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New and known species of the family Dorylaimidae Thorne, 1936 (Nematoda: Dorylaimoidea) from the Western Ghats of India

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Abstract. Five new and thirteen known species of Dorylaimidae are described and illustrated. *Prodorylaimium humaimae* sp. nov has a 0.97–1.29 mm (female) and a 1.03–1.33 mm (male) long body; a truncate lip region; a transverse vulva; 30–35 µm long spicules, and 6–8 ventromedian supplements. *Calcaridorylaimus indicus* sp. nov has a 1.47–1.72 mm (female) and a 1.41–1.56 mm (male) long body; a slightly offset lip region; a longitudinal vulva; spicules 36–39 µm and 12–15 ventromedian supplements. *Thornenema pseudodidelphis* sp. nov has a 1.2–1.6 mm long body; a lip region with distinct labial and postlabial sclerotization; a pseudo-didelphic female genital system; a transverse vulva and a 8.5–14.1 × as long as anal body diameter long tail. *Prothornenema cuticulare* sp. nov has a 0.93 mm (female) and a 0.93–0.98 mm (male) long body; a cap-like lip region; a vulva transverse with a deep cuticle invagination anterior and posterior to it; spicules 31–32 µm and 17 ventromedian supplements. *Prothornenema longicaudatum* sp. nov has a 1.05–1.22 mm (female) and a 0.88–0.98 mm (male) long body; a lip region cap-like; a transverse vulva; spicules 30–32 µm long and 13–14 ventromedian supplements. The known species are *Mesodorylaimus potus*, *M. guarani*, *M. chamoliensis*, *M. keralaensis*, *M. longicaudatus*, *Amphidorylaimus flagellicauday*, *Laimydorus siddiqii*, *Calodorylaimus andrassyi*, *Thornenema mauritianum*, *T. paraconurum*, *Opisthodorylaimus cavalcantii*, *Coomansinema oryzae*, and *Kunjudorylaimus kunjui*.

Keywords. Dorylaimoidea, Dorylaimidae, Western Ghats, new species.

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Introduction

The Western Ghats is a continuous chain of hill peaks situated on the Western escarpment of Peninsular India, recognized as one of the world's eight 'hottest hotspots' of biological diversity (Myers *et al.* 2000; Mittermeier *et al.* 2004). Despite occupying only 6% of India's total land area, it serves as the habitat for more than 30% of all major plant and animal species found in India (CEPF 2016). The soil-inhabiting nematode fauna of this region was first described by Jairajpuri (1964). Later, Siddiqi (1965), Siddiqi & Hussain (1968), Ferris *et al.* (1979), Ahmad & Jairajpuri (1982, 1982a, 1983a, 1983b, 1984, 1986, 1988) in series of papers and Ahmad *et al.* (1992) reported several new and known taxa from this region. In continuation with our work on nematode fauna from the Western Ghats in which Islam & Ahmad (2021a,2021b, 2022a, 2022b, 2022c, 2023, 2024) described two new genera *Tahamina* Islam & Ahmad, 2023 and *Oostenbrinkellus* Islam & Ahmad, 2024 and several new and known species belonging to the superfamily Tylencholaimoidea, whereas, Kumar & Ahmad (2021, 2022, 2023a, 2023b, 2023c, 2024) described two new genera *Timmiella* Kumar & Ahmad, 2023 and *Qudsialemellus* Kumar & Ahmad, 2022 along with several new and known species belonging to the superfamily Belondiroidea Thorne, 1939 from the same collection. Fifty-five species representing the superfamily Dorylaimoidea De Man, 1876 were identified from the same collection. The present paper deals with the species representing the family Dorylaimidae De Man, 1876, including thirteen known and five new species. The five new species, *Prodorylaimium humaimae* sp. nov., *Calcaridorylaimus indicus* sp. nov., *Thornenema pseudodidelphis* sp. nov., *Prothornenema cuticulare* sp. nov., and *Prothornenema longicaudatum* sp. nov., are described in detail in the following. Whereas for the known species, *Mesodorylaimus potus* Heyns, 1963*, M. guarani* Andrássy, 1968*, M. chamoliensis* Ahmad, 1995, *M. keralaensis* Ahmad & Ahmad, 2001, *M. longicaudatus* Ahmad & Araki, 2003, *Amphidorylaimus flagellicauda* Monteiro, 1970, *Laimydorus siddiqii* Baqri & Jana, 1982, *Calodorylaimus andrassyi* Baqri & Jana, 1982, *Thornenema mauritianum* (Williams, 1959) Baqri & Jairajpuri 1967, *T. paraconurum* (Heyns, 1963) Goseco, Ferris & Ferris 1976, *Opisthodorylaimus cavalcantii* (Lordello, 1955) Carbonell & Coomans 1985, *Coomansinema oryzae* Ahmad & Jairajpuri, 1989, and *Kunjudorylaimus kunjui* Dhanam & Jairajpuri, 2000, only morphometric data and photomicrographs are provided to save space as detailed descriptions of these species are already available elsewhere. Herein, *Kunjudorylaimus sirini* Dhanam & Jairajpuri, 2000 is synonymised with *Kunjudorylaimus kunjui* Dhanam & Jairajpuri, 2000 based upon the present population as well as the descriptions of type specimens.

Material and methods

Soil samples were collected from different localities in the Western Ghats of India. Following Cobb's (1918) sieving and decantation, and modifying Baermann's funnel techniques, the nematodes were extracted from soil samples. The extracted nematodes were fixed in a hot triethanolamine-glycerol fixative, dehydrated by the slow evaporation method (Seinhorst 1959), and mounted in anhydrous glycerin. Permanent mounts were prepared using the paraffin wax ring method (de Maeseneer & d'Herde 1963). The measurements were taken using an ocular micrometer, and the positions of the pharyngeal gland nuclei and their orifices were calculated according to Loof & Coomans (1970). Line drawings were prepared using a drawing tube, and photographs were taken with a Nikon DS digital Camera attached to a Nikon Eclipse 80i microscope. Raw photographs were edited using Adobe Photoshop®.

Types and other material are deposited in the nematode collection of the Department of Zoology, Aligarh Muslim University, India (AMU/ZD/NC), or in the nematode collection of the Zoological Survey of India, Kolkata, India (ZSIC).

Abbreviations for measurements and morphological terms

a = body length / greatest body diameter
b = body length / neck length

c = body length / tail length
c' = tail length / body diameter at anus or cloaca
DN = position of dorsal pharyngeal gland nucleus from anterior end × 100 / total neck length
DO = orifice of dorsal pharyngeal gland nucleus from anterior end × 100 / total neck length
G1 = length of anterior genital branch × 100 / body length
G2 = length of posterior genital branch × 100 / body length
L = total body length
V = distance of vulva from anterior end × 100 / body length

Results

Taxonomy

Phylum Nematoda Cobb, 1932
Class Enoplea Inglis, 1983
Subclass Dorylaimia Inglis, 1983
Order Dorylaimida Pearse, 1942
Superfamily Dorylaimoidea De Man, 1876
Family Dorylaimidae De Man, 1876
Subfamily Laimydorinae Andrássy, 1969
Genus *Mesodorylaimus* Andrássy, 1959

Mesodorylaimus potus Heyns, 1963
Fig. 1, Table 1

Mesodorylaimus potus Heyns, 1963: 289–291.
Mesodorylaimus globiceps Loof, 1964: 250–252.

Mesodorylaimus globiceps – Loof & Coomans 1970: 132. — Loof & Heyns 1983: 370–371.
Mesodorylaimus potus – Gagarin 1971: 987–988. — Basson & Heyns 1974: 261–262. — Heyns & Kruger 1983: 47. — Loof & Heyns 1983: 370–371. — Eliava 1984: 206. — Botha & Heyns 1992: 29–30. — Gagarin 1992: 42–43. — Ahmad & Ahmad 2001: 246. — Ciobanu *et al.* 2004a: 24, 26–27. — Uzma & Ahmad 2015: 51–58. — Kazemi & Niknam 2019: 61–62.

Material examined

INDIA • 4 ♀♀, 1 ♂♂; Kerala State, Kozikode district, Ramanatukkara; 11°17′15.83″ N, 75° 50′57.57″ E; 28 Oct. 2017; soil samples collected from around roots of rotten banana rhizome from Vizhayour; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Mesodorylaimus potus* /1–2.

Remarks

Heyns (1963) described *M. potus* from South Africa. Basson & Heyns (1974), Heyns & Kruger (1983), and Botha & Heyns (1992) reported this species from other localities in South Africa. Loof & Heyns (1982) discussed the morphological variations within *M. potus* and synonymized *M. globiceps* Loof, 1964 with this species. Further, Ciobanu *et al.* (2004a), Ahmad & Ahmad (2001), and Uzma & Ahmad (2015) reported it from Romania and Goa India, respectively, where the latter population differed from the earlier described specimens by having a smaller size and a lower number of ventromedian supplements. The present population conforms well with all the previously described populations; however, it slightly differs from the other Indian population described by Ahmad & Ahmad (2001) in having a slightly longer body (1.13–1.21 vs 0.87–1.08 mm), longer odontophore (16–17 vs 13–15 μm), shorter female tail (95–120 vs 130–161 μm) and higher number of ventromedian supplements (16 vs 12–13). These variations may be regarded as minor intraspecific variations. Several populations of *M. potus* described

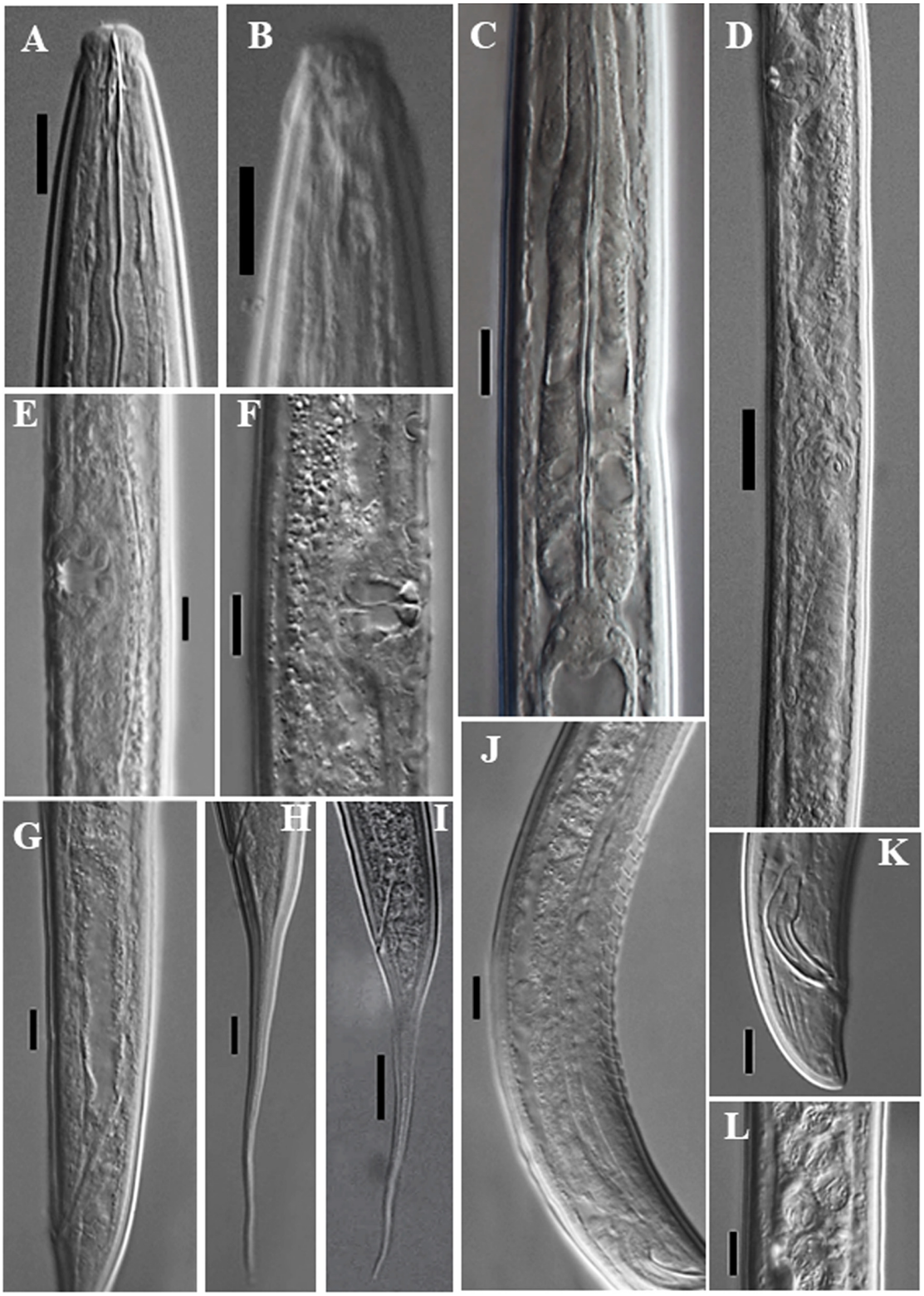

Fig. 1. *Mesodorylaimus potus* Heyns, 1963 (AMU/ZD/NC/*Mesodorylaimus potus*/1–2). **A**. ♀, anterior region. **B**. ♀, anterior end showing amphid. **C**. ♀, pharyngeal expansion and pharyngo-intestinal junction. **D**. ♀, posterior genital branch. **E–F**, **L**. ♀, vulval region. **G**. ♀, prerectum. **H–I**. ♀, posterior region. **J**. ♀, ventromedian supplements. **K**. ♂, posterior region showing spicules. Scale bars: A–G, J–L = 10 µm; H–I = 20 µm.

Table 1. Morphometrics of *Mesodorylaimus potus* Heyns, 1963 and *M. gaurani* Andrássy, 1968 (all measurements in µm except L in mm). Abbreviations: see Material and methods.

	***Mesodorylaimus potus* Heyns, 1963**		***Mesodorylaimus gaurani* Andrássy, 1968**	
Localities			**Goa population**	**Karnataka population**
Characters	**Females**	**Male**	**Females**	**Females**
n	4	1	7	3
L	1.16 ± 0.03 (1.13–1.21)	1.10	1.17 ± 0.07 (1.08–1.27)	1.13 ± 0.09 (1.03–1.25)
a	31.3 ± 1.4 (29.8–33.1)	34.5	38.9 ± 1.2 (37.0–40.9)	41.4 ± 2.1 (39–44.1)
b	5.7 ± 0.2 (5.4–6.0)	5.5	4.5 ± 0.2 (4.3–4.7)	4.4 ± 0.3 (4.0–4.8)
c	10.6 ± 1 (9.7–11.9)	52.6	7.4 ± 0.8 (6.3–8.7)	7.9 ± 0.8 (6.7–8.7)
c’	5.7 ± 0.6 (4.9–6.3)	1.0	8.4 ± 0.8 (7.3–9.3)	8.4 ± 1.1 (7.5–9.9)
V	44.4 ± 0.6 (43.9–45.2)	–	45.9 ± 1.5 (43.7–48.8)	47.7 ± 0.9 (46.5–48.8)
G1	17.8 ± 0.6 (17.3–18.6)	–	9.2 ± 0.4 (8.6–9.7)	9.0 ± 0.1 (8.9–9.2)
G2	19.3 ± 1.8 (17.7–21.8)	–	10.1 ± 1 (8.8–11.8)	9.5 ± 0.6 (8.7–10.2)
body diameter at pharynx base	34.3 ± 1.3 (33–36)	31.5	28.8 ± 1.5 (27–31)	26 ± 2.2 (24–29)
body diameter at mid body	37.1 ± 0.5 (36.5–38.0)	32	30 ± 1.5 (28–32)	27.3 ± 3.3 (25–32)
body diameter at anus	19.4 ± 0.4 (19–20)	21	19 ± 0.8 (18–20)	17.2 ± 1.3 (16–19)
lip region diameter	9 ± 0.4 (8.5–9.5)	9	9.9 ± 0.2 (9.5–10.0)	9.3 ± 0.2 (9.0–9.5)
lip region height	3.5 ± 0 (3.5–3.5)	3.5	2.8 ± 0.4 (2.5–3.5)	3 ± 0 (3–3)
amphid aperture	4.5 ± 0 (4.5–4.5)	4	5 ± 0.4 (4.5–5.5)	4 ± 0 (4–4)
odontostyle length	11.3 ± 0.3 (11.0–11.5)	11	11.6 ± 0.4 (11–12)	11.3 ± 0.2 (11.0–11.5)
odontophore length	16.5 ± 0.5 (16–17)	17	17.5 ± 0.5 (17–18)	16.5 ± 0.4 (16–17)
guiding ring from anterior end	8.3 ± 0.4 (8–9)	8	7.8 ± 0.4 (7–8)	7.7 ± 0.2 (7.5–8.0)
nerve ring from anterior end	87.3 ± 1.9 (86–90)	83	99.8 ± 3.9 (93–105)	100.3 ± 0.5 (100–101)
neck length	203.5 ± 5.7 (196–212)	199	260.3 ± 9.6 (243–269)	258.3 ± 1.9 (257–261)
expanded part of pharynx	86 ± 19.2 (73–119)	68	108.5 ± 5.3 (98–113)	109 ± 1.4 (107–110)
cardia length	16.7 ± 1.2 (15–18)	9	16.3 ± 0.4 (16–17)	20.8 ± 0.8 (20.0–21.5)
anterior genital branch	204.5 ± 5.6 (198–211)	–	107.6 ± 10.6 (94–121)	101.7 ± 9 (91–113)
posterior genital branch	220.3 ± 15.7 (207–247)	–	118.6 ± 15.6 (102–145)	107 ± 14.2 (96–127)
vaginal depth	19.6 ± 0.6 (18.5–20.0)	–	14.8 ± 1 (14–16)	13.5 ± 1.1 (12.0–14.5)
vulva from anterior end	517 ± 21 (497–546)	–	535.2 ± 36.4 (475–582)	536.3 ± 36.4 (491–580)
prerectum length	64.5 ± 4 (60–71)	149	52.2 ± 9.3 (37–61)	57.3 ± 2.6 (55–61)
rectum length	30.5 ± 1.1 (29–32)	33	28.8 ± 2.3 (26–32)	29.5 ± 0.4 (29–30)
tail length	111.3 ± 49.2 (95–120)	21	159.3 ± 17.4 (132–186)	144 ± 15.9 (125–164)
spicule length	–	33	–	–
lateral guiding pieces	–	9.5	–	–
ventromedian supplements	–	16	–	–

from different localities in South Africa have a very wide morphometric range. It seems more than one species has been identified as *M. potus*. As can be seen from the two Indian populations from the Western Ghats itself, there are definite morphometric differences. However, comparing it with the South African population, it all comes in the range. There is a need to restudy the South African populations to make the things clearer.

Mesodorylaimus guarani Andrássy, 1968
Fig. 2, Table 1

Mesodorylaimus guarani Andrássy, 1968: 281–283.

Mesodorylaimus guarani – Eliava 1984: 179–180. — Ahmad & Shaheen 2004: 580–582. — Uzma & Ahmad 2015: 58–62.

Material examined

INDIA • 7 ♀♀; Goa State, Curchorem district, Selbon village; 15°15′0.468″ N, 74°6′30.78″ E; depth 10–15 cm; 14 Apr. 2016; soil sample collected from around roots of grasses (unidentified); AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Mesodorylaimus guarani*/1–2 • 3 ♀♀; Karnataka State, Uttar Kannada district, Manchikeri, Yellapur; 14°51′14.328″ N, 74°48′58.176″ E; same data as for preceding; AMU/ZD/NC, slide reference number AMU/ZD/NC/*Mesodorylaimus guarani*/3.

Remarks

Andrássy (1968) described *M. guarani* from Paraguay. Ahmad & Shaheen (2004) reported this species from Costa Rica. Uzma & Ahmad (2015) recorded it from Arunachal Pradesh, India. The present specimens conform well with the original description as well as with the population of Costa Rica; however, it shows minor differences from the specimens described by Uzma & Ahmad (2015) in having a slightly longer odontophore (16–18 vs 13.0–14.5 µm) and a shorter rectum (26–32 vs 38–41 µm). The present population differs from the two earlier described populations in having a comparatively longer prerectum (prerectum 1.3–1.5 × anal body diameter in the population of Paraguay; 1.9–2.6 × in the population of Costa Rica compared to the present population where the prerectum is 2.7–3.3 × as long as anal body diameter). This may be considered as a geographical variation. Andrássy (1968) described its vulva as a transverse slit; however, in the present specimens the vulva appears pore-like (confirmed by a specimen in dorso-ventral position). There is a possibility that in an earlier described population no dorso-ventral specimen was available for study. This species is reported here for the first time from the Western Ghats of India.

Mesodorylaimus chamoliensis Ahmad, 1995
Fig. 3, Table 2

Mesodorylaimus chamoliensis Ahmad, 1995: 211–212.

Mesodorylaimus chamoliensis – Ahmad & Araki 2003: 47–48. — Baniyamuddin & Ahmad 2006: 505. — Mushtaq & Ahmad 2006: 20. — Uzma & Ahmad 2015: 89–94.

Material examined

INDIA • 5 ♀♀; Maharashtra State, Raigad district, Borli; 18°30′30.528″ N, 72°55′2.208″ E; depth 10–15 cm; 11 Apr. 2016; soil sample collected from around roots of grasses (unidentified); AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Mesodorylaimus chamoliensis*/1–2.

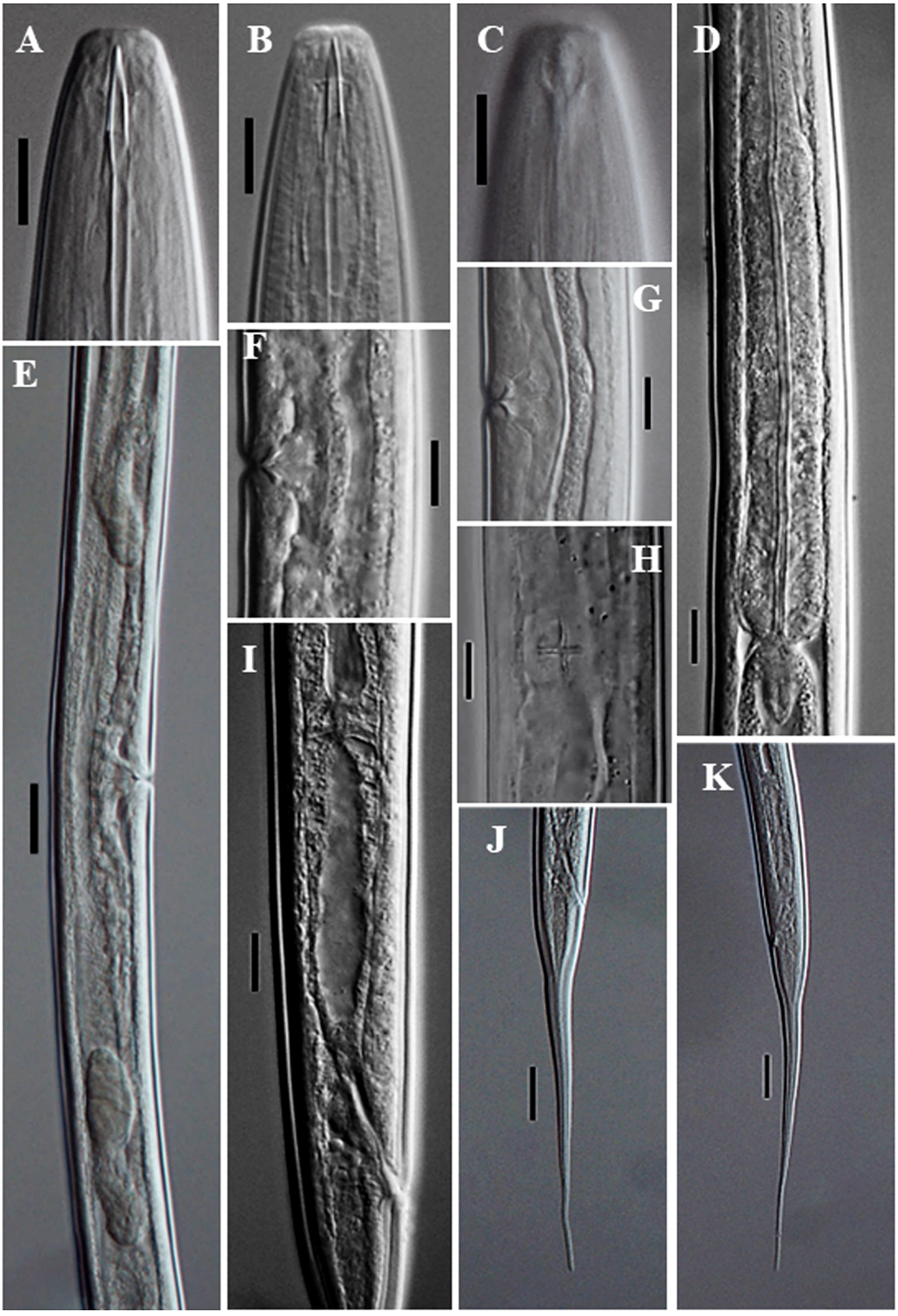

Fig. 2. *Mesodorylaimus guarani* Andrássy, 1968, ♀♀. **A–B**. Anterior region. **C**. Anterior end showing amphid. **D**. Pharyngeal expansion and pharyngeo-intestinal junction. **E**. Genital system. **F–G**. Vulval region. **H**. Vulva in dorso-ventral view. **I**. Prerectum. **J–K**. Posterior region. Scale bars: A–D, F–I = 10 µm; E, J–K = 20 µm.

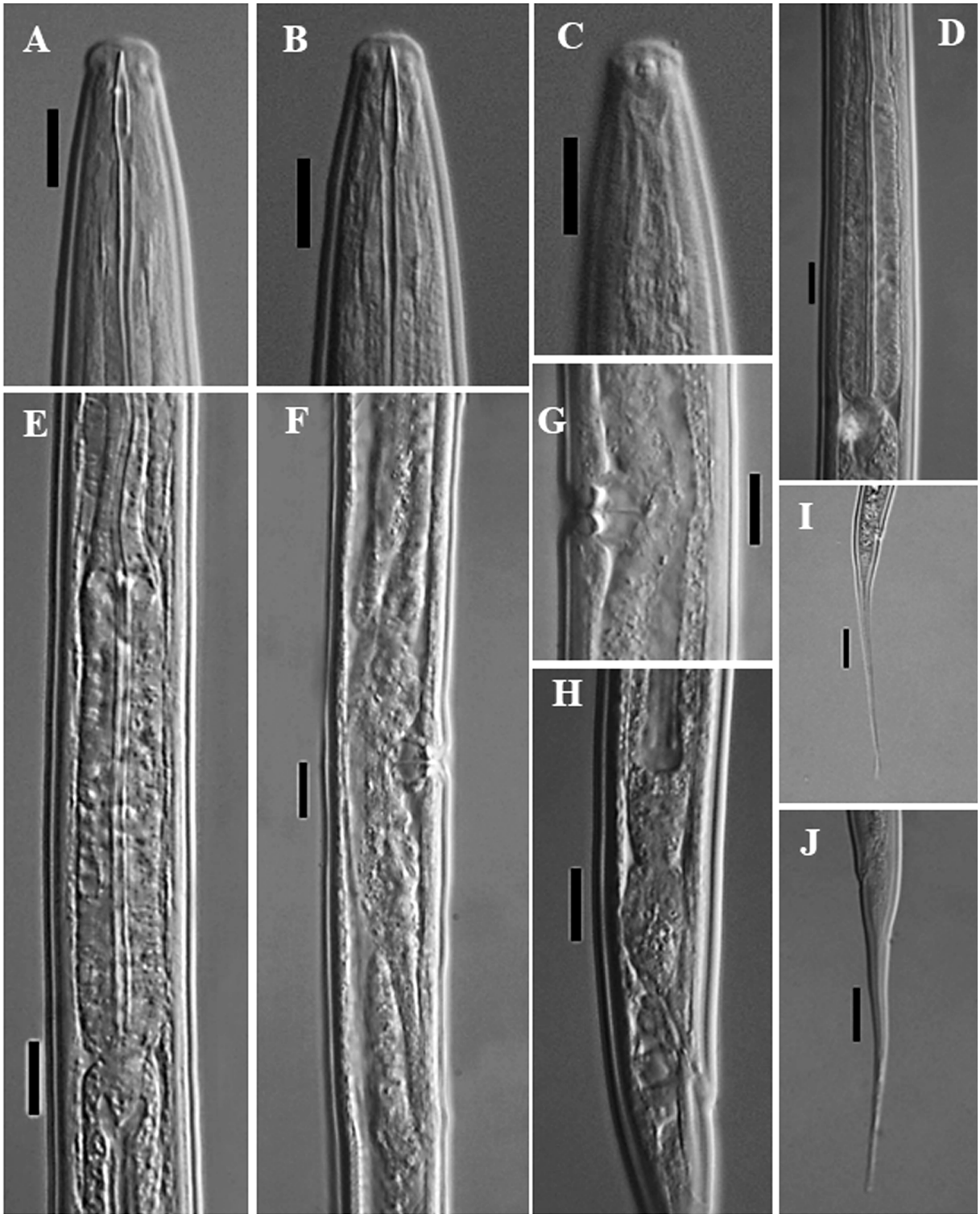

Fig. 3. *Mesodorylaimus chamoliensis* Ahmad, 1995, ♀♀ (AMU/ZD/NC/*Mesodorylaimus chamoliensis*/1–2). **A–B**. Anterior region. **C**. Anterior end showing amphid. **D–E**. Pharyngeal expansion and pharyngeo-intestinal junction. **F**. Genital system. **G**. Vulval region. **H**. Prerectum. **I–J**. Posterior region. Scale bars: A–H = 10 μm; I–J = 20 μm.

Table 2. Morphometrics of *Mesodorylaimus chamoliensis* Ahmad, 1995; *M. keralaensis* Ahmad & Ahmad, 2001 and *M. longicaudatus* Ahmad & Araki, 2003 (all measurements in µm except L in mm). Abbreviations: see Material and methods.

