European Journal of Taxonomy 791: 1–57
https://doi.org/10.5852/ejt.2022.791.1645

ISSN 2118-9773
www.europeanjournaloftaxonomy.eu
2022 · Islam M.N. & Ahmad W.

Monograph

urn:lsid:zoobank.org:pub:2AEDEBA5-69C9-4630-B4BE-C109B6B0D270

Description of five new and six known species of the genus *Basirotyleptus* Jairajpuri, 1964 (Nematoda: Dorylaimida: Tylencholaimoidea) from the Western Ghats, India

Md Niraul ISLAM [1,*] & Wasim AHMAD [2]

[1,2] Nematode Biodiversity Research Lab, Department of Zoology,
Aligarh Muslim University, Aligarh- 202002, India.

[*] Corresponding author: mnislam15@gmail.com
[2] Email: ahmadwasim57@gmail.com

[1] urn:lsid:zoobank.org:author:A202F47B-7E49-43AE-A2EF-988E7E891AA9
[2] urn:lsid:zoobank.org:author:4A070AF3-8976-49F8-BBC1-497F1B3FB354

Abstract. Five new and six known species belonging to the genus *Basirotyleptus* collected from the Western Ghats, India, are described and illustrated. *Basirotyleptus conicaudatus* sp. nov. is characterized by having 0.42–0.44 mm long body; odontostyle 9.5–10.0 µm, odontophore 11.5–12.0 µm; pharyngeal bulb pear-shaped, 14–15% of total neck length; female genital system mono-opisthodelphic; tail conoid with acute terminus. *Basirotyleptus constrictus* sp. nov. is characterized by having 0.38–0.49 mm long body; perioral disc distinct; odontostyle 9–10 µm, odontophore 14–15 µm; pharyngeal bulb pear-shaped, 15–17% of total neck length; female genital system mono-opisthodelphic; tail rounded to conoid. *Basirotyleptus goaensis* sp. nov. is characterized by having 0.73–0.87 mm long body; odontostyle 13.0–14.5 µm, odontophore 15.0–17.5 µm; pharyngeal bulb pyriform, 16–18% of total neck length; female genital system mono-opisthodelphic; tail rounded. *Basirotyleptus neocaudatus* sp. nov. is characterized by having 0.31–0.44 mm long body; odontostyle 7.5–9.5 µm, odontophore 10–13 µm; pharyngeal bulb pear-shaped, 14–19% of total neck length; female genital system mono-opisthodelphic; tail conoid with acute terminus. *Basirotyleptus siddiqii* sp. nov. is characterized by having 0.36 mm long body; odontostyle 7.5–8.0 µm, odontophore 10.0–10.5 µm; pharyngeal bulb pear-shaped, 15–16% of total neck length; female genital system mono-opisthodelphic; tail conoid. Six known species viz., *B. basiri*, *B. pini*, *B. nindei*, *B. ethiopicus*, *B. acus*, *B. minutus* are also described and illustrated. Along with light microscopic study, line drawings, compendium and key to species of *Basirotyleptus* are also provided.

Keywords. Nematode, Leptonchidae, species description, biodiversity hotspot.

Islam M.N. & Ahmad W. 2022. Description of five new and six known species of the genus *Basirotyleptus* Jairajpuri, 1964 (Nematoda: Dorylaimida: Tylencholaimoidea) from the Western Ghats, India. *European Journal of Taxonomy* 791: 1–57. https://doi.org/10.5852/ejt.2022.791.1645

Introduction

The genus *Basirotyleptus* is a soil-inhabiting nematode taxon proposed by Jairajpuri (1964) with *B. basiri* as its type species from Assam, India, under the family Leptonchidae Thorne, 1964. Simultaneously, Siddiqi & Khan (1964) proposed a genus *Trichonchium* with *Trichonchium archium* as its type species and *T. eximium* another species also from Assam, India. Thorne (1964) in his monographic work proposed two new genera *Belonenchus* with *B. penetrans* and *Poncenema* with *P. striata* as type species from Puerto Rico. Siddiqi & Khan (1965) synonymized *Trichonchium archium* Siddiqi & Khan, 1964 with *B. basiri* hence the genus *Trichonchium* became a junior synonym of *Basirotyleptus* due to priority of publications of the later. They (Siddiqi & Khan 1965) added two more species *B. pini* and *B. coronatus* from India and also provided a key for the identification of species. Sauer (1966, from Australia), Jairajpuri (1966, from India) and Hussain & Khan (1968, from India) added a species each to this genus. Siddiqi (1969) synonymized the genera *Belonenchus* Thorne, 1964 and *Poncenema* Thorne, 1964 with *Basirotyleptus* and Siddiqi (1970) added five new species and also revised the key for identification of species. Goseco *et al*. (1974) restudied the type material of all the known species, added two new species, *B. lieberi* and *B. acus* from Indiana, and also provide a key for the identification of species. Ahmad & Jairajpuri (1979) further added two new species *B. upicus* and *B. soueastus* from India and Malaysia respectively, whereas, Jana & Baqri (1981) added a new species *B. minimus* from India. Siddiqi (1982, 1983) proposed two new genera *Coronatyleptus* and *Aculonchus* from Colombia with several species and transferred *Basirotyleptus bunocephalus* Siddiqi, 1970 to the genus *Glochidorella* Siddiqi, 1982 based on the presence of basal knobs of the odontophore. Khan (1987) further added a species *B. minutus* from India. Jairajpuri & Ahmad (1992) in their monographic work synonymized *Coronatyleptus* and *Aculonchus* with *Basirotyleptus* and split the genus into five subgenera viz., *Coronatyleptus*, *Aculonchus*, *Trichonchium*, *Opisthotyleptus* and *Basirotyleptus*, on the basis of presence or absence of labial disc, flanges at the base of odontophore and female genital system to facilitate proper grouping and easy identification. Siddiqi (1995) added several new species from Tropical rain forests of Colombia and Cameroon and Siddiqi (1997) added a species from West Indies. Dhanam & Jairajpuri (1999) added a new species *B. indicus* from India. Peña-Santiago (2006) accepted *Aculonchus* Siddiqi, 1982 as a separate genus but did not accept the subgenera as proposed by Jaiarjpuri & Ahmad (1992). Andrássy (2009) in his book not only accepted *Aculonchus* as a valid genus but also considered *Trichonchium* as separate genus from *Basirotyleptus* with *T. eximium* (Siddiqi & Khan, 1964) as its type because of the presence of prodelphic female genital system. However, *Trichonchium* has not been considered here as a valid genus. Jairajpuri & Ahmad (1992) doubted the validity of the genus *Punctoleptus* Khan, 1987 and considered it a possibly synonym of *Basirotyleptus* which Andrássy (2009) finally synonymized it with the later. An action which is fairly acceptable here.

In the ongoing study on the nematode fauna of Western Ghats of India, several populations representing the genus *Basirotyleptus* were collected from different localities. On detailed study, they were found to represent five new and six known species, which are described in this paper.

Material and methods

During the course of present study, the soil samples were collected from different localities of the Western Ghats of India. The nematodes were extracted from soil samples following Cobb's (1918) sieving and decantation and modified Baermann's funnel techniques. The extracted nematodes were fixed in hot triethanolamine-glycerol fixative, dehydrated by the slow evaporation method (Seinhorst 1959), and mounted in anhydrous glycerine. Permanent mounts were prepared using the paraffin wax ring method (de Maeseneer & d'Herde 1963). The measurements were taken using an ocular micrometer, line drawings were made using a drawing tube, and photographs were taken with a Nikon DS digital Camera attached with Nikon Eclipse 80i microscope. Raw photographs were edited using Adobe® Photoshop®.

Type and others specimens are deposited in the nematode collection of the Department of Zoology, Aligarh Muslim University (AMU/ZD/NC), as well as in the nematode collection of the Zoological Survey of India, Kolkata, India.

List of abbreviations

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
G1 = length of anterior genital branch × 100 / body length
G2 = length of posterior genital branch × 100 / body length
L = total body length
n = number of specimens
V = distance of vulva from anterior end × 100 / body length

Results

Phylum Nematoda Cobb, 1932
Class Enoplea Inglis, 1983
Subclass Dorylaimia Inglis, 1983
Order Dorylaimida Pearse, 1942
Superfamily Tylencholaimoidea Filipjev, 1934
Family Leptonchidae Thorne, 1964
Genus *Basirotyleptus* Jairajpuri, 1964

Basirotyleptus basiri Jairajpuri, 1964
Fig. 1, Table 1

Basirotyleptus basiri Jairajpuri, 1964: 59–64.
Trichonchium archium Siddiqi & Khan, 1964: 141–143.

Basirotyleptus basiri – Siddiqi & Khan 1965: 23–31. — Furstenberg 1980: 154–155.

Material examined

INDIA – **Kerala State** • 7 ♀♀, 1 ♂; Kollam district, Ottakkal; 8º59′24.0″ N, 77º00′28.8″ E; 5–15 cm depth; 2 Nov. 2017; soil samples collected from around the roots of grasses and shrubs (unidentified); slides reference number AMU/ZD/NC/*Basirotyleptus basiri*/1–3 • 5 ♀♀; Ernakulum district, Kalady; 11°03′40.7″ N, 76°32.7′23.8″ E; 5–15 cm depth; 27 Oct. 2017; soil samples collected from around the roots of grasses (unidentified); slides reference number AMU/ZD/NC/*Basirotyleptus basiri*/4–6 • 8 ♀♀; Ernakulum district, Neriamangalam; 10°03′50.4″ N, 76°41′38.4″ E; 5–15 cm depth; 29 Oct. 2017; soil samples collected from around the roots of pineapple (*Ananas comosus* (L.) Merr.); slides reference number AMU/ZD/NC/*Basirotyleptus basiri*/7–9.

Description

Female

Small sized nematodes, slightly curved ventrad upon fixation; body cylindrical, tapering gradually towards both extremities but more so towards anterior end. Cuticle with two distinct layers, 1.0–1.5 µm thick at anterior region, 1.5–2.0 µm at midbody and 2.5–3.0 µm on tail. Outer cuticle thin, with transverse striations; inner layer thick, its outline loose, irregular, distinctly striated, with radial refractive elements. Lateral chords occupying about 28–35% of midbody diameter. Lateral body pores

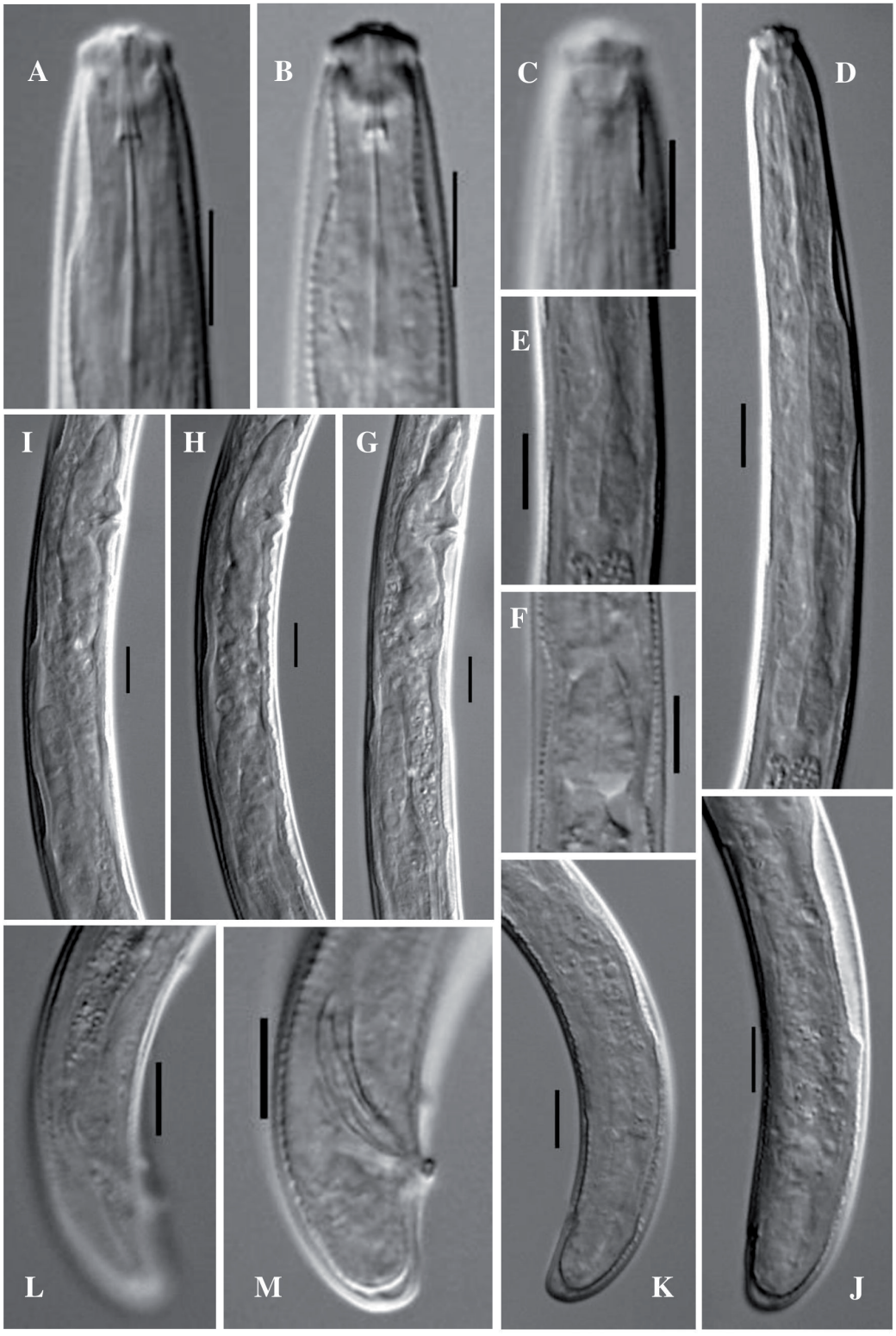

Fig. 1. *Basirotyleptus basiri* Jairajpuri, 1964 (AMU/ZD/NC/*Basirotyleptus basiri*/1–3) (LM photographs). **A–B**. Female, anterior region. **C**. Female, anterior region showing amphid. **D**. Female, pharyngeal region. **E–F**. Female, pharyngeal bulb. **G–I**. Female, genital system. **J–K**. Female, posterior region. **L–M**. Male, posterior end. Scale bars = 10 µm.

Table 1. Measurements of *Basirotyleptus basiri* Jairajpuri, 1964. All measurements are in µm and in the form: mean ± s.d. (range).

Localities	**Kollam population**		**Kalady population**	**Neriamangalum population**
Characters	**Females**	**Male**	**Females**	**Females**
n	7	1	5	8
L	501.0 ± 22.2 (462–537)	498	493.7 ± 32.5 (458–541)	508.8 ± 27.4 (474–549)
Body diameter at neck base	17.6 ± 0.90 (15.5–18.5)	17.0	18.0 ± 0.99 (16.5–19.5)	17.8 ± 0.94 (16.5–19.5)
Body diameter at mid body	19.6 ± 0.52 (18.5–20.5)	17.5	19.2 ± 1.1 (17.5–20.5)	19.1 ± 1.3 (17.5–21.5)
Body diameter at anus	14.1 ± 0.48 (13.5–14.5)	14.5	14.3 ± 1.3 (12.5–16.5)	13.7 ± 0.98 (11.5-14.5)
a	25.5 ± 1.0 (23.6–26.7)	28.2	25.8 ± 2.3 (22.3–29.3)	26.6 ± 1.3 (24.4–28.1)
b	4.6 ± 0.22 (4.2–4.9)	4.9	4.5 ± 0.31 (4.0–4.9)	4.6 ± 0.33 (4.3–4.8)
c	40.2 ± 1.9 (36.4–42.4)	33.9	42.7 ± 0.81 (41.7–44.0)	41.4 ± 3.6 (35.8–47.5)
c’	0.88 ± 0.04 (0.8–1.0)	1.0	0.88 ± 0.05 (0.84–1.0)	0.90 ± 0.08 (0.78–1.0)
V	37.3 ± 1.6 (35.5–40.1)	–	39.1 ± 2.3 (37.1–43.2)	39.8 ± 1.7 (37.7–42.9)
G1	4.4 ± 0.45 (3.8–5.3)	–	4.6 ± 0.79 (3.6–5.7)	5.0 ± 0.86 (3.5–6.1)
G2	19.6 ± 3.0 (16.9–27.1)	–	21.7 ± 5.0 (17.7–31.1)	18.9 ± 2.6 (15.4–25.0)
Lip region diameter	8.1 ± 0.24 (8.0–8.5)	8.5	8.2 ± 0.24 (8.0–8.5)	8.1 ± 0.25 (8.0–8.5)
Lip region height	3.6 ± 0.17 (3.5–4.0)	3.5	3.7 ± 0.2 (3.5–4.0)	3.6 ± 0.25 (3.5–4.0)
Amphidial aperture	4.3 ± 0.31 (4.0–5.0)	5.0	4.4 ± 0.43 (4.0–5.0)	4.7 ± 0.21 (4.5–5.0)
Odontostyle length	11.0 ± 0.44 (10.5–11.5)	10.5	11.5 ± 0.19 (11.0–12.0)	11.5 ± 0.40 (10.5–11.5)
Odontophore length	11.6 ± 0.22 (11.5–12.0)	12.5	12.3 ± 0.58 (11.5–13.0)	12.2 ± 0.42 (11.5–13.0)
Total stylet length	22.6 ± 0.56 (22.0–23.0)	23	23.7 ± 0.73 (22.5–24.5)	23.3 ± 0.63 (22.5–24.5)
Guiding ring from anterior end	9.4 ± 0.56 (8.5–9.5)	10	9.4 ± 0.48 (9.0–10)	9.5 ± 0.42 (9.0–10)
Nerve ring from anterior end	61.6 ± 2.4 (57–66)	58	59.1 ± 4.1 (54–64)	58.8 ± 2.6 (53–62)
Neck length	108.0 ± 2.8 (103–112)	99	108.7 ± 8.3 (100–123)	106.4 ± 3.4 (100–110)
Expanded part of pharynx	17.2 ± 0.48 (16.5–17.5)	17.5	18.4 ± 1.4 (16.5–20.5)	17.1 ± 0.69 (16.5–18.5)
Cardia length	4.7 ± 0.36 (4.0–5.0)	4.0	4.5 ± 0.48 (4.0–5.0)	4.3 ± 0.48 (4.0–5.0)
Anterior genital branch	22.6 ± 2.3 (19–26)	–	23.3 ± 3.4 (18.5–26.5)	26.0 ± 3.5 (19.5–30.0)
Posterior genital branch	99.9 ± 12.3 (85–125)	–	109.1 ± 23.8 (86–152)	97.8 ± 10.4 (84–118)
Vaginal length	10.3 ± 0.68 (9.5–10.5)	–	11.1 ± 0.48 (10.5–11.5)	11.2 ± 0.45 (10.5–11.5)
Vulva from anterior end	186.7 ± 8.9 (174–200)	–	192.8 ± 8.8 (182–205)	202.3 ± 8.6 (188–214)
Prerectum length	35.7 ± 5.0 (30–44)	31	41.7 ± 2.9 (36–44)	32.3 ± 2.1 (29–35)
Rectum length	16.6 ± 2.5 (13.5–20.0)	20	16.8 ± 2.9 (11.5–19.5)	16.0 ± 2.4 (13–19.5)
Tail length	12.4 ± 0.68 (11.5–13.5)	14.5	12.7 ± 2.0 (11–16)	12.3 ± 1.2 (11–15)
Spicules length	–	20	–	–
Lateral guiding pieces	–	5.5	–	–
Ventromedian supplements	–	1	–	–

distinct; 1–3 in neck region; 2–3 at neck to vulval region and 4–7 at post-vulval region. Dorsal and ventral body pores indistinct. Lip region cap-like, offset by slight constriction, 2.0–2.4 times as wide as high or about two-fifths to one-half of the body diameter at neck base. Lips rounded, amalgamated, inner part elevated. Labial and cephalic papillae distinct and slightly raised above the labial contour. Amphids stirrup-shaped, their aperture about one-half to three-fifths as wide as lip region diameter. Stoma a long, slender truncate cone, slightly sclerotized in the perioral region. Odontostyle slender, solid, needle-like, 1.2–1.5 times the lip region diameter long. Odontophore simple, sclerotized, about 1.0–1.1 times the odontostyle length. Guiding ring simple, refractive, at 1.0–1.3 times the lip region diameter from anterior end. Pharynx consisting of a slender anterior part, expanding gradually into a short, pear-shaped basal bulb, with a perceptible thickening at the posterior part of its inner lining, occupying about 15–17% of total neck length. Nerve ring at 51–60% of neck length from anterior end. Cardia short, rounded to conoid, about one-fifth of the corresponding body diameter long.

Genital system monodelphic-opisthodelphic. Ovary reflexed, measuring 41–98 µm; oocytes arranged in single row except near tip. Oviduct joining the ovary subterminally, measuring 45–81 µm, consisting of a slender distal portion and a well-developed pars dilatata. Oviduct-uterus junction marked by well-developed sphincter. Uterus short and tubular, measuring 21–36 µm. Anterior genital branch reduced to a simple sac, 1.0–1.4 times the midbody diameter long. Sperm cell absent. Vagina cylindrical, extending inwards, 9.5–11.5 µm or about one-half to three-fifths (50–61%) of midbody diameter; pars proximalis vaginae 5.5–7.5 × 4.5–6.0 µm, encircled by circular muscles; pars distalis vaginae long, 4.0–5.0 µm with slightly curved walls; pars refringens absent. Vulva apparently a transverse slit. Prerectum 2.0–3.2 and rectum 0.8–1.2 times anal body diameter long. Tail short, rounded to conoid, 0.8–1.0 times anal body diameter long, with a pair of caudal pores on each side.

