and digitate tail. It shows similarities with *T. avolai* ($L=0.85-0.99$ mm) and *T. salinae* ($L=0.7-0.8$ mm) in having small slender body, but differs from both of them in odontostylet length ($15.7-17$ μ m in *T. avolai* and $12-14$ μ m in *T. salinae*), width of lip ($11-14$ μ m in *T. avolai* and $12-14$ μ m in *T. salinae*), oesophageal length ($251-263$ μ m in *T. avolai* and $210-243$ μ m in *T. salinae*) and position of vulva ($V=55.3-61.3$ in *T. avolai* and $56.8-58.4$ in *T. salinae*), pre-rectum length ($52-58$ μ m in *T. avolai* and $23-39$ μ m in *T. salinae*) and shape of cardia (spherical *vs* conical). The species key of the genus is also provided.

Keywords: *Talanema dhritiae* sp. n., species key, vineyard, West Bengal.

Introduction

Andrassy (1991) proposed the genus *Talanema* belonging to the family Qudsianematidae under the order Dorylaimida by transferring four species from the genus *Labronema* Thorne, 1939 *viz.* *Labronema digitatum* Sukul *et al.*, 1975, *L. mauritiense* Williams 1959, *L. pararapax* Ahmad and Jairajpuri, 1982 and *L. pygmaeum* Heyns, 1963. He differentiated the genus from *Labronema* depending upon three important characters i.e. transverse vulva (*vs* longitudinal), digitate tail (*vs* rounded) and non-contiguous supplements (*vs* contiguous); from *Takamangi* Yeates, 1967 in having a double guiding ring, a sub-digitate tail and higher number of supplements. He selected *T. mauritiense* (Williams, 1959) as the type species of the genus. Vinciguerra and Clausi described two new species *T. avolai* and *T. salinae* in 1995. *T. nicaraguaense* was described by Shaheen and Ahmad (2005). Andrassy (2011) again transferred *L. ibarakiense* Khan and Araki, 2002 to the genus. *L. baqrii* Khan *et al.* 1989, *L. malagasi* Furstenberg *et al.*, 1993 and *L. sphinctum* Mohilal and Dhanachand, 2001 were shifted to *Talanema* by Imran *et al.* (2021). They regarded *L. neodiversum* (Mondal,

Manna and Gantait, 2012) as junior synonym of *T. baqrii* (=syn. *L. neodiversum* Mondal *et al.*, 2012). Imran *et al.* (2021) provided the first molecular (18S, D2-D3 and 28S rDNA) study of *T. baqrii*. They discussed its evolutionary relationships and also presented a compendium of the main morphometrics for a total of 11 species of the genus. *T. saccatum* was described by Jabberi *et al.* (2021). *T. ibericum* was described by Pena Santiago *et al.* in 2023. He represented molecular trees to establish the evolutionary relationships of their described species.

During a faunistic survey in 2017 to the Chhatna village in Bankura district of West Bengal, India, nematode specimens were collected from the rhizospheric soil of vineyard which is being described and illustrated. *Talanema dhritiae* sp. n. is characterized by having shorter body length, short odontostylet, transverse vulva that is located at anterior half of the body, small spherical cardia and digitate tail. It shows close similarities with *T. avolai* and *T. salinae* having small body; values of b , c' and length of pharyngeal bulb; transverse vulva and absence of male. But the proposed new species strongly differs from both the species in values of a , c ,

V, lip diameter; length of odontostylet, pharynx, pre-rectum and tail; shape of cardia. A species key to the genus is also provided.

Materials and Methods

Specimens were collected from rhizospheric soil of vineyard from Chhatna village in Bankura district of West Bengal, India. Nematodes were extracted using the Cobb's sieving technique (Cobb, 1918) and decanting method followed by Modified Bearmann's funnel technique (Christie & Perry, 1951). They were then processed by Seinhorst's slow dehydration method (Seinhorst, 1959), mounted on slides in anhydrous glycerin and sealed with paraffin. Specimens were identified (up to subfamily) following the taxonomic key, made by Jairajpuri and Ahmad (1992) and genus identified following Andrassy, 1991. Dimensions were presented in accordance with De Man's formula (De Man, 1884). Positions of the oesophageal gland nuclei were presented according to Andrassy's formula (Andrassy, 1998). Drawings were made with the help of camera lucida using Olympus research microscope with a drawing tube attached, model no. BX 41. Measurements and photographs were taken with Nikon Eclipse Ni Research Microscope Y-TV55.