	***Mesodorylaimus chamoliensis* Ahmad, 1995**	***Mesodorylaimus keralaensis* Ahmad & Ahmad, 2001**		***Mesodorylaimus longicaudatus* Ahmad & Araki, 2003**
Characters	**Females**	**Females**	**Males**	**Females**
n	5	6	6	6
L	0.78 ± 0.03 (0.74–0.82)	0.97 ± 0.07 (0.85–1.09)	0.90 ± 0.04 (0.86–0.96)	1.22 ± 0.04 (1.12–1.26)
a	31.1 ± 1 (30.1–33.0)	30.2 ± 2.9 (25.1–34.0)	29 ± 1.3 (26.7–30.6)	40.6 ± 1.6 (38.7–42.8)
b	3.8 ± 0 (3.8–3.9)	5.4 ± 0.3 (4.9–5.8)	4.9 ± 0.2 (4.6–5.2)	4.4 ± 0.1 (4.2–4.6)
c	6.3 ± 0.4 (5.8–6.9)	8.4 ± 0.8 (7.2–9.6)	51.4 ± 3.8 (45.0–56.7)	5.7 ± 0.5 (4.9–6.3)
c’	8.2 ± 0.7 (7.4–9.2)	7.0 ± 0.5 (6.1–7.8	0.9 ± 0 (0.85–1.0)	11.8 ± 1.3 (10.4–14.3)
V	50.8 ± 1.2 (49.0–52.5)	43.6 ± 1.1 (41.6–44.9)	–	44.2 ± 0.8 (43.0–45.6)
G1	10.2 ± 0.6 (9.5–11.0)	15.6 ± 1.6 (12.4–17.7)	–	9.4 ± 1 (8.1–10.8)
G2	10.5 ± 1.3 (8.4–12.6)	14.1 ± 1.3 (12.6–16.1)	–	9.7 ± 0.4 (9.3–10.1)
body diameter at pharynx base	24 ± 1.4 (22–26)	30.8 ± 0.6 (30.0–31.5)	30.7 ± 1.7 (28.0–32.5)	27.7 ± 0.7 (26–28)
body diameter at mid body	25.2 ± 1.7 (22.5–27.0)	32.3 ± 1.5 (30.5–34.5)	31.3 ± 1.6 (28.5–33.0)	29.9 ± 1 (29.0–31.5)
body diameter at anus	15.2 ± 1 (14–16)	16.8 ± 0.6 (16.0–17.5)	19.2 ± 0.7 (18–20)	18.3 ± 0.4 (18–19)
lip region diameter	8.7 ± 0.4 (8–9)	9.7 ± 0.4 (9–10)	9.8 ± 0.4 (9–10)	9.9 ± 0.2 (9.5–10.0)
lip region height	3.6 ± 0.2 (3.5–4.0)	3.3 ± 0.3 (3.0–3.5)	3.2 ± 0.2 (3.0–3.5)	2.8 ± 0.2 (2.5–3.0)
amphid aperture diameter	4 ± 0 (4–4)	4.4 ± 0.2 (4.0–4.5)	5 ± 0 (5–5)	5 ± 0 (5–5)
odontostyle length	11 ± 0 (11–11)	10.1 ± 0.3 (9.5–10.5)	9.8 ± 0.2 (9.5–10.0)	11.6 ± 0.4 (11–12)
odontophore length	14.8 ± 0.2 (14.5–15.0)	16.5 ± 0.8 (16–18)	15.2 ± 1.1 (14–17)	16.7 ± 0.6 (16.0–17.5)
guiding ring from anterior end	7.1 ± 0.2 (7.0–7.5)	7.8 ± 0.4 (7–8)	7.8 ± 0.2 (7.5–8.0)	7.8 ± 0.2 (7.5–8.0)
nerve ring from anterior end	84.2 ± 4.5 (76–88)	80.2 ± 4.2 (73–85)	83.2 ± 3 (78–86)	109.3 ± 5.3 (103–118)
neck length	203.2 ± 8.5 (191–215)	180.8 ± 4.5 (176–189)	184.8 ± 7.2 (176–195)	277.3 ± 5.8 (267–284)
expanded part of pharynx	79.2 ± 4.7 (74–87)	68.2 ± 3.5 (64–74)	68.5 ± 2.9 (64–72)	122.3 ± 4.8 (113–128)
cardia length	15.9 ± 2.3 (11.5–18.0)	9.1 ± 1.2 (8–11)	11 ± 0.7 (10–12)	17.4 ± 2.2 (14–20)
anterior genital branch	79.4 ± 5.9 (72–90)	152.3 ± 19.3 (123–175)	–	114 ± 12.4 (100–131)
posterior genital branch	82 ± 9.7 (68–98)	152.3 ± 19.3 (123–175)	–	118.5 ± 6.9 (104–125)
vaginal depth	12.7 ± 0.6 (11.5–13.0)	16.2 ± 0.7 (15–17)	–	15.8 ± 0.6 (15.0–16.5)
vulva from anterior end	397 ± 22.3 (364–426)	424 ± 28.9 (371–466)	–	537.8 ± 22.9 (494–568)
prerectum length	29 ± 2 (26–32)	43.2 ± 5 (33–49)	59.5 ± 10.5 (49–74)	52 ± 9.4 (32–60)
rectum length	20 ± 1.4 (18–22)	27.2 ± 1.5 (25–29)	31.2 ± 2.8 (28–35)	30.5 ± 1.7 (28–33)
tail length	123.2 ± 3.7 (118–129)	116.7 ± 6.4 (104–124)	17.7 ± 0.7 (17–19)	215.7 ± 22.3 (192–257)
spicule length	–	–	27.7 ± 0.7 (26–28)	–
lateral guiding pieces	–	–	8.7 ± 0.5 (8–9)	–
ventromedian supplements	–	–	12–14	–

Description

Male

Unknown. No traces of sperm present in female genital tract.

Remarks

Ahmad (1995) described *M. chamoliensis* from Chamoli Hills, Uttarakhand, India. Ahmad & Araki (2003) reported this species from Japan. Later, Baniyamuddin & Ahmad (2006), Mushtaq & Ahmad (2006), and Uzma & Ahmad (2015) described this species from different states of India, covering areas of Arunachal Pradesh, Jammu and Kashmir, and Meghalaya, respectively. The present specimens conform well with all the previously described populations except for having a slightly shorter body (0.74–0.82 vs 0.78–1.03 mm); posterior vulva position (V = 49–53 vs 43–48) and shorter tail (118–129 vs 154–226 µm). In the present specimens, the tail appears to be slightly broken near the posterior end due to which the morphometric values differ from previously described populations. This species is reported for the first time from the Western Ghats of India.

Mesodorylaimus keralaensis Ahmad & Ahmad, 2001
Fig. 4, Table 2

Mesodorylaimus keralaensis Ahmad & Ahmad, 2001: 242–244.

Mesodorylaimus keralaensis – Uzma & Ahmad 2015: 108–113.

Material examined

INDIA • 6 ♀♀, 6 ♂♂; Maharashtra State, Raigad district, beside Phansad Wildlife Sanctuary road, near Usoli flyover; 18°26′38.508″ N, 72°56′26.376″ E; depth 5–15 cm; 4 Apr. 2016; soil sample collected from around roots of paddy; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Mesodorylaimus keralaensis*/1–4.

Remarks

Ahmad & Ahmad (2001) described this species from the soil around the roots of the paddy plant (*Oryza sativa* L.) in the Trivandrum district, Kerala. Uzma & Ahmad (2015) restudied the paratypes of this species. Since then, there has been no record. The present population conforms well with the description of the type population except for having a larger expanded part of the pharynx (37–38% vs 32–34%); a shorter cardia (8–11vs14–16 µm); a shorter prerectum (2.6 anal body width vs 3.0–4.3 anal body width in the original description), and a higher number of ventromedian supplements (12–14 vs12–13), which may be considered minor intraspecific variations.

Mesodorylaimus longicaudatus Ahmad & Araki, 2003
Fig. 5, Table 2

Mesodorylaimus longicaudatus Ahmad & Araki, 2003: 44–47.

Material examined

INDIA • 6 ♀♀; Karnataka State, Shimoga district, Sagar-Hosanagar road, Tirtha village; 14°2′34.8144″ N, 75°7′6.6144″ E; depth 10–15 cm; 27 Oct. 2018; soil samples collected from around roots of shrubs (unidentified) in forest; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Mesodorylaimus longicaudatus*/1–3.

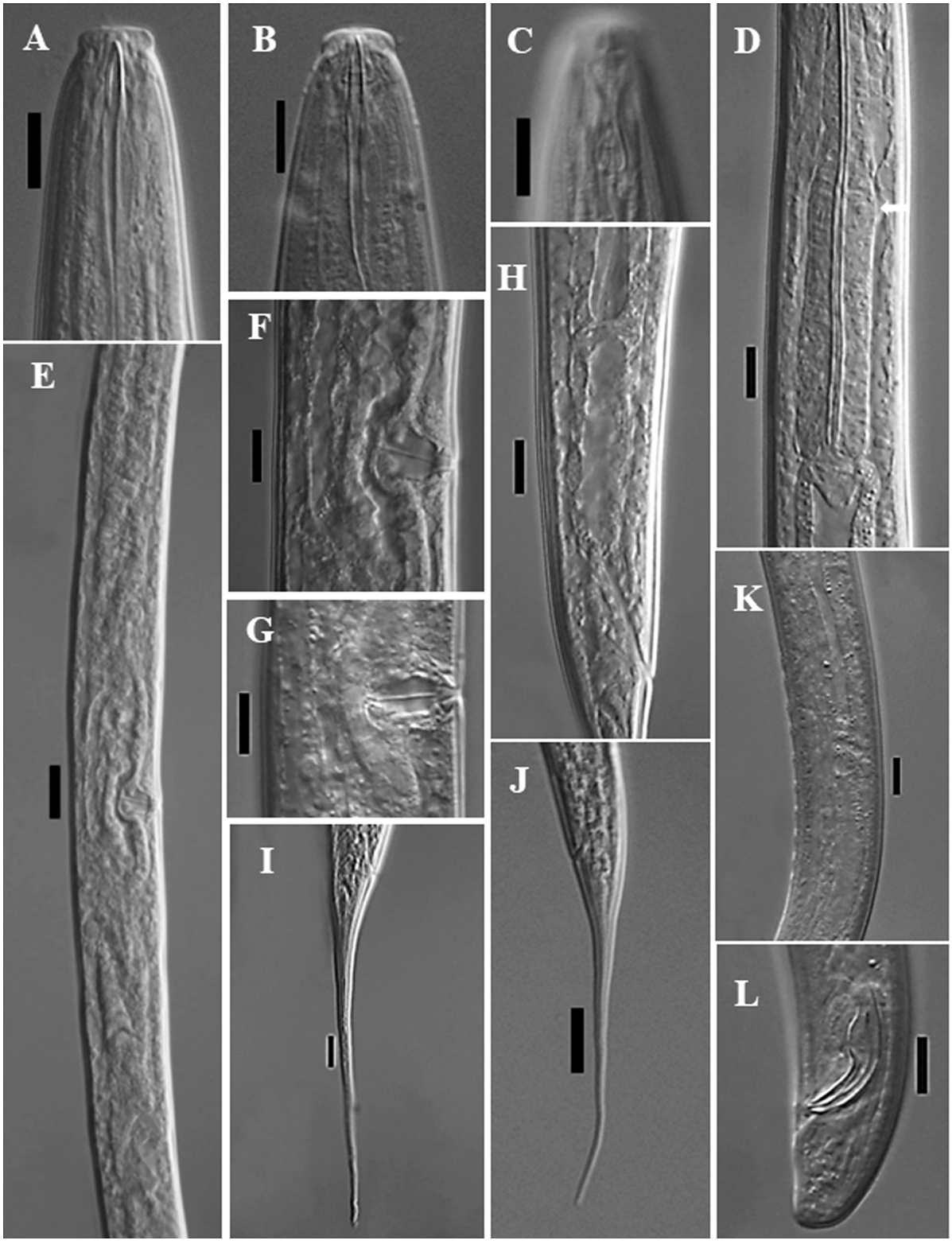

Fig. 4. *Mesodorylaimus keralaensis* Ahmad & Ahmad, 2001 (AMU/ZD/NC/*Mesodorylaimus keralaensis*/1–4). **A–B**. ♀, anterior region. **C**. ♀, anterior end showing amphid. **D**. ♀, pharyngeal expansion and pharyngeo-intestinal junction, arrow showing dorsal gland nucleus. **E**. ♀, genital system. **F–G**. ♀, vulval region. **H**. ♀, prerectum. **I–J**. ♀, posterior region. **K**. ♂, ventromedian supplements. **L**. ♂, posterior region showing spicules. Scale bars: A–H = 10 µm; I–J = 20 µm.

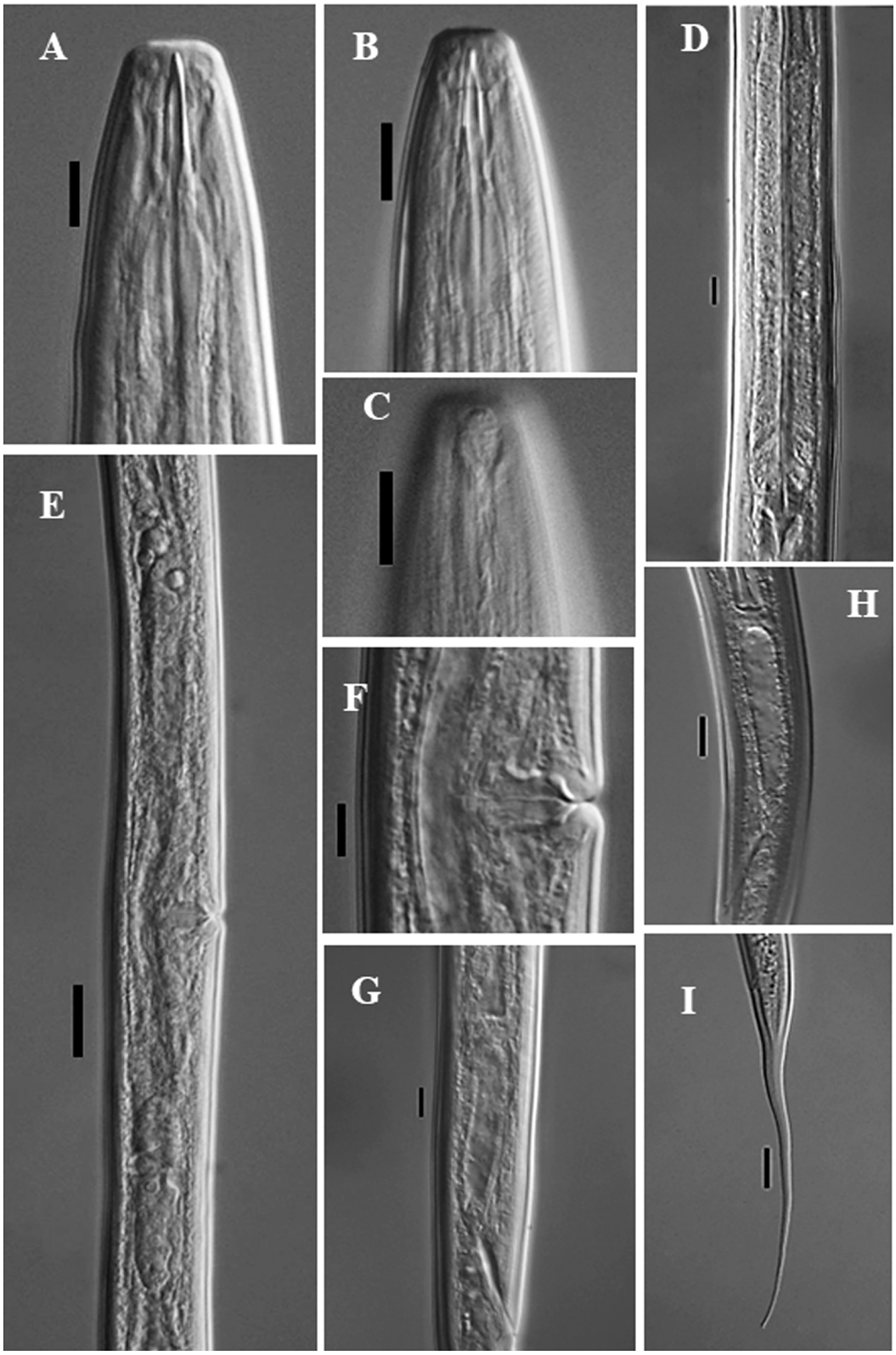

Fig. 5. *Mesodorylaimus longicaudatus* Ahmad & Araki, 2003, ♀♀ (AMU/ZD/NC/*Mesodorylaimus longicaudatus*/1–3). **A–B**. Anterior region. **C**. Anterior end showing amphid. **D**. Pharyngeal expansion and pharyngeo-intestinal junction. **E**. Genital system. **F**. Vulval region. **G–H**. Prerectum. **I**. Posterior region. Scale bars: A–H = 10 μm; I–J = 20 μm.

Description

Male

Unknown. No trace of sperm is present in the female genital tract.

Remarks

Ahmad & Araki (2003) described this species from the soil around the roots of forest trees in temperate deciduous forests in Japan. There is no record of this species after its original description. The present population conforms well with the description of the type population in the shape of the lip region, the nature of the odontostyle and the position of S2N except for having a longer cardia (14–20 vs 9–12 µm); a slightly posterior vulva (V= 43–46 vs 42–44) and a shorter tail (192–257 vs 264–316 µm; c = 4.9–6.3 vs 3.9–4.3; c' = 10.4–14.3 vs 14.8–16.5). These minor morphometric differences might be due to the broken tail tip in all the specimens. This species is recorded here for the first time from the Western Ghats and India.

Genus *Laimydorus* Siddiqi, 1969

Laimydorus siddiqii Baqri & Jana, 1982
Fig. 6, Table 3

Laimydorus siddiqii Siddiqi, 1969: 237–239.

Laimydorus siddiqii – Baqri & Jana 1983: 192–195. — Choi *et al.* 1997: 5. — Ahmad & Ahmad 2002: 97.

Material examined

INDIA • 2 ♀♀, 1 ♂; Maharashtra State, Satara district, about 100 m away from bank of Kaas Pond bridge; 17°43′9.48″ N, 73°48′52.092″ E; depth 5–10 cm; 13 Apr. 2016; soil samples collected from around roots of grasses from dense forest; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Laimydorus siddiqii*/1–2 • 2 ♀♀; Maharashtra State, Raigad, near Mahabaleshwar Forest office; 17°55′6.5028″ N, 73°39′30.6864″ E; depth 10–15 cm; 4 Apr. 2016; soil samples collected from around roots of fern plants (unidentified); AMU/ZD/NC, slide reference number AMU/ZD/NC/*Laimydorus siddiqii*/3.

Remarks

Baqri & Jana (1982) described *L. siddiqii* from West Bengal, India. Ahmad & Ahmad (2002) redescribed it based on material collected from different states in India including Andhra Pradesh, Goa, Kerala, and Uttarakhand. The present population fits well with the type population as well as Ahmad & Ahmad's (2002) populations but differs from the former in having a shorter tail (182–260 vs 322–363 µm; c = 8.8–11.4 vs 7.8) and longer spicules (60 vs 53–57 µm). From the latter, it differs in having a slightly longer spicule (60 vs 50–57 µm). This species has always been recorded from the paddy fields and hence, Ahmad & Ahmad (2002) rightly pointed out that there seems to be some sort of habitat specificity in this species for the paddy field and wet soil. The present specimens in addition to their morphometric similarity with the earlier described populations, were also collected from wet soil in a dense forest region close to the Kaas Pond and Mahabaleshwar Forest, hence it agrees with Ahmad & Ahmad's (2002) view of habitat specificity in this species for the paddy field and wet soil.

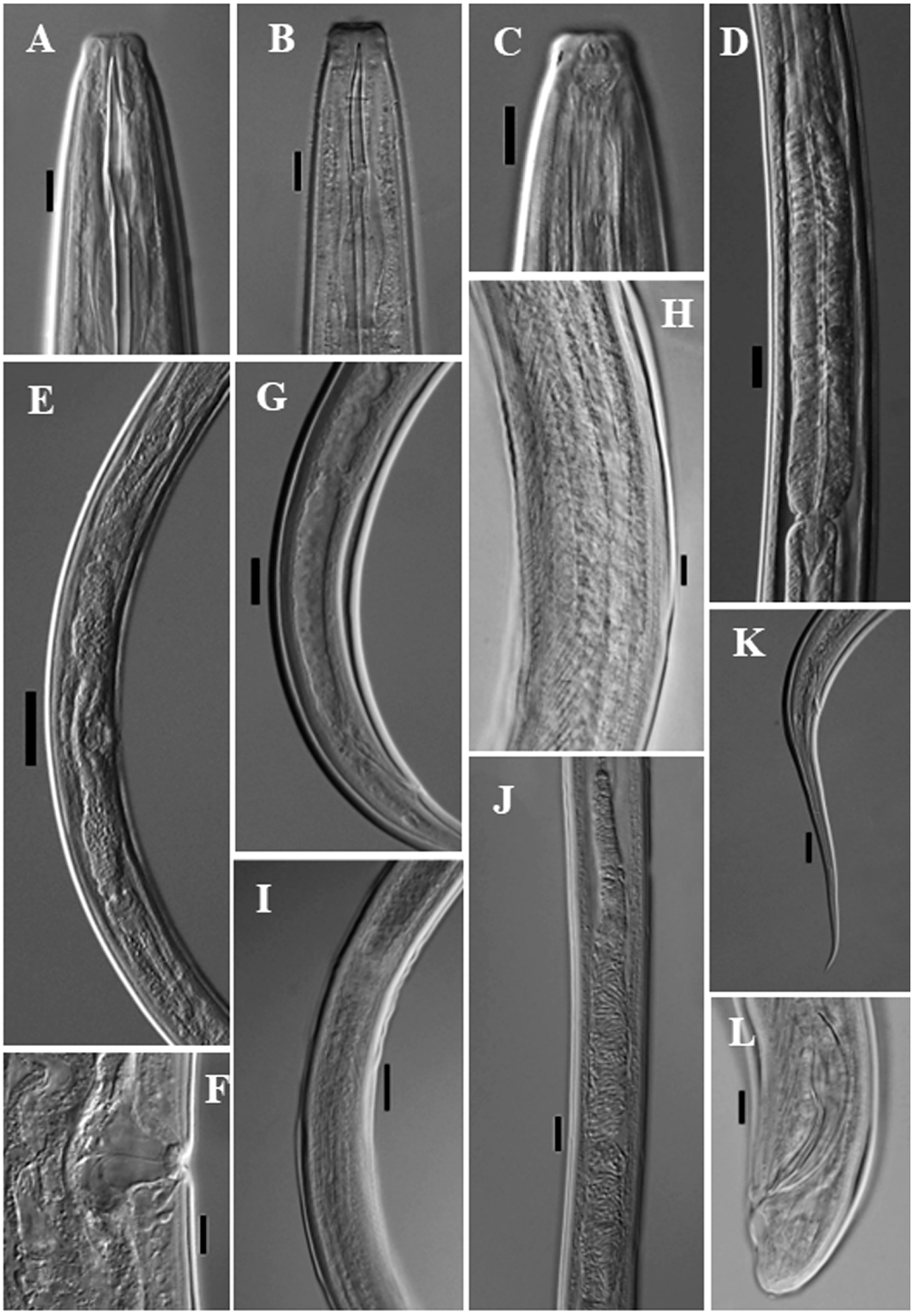

Fig. 6. *Laimydorus siddiqii* Baqri & Jana, 1982. **A–B**. ♀, anterior region. **C**. ♀, anterior end showing amphid. **D**. ♂, pharyngeal expansion and pharyngeo-intestinal junction. **E**. ♀, amphidelphic genital branch. **F**. ♀, vulval region. **G**. ♀, prerectum. **H**. ♂, ventromedian supplements. **I**. ♂, prerectum terminating far beyond the range of supplements. **J**. ♂, testes with spindle-shaped spermatozoa. **K**. ♀, posterior region. **L**. ♂, posterior region. Scale bars: A–C, F, H, L = 10 μm; D, G, I–K = 20 μm; E = 50 μm.

Table 3. Morphometrics of *Laimydorus siddiqii* Baqri & Jana, 1982 (all measurements in µm except L in mm). Abbreviations: see Material and methods.

Localities	**Satara population**		**Raigad population**
Characters	**Females**	**Male**	**Females**
n	2	1	2
L	2.08, 2.29	2.63	1.88, 2.36
a	37.9, 46.2	46.2	37.6, 42.1
b	4.2, 4.6	4.5	3.9, 4.9
c	8.8, 11.4	101.2	9.9, 10.1
c’	6.5, 10	0.8	7.2, 9.3
V	44.7, 45.3	–	45.8, 52.4
G1	12.5, 14.9	–	13.5, 14.7
G2	14.3, 16.9	–	11.9, 14.0
body diameter at pharynx base	48, 51	52, 60	49, 55
body diameter at mid body	49.5, 55	48, 57	50, 56
body diameter at anus	26, 28	30, 33	25, 26.5
lip region diameter	14, 14	15	14.5, 15
lip region height	5.5, 6.0	4	5, 6.5
amphid aperture diameter	8.0, 8.5	8	8, 10
odontostyle length	29, 29.5	30	30.5, 34
odontophore length	30, 30	39	33, 35
guiding ring from ant. end	15, 16	20	16.5, 17.5
nerve ring from ant. end	136, 143	162	156, 165
neck length	456, 543	585	481, 482
expanded part of pharynx	212, 308	310	224, 229
cardia length	18, 20	22	24
anterior genital branch	287, 311	–	253, 348
posterior genital branch	327, 353	–	225, 304
vaginal depth	21, 23.5	–	24, 29
vulva from ant. end	943, 1023	–	984, 1081
prerectum length	110, 179	291	123, 150
rectum length	39, 39	57	36, 43
tail length	182, 260	26	190, 233
spicule length	–	60	–
lateral guiding pieces	–	14	–
ventromedian supplements	–	25	–

Genus *Calodorylaimus* Andrássy, 1969

Calodorylaimus andrassyi Baqri & Jana, 1982
Fig. 7, Table 4

Calodorylaimus andrassyi Baqri & Jana, 1982: 195–199.

Laimydorus andrassyi – Ahmad & Ahmad 2002: 92–94.

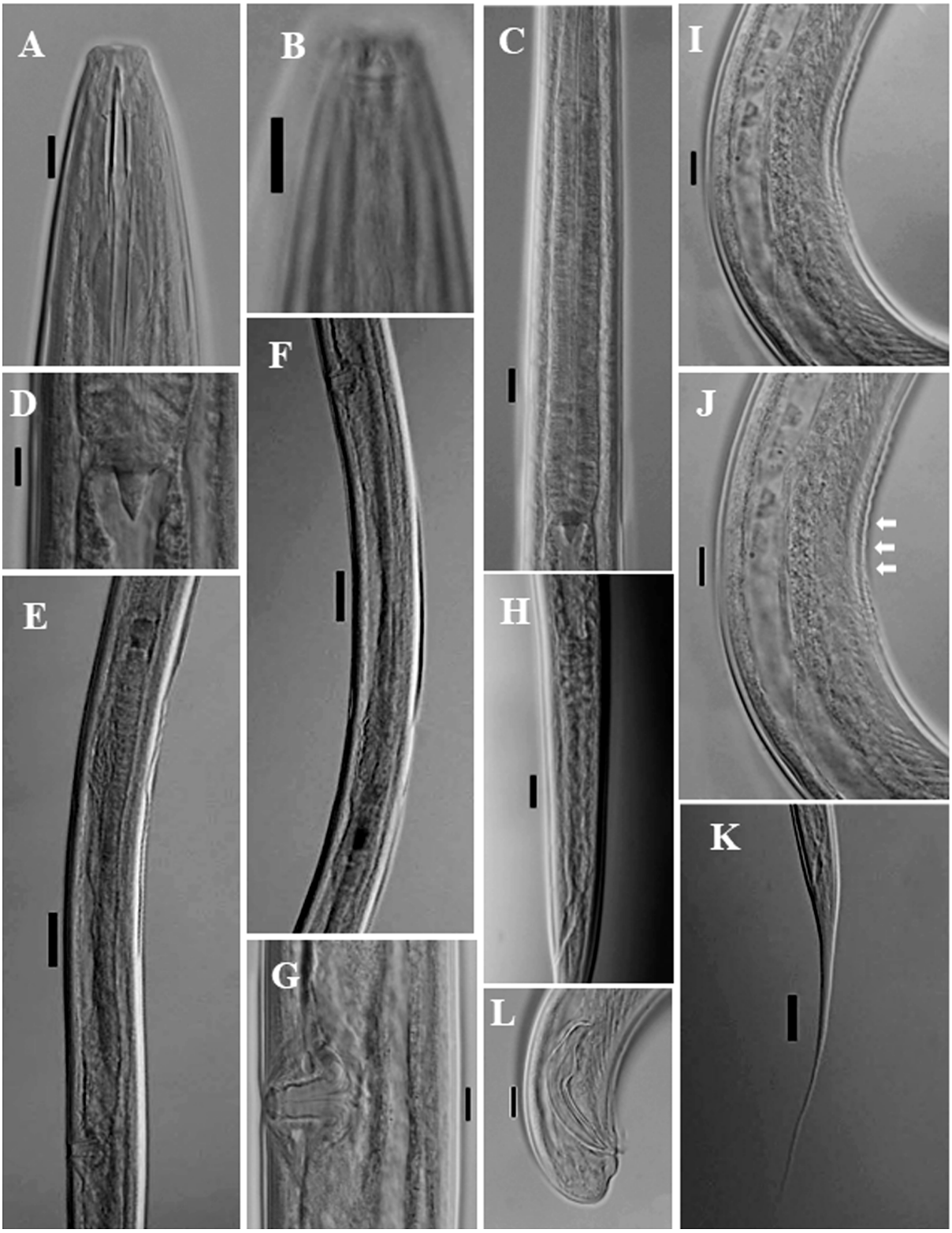

Fig. 7. *Calodorylaimus andrassyi* Baqri & Jana, 1982 (AMU/ZD/NC/*Calodorylaimus andrassyi*/1–2). **A**. ♀, anterior region. **B**. ♀, anterior end showing amphid. **C**. ♀, pharyngeal expansion. **D**. ♀, pharyngeo-intestinal junction. **E**. ♀, anterior genital branch. **F**. ♀, posterior genital branch. **G.** ♀, vulval region. **H**. ♀, prerectum. **I–J**. ♂, ventromedian supplements. **K**. ♀, posterior region. **L**. ♂, posterior region showing spicules. Scale bars: A–B, D, G, I–J, L = 10 µm; C, H, K = 20 µm; E–F = 50 µm.

Table 4. Morphometrics of *Calodorylaimus andrassyi* Baqri & Jana, 1982 and *Calcaridorylaimus indicus* sp. nov. (all measurements in µm except L in mm). Abbreviations: see Material and methods.

	***Calodorylaimus andrassyi* Baqri & Jana, 1982**		***Calcaridorylaimus indicus* sp. nov.**		
Characters	**Females**	**Males**	**Holotype female**	**Paratypes female**	**Paratypes male**
n	3	1		4	4
L	3.49 ± 0.18 (3.26–3.70)	2.87	1.58	1.59 ± 0.09 (1.47–1.72)	1.48 ± 0.06 (1.41–1.56)
a	55.5 ± 9.4 (46.5–68.5)	59.9	50.9	50.5 ± 4.3 (45.9–57.4)	53.9 ± 1.9 (51.8–56.5)
b	5.73 ± 0 (5.69–5.76)	5.2	5.5	5.4 ± 0.1 (5.2–5.6)	5.2 ± 0.1 (5.1–5.3)
c	9.2 ± 0.6 (8.4–9.9)	136.9	12.1	12.1 ± 0.5 (11.3–12.6)	65.1 ± 3.7 (61.4–70.7)
c’	12.9 ± 0.7 (12.4–13.9)	0.7	6.8	7.2 ± 0.5 (6.6–7.8)	1.0 ± 0.1 (0.9–1.1)
V	44.7 ± 0.7 (43.7–45.3)	–	45.9	44.3 ± 1.2 (42.7–45.8)	–
G1	13.2 ± 1.2 (11.5–14.4)	–	11.9	12.2 ± 0.9 (11.1–13.5)	–
G2	13.9 ± 1.7 (11.5–15.2)	–	16.7	13.3 ± 1 (12.0–14.6)	–
body diameter at pharynx base	62 ± 5.7 (54–67)	52	30	27.6 ± 1.4 (26–29)	28.3 ± 2 (25–30)
body diameter at mid body	64 ± 7.1 (54–70)	48	31	31.6 ± 1 (30.0–32.5)	27.5 ± 1.5 (26–30)
body diameter at anus	29.3 ± 1.7 (27–31)	30	19	18.3 ± 0.4 (18–19)	22.9 ± 1.1 (21–24)
lip region diameter	15.3 ± 0.5 (15–16)	16	9	9 ± 0 (9–9)	9.1 ± 0.5 (8.5–10.0)
lip region height	4.5 ± 0.4 (4–5)	5	4	3.2 ± 0.2 (3.0–3.5)	3.3 ± 0.3 (3.0–3.5)
amphid aperture diameter	8.5 ± 0.5 (8–9)	8	4.5	4.7 ± 0.2 (4.5–5.0)	5 ± 0.7 (4–6)
odontostyle length	30.2 ± 0.2 (30.0–30.5)	29.5	12	12.4 ± 0.4 (12–13)	11.6 ± 0.5 (11.0–12.5)
odontophore length	35.7 ± 0.9 (35–37)	35	17	16.3 ± 0.8 (15–17)	15 ± 0.7 (14–16)
guiding ring from ant. end	19.2 ± 0.2 (19.0–19.5)	17.5	9	8.3 ± 0.2 (8.0–8.5)	8.3 ± 0.6 (7.5–9.0)
nerve ring from ant. end	160 ± 6.7 (153–169)	155	110	111.5 ± 1.1 (110–113)	113.8 ± 3 (110–118)
neck length	609 ± 33.1 (569–650)	551	289	294 ± 13.3 (282–315)	287.3 ± 11.2 (275–302)
expanded part of pharynx	380.7 ± 13.8 (369–400)	331	116	124 ± 14.9 (111–148)	117.8 ± 5 (110–124)
cardia length	20 ± 1 (19–20)	36	14	12.1 ± 0.7 (11–13)	12.5 ± 2.1 (10–15)
anterior genital branch	457.7 ± 34.7 (426–506)	–	188	193.3 ± 9.4 (178–203)	–
posterior genital branch	481.7 ± 43 (427–532)	–	264	211.5 ± 3.8 (206–216)	–
vaginal depth	29.7 ± 0.9 (29–31)	–	20	17.7 ± 1.7 (16–20)	–
vulva from ant. end	1558 ± 80 (1475–1666)	–	724	704.3 ± 22.4 (672–735)	–
prerectum length	182.7 ± 4.2 (177–187)	267	52	88 ± 10.3 (72–100)	150 ± 25.6 (124–191)
rectum length	51.3 ± 3.1 (47–54)	53	30	34.3 ± 1.3 (33–36)	36.3 ± 2.5 (33–40)
tail length	377.7 ± 7.4 (371–388)	21	130	131.5 ± 10.4 (118–143)	22.8 ± 0.4 (22–23)
spicule length	–	55	–	–	37.5 ± 1.1 (36–39)
lateral guiding pieces	–	14	–	–	6.5 ± 0.5 (6–7)
ventromedian supplements	–	18	–	–	12–15

Material examined

INDIA • 3 ♀♀, 1 ♂; Karnataka State, Shivamogga district, Mattur; 13°52′26″ N, 75°33′32″ E; depth 5–10 cm; 26 Oct. 2018; soil samples collected from around roots of paddy plant; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Calodorylaimus andrassyi*/1–2.