Male

General morphology similar to that of female except for posterior region being more ventrally curved. Genital system diorchic, testes opposed, sperm cell spindle-shaped. In addition to adcloacal pair situated at 6 µm from cloacal aperture, there is single ventromedian supplement located at 25 µm from adcloacal pair, beyond the range of spicules. Spicules typically dorylaimoid, curved ventrad, slightly robust, 5.0 times as long as wide and 1.3 times as long as cloacal body diameter, dorsal contour regularly convex, ventral contour bearing a moderately developed hump and hollow, curvature 132º, head occupying 20% of total spicules length, median pieces 10.6 times as long as wide or occupying about 37% of the spicules maximum width, reaching the spicules tip, posterior end 2.5 µm wide. Lateral guiding pieces distinct, rod-like, about 5.0 times as long as wide or about one-fourth of the spicules length. Prerectum 3.0 and rectum 1.4 times cloacal body diameter long. Tail short rounded to conoid, about as long as the cloacal body diameter, with a pair of caudal pores on each side.

Remarks

Jairajpuri (1964) proposed the genus *Basirotyleptus* with *B. basiri* as its type species from Jorhat, Assam, India. Siddiqi & Khan (1964, 1965) recorded this species from Assam and Madhya Pradesh respectively. Furstenberg (1980) described this species from Malaysia, whereas, Shamim *et al*. (2014) from Pakistan. The morphometrics of present populations conform well with the type population except in having slightly lower c (35–47 vs 45–58) ratio and presence of male (vs absent). The present populations also conform well with Siddiqi & Khan (1964) population except in having slightly shorter body (0.45–0.54 vs 0.59–0.67 mm); lower b (4.0–4.9 vs 5.4–6.4) and c (36–47 vs 47–56) ratios and presence of male (vs absent). The present specimens also conform well with Madhya Pradesh population described by Siddiqi & Khan (1965) except in having short and robust body (0.45–0.54 vs 0.68–0.71 mm, a = 22–29 vs 29–31); slightly shorter odontostyle (10.5–12 vs 13–14 µm); lower b (4.0–4.9 vs 6.3–6.5) and c (36–47 vs 58–61) ratios and smaller spicules (20 vs 25–26 µm). The morphometrics of present populations agree well with the Malaysia population except in having slightly longer odontostyle (10.5–12.0 vs

9.3–10.5 µm); longer rectum (11.5–20.0 vs 10–11 µm) and presence of male (vs absent). The present populations conform well with the Pakistan population except in having shorter body (0.45–0.54 vs 0.63–0.78 mm); lower b (4.0–4.9 vs 5.0–6.8), lower c (35–47 vs 56–69) ratios and slighter higher c' (0.7–1.0 vs 0.5–0.7) ratio. These differences are considered here as intraspecific variability. This species is recorded here for the first time from the Western Ghats.

Basirotyleptus pini Siddiqi & Khan, 1965
Fig. 2, Table 2

Basirotyleptus pini Siddiqi & Khan, 1965: 641–645.

Basirotyleptus pini – Baqri 1991: 75–77. — Li *et al*. 2008: 2008–2009.

Material examined

INDIA – **Kerala State** • 9 ♀♀; Kollam district, Pathanampuram; 9º05′34.8″ N, 76º51′39.6″ E; 5–15 cm depth; 3 Nov. 2017; soil samples collected from around the roots of grasses (unidentified); slides reference number AMU/ZD/NC/*Basirotyleptus pini*/1–3 • 9 ♀♀; Pathanamthitta district, Thannithode; 9°15′21.6″ N, 76°55′19.2″ E; 5–15 cm depth; 1 Nov. 2017; soil samples collected from around the roots of shrubs (unidentified); slides reference number AMU/ZD/NC/*Basirotyleptus pini*/4–6.

Description

Female

Small sized nematodes, slightly curved ventrad or open C-shaped upon fixation; tapering gradually towards both extremities but more so towards anterior end. Cuticle with two distinct layers, 1.0–1.5 µm thick at anterior region, 2.0–2.5 µm at midbody and 2.5–3.5 µm on tail. Outer cuticle thin, smooth or with very fine transverse striations; inner layer thick, its outline irregular, loose, finely striated, with radial refractive elements. Lateral chords occupying about 30–35% of midbody diameter. Lateral body pores distinct; 1–2 in neck region; 2–3 at neck to vulval region and 5–9 at post-vulval region. Dorsal and ventral body pores indistinct. Lip region cap-like, offset by deep constriction, 2.1–2.5 times as wide as high or about two-fifths to one-half of the body diameter at neck base. Lips rounded, amalgamated, angular, projected, inner part elevated. Labial and cephalic papillae distinct and slightly raised above the labial contour. Amphids stirrup-shaped, their aperture about one-half to three-fifths as wide as lip region diameter. Stoma a long, slender truncate cone, slightly sclerotized in the perioral region. Odontostyle slender, solid, needle-like, 1.3–1.5 times the lip region diameter long. Odontophore simple, sclerotized, slightly swollen at base surrounded by pharyngeal tissue, 1.0–1.1 times the odontostyle length. Guiding ring simple, refractive, at 1.2–1.3 times the lip region diameter from anterior end. Pharynx consisting of a slender anterior part, expanding gradually into a short, pear-shaped basal bulb, with a perceptible thickening at the posterior part of its inner lining, occupying about 14–17% of total neck length. Nerve ring at 50–59% of neck length from anterior end. Cardia short, rounded to conoid, about one-fifth to one-third of the corresponding body diameter long.

Genital system monodelphic-opisthodelphic. Ovary reflexed, measuring 56–98 µm; oocytes arranged in single row except near tip. Oviduct joining the ovary subterminally, measuring 45–95 µm, consisting of a slender distal portion and a well-developed pars dilatata. Oviduct-uterus junction marked by weak sphincter. Uterus short and tubular, measuring 19–31 µm. Anterior genital branch reduced to small sac, 0.40–0.81 times midbody diameter long. Sperm cell absent. Vagina cylindrical, extending inwards, 10.5–12.5 µm or about one-half to three-fifths (50–62%) of midbody diameter; pars proximalis vaginae 6.0–7.5 × 4.0–6.5 µm, encircled by circular muscles; pars distalis vaginae 4.0–5.0 µm with slightly curved walls; pars refringens absent. Vulva apparently a transverse slit. Prerectum 2.0–3.5 and rectum

Fig. 2. *Basirotyleptus pini* Siddiqi & Khan, 1964, ♀ (AMU/ZD/NC/*Basirotyleptus pini*/1–3) (LM photographs). **A–B**. Anterior region. **C**. Anterior region showing amphid. **D**. Pharyngeal region. **E–F**. Pharyngeal bulb. **G**. Genital system. **H**. Vulval region. **I**. Posterior region. **J**. Posterior end. Scale bars =10 µm.

Table 2. Measurements of *Basirotyleptus pini* Siddiqi & Khan, 1964. All measurements are in µm and in the form: mean ± s.d. (range).

Localities	**Kollam population**	**Pathanamthitta population**
Characters	**Females**	**Females**
n	9	9
L	522.9 ± 23.0 (465–575)	522.5 ± 28.9 (453–556)
Body diameter at neck base	19.6 ± 0.65 (18.5–20.5)	19.3 ± 0.61 (18.5–20.5)
Body diameter at mid body	20.9 ± 0.65 (19.5–21.5)	21.2 ± 0.80 (19.5–22.5)
Body diameter at anus	15.5 ± 0.55 (14.5–16.5)	15.5 ± 0.85 (13.5–16.5)
a	25.0 ± 1.3 (22.6–26.7)	24.6 ± 0.85 (23.1–25.8)
b	4.5 ± 0.24 (4.1–4.9)	4.4 ± 0.20 (4.0–4.8)
c	37.2 ± 1.7 (33.9–39.1)	37.9 ± 3.1 (33.3–43.0)
c’	0.90 ± 0.05 (0.81–1.0)	0.88 ± 0.06 (0.76–1.0)
V	38.7 ± 1.0 (37.5–40.6)	37.2 ± 1.5 (35.5–40.2)
G1	2.9 ± 0.81 (2.2–5.0)	2.3 ±0.43 (1.5–3.0)
G2	19.9 ± 2.4 (17.0–24.8)	21.6 ± 3.4 (16.4–27.4)
Lip region diameter	8.6 ± 0.24 (8.5–9.0)	8.7 ± 0.15 (8.5–9.0)
Lip region height	3.8 ± 0.20 (3.5–4.0)	3.8 ± 0.20 (3.5–4.0)
Amphidial aperture	4.8 ± 0.15 (4.5–5.0)	4.7 ± 0.20 (4.5–5.0)
Odontostyle length	12.3 ± 0.27 (11.5–12.5)	11.5 ± 0.30 (11–12)
Odontophore length	13.2 ± 0.46 (12.5–14.0)	13.8 ± 0.46 (12.5–14.0)
Total stylet length	25.5 ± 0.63 (25–26)	25.4 ± 0.70 (24.5–26.0)
Guiding ring from anterior end	10.8 ± 0.20 (10.5–11.0)	10.9 ± 0.23 (10–11)
Nerve ring from anterior end	63.8 ± 2.5 (58–66)	63.2 ± 2.8 (58–66)
Neck length	115.7 ± 4.2 (105–121)	117.0 ± 3.9 (110–124)
Expanded part of pharynx	19.1 ± 0.93 (17.5–20.5)	18.6 ± 1.0 (17–20)
Cardia length	5.3 ± 0.58 (4.5–5.5)	4.7 ± 0.56 (4.0–6.0)
Anterior genital branch	14.5 ± 2.0 (11–18)	12.5 ± 2.5 (8.0–17)
Posterior genital branch	106.1 ± 10.8 (89–119)	114.6 ± 14.4 (91–142)
Vaginal length	11.3 ± 0.67 (10.5–12.5)	11.5 ± 0.65 (10.5–12.5)
Vulva from anterior end	202.6 ± 9.5 (185–217)	194.8 ± 12.59 (172–222)
Prerectum length	40.6 ± 5.9 (29–47)	42.4 ± 5.2 (37–49)
Rectum length	18.9 ± 0.80 (17.5–19.5)	19.7 ± 0.97 (18.5–21.5)
Tail length	14.0 ± 0.80 (12.5–16.0)	13.8 ± 1.1 (12–15)

1.1–1.3 times anal body diameter long. Tail short, rounded to conoid, 0.7–1.0 times anal body diameter long, with a pair of caudal pores on each side.

Male

Not found.

Remarks

Siddiqi & Khan (1965) described this species from Kashmir, India. Baqri (1991) reported it from South Sikkim, India, whereas, Li *et al*. (2008) recorded it from the China. The morphometrics of present populations conform well with the type population except in having slightly lower c ratio (33–43 vs 43–55). The present populations conform well with the Sikkim population except for longer total stylet (24.5–26.0 vs 18–23) and odontostyle (11.0–12.5 vs 8.0–9.0 µm); lower c (33–43 vs 50–60) and higher c' (0.76–1.0 vs 0.6–0.7) ratios, and longer tail (12–16 vs 8.0–9.0 µm). The present specimens also conform well with the Chinese specimens except in having anterior vulva position (V = 35.5–40.6 vs 42.0–43.5); slightly longer tail (12–16 vs 10–13 µm) and lower c ratio (33–43 vs 55–61). Goseco *et al*. (1974) in their revision of the genus *Basirotyleptus* restudied the type material of *B*. *pini* and they observed amphids are duplex, stirrup-shaped, but Siddiqi & Khan (1965) in their description mentioned that amphids are simple, stirrup-shaped. Whereas Baqri (1991) mentioned amphids as simple cup-shaped. The shape of amphids is apparently difficult to observe and in present specimens the amphids appeared as simple, stirrup-shaped. This species is recorded here for the first time from the Western Ghats.

In the presence of simple odontophore and anterior uterine sac, this species also comes close to *Basirotyleptus basiri* Jairajpuri, 1964 but differs in having outer and inner cuticle finely striated (vs distinctly striated), lip region offset by deep constriction (vs slight constriction) and shorter anterior uterine branch (two-fifths to two-thirds vs always more than midbody diameter long).

Basirotyleptus nindei Siddiqi, 1970
Fig. 3, Table 3

Basirotyleptus nindei Siddiqi, 1970: 203–205.

Material examined

INDIA – **Kerala State** • 11 ♀♀; Pathanamthitta district, Thannithodu forest; 9º15′21.6″ N, 76º55′19.2″ E; 5–15 cm depth; 1 Nov. 2017; soil samples collected from around the roots of shrubs (unidentified); slides reference number AMU/ZD/NC/*Basirotyleptus nindei*/1–4 • 7 ♀♀; Ernakulum district, Manikandanchal; 10º09′28.8″ N, 76º47′56.4″ E; 5–15 cm depth; 28 Oct. 2017; soil samples collected from around the roots of shrubs (unidentified); slides reference number AMU/ZD/NC/*Basirotyleptus nindei*/5–7.

Description

Female

Small sized nematodes, slightly curved ventrad or open C-shaped upon fixation; body cylindrical tapering gradually towards both extremities but more so towards the anterior end. Cuticle with two distinct layers, 1.0–1.5 µm thick at anterior region, 1.5–2.0 µm at midbody and 2.5–3.0 µm on tail. Outer cuticle thin, with fine transverse striations; inner layer thick, finely striated, loose, its outline irregular, with distinct radial refractive elements. Lateral chords occupying about 29–35% of midbody diameter. Lateral body pores distinct; 1–2 in neck region; 1–2 from pharyngeal base to vulva; 2–4 in post-vulval region. Dorsal and ventral body pores indistinct. Lip region cap-like, offset by constriction, 1.8–2.1 times as wide as high or about one-third to two-fifths of the body diameter at neck base. Lips angular, separate, inner part elevated. Labial and cephalic papillae distinct but not interfering with labial contour. Amphids stirrup-shaped, their aperture about two-fifths to one-half as wide as lip region diameter. Stoma a long, slender

Fig. 3. *Basirotyleptus nindei* Siddiqi, 1970, ♀ (AMU/ZD/NC/*Basirotyleptus nindei*/1–4) (LM photographs). **A–C**. Anterior region. **D**. Anterior region showing amphid. **E**. Pharyngeal region. **F–G**. Pharyngeal bulb. **H**. Genital system. **I–J**. Vulval region. **K–L**. Posterior region. Scale bars = 10 µm.

Table 3. Measurements of *Basirotyleptus nindei* Siddiqi, 1970. All measurements are in μm and in the form: mean ± s.d. (range).

Localities	**Pathanamthitta population**	**Ernakulum population**
Characters	**Females**	**Females**
n	11	7
L	415.4 ± 13.9 (393–438)	432.8 ± 19.8 (391–448)
Body diameter at neck base	16.1 ± 0.48 (15.5–16.5)	16.6 ± 0.90 (14.5–17.5)
Body diameter at mid body	19.1 ± 1.6 (16.5–21.5)	17.9 ± 1.1 (16.5–19.5)
Body diameter at anus	11.4 ± 0.43 (10.5–11.5)	11.4 ± 0.68 (10.5–12.5)
a	21.8 ± 1.6 (19.1–24.3)	24.0 ± 0.65 (22.9–25.0)
b	3.9 ± 0.16 (3.6–4.1)	3.9 ± 03.0 (3.5–4.5)
c	34.1 ± 1.9 (30.3–36.8)	35.3 ± 2.6 (30.5–38.1)
c’	1.02 ± 0.07 (1.0–1.2)	1.03 ± 0.06 (1.0–1.1)
V	42.4 ± 1.6 (39.6–45.1)	42.5 ± 1.2 (40.9–44.3)
G1	1.3 ± 0.17 (1.1–1.6)	1.2 ± 0.12 (1.0–1.4)
G2	22.1 ± 2.2 (17.6–25.7)	23.0 ± 2.6 (19.4–26.9)
Lip region diameter	6.2 ± 0.30 (6.0–7.0)	6.7 ± 0.17 (6.5–7.0)
Lip region height	3.2 ± 0.22 (3.0–3.5)	3.2 ± 0.22 (3.0–3.5)
Amphidial aperture	3.1 ± 0.24 (3.0–3.5)	3.2 ± 0.22 (3.0–3.5)
Odontostyle length	9.5 ± 0.38 (9.0–10)	9.8 ± 0.31 (9.5–10.5)
Odontophore length	10.7 ± 0.29 (10.5–11.5)	11.03 ± 0.35 (11–12)
Total stylet length	20.3 ± 0.56 (19–21)	20.9 ± 0.50 (20.0–21.5)
Guiding ring from anterior end	8.5 ± 0.24 (8.5–9.0)	8.6 ± 0.22 (8.5–9.0)
Nerve ring from anterior end	61.7 ± 2.3 (58–66)	61.0 ± 2.4 (55–63)
Neck length	106.6 ± 4.2 (97–113)	109.3 ± 4.4 (98–112)
Expanded part of pharynx	16.9 ± 0.78 (15.5–18.0)	18.0 ± 1.1 (15.5–19.5)
Cardia length	4.2 ± 0.39 (4.0–5.0)	4.4 ± 0.37 (4.0–5.0)
Anterior genital branch	5.6 ± 0.69 (5.0–6.0)	5.3 ± 0.40 (4.5–6.0)
Posterior genital branch	94.0 ± 10.2 (74–112)	102.2 ± 14.3 (78–120)
Vaginal length	9.3 ± 0.44 (8.5–9.5)	9.5 ± 0.35 (8.5–9.5)
Vulva from anterior end	176.3 ± 10.8 (160–197)	184.2 ± 7.2 (173–195)
Prerectum length	29.5 ± 2.7 (25–36)	30.5 ± 4.7 (24.0–37.0)
Rectum length	14.3 ± 0.86 (12.5–15.5)	14.1 ± 1.2 (11.5–15.5)
Tail length	12.2 ± 0.76 (11.0–13.5)	12.3 ± 1.0 (11.0–13.5)

truncate cone, slightly sclerotized in the perioral region. Odontostyle slender, solid, needle-like, 1.4–1.5 times the lip region diameter long. Odontophore sclerotized, with prominent basal flanges, about 1.0–1.2 times the odontostyle length. Guiding ring simple, refractive, at 1.2–1.7 times the lip region diameter from anterior end. Pharynx consisting of a slender anterior part, expanding abruptly into a short pear-shaped basal bulb, with a perceptible thickening at the posterior part of its inner lining, occupying about 14–18% of total neck length. Nerve ring located at 53–60% of neck length from anterior end. Cardia rounded to conoid, about one-fourth to one-third of the corresponding body diameter long.

Genital system monodelphic-opisthodelphic. Ovary reflexed, measuring 37–84 µm; oocytes arranged in single row except near tip. Oviduct joining the ovary subterminally, measuring 39–81 µm, consisting of a slender distal portion and a well-developed pars dilatata. Oviduct-uterus junction marked by weak sphincter. Uterus short and muscular, measuring 16–25 µm. Anterior genital branch absent or rarely present (n = 7), reduced to a very small sac, about one-fifth to one-fourth midbody diameter long. Sperm cell absent. Vagina cylindrical, extending inwards, 8.5–9.5 µm or about two-fifths to one-half (43–52%) of midbody diameter; pars proximalis vaginae 5.0–7.0 × 4.0–5.0 µm, encircled by circular muscles; pars distalis vaginae 3.0–4.0 µm with slightly curved walls; pars refringens absent. Vulva apparently a transverse slit. Prerectum 2.0–3.1 and rectum 1.0–1.4 times anal body diameter long. Tail short, rounded to conoid, with a pair of caudal pores on each side.

Male

Not found.

Remarks

Siddiqi (1970) described this species from the Malawi. During the present study eighteen females were collected from two different localities of the Western Ghats, India. The morphometrics of present populations conform well with the type population except in having differently shaped amphids (stirrup-shaped vs cup-shaped), slightly shorter odontostyle (9.0–10.5 vs 11.0 µm), slightly longer odontophore (10.5–12 vs 10 µm); nerve ring located more posteriorly (53–60 vs 50% of total neck length); sometimes presence of small anterior uterine sac about one-fourth to one-third midbody diameter long (vs anterior sac completely absent) and slightly shorter prerectum (2.0–3.1 vs 3.0–4.0 times anal body diameter). These slight differences are considered as intraspecific variability. This species is reported here for the first time from the India.

Basirotyleptus ethiopicus Siddiqi, 1970

Fig. 4, Table 4

Basirotyleptus ethiopicus Siddiqi, 1970: 205–206

Basirotyleptus ethiopicus – Goseco *et al*. 1974: 11, 20.

Material examined

INDIA – **Kerala State** • 7 ♀♀; Palakkad district, Silent Valley National Park; 11º03′49.6″ N, 76º32′17.4″ E; 5–15 cm depth; 26 Oct. 2017; soil samples collected from around the roots of forest trees (unidentified); slides reference number AMU/ZD/NC/*Basirotyleptus ethiopicus*/1–5.