Systematic Accounts

ORDER : DORYLAIMIDA Pearse, 1942

SUBORDER : DORYLAIMINA Pearse, 1936

SUPERFAMILY : DORYLAIMOIDEA De Man, 1876

FAMILY : QUDSIANEMATIDAE Jairajpuri, 1965

SUBFAMILY : QUDSIANEMATINAE Jairajpuri, 1965

Genus : *Talanema* Andrassy, 1991

Talanema dhritiae sp.n. (Table-1; Figs. 1 & 2)

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Materials examined : Holotype and 6 Paratypes : Female : India, West Bengal, Bankura district, Chhatna village, 23.3085°N, 86.9649°E, 4-vii-2017, coll. V.V. Gantait (Reg. No. NZC/ZSI/WN 3913).

Measurements : Shown in Table-1.

Description : Female : Small sized nematode, moderately slender body more or less straight to ventrally arcuate upon fixation. Body slightly tapering towards both the extremities.

Cuticle smooth, when observed under light microscope 1.6-1.8 μm thick at midbody and 1.9-2.2 μm at anterior portion and 2.3-2.4 μm on dorsal side of the tail, but possess fine striations when observed under high magnification. Lip region well offset with a distinct constriction, 2.2-3.0 times as wide as high and about one-fifth (21-24%) of body diameter. Amphid fovea stirrup shaped, 7.8 μm wide, its aperture occupying more than one-half of lip region diameter. Odontostylet strong, 1.2 times longer than lip region diameter; aperture one-half of its length. Guiding ring double, situated at 8.4-11.0 μm from anterior end. Odontophore rod-like, 1.3-0.9 times longer than odontostylet. Pharynx entirely muscular, gradually enlarging into the basal expansion which occupies less than one-half (42-48%) of the total neck length. Gland nuclei located as follows: D=61-67%, AS₁ =30.4-32.4%, AS₂ = 36.7-37.7%, PS₁ = 55.3-57.3%, PS₂ =67.1-69.1%. Nerve ring located at 44.6 – 47.0% of the total neck length from anterior end. Pharyngo-intestinal junction consisting of a short and spherical cardia measuring 8.6-9.1 \times 8.5-8.7 μm . Genital system amphidelphic with equally-developed branches; the anterior gonad 156.7-174.1 μm long or 18-22% of body length, the posterior one 173.0-191.6 μm or 18-27% of the body length. Ovary reflexed with oocytes arranged in a single row. Vulva, a transverse slit 4.1-5.6 μm long with sclerotized lips. Vagina extending inwards 23.4-32.2 μm or 49-70% of body diameter. Pars proximalis 16-22 \times 12-15 μm , with well-developed musculature, pars refringes consisting of sclerotized pieces measuring 4.0-5.8 \times 3-6 μm and pars distalis 3.3-4.1 μm long. Sphincter present between oviduct and uterus. Uterus 103.4-104.1 μm long or 2.2-1.9 times body diameter. Uterine eggs 50.4-48.5 \times 34.2-33.5 μm . Pre-rectum about 1.5 times anal body width. Rectum slightly smaller than anal body diameter. Tail short, 2.8-6.4% of body length, digitate with small concavities.

Male : Not found.

Differential diagnosis and relationships: The genus *Talanema* possesses 13 species under it. *Talanema dhritiae* sp.n. is strongly differentiated from all other species of the genus having shorter body length (vs more than 1 mm), except *T. avolai* (0.8-0.9 mm) and *T. salinae* (0.7-0.8 mm). It also differs from all of them in the values of a (vs. 18.0-34.6), c (vs 26.4-77.0), narrower lip region (vs. 11-16 μm), short odontostylet (vs. long 15-27 μm), length of pharynx (vs. 202-488 μm), pharyngeal bulb length (vs. 89-251 μm), small spherical cardia (vs. conical), pre-rectum length (vs. 24-231 μm) and vulva at anterior half of the body (vs. posterior half).

The proposed new species shows close resemblances with *Talanema avolai* and *T. salinae* with small slender body (L=

0.85-0.99 mm in *T. avolai* and 0.70-0.80 mm in *T. salinae*), in the values of **b** (3.4-3.9 and 19.5-22.7) and **c'** (1.0-1.2 and 1.1-1.3), length of pharyngeal bulb (93-100 μm and 89-108 μm), transverse vulva, tail length (22-27 μm and 21-26 μm) and absence of male. But it differs from *T. avolai* in the values of **a** (*vs* 25-31), **c** (*vs* 36.3-36.9), **V** (*vs* 55.3-61.3), odontostylet length (*vs* 15.7-17.0 μm), neck length (251-263 μm), length of pre-rectum (*vs* 52.7-58.0 μm) and long conical cardia (*vs* small spherical).