Remarks

Baqri & Jana (1982) described *Calodorylaimus andrassyi* from West Bengal, India. Loof (1996) synonymized the genus *Laimydorus* Siddiqi, 1969 with *Calodorylaimus* Andrássy, 1969, and transferred *C. andrassyi* to *Laimydorus*. Later, several authors rejected its synonymy and considered *Calodorylaimus* as a valid genus. *Calodorylaimus andrassyi* Baqri & Jana, 1982 is distinguished by having a long slender body (a = 60–65); an offset lip region; a relatively long odontostyle; a longitudinal vulva in females, males with ventromedian supplements arranged in groups, its prerectum extending well beyond the range of supplements. In their original description, Baqri & Jana (1982) described the vulva as a transverse slit; however, Ahmad & Ahmad (2002) reported this species from South India (Hyderabad and Mangalore) and described the vulva to be longitudinal rather than transverse. Their claim of a longitudinal vulva in *C. andrassyi* is also supported in the present study. The present population from the Western Ghats conforms well with the description of the type population but differs in having a slightly longer odontostyle (30.0–30.5 vs 26–29 µm) and comparatively longer tail (371–388 vs 312–367 µm). The present specimens also fit with the population of South India except in having a slightly longer odontostyle (30.0–30.5 vs 23–29 µm), a longer odontophore (35–37 vs 23–32 µm) and longer spicules (55 vs 43–53 µm). These differences may be attributed to intraspecific variations.

Genus *Calcaridorylaimus* Andrássy, 1986

Calcaridorylaimus indicus sp. nov.
urn:lsid:zoobank.org:act:3711E4C1-0226-4C49-A5BF-5DF2D5D2EBC6
Figs 8–9, Table 4

Diagnosis

Calcaridorylaimus indicus sp. nov. is characterized by having a 1.47–1.72 mm (female) or a 1.41–1.56 mm (male) long and slender body (a = 45.9–57.4); a hardly offset lip region with amalgamated lips, an amphid fovea cup-shaped, guiding ring single; an amphidelphic female genital system; a longitudinal vulva and an elongate tail with rounded terminus. Males have 36–39 µm long dorylaimoid spicules with spur present before its distal end, 12–15 almost equally spaced ventromedian supplements and a short conoid tail with bluntly rounded terminus.

Etymology

The new species is named *Calcaridorylaimus indicus* sp. nov. because of its distribution in India.

Type material

Holotype

INDIA • ♀; Goa State, South Goa district, near bus stop of Canacona city; 15°0′28.908″ N, 74°2′40.488″ E; depth 5–10 cm; 18 Apr. 2016; soil samples collected from around roots of grasses (unidentified); AMU/ZD/NC, slide reference number AMU/ZD/NC/*Calcaridorylaimus indicus* sp. nov./1.

Paratypes

INDIA • 4 ♀♀, 4 ♂♂; same data as for holotype; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Calcaridorylaimus indicus* sp. nov./2–5 • 1 ♀, 1 ♂; same data as for holotype; ZSIC, slide reference number AMU/ZD/NC/*Calcaridorylaimus indicus*/6.

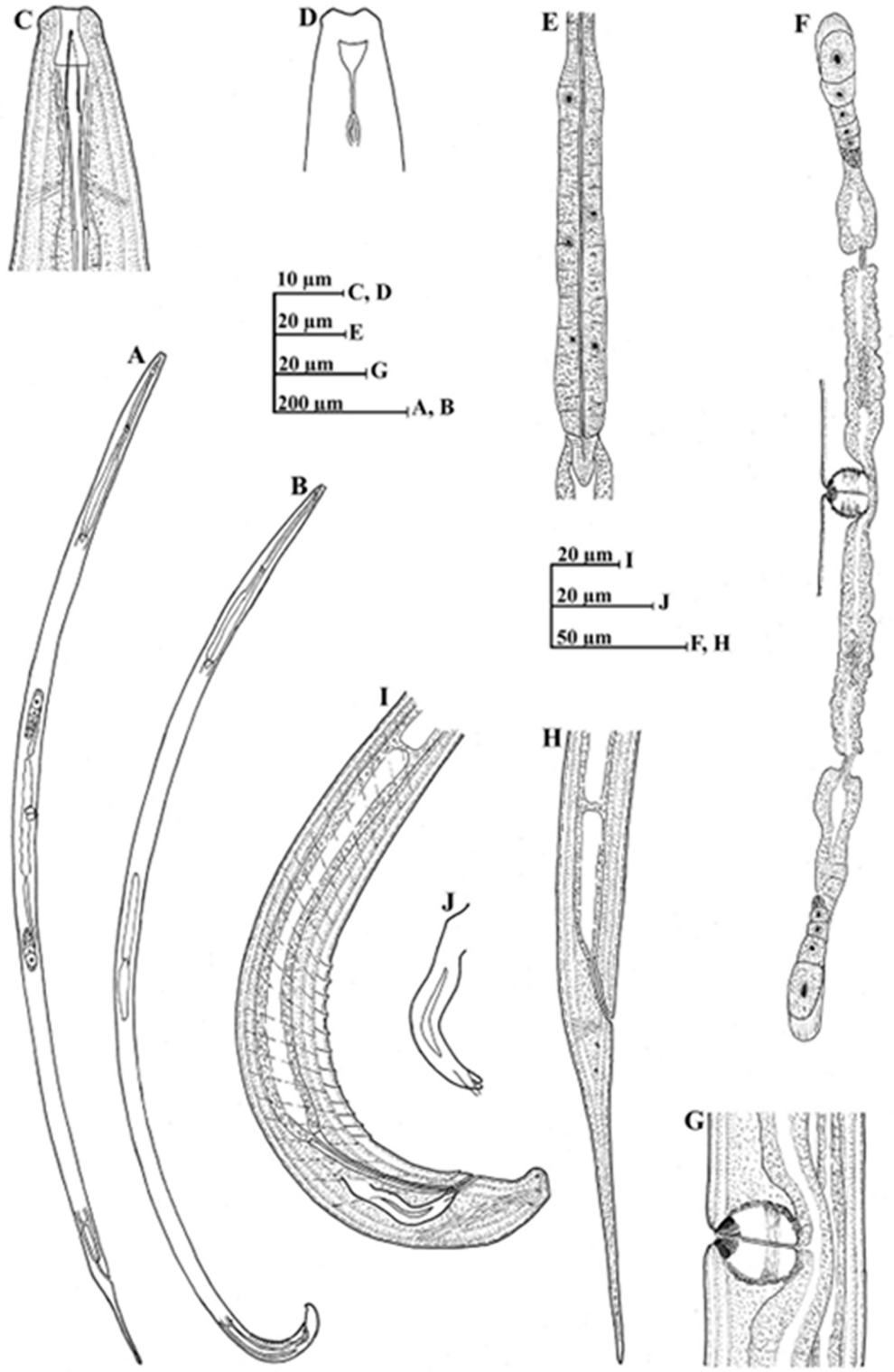

Fig. 8. *Calcaridorylaimus indicus* sp. nov. **A, C–D**. Holotype, ♀ (AMU/ZD/NC/*Calcaridorylaimus indicus*/1). **E–H**. Paratype 2, ♀ (AMU/ZD/NC/*Calcaridorylaimus indicus*/2). **B, I–J**. Paratype 4, ♂ (AMU/ZD/NC/*Calcaridorylaimus indicys*/4). **A**. Entire female. **B**. Entire male. **C**. Anterior region. **D**. Anterior region showing amphid. **E**. Pharyngeal expansion and pharyngeo-intestinal junction. **F**. Genital branch. **G**. Vulval region. **H–I**. Posterior regions. **J**. Spicules.

Description

Female

Body slender, 1.47–1.72 mm long, more or less curved ventrad upon fixation, tapering towards both extremities, posteriorly ending in an elongate conoid tail. Cuticle thin, 1.0 µm thick in anterior region, 1.5 µm at mid body and 2.0–2.5 µm on tail; outer layer with fine transverse striations. Lateral chords about 23–26% of mid body diameter. Lateral, dorsal and ventral body pores indistinct. Lip region offset by slight depression, 2.3–2.6 × as wide as high or about 2/7–⅓ of body diameter at neck base. Lips amalgamated, slightly angular; labial papillae not protruding above labial contour. Amphids cup-shaped, their aperture occupying about ½ of lip region diameter. Odontostyle dorylaimoid, straight, 1.3–1.4 × as long as lip region diameter, its aperture about 2/5 of its length. Odontophore simple, rod-like, 1.3–1.4 × as long as odontostyle. Guiding ring single, at 0.9–1.0 × lip region diameter from anterior end. Nerve ring encircling anterior slender part of pharynx at 35–38% of neck length from head end. Pharynx consisting of slender anterior part, expanding gradually into posterior expanded part 7.3–9.9 × as long as wide or 3.9–5.1 × as long as corresponding body diameter, occupying about 40–47% of total neck length. Pharyngeal gland nuclei and their orifices are located as follows: DO = 61–62; DN = 63–64; DO-DN = 2.0–2.4; S1N1 = 80–84; S1N2 = 84–85; S2N = 90–91; S2O = 91–92. Cardia rounded to conoid, slightly less than ½ as long as corresponding body diameter, surrounded by intestinal tissue. Female genital system amphidelphic, measuring 178–203 µm (anterior branch) and 206–264 µm (posterior branch) long. Ovaries reflexed, measuring 51–73 µm (anterior) and 51–88 µm (posterior) long; oocytes arranged first in two or more rows, then in single row. Oviduct joining ovary subterminally, measuring 89–102 µm or 2.8–3.3 (anterior) and 93–167 µm or 3.1–5.4 (posterior) × as long as corresponding body diameter. Sphincter distinct at oviduct-uterus junction. Uterus simple, measuring 86–103 µm or 2.8–3.4 × (anterior) and 206–264 µm or 3.1–3.8 × (posterior) as long as corresponding body diameter. Spindle-shaped sperms present in uterus. Vulva longitudinal. Vagina extending inwards, 20 µm or about ⅔ of mid body diameter; pars distalis vaginae 1.5–2.0 µm; pars refringens vaginae with two divergent, well separated sclerotized pieces and cuticularized intermediate area, each measuring 4.0 × 1.5–2.0 µm with combined width of 9–10 µm; pars proximalis vaginae 15–16 × 10–10.5 µm with convex walls encircled by weak musculature. Prerectum 2.7–4.8 × and rectum 1.6–1.8 × as long as anal body diameter. Tail elongate, tapering abruptly at first, then more gradually to a finely rounded terminus, 6.6–7.8 × as long as anal body diameter. Hyaline part comprising 20% of total tail length. Two caudal pores present on each side.

Male

General morphology similar to female except for posterior region generally more curved and twisted ventrally, 1.41–1.56 mm long. Genital system diorchic, testes opposed, sperms spindle-shaped, measuring 5 × 2 µm long. Spicules typical dorylaimoid, curved ventrad, relatively robust, 4.9–5.4 × as long as wide and 1.6–1.7 × as long as cloacal body diameter. Head well developed, occupying 26–35% of spicules total length, dorsal contour regularly convex, ventral contour bearing moderately distinct hump at 15.5–16.5 µm from anterior end of spicule. Spur present dorsally before distal tip. Median piece 8.5–9.5 × as long as wide, occupying about 27–29% of spicules maximum width, not reaching spicule distal end. Posterior end 3.0–3.5 µm wide. Lateral guiding pieces well developed, 3.6–5.3 × as long as wide. In addition to adcloacal pair, situated at 3–4 µm from cloacal aperture, series of 12–14 almost regularly spaced, comparatively weakly developed ventromedian papillae located beyond range of spicules, posterior ventromedian supplements located at 27–30 µm from adcloacal pair. Prerectum very long, 5.3–6.6 × as long as cloacal body diameter, starting well anteriorly to range of supplements. Rectum 1.4–1.7 × as long as cloacal body diameter. Tail short, dorsally convex-conoid with distinct ventral concavity and bluntly rounded terminus, about 1.0–1.1 × as long as cloacal body diameter, hyaline part small, 2.0 µm long. Caudal pores three pairs: one lateral near anus, one subventral and one subdorsal near terminus present on each side of tail.

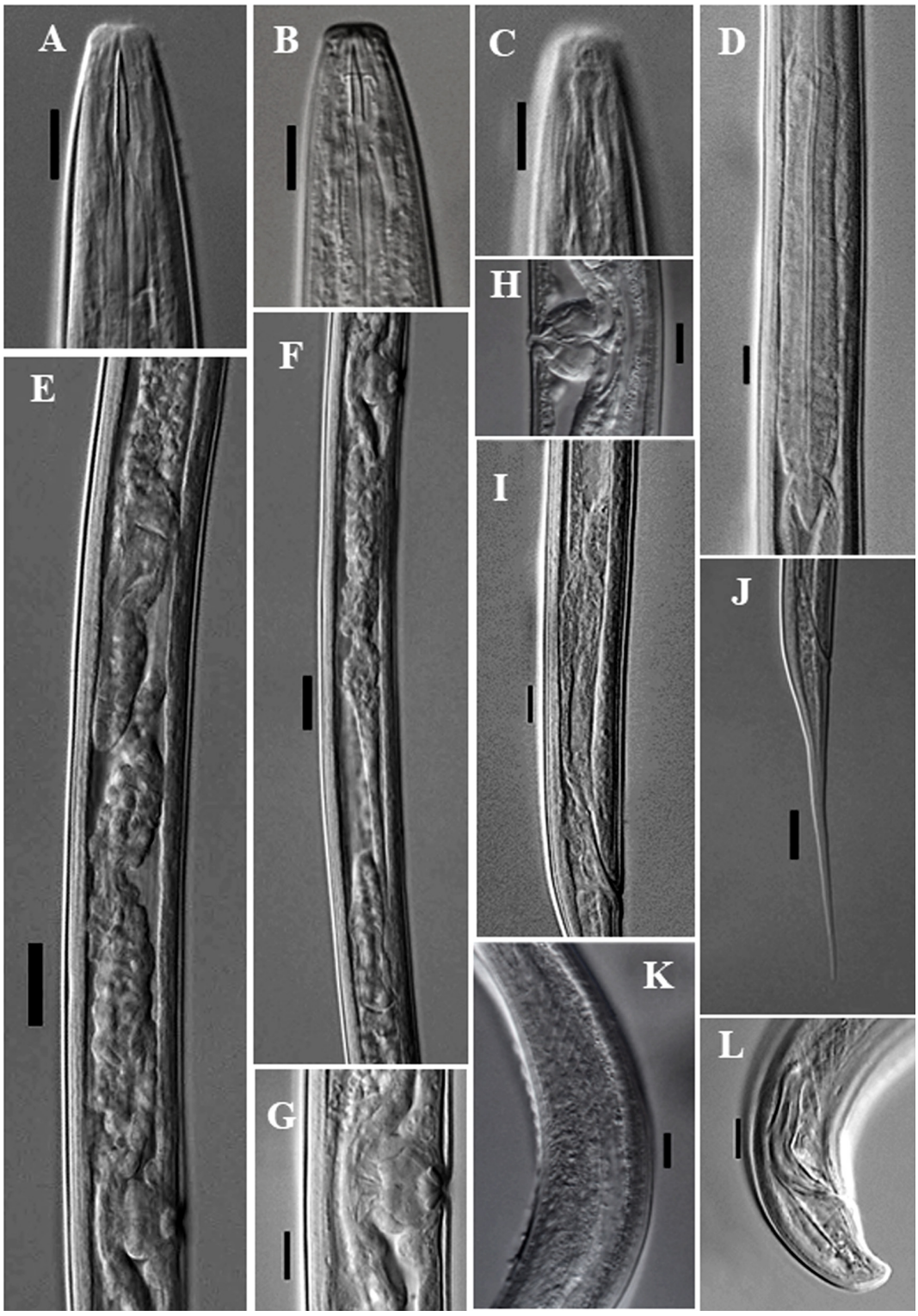

Fig. 9. *Calcaridorylaimus indicus* sp. nov. **A–C**. Holotype, ♀ (AMU/ZD/NC/*Calcaridorylaimus indicus*/1). **D–G, J**. Paratype 2, ♀ (AMU/ZD/NC/*Calcaridorylaimus indicus*/2). **K–L**. Paratype 4, ♂ (AMU/ZD/NC/*Calcaridorylaimus indicus*/4). **A–B**. Anterior region. **C**. Anterior end showing amphid. **D**. Pharyngeal expansion and pharyngeo-intestinal junction. **E**. Anterior genital branch. **F**. Posterior genital branch. **G–H**. Vulval region. **I**. Prerectum. **J**. Posterior region. **K**. Ventromedian supplements. **L**. Posterior region. Scale bars: A–D, G–I, K–L = 10 µm; E–F, J = 20 µm.

Type habitat and locality

Soil samples collected from around the roots of grasses (unidentified) near bus stop of Canacona city, South Goa district, Goa, India.

Remarks

The new species differs from the type species *C. calcalifer* Andrássy, 1986 in having a longer and more slender body (1.47–1.72 vs 1.18–1.30 mm; a = 45.9–57.4 vs 30–32); a shorter female tail (c = 11.3–12.6 vs 7.8–10.3); shorter spicules (36–39 vs 52–54 μm); a prerectum starting anteriorly to the range of supplements (vs starting within the range of supplements) and more ventromedian supplements (12–15 vs 8–9).

From *C. sirgeli* (Loof, 1975) Andrássy, 1986 it differs in having a slender body with a narrow lip region (a = 45.9–57.4 vs 26.8–36.4; lip region 8.5–9.0 vs 10.0–12.5 μm;); a vulva pre-equatorial (vs post-equatorial, V = 43–46 vs 52–56); a longitudinal (vs pore-like); the absence of an advulval ornamentation (vs advulval ornamentation present); more ventromedian supplements (12–15 vs 6–9); a prerectum in males starting far beyond the range of supplements (vs prerectum starting within the range of supplements).

In the presence of a longitudinal vulva, the new species comes close to *C. beatus* Andrássy, 2011 and *C. signatus* (Loof, 1975) Andrássy, 1986, but differs from the former in having a longer, slender body (1. 47–1.72 vs 1.28–1.30 mm; a = 45.9–57.4 vs 24–29), a narrow lip region (9.0 vs 14–15 μm), a shorter odontostyle (12–13 vs 15–16 μm), a longer tail (130–143 vs 60–68 μm; c = 11.3–12.3 vs 19–23; c′ = 6.8–7.8 vs 2.2–2.4), the prerectum in males starting far beyond the range of supplements (vs prerectum starting at the level of anterior supplement) and shorter spicules (36–39 vs 48–55 μm). From the latter, it differs in having a slender body (a = 45.9–57.4 vs 25–33), a narrow lip region (9 vs 14 μm), a shorter odontostyle (12–13 vs 16–18 μm), a shorter odontophore (15–17 vs 19–23 μm), an anterior vulva position (V = 43–46 vs 49–56), a higher c′ value (6.6–7.8 vs 2.9–4.2), shorter spicules (36–39 vs 72 μm), the prerectum in males starting far beyond the range of supplements (vs prerectum starting at level of anterior supplement).

From *Calcaridorylaimus andrassyi* Ahmad & Shaheen, 2004, the new species differs by having a slender body (a = 45.9–57.4 vs 42–46) with a narrow lip region (lip region 9.0 vs 11.5–12.0 μm); a shorter odontostyle (12–13 vs 15–16 μm); a longitudinal vulva (vs pore-like); a slightly longer tail (c = 11.3–12.6 vs 14–16; c′ = 6.6–7.8 vs 4.1–4.7); the shape and length of spicules (typical dorylaimoid, curved ventrad, 36–39 μm long vs massive, dorylaimoid, with triple contour, ventral arm smaller than dorsal arm, 52–57 μm long) and a higher number of ventromedian supplements (12–15 vs 10). It also differs from *C. promissus* Andrássy, 1986 in having a longer and slender body (L = 1.47–1.72 vs 1.28–1.37 mm; a = 45.9–57.4 vs 36–38); a longitudinal vulva (vs transverse); a comparatively smaller tail (118–143 vs 158–178 μm; c = 11.3–12.6 vs 7.7–8.4); shorter and differently shaped spicules (36–39 vs 50–53 μm) and the prerectum in males starting far beyond the range of supplements (vs prerectum starting within the range of supplements). The new species differs from all remaining species of the genus *Calcaridorylaimus* in having a slender body, a pre-equatorial vulva, shorter spicules, and the number of ventromedian supplements. This genus is reported for the first time from the Western Ghats and India.

Subfamily Prodorylaiminae Andrássy, 1969
Genus *Prodorylaimium* Andrássy, 1969

Prodorylaimium humaimae sp. nov.
urn:lsid:zoobank.org:act:976683CB-24AB-4DE9-B183-E39B63747497
Figs 10–12, Table 5

Diagnosis

Prodorylaimium humaimae sp. nov. is characterized by having a 0.97–1.29 mm (female) and 1.03–1.33 mm (male) long body, a truncate lip region, amalgamated lips, amphids fovea cup-shaped, a single guiding ring, an amphidelphic female genital system, a pre-equatorial, transverse vulva; males with 30–35 µm long dorylaimoid spicules, 6–8 (3, n = 1) almost equally spaced ventromedian supplements, a prerectum starting within the range of supplements. The tail is similar in both sexes; it is long filiform with a dorsally curved terminus.

Etymology

The new species is named after the daughter Humaima of the first author.

Type material

Holotype

INDIA • ♀; Goa State, South Goa district, Mormugao, near Arossim beach; 15°20′6.18″ N, 73°53′38.58″ E; depth 5–10 cm; 23 Apr. 2016; soil samples collected from around roots of grasses (unidentified); AMU/ZD/NC, slide reference number AMU/ZD/NC/*Prodorylaimium humaimae*/1.

Paratypes

INDIA • 11 ♀♀, 5 ♂♂; same data as for holotype; slide reference numbers AMU/ZD/NC/*Prodorylaimium humaimae*/2–10 • 2 ♀♀, 1 ♂; same data as for holotype; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Prodorylaimium humaimae*/11–12.

Other material examined

INDIA • 11 ♀♀, 5 ♂♂; Goa State, South Goa district, near Canacona bus stop; 15°0′28.908″ N, 74° 2′ 40.488″ E; 5–10 cm depth; 18 Apr. 2016; soil samples collected from around roots of grasses (unidentified), AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Prodorylaimium humaimae*/13–15 • 4 ♀♀, 13 ♂♂; Maharashtra State, Satara district, about 100 meter distance from bank of Kaas Pond bridge; 17°43′9.48″ N, 73° 48′ 52.092″ E; depth 5–10 cm; 13 Apr. 2016; soil collected from roots of grasses from dense forest; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Prodorylaimium humaimae*/16–18.

Description

Female

Moderately slender nematodes of medium size, 0.97–1.29 mm long. Body cylindrical, curved ventrad upon fixation, tapering towards both extremities but more so towards posterior end leading to long filiform tail. Cuticle thin, 1.0–1.5 µm thick in anterior region, 1–2 µm at mid body and 2–3 µm thick on tail; outer layer with fine transverse striations. Lateral hypodermal chords occupying about 25% of mid body diameter. Lateral, dorsal and ventral body pores indistinct. Lip region truncate, narrower than adjoining body, hardly offset by slight depression, 2.0–2.5 × as wide as high or about ⅓–⅖ of body diameter at neck base. Lips amalgamated, labial papillae not protruding above lip contour. Amphids cup-shaped, their aperture occupying about ½ of lip region diameter. Odontostyle dorylaimoid, slender, 1.0–1.3 × as long as lip region diameter, its aperture about ⅓ as long as its length. Odontophore simple, rod-

like, 1.4–1.7 × as long as odontostyle. Guiding ring single, sclerotized in few specimens, at 0.7–0.9 × lip region diameter from anterior end. Nerve ring surrounding anterior slender part of pharynx at 41–47% of neck length from anterior end. Pharynx consists of anterior slender part gradually expanding into wider, cylindrical posterior part, 4.2–6.3 × as long as wide or 2.3–3.0 × as long as corresponding body diameter, and occupying about 37–41% of total neck length. Pharyngeal gland nuclei and their orifices located as follows: DO = 62–66; DN = 63–67; DO-DN = 2–3; S1N1 = 74–76; S1N2 = 77–79; S2N = 87–89; S2O = 88–90 (n = 11). Cardia short rounded to conoid, about ⅓ as long as corresponding body diameter, surrounded by intestinal tissue. Female genital system amphidelphic, measuring 110–212 µm (anterior branch) and 101–205 µm (posterior branch) long. Ovaries reflexed, measuring 23–35 µm (anterior) and 44–74 µm (posterior) long; oocytes arranged in single row except near tip. Oviduct joining ovary subterminally, measuring 40–105 µm or 1.2–3.7 (anterior) and 49–86 µm or 1.6–3.0 (posterior) × as long as corresponding body diameter. Oviduct-uterus junction marked by sphincter. Uterus simple, measuring 70–129 µm or 2.1–4.2 (anterior) and 45–86 µm or 1.6–2.7 (posterior) × as long as corresponding body diameter. Spindle-shaped sperms present in uterus. Vulva pre-equatorial, transverse. Vagina extending inwards, 16–19 µm or about ½ as long as of corresponding body diameter; pars distalis vaginae 3–4 µm long; pars refringens vaginae absent; pars proximalis vaginae 13–15 × 3.5–5.0 µm with slightly curved walls. Prerectum 2.0–3.1 and rectum 1.1–1.7 × as long as anal body diameter. Tail long filiform, dorsally curved near its tip; 5.0–7.2 × as long as anal body diameter. Tail hyaline portion about 8–12% of tail length, with pair of caudal pores on each side.

Male

Slender nematodes of medium size, 1.03–1.33 mm long, similar to female in general morphology except for posterior region generally more curved because of presence of copulatory muscles. Genital system diorchic, testes opposed, sperms spindle-shaped, measuring 6 × 2 µm long. Spicules typical dorylaimoid, curved ventrad, relatively robust, 3.6–4.4 × as long as wide and 1.4–1.5 × as long as cloacal body diameter. Head well developed, 1.2–2.4 × as long as wide, occupying about 19–26% (33%, n = 1) of spicules total length, dorsal contour regularly convex, ventral contour bearing distinct hump at 10–13 µm from anterior end of spicule. Median piece 10.8–13.0 × as long as wide, occupying 23–25% of spicules maximum width. Posterior end 3.5–4.0 µm wide. Lateral guiding pieces, 4.4–7.0 × as long as wide. In addition to adcloacal pair, situated at 7–9 µm from cloacal aperture, series of 6–8 (3, n = 1) almost regularly spaced ventromedian supplements located beyond spicular range, posterior ventromedian supplements located at 32–54 µm from adcloacal pair. Prerectum 3.5–4.3 × as long as cloacal body diameter, starting within range of supplements. Rectum 1.2–1.5 × as long as cloacal body diameter. Tail long filiform, dorsally curved near its tip; 4.5–5.8 × as long as anal body diameter. Two caudal pores present on each side of tail.

Type habitat and locality

Soil samples collected from around the roots of grasses (unidentified) near Arossim beach, Mormugao, South Goa district, Goa, India.

Remarks

In the shape of the lip region and odontostyle length, the new species is most closely related to *P. brigdammense* (De Man, 1876) Andrássy, 1969 but differs in having a shorter neck (190–223 vs 300–350 µm); tail length and morphology (filiform tail with dorsally curved terminus, 99–136 µm vs long filiform tail, 250–270 µm); more c value (7.5–13.2 vs 4–6); less c' value (5.0–7.2 vs 8–12) and shorter spicules (30–35 vs 40–46 µm).

The new species also comes close to *P. alpinum* Andrássy, 1978 in having a small body size and smaller spicules but differs in having a narrow lip region (9.5–11 vs 13 µm); a shorter odontostyle (11.5–13.0 vs 14–17 µm), a smaller expanded part of pharynx (37–41 vs 46–47% of neck length); a transverse vulva (vs

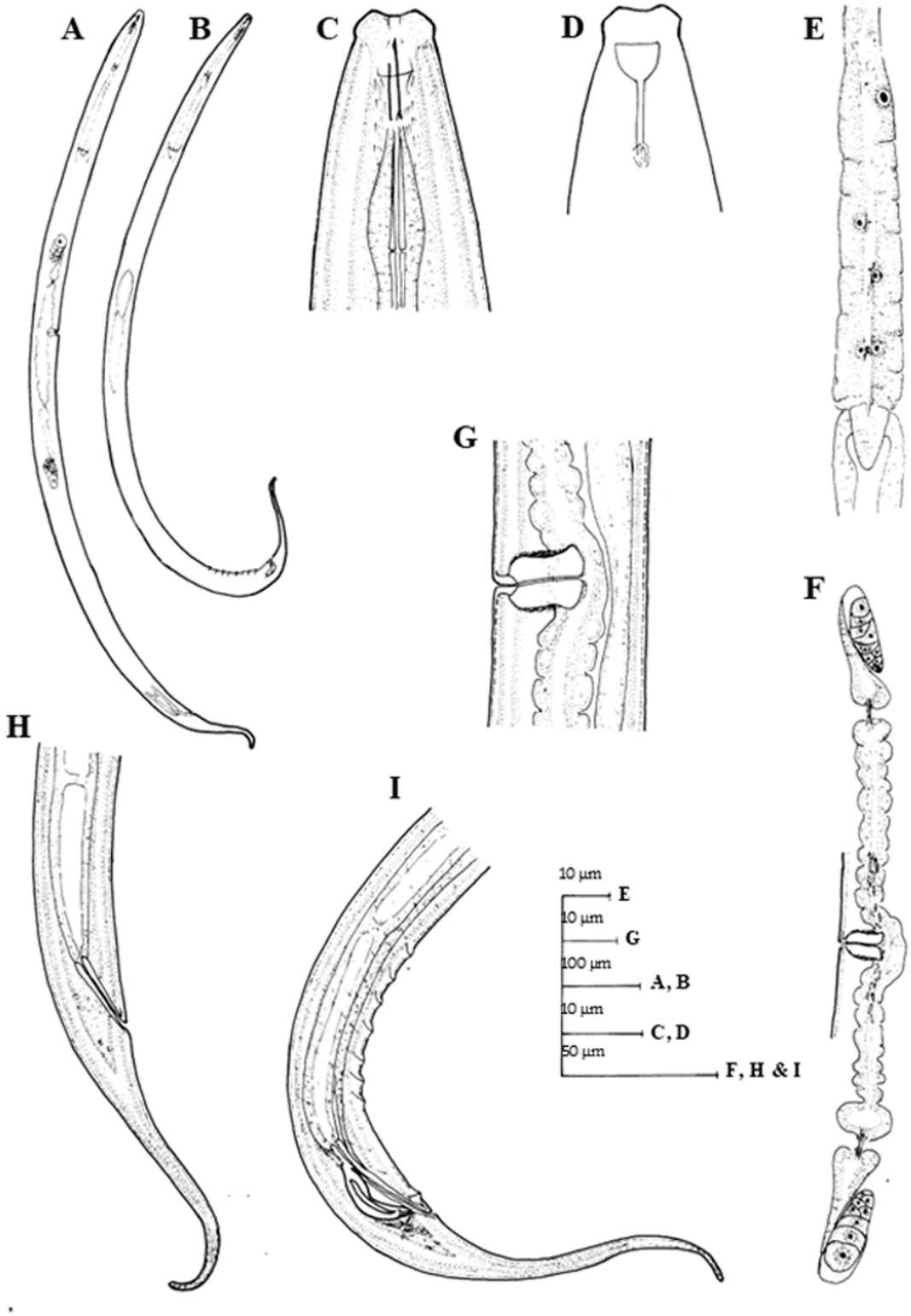

Fig. 10. *Prodorylaimium humaimae* sp. nov. **A, C–D**. Holotype, ♀ (AMU/ZD/NC/*Prodorylaimium humaimae*/1). **E–H**. Paratype 2, ♀ (AMU/ZD/NC/*Prodorylaimium humaimae*/2). **B, I**. Paratype 2, ♂ (AMU/ZD/NC/*Prodorylaimium humaimae*/3). **A**. Entire female. **B**. Entire male. **C**. Anterior region. **D**. Anterior end showing amphid. **E**. Pharyngeal expansion with pharyngeo-intestinal junction. **F**. Genital system. **G**. Vulval region. **H–I**. Posterior region.