Description

Female

Small sized nematodes, slightly curved ventrad upon fixation; tapering gradually towards both extremities but more so towards anterior end. Cuticle with two distinct layers, 1.0–1.5 µm thick at anterior region, 2.0–2.5 µm at midbody and 2.5–3.0 µm on tail. Outer cuticle thin with transverse striation, inner layer

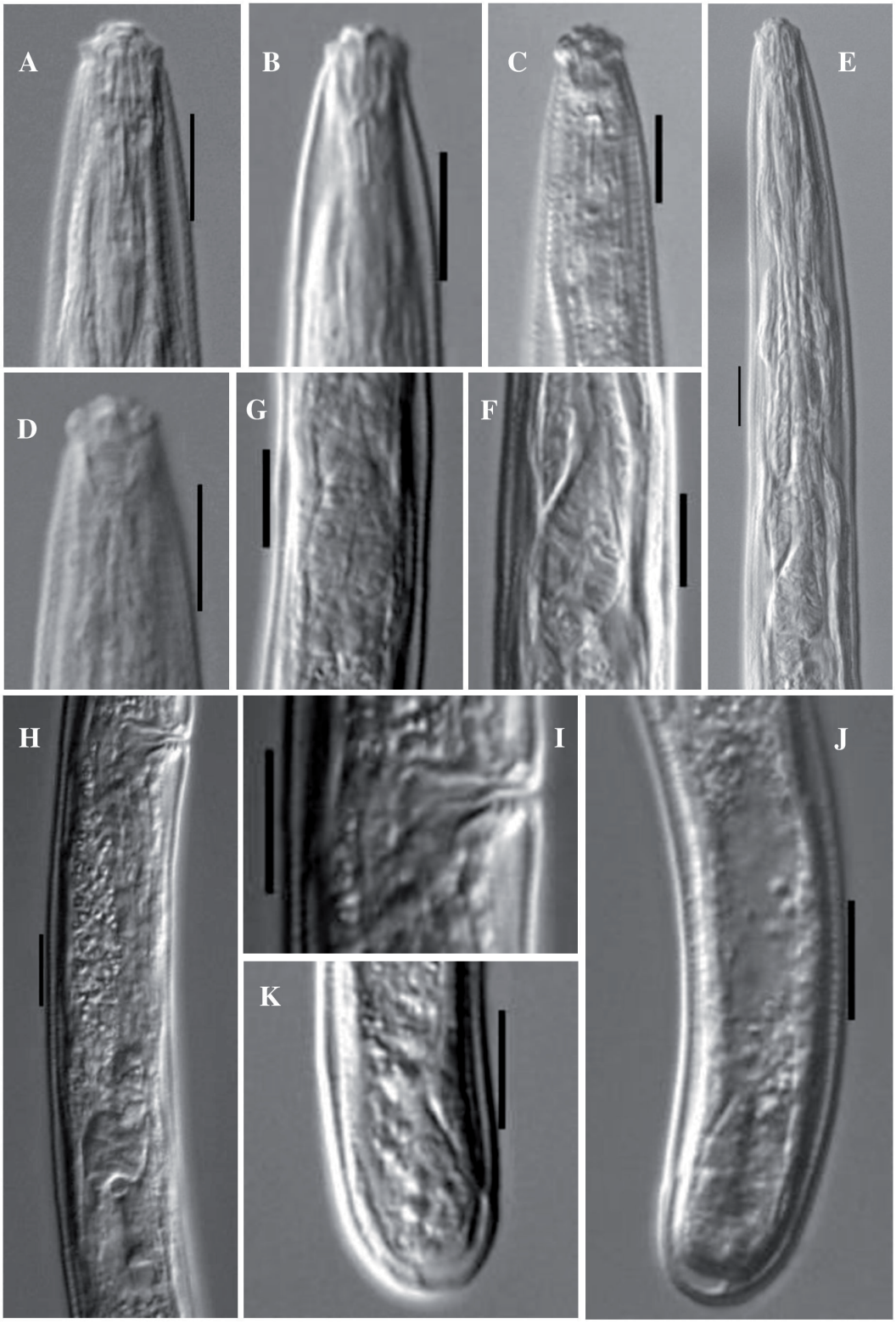

Fig. 4. *Basirotyleptus ethiopicus* Siddiqi, 1970, ♀ (AMU/ZD/NC/*Basirotyleptus ethiopicus*/1–5) (LM photographs). **A–C**. Anterior region. **D**. Anterior region showing amphid. **E**. Pharyngeal region. **F–G**. Pharyngeal bulb. **H**. Genital system. **I**. Vulval region. **J**. Posterior region. **K**. Posterior end. Scale bars =10 µm.

Table 4. Measurements of *Basirotyleptus ethiopicus* Siddiqi, 1970. All measurements are in μm and in the form: mean ± s.d. (range).

Characters	Females
n	7
L	439.8 ± 51.9 (388–500)
Body diameter at neck base	17.7 ± 1.2 (16.5–20.5)
Body diameter at mid body	19.6 ± 1.2 (18.5–22.5)
Body diameter at anus	13.3 ± 1.0 (12.5–15.5)
a	21.9 ± 1.2 (20.8–24.8)
b	4.3 ± 0.46 (3.8–5.3)
c	45.2 ± 3.3 (42.2–52.0)
c’	0.71 ± 0.03 (0.70–0.80)
V	40.1 ± 2.3 (36.9–43.6)
G2	20.2 ± 3.2 (16.0–24.7)
Lip region diameter	6.4 ± 0.49 (6.0–7.5)
Lip region height	3.1 ± 0.24 (3.0–3.5)
Amphidial aperture	3.1 ± 0.22 (3.0–3.5)
Odontostyle length	10.1 ± 0.85 (8.5–10.5)
Odontophore length	11.3 ± 0.55 (10.5–12.0)
Total stylet length	21.4 ± 1.2 (19.5–23.0)
Guiding ring from anterior end	7.7 ± 0.88 (7.0–10)
Nerve ring from anterior end	58.9 ± 2.1 (54–61)
Neck length	100.2 ± 4.3 (94–105)
Expanded part of pharynx	15.2 ± 0.88 (14–17)
Cardia length	4.6 ± 0.68 (4.0–6.0)
Posterior genital branch	90.8 ± 16.5 (68–113)
Vagina length	9.6 ± 0.81 (8.5–10.5)
Vulva from anterior end	179.0 ± 12.9 (167–206)
Prerectum length	32.0 ± 2.9 (27–37)
Rectum length	14.4 ± 1.8 (12.5–18.5)
Tail length	9.5 ± 0.68 (9.0–11)

thick, distinctly striated, loose, its outline irregular, with distinct radial refractive elements. Lateral chords occupying about 30–35% of midbody diameter. Lateral body pores distinct; 1–2 in neck region; 1–2 from pharyngeal base to vulva; 4–7 in post-vulval region. Dorsal and ventral body pores indistinct. Lip region cap-like, offset by slight constriction, 1.8–2.1 times as wide as high or about one-third to two-fifths of the body diameter at neck base. Lips rounded, amalgamated; inner part elevated, forming a perioral disc. Labial and cephalic papillae distinct but not interfering with labial contour. Amphids duplex, stirrup-shaped, their aperture about one-half to three-fifths as wide as lip region diameter. Stoma

a long, slender truncate cone, slightly sclerotized in the perioral region. Odontostyle very slender, solid, thin needle-like, 1.4–1.8 times the lip region diameter long. Odontophore simple, sclerotized, about 1.0–1.2 times the odontostyle length. Guiding ring simple, refractive, at 1.0–1.3 times the lip region diameter from anterior end. Pharynx consisting of a slender anterior part, expanding abruptly into a short, pear-shaped basal bulb, with a perceptible thickening at the posterior part of its inner lining, occupying about 13–16% of total neck length. Nerve ring at 55–62% of neck length from anterior end. Cardia short, rounded to conoid, about one-fourth to one-third of the corresponding body diameter long.

Genital system monodelphic-opisthodelphic. Ovary reflexed, measuring 36–88 µm; oocytes arranged in single row except near tip. Oviduct joining the ovary subterminally, measuring 30–57 µm, consisting of a slender distal portion and a weakly developed pars dilatata. Oviduct-uterus junction indistinct. Uterus short and tubular, measuring 21–32 µm. Anterior genital branch completely absent. Sperm cell absent. Vagina cylindrical, extending inwards, 8.5–10.5 µm or about two-fifths to one-half (45–55%) of midbody diameter; pars proximalis vaginae 5.0–7.0 × 3.0–4.0 µm, encircled by circular muscles; pars distalis vaginae 3.0–4.0 µm with slightly curved walls; pars refringens absent. Vulva apparently a transverse slit. Prerectum 2.0–2.9 and rectum 0.9–1.4 times anal body diameter long. Tail short, rounded to hemispheroid, 0.7–0.8 times anal body diameter long, with a pair of caudal pores on each side.

Male

Not found.

Remarks

Siddiqi (1970) described *B. ethiopicus* from the Malawi. Goseco *et al*. (1974) in their revision of the genus *Basirotyleptus* made a detailed study of the type material and added a population from Indiana. The morphometrics of present populations conform well with the type population as well as Indiana population except in having slightly wider lip region (6.0–7.5 vs 5.0–6.0 µm); narrower lateral chords (30–35% vs more than 50% of mid body diameter) and slight differently shaped cardia (rounded to conoid vs rounded). These slight differences are considered as intraspecific variability. This species is reported here for the first time from the India.

In the presence of labial disc, this species closely resembles *B. nemoralis* Siddiqi, 1970 except in having a comparatively robust body (a = 20–25 vs 27–33); shorter pharyngeal bulb (about one vs two corresponding body diameter long); absence of anterior uterine sac (vs present) and differently shaped tail (rounded to hemispheroid vs obtusely rounded).

Basirotyleptus acus Goseco, Ferris & Ferris, 1974
Fig. 5, Table 5

Basirotyleptus acus Goseco *et al*., 1974: 12, 14.

Basirotyleptus pini – Furstenberg 1980: 153–155.

Material examined

INDIA – **Kerala State** • 11 ♀♀; Palakkad district, Silent Valley National Park; 11º03′49.6″ N, 76º32′17.4″ E; 5–15 cm depth; 26 Oct. 2017; soil samples collected from around the roots of forest trees (unidentified); slides reference number AMU/ZD/NC/*Basirotyleptus acus*/1–4. – **Tamil Nadu State** • 7 ♀♀; Nilgiris district, Mudumalai National Park; 11º32′35.4″ N, 76º31′24.1″ E; 5–15 cm depth; 14 Nov. 2016; soil samples collected from around the roots of shrubs (unidentified); slides reference number AMU/ZD/NC/*Basirotyleptus acus*/5–8.

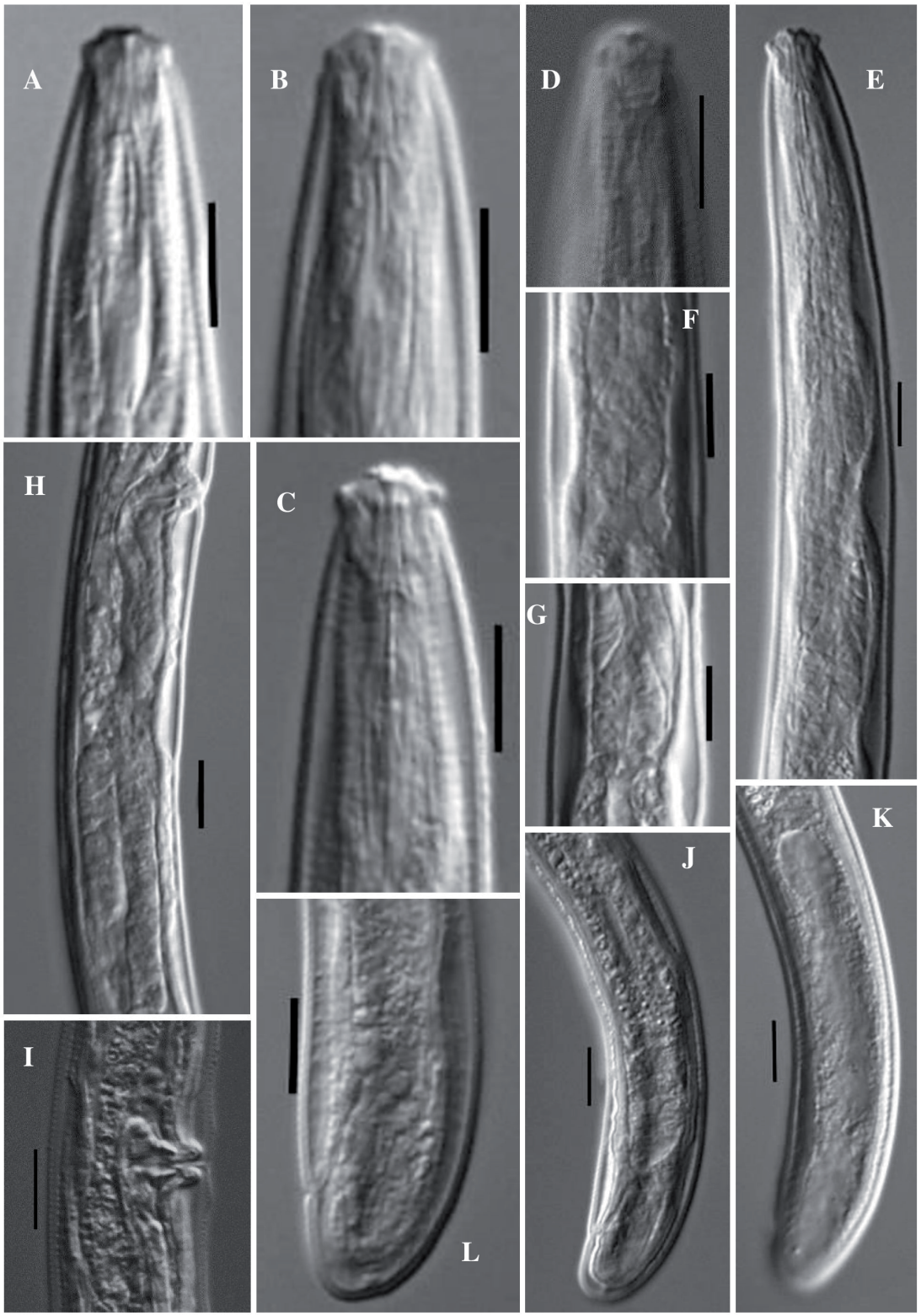

Fig. 5. *Basirotyleptus acus* Goseco, Ferris & Ferris, 1974, ♀ (AMU/ZD/NC/*Basirotyleptus acus*/1–4) (LM photographs). **A–C**. Anterior region. **D**. Anterior region showing amphid. **E**. Pharyngeal region. **F–G**. Pharyngeal bulb. **H**. Genital system. **I**. Vulval region. **J–K**. Posterior region. **L**. Posterior end. Scale bars = 10 µm.

Table 5. Measurements of *Basirotyleptus acus* Goseco, Ferris & Ferris, 1974. All measurements are in μm and in the form: mean ± s.d. (range).

Localities	**Mukkali population**	**Modumalai population**
Characters	**Females**	**Females**
n	11	7
L	486.1 ± 50.5 (391–552)	530.0 ± 40.6 (471–594)
Body diameter at neck base	18.9 ± 0.98 (17.5–20.5)	18.9 ± 0.68 (18.5–20.5)
Body diameter at mid body	20.9 ± 1.1 (19.5–23.5)	21.0 ± 0.98 (19.5–22.5)
Body diameter at anus	13.9 ± 1.5 (11.5–16.5)	13.5 ± 0.58 (12.5–14.5)
a	23.1 ± 1.7 (20.0–25.6)	24.7 ± 2.2 (21.3–28.7)
b	4.8 ± 0.38 (4.2–5.4)	4.7 ± 0.18 (4.5–5.0)
c	48.9 ± 4.5 (40.5–54.7)	48.3 ± 2.6 (44.5–53.4)
c’	0.72 ± 0.07 (0.61–0.84)	0.79 ± 0.06 (0.64–0.85)
V	36.9 ± 1.2 (35.5–39.8)	36.9 ± 1.6 (35.7–41.0)
G2	20.5 ± 3.1 (13.3–24.5)	18.2 ±2.4 (14.6–21.5)
Lip region diameter	7.2 ± 0.32 (7.0–8.0)	7.6 ± 0.34 (7.0–8.0)
Lip region height	3.3 ± 0.20 (3.0–3.5)	3.6 ± 0.24 (3.5–4.0)
Amphidial aperture	3.5 ± 0.22 (3.5–4.0)	3.8 ± 0.18 (3.5–4.0)
Odontostyle length	11.5 ± 0.26 (10–11)	11.0 ± 0.54 (10.5–11.5)
Odontophore length	11.4 ± 0.58 (11–12)	12.0 ± 0.88 (11–13)
Total stylet length	22.2 ± 0.73 (21–23)	23.0 ± 1.3 (21.5–24.5)
Guiding ring from anterior end	9.0 ± 0.39 (8.5–9.5)	9.6 ± 0.21 (9.0–10)
Nerve ring from anterior end	57.8 ± 2.0 (54–61)	62.8 ± 1.6 (60–65)
Neck length	99.6 ± 4.4 (93–106)	111.3 ± 4.6 (102–119)
Expanded part of pharynx	15.5 ± 0.92 (15–18)	18.9 ± 0.83 (17–20)
Cardia length	4.8 ± 0.14 (4.5–5.0)	4.4 ± 0.71 (3.0–5.0)
Anterior genital branch	4.9 ± 0.61 (4.0–6.0)	5.8 ± 0.42 (5.0–6.5)
Posterior genital branch	100.8 ± 13.5 (70–117)	97.7 ± 9.1 (84–112)
Vaginal length	10.0 ± 0.76 (8.5–10.5)	10.8 ± 0.57 (10.0–11.5)
Vulva from anterior end	179.4 ± 19.1 (139–201)	199.6 ± 12.1 (179–213)
Prerectum length	42.7 ± 5.0 (38–53)	42.7 ± 3.1 (39–49)
Rectum length	15.1 ± 1.7 (13.5–17.5)	17.0 ± 0.97 (15.5–18.5)
Tail length	9.9 ± 1.2 (8.0–11.5)	10.7 ± 0.98 (9.0–12)

Description

Female

Small sized nematodes, slightly curved ventrad or open C-shaped upon fixation; body cylindrical, tapering gradually towards both extremities but more so towards the anterior end. Cuticle with two distinct layers, 1.0–1.5 µm thick at anterior region, 1.5–2.0 µm at midbody and 2.0–2.5 µm on tail. Outer cuticle thin, with fine transverse striations; inner layer thick, striated, loose, its outline irregular, with distinct radial refractive elements. Lateral chords occupying about 28–35% of midbody diameter. Lateral body pores distinct; 1–3 in neck region; 1–2 from pharyngeal base to vulva and 3–8 post-vulval region. Dorsal and ventral body pores indistinct. Lip region cap-like, offset by constriction, 2.0–2.3 times as wide as high or about one-third to two-fifths of the body diameter at neck base. Lips rounded, amalgamated; inner part slightly elevated. Labial and cephalic papillae distinct but not interfering with labial contour. Amphids duplex, stirrup-shaped, their aperture about one-half to three-fifths as wide as lip region diameter. Stoma a long, slender truncate cone, slightly sclerotized in the perioral region. Odontostyle very slender, solid, thin needle-like, sometimes slightly dorsally bent, 1.2–1.6 times the lip region diameter long. Odontophore simple, sclerotized, about 1.0–1.1 times the odontostyle length. Guiding ring simple, refractive, at 1.2–1.4 times the lip region diameter from anterior end. Pharynx consisting of a slender and slightly muscular anterior part, expanding gradually into a short pear-shaped basal bulb, with a perceptible thickening at the posterior part of its inner lining, occupying about 14–18% of total neck length. Nerve ring at 51–60% of neck length from anterior end. Cardia rounded to conoid, about one-fifth to one-fourth of the corresponding body diameter long.

Genital system monodelphic-opisthodelphic. Ovary reflexed, measuring 42–89 µm; oocytes arranged in single row except near tip. Oviduct joining the ovary subterminally, measuring 44–63 µm, consisting of a slender distal portion and a well-developed pars dilatata. Oviduct-uterus junction marked by weak sphincter. Uterus short and slender tube without any specialization, measuring 17–30 µm. Anterior genital branch usually absent or reduced to a very small sac, about one-fifth to one-third midbody diameter long. Sperm cell absent. Vagina cylindrical, extending slight posteriorly, 8.5–11.5 µm or about two-fifths to one-half (40–52%) of midbody diameter; pars proximalis vaginae 5.5–7.5 × 4.0–6.0 µm, encircled by circular muscles; pars distalis vaginae 3.5–4.5 µm with slightly curved walls; pars refringens absent. Vulva apparently a transverse slit. Prerectum 2.5–3.8 and rectum 0.9–1.3 times anal body diameter long. Tail short, rounded to conoid, 0.6–0.8 times anal body diameter long, with a pair of caudal pores on each side, a distinct terminal pore also present.

Male

Not found.

Remarks

Goseco *et al*. (1974) described this species from the Indiana. The morphometrics of present populations conform well with the type population except in having a slightly longer odontostyle (10.0–11.5 vs 8 µm), slightly shorter odontophore (11–13 vs 14.4 µm); shorter pharyngeal bulb (15–20 vs 22 µm); longer vagina (8.5–11.5 vs 13 µm) and presence of anterior uterine sac in some specimens (vs anterior uterine sac absent). This species is reported here for the first time from India.

During the present study, two populations representing eighteen specimens were collected from the Western Ghats, India. Although in some specimens of the present populations a very small anterior uterine sac was present, other morphometric values completely overlapped to with those in *B*. *acus*, and therefore these specimens are considered as *B*. *acus*.

Furstenberg (1980) redescribed *B*. *pini* Siddiqi & Khan, 1965 based on two populations comprising twenty eight females from Australia and mentioned that Australian specimens correspond well with

type population of *B. pini* except for the absence of anterior uterine sac in some specimens. Some doubt exists on the correct identity of the Australian population as it shows some morphological differences i.e., differently shaped odontostyle (odontostyle very slender, thin needle-like vs slender, simple needle-like); differently shaped lip region (lip region low, flat, offset by slight constriction vs lip region comparatively higher, angular, offset by deep constriction), labial papillae not interfering with labial contour (vs labial papillae interfering with labial contour, forming a liplets-like structure), and absence of anterior uterine sac in some specimens (vs anterior uterine present in every specimen). The morphometrics of Furstenberg (1980) population is quite comparable to *B. acus* except in the presence of anterior uterine sac in some specimens (vs absent in the type population). With the addition of present populations, which have specimens both with or without sac, *B. pini* apud Furstenberg, 1980 is considered here as *B. acus*.

Basirotyleptus minutus Khan, 1987
Figs 6–7, Table 6

Basirotyleptus minutus Khan, 1987: 177–179.