Talanema dhritiae sp. n. also differs from *T. salinae* in the values of **a** (*vs* 19.5-22.7), **V** (*vs* 56.8-58.4), lip diameter

(*vs* 12-14 μm), odontostylet length (*vs* 15.5-17.0 μm), pharyngeal length (*vs* 210-243 μm) anal body diameter (*vs* 23.5-39.0 μm) and cardia conical in shape (*vs* small spherical). Therefore, the present species holds significant and substantial differences from all other valid species of the genus *Talanema* and can be considered as a new species under this genus.

Etymology: The species epithet, *dhritiae*, is a Latin term which is given after Dr. Dhriti Banerjee, the eminent scientist and the first lady Director of Zoological Survey of India, Kolkata, West Bengal, India.

Key to species of the genus *Talanema* Andrassy, 1991

1. Male present-----2
Male absent -----9
2. Cardia rounded, enveloped by conical intestinal tissue ----- *T. ibericum* Pena-Santiago *et al.*, 2023
Cardia conical, not enveloped by conical intestinal tissue-----3
3. Female tail conoid, without digitations *T. malagasi* (Furstenberg, Heyns and Swart, 1993) Imran, Abolafia and Ahmad, 2021
Female tail digitate-----4
4. Tail dissimilar in sexes, female tail digitate, male tail without digitation -----5
Tail similar in sexes, both female and male tail digitate -----6
5. Male tail convex conoid with rounded terminus, lip region offset by deep constriction - *T. baqrii* (Khan, Jairajpuri and Ahmad, 1989) Imran, Abolafia and Ahmad, 2021
Male tail convex conoid with more thickened terminus, lip region slightly offset -----
T. digitatum (Sukul, Das and Mitra 1975) Andrassy, 1991
6. Males with hiatus, odontostylet 25-27 μm long ----- *T. pararapax* (Ahmad and Jairaipuri 1982) Andrassy, 1991
Males without hiatus, odontostylet 17.5-22.4 μm long -----7
7. Tail 30.4-36 μm long; male with 8 ventromedian supplements -----
T. sphinctum (Mohilal and Dhanachand, 2001) Imran, Abolafia and Ahmad, 2021
Tail length < 30 μm ; ventromedian supplements 19-23 in numbers-----8
8. Tail slightly digitate, anal body diameter 27-33 μm , prerectum 72-85 μm long-----
T. mauritiense (Williams, 1959) Andrassy, 1991
Tail digitate, anal body diameter 23-26 μm , prerectum 50-63 μm long -----
T. ibarakiense (Khan and Araki, 2002) Andrassy, 2011
9. Tail with saccate bodies at ventral and sometimes both sides ----- *T. saccatum* Jabberi *et al.*, 2021
Tail without saccate bodies at ventral or dorsal sides ----- 10
10. Body length more than 1.1 mm----- 11
Body length less than 1.1 mm----- 12

- 11. Body length >1.5 mm, c=66-77, female tail length 25-27 µm ----- *T. nicaraguaense* Shaheen and Ahmad, 2005
 Body length <1.5 mm, c = 54-66, female tail length 17 µm -----
T. pygmaeum (Heyns 1963) Andrassy, 1991 = *Labronema pygmaeum* Heyns, 1963
- 12. Odontostylet length 11-12.4 µm, lip width 9.91-10.71 µm, vulva pre-equatorial (V=44.61-48.17%) -----
T. dhritiae sp. n.
 Odontostylet length >12.4 µm, lip width >10.71 µm, vulva post-equatorial (V>55%) ----- 13
- 13. Body length ≤ 1.06 mm, L = 0.85-1.06 mm, a=23.4-33.4, c = 31-44.9, prerectum length 51-78 µm ----- *T. avolai*
 Vinciguerra and Clausi, 1994
 Body length < 1.06 mm, L < 0.81mm, a=18.4-22.7, c = 26.4-32.8, prerectum length 23.5-39 µm -----
T. salinae Vinciguerra and Clausi, 1994

Table 1. Morphometric data of *Talanema dhritiae* sp. n; all measurements in µm, except L in mm