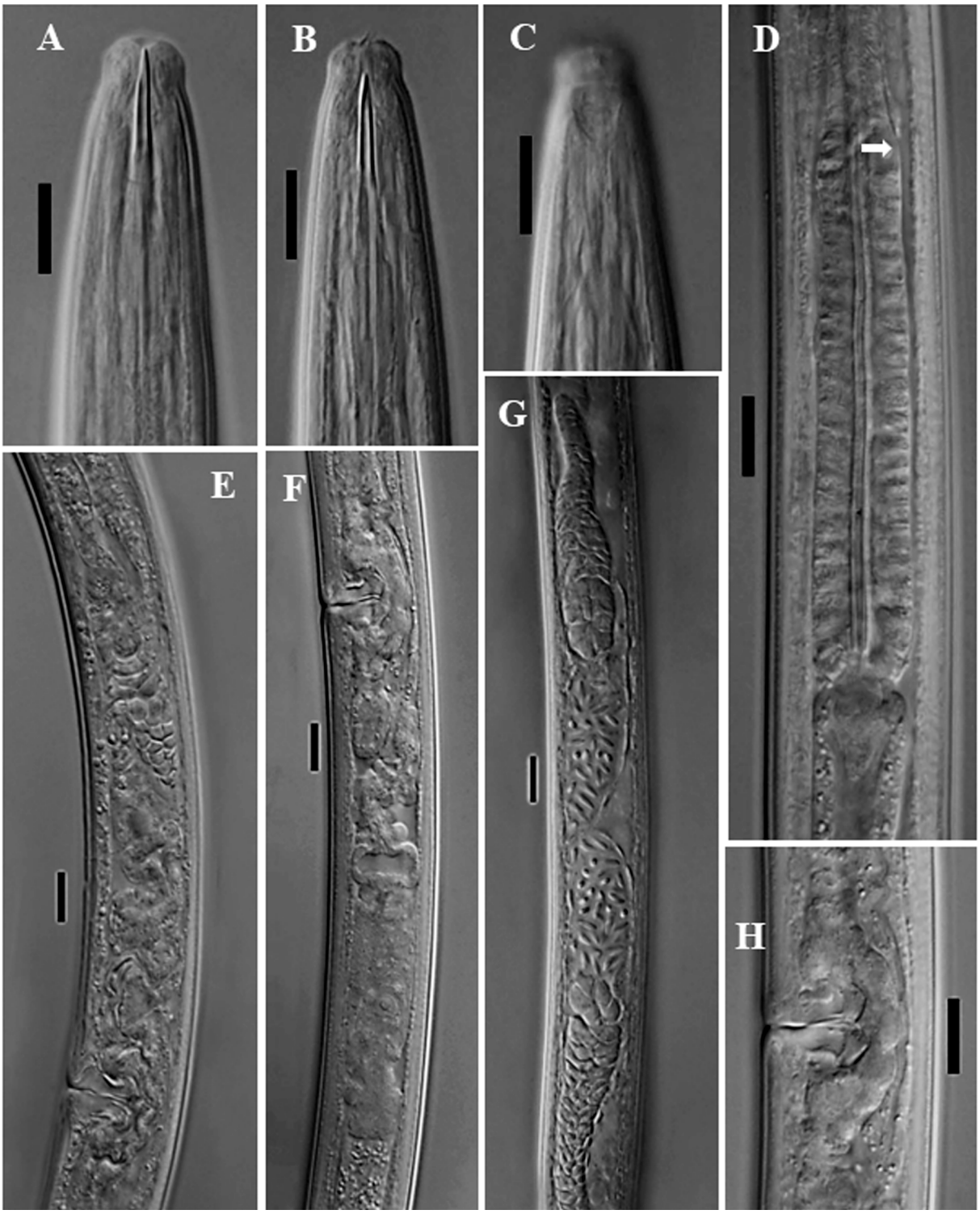

Fig. 11. *Prodorylaimium humaimae* sp. nov. **A–D**. Holotype, ♀ (AMU/ZD/NC/*Prodorylaimium humaimae*/1). **E–F, H**. Paratype 2, ♀ (AMU/ZD/NC/*Prodorylaimium humaimae*/2). **G**. Paratype 2, ♂ (AMU/ZD/NC/*Prodorylaimium humaimae*/4). **A–B**. Anterior region. **C**. Anterior end showing amphid. **D**. Pharyngeal expansion with pharyngeo-intestinal junction and arrow showing dorsal gland nucleus. **E**. Anterior genital branch. **F**. Female posterior genital branch. **G**. Gonad. **H**. Vulval region. Scale bars = 10 μm.

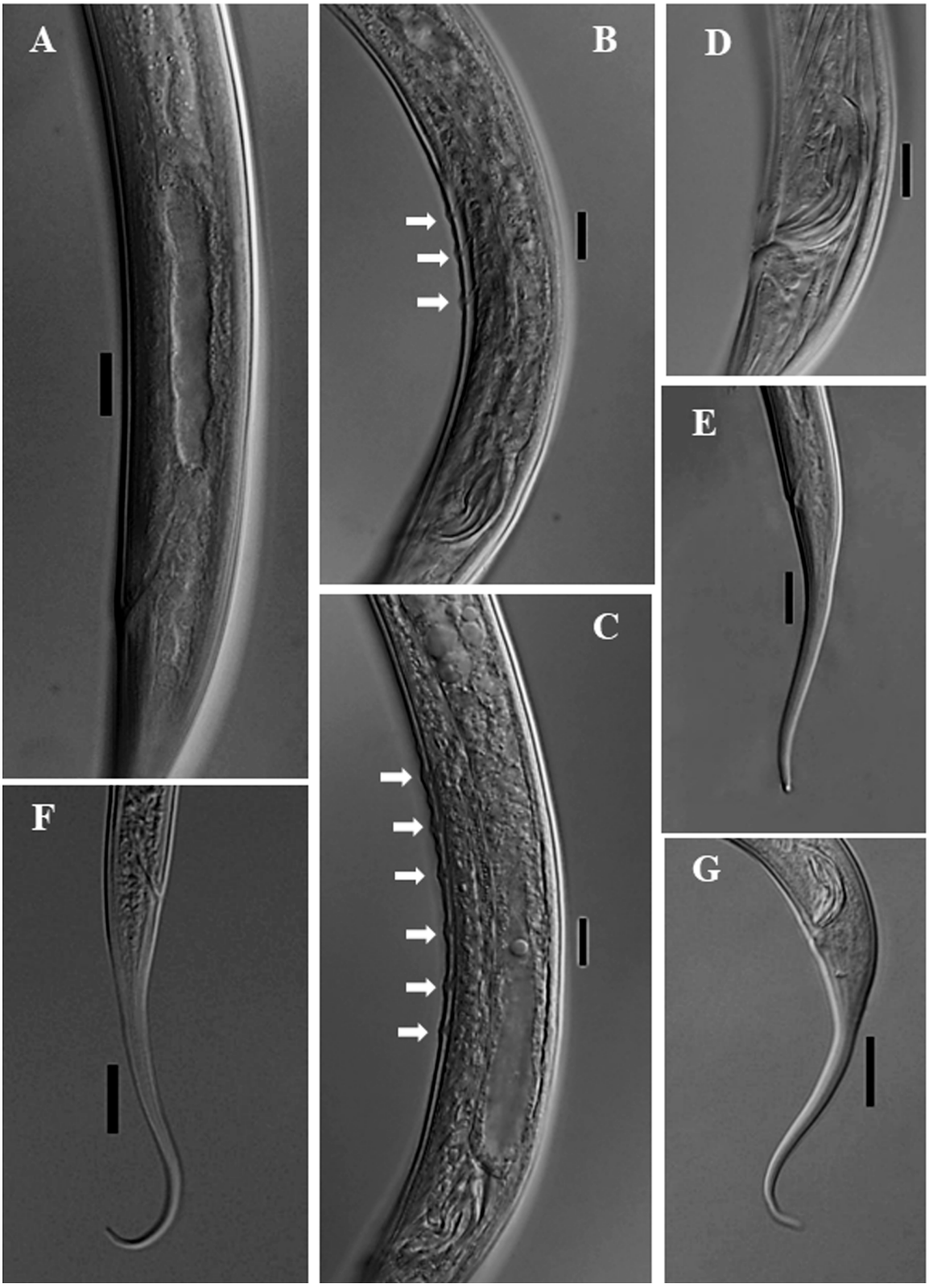

Fig. 12. *Prodorylaimium humaimae* sp. nov. **A, E–F**. Paratype 2, ♀ (AMU/ZD/NC/*Prodorylaimium humaimae*/2). **B–D, G**. Paratype 2, ♂ (AMU/ZD/NC/*Prodorylaimium humaimae*/4). **A**. Posterior region showing prerectum. **B–C**. Posterior region, showing ventromedian supplements and prerectum. **D**. Posterior region, showing spicules. **E–G**. Posterior regions. Scale bars: A–D = 10 μm; E–G = 20 μm.

Table. 5 (continued on next page). Morphometrics of *Prodorylaimium humaimi* sp. nov. (all measurements in µm except L in mm). Abbreviations: see Material and methods.

Localities	Type population			Goa population		Satara population	
Characters	**Holotype female**	**Paratype females**	**Males**	**Females**	**Males**	**Females**	**Males**
n	1	10	5	11	5	4	13
L	1.01	1.08 ± 0.06 (0.99–1.18)	1.14 ± 0.04 (1.11–1.19)	1.06 ± 0.05 (0.98–1.14)	1.09 ± 0.07 (1.03–1.18)	1.24 ± 0.06 (1.15–1.29)	1.23 ± 0.05 (1.13–1.33)
a	33.6	33.8 ± 1.5 (30.7–36.1)	34.8 ± 0.9 (33.9–35.7)	35.8 ± 1.8 (33.0–38.6)	37.8 ± 2.7 (34.6–42.2)	35.4 ± 2.1 (33.1–38.1)	39.2 ± 1.7 (36.4–43.6)
b	5.0	5.5 ± 0.2 (5.1–5.9)	5.6 ± 0.2 (5.3–5.9)	5.2 ± 0.3 (4.9–5.8)	5.5 ± 0.3 (5.2–5.8)	5.8 ± 0.2 (5.5–6.0)	5.7 ± 0.2 (5.3–6.0)
c	9.6	9.9 ± 0.8 (9.0–11.3)	10.8 ± 0.2 (10.7–11.1)	8.5 ± 0.5 (7.5–9.4)	9.3 ± 0.7 (8.5–10.4)	10.2 ± 1.1 (9.4–12.1)	10.8 ± 0.5 (9.8–11.5)
c’	5.4	5.6 ± 0.5 (4.8–6.4)	4.9 ± 0.2 (4.7–5.1)	6.7 ± 0.3 (6.2–7.2)	5.5 ± 0.2 (5.3–5.8)	5.9 ± 0.5 (5.1–6.5)	4.9 ± 0.3 (4.5–5.7)
V	41	39.5 ± 0.9 (37.4–40.7)	–	39.6 ± 1.1 (37.7–41.2)	–	36.6 ± 0.6 (36.1–37.6)	–
G1	18.3	17.4 ± 0.9 (16.0–18.9)	–	16.5 ± 0.3 (16.0–16.9)	–	11.6 ± 1.2 (9.6–12.4)	–
G2	12.0	13.7 ± 2.3 (11.2–18.2)	–	12.5 ± 1 (10.8–14.6)	–	10.5 ± 1.4 (8.8–12.8)	–
body diam. at phary. base	29	31.1 ± 1.2 (28.0–32.5)	30.7 ± 0.5 (30–31)	28.6 ± 1.3 (27–31)	29.2 ± 0.7 (28–30)	32 ± 0.7 (31–33)	30.3 ± 1.1 (29–33)
body diam. at mid body	30	32.2 ± 1.4 (29–34)	32 ± 1 (31–33)	29.5 ± 1.2 (28–31)	29 ± 1.4 (27–31)	35 ± 2.3 (33–39)	31.3 ± 1.1 (30–34)
body diam. at anus	19.5	19.7 ± 0.8 (18–21)	21.7 ± 0.6 (21.0–22.5)	18.8 ± 0.8 (18–20)	21.3 ± 0.4 (21–22)	20.5 ± 0.5 (20–21)	23.3 ± 0.5 (22.5–24.0)
lip region diam.	10	10.3 ± 0.4 (10–11)	10 ± 0 (10–10)	10.0 ± 0.3 (9.5–10.5)	10 ± 0 (10–10)	10.4 ± 0.4 (10–11)	10 ± 0.1 (10.0–10.5)
lip region height	4.5	4.6 ± 0.3 (4–5)	4 ± 0 (4–4)	4.7 ± 0.2 (4.5–5.0)	4.4 ± 0.4 (4–5)	5.4 ± 0.4 (5–6)	5 ± 0.1 (5.0–5.5)
amphid aperture diam.	5	5.2 ± 0.2 (5.0–5.5)	5.8 ± 0.3 (5.5–6.0)	5.5 ± 0.3 (5–6)	5.5 ± 0.3 (5–6)	5.7 ± 0.6 (5.0–6.5)	6 ± 0.6 (5–7)
odontostyle length	12	11.9 ± 0.3 (11.5–12.5)	12.4 ± 0.6 (12–13)	12.4 ± 0.5 (11.5–13.0)	12.7 ± 0.5 (12.0–13.5)	12.38 ± 0.6 (11.5–13.0)	12.6 ± 0.4 (12–13)
odontophore length	18	18.4 ± 0.8 (17.0–19.5)	19.3 ± 0.5 (19–20)	19.4 ± 0.5 (18.5–20.0)	19 ± 0 (19–19)	19.5 ± 0.5 (19–20)	20 ± 0.6 (19–21)
guiding ring from ant. end	8	7.7 ± 0.4 (7–8)	7.7 ± 0.2 (7.5–8.0)	7.8 ± 0.7 (6–8)	8.3 ± 0.4 (8–9)	8.25 ± 0.4 (8–9)	8.3 ± 0.4 (8–9)
nerve ring from ant. end	86	87.5 ± 1.5 (85–90)	91 ± 0.8 (90–92)	90 ± 3.1 (86–96)	89.6 ± 1 (88–91)	93.75 ± 3.3 (90–98)	93.3 ± 2.1 (90–96)
neck length	202	198.2 ± 3.9 (190–202)	203.7 ± 2.4 (202–207)	203.2 ± 6.8 (192–212)	200.6 ± 2.6 (196–203)	213.8 ± 13.8 (190–223)	216.3 ± 7.8 (203–234)
expanded part of pharynx	75	76.4 ± 2.4 (73–82)	76.3 ± 0.9 (75–77)	79.9 ± 3.8 (75–85)	75.8 ± 1.6 (74–78)	85.5 ± 6.1 (75–90)	82.6 ± 3.9 (77–89)
cardia length	13	11.9 ± 1.0 (11–14)	12 ± 6 (12–12)	8.8 ± 2 (6–11)	8.4 ± 0.8 (8–10)	9.25 ± 1.5 (7–11)	7.6 ± 1.4 (6.0–10.5)
anterior genital branch	185	188.8 ± 14.9 (165–212)	–	177 ± 1.9 (175–180)	–	144.5 ± 20.5 (110–161)	–
posterior genital branch	121	148.9 ± 23.5 (123–205)	–	131.9 ± 6.3 (120–142)	–	130.5 ± 22.9 (101–165)	–
vaginal depth	17	16.9 ± 0.3 (16.5–17.5)	–	16.6 ± 0.9 (15.5–18.0)	–	18.4 ± 0.9 (17.5–19.5)	–
vulva from ant. end	413	430.8 ± 22.8 (378–456)	–	418.7 ± 19.9 (391–463)	–	453.3 ± 23.5 (414–472)	–
prerectum length	55	53.3 ± 5.8 (43–60)	74.5 ± 35.3 (70–79)	42.5 ± 18.6 (36–46)	84 ± 6.5 (75–90)	49.75 ± 6.4 (43–60)	88.8 ± 6.4 (81–102)

Table. 5 (continued).

Localities	**Type population**			**Goa population**		**Satara population**	
Characters	**Holotype female**	**Paratype females**	**Males**	**Females**	**Males**	**Females**	**Males**
rectum length	29	28.1 ± 1.1 (27–30)	30.5 ± 0.5 (30–31)	25.8 ± 2.6 (21–30)	29.4 ± 1.4 (27–31)	26.5 ± 0.5 (26–27)	31.5 ± 1.4 (29–34)
tail length	105	110.1 ± 9.1 (99–130)	105 ± 1.6 (103–107)	125.4 ± 6.5 (112–135)	117.8 ± 3.2 (113–121)	122.5 ± 10.4 (107–136)	113.9 ± 7.4 (104–129)
spicule length	–	–	29.8 ± 0.2 (29.5–30.0)	–	31.1 ± 0.8 (30–32.5)	–	33.5 ± 3.4 (30–43)
lateral guiding pieces	–	–	7.8 ± 0.3 (7.5–8.0)	–	9.4 ± 1.0 (8.0–10.5)	–	12.3 ± 4 (11–14)
ventromedian supplements	–	–	7–8	–	6–8 (3, n=1)	–	6–8

longitudinal), 6–8 (3, n = 1) regularly spaced ventromedian supplements located far beyond the spicular range vs 8–10 supplements widely spaced, ending at level of head of spicules, as well as in tail length and morphology (tail filiform with dorsally curved terminus 99–136 µm vs long filiform tail 150–212 µm). The new species also comes close to *P. baldum* (Baniyamuddin & Ahmad, 2006) Andrássy, 2009 by having a transverse vulva but differs in having a shorter, robust body (0.97–1.29 vs 1.62–1.75 mm; a = 30.7–38.6 vs 57.0–58.5); a shorter odontostyle (11.5–13.0 vs 14.5–16.5 µm); a smaller expanded part of the pharynx (37–41 vs 53–56% of neck length); a different tail length and morphology (tail filiform with dorsally curved terminus 99–136 µm vs tail long, filiform whip-like, 282–297 µm; c'= 5.0–7.2 vs 16.0–16.8); and in having fewer ventromedian supplements (6–8 (3, n = 1) vs 9) and longer spicules (30–35 vs 28 µm). The new species also differs from *P. goaense* Ahmad & Jairajpuri, 1984, another species known from the Western Ghats region, in having a relatively shorter and robust body (0.97–1.29 vs 1.65–2.0 mm; a = 30.7–38.6 vs 44–55); a shorter odontostyle (11.5–13.0 vs 25 µm); a vulva transverse vs longitudinal and a shorter tail with dorsally curved terminus (99–136 vs 630 µm; c = 7.5–13.2 vs 3.1; c' = 5.0–7.2 vs 26).

Genus *Kunjudorylaimus* Dhanam & Jairajpuri, 2000

Kunjudorylaimus kunjui Dhanam & Jairajpuri, 2000
Fig. 13, Table 6

Kunjudorylaimus kunjui Dhanam & Jairajpuri, 2000: 205–206.
Kunjudorylaimus srinii Dhanam & Jairajpuri 2000: 207. **Syn. nov.**

Material examined

INDIA • 14 ♀♀, 4 ♂♂; Kerala State, Malappuram district, village Chungathara; 11°20′1.1″ N, 76°16′32.44″ E; depth 5–15 cm; 16 Nov. 2016; soil samples collected from grassland; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Kunjudorylaimus kunjui*/1–5.

Remarks

Dhanam & Jairajpuri (2000) described *K. kunjui* and *K. srinii* from soil around the roots of Cardamom (*Elettaria cardamomum* (L.) Maton) from Karnataka State, India. The present population widely overlaps with the description of the type populations of these species. In the original description, *K. srinii* resembles that of the type and only species of the genus *K. kunjui* in general morphology and typical body postures, but differes in having a smaller body, a smaller odontostyle, a smaller odontophore, a smaller female prerectum, shorter spicules and smaller number of ventromedian supplements. The morphology and morphometry of the present specimens overlaps with *K. kunjui* but differs in having a relatively shorter body (1.6–2.1 vs 2.0–2.3 mm); a shorter odontostyle (18–20 vs 20–22 µm long); a shorter odontophore (24–27 vs 32–34 µm long); a relatively shorter prerectum (40–76 vs 73–115 µm long); shorter spicules (29–32 vs 32–37 µm long) and fewer ventromedian supplements (8–11 vs 11–13). The record of the present specimens, which in most of the morphometric data are intermediate between the two species (see Table 6 for comparative morphometrics of the two species) puts a doubt on the identity of *K. srinii. K. kunjui*, *K. srinii*, and the present population exhibits a slight overlap in their morphometrics. The odontostyle length (20–22 vs 18–20 µm), ventromedian supplements (11–13 vs 8–11), and spicule length (32–37 vs 29–32 µm) in *K. kunjui* and the present population overlap; however, the length of the odontophore (24–25 vs 24–27 µm), the number of ventromedian supplements (8–10 vs 8–11) and spicule length (29–31 vs 29–32 µm) overlap in *K. srinii* and the present population. Due to overlapping morphometry and similar morphology of *K. kunjui*, *K. srinii* and the present population, it might be possible that the two species are conspecific and hence the present population is regarded as *K. kunji*, and *K. srinii is* considered a synonym of the type species.

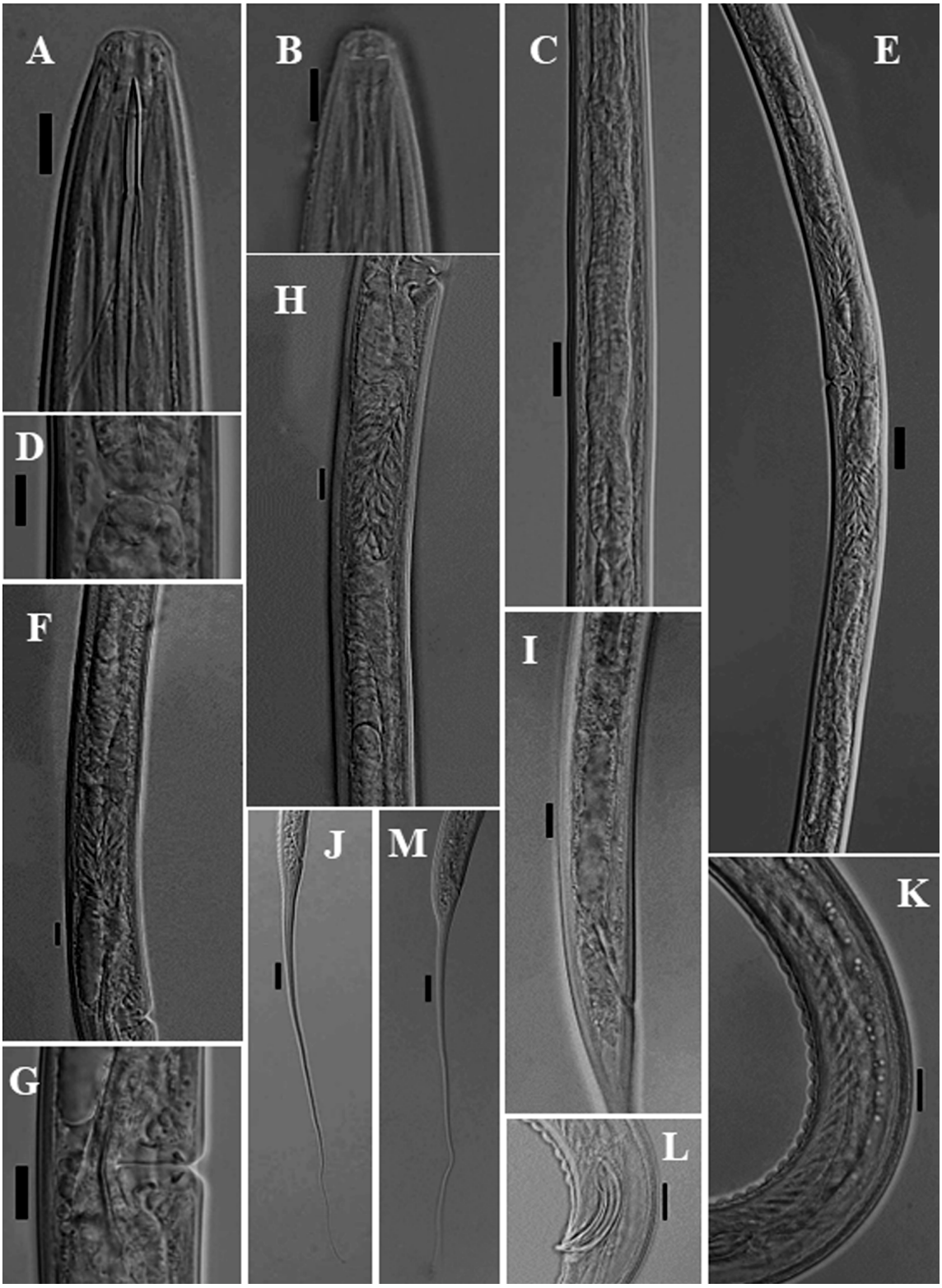

Fig. 13. *Kunjudorylaimus kunjui* Dhanam & Jairajpuri, 2000. **A**. ♀, anterior region. **B**. ♀, anterior end showing amphid. **C**. ♀, pharyngeal expansion. **D**. ♀, pharyngeo-intestinal junction. **E**. ♀, genital system. **F**. ♀, anterior genital branch. **G**. ♀, vulval region. **H**. ♀, posterior genital branch. **I**. ♀, prerectum. **J**. ♀, posterior region. **K**. ♂, ventromedian supplements. **L–M**. ♂, posterior region. Scale bars: A–B, D–I, K–L = 10 µm; C, J, M = 20 µm.

Table 6. Morphometrics of *Kunjudorylaimus kunji* Dhanam & Jairajpuri, 2000 (all measurements in µm except L in mm). Abbreviations: see Material and methods.

	K. kunji		**Western Ghats Population**		***K. srinii***	
Characters	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
n	13	15	14	4	9	9
L	2.0–2.3	2.0–2.4	1.92 ± 1.59 (1.65–2.12)	1.84 ± 0.2 (1.59–2.04)	1.7–1.9	1.6–1.9
a	57–60	57–60	63.4 ± 2.9 (56.8–67.6)	64.8 ± 3.8 (58.9–68.3)	61–64	59–72
b	5.0–5.5	4.9–6.1	5.1 ± 0.1 (4.8–5.4)	5.1 ± 0.3 (4.6–5.4)	4.9–5.4	5.2–5.8
c	6–8	5–7	6.1 ± 0.6 (4.5–7.0)	5.8 ± 0.3 (5.5–6.3)	–	6–7
c’	13–18	15–19	16.6 ± 1.7 (14.1–20.9)	15.2 ± 1.3 (13.7–16.7)	6–7	14–15
V	43–47	–	46.3 ± 2.2 (42.3–49.5)	–	44–48	–
G1	9–19	–	10.5 ± 1.1 (9.2–12.9)	–	10–13	–
G2	11–12	–	9.9 ± 0.9 (8.3–11.8)	–	11–16	–
body diameter at pharynx base	–	–	30.8 ± 2.7 (26–35)	30 ± 1.2 (29–32)	–	–
body diameter at mid body	–	–	30.2 ± 1.9 (26–32)	28.3 ± 1.1 (27–30)	–	–
body diameter at anus	19–21	20–23	19.2 ± 1 (17–20)	20.8 ± 0.8 (20–22)	18–20	18–20
lip region diameter	11–13	–	10.9 ± 0.5 (10–12)	11 ± 0 (11–11)	10	–
lip region height	6–7	–	5.2 ± 0.4 (5–6)	5.5 ± 0.5 (5–6)	4	–
amphid aperture diameter	–	–	6.7 ± 0.5 (6–7)	6.8 ± 0.4 (6–7)	–	–
odontostyle length	20–22	21–22	18.7 ± 0.6 (18–20)	19 ± 0.7 (18–20)	15–16	15
odontophore length	32–34	31–34	25.6 ± 1.1 (24–27)	25.8 ± 1.3 (24–27)	24–25	24–25
guiding ring from ant. End	11–14	–	12.5 ± 0.6 (11–13)	12 ± 0.7 (11–13)	10–12	–
nerve ring from ant. End	125–151	–	125.6 ± 5.2 (116–135)	124.3 ± 2.9 (121–128)	118–126	–
neck length	375–410	385–415	374.6 ± 26 (328–409)	362.8 ± 22.2 (340–391)	337–372	326–348
expanded part of pharynx	191–215	189–221	188.6 ± 17.7 (158–212)	179 ± 15.3 (160–196)	156–184	136–169
Ccardia length	11–14	–	12.8 ± 2.7 (9–18)	13.5 ± 2.3 (10–16)	10–12	–
anterior genital branch	–	–	201.3 ± 31.7 (153–252)	–	–	–
posterior genital branch	–	–	189.7 ± 19.4 (156–221)	–	–	–
vaginal depth	–	–	17.2 ± 1.3 (15–20)	–	–	–
vulva from ant. End	–	–	889.8 ± 107.7 (720–1030)	–	–	–
prerectum length	75–113	115–172	59.5 ± 11 (40–76)	113 ± 15 (90–132)	47–75	79–118
rectum length	31–40	41–52	30.8 ± 2.7 (26–35)	33.3 ± 1.6 (32–36)	27–32	34–46
tail length	257–346	323–397	319.3 ± 37.6 (253–377)	316.3 ± 38.9 (273–368)	272–294	235–272
spicule length	–	32–37	–	30.3 ± 1.3 (29–32)	–	29–31
lateral guiding pieces	–	7–9	–	7.5 ± 0.5 (7–8)	–	–
ventromedian supplements	–	11–13	–	8–11	–	8–10

Subfamily Thornenematinae Siddiqi, 1969
Genus *Thornenema* Andrássy, 1959

Thornenema mauritianum (Williams, 1959) Baqri & Jairajpuri, 1967
= *Chrysonema mauritianum* Williams, 1959
Fig. 14, Table 7

Chrysonema mauritianum Williams, 1959: 7–9.

Thornenema mauritianum – Baqri & Jairajpuri 1967: 358–363. — Khera & Chaturvedi 1977: 141–142. — Ali *et al.* 1971: 173. — Eliava *et al.* 1975: 9–10. — Nesterov, 1979: 90. — Sauer 1981: 75. — Eliava 1984: 134–135. — Carbonell & Coomans 1986: 138–147. — Gambhir & Dhanachand 1990: 34. — Ahmad *et al.* 1996: 15. — Ahmad & Ahmad 2003: 132–134. — Fadaei-Tehrani & Coomans 2005: 35–36. — Nasira *et al.* 2005: 198–199. — Baniyamuddin & Ahmad 2006: 506–507.
Thornenema viriosum – Williams 1964: 346–349. — Baqri & Jairajpuri 1967: 362–363. — Loof & Coomans 1970: 91.
Thornenema filiforme – Siddiqi 1965: 129–131. — Baqri & Jairajpuri 1967: 362–363.
Thornenema delhiensis – Prasad & Chawla 1965 — Baqri & Jairajpuri 1967: 362–363
Thornenema africanum – Andrássy 1965: 139–140.