Material examined

INDIA – **Karnataka State** • 2 ♀♀; Kodagu district, Bhagamandala; 12º23′29.1″ N, 75º31′50.0″ E; 5–15 cm depth; 8 Nov. 2016; soil samples collected from around the roots of shrubs and forest trees (unidentified); slides reference number AMU/ZD/NC/*Basirotyleptus minutus*/1.

Description

Female

Small sized nematodes, slightly curved ventrad upon fixation; body cylindrical, tapering gradually towards both extremities but more so towards the anterior end. Cuticle with two distinct layers, 1.0 µm thick at anterior region, 1.5 µm at midbody and 2.0–2.5 µm on tail. Outer cuticle thin, with fine transverse striations; inner layer thick, finely striated, loose, with radial refractive elements. Lateral chords occupying about 26–30% of midbody diameter. Lateral, dorsal and ventral body pores indistinct. Lip region cap-like, offset by constriction, 2.3 times as wide as high or about one-third of the body diameter at neck base. Lips rounded, amalgamated, slightly angular; inner part slightly elevated. Amphids duplex, cup-shaped, their aperture about one-half to three-fifths as wide as lip region diameter. Stoma a long, slender truncate cone, slightly sclerotized in the perioral region. Odontostyle slender, solid, needle-like, 1.4 times the lip region diameter long. Odontophore simple, sclerotized, with basal flanges, about 1.3–1.4 times the odontostyle length. Guiding ring simple, refractive, at 1.3 times the lip region diameter from anterior end. Pharynx consisting of a slender anterior part, expanding abruptly into a short pyriform bulb, with a perceptible thickening at the posterior part of its inner lining, occupying about 18% of total neck length. Nerve ring at 52–55% of neck length from anterior end. Cardia rounded to hemispheroid, about one-fourth of the corresponding body diameter long.

Genital system monodelphic-opisthodelphic. Ovary reflexed, measuring 43–59 µm; oocytes arranged in single row except near tip. Oviduct joining the ovary subterminally, measuring 55–84 µm, consisting of a slender distal portion and a well-developed pars dilatata. Oviduct-uterus junction marked by distinct sphincter. Uterus a short tube with wide lumen, measuring 27–30 µm. Anterior genital branch reduced to a very small sac, about one-fifth midbody diameter long. Sperm cell absent. Vagina cylindrical, extending inwards, 10.0–10.5 µm or about one-half (50–55%) of midbody diameter; pars proximalis vaginae 6.5 × 4.5–5.0 µm, encircled by circular muscles; pars distalis vaginae 4.0 µm with slightly curved walls; pars refringens absent. Vulva apparently a transverse slit. Prerectum 3.1–3.2 and rectum 0.9–1.0 times anal body diameter long. Tail short, rounded to conoid, 0.8 times anal body diameter long, with a pair of caudal pores on each side.

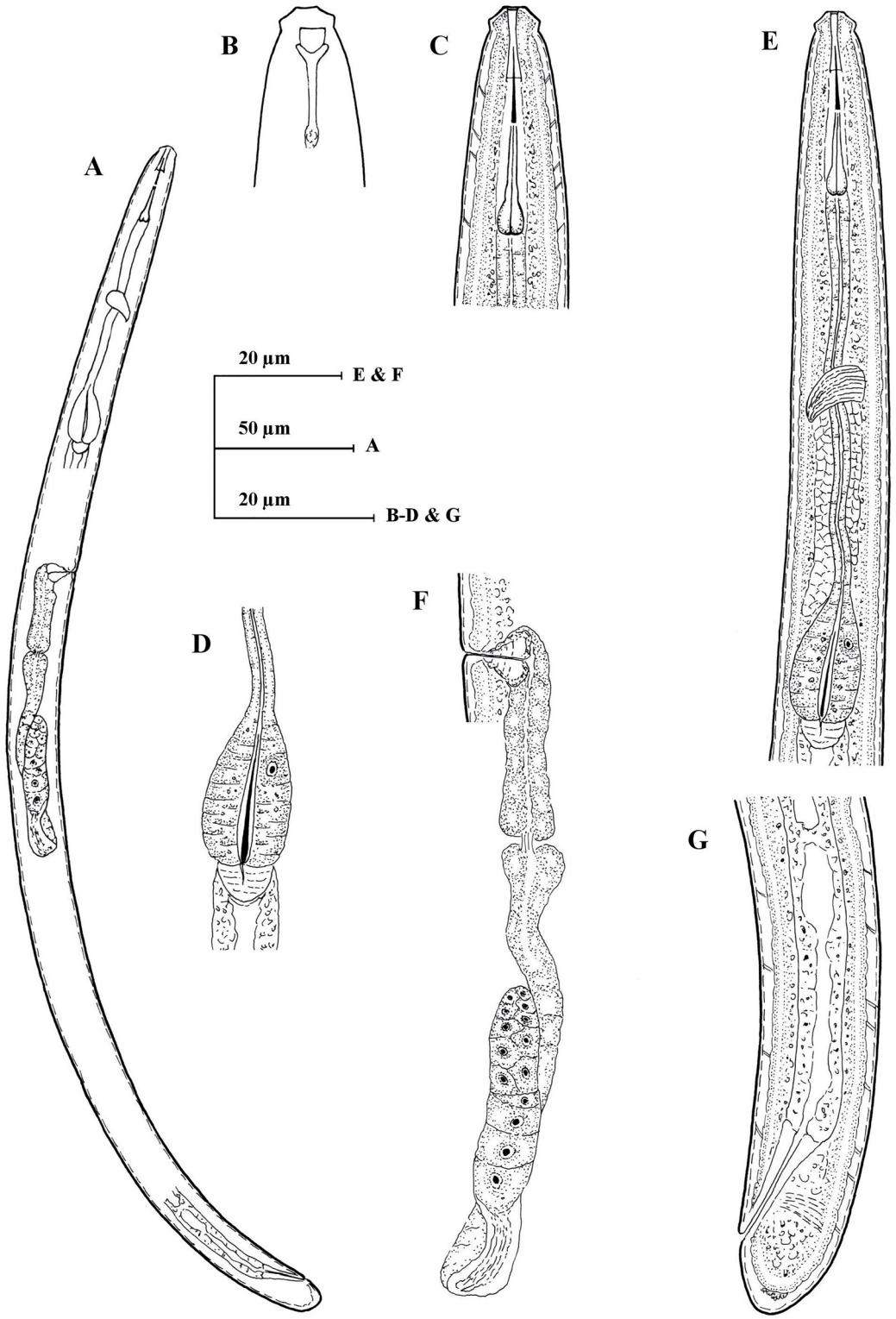

Fig. 6. *Basirotyleptus minutus* Khan, 1987, ♀ (AMU/ZD/NC/*Basirotyleptus minutus*/1). **A**. Entire specimen. **B**. Anterior region showing amphid. **C**. Anterior region. **D**. Pharyngeal bulb. **E**. Pharyngeal region. **F**. Genital system. **G**. Posterior region.

Fig. 7. *Basirotyleptus minutus* Khan, 1987, ♀ (AMU/ZD/NC/*Basirotyleptus minutus*/1) (LM photographs). **A–B**. Anterior region. **C**. Anterior region showing amphid. **D**. Pharyngeal region. **E–F**. Pharyngeal bulb. **G**. Vulval region. **H**. Genital system. **I**. Posterior region. **J–K**. Posterior end. Scale bars = 10 µm.

Table 6. Measurements of *Basirotyleptus minutus* Khan, 1987. All measurements are in µm.

Characters	Females
n	2
L	446, 486
Body diameter at neck base	17.0, 18.5
Body diameter at mid body	18.5, 19.5
Body diameter at anus	12.5, 12.5
a	24.0, 24.8
b	4.0, 4.1
c	45, 49
c’	0.8, 0.8
V	35.1, 33.7
G1	0.7, 0.8
G2	20.6, 26.2
Lip region diameter	7.0, 7.0
Lip region height	3.0, 3.0
Amphidial aperture	3.5, 4.0
Odontostyle length	10, 10
Odontophore length	13, 14
Total stylet length	23, 24
Guiding ring from anterior end	9.0, 9.0
Nerve ring from anterior end	57, 64
Neck length	111, 117
Expanded part of pharynx	19, 20
Cardia length	4.0, 4.0
Anterior genital branch	4.0, 4.0
Posterior genital branch	94, 130
Vagina length	10.5, 10.0
Vulva from anterior end	156, 163
Prerectum length	39, 41
Rectum length	12, 13
Tail length	10, 10

Male

Not found.

Remarks

Khan (1987) described *Basirotyleptus minutus* from Tamil Nadu, India. The morphometrics of present specimens conform well with the type population except in having differently shaped amphids (duplex, cup-shaped vs simple, stirrup-shaped) and slightly longer pharyngeal bulb (19–20 vs 16 µm). In original description of *B. minutus*, the size of odontostyle (10–14 µm) and odontophore (8.0–10.0 µm) does not correspond with the figure (Khan 1987: fig. 2b, e). The figure depicts the odonotostyle as shorter than the odontophore which is generally true with other *Basirotyleptus* species. There might be error in his measurements. In our present specimens the length of odontostyle (10 µm) is shorter than odontophore (13–14 µm) with a combined length of 23–24 µm, which overlaps with type population (18–24 µm). However, in the other characters the present population agrees well with the type population.

In the presence of flanged odontophore, this species closely resembles *Basirotyleptus nindei* Siddiqi, 1970 except in having slightly differently shaped lip region (lips slightly angular and labial papillae not distinct vs lips more angular and labial papillae distinct); differently shaped amphids (duplex, cup-shaped vs simple, stirrup-shaped) and comparatively shorter tail (10.0 vs 11.0–13.5 µm, c' = 0.8 vs 1.0–1.2).

Basirotyleptus conicaudatus sp. nov.

urn:lsid:zoobank.org:act:25B540AE-3BF1-43F8-865C-7342E11514F8

Figs 8–9, Table 7

Diagnosis

Basirotyleptus conicaudatus sp. nov. is characterized by having robust body, 0.42–0.44 mm long; lip region cap-like, offset by deep constriction, lips rounded, inner part elevated; odontostyle 9.5–10.0 µm long, odontophore 11.0–12.0 µm long and total stylet length 21.0–22.0 µm; pharynx with a slender anterior part, expanding abruptly into a short pear-shaped basal bulb, occupying about 14–15% of total neck length; female genital system monodelphic-opisthodelphic; anterior genital branch a small sac, measuring 15–20 µm or 0.7–0.9 times midbody diameter long; tail convex-conoid with acute terminus, 1.2–1.3 times anal body diameter long; male with 20 µm long spicules, 5.0 µm long lateral guiding pieces and a single ventromedian supplement.

Etymology

The new species is named *Basirotyleptus conicaudatus* sp. nov. because of its conoid tail.

Material examined

Holotype

INDIA • ♀; Kerala State; Thrissur district, Chalakudy; 10º18′03.6″ N, 76º26′27.6″ E; 5–15 cm depth; 27 Oct. 2017; roots of shrubs (unidentified); slide reference number AMU/ZD/NC/*Basirotyleptus conicaudatus*/1.

Paratypes

INDIA • 1 ♀, 1 ♂; same collection data as for holotype; slides reference number AMU/ZD/NC/*Basirotyleptus conicaudatus*/2.

Type habitat and locality

Soil samples collected from around the roots of shrubs (unidentified) from Chalakudy, Thrissur, Kerala State.

Description

Female

Small sized nematodes, curved ventrad upon fixation; body cylindrical, tapering gradually towards both extremities but more so towards the anterior end. Cuticle with two distinct layers, 1.0 µm thick at anterior region, 1.5 µm at midbody and 2.0 µm on tail. Outer cuticle thin, smooth to finely transversaly striated; inner layer thick, loose, finely striated, radial refractive elements distinct. Lateral chords occupying about 28–30% of midbody diameter. Lateral, dorsal and ventral body pores indistinct. Lip region cap-like, offset by constriction, 2.0–2.1 times as wide as high or about two-fifths of the body diameter at neck base. Lips rounded, amalgamated, inner part slightly elevated. Labial and cephalic papillae distinct but not interfering with labial contour. Amphids stirrup-shaped, their aperture about three-fifths as wide as lip region diameter. Stoma a long, slender truncate cone, slightly sclerotized in the perioral region. Odontostyle short, slender, solid, needle-like, 1.1–1.2 times the lip region diameter long. Odontophore simple, sclerotized, with basal flanges, about 1.2 times the odontostyle length. Guiding ring simple, refractive, at 0.9–1.0 times the lip region diameter from anterior end. Pharynx consisting of a slender anterior part, expanding abruptly into a short, pear-shaped basal bulb, with a perceptible thickening at the posterior part of its inner lining, occupying about 14–15% of total neck length. Nerve ring at 53–56% of neck length from anterior end. Cardia rounded to conoid, about one-fifth of the corresponding body diameter long.

Genital system monodelphic-opisthodelphic. Ovary reflexed, measuring 49–50 µm; oocytes arranged in single row except near tip. Oviduct joining the ovary subterminally, measuring 53–60 µm, consisting of a slender distal portion and a well-developed pars dilatata. Oviduct-uterus junction marked by distinct sphincter. Uterus short and wide tubular, measuring 15–17 µm. Anterior genital branch reduced to small sac, 0.7–0.9 times midbody diameter. Vagina cylindrical, extending inwards, 9.0–9.5 µm or about one-half (45–48%) of midbody diameter; pars proximalis vaginae 5.5–6.0 × 4.0–4.5 µm, encircled by circular muscles; pars distalis vaginae 3.0–3.5 µm with slightly curved walls; pars refringens absent. Vulva apparently a transverse slit. Prerectum 2.8–3.2 and rectum 1.2 times anal body diameter long. Tail short, convex-conoid with acute terminus, 1.2–1.3 times anal body diameter long, with a pair of caudal pores on each side.

Male

General morphology similar to that of female except for posterior region being more ventrally curved. Genital system diorchic, testes opposed, sperm cell spindle-shaped. In addition to adcloacal pair at 6.5 µm from cloacal aperture, there is single ventromedian supplement located beyond the range of spicules, 25 µm from adcloacal pair. Spicules typically dorylaimoid, curved ventrad, slender, five times as long as wide and 1.4 times as long as cloacal body diameter, dorsal contour regularly convex, ventral contour bearing a moderately developed hump and hollow, curvature 135º, head occupying 22% of total spicules length, median pieces about ten times as long as wide or occupying 37% of the spicules maximum width, reaching the spicules tip, posterior end 2.5 µm wide. Lateral guiding pieces distinct, rod-like, about 5.0 times as long as wide or about one-fourth of the spicules length. Prerectum 3.5 and rectum 1.5 times cloacal body diameter long. Tail short, convex-conoid with acute terminus, 1.2 times cloacal body diameter long, with a pair of caudal pores on each side.

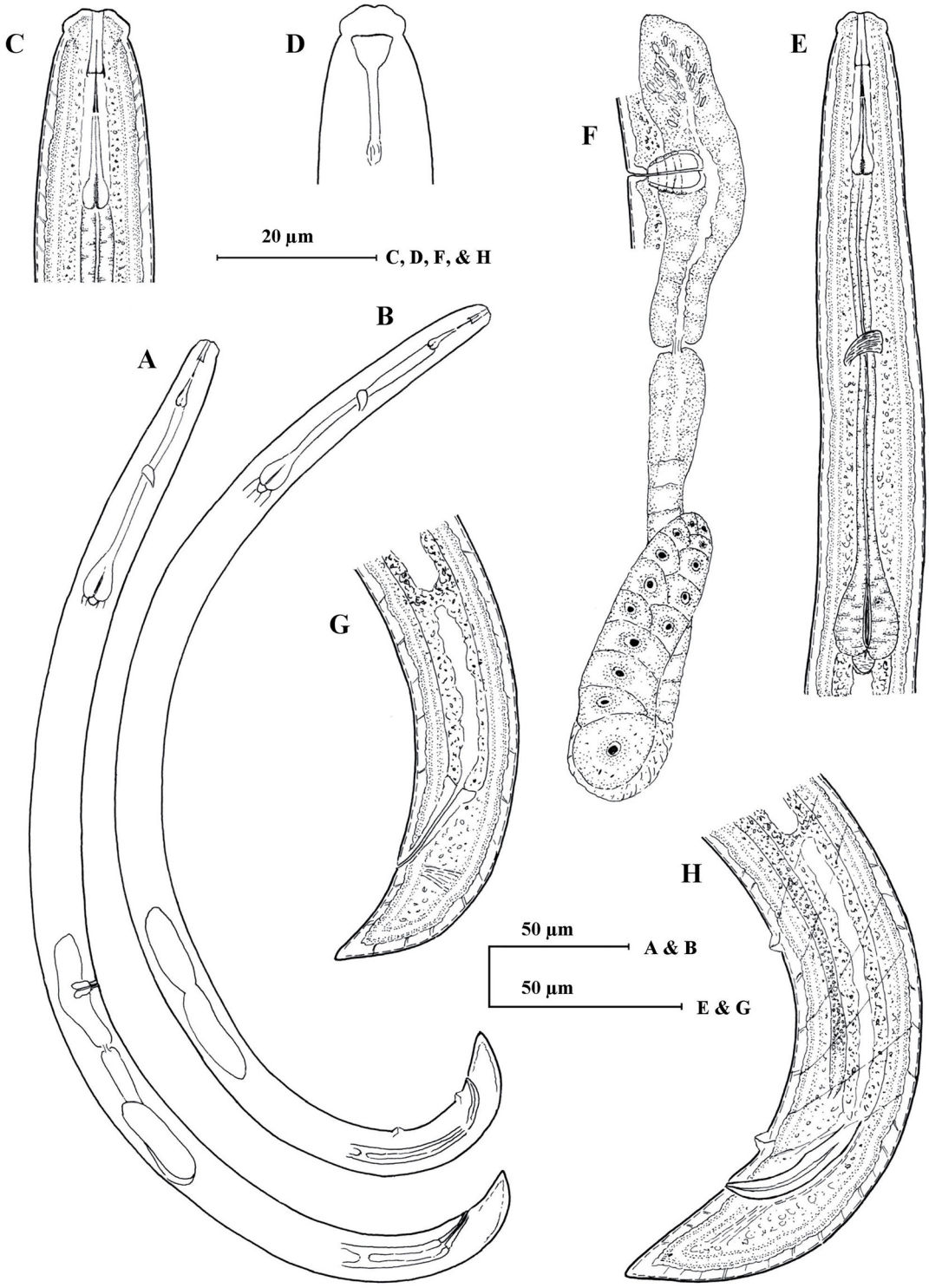

Fig. 8. *Basirotyleptus conicaudatus* sp. nov. **A, C–G**. Holotype, ♀ (AMU/ZD/NC/*Basirotyleptus conicaudatus*/1). **B, H**. Paratype, ♂ **(**AMU/ZD/NC/*Basirotyleptus conicaudatus*/2). **A**. Entire female. **B**. Entire male. **C**. Female, anterior region. **D**. Female, anterior region showing amphid. **E**. Female, pharyngeal region. **F**. Female, genital system. **G**. Female, posterior region. **H**. Male, posterior region.

Fig. 9. *Basirotyleptus conicaudatus* sp. nov. (LM photographs). **A, C–I**. Holotype, ♀ **(**AMU/ZD/NC/*Basirotyleptus conicaudatus*/1**)**. **B**. Paratype 1, ♀ (AMU/ZD/NC/*Basirotyleptus conicaudatus*/2). **J–K**. Paratype 2, ♂ (AMU/ZD/NC/*Basirotyleptus conicaudatus*/2). **A–B**. Female, anterior region. **C**. Female, anterior region showing amphid. **D**. Female, pharyngeal region. **E**. Female, pharyngeal bulb. **F–G**. Female, genital system. **H**. Female, posterior region. **I**. Female, posterior end. **J–K**. Male, posterior end. Scale bars = 10 µm.

Table 7. Measurements of *Basirotyleptus conicaudatus* sp. nov. All measurements are in μm.

Characters	Holotype ♀	Paratype ♀	Paratype ♂
n		1	1
L	442	427	423
Body diameter at neck base	18	18.5	16.5
Body diameter at mid body	19.5	19.5	18.5
Body diameter at anus	13.5	13.0	13.5
a	22.6	21.8	24.0
b	4.3	4.4	4.0
c	25.1	27.3	25.4
c’	1.3	1.2	1.2
V	55.3	58.0	–
G1	4.2	3.4	–
G2	21.0	20.4	–
Lip region diameter	8.0	8.5	8.0
Lip region height	4.0	4.0	4.0
Amphidial aperture	5.0	5.0	5.0
Odontostyle length	10	9.5	10
Odontophore length	12	11.5	11
Total stylet length	22	21	21
Guiding ring from anterior end	8.5	8.0	8.5
Nerve ring from anterior end	56	50	58
Neck length	101	97	105
Expanded part of pharynx	15	14	15
Cardia length	4.0	4.0	4.0
Anterior genital branch	20	15	–
Posterior genital branch	87	93	–
Vagina length	9.0	9.5	–
Vulva from anterior end	245	247	–
Prerectum length	37	41	48
Rectum length	14	13	20
Tail length	17	15.5	16.5
Spicules length	–	–	20
Lateral guiding pieces	–	–	5
Ventromedian supplements	–	–	1

Remarks

In the presence of a flanged odontophore and short anterior uterine sac, the new species comes close to *B. syncheilus* Siddiqi, 1995; *B. siremps* Siddiqi, 1995; *B. nindei* Siddiqi, 1970 and *B. minutus* Khan, 1987 but differs from *B. syncheilus* in having lip region offset by constriction (vs lip region continuous); lips elevated (vs lips not elevated, flat); shorter pharyngeal bulb (14–15 vs 19 µm); differently shaped tail (tail convex-conoid with acute terminus vs convex-rounded with hemispheroid terminus); lower c (25–27 vs 34–53) and slightly higher c' (1.2–1.3 vs 0.9–1.1) ratios; longer spicules (20 vs 15–16 µm) and presence of ventromedian supplements (vs absent).