Morphometric characters	Holotype (n=1)	Paratypes (n=6)	Mean±SD
L	0.97	0.71-0.97	(0.85±0.1)
a	20.5	15.5-20.5	(17.2±2.8)
b	4.6	3.4-4.6	(4.1±0.6)
c	35.4	28.4-35.4	(32.4±3.6)
c'	1.1	0.9-1.1	(1.0±0.1)
V	44.6	44.6-48.2	(46.8±1.8)
V'	51.5	49.9-51.5	(50.6±0.8)
G1	18	17.9-22.2	(19.7±2.2)
G2	17.9	17.9-27.2	(21.7±4.8)
Lip region width	9.9	9.9-10.7	(10.4±0.4)
Lip region depth	4.6	3.6-4.6	(4.2±0.6)
Maximum body width	47.4	45.4-47.4	(46.4±1.0)
Body width at base of lip region	15.3	14.3-15.3	(14.5±0.7)
Body width at base of oesophagus	38.6	38.6-40.0	(39.4±0.7)
Body width at anus	24.0	24.0-25.8	(25.2±1.0)
Odontostyle length	12.4	11.2-12.4	(11.9±0.6)
Odontophore length	17.0	12.1-17.0	(14.7±2.5)
Amphid from anterior end	5.4	4.4-5.4	(4.6±0.7)
Guiding ring from anterior end	8.4	7.4-8.4	(7.8±0.6)
Nerve ring from anterior end	94.3	94.3-97.4	(96.0±1.6)
Oesophageal length	211.0	207.2-211.0	(209.4±2.03)
Expanded part of oesophagus	97.4	94.3-97.4	(96.0±1.6)
Glandularium	87.1	87.1-88.0	(87.5±0.5)

Morphometric characters	Holotype (n=1)	Paratypes (n=6)	Mean±SD
Vulva from anterior end	432.7	339.9-432.7	(405.1±56.6)
Anterior gonad	174.1	156.7-174.1	(166.9±9.1)
Posterior gonad	173.0	173.0-191.6	(181.7±9.3)
Prerectum	35.6	28.8-35.6	(31.7±3.5)
Rectum	22.9	17.1-22.9	(19.9±2.9)
Tail length	27.4	27.4 - 45.3	(36.1±9.0)