Material examined

INDIA • 7 ♀♀; Maharashtra State, Raigad district, Borli, near bus-stand; 18°51′12.8″ N, 72°91′25.7″ E; depth 5–10 cm; 11 Apr. 2016; soil samples collected from around roots of grasses (unidentified); AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Thornenema mauritianum*/1–3 • 5 ♀♀; Goa State, South Goa district, Madgoa, forest near Balli; 15°15′61.3″ N, 74°01′62.1″ E; depth 10–15 cm; 19 Apr. 2016; soil samples collected from around roots of plants (unidentified); AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Thornenema mauritianum*/4–5 • 3 ♀♀; Kerala State, Thrissur district, Konnakuzhy, Thumboormuzhi Garden near Chalakkudy river; 10°30′1″N, 76°45′1″E; depth 5–10 cm; 27 Oct. 2017; soil samples collected from around roots of grasses and shrubs (unidentified); AMU/ZD/NC, slide reference number AMU/ZD/NC/*Thornenema mauritianum*/6 • 5 ♀♀; Karnataka State, Chikmagalur district, Hosahalli, near Kaimara town; 13°22′38.4″ N, 75°44′55.6″ E; depth 5–10 cm; 24 Oct. 2018; soil samples collected from grass field (unidentified); AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Thornenema mauritianum*/7–8 • 6 ♀♀; Karnataka State, Uttara Kannada district, Sirsi, forest of Gudnapur; 14°37′14.59″ N, 74°50′7.94″ E; depth 5–10 cm; 28 Oct. 2018; soil samples collected from grass field (unidentified); AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Thornenema mauritianum*/9–10 • 5 ♀♀; Karnataka State, Uttara Kannada district, Yellapur, Manchikeri; 14°85′39.8″ N, 74°81′61.6″ E; depth 5–10 cm; 19 Oct. 2018; soil samples collected from small grasses (unidentified); AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Thornenema mauritianum*/11–12.

Description

Male

Unknown.

Remarks

Baqri & Jairajpuri (1967) while studying species of *Thornenema* from India, transferred *Chrysonema mauritiana* Williams, 1959 to *Thornenema* and also synonymized *T. viriosum* Williams, 1964; *T. filiforme* Siddiqi, 1965; *T. delhiense* Prasad & Chawla, 1965 and *T. africanum* Andrássy, 1965 with this species. *T. mauritianum* (Williams, 1959) Baqri & Jairajpuri, 1967 has a world-wide distribution and is reported from Mauritius (Williams, 1959), Ghana (Andrássy, 1965), Malaysia (Baqri & Jairajpuri, 1967; Sauer, 1981), Costa Rica (Loof & Coomans, 1970), Russia (Eliava *et al.*, 1975) and Australia (Sauer, 1981).

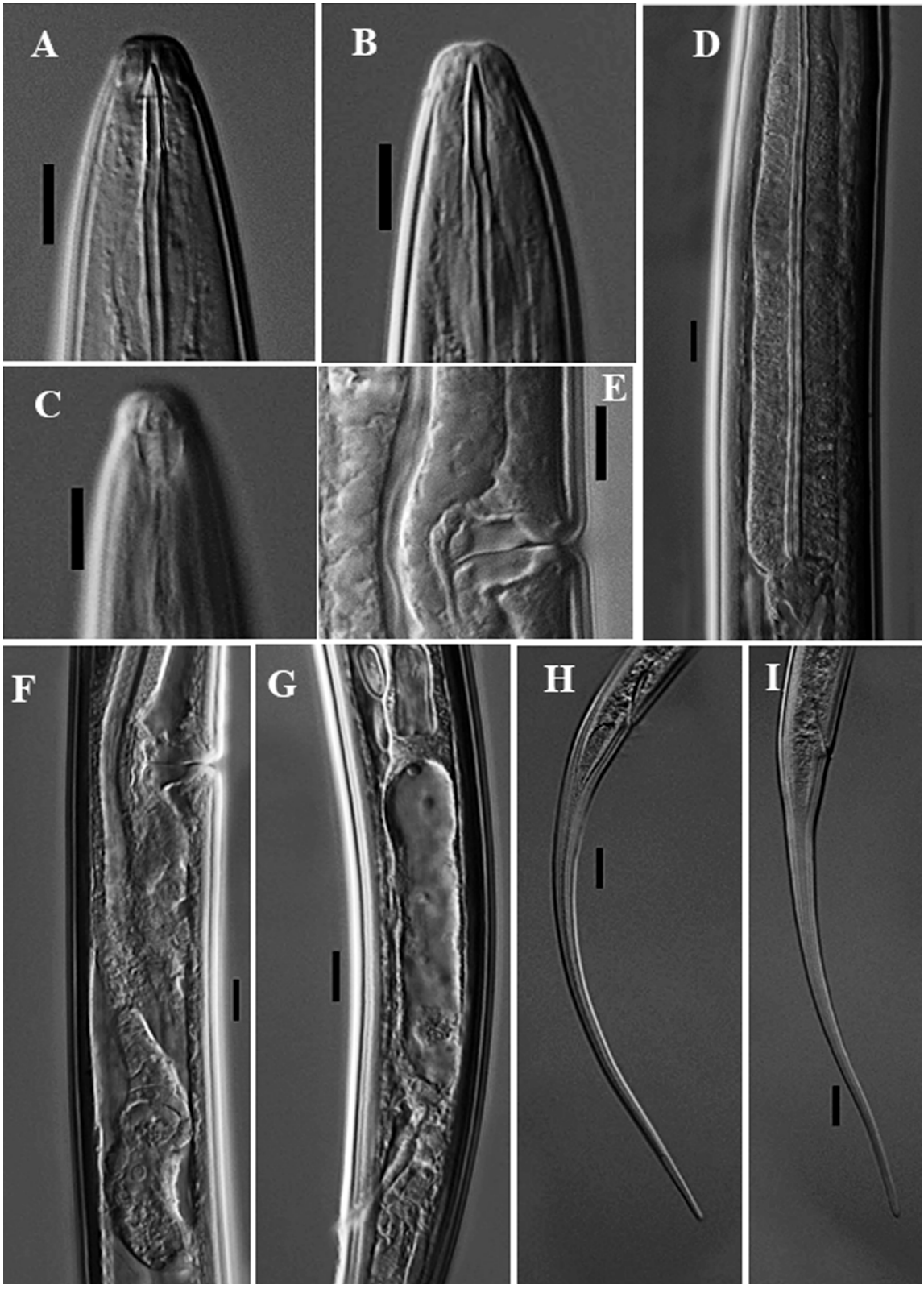

Fig. 14. *Thornenema mauritianum* (Williams, 1959) Baqri & Jairajpuri, 1967. **A–B**. ♀, anterior region. **C**. ♀, anterior end showing amphid. **D**. ♀, pharyngeal expansion with pharyngeo-intestinal junction. **E**. ♀, vulval region. **F**. ♀, genital system. **G**. ♀, prerectum. **H–I**. ♀, posterior region. Scale bars: A–G = 10 µm; H–I = 20 µm.

Table 7 (continued on next page). Morphometrics of *Thornenema mauritianum* (Williams, 1959) Baqri & Jairajpuri 1967 (all measurements in µm except L in mm). Abbreviations: see Material and methods.

Localities	**Raigad population**	**Goa population**	**Thrissur population**	**Chikmagalur population**	**Sirsi population**	**Yellapur population**
Characters	**Females**	**Females**	**Females**	**Females**	**Females**	**Females**
n	7	5	3	5	6	5
L	1.61 ± 0.1 (1.48–1.77)	1.40 ± 0.07 (1.31–1.51)	1.59 ± 0.04 (1.53–1.64)	1.46 ± 0.04 (1.43–1.53)	1.60 ± 0.08 (1.46–1.70)	1.59 ± 0.06 (1.50–1.67)
a	46.3 ± 2 (44.3–50.5)	45.3 ± 1.2 (43.8–47.3)	45.8 ± 0.7 (45.0–46.7)	46.5 ± 1.9 (43.6–49.4)	48.1 ± 1.7 (45.6–50.2)	47.4 ± 1.3 (45.4–49.1)
b	5.4 ± 0.4 (4.9–6.1)	4.9 ± 0.1 (4.8–5.1)	5.5 ± 0.3 (5.1–5.8)	4.8 ± 0.2 (4.7–5.1)	5.3 ± 0.3 (5.0–5.8)	5.1 ± 0.2 (4.7–5.2)
c	6.8 ± 0.6 (5.9–7.8)	5.6 ± 0.3 (5.3–6.0)	6.1 ± 0.2 (5.8–6.3)	5.9 ± 0.2 (5.6–6.2)	6.4 ± 0.3 (6.0–7.1)	6.1 ± 0.3 (5.7–6.5)
c’	10.9 ± 0.7 (9.5–11.4)	12.8 ± 0.4 (12.3–13.5)	13.0 ± 0.5 (12.6–13.8)	12.8 ± 0.4 (12.2–13.3)	13.2 ± 0.9 (11.8–14.3)	13.1 ± 0.9 (12.2–14.3)
V	32.9 ± 1.1 (30.9–34.5)	33.8 ± 0.5 (32.8–34.3)	31.4 ± 0.5 (30.7–31.8)	32.4 ± 1.1 (30.7–34.0)	32.9 ± 1.2 (31.3–34.6)	32.9 ± 0.6 (32.2–33.8)
G2	8.2 ± 0.7 (6.9–8.9)	7.3 ± 1.6 (5.9–10.0)	7.2 ± 0.5 (6.8–7.9)	8.8 ± 0.8 (7.8–9.7)	8.1 ± 1.1 (6.2–9.9)	8.2 ± 0.3 (7.9–8.6)
body diam. at phary. base	35 ± 1.7 (33–38)	30.2 ± 1.2 (28–31)	34.3 ± 0.9 (33–35)	31 ± 0.9 (30–32)	32.4 ± 0.7 (31–33)	32.9 ± 0.5 (32.0–33.5)
body diam. at mid body	34.9 ± 2.2 (33–38)	31 ± 0.9 (30–32)	34.7 ± 0.8 (33.5–35.5)	31.5 ± 1.8 (29–34)	33.3 ± 0.7 (32–34)	33.5 ± 0.4 (33–34)
body diam. at anus	21.8 ± 1.1 (20.0–23.5)	19.6 ± 0.8 (18–20)	20.2 ± 0.8 (19–21)	19.5 ± 0.4 (19–20)	19.2 ± 0.4 (19–20)	20 ± 0 (20–20)
lip region diam.	9 ± 0 (9–9)	7.2 ± 0.2 (7.0–7.5)	7.2 ± 0.2 (7.0–7.5)	7.5 ± 0.4 (7–8)	8.1 ± 0.2 (8.0–8.5)	7.2 ± 0.2 (7.0–7.5)
lip region height	4.7 ± 0.2 (4.5–5.0)	4.8 ± 0.2 (4.5–5.0)	4.5 ± 0 (4.5–4.5)	4.2 ± 0.2 (4.0–4.5)	4.5 ± 0.3 (4–5)	3.8 ± 0.2 (3.5–4.0)
amphid aperture diam.	6 ± 0 (6–6)	5 ± 0 (5–5)	5.2 ± 0.2 (5.0–5.5)	4.9 ± 0.2 (4.5–5.0)	5.1 ± 0.2 (5.0–5.5)	4.8 ± 0.2 (4.5–5.0)
odontostyle length	13.7 ± 0.5 (13–14)	13.5 ± 0.4 (13–14)	12.8 ± 0.2 (12.5–13.0)	11.6 ± 0.6 (11.0–12.5)	13 ± 0.3 (12.5–13.5)	12.8 ± 0.4 (12.5–13.5)
odontophore length	19.8 ± 0.7 (19–21)	17.9 ± 0.2 (17.5–18.0)	16.7 ± 0.2 (16.5–17.0)	16.4 ± 0.5 (16–17)	17 ± 0.5 (16.5–18.0)	17.1 ± 0.4 (16.5–17.5)
guiding ring from ant. end	8.3 ± 0.6 (7–9)	7.4 ± 0.2 (7.0–7.5)	7.8 ± 0.2 (7.5–8.0)	7.5 ± 0.6 (6.5–8.0)	6.9 ± 0.2 (6.5–7.0)	7.2 ± 0.2 (7.0–7.5)
nerve ring from ant. end	112.1 ± 3.2 (108–116)	105 ± 1.4 (103–107)	103.3 ± 0.5 (103–104)	107 ± 1.7 (105–109)	111.8 ± 2.9 (108–117)	112.4 ± 1.6 (110–115)
neck length	297.1 ± 9.9 (283–317)	284.8 ± 8.8 (275–300)	290.7 ± 11.1 (275–299)	302.4 ± 8.3 (292–317)	301.3 ± 8.1 (289–310)	313.8 ± 5.5 (304–320)
expanded part of pharynx	132.1 ± 5.2 (125–140)	125.6 ± 5.9 (118–133)	137 ± 1 (136–138)	137.8 ± 7.6 (129–151)	131.3 ± 6.5 (122–140)	138.6 ± 3.1 (134–142)
cardia length	13 ± 1.8 (11–16)	8.7 ± 1.3 (7.0–10.5)	13.2 ± 0.5 (12.5–13.5)	13.1 ± 4.5 (7.5–18.0)	11.5 ± 2.8 (7–15)	11.8 ± 1 (11–13)
posterior genital branch	131.3 ± 10.8 (118–150)	103.3 ± 18.3 (86–134)	114.7 ± 5.2 (110–122)	127 ± 12.2 (112–139)	128.8 ± 16.9 (106–162)	133.8 ± 5.1 (128.0–140.5)
vaginal depth	16.3 ± 0.4 (16–17)	16.4 ± 0.8 (15–17)	18.5 ± 1.1 (17.0–19.5)	16.3 ± 0.4 (16–17)	15.6 ± 0.3 (15–16)	16.9 ± 1.1 (16–19)

Table 7 (continued).

Localities	Raigad population	Goa population	Thrissur population	Chikmagalur population	Sirsi population	Yellapur population
Characters	**Females**	**Females**	**Females**	**Females**	**Females**	**Females**
Vulva from ant. end	530.4 ± 30.6 (495–581)	474.2 ± 24.4 (451–515)	498 ± 11.6 (482–509)	473.8 ± 17.2 (455–501)	526.7 ± 20.8 (492–553)	523.2 ± 24.5 (482–554)
Prerectum length	47 ± 5.6 (37–53)	54.9 ± 9.8 (38.0–62.5)	50 ± 9.9 (39–63)	50.4 ± 15.6 (33–70)	55.2 ± 7.4 (43–65)	66.1 ± 6.6 (56.0–73.5)
Rectum length	32.3 ± 1.4 (30–35)	29.2 ± 0.9 (28.0–30.5)	32 ± 0.8 (31–33)	29.6 ± 1.4 (28–31)	29.5 ± 1 (28–31)	31.5 ± 1.8 (29–34)
Tail length	236.9 ± 16 (210–264)	249.6 ± 5.1 (243–257)	262 ± 1.6 (260–264)	249 ± 8.7 (232–256)	252.8 ± 19.9 (225–275)	262.4 ± 18.6 (244–285)

Carbonell & Coomans (1986) in their reviews of the genus *Thornenema* made a detailed study of this species based on specimens collected from Cameroon, Brazil, India, Fiji Islands, Sudan, Iraq, Nigeria, and South Africa.

Thornenema mauritianum is the most widely distributed species of *Thornenema* in India, with records from Aligarh, Madras and Thane (Siddiqi, 1965); Delhi (Prasad & Chawla, 1965); Aligarh, Mathura, Kurnool, Andamans, Aurangabad (Baqri & Jairajpuri, 1967); Osmanabad (Ali *et al.*, 1971) and Goa, Karnataka and Kerala (Ahmad & Ahmad, 2003).

The present specimens from the Western Ghats fit well with the description provided by earlier authors, except that the population of Chikmagalur slightly differs from Prasad & Chawla (1965) and Ahmad & Ahmad (2003) populations. From former it differs by having a slightly smaller body (1.43–1.53 vs 1.63–2.01 mm) while from latter (Goa and Kerala population) it differs in having a slightly smaller odontostyle (11.0–12.5 vs 13–15 µm). The population of Goa also differs from the description of Prasad & Chawla (1965) by having a slightly smaller body (1.31–1.51 vs 1.63–2.01 mm). The present six populations of the Western Ghats conform well with each other except for the population of Maharashtra which slightly differs by having a comparatively wider lip region and longer odontophore, which may be considered as minor intraspecific variations.

Thornenema paraconurum (Heyns, 1963) Goseco, Ferris & Ferris 1976
Fig. 15, Table 8

Dorylaimoides paraconurus Heyns, 1963: 298–300.

Dorylaimoides paraconurus – Heyns 1971: 189.
Thornenema paraconurum – Goseco, Ferris & Ferris 1976: 1. — Heyns 1963: 298–300. — Goseco *et al.* 1976: 1. — Carbonell & Coomans 1986: 147–150.

Material examined

INDIA • 4 ♀♀; Karnataka State, Shivamoga district, Mattur; 13°52′26″ N, 75°33′32″ E; depth 5–15 cm; 26 Oct. 2018; soil samples collected from around roots of grasses of areca nut field; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Thornenema paraconurum*/1–2.

Description

Male
Unknown.

Remarks

Heyns (1963) described this species as *Dorylaimoides paraconurus* from South Africa. Later, Goseco *et al.* (1976) transferred it to the genus *Thornenema*. Carbonell & Coomans (1986) restudied the type specimens and three other populations from South Africa. The present population conforms well with type population except for having a slightly longer odontostyle (14.5–15.0 vs 12.5–14.0 µm) and odontophore (18–19 vs 16–17 µm) and a smaller tail (97–145 vs 148.5–154 µm; c =10.3–16.5 vs 9.3–10.0). All the three populations described by Carbonell & Coomans (1986) from South Africa have a much longer tail compared to the type population, (Louisvale population 204.5–247 µm; the population of Bethal 211.5–273.0 µm; and the population of Ladysmith 229–235 µm). Since there was no other significant difference from the type population, they considered all the three populations conspecific with the type. This species is reported for the first time from India.

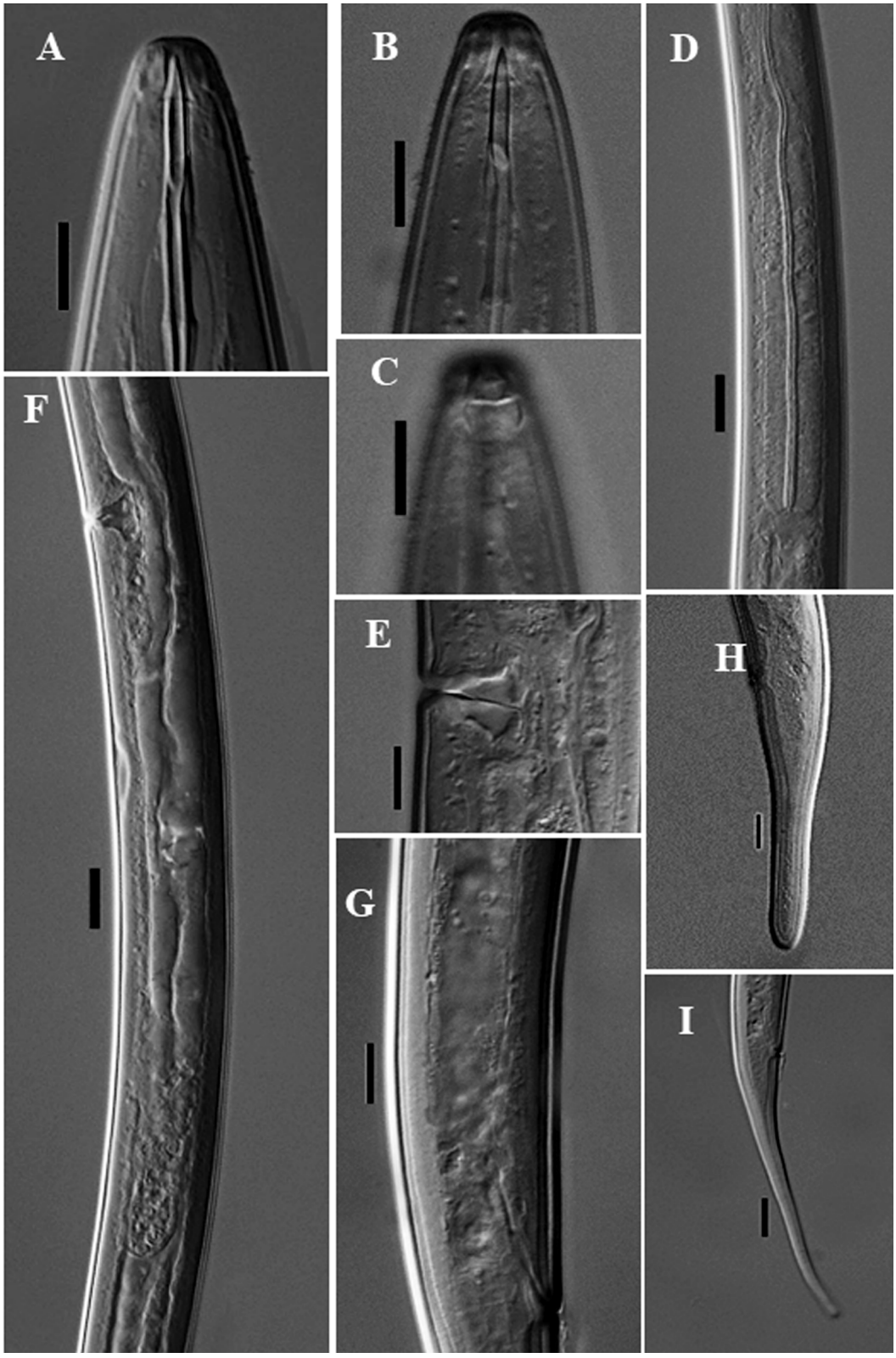

Fig. 15. *Thornenema paraconurum* (Heyns, 1963) Goseco, Ferris & Ferris 1976, ♀♀ (AMU/ZD/NC/*Thornenema paraconurum*/1–2). **A–B**. Anterior region. **C**. Anterior end showing amphid. **D**. Pharyngeal expansion with pharyngeo-intestinal junction. **E**. Vulval region. **F**. Genital system. **G**. Prerectum. **H–I**. Posterior region. Scale bars: A–G = 10 µm; H–I = 20 µm.

Table 8. Morphometrics of *Thornenema paraconurum* (Heyns, 1963) Goseco, Ferris & Ferris 1976 and *Thornenema pseudodidelphum* sp. nov. (all measurements in µm except L in mm). Abbreviations: see Material and methods.

	***Thornenema paraconurum* (Heyns, 1963) Goseco, Ferris & Ferris 1976**	***Thornenema pseudodidelphum* sp. nov.**		
		Type population		**Tamil Nadu population**
Characters	**Females**	**Holotype female**	**Paratypes female**	**Females**
n	4	1	4	14
L	1.52 ± 0.06 (1.46–1.60)	1.22	1.30 ± 0.02 (1.26–1.32)	1.43 ± 83.2 (1.33–1.59)
a	41.1 ± 1.2 (39.4–42.1)	36.9	36.7 ± 0.9 (36.0–38.2)	35.7 ± 3.6 (30.9–41.7)
b	4.9 ± 0.1 (4.8–5.1)	5.1	5.6 ± 0.2 (5.4–5.9)	5.6 ± 0.4 (5.2–6.5)
c	12.7 ± 2.7 (10.3–16.5) (17.2, n=1)	6.5	6.0 ± 0.3 (5.6–6.3)	6.2 ± 0.4 (5.2–7.0)
c’	5.7 ± 1.0 (4.4–6.7) (3.9, n=1)	8.9	10.5 ± 0.4 (10.2–11.3)	10.1 ± 1.3 (8.5–14.1)
V	36.2 ± 0.5 (35.4–36.7)	36	34.1 ± 0.9 (33.0–35.3)	35.0 ± 2.1 (28.3–37.2)
G2	7.7 ± 0.1 (7.6–7.8)	5.8	–	2 ± 0.8 (1.1–3.5)
body diameter at pharynx base	36.7 ± 1.2 (35–38)	9.3	9.5 ± 1.2 (8.0–10.9)	9.9 ± 1.2 (7.5–11.9)
body diameter at mid body	37 ± 1.4 (35–38)	34	35.9 ± 0.7 (35–37)	40.8 ± 4.6 (34–47)
body diameter at anus	21.8 ± 0.2 (21.5–22.0)	33	35.4 ± 1.0 (34.0–36.5)	40.5 ± 4.1 (33–46)
lip region diameter	9.3 ± 0.2 (9.0–9.5)	21	20.5 ± 0.5 (20–21)	23.2 ± 1.4 (20–25)
lip region height	4.5 ± 0 (4.5–4.5)	8.5	8.9 ± 0.2 (8.5–9.0)	9.9 ± 0.3 (9.0–10.5)
amphid aperture diameter	5.6 ± 0.2 (5.5–6.0)	5.0	4.6 ± 0.2 (4.5–5.0)	5.1 ± 0.3 (4.5–5.5)
odontostyle length	14.8 ± 0.2 (14.5–15.0)	5.5	5.9 ± 0.2 (5.5–6.0)	5.8 ± 0.4 (5–6)
odontophore length	18.3 ± 0.5 (18–19)	15.5	14.2 ± 0.2 (14.0–14.5)	16.1 ± 0.8 (14–17)
guiding ring from anterior end	7.6 ± 0.5 (7–8)	25	24.3 ± 0.5 (24–25)	23.2 ± 0.7 (22.0–24.5)
nerve ring from anterior end	114.7 ± 5.9 (110–123)	9	9 ± 0 (9–9)	9.6 ± 0.4 (9–10)
neck length	307.3 ± 6.1 (303–316)	103	99.8 ± 2.0 (98–103)	105.4 ± 4.2 (95–111)
expanded part of pharynx	145.7 ± 1.7 (144–148)	240	231.5 ± 8.4 (223–243)	255.4 ± 12 (228–272)
cardia length	9.3 ± 1.7 (7–11)	95	97.5 ± 5.7 (92–107)	106.6 ± 10.8 (78–132)
posterior genital branch	114 ± 3 (111–117)	13	12.6 ± 0.4 (12–13)	13.1 ± 2.7 (10–18)
vaginal depth	17 ± 1 (16–18)	71	–	29.4 ± 11.9 (15–51)
vulva from anterior end	549 ± 15.1 (530–567)	113	123.3 ± 15.5 (105–143)	142.4 ± 14.2 (120–167)
prerectum length	68 ± 9 (59–77)	20.5	19.8 ± 0.3 (19.5–20.0)	20.3 ± 1.5 (17–23)
rectum length	38 ± 5 (33–43)	442	441.8 ± 15.8 (416–459)	502 ± 34.9 (412–571)
tail length	124.7 ± 20.3 (97–145) (85, n=1)	47	38 ± 7.6 (32–51)	44.8 ± 10.2 (25–63)

Thornenema pseudodidelphis sp. nov.
urn:lsid:zoobank.org:act:A2FAE3BC-F337-4A72-9810-19C6521A6B76
Figs 16–17, Table 8

Diagnosis

Thornenema pseudodidelphis sp. nov. is characterized by having a 1.2–1.6 mm long body; lip region narrow, truncate, slightly depressed to continuous with body contour; labial and postlabial sclerotization distinct; amphids fovea cup-shaped; guiding ring single; female genital system pseudo-didelphic with anterior branch reduced having degenerate ovary; vulva transverse, pars refringens vaginae absent; tail long filiform, 8.5–14.1 × as long as anal body diameter.

Etymology

The specific epithet refers to the pseudo-didelphic female genital system, with an anterior branch occasionally complete with reduced ovary but non-functional and posterior branch well-developed and functional.

Type material

Holotype

INDIA • ♀; Kerala State, Kasargod district, Ranipuram National Park; 12°42′50.8″ N, 75°34′63.4″ E; depth 10–15 cm; 7 Nov. 2016; soil samples collected from around roots of unidentified plants from forest; AMU/ZD/NC, slide reference number AMU/ZD/NC/*Thornenema pseudodidelphis*/1.

Paratypes

INDIA • 4 ♀♀; same data as for holotype; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Thornenema pseudodidelphis*/2–3.

Other material examined

INDIA • 14 ♀♀; Tamil Nadu State, Nilgiri district, Mudumalai National Park; 11°34′53.2884″ N, 76°34′58.908″ E; depth 5–10 cm; 14 Nov. 2016; soil samples collected from around roots of grass field; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Thornenema pseudodidelphis*/4–6 • 2 ♀♀; same data as for preceding; ZSIC, slide reference number AMU/ZD/NC/*Thornenema pseudodidelphis*/7.

Description

Female

Body cylindroid, 1.22–1.59 mm long, curved ventrally, tapering towards both extremities. Cuticle finely striated, thickness varies between 1.0–1.5 µm in anterior region, 1.5–2.0 µm at mid body and 2.0–3.5 µm on tail. Lateral chords about 19–25% of the mid body diameter. Lateral, dorsal and ventral body pores indistinct. Lip region narrow, truncate, amalgamated, slightly depressed to continuous with body contour, 1.7–2.2 × as wide as high or about ¼ as wide as body diameter at neck base. Labial and postlabial sclerotization present. Amphids cyathiform, their aperture about 3/5 of lip region diameter. Odontostyle cylindroid, 1.4–1.8 × as long as lip region diameter, its aperture about ¼–⅓ of its length. Odontophore simple rod-like, 1.4–1.8 × as long as odontostyle. Guiding ring single, at 0.9–1.1 × as long as lip region diameter from anterior end. Nerve ring encircling anterior slender part of pharynx at 40–47% of neck length from anterior end. Pharynx consists of anterior slender part and posterior expanded part occupying about 40–44% of total neck length. Pharyngeal gland nuclei and their orifices are located as follows: DO = 58–62; DN = 60–63; DO-DN = 0.8–1.9; S1N1 = 66–73; S1N2 = 73–76; S2N = 82–86; S2O =83–87 (n = 7). Cardia conoid, about one-half of the corresponding body diameter long. Female genital system pseudo-didelphic; anterior branch reduced, measuring 71–75 µm long, comprising narrow tubular uterus 35–36 µm long with slightly enlarged proximal part joining sphincter;

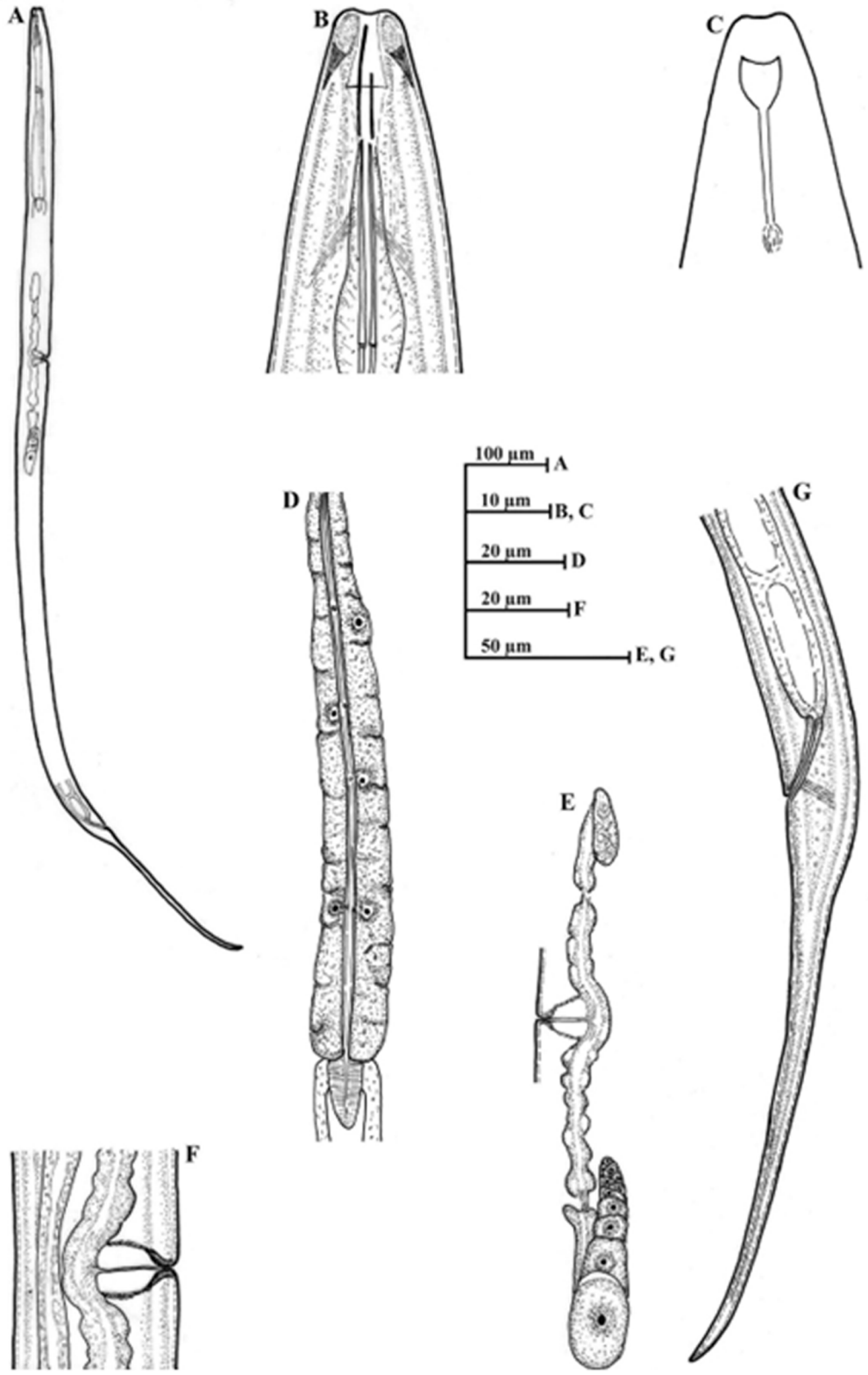

Fig. 16. *Thornenema pseudodidelphis* sp. nov. **A–C**. Holotype, ♀ (AMU/ZD/NC/*Thornenema pseudodidelphum*/1). **D–G**. Paratype 2, ♀ (AMU/ZD/NC/*Thornenema pseudodidelphum*/2). **A**. Entire female. **B**. Anterior region. **C**. Anterior region showing amphid. **D**. Pharyngeal expansion and pharyngeo-intestinal junction. **E**. Genital branch. **F**. Vulval region. **G**. Posterior region.