From *B. siremps*, the new species differs in having slightly longer body (L = 0.42–0.44 vs 0.30–0.39 mm); longer total stylet (21–22 vs 15.5–17.5 µm, odontostyle 9.5–10.0 vs 7.5–8.5 µm; odontophore 11.5–12.0 vs 8.0–9.0 µm); comparatively posterior vulva position (V = 55–58 vs 47–53); lower c (25–27 vs 27–43) ratio; differently shaped tail (tail convex-conoid with acute terminus vs tail with rounded to hemispherical terminus); longer spicules (20 vs 12.5 µm) and presence ventromedian supplements (vs absent).

From *B. nindei*, the new species differs in having wider lip region (8.0–8.5 vs 6.0–7.0 µm); posterior vulva position (V = 55–58 vs 39–45); presence of longer anterior uterine sac (15–20 vs anterior uterine sac usually absent, rarely present, 4.5–6.0 µm); differently shaped tail (tail conoid with acute terminus vs bluntly rounded to conoid terminus) and presence of male (vs male absent).

From *B. minutus*, the new species differs in having wider lip region (8.0–8.5 vs 5.0–7.0 µm); amphids simple, stirrup-shaped (vs duplex, stirrup-shape); posterior vulva position (V = 55–58 vs 32–42); differently shaped tail (tail conoid with acute terminus vs rounded to conoid terminus) and presence of male (vs absent).

The new species also comes close to *B. discinus* Siddiqi, 1995 and *B. diminutus* Siddiqi, 1995 but differs from the former in having robust body (a = 21–22 vs 28); absence of labial disc (vs labial disc present); odontophore with distinct basal flanges (vs odontophore with poorly developed basal flanges); posterior vulva position (V = 55–58 vs 51) and lower c (25–27 vs 35) ratio.

From *B. diminutus*, the new species differs in having slightly longer and slender body (L = 0.42–0.44 vs 0.29–0.36 mm, a = 21–22 vs 17–20); longer total stylet (21–22 vs 16.0–18.5 µm) and odontostyle (9.5–10 vs 7.5–8.5 µm), odontophore with well developed basal flanges (vs poorly developed flanges); posterior vulva position (V = 55–58 vs 37–42); presence of anterior uterine sac (vs absent) and differently shaped tail (conoid with acute terminus vs hemispherical to rounded).

In the presence of a conoid tail the new species comes close to *B. caudatus* Jairajpuri, 1966; *B. lieberi* Goseco *et al*., 1974 and *B. westralis* Siddiqi, 1970, but differs from *B. caudatus* in having odontophore with basal flanges (vs odontophore without flanges); posterior vulva position (V = 55–58 vs 40–48); presence of anterior uterine sac (vs anterior uterine sac absent) and presence of male (vs male absent).

From *B. lieberi*, the new species differs in having shorter body (L = 0.42–0.44 vs 0.67–0.90 mm); female genital system mono-opisthodelphic (vs mono-prodelphic) and smaller spicules (20 vs 24–28 µm).

From *B. westralis*, the new species differs in having shorter body (L = 0.42–0.44 vs 0.55–0.75 mm); female genital system mono-opisthodelphic (vs amphidelphic) and smaller spicules (20 vs 22–25 µm).

Basirotyleptus constrictus sp. nov.
urn:lsid:zoobank.org:act:D3AB632D-0286-4577-9A83-78E61A57225E
Figs 10–11, Table 8

Diagnosis

Basirotyleptus constrictus sp. nov. is characterized by having 0.38–0.49 mm long body; lip region cap-like, offset by constriction; lips rounded, inner part elevated, forming a perioral disc; odontostyle 9.5–10 µm long, odontophore 14–15 µm long, total stylet length 23.5–25.0 µm; pharynx slender with slightly muscular anterior part, expanding abruptly into a short pear-shaped basal bulb separated by constriction, occupying about 15–17% of total neck length; female genital system monodelphic-opisthodelphic; anterior genital branch absent or rarely a very small sac, 4.0–6.0 µm or one-fourth to one-third midbody diameter long, tail short, with conoid to bluntly rounded terminus, 1.1–1.4 times anal body diameter long.

Etymology

The new species is named *Basirotyleptus constrictus* sp. nov. because of its pharyngeal bulb separated by constriction.

Material examined

Holotype

INDIA • ♀; Karnataka State, Kodagu district, Bhagamandala; 12º23′29.1″ N, 75º31′50.0″ E; 5–15 cm depth; 8 Nov. 2017; roots of shrubs and forest trees (unidentified); slide reference number AMU/ZD/NC/*Basirotyleptus constrictus*/1.

Paratypes

INDIA • 8 ♀♀; same collection data as for holotype; slides reference number AMU/ZD/NC/*Basirotyleptus constrictus*/2–5.

Type habitat and locality

Soil samples collected from around the roots of shrubs and forest trees (unidentified) from Bhagamandala, Kodagu, Karnataka State.

Description

Female

Small sized nematodes, slightly curved ventrad or open C-shaped upon fixation, tapering gradually towards both extremities but more so towards anterior end. Cuticle with two distinct layers, 1.0–1.5 µm thick at anterior region, 1.5–2.0 µm at midbody and 2.0–2.5 µm on tail. Outer cuticle thin, with fine transverse striations; inner layer thick, finely striated, loose, its outline irregular, with distinct radial refractive elements. Lateral chords occupying about 25–30% of midbody diameter. Lateral, dorsal and ventral body pores indistinct. Lip region cap-like, offset by constriction, 1.8–2.1 times as wide as high or about two-fifths to one-half of the body diameter at neck base. Lips rounded, amalgamated; inner part elevated, forming a perioral disc-like structure. Labial and cephalic papillae clear but not interfering with labial contour. Amphids stirrup-shaped, their aperture about one-half to three-fifths as wide as lip region diameter. Stoma a long, slender truncate cone, slightly sclerotized in the perioral region. Odontostyle slender, solid, needle-like, 1.2–1.3 times the lip region diameter long. Odontophore simple with basal flanges, about 1.4–1.6 times the odontostyle length. Guiding ring simple, refractive, at 1.0–1.2 times the lip region diameter from anterior end. Pharynx consisting of a slender and slightly muscular anterior part, expanding abruptly into a short, pear-shaped basal bulb, with a perceptible thickening at the posterior part of its inner lining, occupying about 15–17% of total neck length, two parts separated

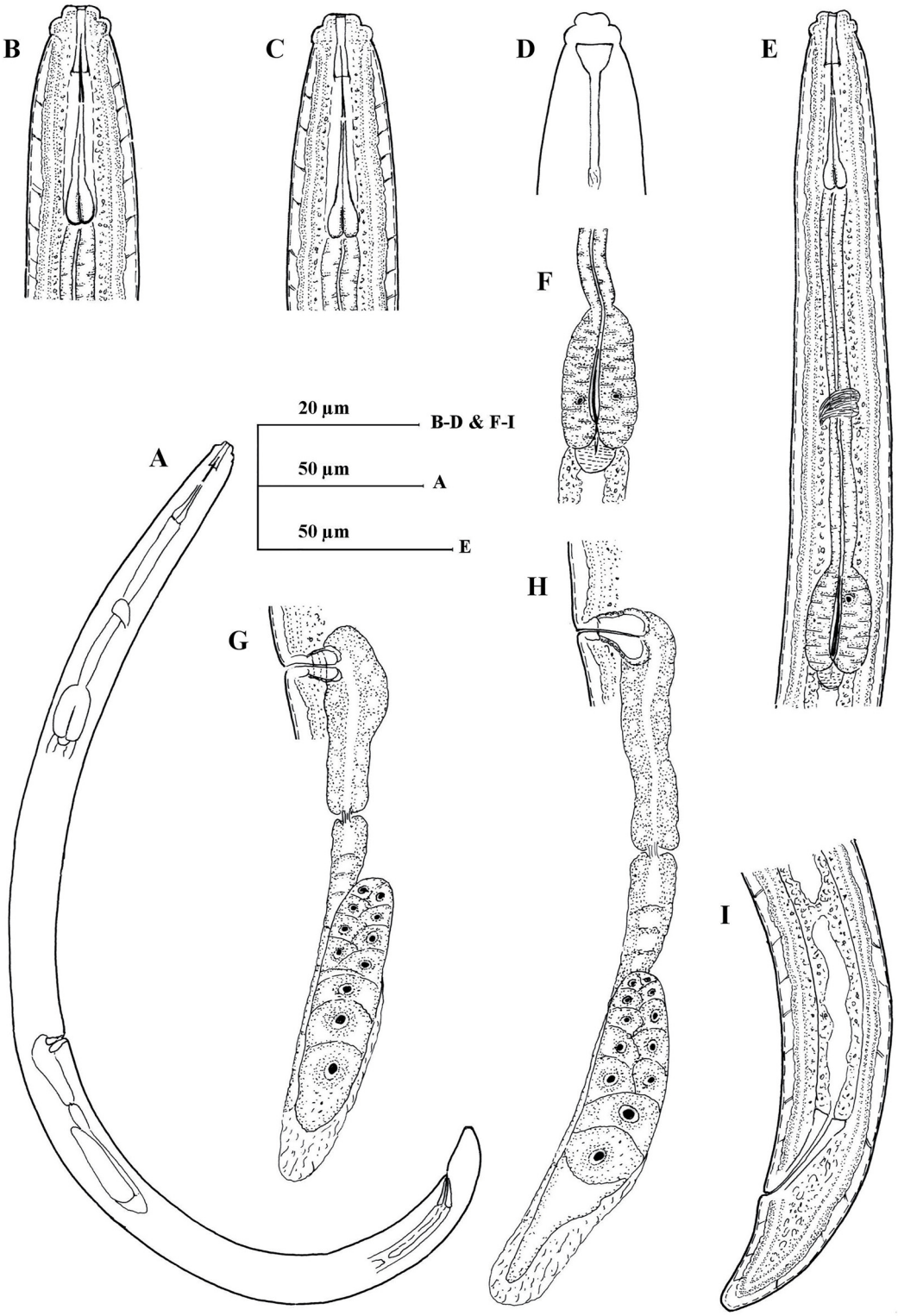

Fig. 10. *Basirotyleptus constrictus* sp. nov., ♀ (AMU/ZD/NC/*Basirotyleptus constrictus*/2–5). **A**. Paratype 3. **B**, **H**. Paratype 1. **C–E, I**. Paratype 5. **F**. Paratype 4. **G**. Paratype 2. **A**. Entire specimen. **B–C**. Anterior region. **D**. Anterior region showing amphid. **E**. Pharyngeal region. **F**. Pharyngeal bulb. **G–H**. Genital system. **I**. Posterior region.

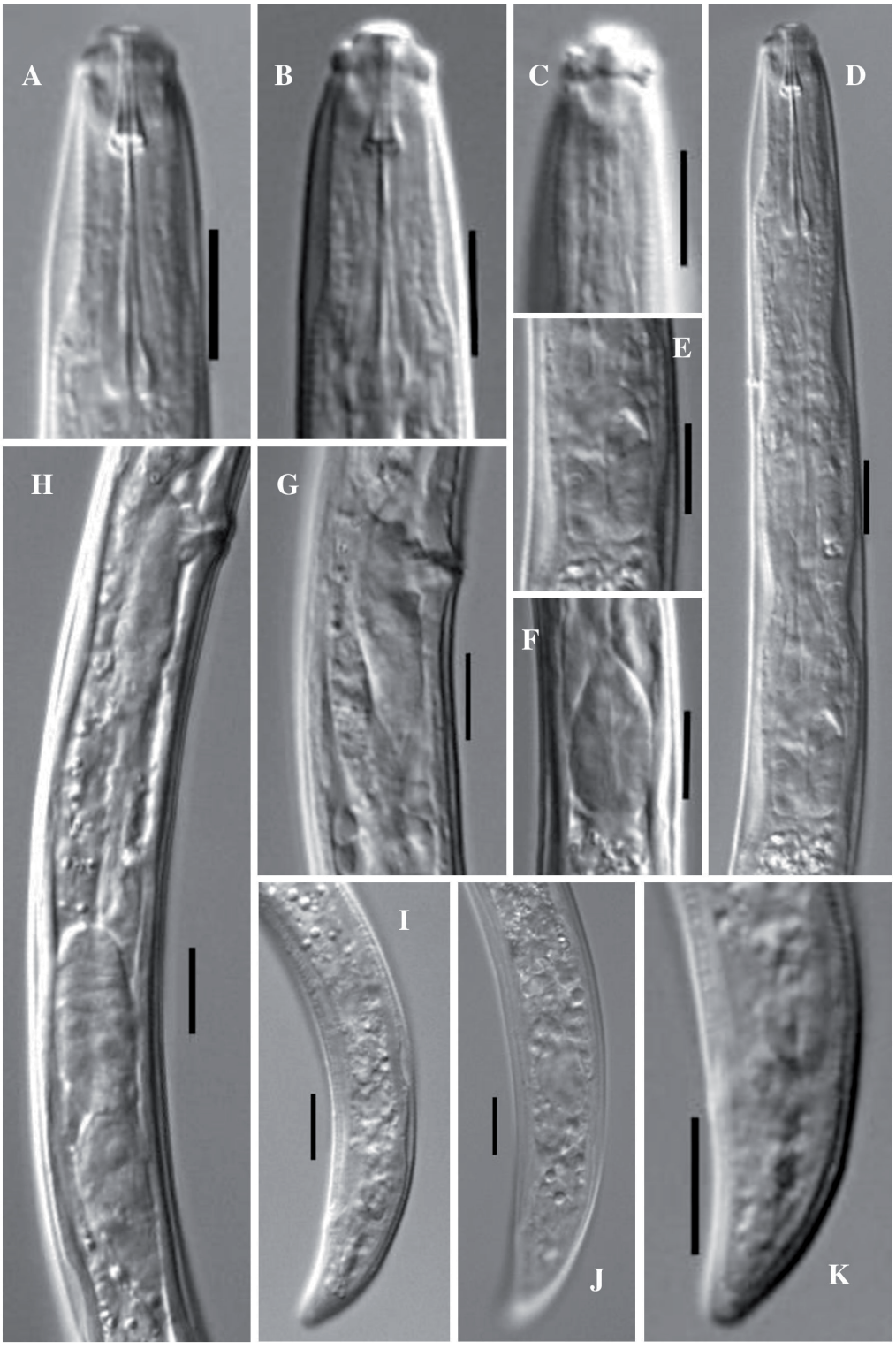

Fig. 11. *Basirotyleptus constrictus* sp. nov., ♀ (LM photographs). **A, C–F, H–I, K**. Paratypes (AMU/ZD/NC/*Basirotyleptus constrictus*/2–5). **B, G, J**. Holotype (AMU/ZD/NC/*Basirotyleptus constrictus*/1). **A**. Paratype 5. **C**. Paratype 7. **D–E**. Paratype 5. **F**. Paratype 2. **H**. Paratype 1. **I, K**. Paratype 3. **A–B**. Anterior region. **C**. Anterior region showing amphid. **D**. Pharyngeal region. **E–F**. Pharyngeal bulb. **G–H**. Genital system. **I–J**. Posterior region. **K**. Posterior end. Scale bars = 10 µm.

Table 8. Measurements of *Basirotyleptus constrictus* sp. nov. All measurements are in μm and in the form: mean ± s.d. (range).

Characters	Holotype female	Paratype females
n		8
L	497	449.7 ± 37.6 (384–496)
Body diameter at neck base	17.5	17.1 ± 0.92 (15.5–18.5)
Body diameter at mid body	19.5	18.5 ± 0.97 (16.5–19.5)
Body diameter at anus	13.5	12.7 ± 0.92 (11.5–13.5)
a	25.4	23.7 ± 1.2 (22.5–26.6)
b	4.4	4.0 ± 0.26 (3.6–4.6)
c	29.9	26.8 ± 1.8 (24.5–30)
c’	1.2	1.2 ± 0.09 (1.1–1.4)
V	54.5	52.9 ± 1.6 (51.5–56.6)
G1	0.78	1.0 ± 0.28 (0.77–1.3)
G2	21.0	21.2 ± 1.2 (19.5–23.3)
Lip region diameter	8.5	8.2 ± 0.41 (8.0–8.5)
Lip region height	4.0	4.2 ± 0.15 (4.0–4.5)
Amphidial aperture	4.5	4.3 ± 0.43 (4.0–5.0)
Odontostyle length	9.5	9.8 ± 0.23 (9.0–10)
Odontophore length	14.5	14.2 ± 0.36 (14–15)
Total stylet length	24	24.3 ± 0.39 (23.5–25)
Guiding ring from anterior end	9.0	8.9 ± 0.50 (8.0–10)
Nerve ring from anterior end	65	63.3 ± 2.0 (60–65)
Neck length	111	108.4 ± 3.0 (103–112)
Expanded part of pharynx	17	17.6 ± 0.46 (16–19)
Cardia length	4.5	4.1 ± 0.69 (3.0–5.0)
Anterior genital branch	4.0	4.9 ± 0.98 (4.0–6.0)
Posterior genital branch	104	97.6 ± 9.8 (78–111)
Vaginal length	9.0	8.9 ± 0.57 (8.5–10)
Vulva from anterior end	271	239.7 ± 22.5 (201–268)
Prerectum length	30	35.7 ± 4.5 (30–43)
Rectum length	16.5	14.9 ± 1.2 (12.5–16.5)
Tail length	16.5	16.4 ± 1.3 (15.0–18.0)

by constriction. Nerve ring at 56–60% of neck length from anterior end. Cardia short, rounded to conoid, about one-fifth to one-third of the corresponding body diameter long.

Genital system monodelphic-opisthodelphic. Ovary reflexed, measuring 51–71 µm; oocytes arranged in single row except near tip. Oviduct joining the ovary subterminally, measuring 29–54 µm, consisting of a slender distal portion and a poorly developed pars dilatata. Oviduct-uterus junction marked by weak sphincter. Uterus short and tubular, measuring 21–27 µm. Anterior genital branch absent or sometimes reduced to small sac (n = 3), 4.0–6.0 µm or about one-fifth to one-third midbody diameter long. Sperm cell absent. Vagina cylindrical, extending inwards, 8.5–10.0 µm or about two-fifths to one-half (43–53%) of midbody diameter; pars proximalis vaginae 5.0–7.0 × 3.0–4.0 µm, encircled by circular muscles; pars distalis vaginae long, 3.0–4.0 µm with slightly curved walls; pars refringens absent. Vulva apparently a transverse slit. Prerectum 2.2–3.7 and rectum 0.9–1.3 times anal body diameter long. Tail short, conoid with bluntly rounded terminus, 1.1–1.4 times anal body diameter long, with a pair of caudal pores on each side.

Male

Not found.

Remarks

In the presence of a distinct labial disc, the new species comes close to *B. discinus* Siddiqi, 1995; *B. ethiopicus* Siddiqi, 1970 and *B. nemoralis* Siddiqi, 1970 but differs from *B. discinus* in having longer odontophore (14–15 vs 9.5–10 µm), with distinct basal flanges (vs odontophore with poorly developed basal flanges); longer total stylet length (23.5–25 vs 18.5–19.5 µm); pharyngeal bulb separated by constriction (vs without constriction); anterior genital branch either absent or rarely present but very short (about 0.2–0.3 vs one anal body diameter long), lower c (24–30 vs 35) ratio and absence of male (vs present).

From *B. ethiopicus*, the new species differs in having its odontophore with distinct basal flanges (vs odontophore without flanges); pharyngeal bulb separated by constriction (vs without constriction); posterior vulva position (V = 51–56 vs 38–48) and in the size and shape of tail (tail conoid vs comparatively short, rounded to hemispheroid, c = 24–30 vs 46–77, c' = 1.1–1.4 vs 0.50–0.80).

From *B. nemoralis*, the new species differs in having odontophore with distinct basal flanges (vs odontophore without flanges), pharyngeal bulb separated by constriction (vs without constriction); posterior vulva position (V = 51–56 vs 43–50) and longer tail (15–18 vs 11.0 µm, c = 24–30 vs 45–58, c' = 1.1–1.4 vs 1.0).

Basirotyleptus goaensis sp. nov.

urn:lsid:zoobank.org:act:E0A280BC-CE80-43F7-8637-BDE34EC5017F

Figs 12–13, Table 9

Diagnosis

Basirotyleptus goaensis sp. nov. is characterized by having 0.73–0.87 mm long body; lip region cap-like, offset by deep constriction; lips rounded, slightly angular, separated, inner part elevated; odontostyle 13.0–14.5 µm long, odontophore 15.0–17.5 µm long, total stylet length 28.5–31.0 µm; pharynx with a slender anterior part, expanding gradually into a short pyriform basal bulb, occupying about 16–18% of total neck length; female genital system monodelphic-opisthodelphic; anterior genital branch reduced to a simple sac, 24.5–46.0 µm or 1.0–1.6 times midbody diameter long, tail short, rounded to conoid, 0.7–0.8 times anal body diameter long.

Etymology

The new species is named *Basirotyleptus goaensis* sp. nov. because of its type locality Goa.

Material examined

Holotype

INDIA • ♀; Goa State, South Goa district, Madgaon; 15º09′03.5″ N, 74º01′05.5″ E; 5–15 cm depth; 19 April. 2016; roots of shrubs (unidentified); slide reference number AMU/ZD/NC/*Basirotyleptus goaensis*/1.

Paratypes

INDIA • 7 ♀♀; same collection data as for holotype; slides reference number AMU/ZD/NC/*Basirotyleptus goaensis*/2–6.

Type habitat and locality

Soil samples collected from around the roots of shrubs and forest trees (unidentified) from Madgaon, Goa State.