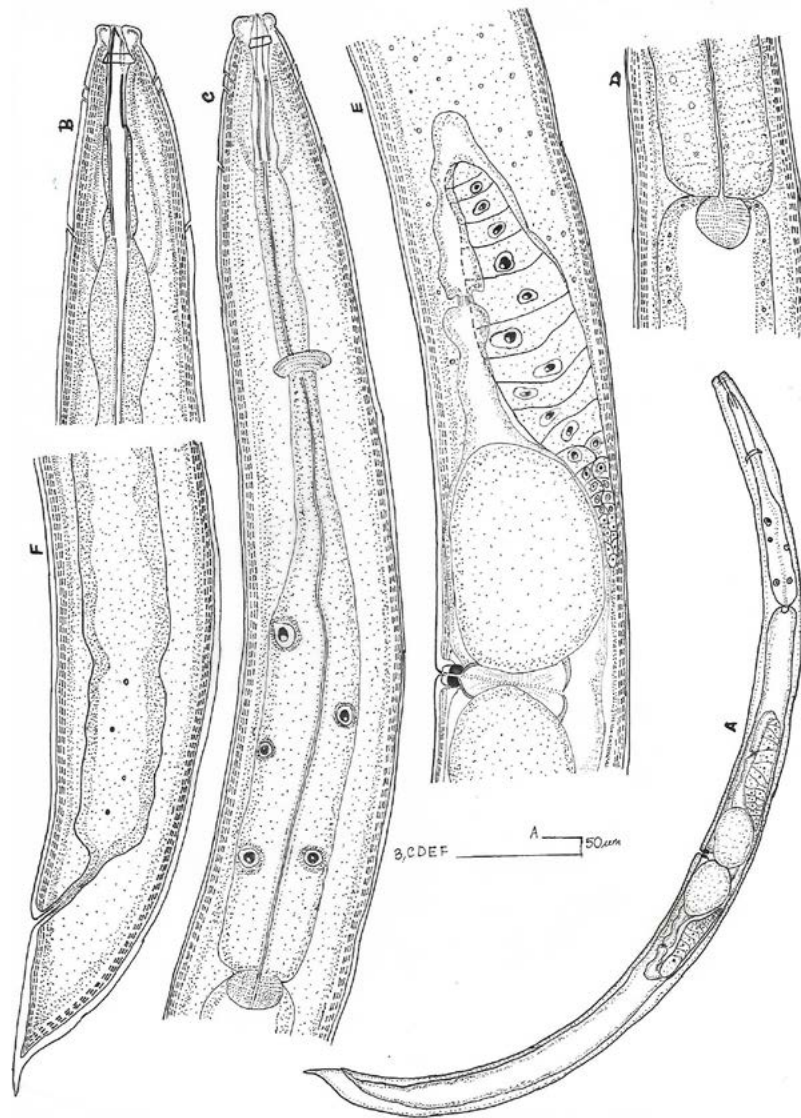


Figure 1. *Talanema dhritiae* sp.n. A. Entire female, B. Anterior region, C. Pharynx, D. Pharyngo-intestinal junction, E. Vulva and anterior gonad, F. posterior region

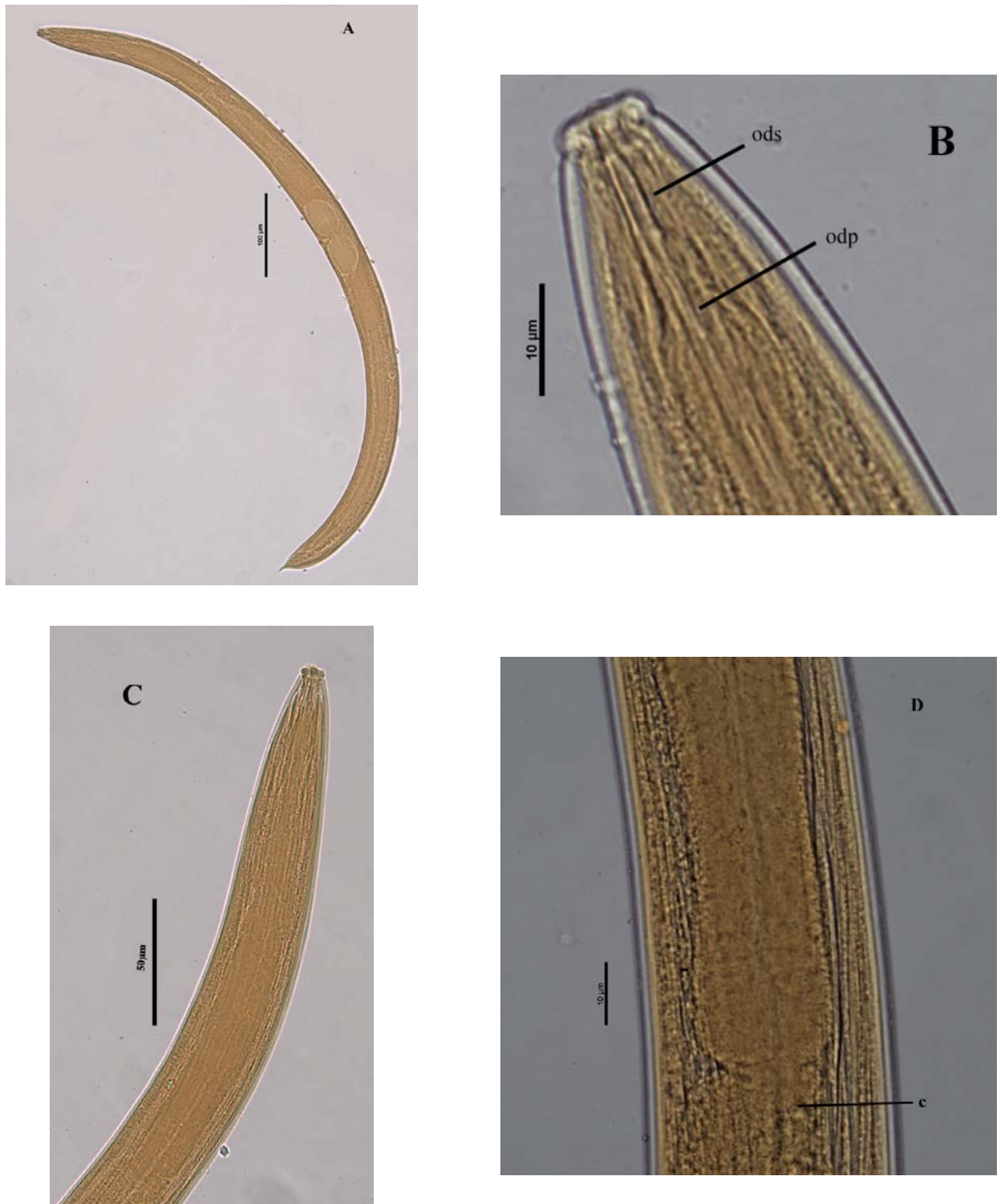


Figure 2. Photomicrographs of *Talanema dhritiae* sp. n. A. Entire female, B. Head region, C. Pharynx, D. Pharyngo-intestinal junction,