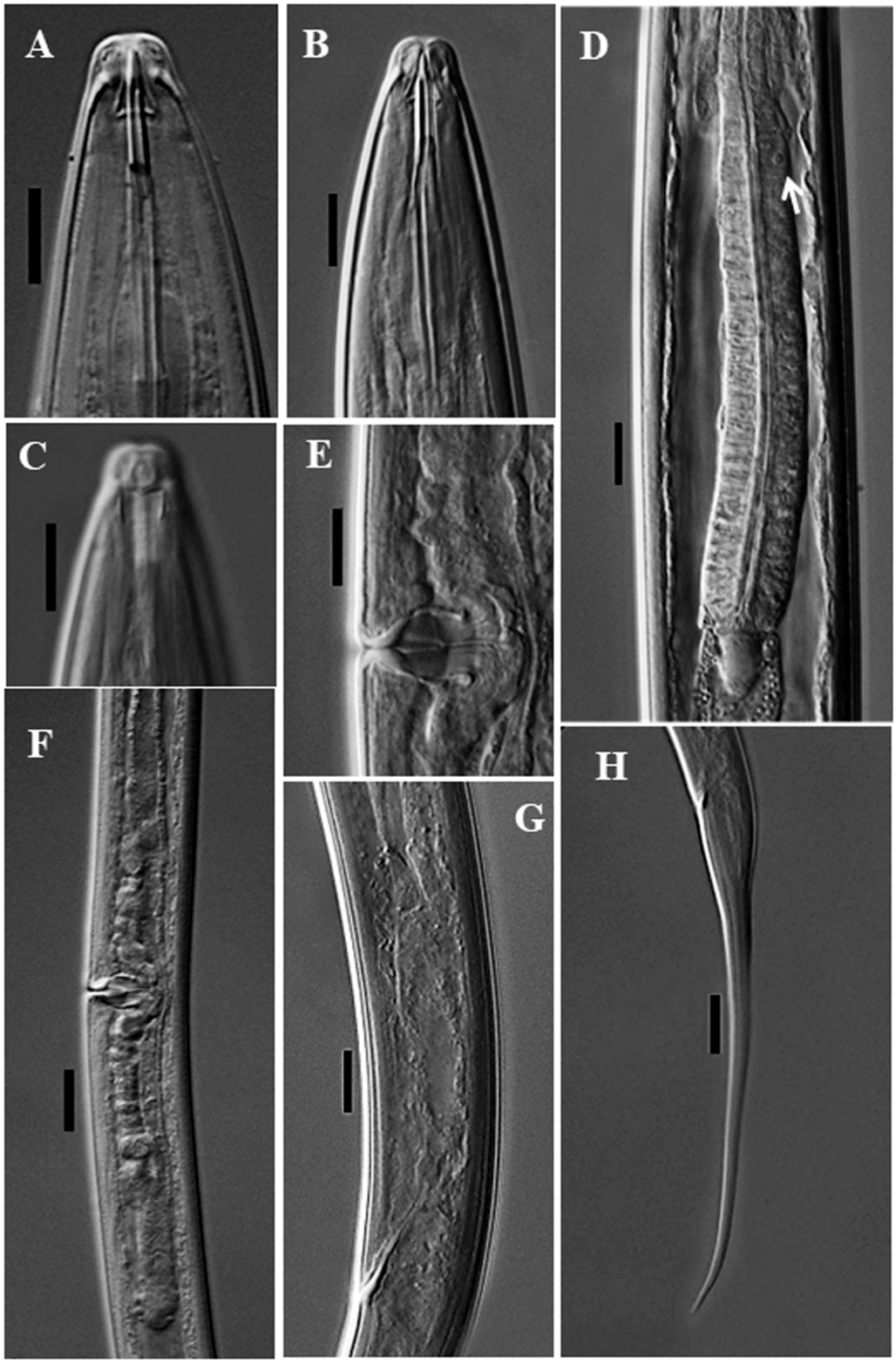

Fig. 17. *Thornenema pseudodidelphis* sp. nov. **A–C**. Holotype, ♀ (AMU/ZD/NC/*Thornenema pseudodidelphum*/1). **D–H**. Paratype 2, ♀ (AMU/ZD/NC/*Thornenema pseudodidelphum*/2). **A–B**. Anterior region. **C**. Anterior end showing amphid. **D**. Pharyngeal expansion with pharyngeo-intestinal junction, arrow head pointing dorsal gland nucleus. **E**. Vulval region. **F**. Genital system. **G**. Prerectum. **H**. Posterior region. Scale bars: A–E, G = 10 µm; F, H = 20 µm.

oviduct measuring 35–40 µm long, and small, nonfunctional, and degenerate ovary measuring 20–24 µm (n = 2). Posterior genital branch well developed, measuring 105–167 µm long, comprising tubular uterus measuring 45–72 µm or 1.3–2.0 × as long as corresponding body diameter. No traces of sperms in uterus. Oviduct joining ovary subterminally, measuring 54–99 µm or 1.5–2.5 × as long as corresponding body diameter. Sphincter prominent at oviduct-uterus junction. Ovaries reflexed, measuring 61–97 µm long, oocytes arranged in single row except near tip. Vulva transverse, pre-equatorial. Vagina slightly thickened, extending inwards, 18.5–23.0 µm or about ½ of mid body diameter; pars distalis vaginae 5.5–6.5 µm long; pars refringens vaginae absent; pars proximalis vaginae measuring 13.0–14.5 × 4.0–5.5 µm with slightly curved walls. Prerectum 1.1–2.6 and rectum 1.0–1.6 × as long as anal body diameter. Tail long, filiform, 8.5–14.1 × as long as anal body diameter with finely rounded terminus. Two to three pairs of caudal pores present on each side of tail.

Male

Unknown.

Type habitat and locality

Soil samples collected from around the roots of unidentified plants from forest vegetation of Ranipuram National Park, Ranipuram, Kasargod district, Kerala, India.

Taxonomic remarks

In the presence of a pseudo-didelphic female genital system, the new species comes close to *T. pseudosartum* Carbonell & Coomans, 1986, the only species in the genus *Thornenema* with such a well-developed female anterior genital branch. However, it differs from it in having a smaller body size (1.22–1.59 vs 1.79–1.93 mm); smaller anterior genital branch (71–75 vs 237–258 µm long); longer tail (187–281 vs 148–184 µm; c = 5.2–7.0 vs 10.1–12.1 and c' = 8.5–14.1 vs 4.8–5.7) and absence of male (vs present).

Genus *Opisthodorylaimus* Ahmad & Jairajpuri, 1982

Opisthodorylaimus cavalcantii (Lordello, 1955) Carbonell & Coomans 1985
Figs 18–19, Table 9

Thornenema cavalcantii Lordello, 1955: 216–217.

Dorylaimus cavalcantii – Andrassy 1958: 286–287.

Thornenema cavalcantii — Andrássy 1959: 196. — Loof 1964: 266–267. — Siddiqi 1965: 131–132. — Loof & Coomans 1970: 91. — Monteiro 1970: 256–258. — Eliava *et al.* 1975: 8–9. — Baqri & Khera 1977: 2–5. — Khera & Chaturvedi 1977: 141. — Sauer 1981: 72, 75. — Ahmad & Jairajpuri 1982b: 266–269. — Eliava 1984: 133. — Gambhir & Dhanachand 1990: 34.

Opisthodorylaimus cavalcantii – Carbonell & Coomans 1985: 382–390. — Coomans & Carbonell 1988: 380. — Baqri 1991: 52–54. — Choi 1999: 178–179. — Khan & Araki 2002: 11. — Baniyamuddin & Ahmad 2006: 507–508. — Andrássy 2007: 10.

Material examined

INDIA • 4 ♀♀; Kerala State, Palakkad district, Mukkali forest; 11°3′40.6944″ N, 76°32′ 23.8236″ E; depth 5–10 cm; 25 Oct. 2017; soil samples collected from around roots of grasses (unidentified); AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Opisthodorylaimus cavalcantii*/1–2 • 5 ♀♀; Karnataka State, Chikmagalur district, Lakya road, hills near Kalavara Resort; 11°3′40.6944″ N, 76°32′23.8236″ E; depth 5–10 cm; 24 Oct. 2018; soil samples collected from around roots of grasses (unidentified); AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Opisthodorylaimus cavalcantii*/3–4 • 5 ♀♀; Karnataka

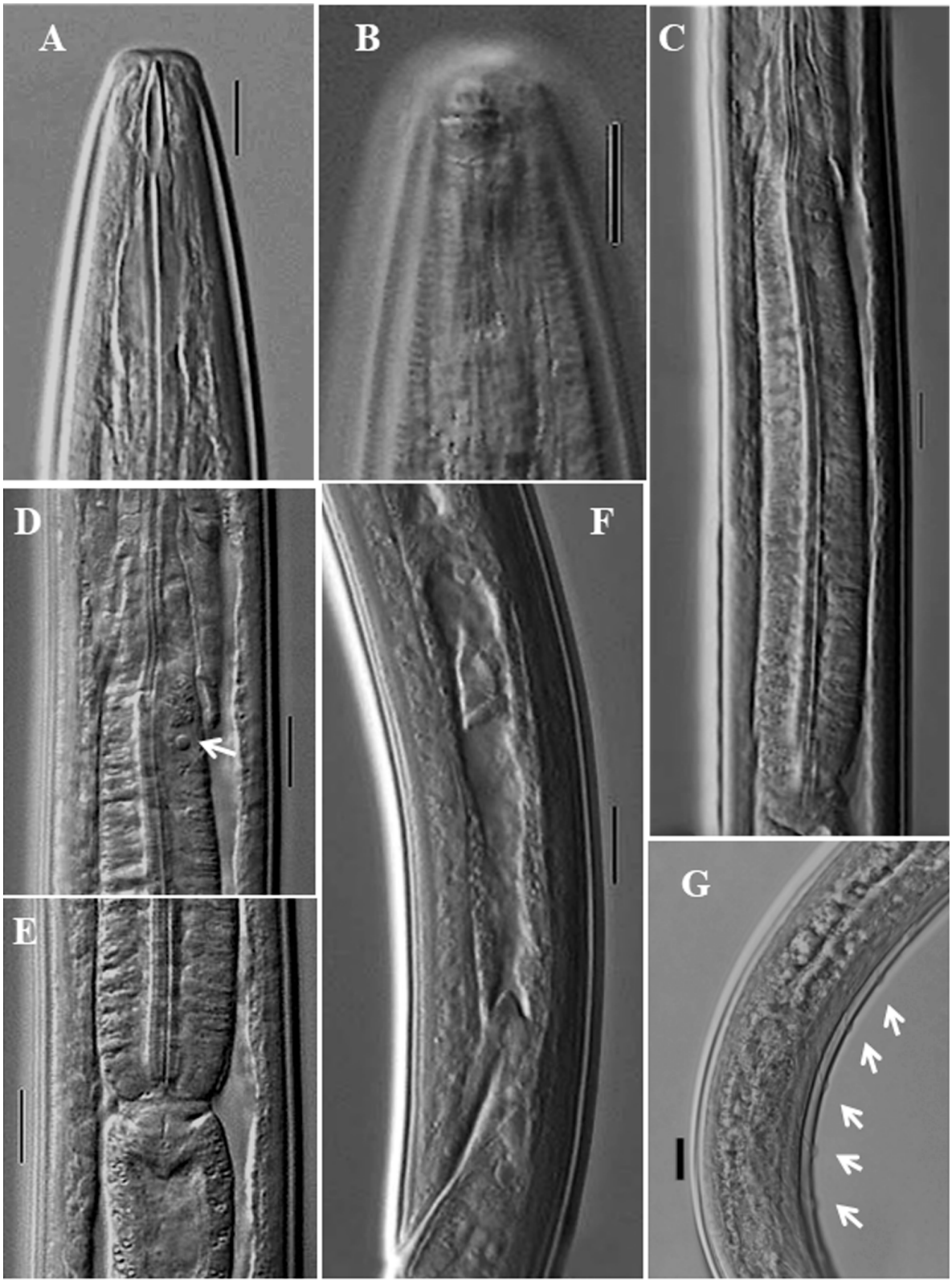

Fig. 18. *Opisthodorylaimus cavalcantii* (Lordello, 1955) Carbonell & Coomans 1985. **A**. ♀, anterior region. **B**. ♀, anterior region showing amphid. **C**. ♀, pharyngeal expansion. **D**. ♀, arrow head pointing towards dorsal gland nucleus. **E**. ♀, pharyngeo-intestinal junction. **F**. ♀, prerectum. **G**. ♂, posterior region, arrow heads pointing towards ventromedian supplements. Scale bars: A–G = 10 µm.

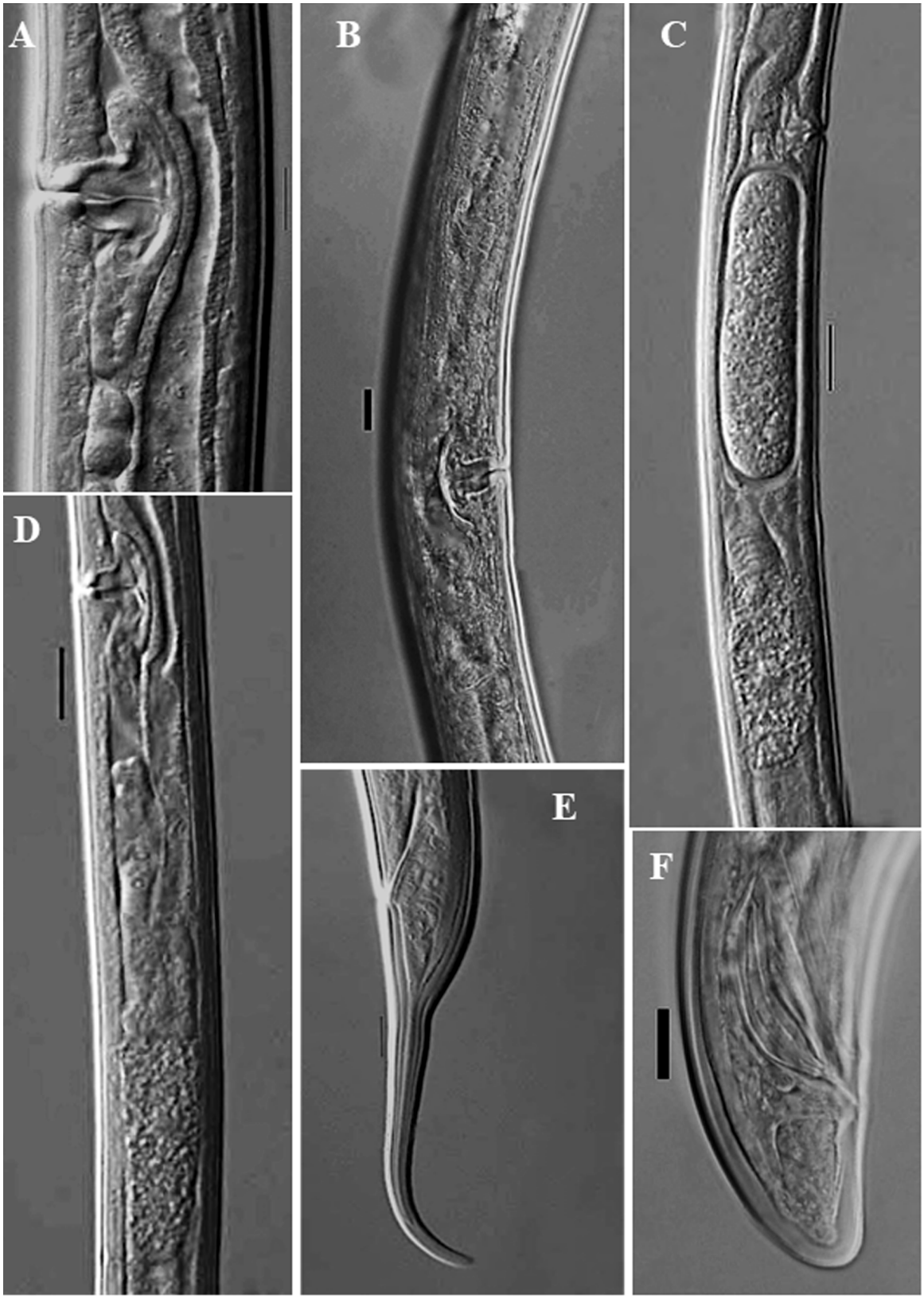

Fig. 19. *Opisthodorylaimus cavalcantii* (Lordello, 1955) Carbonell & Coomans 1985. **A**. ♀, vulval region. **B**. ♀, anterior genital branch. **C–D**. ♀, genital system. **E**. ♀, posterior region. **F**. ♂, posterior region. Scale bars: A–B, E–F = 10 µm; C–D = 20 µm.

Table 9. Morphometrics of *Opisthodorylaimus cavalcantii* (Lordello, 1955) Carbonell & Coomans 1985 (all measurements in µm except L in mm). Abbreviations: see Material and methods.

Localities	**Palakkad population**	**Chikmagalur (Kalavara) population**	**Chikmagalur (Hosahalli) population**	**Shivamogga (Dummali) population**	**Shivamogga (Mattur) population**
Characters	**Females**	**Females**	**Females**	**Females**	**Females**
n	4	5	5	5	3
L	1.11 ± 0.05 (1.06–1.19)	1.16.2 ± 0.03 (1.13–1.22)	1.17 ± 0.13 (1.0–1.39)	1.14 ± 0.02 (1.12–1.17)	1.14 ± 0.03 (1.11–1.17)
a	29.1 ± 2.7 (25.2–32.6)	33.8 ± 1.1 (32.6–35.7)	31.9 ± 2.0 (28.7–34.2)	34.3 ± 1.1 (32.4–35.3)	32.6 ± 0.9 (31.8–33.5)
b	4.1 ± 0.1 (3.9–4.3)	4.5 ± 0.2 (4.30–4.80)	4.23 ± 0.4 (3.77–4.83)	4.26 ± 0.1 (4.18–4.38)	4.23 ± 0.1 (4.09–4.38)
c	13.1 ± 1.7 (11.3–15.8)	11.61 ± 0.7 (10.75–12.59)	10.08 ± 1.3 (8.29–12.04)	10.8 ± 0.7 (10.2–12.2)	10.48 ± 0.3 (10.2–10.8)
c’	3.8 ± 0.7 (2.7–4.4)	4.76 ± 0.4 (4.28–5.38)	5.07 ± 0.3 (4.79–5.50)	4.87 ± 0.4 (4.18–5.19)	5.20 ± 0.2 (4.95–5.45)
V	46.3 ± 0.6 (45.5–47.2)	46.13 ± 0.9 (45.27–47.81)	43.39 ± 1.3 (41.88–45.36)	44.7 ± 0.7 (43.9–45.9)	44.2 ± 0.0 (44.15–44.24)
G2	10.6 ± 0.4 (9.9–11.2)	10.6 ± 0.8 (9.1–11.4)	11.1 ± 1.0 (10.3–12.7)	10.9 ± 0.9 (9.6–12.1)	14.5 ± 2.2 (12.4–16.7)
body diam. at pharynx base	36.3 ± 2.9 (33–40)	31.7 ± 0.7 (31–33)	35.5 ± 1.5 (34–38)	32.4 ± 1.4 (31–35)	32 ± 0.8 (31–33)
body diam. at mid body	38.5 ± 3.2 (34–42)	34.2 ± 0.8 (33.0–35.5)	36.62 ± 2.3 (35.0–40.5)	33.3 ± 1.0 (32–35)	35.33 ± 0.5 (35–36)
body diam. at anus	23.3 ± 1.3 (22–25)	21 ± 0.3 (20.5–21.5)	23 ± 0.7 (22–24)	21.7 ± 0.7 (21–23)	21 ± 0.8 (20–22)
lip region diam.	11 ± 0 (11–11)	10.1 ± 0.2 (10.0–10.5)	10.12 ± 0.2 (10.0–10.5)	10 ± 0 (10–10)	10.83 ± 0.2 (10.5–11.0)
lip region height	4.3 ± 0.3 (4.0–4.5)	3.8 ± 0.2 (3.5–4.0)	3.62 ± 0.2 (3.5–4.0)	3.6 ± 0.2 (3.5–4.0)	3.5 ± 0.0 (3.5–3.5)
amphid aperture diam.	5 ± 0 (5–5)	5.1 ± 0.2 (5.0–5.5)	5 ± 0.0 (5–5)	5.3 ± 0.2 (5.0–5.5)	4.7 ± 0.2 (4.5–5.0)
odontostyle length	12.4 ± 0.4 (12–13)	12.6 ± 0.2 (12.5–13.0)	13 ± 0.4 (12.5–13.5)	12.3 ± 0.4 (12–13)	12.25 ± 0.8 (11.5–13.0)
odontophore length	18.5 ± 0.5 (18–19)	18.1 ± 0.2 (18.0–18.5)	18.25 ± 0.8 (17.5–19.0)	18.1 ± 0.4 (17.5–18.5)	18.5 ± 0.5 (18–19)
guiding ring from ant. end	7.8 ± 0.4 (7–8)	7.1 ± 0.2 (7.0–7.5)	7.6 ± 0.4 (7–8)	7.6 ± 0.4 (7–8)	7.83 ± 0.2 (7.5–8.0)
nerve ring from ant. end	109.3 ± 2.5 (106–113)	99.6 ± 3.4 (96–105)	104.75 ± 5.1 (100–113)	101.6 ± 1.0 (100–103)	99.67 ± 0.5 (99–100)
neck length	270 ± 3.7 (266–276)	256.8 ± 5.7 (251–266)	276.25 ± 7.6 (266–287)	267.4 ± 4.2 (262–274)	265.33 ± 6.8 (256–272)
expanded part of pharynx	132.5 ± 2.9 (128–136)	131.6 ± 8.8 (118–141)	139 ± 3.2 (135–144)	132 ± 3.5 (128–138)	130.5 ± 4.5 (126–135)
cardia length	7.8 ± 0.4 (7–8)	8.12 ± 1.7 (6.5–11.0)	12.62 ± 1.0 (11.5–14.0)	10.6 ± 1.7 (8.5–12.0)	10 ± 0.4 (9.5–10.5)
anterior uterine sac	17.3 ± 1.1 (16–19)	16 ± 4.5 (11–22)	16.25 ± 2.0 (13–18)	12.75 ± 2.6 (10–17)	16.33 ± 4.0 (13–22)
posterior genital branch	117.5 ± 7.1 (109–125)	121.8 ± 6.0 (111–129)	130 ± 14.3 (112–145)	125.25 ± 11.3 (111–141)	166.33 ± 16.8 (145–186)
vaginal depth	18.3 ± 0.8 (17–19)	16.5 ± 0.8 (15.0–17.5)	18.12 ± 0.9 (17.0–19.5)	16.4 ± 0.5 (16–17)	17.33 ± 0.8 (16.5–18.5)
vulva from ant. end	514.8 ± 18.8 (492–541)	533.2 ± 14.2 (513–550)	506.5 ± 45.7 (455–580)	509.4 ± 4.7 (502–516)	514 ± 17.1 (491–532)
prerectum length	55.8 ± 5.1 (51–64)	56.4 ± 12.7 (41–73)	51.5 ± 8.4 (38–61)	48.6 ± 10.5 (39–69)	44.33 ± 0.9 (43–45)
rectum length	33 ± 2.1 (31–36)	31.9 ± 1.2 (30–33)	32.25 ± 1.8 (30–35)	30.5 ± 0.6 (30.0–31.5)	30.17 ± 1.5 (28–31.5)
tail length	86.5 ± 11.6 (67–97)	100 ± 7.4 (92–113)	116.5 ± 3.0 (113–121)	105.6 ± 6.9 (92–111)	109.5 ± 0.5 (109–110)

State, Chikmagalur district, near Kaimara town, Hosahalli village; 13°22′38.4″ N, 75°44′55.6″ E; depth 5–10 cm; 24 Oct. 2018; soil samples collected from around roots of grasses (unidentified); AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Opisthodorylaimus cavalcantii*/5–6 • 5 ♀♀; Karnataka State, Shivamogga district, Dummalli village; 13°50′31.4″ N, 75°35′58.9″ E; depth 5–10 cm; 26 Oct. 2018; soil samples collected from around roots of large grasses (unidentified) near paddy field; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Opisthodorylaimus cavalcantii*/7–8 • 3 ♀♀; Karnataka State, Shivamogga district, Mattur village; 13°52′26″ N, 75°33′32″ E; depth 5–10 cm; 26 Oct. 2018; soil samples collected from around roots of grasses (unidentified) from areca nut field; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Opisthodorylaimus cavalcantii*/9–10.

Remarks

Opisthodorylaimus cavalcantii is one of the most widely distributed nematode species of the genus, so far reported from every continent except Europe. This species has been observed in 18 countries. Carbonell & Coomans (1985) made a detailed study of this species based on 14 populations obtained from Kenya, Belmonte (Bahia State, Brazil), Cameroon, Ivory Coast, South Africa, USA, Zaire and observed intraspecific variations especially in the female reproductive system which is mono-opisthodelphic with variable length of anterior genital branch, very rarely even didelphic. However, in didelphic females the anterior genital branch is non-functional and reduced in size compared to a normal and functional posterior genital branch.

During the present study, this species was recorded from five different locations in the Western Ghats. The present specimens fit well with those described by Carbonell & Coomans (1985), Khan & Araki (2002), and Baniyamuddin & Ahmad (2006). However, the population of Kerala differs from Andrássy's (2007) description in having a wider lip region (11 vs 8–9 µm), a posterior vulva position (46–47 vs 41–43%) and a slightly smaller tail (67–97 vs 98–104 µm). The population of Chikmagalur (Hosahalli) differs from the population of Kerala in the anterior vulva position (42–45 vs 46–47%), a longer cardia (11.5–14.0 vs 7–8 µm) and a longer tail (113–121 vs 67–97 µm). These differences may be regarded as intraspecific variations. This species is reported here for the first time from the Western Ghats of India.

Genus *Coomansinema* Ahmad & Jairajpuri, 1989

Coomansinema oryzae Ahmad, 1993
Fig. 20, Table 10

Coomansinema oryzae Ahmad, 1993: 176.

Coomansinema oryzae – Andrássy 2012: 92, 94.

Material examined

INDIA • 3 ♀♀; 2 ♂♂; Goa State, South Goa district, Xelvona village in Curchorem town; 15°15′28.44″ N, 74°6′ 37.692″ E; depth 10–15 cm; 16 Apr. 2016; soil samples collected from around roots of paddy crop; slide reference numbers AMU/ZD/NC/*Coomansinema oryzae* /1–2; AMU/ZD/NC.

Remarks

Ahmad (1993) described *Coomansinema oryzae* from soil around the roots of paddy field of Assam, India. Later, Andrássy (2012) reported this species from a moss-rain forest of Ecuador. Andrássy's population differs from the original population in the width of the lip region (14–15 vs 15–17 µm). The present specimens conform well with the type populations except for having a comparatively longer odontostyle (22.0–23.5 vs 20–21 µm) and a slightly longer tail (101–122 vs 97–114 µm). It also fits

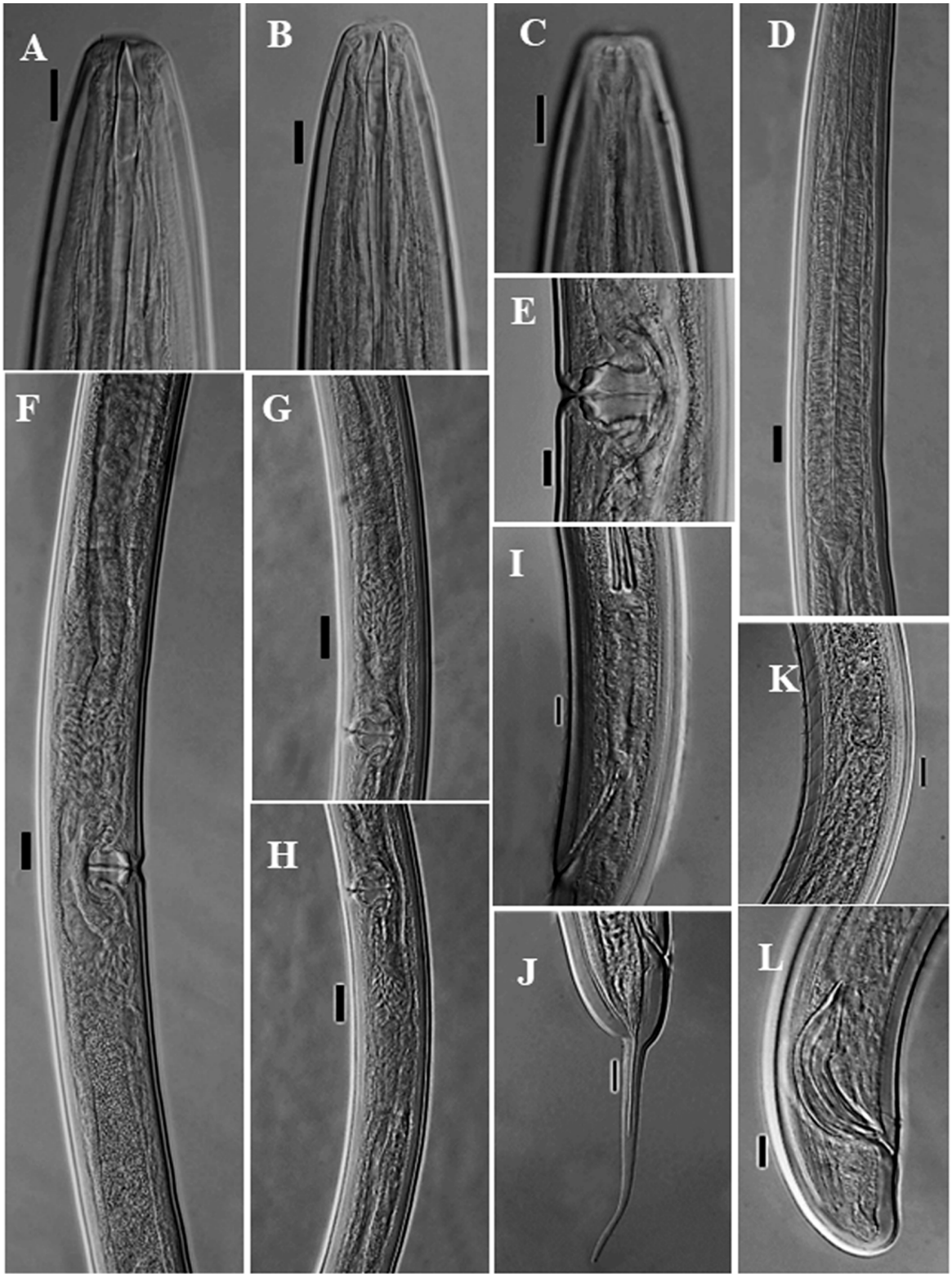

Fig. 20. *Coomansinema oryzae* Ahmad, 1993. **A–B**. ♀, anterior region. **C**. ♀, anterior end showing amphid. **D**. ♀, pharyngeal expansion with pharyngeo-intestinal junction. **E**. ♀, vulval region. **F**. ♀, genital system. **G**. ♀, anterior genital branch. **H**. ♀, posterior genital branch. **I**. ♀, prerectum. **J**. ♀, posterior region. **K**. ♂, posterior region, showing ventromedian supplements. **L**. ♂, posterior region. Scale bars: A–E, I–L = 10 μm; F–H = 20 μm).