Description

Female

Small sized nematodes, slightly curved ventrad or open C-shaped upon fixation; body cylindrical, tapering gradually towards both extremities but more so towards the anterior end. Cuticle with two distinct layers, 1.0–1.5 µm thick at anterior region, 2.0–2.5 µm at midbody and 2.5–3.0 µm on tail. Outer cuticle thin, finely striated, with distinct rows of punctations; inner layer thick, finely striated, loose, its outline irregular, with distinct radial refractive elements but more so towards posterior region. Lateral chords occupying about 24–32% of midbody diameter. Lateral body pores distinct; 1–3 in neck region; 2–3 from pharyngeal base to vulva; 3–7 in post-vulval region. Dorsal and ventral body pores indistinct. Lip region cap-like, offset by deep constriction, 2.0–2.2 times as wide as high or about one-third of the body diameter at neck base. Lips rounded, slightly angular, separated, inner part elevated. Labial and cephalic papillae distinct and slightly raised above the labial contour. Amphids large, duplex, cup-shaped, their aperture about three-fifths to two-thirds as wide as lip region diameter. Stoma a long, slender truncate cone, slightly sclerotized in the perioral region. Odontostyle slender, solid, needle-like, 1.5–1.6 times the lip region diameter long. Odontophore simple, sclerotized, about 1.1–1.2 times the odontostyle length. Guiding ring simple, refractive, at 1.2–1.3 times the lip region diameter from anterior end. Pharynx consisting of a slender anterior part, expanding gradually into a short pyriform bulb, with a perceptible thickening at the posterior part of its inner lining, occupying about 16–18% of total neck length. Nerve ring at 56–60% of neck length from anterior end. Cardia rounded to conoid, about one-seventh to one-fifth of the corresponding body diameter long.

Genital system monodelphic-opisthodelphic. Ovary reflexed, measuring 73–167 µm; oocytes arranged in single row except near tip. Oviduct joining the ovary subterminally, measuring 73–132 µm, consisting of a slender distal portion and a well-developed pars dilatata. Oviduct-uterus junction marked by distinct sphincter. Uterus short and wide tubular, measuring 36–52 µm. Anterior genital branch reduced to a simple sac, about 1.0–1.6 times midbody diameter long. Sperm cells present throughout the genital tract. Vagina cylindrical, extending inwards, 12–14 µm or about one-half (46–51%) of midbody diameter; pars proximalis vaginae 8.5–9.5 × 5.5–7.5 µm, encircled by circular muscles; pars distalis vaginae long, 4.0–5.0 µm with slightly curved walls; pars refringens absent. Vulva apparently a transverse slit. Prerectum 3.0–4.1 and rectum 0.8–1.1 times anal body diameter long. Tail short, rounded to conoid, 0.7–0.8 times anal body diameter long, with a pair of caudal pores on each side.

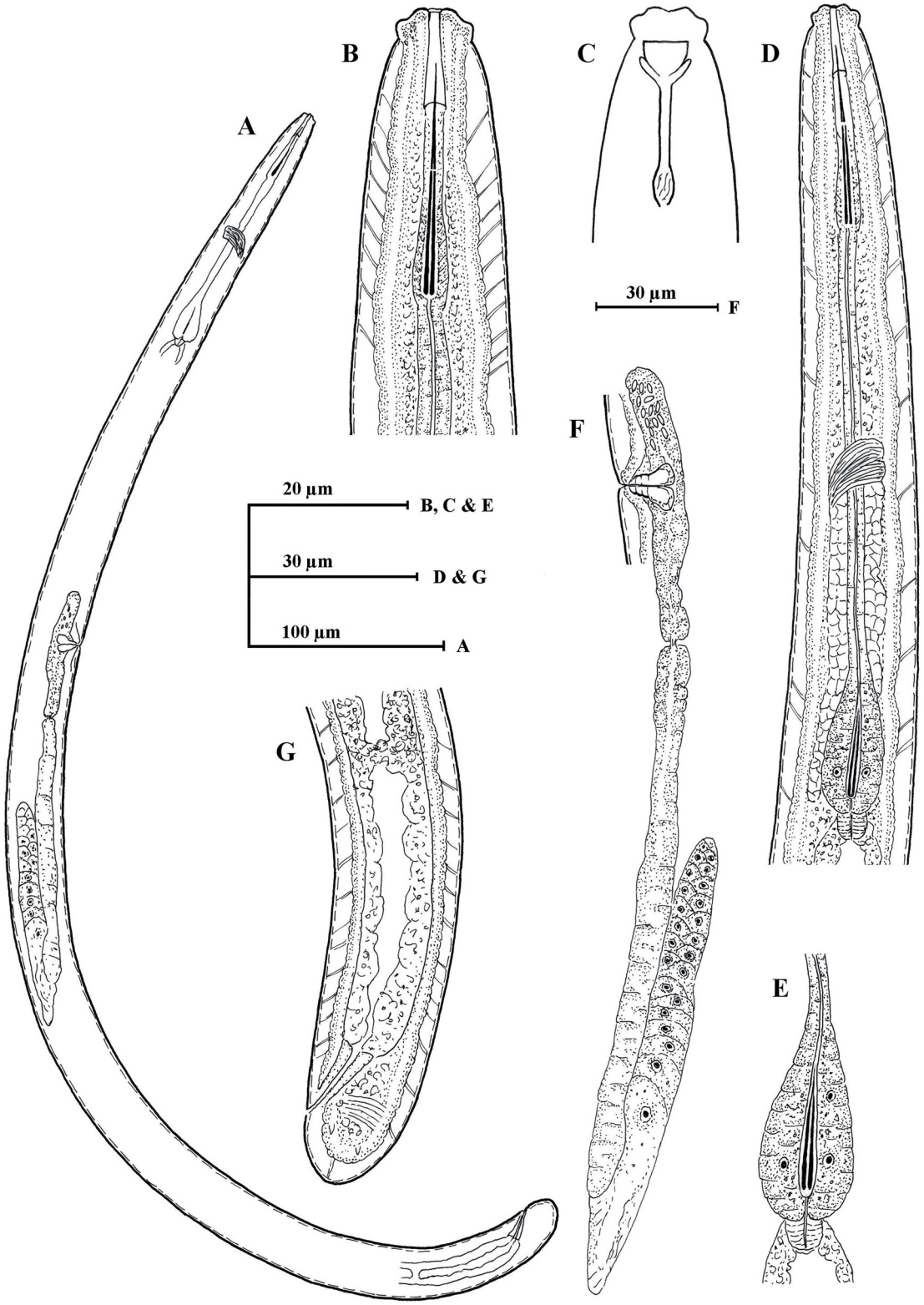

Fig. 12. *Basirotyleptus goaensis* sp. nov., ♀. **A–E, G**. Paratypes (AMU/ZD/NC/*Basirotyleptus goaensis*/2–6). **A**. Paratype 7. **B, D, G**. Paratype 4. **C**. Paratype 2. **E**. Paratype 1. **F**. Holotype (AMU/ZD/NC/*Basirotyleptus goaensis*/1). **A**. Entire specimen. **B**. Anterior region. **C**. Anterior region showing amphid. **D**. Pharyngeal region. **E**. Pharyngeal bulb. **F**. Genital system. **G**. Posterior region.

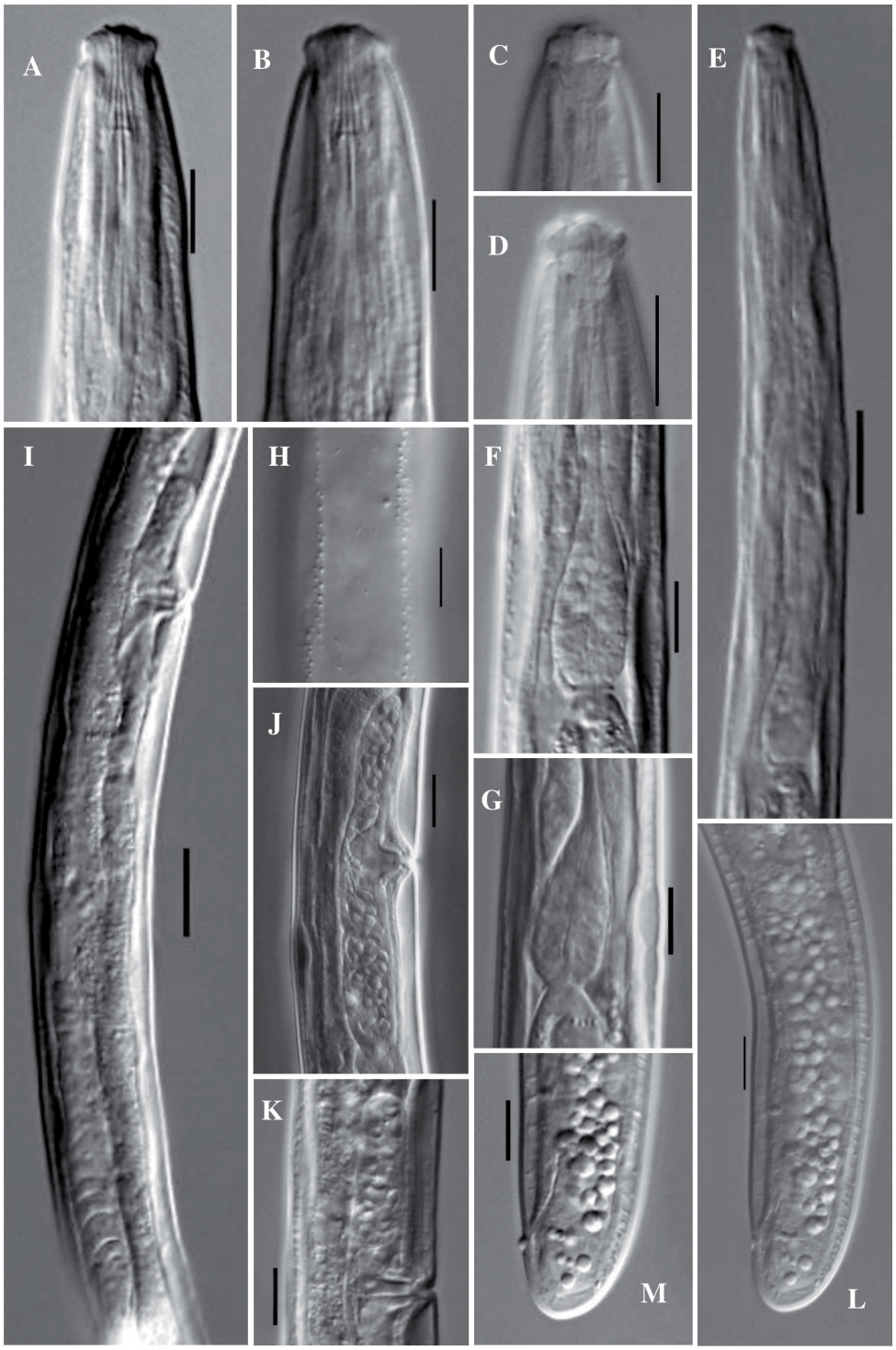

Fig. 13. *Basirotyleptus goaensis* sp. nov., ♀ (LM photographs). **A–B, D–M**. Paratypes (AMU/ZD/NC/*Basirotyleptus goaensis*/2–6). **A, D–F, H, K**. Paratype 1. **B, G, J**. Paratype 2. **C**. Holotype (AMU/ZD/NC/*Basirotyleptus goaensis*/1). **I**. Paratype 4. **L**. Paratype 5. **M**. Paratype 3. **A–B**. Anterior region. **C–D**. Anterior region showing amphid. **E**. Pharyngeal region. **F–G**. Pharyngeal bulb. **H**. Cuticle showing punctations. **I–K**. Genital system. **L**. Posterior region. **M**. Posterior end. Scale bars: A–D, F–H, J–K, M = 10 μm; E, I = 20 μm.

Table 9. Measurements of *Basirotyleptus goaensis* sp. nov. All measurements are in µm and in the form: mean ± s.d. (range)

Characters	Holotype female	Paratype females
n		7
L	849	813.6 ± 48.7 (730–873)
Body diameter at neck base	24.5	23.8 ± 1.2 (22.0–25.0)
Body diameter at mid body	26.5	27.1 ± 1.4 (24.5–28.5)
Body diameter at anus	18	18.1 ± 1.3 (16.0–20.5)
a	32.1	29.4 ± 1.2 (28.4–32.1)
b	6.1	5.7 ± 0.33 (5.3–6.2)
c	54.2	55.3 ± 3.1 (51.6–62.0)
c’	0.84	0.79 ± 0.05 (0.72–0.88)
V	38.9	36.6 ± 0.93 (36.0–38.2)
G1	4.1	3.6 ± 0.34 (3.1–4.0)
G2	20.0	23.0 ± 2.3 (19.5–25.8)
Lip region diameter	9.0	9.0 ± 0.39 (8.5–10)
Lip region height	4.0	4.1 ± 0.24 (4.0–4.5)
Amphidial aperture	6.0	5.6 ± 0.35 (5.0–6.0)
Odontostyle length	14	13.7 ± 0.38 (13.0–14.5)
Odontophore length	16.5	16.1 ± 0.73 (15.0–17.5)
Total stylet length	30.5	29.9 ± 0.93 (28.5–31.0)
Guiding ring from anterior end	12	11.8 ± 0.53 (10.5–12.5)
Nerve ring from anterior end	79	79.3 ± 2.1 (75–83)
Neck length	137	137.9 ± 3.4 (132–144)
Expanded part of pharynx	24.5	23.8 ± 1.1 (22.5–26.0)
Cardia length	5.0	4.7 ± 0.39 (4.0–5.0)
Anterior genital branch	35	31.6 ± 6.4 (24.5–46.0)
Posterior genital branch	170	191.2 ± 22.4 (152–225)
Vaginal length	13.5	13.4 ± 0.64 (13.0–14.5)
Vulva from anterior end	330	304.1 ± 17.5 (279–330)
Prerectum length	72	67.3 ± 6.8 (52–73)
Rectum length	21	18.0 ± 2.0 (14.5–21.5)
Tail length	15.5	14.4 ± 1.2 (12.0–15.5)

Male

Not found.

Remarks

In the presence of a comparatively long body, simple odontophore and presence of long anterior uterine sac, the new species comes close to *B. upicus* Ahmad & Jairajpuri 1979; *B. rotundicaudatus* (Khan, 1987); *B. basiri* Jairajpuri, 1964 and *B. pini* Siddiqi & Khan, 1965 but differs from *B. upicus* in the presence of distinct punctations on cuticle (vs punctations absent); lip region with differently shaped amphid (duplex, cup-shaped vs simple, cup-shaped); guiding ring slightly more posterior (1.2–1.3 times vs one lip region diameter from anterior end); longer total stylet and odontophore (stylet 28.5–31.0 vs 25–27 µm, odontophore 15.0–17.5 vs 11–13 µm); longer pharyngeal bulb (22.5–26.0 vs 20–22 µm or 16–18 vs 15–16% of total neck length); slightly anterior vulva position (V = 36–39 vs 39–42); longer prerectum (52–73 vs 45–50 µm or 3.0–4.1 vs 2.5–2.7 times anal body diameter); shorter tail (12–15 vs 17–20 µm, c = 51–62 vs 41–48) and absence of male (vs present).

From *B. rotundicaudatus*, the new species differs in having differently shaped amphids (duplex, cup-shaped vs simple, cup-shaped), absence of hypodermal glands (vs present); pharyngeal expansion gradual (vs abrupt) and longer pharyngeal bulb (22.5–26.0 vs 19 µm); absence of flanges at base of odontophore (vs small flanges present); shorter anterior uterine sac (24.5–46.0 vs 65 µm); higher c (51–62 vs 42–47) ratio and absence of male (vs male present).

From *B. basiri*, the new species differs in having longer body (L = 0.73–0.87 vs 0.45–0.71 mm), presence of punctations on cuticle (vs punctations absent); lip region offset by deep constriction (vs slight constriction); differently shaped amphid (duplex, cup-shaped vs simple, stirrup-shaped); wider lip region (8.5–10.0 vs 8.0–8.5 µm); longer total stylet length and odontophore (28.5–31.0 vs 22.0–24.5 µm, 15.0–17.5 vs 11.5–13 µm); longer pharyngeal bulb (22.5–26.5 vs 16.5–20.5 µm) and absence of male (vs present).

From *B. pini*, the new species differs in having a longer body (L = 0.73–0.87 vs 0.49–0.62 mm), presence of punctations on cuticle (vs punctations absent); longer odontostyle (13.0–14.5 vs 11.0–12.5 µm); longer pharyngeal bulb (22.5–26.5 vs 17–20.5 µm); longer anterior uterine sac (24.5–46 vs 8.0–18 µm or 1.0–1.6 times vs less than one midbody diameter long).

Basirotyleptus neocaudatus sp. nov.

urn:lsid:zoobank.org:act:E9DD76EF-C8B7-450B-B019-F77513AE8C42

Figs 14–15, Table 10

Diagnosis

Basirotyleptus neocaudatus sp. nov. is characterized by having 0.31–0.44 mm long body; lip region cap-like, offset by constriction; lips rounded, inner part slightly elevated; odontostyle 7.5–9.5 µm long, odontophore 10–13 µm long, total stylet length 18–22 µm; pharynx a slender anterior part, expanding abruptly into a short pyriform basal bulb, occupying about 14–19% of total neck length; female genital system monodelphic-opisthodelphic; anterior genital branch absent or rarely a very small sac, 3.0–5.0 µm or less one-third midbody diameter long, tail with convex-conoid to digitate acute terminus, 1.1–1.7 times anal body diameter long; male with 20.5 µm long spicules, 5.5 µm long lateral guiding pieces and two ventromedian supplements.

Etymology

The new species is named *Basirotyleptus neocaudatus* sp. nov. because of its tail close to *B. caudatus*.

Material examined

Holotype

INDIA • ♀; Kerala State, Kasaragad district, Ranipuram National Park; 12.4º26′18.3″ N, 75.3º58′94.4″ E; 5–15 cm depth; 7 Nov. 2016; soil samples collected from around the roots of grasses (unidentified); slide reference number AMU/ZD/NC/*Basirotyleptus neocaudatus*/1.

Paratypes

INDIA • 5 ♀♀, 1 ♂; same collection data as for holotype; slides reference number AMU/ZD/NC/*Basirotyleptus neocaudatus*/2–4.

Additional material

INDIA – **Kerala State** • 14 ♀♀; Palakkad district, Mukkali Forest; 11°03′40.7″ N, 76°32.7′23.8″ E; 5–15 cm depth; 26 Oct. 2017; soil samples collected from around the roots of grasses (unidentified); slides reference number AMU/ZD/NC/*Basirotyleptus neocaudatus*/5–9 • 16 ♀♀; Idukki district, Muttam; 9°49′22.8″ N, 76°43′40.8″ E; 5–15 cm depth; 30 Oct. 2017; soil samples collected from around the roots of grasses (unidentified); slides reference number AMU/ZD/NC/*Basirotyleptus neocaudatus*/10–15.

Type habitat and locality

Soil samples collected from around the roots of grasses (unidentified) from Ranipuram National Park, Kasaragad district, Kerala State.

Other habitat and localities

Soil samples collected from around the roots of grasses (unidentified) from Mukkali forest, Palakkad district and from Muttam, Idukki district, Kerala State.

Description

Female

Small sized nematodes, slightly curved ventrad or open C-shaped upon fixation; body cylindrical, tapering gradually towards both extremities but more so towards the anterior end. Cuticle with two distinct layers, 1.0–1.5 µm thick at anterior region, 1.5–2.0 µm at midbody and 2.0–2.5 µm on tail. Outer cuticle thin, with fine transverse striations; inner layer thick, its outline loose, irregular, distinctly striated, with distinct radial refractive elements. Lateral chords occupying about 25–35% of midbody diameter. Lateral body pores distinct; one at odontostyle-odontophore region; 1–2 in neck region; 2–3 at neck to vulval region and 3–9 at post-vulval region. Dorsal and ventral body pores indistinct. Lip region cap-like, offset by constriction, 2.0–2.3 times as wide as high or about two-fifths of the body diameter at neck base. Lips slightly angular, separated, inner part slightly elevated. Labial and cephalic papillae distinct but not interfering with labial contour. Amphids stirrup-shaped, their aperture about one-half to three-fifths as wide as lip region diameter. Stoma a long, slender truncate cone, slightly sclerotized in the perioral region. Odontostyle slender, solid, needle-like, 1.0–1.4 times the lip region diameter long. Odontophore simple, sclerotized, slightly swollen at base surrounded by pharyngeal tissue, 1.2–1.5 times the odontostyle length. Guiding ring simple, refractive, at 1.1–1.4 times the lip region diameter from anterior end. Pharynx consisting of a slender anterior part, expanding abruptly into a short pear-shaped basal bulb, with a perceptible thickening at the posterior part of its inner lining, occupying about 14–19% of total neck length. Nerve ring at 49–64% of neck length from anterior end. Cardia rounded to conoid, about one-sixth to one-third of the corresponding body diameter long.