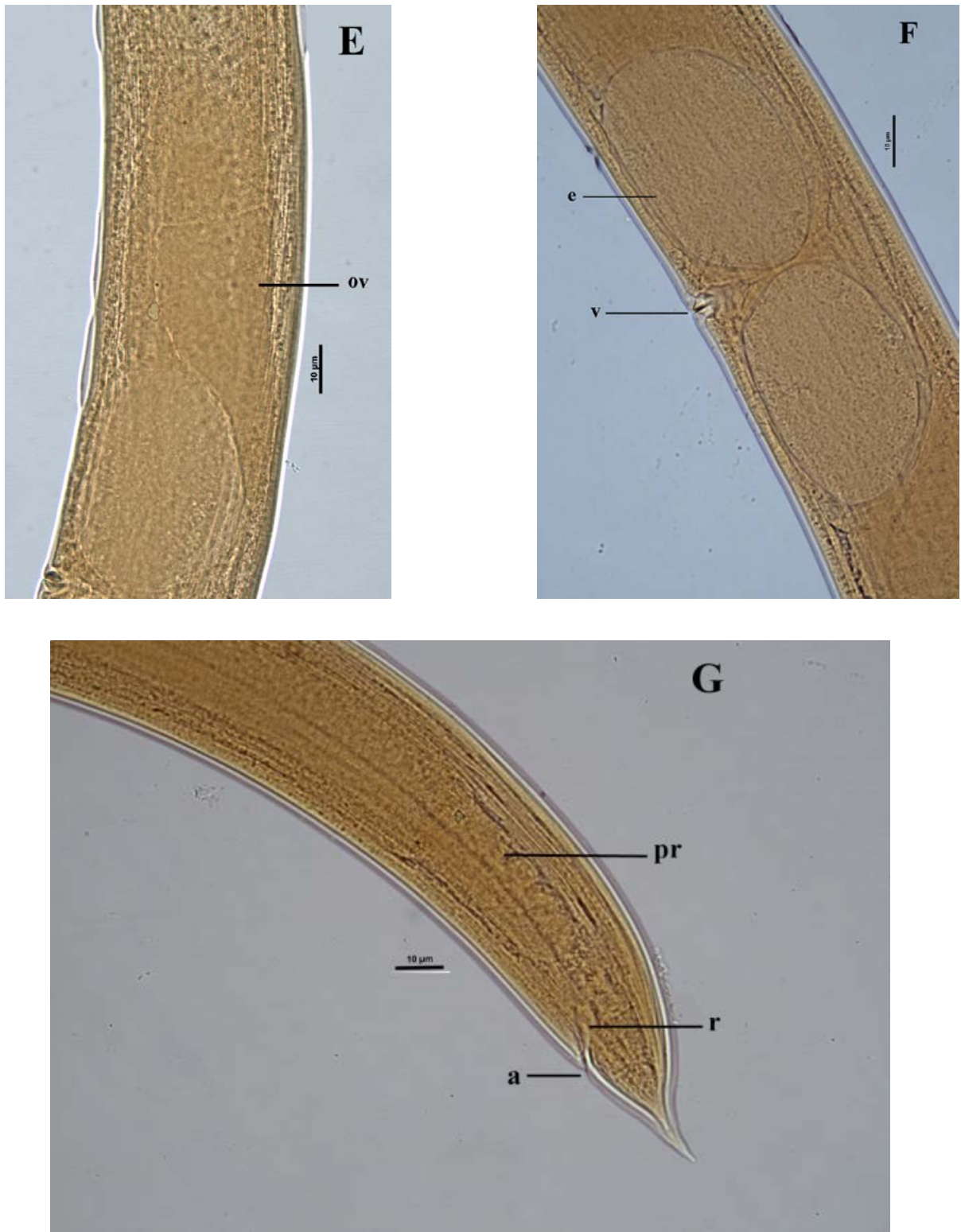


Figure 3. Photomicrographs of *Talanema dhritiae* sp. n. E. Vulva and egg, F. Anterior gonad, G. Posterior region.
 Ods : Odontostylet ; Odp : Odontophore ; c : cardia ; ov : ovary ; e : egg ; v : vulva ; pr : pre-rectum ; r : rectum ; a : anus

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