Table 10. Morphometrics of *Coomansinema oryzae* Ahmad, 1993 (all measurements in µm except L in mm). Abbreviations: see Material and methods.

	***Coomansinema oryzae* Ahmad, 1993**	
Characters	**Females**	**Males**
n	3	2
L	1.83 ± 0.03 (1.79–1.87)	1.64, 1.74
a	34.53 ± 0.6 (33.78–35.30)	34.9, 35.4
b	4.43 ± 0 (4.37–4.48)	4.1, 4.2
c	16.83 ± 1.1 (15.34–18.06)	49.7, 51.1
c’	3.12 ± 0.2 (2.97–3.39)	0.9, 0.9
V	55.65 ± 0.6 (54.78–56.24)	–
G2	12.2 ± 1.4 (10.8–14.1)	–
body diameter at pharynx base	11.1 ± 1 (9.8–12.0)	–
body diameter at mid body	50.3 ± 1.7 (48–52)	44, 48
body diameter at anus	53 ± 0.8 (52–54)	47, 49
lip region diameter	35 ± 0.8 (34–36)	35, 37
lip region height	16.7 ± 0.5 (16–17)	15, 16
amphid aperture diameter	5 ± 0 (5–5)	5, 5
odontostyle length	7.7 ± 0.9 (7–9)	8, 8
odontophore length	23.7 ± 0.5 (23–24)	23, 24
guiding ring from anterior end	28.7 ± 0.5 (28–29)	28, 29
nerve ring from anterior end	13.7 ± 0.5 (13–14)	13, 14
neck length	142.7 ± 1.2 (141–144)	140, 145
expanded part of pharynx	413.3 ± 5.9 (405–418)	397, 417
cardia length	198.7 ± 4.7 (192–202)	187, 195
posterior genital branch	24.7 ± 2.5 (22–28)	21, 24
vaginal depth	223.3 ± 28.5 (197–263)	–
vulva from anterior end	204 ± 19.3 (178–224)	–
prerectum length	29.3 ± 1.7 (27–31)	–
rectum length	1018 ± 6.7 (1009–1025)	–
tail length	66 ± 3.3 (62–70)	97, 119
spicule length	50 ± 2.4 (47–53)	51, 53
lateral guiding pieces	109.3 ± 9.1 (101–122)	33, 34
ventromedian supplements	–	58, 60

well with the population of Ecuador except for having a comparatively longer odontostyle (22.0–23.5 vs 20–21 µm). This species is reported here for the first time from the Western Ghats of India.

Genus *Prothornenema* Baqri & Bohra, 2003

Prothornenema cuticulare sp. nov.
urn:lsid:zoobank.org:act:FAA54266-C42A-4CB1-B606-52DCA905B3EC
Figs 21–22, Table 11

Diagnosis

Prothornenema cuticulare sp. nov is characterized by having a 0.93 mm (female) and 0.93–0.98 mm (male) long body; a cap-like lip region, offset by constriction with moderate labial and postlabial sclerotization; amphids stirrup-shaped; a guiding ring single; an odontostyle 10–11 µm long; an expanded part of the pharynx occupying about 40% of the total neck length; an amphidelphic female genital system; a transverse vulva with deep cuticle invagination anterior and posterior to it, pars refringens vaginae present; an elongate tail, 4.6 × as long as the anal body diameter. Males with slender spicules, 31–32 µm long; 17 contiguous ventromedian supplements; the prerectum starting at or within the range of ventromedian supplements and tail short conoid with broadly rounded terminus.

Etymology

The new specific epithet refers to the cuticular infolding near vulva of the species.

Type material

Holotype

INDIA • ♀; Maharashtra State, Sangli district, near Sahyadri Tiger reserve; 17°48′59.8″ N, 73°80′88.6″ E; depth 5–10 cm; 14 Apr. 2016; soil samples collected from around roots of unidentified grasses; AMU/ZD/NC, slide reference number AMU/ZD/NC/*Prothornenema cuticulare*/1.

Paratypes

INDIA • 3 ♂♂; same data as for holotype; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Prothornenema cuticulare*/2–3.

Description

Female

Body slightly ventrally curved upon fixation, tapering towards both ends. Cuticle thin with fine transverse striations, 1.0 µm thick in anterior region, 1.5 µm at mid body and 3.0 µm on tail. Lateral chords occupying about ⅓ of mid body diameter. Lateral, dorsal and ventral body pores indistinct. Lip region cap-like, offset from body by constriction with moderate labial and postlabial sclerotization, about 2.6 × as wide as high or about ⅓ as wide as body diameter at neck base. Amphids stirrup-shaped, their apertures occupying about ½ of lip region diameter. Odontostyle dorylaimoid, 1.2 × as long as the lip region diameter, its aperture about ²/₅ of its length. Odontophore simple, rod-like, 1.4 × as long as odontostyle. Guiding ring single, at about lip region diameter from anterior end. Nerve ring surrounding the anterior slender part of pharynx at 44% of neck length from anterior end. Pharynx consisting of slender anterior part, expanding gradually; expanded part occupying about 40% of total neck length. Pharyngeal gland nuclei and their orifices are located as follows: DO = 68; DN = 68.6; DO-DN = 0.5; S1N1 = 76; S1N2 = 82; S2N = 91; S2O = 92. Cardia long, conoid to rounded, about ³/₅ as long as corresponding body diameter. Female genital system amphidelphic, ovary reflexed, measuring 37 µm (anterior) and 54 µm (posterior) long; oocytes arranged in single row except near tip. Oviduct joining ovary subterminally, measuring 61 µm (anterior) and 100 µm (posterior). Sphincter distinct at oviduct-uterus junction. Uterus apparently bipartite, measuring 71 µm (anterior) and 75 µm (posterior), with two sections of nearly same length, distal part more strongly muscular. Vulva transverse, with two cuticular invaginations anterior and three posterior of it. Vagina extending inwards, 16.5 µm or about ½ of mid body diameter; pars distalis

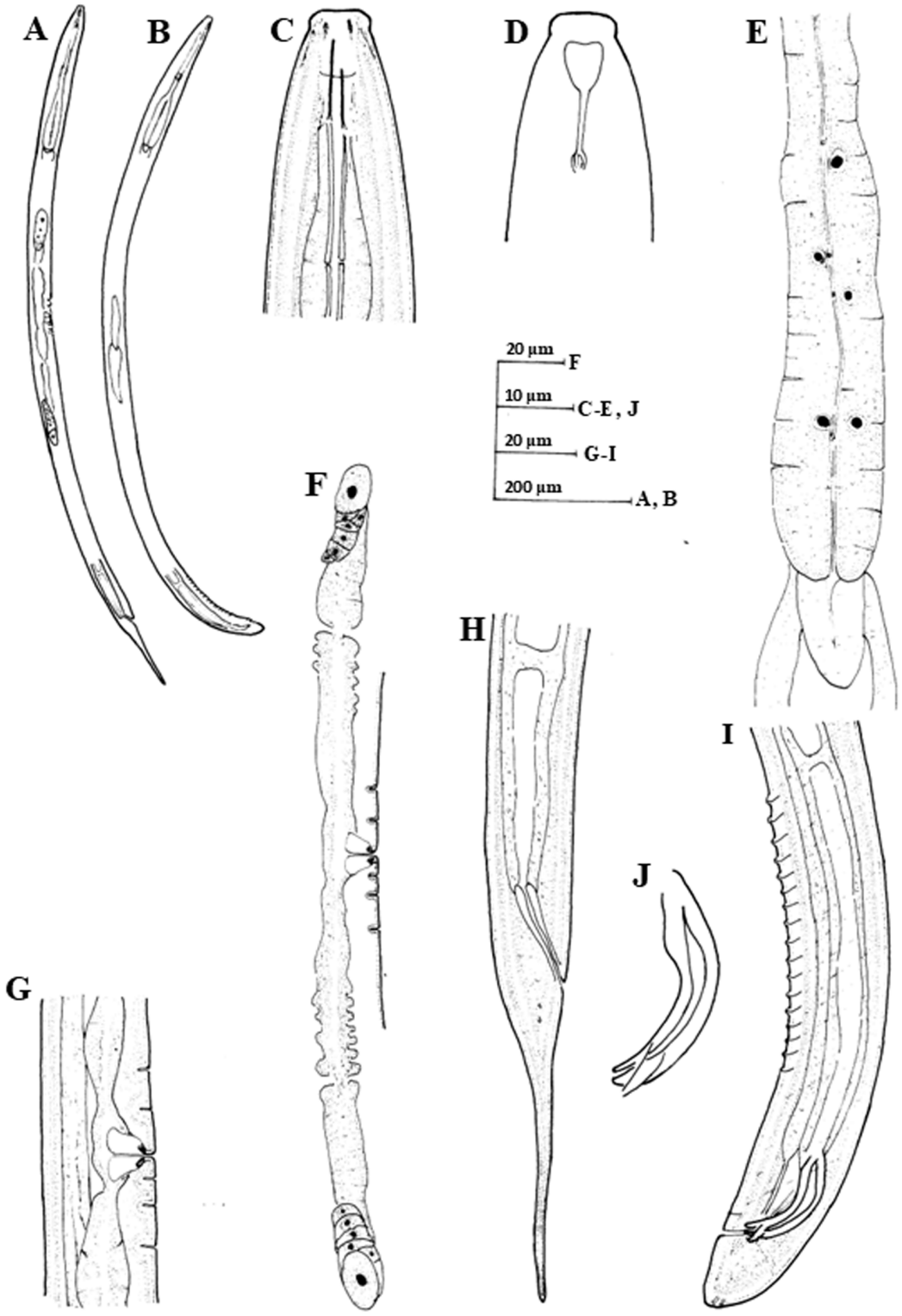

Fig. 21. *Prothornenema cuticulare* sp. nov. **A, C–H**. Holotype, ♀ (AMU/ZD/NC/*Prothornenema cuticulare*/1). **B, I–J**. Paratype 1, ♂ (AMU/ZD/NC/*Prothornenema cuticulare*/2). **A**. Entire female. **B**. Entire male. **C**. Anterior region. **D**. Anterior end showing amphid. **E**. Pharyngeal expansion with pharyngeo-intestinal junction. **F**. Genital branch. **G**. Vulval region. **H–I**. Posterior region. **J**. Spicules.

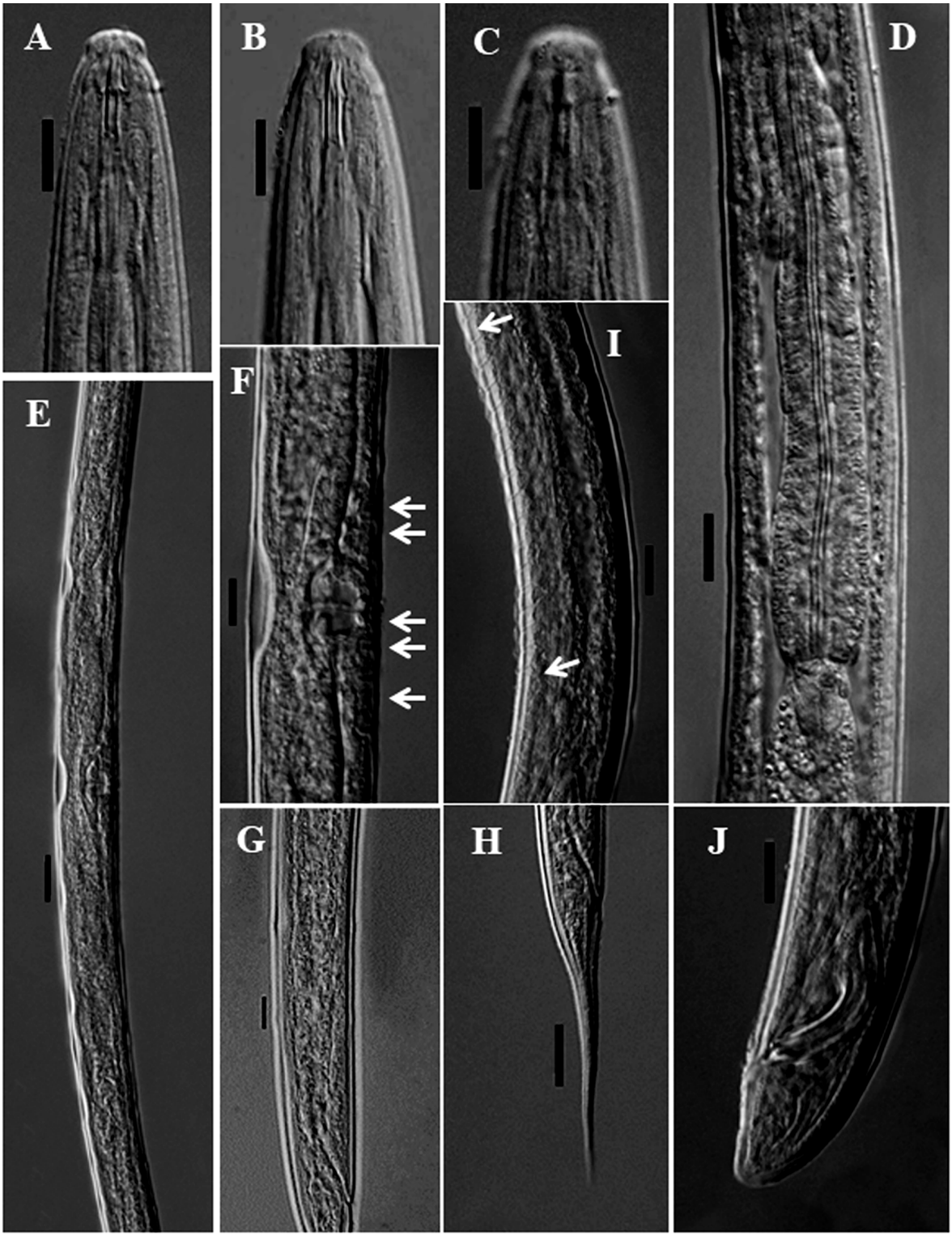

Fig. 22. *Prothornenema cuticulare* sp. nov. **A–H**. Holotype, ♀ (AMU/ZD/NC/*Prothornenema cuticulare*/1). **I–J**. Paratype 1, ♂ (AMU/ZD/NC/*Prothornenema cuticulare*/2). **A–B**. Anterior region. **C**. Anterior end showing amphid. **D**. Pharyngeal expansion with pharyngeo-intestinal junction. **E**. Amphidelphic genital branch. **F**. Vulval region with arrows showing cuticular infoldings. **G**. Prerectum. **H**. Female posterior region. **I**. Ventromedian supplements. **J**. Posterior region with spicules Scale bars: A–D, F–G, I–J = 10 µm; E, H = 20 µm.

vaginae 2.5 µm long; pars refringes vaginae with two divergent, well separated triangular sclerotizations, each measuring 2.5 × 2.0 µm and with combined width 6 µm; pars proximalis vaginae 11 × 7.5 µm with curved walls. Prerectum 2.5 and rectum 1.5 × as long as anal body diameter. Tail elongate, 4.6 × as long as anal body diameter. Two caudal pores on each side.

Male

General morphology similar to female except for posterior region generally more curved because of presence of copulatory muscles. Body slender, 0.93–0.98 mm long. Genital system diorchic, testes opposed filled with spindle-shaped sperm, measuring 5.0 × 1.5 µm long. Spicules typical dorylaimoid, curved ventrad, 4.9–5.4 × as long as wide and 1.4–1.6 × as long as cloacal body diameter. Head well developed, occupying 22–25% of the spicules total length, dorsal contour regularly convex, ventral contour bearing moderately distinct hump at 11–13 µm from anterior end of spicule. Median piece 8.0–8.5 × as long as wide, occupying about 28% of spicules maximum width. Posterior end of spicule 3.5–4.0 µm wide. Lateral guiding pieces 3 × as long as wide. In addition to ad-cloacal pair, situated at 3.5–4.0 µm from cloacal aperture, series of 17 ventromedian supplement, almost 5 µm equally spaced, located outside range of spicules, posterior ventromedian supplement located at 41.5–42.0 µm from ad-cloacal pair. Prerectum 4.8–6.2 × as long as cloacal body diameter, starting at or within range of ventromedian supplements. Rectum 1.6–1.8 × as long as cloacal body diameter. Tail short conoid with broadly rounded terminus, 0.9–1.0 × as long as cloacal body diameter with two caudal pores on each side of tail.

Type habitat and locality

Soil samples collected from around the roots of unidentified grasses near Sahyadri Tiger reserve, Sangli district, Maharashtra, India.

Remarks

In the presence of cuticular infoldings near vulva, this new species is most closely related to *P. vulvatum* Baniyamuddin & Ahmad, 2011, but differs in having a smaller body (0.93–0.98 vs 1.06–1.07 mm); the nature of pars refringens vaginae (two triangular pieces vs additional well developed median triangular piece present between the two triangular vulval sclerotized pieces); a longer expanded part of pharynx (40 vs 28–29%); tail length and morphology (elongate, 85 µm vs long filiform tail 119–128 µm long); smaller spicules (31–32 vs 38–40 µm) and more ventromedian supplements (17 vs 13–14). This species also differs from *P. capitatum* Baqri & Bohra, 2003 in having a relatively smaller body size (L = 0.93 vs 1.03–1.34 mm); a lower b value (4.8 vs 5.7–5.8); a wider lip region (9 vs 7 µm); a longer expanded part of pharynx (40 vs 32–34%); a cuticle infolding present anterior and posterior to vulva vs absent and slightly longer spicules (31–32 vs 30 µm). From *P. longicaudatum* sp. nov., the new species differs in having a relatively shorter, robust body (L= 0.93 vs 1.05–1.22 mm; a = 30.1 vs 35.9–37.6; b = 4.8 vs 5.5–5.9 µm); a cuticle infolding present anterior and posterior to vulva vs absent; a smaller tail (85 vs 168–202 µm; c = 11 vs 5.5–7.2; c'= 4.6 vs 8.9–11.9) and more ventromedian supplements (17 vs 13–14).

Prothornenema longicaudatum sp. nov.
urn:lsid:zoobank.org:act:A2C52328-EB60-4F69-AC74-97579ED372D2
Figs 23–25; Table 11

Diagnosis

Prothornenema longicaudatum sp. nov. is characterized by having a 1.05–1.22 mm (female) and a 0.88–0.98 mm (male) long body; lip region cap-like, offset by constriction with moderate labial and postlabial sclerotization; amphids stirrup-shaped; guiding ring single; odontostyle 10.0–11.5 µm long; pharyngeal expansion 33–36% of total neck length; female genital system amphidelphic; vulva transverse, pars

refringens vaginae present; female tail long filiform, 8.9–11.9 × as long as anal body diameter. Males with slender spicules, 30–32 µm long; 13–14 contiguous ventromedian supplements, prerectum starting within the range of ventromedian supplements and tail short conoid with broadly rounded terminus.

Etymology

The specific epithet refers to the long tail of the specimens.

Type material

Holotype

INDIA • ♀; Maharashtra State, Raigad district, Borli, near bus-stand; 18°51′12.8″ N, 72°91′25.7″ E; depth 5–10 cm; 11 Apr. 2016; soil samples collected from around roots of grasses (unidentified); AMU/ZD/NC, slide reference number AMU/ZD/NC/*Prothornenema longicaudatum*/1.

Paratypes

INDIA • 6 ♀♀, 5 ♂♂; same data as for holotype; slide reference numbers AMU/ZD/NC/*Prothornenema longicaudatum*/2–4 • 1 ♀, 1 ♂; same data as for holotype; AMU/ZD/NC, slide reference number AMU/ZD/NC/*Prothornenema longicaudatum*/5.

Description

Female

Body slightly curved ventrad upon fixation, tapering slightly anterior to the pharynx base, posteriorly ending in a long filiform tail. Cuticle thin with fine transverse striations, 1.0–1.5 µm thick in anterior region, 1.0–1.5 µm at mid body and 2.5–3.0 µm on tail. Lateral chords about ⅓ of mid body diameter. Lateral, dorsal and ventral body pores indistinct. Lip region cap-like, set off from body by constriction, with moderate labial and postlabial sclerotization, about 2.0–2.3 × as wide as high or about ¼ × as wide as body diameter at neck base. Amphids stirrup-shaped, their aperture occupying about 3/5 of lip region diameter. Odontostyle dorylaimoid, 1.4–1.6 × as long as the lip region diameter, its aperture about 2/5 of its length. Odontophore simple, rod-like, 1.3–1.7 × as long as odontostyle. Guiding ring single, fixed ring at about 1.0–1.1 × lip region diameter from anterior end. Nerve ring surrounding anterior slender part of pharynx at 43–47% of neck length from anterior end. Pharynx consists of slender anterior part, expanding gradually into small posterior part; expanded portion occupying about 33–36% of total neck length. Pharyngeal gland nuclei and their orifices are located as follows: DO = 69–72; DN = 70–73; DO-DN = 2–3; S1N1 = 78–83; S1N2 = 82–84; S2N = 90–91; S2O = 90–92. Cardia long conoid to rounded, about ¼ as long as corresponding body diameter. Female genital system amphidelphic, measuring 163–189 µm (anterior) and 125–155 µm (posterior) long. Ovaries reflexed, measuring 58–86 µm (anterior) and 59–80 µm (posterior) long; oocytes arranged in single row except near tip. Oviduct joining ovary subterminally, measuring 87–109 µm or 2.8–3.5 (anterior) and 66–113 µm or 2.1–3.3 (posterior) × as long as corresponding body diameter. Sphincter distinct at oviduct-uterus junction. Uterus wide tube, measuring 56–91 µm or 2.0–2.7 (anterior) and 49–62 µm or 1.7–1.9 (posterior) × as long as corresponding body diameter. Vulva pre-equatorial, transverse slit. Vagina extending inwards, 16.0–17.5 µm or about ½ of mid body diameter; pars distalis vaginae 1.5–2.0 µm long; pars refringes vaginae with two divergent, well separated triangular sclerotizations, each measuring 4–5 × 3.0–3.5 µm and with combined width 6.0–7.5 µm; pars proximalis vaginae 10.0–11.5 × 4–5 µm long with curved walls. Prerectum 2.4–3.8 and rectum 1.5–1.9 × as long as anal body diameter. Tail long filiform, 8.9–11.9 × as long as anal body diameter. Two caudal pores present on each side.

Male

General morphology similar to female except for posterior region generally more curved because of the presence of copulatory muscles. Body slender, 0.88–0.98 mm long. Genital system diorchic, testes opposed filled with spindle-shaped sperms, measuring 3–4 × 1.0–1.5 µm. Spicules typical dorylaimoid,

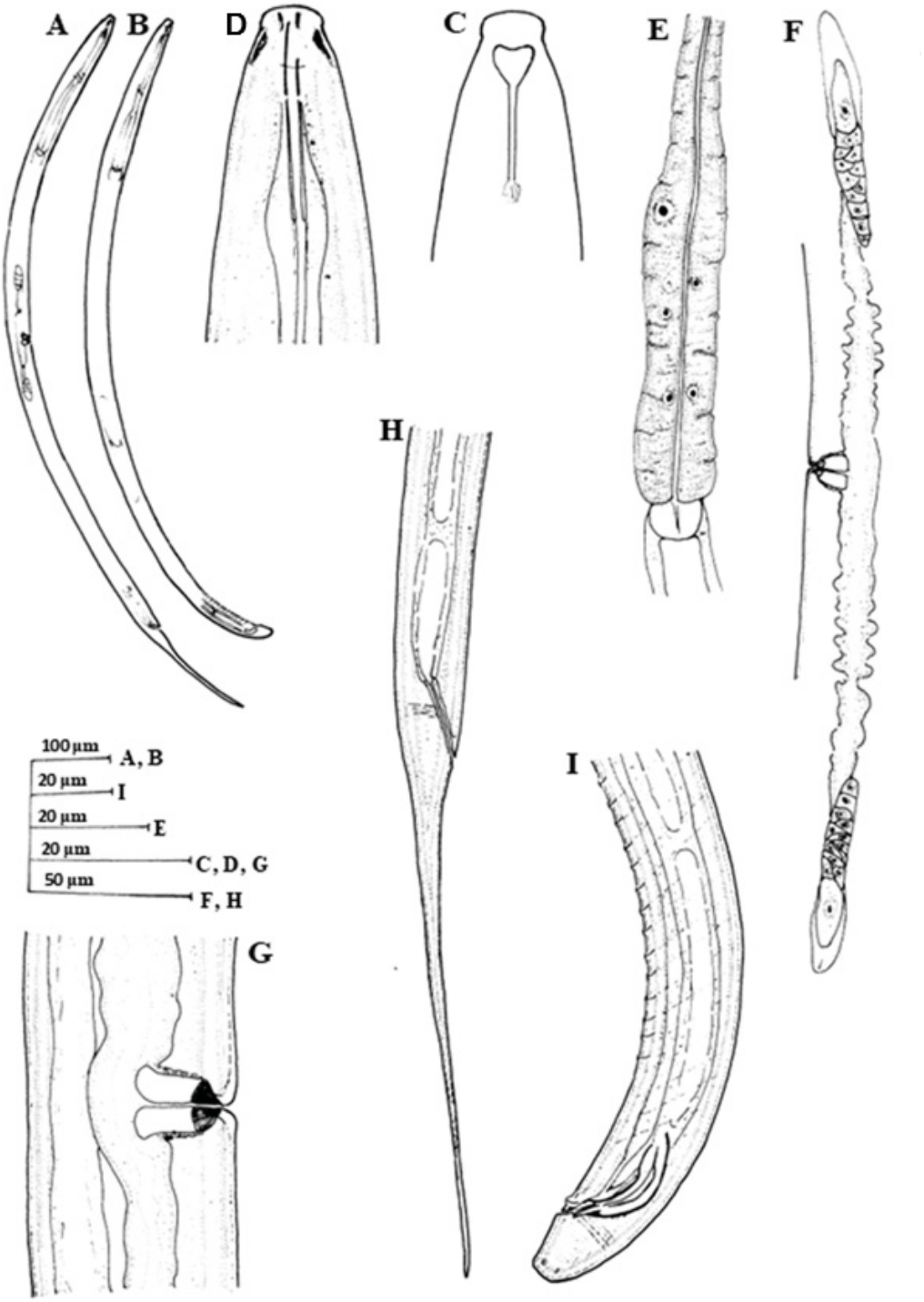

Fig. 23. *Prothornenema longicaudatum* sp. nov. **A, C–E**. Holotype, ♀ (AMU/ZD/NC/*Prothornenema longicaudatum*/1). **F–H**. Paratype 2, ♀ (AMU/ZD/NC/*Prothornenema longicaudatum*/2). **B, I**. Paratype 3, ♂ (AMU/ZD/NC/*Prothornenema longicaudatum*/3). **A**. Entire female. **B**. Entire male. **C**. Anterior region. **D**. Anterior region showing amphid. **E**. Pharyngeal expansion and pharyngeo-intestinal junction. **F**. Genital branch. **G**. Vulval region. **H–I**. Posterior region.

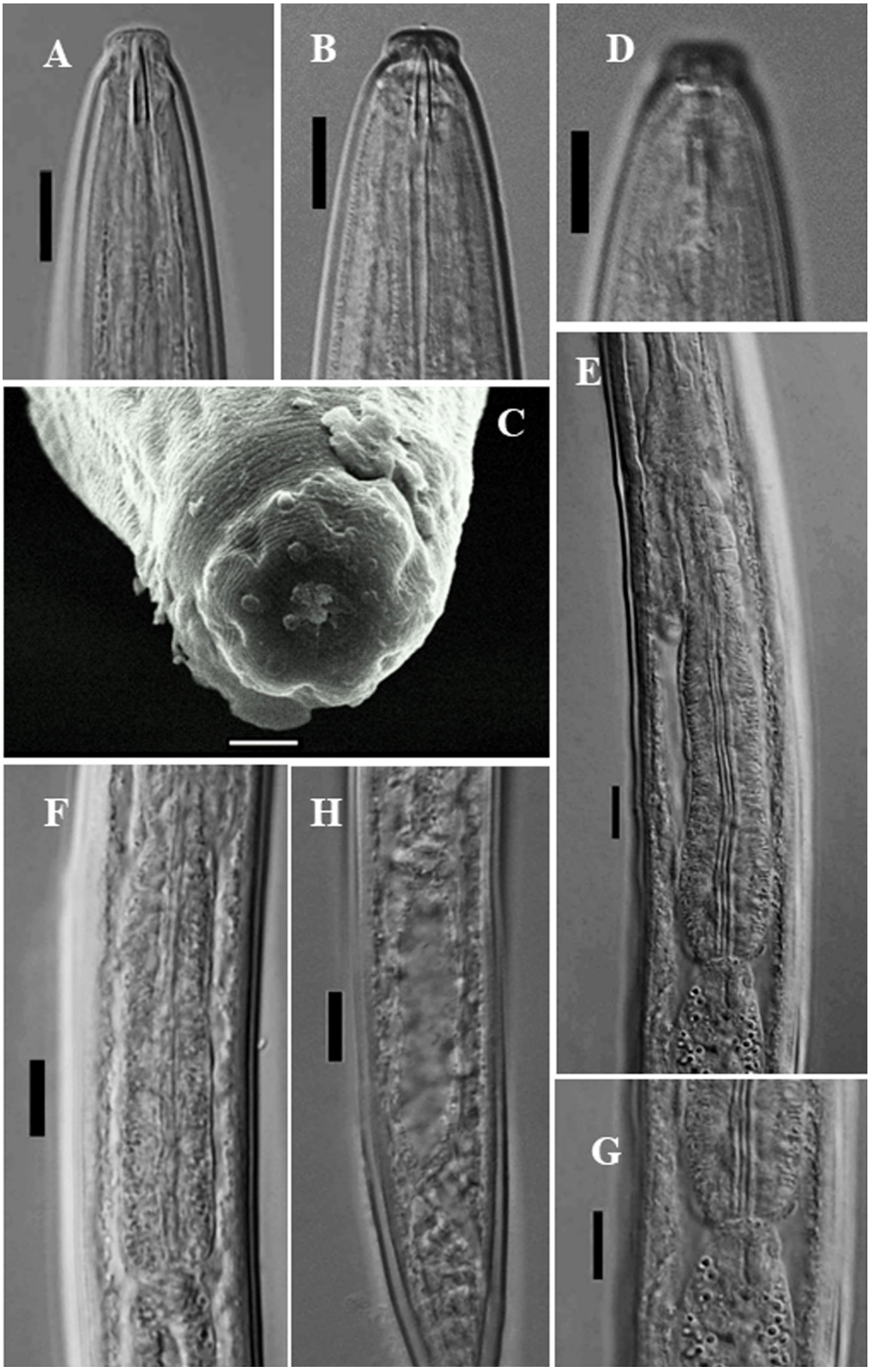

Fig. 24. *Prothornenema longicaudatum* sp. nov. **A–B, C–D**. Holotype ♀ (AMU/ZD/NC/*Prothornenema longicaudatum*/1). **E–H**. Paratype 2, ♀ (AMU/ZD/NC/*Prothornenema longicaudatum*/2). **A–B**. Anterior region. **C**. Lip region in face view (SEM). **D**. Anterior end showing amphid. **E–F**. Pharyngeal expansion. **G**. Pharyngeo-intestinal junction. **H**. Prerectum. Scale bars = 10 μm.