Genital system monodelphic-opisthodelphic. Ovary reflexed, measuring 33–69 µm; oocytes arranged in single row except near tip. Oviduct joining the ovary subterminally, measuring 27–52 µm, consisting of a slender distal portion and a well-developed pars dilatata. Oviduct-uterus junction marked by weak

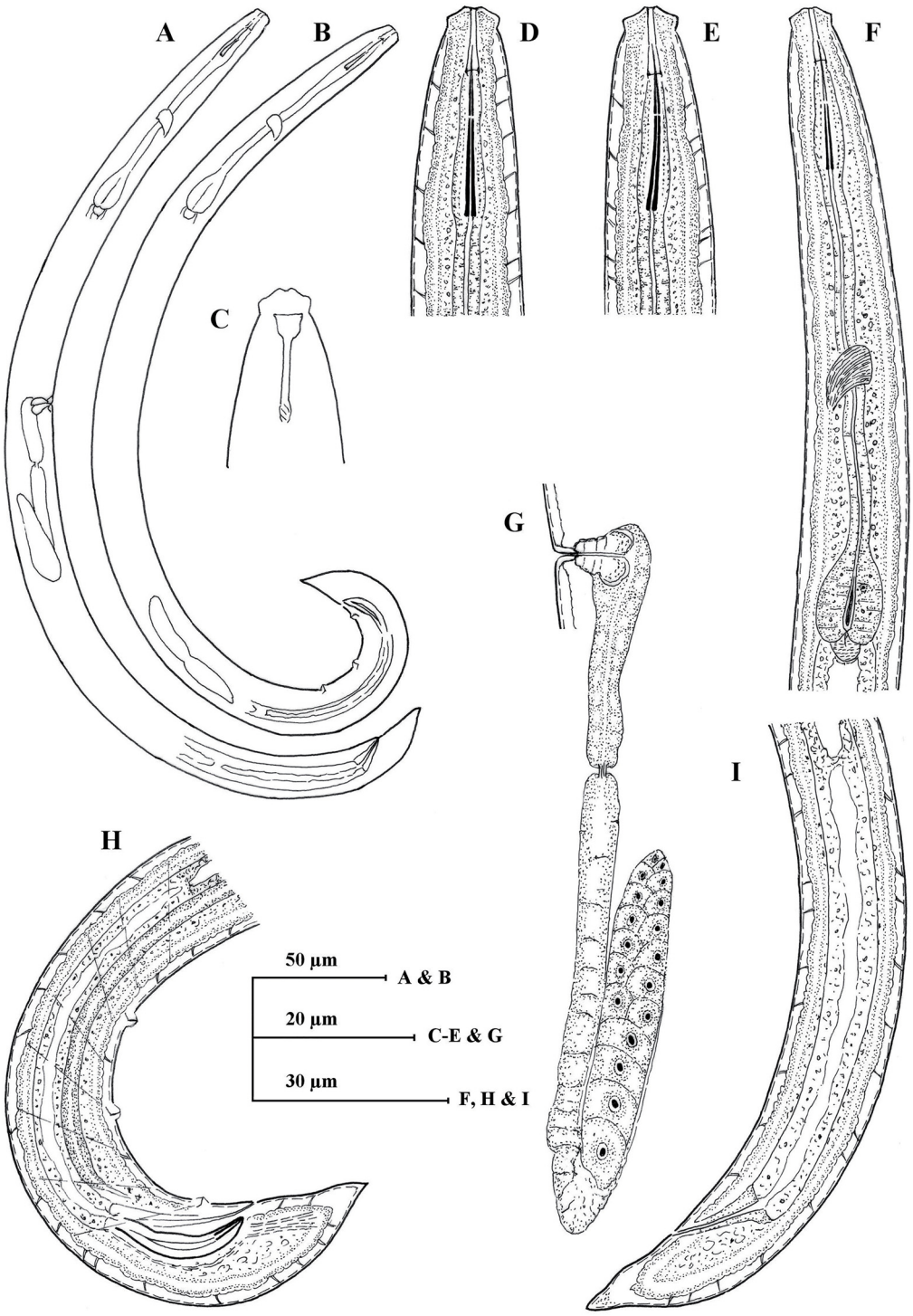

Fig. 14. *Basirotyleptus neocaudatus* sp. nov. **A, C, E–F, I**. Holotype, ♀ (AMU/ZD/NC/*Basirotyleptus neocaudatus*/1). **B, H**. Paratype, ♂ (AMU/ZD/NC/*Basirotyleptus neocaudatus*/4). **D**. Specimen 10, ♀ (AMU/ZD/NC/*Basirotyleptus neocaudatus*/6). **G**. Paratype 1, ♀ (AMU/ZD/NC/*Basirotyleptus neocaudatus*/2). **A**. Entire female. **B**. Entire male. **C**. Female, anterior region showing amphid. **D–E**. Female, anterior region. **F**. Female, pharyngeal region. **G**. Female, genital system. **H**. Male, posterior region. **I**. Female, posterior region.

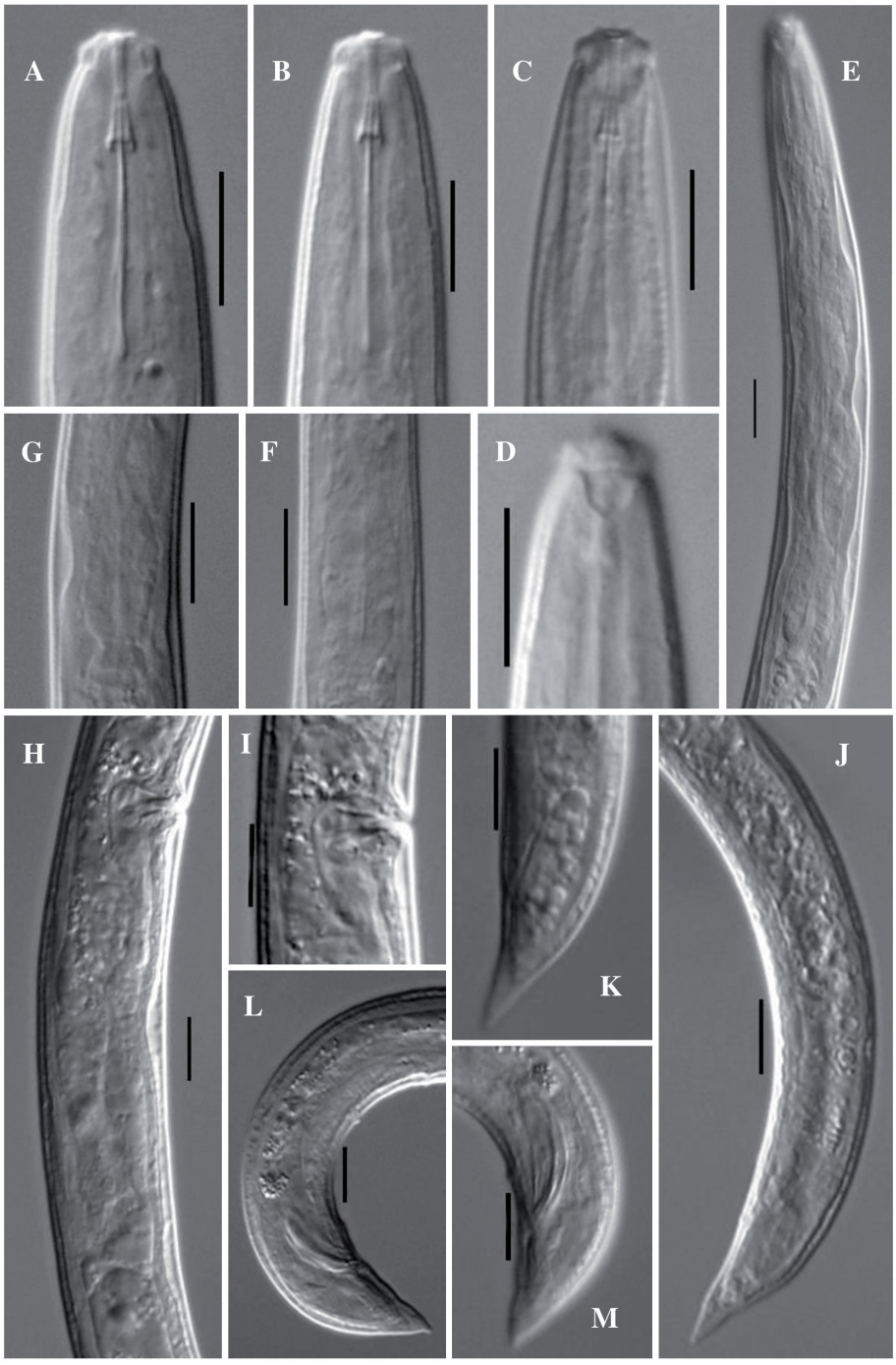

Fig. 15. *Basirotyleptus neocaudatus* sp. nov. (LM photographs). **A, C–D, J–M**. Paratypes (AMU/ZD/NC/*Basirotyleptus neocaudatus*/2–4). **A, D**. Paratype 6, ♀. **B**. Specimen 14, ♀ (AMU/ZD/NC/*Basirotyleptus neocaudatus*/9). **C**. Paratype 4, ♀. **E**. Specimen 21, ♀ (AMU/ZD/NC/*Basirotyleptus neocaudatus*/11). **F**. Specimen 24, ♀ (AMU/ZD/NC/*Basirotyleptus neocaudatus*/12). **G**. Specimen 25, ♀ (AMU/ZD/NC/*Basirotyleptus neocaudatus*/12). **H–I**. Holotype, ♀ (AMU/ZD/NC/*Basirotyleptus neocaudatus*/1). **J**. Paratype 2, ♀. **K**. Paratype 1, ♀. **L–M**. Paratype, ♂. **A–C**. Female, anterior region. **D**. Female, anterior region showing amphid. **E**. Female, pharyngeal region. **F–G**. Female, pharyngeal bulb. **H**. Female, genital system. **I**. Vulval region. **J**. Female, posterior region. **K**. Female, posterior end. **L**. Male, posterior region. **M**. Male, posterior end. Scale bars =10 µm.

Table 10. Measurements of *Basirotyleptus neocaudatus* sp. nov. All measurements are in µm and in the form: mean ± s.d. (range).

Localities		**Type population**		**Palakkad population**	**Idukki population**
Characters	**Holotype female**	**Paratypes females**	**Paratype male**	**females**	**males**
n		5	1	14	16
L	417	397.6 ± 31.3 (343–441)	418	349.3 ± 24.6 (312–402)	367.8 ± 22.6 (343–434)
Body diameter at neck base	18.0	16.9 ± 1.0 (15.5–18.5)	17.5	16.6 ± 0.73 (15.5–17.5)	15.8 ± 0.78 (15–18)
Body diameter at mid body	19.5	18.2 ± 0.99 (16–20)	19.5	18.1 ± 0.87 (16.5–19.5)	17.3 ± 0.94 (15.5–18.5)
Body diameter at anus	12.5	11.9 ± 0.73 (10.5–12.5)	16.5	11.1 ± 0.70 (10–13)	10.6 ± 0.90 (10–13)
a	20.8	21.3 ± 1.4 (19.4–23.9)	21.3	19.2 ± 0.81 (17.7–21.0)	21.2 ± 1.3 (18.9–23.3)
b	4.0	3.8 ± 0.15 (3.8–4.1)	3.9	3.9 ± 0.33 (3.4–4.6)	3.9 ± 0.41 (3.5–5.2)
c	24.5	23.1 ± 1.7 (20.5–25.5)	23.7	25.2 ± 2.4 (21.6–30.8)	23.0 ± 2.7 (18.0–26.5)
c’	1.3	1.4 ± 0.07 (1.3–1.5)	1.0	1.2 ± 0.10 (1.1–1.5)	1.5 ± 0.15 (1.2–1.7)
V	43.7	43.2 ± 0.63 (42.8–44.5)	–	44.8 ± 1.6 (42.7–48.3)	44.6 ± 1.7 (41.4–48.0)
G1	0.93	1.1 ± 0.03 (1.1–1.2)	–	1.1 ± 0.20 (0.8–1.5)	1.0 ± 0.19 (0.74–1.4)
G2	19.9	19.6 ± 3.4 (16.0–25.2)	–	20.6 ± 2.1 (16.9–24.6)	20.0 ± 1.3 (18.8–23.4)
Lip region diameter	7.0	6.7 ± 0.2 (6.5–7.0)	7.0	6.8 ± 0.12 (6.5–7.0)	6.8 ± 0.12 (6.5–7.0)
Lip region height	3.5	3.0 ± 0.2 (3.0–3.5)	3.5	3.2 ± 0.20 (3.0–3.5)	3.2 ± 0.23 (3.0–3.5)
Amphidial aperture	3.5	3.4 ± 0.19 (3.0–3.5)	3.5	3.6 ± 0.30 (3.0–4.0)	3.7 ± 0.23 (3.5–4.0)
Odontostyle length	8.0	8.4 ± 0.48 (8.0–9.0)	9.5	8.4 ± 0.55 (7.5–9.5)	8.0 ± 0.34 (7.5–9.0)
Odontophore length	11	11.2 ± 0.75 (10–12)	11.5	11.2 ± 0.58 (10–13)	11.3 ± 0.82 (10.0–12.5)
Total stylet length	19	19.6 ± 1.0 (18–20.5)	21	19.7 ± 1.1 (19–22)	19.2 ± 1.0 (18–21)
Guiding ring from anterior end	8.5	8.1 ± 0.39 (8.0–9.0)	8.5	8.6 ± 0.30 (8.0–9.0)	8.1 ± 0.49 (7.0–9.0)
Nerve ring from anterior end	56	53.5 ± 4.6 (47–57)	60	49.6 ± 2.6 (44–54)	53.5 ± 3.7 (45–59)
Neck length	101	98.4 ± 6.2 (90–105)	105	88.3 ± 5.2 (78–97)	94.5 ± 6.8 (84–103)
Expanded part of pharynx	15	16.4 ± 1.8 (15–20)	15.5	16.7 ± 1.1 (14.0–18.5)	15.6 ± 0.83 (15–17)
Cardia length	4.0	3.9 ± 0.61 (3.0–5.0)	4.0	4.2 ± 0.58 (3.0–5.0)	3.8 ± 0.44 (3.0–5.0)
Anterior genital branch	4.0	4.6 ± 0.42 (4.0–5.0)	–	4.1 ± 0.66 (3.0–5.0)	4.0 ± 0.70 (3.0–5.0)
Posterior genital branch	83	78.8 ± 9.3 (65–88)	–	73.5 ± 9.9 (61–98)	75.3 ± 6.7 (68–96)
Vaginal length	10.5	10.3 ± 0.99 (9.0–12)	–	10.1 ± 0.40 (10–11)	9.8 ± 0.35 (9.0–11)
Vulva from anterior end	182	175.4 ± 12.0 (152–189)	–	157.1 ± 9.5 (135–176)	164.2 ± 10.0 (146–188)
Prerectum length	41	39.3 ± 3.7 (32–43)	61	31.9 ± 5.0 (27–43)	33.6 ± 5.3 (27–46)
Rectum length	12	13.3 ± 0.99 (11.5–14.5)	23.5	14.9 ± 1.8 (12.5–20.5)	14.6 ± 1.3 (10–17)
Tail length	16.5	16.8 ± 0.73 (15–18)	17.5	13.9 ± 1.1 (12–15)	16.1 ± 1.8 (13–20)
Spicules length	–	–	20.5	–	–
Lateral guiding pieces	–	–	5.5	–	–
Ventromedian supplements	–	–	2	–	–

sphincter. Uterus short and tubular, measuring 13–25 µm. Anterior genital branch completely absent or rarely reduced to a very small sac, less than one-third midbody diameter long. Vagina cylindrical, extending inwards, 9.0–12.0 µm or about one-half to three-fifths (50–61%) of midbody diameter; pars proximalis vaginae 5.5–8.0 × 3.5–5.5 µm, encircled by circular muscles; pars distalis vaginae 3.0–4.0 µm with slightly curved walls; pars refringens absent. Vulva apparently a transverse slit. Prerectum 2.2–4.7 and rectum 0.9–1.5 times anal body diameter long. Tail convex-conoid to digitate with acute terminus, 1.1–1.7 times anal body diameter long, with a pair of caudal pores on each side.

Male

General morphology similar to that of female except for posterior region being more ventrally curved. Genital system diorchic, testes opposed, sperm cell spindle-shaped. In addition to adcloacal pair at 7 µm from cloacal aperture, there are two irregularly spaced ventromedian supplements, first one located beyond the range of spicules, 19 µm from adcloacal pair and second 15 µm from first. Spicules typically dorylaimoid, curved ventrad, slightly robust, 5.3 times as long as wide and 1.2 times as long as cloacal body diameter, dorsal contour regularly convex, ventral contour bearing a moderately developed hump and hollow, curvature 129º, head occupying 13% of total spicules length, median pieces 12 times as long as wide or occupying 35% of the spicules maximum width, reaching the spicules tip, posterior end 2 µm wide. Lateral guiding pieces distinct, rod-like, about 5.5 times as long as wide or about one-fourth of the spicules length. Prerectum 3.7 and rectum 1.4 times cloacal body diameter long. Tail convex-conoid with acute terminus, about one cloacal body diameter long, with a pair of caudal pores on each side.

Remarks

In the presence of a short body and conoid tail with acute terminus, the new species comes close to *B*. *caudatus* Jairajpuri, 1966 and *B*. *conicaudatus* sp. nov. but, differs from the former in the absence of liplets (vs present); differently shaped amphids (stirrup-shaped vs cup-shaped); shorter odontostyle (7.5–9.5 vs 12 µm); odontophore longer than odontostyle (vs odontophore shorter than odontostyle, about one-half as long as odontostyle length) and presence of male (vs male absent).

From *B*. *conicaudatus* sp. nov., the new species differs in having a simple odontophore, without basal flanges (vs with distinct basal flanged); absence of anterior uterine sac (vs anterior uterine sac present); anterior vulva position (V = 41–48 vs 55–58) and more ventromedian supplements (2 vs 1).

In the presence of a conoid tail, the new species also comes close to *B*. *lieberi* Goseco *et al*., 1974 and *B*. *westralis* Siddiqi, 1970 but differs from the former in having shorter body (L = 0.31–0.44 vs 0.67–0.90 mm); female genital system mono-opisthodelphic (vs mono-prodelphic) and smaller spicules (20.5 vs 24–28 µm).

From *B*. *westralis*, the new species differs in having shorter body (L = 0.31–0.44 vs 0.55–0.75 mm); female genital system mono-opisthodelphic (vs amphidelphic) and smaller spicules (20.5 vs 22–25 µm).

Basirotyleptus siddiqii sp. nov.
urn:lsid:zoobank.org:act:EA6FF0DE-F046-4879-B5C1-A0DC37394D25
Figs 16–17, Table 11

Diagnosis

Basirotyleptus siddiqii sp. nov. is characterized by having robust body, 0.36 mm long; lip region cap-like, low, flat, offset by depression; lips rounded, inner part slightly elevated; odontostyle 7.5–8.0 µm long, odontophore 10.0–10.5 µm long, total stylet length 17.5–18.5 µm; pharynx slender with slightly muscular anterior part, expanding gradually into a short pear-shaped basal bulb, occupying about 15–

16% of total neck length; female genital system monodelphic-opisthodelphic; anterior genital branch reduced to small sac, 4.0–6.0 µm or one-fourth to one-third midbody diameter long, tail short, bluntly rounded, 0.9 times anal body diameter long.

Etymology

The new species is named after late Dr Mohammad Rafiq Siddiqi in recognition of his contribution to nematode taxonomy.

Material examined

Holotype

INDIA • ♀; Tamil Nadu State, Nilgiris hill district, Naduvattum; 11º28′37.8″ N, 76º32′36.7″ E; 5–15 cm depth; 15 Nov. 2016; roots of shrubs (unidentified); slide reference number AMU/ZD/NC/*Basirotyleptus siddiqii*/1.

Paratype

INDIA • 1 ♀; same collection data as for holotype; slide reference number AMU/ZD/NC/*Basirotyleptus siddiqii*/2.

Type habitat and locality

Soil samples collected from around the roots of shrubs (unidentified) from Naduvattum, Nilgiris Hill, Tamil Nadu State.

Description

Female

Very small size, robust nematodes, curved ventrad or open C-shaped upon fixation; body cylindrical, tapering gradually towards both extremities but more so towards the anterior end. Cuticle with two distinct layers, 1.0 µm thick at anterior region, 1.5 µm at midbody and 2.0 µm on tail. Outer cuticle thin, with fine transverse striations; inner layer thick, finely striated, loose, with radial refractive elements. Lateral chords occupying about 22–24% of midbody diameter. Lateral, dorsal and ventral body pores indistinct. Lip region cap-like, low, flat, offset by depression, 2.5 times as wide as high or about two-fifths of the body diameter at neck base. Lips rounded, amalgamated, inner part slightly elevated. Amphids stirrup-shaped, their aperture about two-thirds as wide as lip region diameter. Stoma a long, slender truncate cone, slightly sclerotized in the perioral region. Odontostyle short, slender, solid, needle-like, 1.0–1.1 times the lip region diameter long. Odontophore simple, sclerotized, with basal flanges, about 1.3 times the odontostyle length. Guiding ring simple, refractive, at 1.0–1.1 times the lip region diameter from anterior end. Pharynx consisting of a slender anterior part, expanding gradually into a short pear-shaped basal bulb, with a perceptible thickening at the posterior part of its inner lining, occupying about 15–16% of total neck length. Nerve ring at 52–53% of neck length from anterior end. Cardia rounded to conoid, about one-fourth of the corresponding body diameter long.

Genital system monodelphic-opisthodelphic. Ovary reflexed, measuring 42–53 µm; oocytes arranged in single row except near tip. Oviduct joining the ovary subterminally, measuring 36–42 µm, consisting of a slender distal portion and a well-developed pars dilatata. Oviduct-uterus junction marked by distinct sphincter. Uterus short and wide tubular, measuring 17–18 µm. Anterior genital branch reduced to a small sac, 4.0–6.0 µm or one-fourth to one third of midbody diameter. Sperms absent. Vagina cylindrical, extending inwards, 9.5 µm or about one-half (53%) of midbody diameter; pars proximalis vaginae 6.0–6.5 × 4.0–4.5 µm, encircled by circular muscles; pars distalis 3.5–4.0 µm with slightly curved walls; pars refringens absent. Vulva apparently a transverse slit. Prerectum 6.0–6.8 and rectum 1.2–1.4 times anal body diameter long. Tail short, conoid, 0.8–0.9 times anal body diameter long, with a pair of caudal pores on each side.