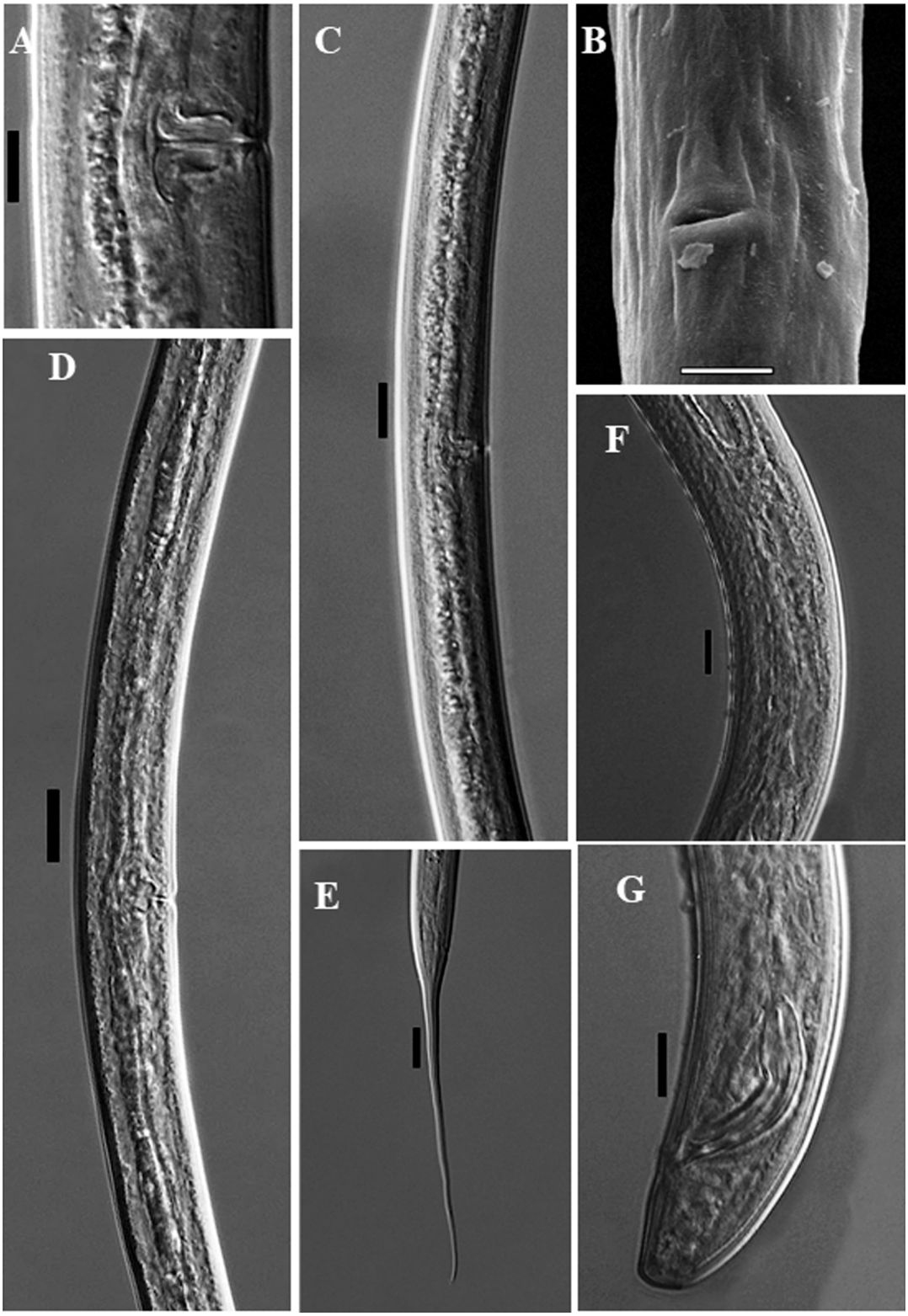

Fig. 25. *Prothornenema longicaudatum* sp. nov. **A–B, C–E**. Paratype 2, ♀ (AMU/ZD/NC/*Prothornenema longicaudatum*/2). **F–G**. Paratype 3, ♂ (AMU/ZD/NC/Prothornenema longicaudatum/3). **A**. Vulval region. **B**. Vulva in ventral view (SEM). **C–D**. Amphidelphic genital branch. **E**. Posterior region. **F**. Ventromedian supplements. **G**. Posterior region with spicules. Scale bars: A–B, F–G = 10 μm; C–E = 20 μm.

Table 11 (continued on next page). Morphometrics of *Prothornenema cuticulare* sp. nov. and *Prothornenema longicaudatum* sp. nov. (all measurements in µm except L in mm). Abbreviations: see Material and methods.

	***Prothornenema cuticulare* sp. nov.**		***Prothornenema longicaudatum* sp. nov.**		
Characters	**Holotype female**	**Paratypes male**	**Holotype female**	**Paratypes female**	**Paratypes male**
N	1	3	1	7	5
L	933	0.95 ± 0.03 (0.93–0.98)	1.22	1.13 ± 0.06 (1.05–1.21)	0.92 ± 0.04 (0.88–0.99)
a	30.1	32.6 ± 0.5 (31.9–33.1)	35.9	36.8 ± 0.7 (35.9–37.6)	32.7 ± 1.6 (30.3–35.2)
b	4.8	4.9 ± 0.1 (4.8–5.0)	5.9	5.7 ± 0.1 (5.5–5.8)	4.8 ± 0.2 (4.5–5.0)
c	11	48.9 ± 2.1 (46.3–51.6)	7.2	6.2 ± 0.5 (5.5–6.9)	56.2 ± 2.2 (52.3–58.6)
c’	4.6	0.9 ± 0 (0.9–1.0)	8.9	10.7 ± 1 (9.2–11.9)	0.9 ± 0 (0.8–0.9)
V	44.7	–	44.1	42.9 ± 1.8 (39.9–45.9)	–
G1	14.1	–	15	15.1 ± 0.6 (14.3–16.0)	–
G2	18.8	–	14.3	12.1 ± 0.6 (11.3–12.9)	–
body diameter at pharynx base	29	30 ± 0.8 (29–31)	32	29.4 ± 1.8 (26.0–31.5)	28.1 ± 1 (27.0–29.5)
body diameter at mid body	31	29 ± 0.8 (28–30)	34	31 ± 1.8 (28–33)	28.2 ± 0.7 (27–29)
body diameter at anus	18.5	20.7 ± 1.2 (19–22)	19	17.1 ± 1 (16–19)	18.9 ± 0.7 (18–20)
lip region diameter	9	8.3 ± 0.5 (8–9)	8	7.1 ± 0.3 (7–8)	7.4 ± 0.4 (7–8)
lip region height	3.5	3.5 ± 0 (3.5–3.5)	3.5	3.3 ± 0.2 (3.0–3.5)	3.5 ± 0 (3.5–3.5)
amphid aperture diameter	5.5	5.2 ± 0.2 (5.0–5.5)	5	4.3 ± 0.4 (4–5)	3.8 ± 0.2 (3.5–4.0)
odontostyle length	11	10.7 ± 0.5 (10–11)	11.5	10.6 ± 0.6 (10.0–11.5)	10.8 ± 0.6 (10.0–11.5)
odontophore length	15.5	15.8 ± 0.3 (15.5–16.0)	15	15.3 ± 0.8 (14.0–16.5)	15.8 ± 0.4 (15–16)
guiding ring from anterior end	9	8 ± 0 (8–8)	8	7.9 ± 0.2 (7.5–8.0)	8.2 ± 0.2 (8.0–8.5)
nerve ring from anterior end	86	85.3 ± 1.2 (84–87)	91	89.7 ± 4.9 (82–95)	85.6 ± 4.2 (80–91)
neck length	194	192 ± 6.2 (185–200)	208	199.6 ± 8.1 (186–210)	192.8 ± 5.3 (188–201)
expanded part of pharynx	79	73.7 ± 4.5 (70–80)	72	69.3 ± 3.6 (65–74)	66.2 ± 2.1 (64–70)
cardia length	17	14.3 ± 2.1 (12–17)	8	7 ± 0.6 (6–8)	6.5 ± 1.2 (5–8)
anterior genital branch	132	–	183	171.7 ± 11.2 (151–189)	–
posterior genital branch	175	–	174	135.1 ± 10.3 (125–155)	–
vaginal depth	16.5	–	17.5	16.5 ± 0.5 (16–17)	–
vulva from anterior end	417	–	538	488.6 ± 39.3 (443–552)	–

Table 11 (continued).

	Prothornenema cuticulare **sp. nov.**		*Prothornenema longicaudatum* **sp. nov.**		
Characters	**Holotype female**	**Paratypes male**	**Holotype female**	**Paratypes female**	**Paratypes male**
prerectum length	47	118 ± 12 (106–130)	58	52.1 ± 8.7 (39–64)	76 ± 2.2 (73–78)
rectum length	28	35.7 ± 0.9 (35–37)	31	28.1 ± 1.5 (26–30)	34.6 ± 0.8 (33–35)
tail length	85	19.3 ± 0.9 (18–20)	170	181.7 ± 11.7 (168–202)	16.4 ± 1 (15–18)
spicule length	–	31.5 ± 0.4 (31–32)	–	–	31 ± 0.6 (30–32)
lateral guiding pieces	–	9 ± 0 (9–9)	–	–	9.1 ± 0.8 (8–10)
ventromedian supplements	–	17 ± 0 (17–17)	–	–	13.8 ± 0.4 (13–14)

curved ventrad, 4.8–6.4 × as long as wide and 1.6–1.7 × as long as cloacal body diameter. Head well developed, occupying 10–11% of spicules total length, dorsal contour regularly convex, ventral contour bearing a moderately distinct hump at 29–34% from anterior end of spicule. Median piece 13–14 × as long as wide, occupying about ⅓–⅖ of spicules maximum width. Posterior end of spicule 3.5–4.5 µm wide. Lateral guiding pieces 4–5 × as long as wide. In addition to ad-cloacal pair, situated at 4.0 µm from cloacal aperture, series of 13–14 ventromedian supplements, almost 5–6 µm equally spaced, located outside range of spicules, posterior ventromedian supplement located at 39–42 µm from ad-cloacal pair. Prerectum 3.9–4.2 × as long as cloacal body diameter, starting within range of ventromedian supplements. Rectum 1.7–1.9 × as long as cloacal body diameter. Tail short conoid with broadly rounded terminus, two caudal pores present on each side of tail.

Type habitat and locality

Soil samples collected from around the roots of grasses (unidentified) near bus-stand of Borli, Raigad district, Maharashtra State, India.

Remarks

The new species differs from *P. capitatum* Baqri & Bohra, 2003 in having a comparatively slender body (a = 36–38 vs 28–32); a comparatively anterior vulva (V = 39.9–45.9 vs 46–47); a much longer tail (168–202 vs 70–120 µm; c = 5.5–7.2 vs 9.1–14.6; c' = 8.9–11.9 vs 3.7–6.3) and fewer ventromedian supplements (13–14 vs 15–17). From *P. vulvatum* Baniyamuddin & Ahmad, 2011, the new species primarily differs in the absence of a cuticular infolding near vulval opening. Furthermore, it differs in having a comparatively slender body (a = 36–38 vs 31–33); a longer expanded part of pharynx (33–36 vs 28–29%); a longer tail (168–202 vs 119–128 µm; c = 5.5–7.2 vs 8.5–9.5; c' = 8.9–11.9 vs 6.5–7.5) and smaller spicules (30–32 vs 38–40 µm).

Subfamily Amphidorylaiminae Andrássy, 1976
Genus *Amphidorylaimus* Andrássy, 1960

Amphidorylaimus flagellicauda Monteiro, 1970
Fig. 26, Table 12

Amphidorylaimus flagellicauda Monteiro, 1970: 106–108.

Amphidorylaimus flagellicauda – Ahmad & Jairajpuri 1982a: 43. — Baniyamuddin & Ahmad 2006: 505–506.

Material examined

INDIA • 8 ♀♀; Kerala State, Palakkad district, Mukkali forest area; 11°3′28.55″ N 76°32′19.17″ E; depth 10–15 cm; 25 Oct. 2017; soil samples collected from around roots of mixed shrubs (unidentified); AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Amphidorylaimus flagellicauda*/1–3 • 2 ♀♀; Kerala State, Thiruvananthapuram district, Palai village, Ponmudi hills; 8°44′56.4″ N, 77° 737.2″ E; depth 5–15 cm; 4 Nov. 2017; soil samples collected from around roots of grasses and tea plants; AMU/ZD/NC, slide reference number AMU/ZD/NC/*Amphidorylaimus flagellicauda*/4 • 4 ♀♀; Karnataka State, Chickmagalur district, Kalavara Resort, from hills near Chickmagalur Lakya Road; 13°21′26.3″ N, 75°51′ 05.9″ E; depth 5–15 cm; 26 Oct. 2018; soil samples collected from mixed grasses and shrubs (unidentified); AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Amphidorylaimus flagellicauda*/5–6 • 5 ♀♀; Karnataka State, Shivamogga district, Kalavara Resort, Kaspadi, forest; 14°12′ 33.75″ N, 75°05′66.03″ E; depth 5–15 cm; 27 Oct. 2018; soil samples collected from mixed grasses and small plants (unidentified); AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Amphidorylaimus flagellicauda*/7–8

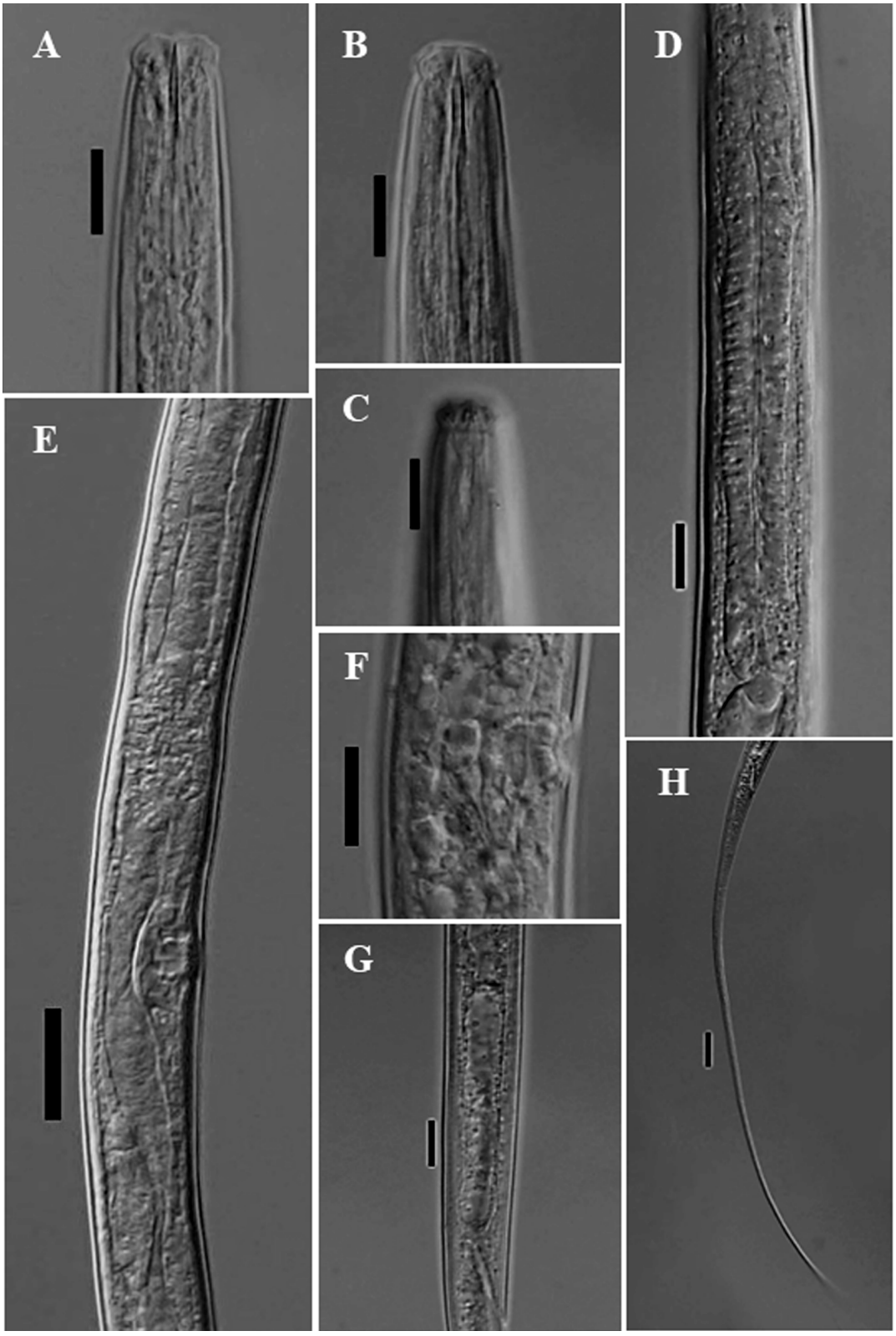

Fig. 26. *Amphidorylaimus flagellicauda* Monteiro, 1970. **A–B**. ♀, anterior region. **C**. ♀, anterior end showing amphid. **D**. ♀, pharyngeal expansion and pharyngeo-intestinal junction. **E**. ♀, amphidelphic genital system. **F**. ♀, vulval region. **G**. ♀, prerectum. **H**. ♀, posterior region. Scale bars: A–C = 10 µm; D, F–G = 20 µm; E–H = 50 µm.

Table 12 (continued on next page). Morphometrics of *Amphidorylaimus flagellicauda* Monteiro, 1970 (all measurements in µm except L in mm). Abbreviations: see Material and methods.

Localities	**Palakkad population**	**Thiruvananthapuram population**	**Chickmagalur population**	**Shivamogga population**	**Uttara Kannada population**	**Maharashtra population**
Characters	**Females**	**Females**	**Females**	**Females**	**Females**	**Females**
n	8	2	4	5	5	3
L	0.85 ± 0.06 (0.74–0.93)	0.96, 1.06	1.05 ± 0.06 (0.99–1.15)	0.98 ± 0.03 (0.94–1.01)	1.06 ± 0.05 (1.0–1.13)	0.89 ± 0.05 (0.84–0.96)
a	50.57 ± 3.7 (45.21–54.65)	46.8, 48.2	52.3 ± 2 (49.8–54.6)	47.1 ± 2.2 (43.5–49.2)	54.3 ± 3.5 (48.3–56.8)	48.89 ± 3.2 (44.37–51.73)
b	4.65 ± 0.3 (3.97–4.91)	5.0, 5.4	5.1 ± 0.3 (4.8–5.5)	4.9 ± 0.2 (4.6–5.1)	4.9 ± 0.4 (4.6–5.4)	4.66 ± 0.2 (4.43–5.0)
c	3.49 ± 0.2 (3.33–3.79)	3.5, 3.7	3.7 ± 0.1 (3.5–3.8)	3.3 ± 0.1 (3.1–3.4)	3.6 ± 0 (3.5–3.6)	4.13 ± 0.1 (3.96–4.30)
c’	24.81 ± 2.5 (22.43–29.33)	23.5, 25.3	23.6 ± 1.1 (22.5–25.0)	23.4 ± 0.6 (22.4–24.1)	23.2 ± 2.2 (21.1–26.7)	20.17 ± 1.7 (17.82–21.7)
V	37.77 ± 1.1 (35.86–39.65)	36.4, 37.3	36.6 ± 0.3 (36.4–37.2)	36.1 ± 1.3 (33.5–37.4)	36.8 ± 0.9 (35.9–38.2)	40.12 ± 0.1 (39.92–40.23)
G1	5.3 ± 0.6 (4.6–6.2)	6.9, 7.4	6.2 ± 0.3 (5.9–6.5)	6.2 ± 0.6 (5.1–6.8)	5.2 ± 0.4 (4.7–5.8)	7.3 ± 1.7 (5.5–9.0)
G2	6.2 ± 1.4 (4.2–8.7)	10.5	5.2 ± 0.2 (4.9–5.4)	5.3 ± 0.3 (5.1–5.9)	5.8 ± 1.4 (3.7–7.1)	5.5 ± 0.7 (4.7–6.2)
body diam. at phary. base	15.64 ± 1.2 (14–17)	19, 20	19.3 ± 0.8 (18–20)	19.2 ± 1.3 (17–21)	18.7 ± 1.5 (17.0–21.5)	17.67 ± 0.5 (17–18)
body diam. at mid body	16.86 ± 1.6 (15–19)	20.5, 22	20 ± 0.7 (19–21)	20.8 ± 1.2 (19–22)	19.3 ± 1.3 (18.0–21.5)	18.16 ± 0.8 (17–19)
body diam. at anus	9.86 ± 1.0 (9.0–11.5)	11, 12	11.9 ± 0.2 (11.5–12.0)	12.8 ± 0.8 (11.5–14.0)	12.7 ± 0.7 (12–14)	10.67 ± 0.5 (10–11)
lip region diam.	9.21 ± 0.4 (9–10)	9, 10	9 ± 0 (9–9)	10.1 ± 0.2 (10.0–10.5)	9.5 ± 0.3 (9–10)	10 ± 0.0 (10–10)
lip region height	4.1 ± 0.2 (4.0–4.5)	4, 4.5	4 ± 0 (4–4)	4 ± 0 (4–4)	4.1 ± 0.2 (4.0–4.5)	4.5 ± 0.0 (4.5–4.5)
amphid aperture diam.	4.3 ± 0.2 (4.0–4.5)	5.5, 5.5	4.9 ± 0.2 (4.5–5.0)	4.9 ± 0.2 (4.5–5.0)	4.8 ± 0.3 (4.5–5.0)	5.33 ± 0.2 (5.0–5.5)
odontostyle length	10.1 ± 0.6 (9.5–11.0)	10.5, 10.5	10.6 ± 0.4 (10–11)	11.3 ± 0.4 (10.5–11.5)	11.1 ± 0.6 (10.5–12.0)	10.83 ± 0.6 (10.0–11.5)
odontophore length	15.6 ± 0.6 (15.0–16.5)	17, 18	16 ± 0.4 (15.5–16.5)	15.5 ± 0.4 (15–16)	17.3 ± 0.8 (16–18)	15.2 ± 0.2 (15.0–15.5)
guiding ring from ant. end	5 ± 0.0 (5–5)	5.5, 6.0	6.5 ± 0.5 (6–7)	6.6 ± 0.7 (5.5–7.5)	6.8 ± 0.2 (6.5–7.0)	5.75 ± 0.3 (5.5–6.0)

Table 12 (continued).

Localities	**Palakkad population**	**Thiruvananthapuram population**	**Chickmagalur population**	**Shivamogga population**	**Uttara Kannada population**	**Maharashtra population**
Characters	**Females**	**Females**	**Females**	**Females**	**Females**	**Females**
nerve ring from ant. end	69 ± 5.4 (58–75)	69, 73	76.5 ± 3.6 (72–82)	73.6 ± 2.2 (70–76)	78.8 ± 1.2 (77–80)	70.67 ± 3.3 (67–75)
neck length	182.71 ± 9.2 (167–191)	192, 195	204.3 ± 7.1 (195–213)	200.8 ± 4.5 (195–208)	214.8 ± 7.2 (207–227)	191 ± 18.5 (172–216)
expanded part of pharynx	78.67 ± 3.0 (74–84)	83, 83	85.3 ± 6.4 (80–96)	114.3 ± 5.2 (107–118)	93.4 ± 6.3 (86–104)	84.67 ± 11.9 (73–101)
cardia length	5.4 ± 0.5 (5–6)	4.5, 5.0	6.1 ± 1.1 (5–8)	5.4 ± 0.4 (5–6)	5.4 ± 0.4 (5–6)	6.16 ± 0.6 (5.5–7.0)
anterior genital branch	45.75 ± 19 (39–53)	66, 78	62.7 ± 2.5 (60–66)	61 ± 5.9 (52–68)	55.5 ± 3.2 (50–58)	64.5 ± 11.5 (53–76)
posterior genital branch	52.86 ± 13.3 (38–81)	111	56 ± 1 (55–57)	52.5 ± 2.1 (50–55)	61.8 ± 12.9 (40–72)	49.5 ± 9.5 (40–59)
vaginal depth	8.28 ± 0.8 (7.5–10.0)	7, 7	7.3 ± 0.4 (7–8)	8.7 ± 0.4 (8–9)	8.7 ± 0.7 (8–10)	8.5 ± 0.4 (8–9)
vulva from ant. end	320.57 ± 25.1 (279–355)	358, 386	383 ± 20.9 (363–418)	352.6 ± 10.1 (339–363)	387.2 ± 11.2 (373–407)	355.67 ± 18.8 (339–382)
prerectum length	26.2 ± 7.2 (20–35)	31, 34	40.7 ± 9.5 (33–54)	42.4 ± 19.5 (26–75)	44.8 ± 14.7 (28–65)	49.33 ± 5.3 (43–56)
rectum length	20.67 ± 2.9 (15–24)	17.5, 21	20 ± 0.8 (19–21)	22 ± 1.4 (20–24)	21.2 ± 1.7 (19–24)	20 ± 0.0 (20–20)
tail length	243.71 ± 25.7 (205–277)	258, 304	280.8 ± 16.3 (260–300)	299 ± 18.7 (277–326)	297.8 ± 14.9 (278–320)	214.67 ± 14.4 (196–231)

• 5 ♀♀; Karnataka State, Uttara Kannada district, Sirsi, Kappe; 14°34′31.8144″ N, 74°54′49.3092″ E; depth 5–15 cm; 28 Oct. 2018; soil samples collected from mixed grasses of forest; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Amphidorylaimus flagellicauda*/9–10 • 3 ♀♀; Maharashtra State, Satara district, Sirsi, Kappe, dense forest near Kaas pond; 17°71′67.7″ N, 73°80′80.3″ E; depth 10–15 cm; 13 Apr. 2016; soil samples collected from around roots of *Ficus benjamina*; AMU/ZD/NC, slide reference numbers AMU/ZD/NC/*Amphidorylaimus flagellicauda*/11–12.

Remarks

Monteiro (1970) described *Amphidorylaimus flagellicauda* based on three females, from Brazil only. Ahmad & Jairajpuri (1982a) redescribed this species with the first report of its male from the population of Bangalore, India. The population of Bangalore differs from the original description by having a slightly longer body and a slightly posterior vulva position. Later, Baniyamuddin & Ahmad (2006) redescribed this species from Arunachal Pradesh, India. The present specimens from Palakkad conform well with original description, whereas the remaining specimens collected from Kerala, Karnataka and Maharashtra differ from the original description in having a slightly longer body (vs 0.79–0.82 mm) and a narrow lip region (vs 11 µm). The specimens from Shivamogga and Uttara Kannada agree well with all the previously described populations and remaining populations of the Western Ghats from the present study except for having a longer female tail. These minor differences may be attributed to intraspecific variations. This species is reported for the first time from the Western Ghats of India.

Discussion

The superfamily Dorylaimoidea with over 150 genera constitutes the bulk of Dorylaimida, representing over 53% of the dorylaim fauna (Andrássy 2009). These nematodes possess a highly diversified type of feeding apparatus, which indicates their varied feeding habits and occurrence in diverse habitats. They are either predatory or omnivorous, few being suspected plant parasites. The predatory forms have recently received attention after their role as potential bio-control agents was understood. Additionally, recent research has highlighted the crucial role played by dorylaim nematodes as bio-indicators, effectively reflecting the health and dynamics of soil ecosystems. Four families, Dorylaimidae, Qudsianematidae Jairajpuri, 1965, Nordiidae Jairajpuri & Siddiqui, 1964 and Aporcelaimidae Heyns, 1965 have usually been accepted under this superfamily (Hodda 2022; Jairajpuri & Ahmad 1992). However, several authors proposed many more families under Dorylaimoidea (cf. Andrássy 2009) or even considered Actinolaimoidea and Longidoroidea as families under Dorylaimoidea.

The present paper is in continuation with our recent work on nematode fauna from the Western Ghats in India in which Islam & Ahmad (2021a, 2021b, 2022a, 2022b, 2022c, 2023a, 2023b) and Kumar & Ahmad (2021, 2022, 2023a, 2023b, 2023c, 2024) described several new dorylaim taxa mainly belonging to the superfamilies Tylencholaimoidea and Belondiroidea. Fifty-five species representing the superfamily Dorylaimoidea were also identified from the same collection. This paper provides descriptions of members of the family Dorylaimidae of the superfamily Dorylaimoidea. Taxa representing other families of Dorylaimoidea will be described in later papers. Out of the total of 18 species identified, seven known and a new species represented the subfamily Laimydorinae Andrássy, 1969; a new and a known species represented the subfamily Prodorylaiminae Andrássy, 1969; four known and three new species represented the subfamily Thornenematinae Siddiqi, 1969 and a single known species represented the rare subfamily Amphidorylaiminae Andrássy, 1976. The genus *Mesodorylaimus* has a worldwide distribution with over 130 known species. Out of the five known species recorded in this collection, *M. potus* has earlier been recorded from the Western Ghat region (Goa) in India, in addition to South Africa and Romania. *Mesodorylaimus guarani*, a species recorded to date only from Central and South America (Costa Rica and Paraguay) is an interesting finding from the tropical forests of two distinct regions of the world. On the other hand, *M. chamoliensis* which was recorded to date only from

temperate forests (Japan; Jammu Kashmir, Arunachal Pradesh and Meghalaya in the Himalayas), and *M. longicaudatus* (Japan) are recorded here for the first time from tropical rainforests. It is interesting to note that several of the dorylaim species recorded during our study have earlier been reported from north-eastern states of India. *Laimydorus siddiqii* and *Calodorylaimus andrassyi* till date have been reported only from India. An interesting finding is the first report of the genus *Calcaridorylaimus* which has earlier been reported from Bulgaria, Republic of Congo, Costa Rica, Bolivia, South Africa, Australia, Chile and even Antarctica. Another interesting finding is the record of a pseudo-didelphic species of the genus *Thornenema*, a genus with a large number of species, although restricted mainly to tropical forests, till date has only one species with the pseudo-didelphic female genital system, *T. pseudosartum* (syn. *Sicaguttus sartum* Baqri & Jana, 1980). Pseudo-didelphi is very rare in Dorylaimoidea, and has often been also recorded in a few specimens of *Opisthodorylaimus cavalcantii*. *Thornenema paraconurum* is reported here for the first time from India. Earlier this species has been described only from South Africa. Two new species *Prothornenema cuticulare* sp. nov. and *Prothornenema longicaudatum* sp. nov. have also been described.

The Western Ghats in India is a well-known biodiversity hotspot, representing some of the best tropical evergreen forests with high mosaic topography. Although it covers only about 6% of the total Indian land area, it retains a very rich floral and faunal diversity. Nematodes belonging to the order Dorylaimida are represented by over 285 valid genera (Peña-Santiago 2022), with over 50% of the genera representing the superfamily Dorylaimoidea. However, in tropical rainforests generally, some of the genera representing the superfamilies Tylencholaimoidea and Belondiroidea dominate compared to the most common genera of the superfamily Dorylaimoidea. In our several years of study on the nematode fauna of the Western Ghats, we found that the two common genera of Tylencholaimoidea, the genera *Tylencholaimus* de Man, 1876, which has 62 valid species, 11 of them in the Western Ghats which constitutes 17% of the world fauna (Islam & Ahmad 2021a), and *Basirotyleptus* Jairajpuri, 1964, with 36 valid species, 13 of them in the Western Ghats, which represents 36% of the world fauna (Islam & Ahmad 2022). Similarly, the two most common genera of Belondiroidea, *Axonchium* Cobb, 1920 with 44 valid species, 15 of them represented in the Western Ghats, i.e., 34% of the world fauna (Kumar & Ahmad 2023a), and *Belondira* Thorne, 1939 represented by 48 valid species, 12 of them in the Western Ghats, i.e., 25% of the world fauna (Kumar & Ahmad 2023c). However, the family Dorylaimidae is comparatively less represented in the tropical rainforest, the most common genus being *Mesodorylaimus* Andrássy, 1959 with over 130 valid species represented by 31 species in India of which only five have been recorded from this rich habitat; similarly, the genera *Laimydorus*, *Prodorylaimus*, and *Thornenema* have minimal representation. Generally, in undisturbed soil, tylencholaimids and belondirids are more common than members of Dorylaimoidea.

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