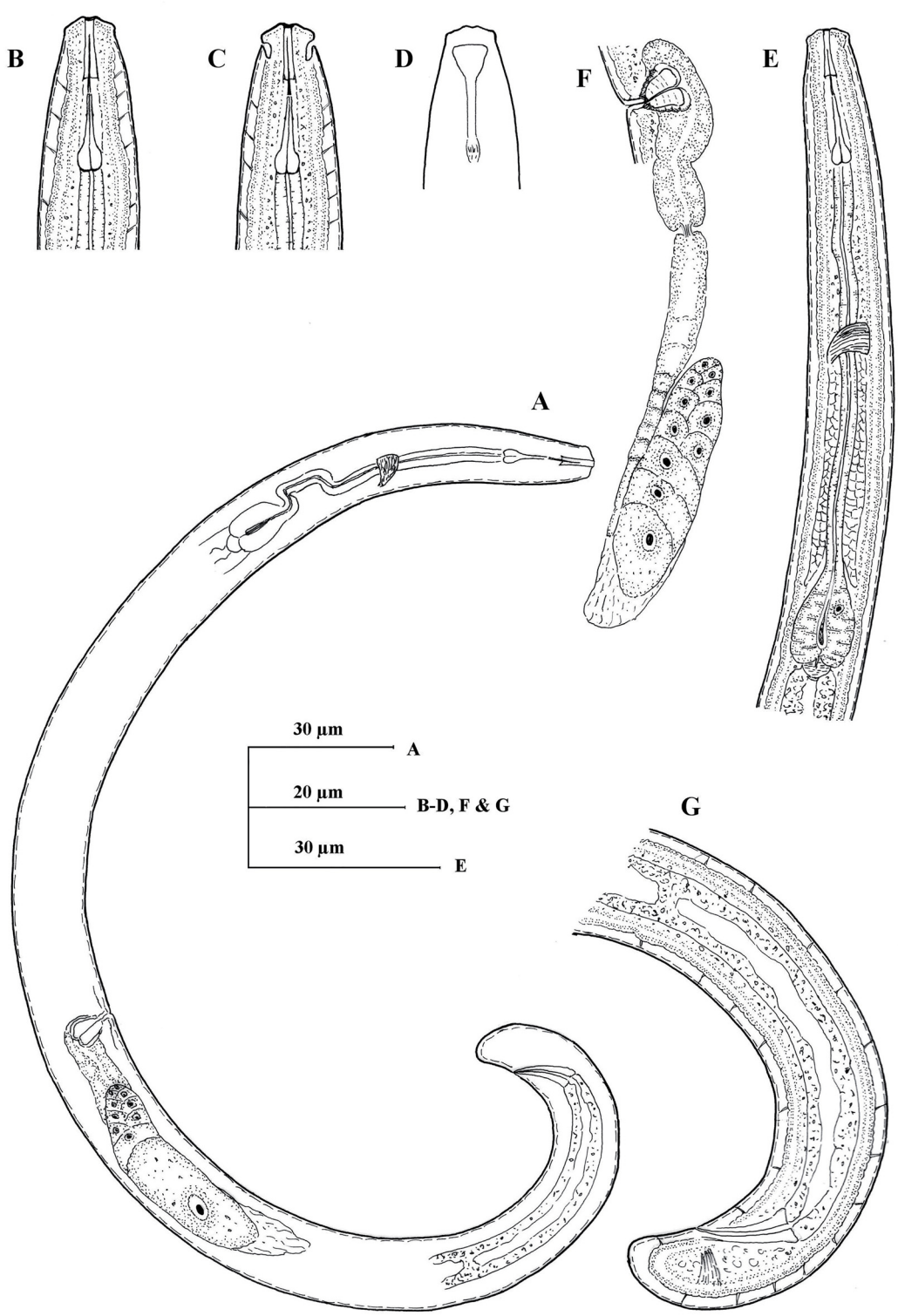

Fig. 16. *Basirotyleptus siddiqii* sp. nov., ♀. **A–B, D–G**. Holotype (AMU/ZD/NC/*Basirotyleptus siddiqii*/1). **C**. Paratype 1 (AMU/ZD/NC/*Basirotyleptus siddiqii*/2). **A**. Entire specimen. **B–C**. Anterior region. **D**. Anterior region showing amphid. **E**. Pharyngeal region. **F**. Genital system. **G**. Posterior region.

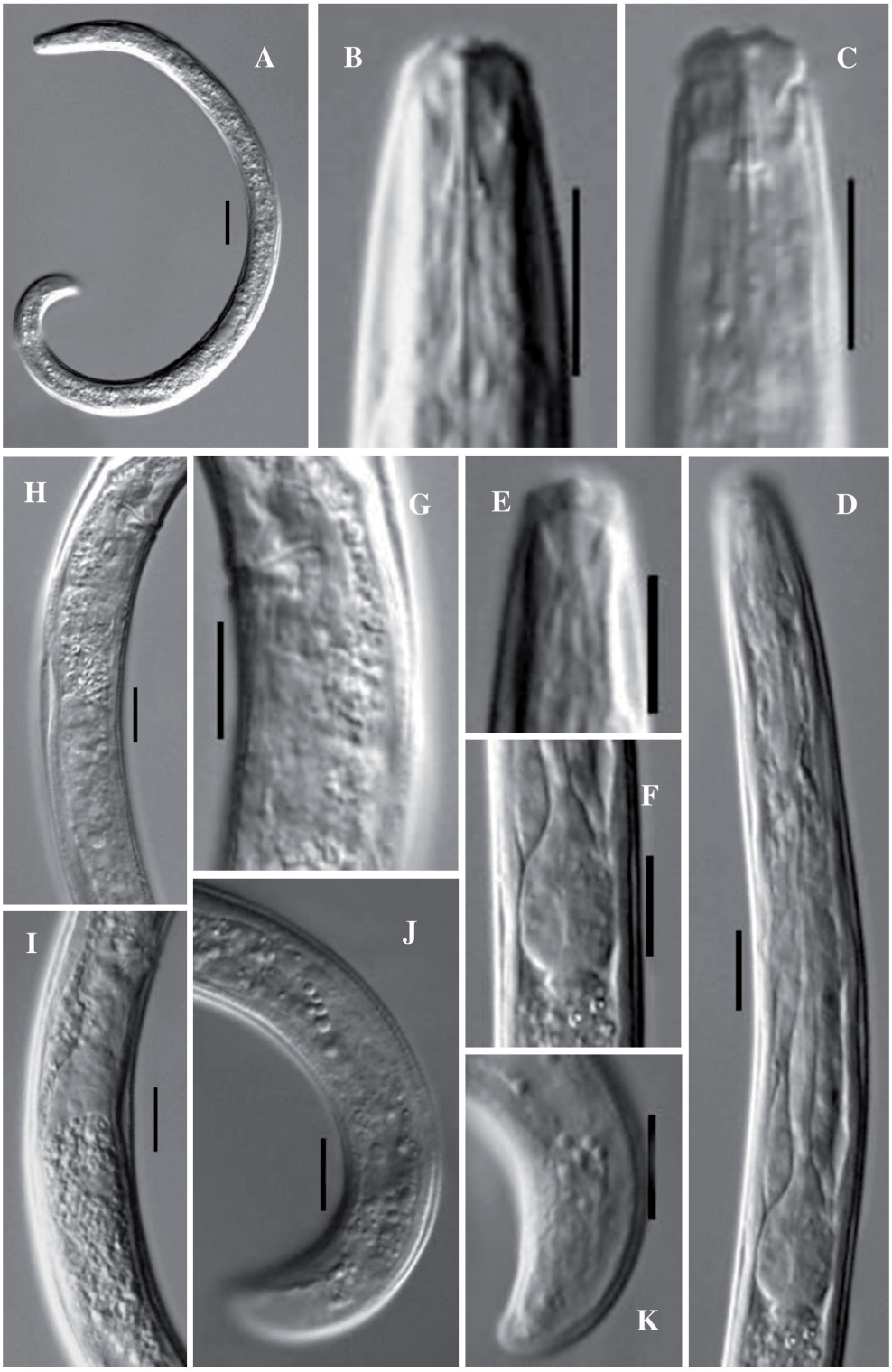

Fig. 17. *Basirotyleptus siddiqii* sp. nov., ♀ (LM photographs). **A–B, E, I–K**. Holotype (AMU/ZD/NC/*Basirotyleptus siddiqii*/1). **C–D, F–H**. Paratype 1 (AMU/ZD/NC/*Basirotyleptus siddiqii*/2). **A**. Entire specimen. **B–C**. Anterior region. **D**. Pharyngeal region. **E**. Anterior region showing amphid. **F**. Pharyngeal bulb. **G**. Vulval region. **H–I**. Genital system. **J**. Posterior region. **K**. Posterior end. Scale bars: A = 20 µm; B–K = 10 µm.

Table 11. Measurements of *Basirotyleptus siddiqii* sp. nov. All measurements are in µm.

Characters	Holotype female	Paratype female
n		1
L	362	366
Body diameter at neck base	16	16.5
Body diameter at mid body	17. 5	17
Body diameter at anus	10	9.5
a	20.1	21.5
b	3.8	3.4
c	40.2	40.7
c’	0.9	0.9
V	54.7	56.8
G1	1.1	1.6
G2	18.7	19.6
Lip region diameter	7.5	7.5
Lip region height	3.0	3.0
Amphidial aperture	5.0	–
Odontostyle length	7.5	8.0
Odontophore length	10.0	10.5
Total stylet length	17.5	18.5
Guiding ring from anterior end	8.0	7.5
Nerve ring from anterior end	50	55
Neck length	95	106
Expanded part of pharynx	15	16
Cardia length	4.0	4.0
Anterior genital branch	4.0	6.0
Posterior genital branch	68	72
Vagina length	9.5	9.0
Vulva from anterior end	198	212
Prerectum length	60	63
Rectum length	12	13
Tail length	9.0	9.0

Male

Not found.

Remarks

In its small body size and flanged odontophore, the new species comes close to *B. siremps* Siddiqi, 1995; *B. syncheilus* Siddiqi, 1995 and *B. minutus* Siddiqi, 1995 but it differs from *B. siremps* in having low, flat lip region, offset by depression (vs lip region high, conoid, offset by constriction); cuticle finely striated (vs cuticle distinctly striated); slightly longer odontophore (10.0–10.5 vs 8.0–9.0 µm); slightly posterior vulva position (V = 54–56 vs 47–53); in the shape and size of tail (conoid vs subcylindrical to a hemispherical terminus; c' = 0.9 vs 1.2–1.7) and absence of male (vs male present).

From *B. syncheilus*, the new species differs in having lip region low, wider, offset by depression (vs lip region narrow, 5.0 µm, continuous with body); lips slightly raised (vs lips not raised); shorter odontostyle (7.5–8.0 vs 9.0–1.0); shorter pharyngeal bulb (15–16 vs 19 µm); shorter anterior uterine sac (4.0–6.0 µm or 0.2–0.3 vs 18 µm or about one midbody diameter) and absence of male (vs male present).

From *B. minutus*, the new species differs in having slightly short and slender body (L = 0.36 vs 0.38–0.51 mm; a = 20–21 vs 23–39); amphids simple (vs duplex); shorter total stylet (17.5–18.5 vs 23–24 µm, odontostyle 7.5–8.0 vs 10 µm, odontophore 10.0–10.5 vs 13–14 µm), posterior vulva position (V = 54–56 vs 32–42) and presence of anterior uterine sac (vs absent).

The new species also comes close to *B. diminutus* Siddiqi, 1995 but differs in having differently shaped lip region (lip region flat, low, offset by depression vs lip region conoid, high, offset by constriction); odontophore with distinctly basal flanges (vs poorly basal flanges), posterior vulva position (V = 54–56 vs 37–42) and presence of anterior uterine sac (vs absent).

Key to species of the genus *Basirotyleptus* (modified after Goseco *et al*. 1974)

1. Female genital system amphidelphic 2
– Female genital system monodelphic 3

2. Tail bluntly conoid; c = 23–29, c' = 1.4–1.7 ..... ***B. westralis*** Siddiqi, 1970
– Tail hemispheroid; c = 43–57, c' = 1.0 ..... ***B. rugosus*** Siddiqi, 1982

3. Female genital system mono-prodelphic 4
– Female genital system mono-opisthodelphic 6

4. Body length more than 0.6 mm; spicules longer, 24–28 µm ..... ***B. lieberi*** Goseco *et al*., 1970
– Body length less than 0.6 mm; spicules shorter, 15–21 µm 5

5. Odontophore with basal flanges; post-uterine sac long, 1.8–3.5 times midbody diameter long; tail comparatively long, conoid, 18–28 µm ..... ***B. heynsi*** Furstenberg, 1980
– Odontophore without basal flanges; post-uterine sac short, 1.2 times midbody diameter long; tail short, conoid, 15 µm ..... ***B. eximius*** Siddiqi & Khan, 1964

6. Labial disc present 7
– Labial disc absent 17

7. Odontophore with basal flanges ..... ***B. constrictus*** sp. nov.
– Odontophore without basal flanges 8

8. Anterior uterine sac absent ..... ***B. ethiopicus*** Siddiqi, 1970
– Anterior uterine sac present 9

9. Anterior uterine sac < 15 µm or less than one midbody diameter long 10
– Anterior uterine sac > 15 µm or more than one midbody diameter long 12

10. Body 0.41–0.57 mm long; b = 3.8–4.2 ..... ***B. nemoralis*** Siddiqi, 1970
– Body more than 6.0 mm long; b = 4.3–5.8 11

11. c = 74–100; prerectum 48 µm or about 3.0 times anal body diameter .....
..... ***B. coronatus*** Siddiqi & Khan, 1965
– c = < 69; prerectum 73–104 µm or 4.0–5.4 times anal body diameter .....
..... ***B. indicus*** Dhanam & Jairajpuri, 1999

12. V = > 50 13
– V = < 50 14

13. Body longer, L = 0.68–0.77 mm; a = 39–42; c = 80–90 ..... ***B. curvus*** Siddiqi, 1982
– Body shorter, L = 0.45 mm; a = 28; c = 35 ..... ***B. discinus*** Siddiqi, 1995

14. Body less than 0.6 mm 15
– Body more than 0.6 mm 16

15. Pharynx short, 90 µm, b = 4.7–6.0; V = 36–43; c = 42–44 ..... ***B. modestus*** Hussain & Khan, 1968
– Pharynx long, 110–124 µm, b = 3.8–4.9; V = 42–47; c = 47–67 ..... ***B. safiae*** Siddiqi, 1997

16. Odontostyle 6.0 µm, odonotophore 10.5–11 µm; spicules 24 µm ..... ***B. barbarae*** Siddiqi, 1997
– Odontostyle 7.5–8.5 µm, odonotophore 12–15 µm; spicules 29–32 µm .... ***B. robustus*** Siddiqi, 1982

17. Odontophore flanged 18
– Odontophore simple, with sclerotized or slightly swollen base, not flanged 25

18. V = 47–58 19
– V = up to 47 23

19. Body 0.50–0.58 mm long; posterior uterine sac 2.0–2.8 times midbody diameter long .....
..... ***B. longisaccus*** Siddiqi, 1995
– Body 0.30–0.51 mm long; posterior uterine sac about as long as midbody diameter long 20

20. Tail short, with rounded to hemispheroid terminus; c = 30–44 21
– Tail short, conoid with acute terminus; c < 28 ..... ***B. conicuadatus*** sp. nov.

21. Odontostyle 9.0–10 µm; neck length 110–119 µm ..... ***B. syncheillus*** Siddiqi, 1995
– Odontostyle 7.5–8.5 µm; neck length 95–106 µm 22

22. Lip region flat; V = 54–56; c' = 0.9 ..... ***B. siddiqii*** sp. nov.
– Lip region elevated; V = 47–53; c' = 1.2–1.7 ..... ***B. siremps*** Siddiqi, 1995

23. Lips separated, angular; c' = 1.0–1.2 ..... ***B. nindei*** Siddiqi, 1970
– Lips amalgamated, slightly elevated; c' = 0.6–0.9 24

24. Longer body, L = 0.38–0.48 mm; amphids duplex; odontostyle 10–14 µm ..... ***B. minutus*** Khan, 1987
– Shorter body, L = 0.29–0.36 mm; amphids simple; odontostyle 7.5–8.5 µm ..... ***B. deminutus*** Siddiqi, 1995

25. Anterior uterine sac absent 26
– Anterior uterine sac present 29

26. Tail conoid to digitate, with acute terminus; c' = 1.1–1.7 27
– Tail rounded to hemispheroid; c' = < 1.0 28

27. Liplets distinct; amphids cup-shaped; odontophore about one-half of odontostyle length ..... ***B. caudatus*** Jairajpuri, 1966
– Liplets absent; amphids stirrup-shaped; odontophore about 1.2–1.5 times odontostyle length ..... ***B. neocaudatus*** sp. nov.

28. V = 31–41; tail rounded, with terminal caudal pore ..... ***B. acus*** Goseco *et al*., 1974
– V = 47–48; tail conoid, without terminal caudal pore ..... ***B. soueastus*** Ahmad & Jairajpuri, 1979

29. Vulva posterior, V = > 50 ..... ***B. penetrans*** (Thorne, 1964) Siddiqi, 1969
– Vulva anterior, V = < 44 30

30. Body long, 0.68–0.98 mm; pharyngeal bulb 20–26 µm 31
– Body short, 0.45–0.68 mm; pharyngeal bulb 14–20 µm 33

31. Cuticle without punctations; amphids stirrup-shaped ..... ***B. upicus*** Ahmad & Jairajpuri, 1979
– Cuticle bearing punctations; amphids cup-shaped 32

32. Amphids duplex, cup-shaped; anterior uterine sac 24.5–46 µm; males absent ..... ***B. goaensis*** sp. nov.
– Amphids simple, cup-shaped, anterior uterine sac 65 µm; males present ..... ***B. rotundicaudatus*** (Khan, 1987) Andrássy, 2009

33. Anterior uterine sac more than one midbody diameter long 34
– Anterior uterine sac less than one midbody diameter long 35

34. Odontostyle 10–14 µm; tail 11–16 µm ..... ***B. basiri*** Jairajpuri, 1964
– Odontostyle 6.0–7.0 µm; tail 8.0–10 µm ..... ***B. minimus*** Jana & Baqri, 1981

35. Lip region distinctly offset; odontostyle, 11–15 µm ..... ***B. pini*** Siddiqi & Khan, 1965
– Lip region distinctly not offset; odontostyle, 4.6 µm ..... ***B. striatus*** (Thorne, 1964) Siddiqi, 1969

Discussion

Basirotyleptus is a taxon of soil-inhabiting nematodes, mostly occurring in undisturbed natural soils, and due to the presence of delicate odontostyle, it is considered as fungal feeders (Yeates 2007). The genus *Basirotyleptus* is quite heterogenous, and has a worldwide distribution, with representatives reported from all continents (except Antarctica). It is one of the most speciose taxon in the superfamily Tylencholaimoidea of the order Dorylaimida (Table 12), but is not yet well studied from the Western Ghats. A total of 12 species (38% of the total described species) has been recorded from India so far,

Table 12 (continued on next two pages). Morphometrics of species belonging to the genus *Basirotyleptus* Jairajpuri, 1964 (all measurements in µm, except L in mm). Abbreviations: GD = Geographical distribution; LRD = Lip region diameter; ODL = Odontostyle length; NL = Neck length; PBL = Pharyngeal bulb length; PRM = Prerectum length; Ref. = Reference; SPL = Spicules length; TL = Tail length; VMS = Ventromedian supplements.

Characters Species	n	L	a	b	c	c'	V	LRD	ODL	NL	PBL	PRM	TL	SPL	VMS	GD	Ref.
B. acus	11 ♀♀	0.50–0.63	19–26	4.2–5.8	42–75	–	31–41	8.0	8.0	96–128	22	–	6.0–11	–	–	Indiana	Goseco *et al*. 1974
	18 ♀♀	0.39–0.59	20–28	4.2–5.4	40–54	0.6–0.8	35–41	7.0–8.0	10–11.5	93–119	15–20	38–53	8.0–12	–	–	India	Present study
	28 ♀♀	0.49–0.62	20–29	4.6–6.1	49–68	–	36–41	8.0	9.0–13.2	–	–	–	8.0–12	–	–	Australia	Furstenberg 1980
B. basiri	20 ♀♀	0.50–0.58	21–28	4.8–6.0	45–58	–	34–40	–	–	–	–	–	–	–	–	India	Jairajpuri 1964
	7 ♀♀	0.59–0.67	25–30	5.4–6.4	47–56	–	35–40	–	11–12	–	–	–	–	–	–	India	Siddiqi & Khan 1964
	3 ♀♀	0.68–0.71	29–30	6.3–6.5	58–61	0.9	35–37	8	13–14	117	14	–	12.5	–	–		
	2 ♂♂	0.69–0.76	30	5.9–6.0	46–51	–	–	–	–	–	–	–	13	25–26	1	India	Siddiqi & Khan 1965
	12 ♀♀	0.42–0.58	25–30	4.5–6.0	42–56	–	34–40	–	9.6–10.5	–	–	–	9.0–11	–	–	Malaysia	Furstenberg 1980
	20 ♀♀	0.45–0.54	22–29	4.0–4.9	35–47	0.8–1.0	35–43	8.0–8.5	10–12	100–123	16–20	29–44	11–16	–	–		
	1 ♂	0.49	28.2	4.9	33.9	1.0	–	8.5	10.5	99	17.5	31	14.5	20	1	India	Present study
B. barbarae	1 ♀	0.75	27	5. 3	88	0.5	42	6	6	140	33	–	10	–	–		
	1 ♂	0.72	31	4.9	60	0.7	–	–	6	–	–	–	13	24	0	Colombia	Siddiqi 1982
B. caudatus	11 ♀♀	0.4–0.5	19–28	4.1–4.9	24–30	1.1	40–48	6	12	–	16	–	18	–	–	India	Jairajpuri 1966
	3 ♀♀	0.40–0.42	21–24	4.0–4.9	23–30	1.2–1.4	42–43	–	11–13	–	–	–	14–17	–	–	India	Baqri 1991
B. conicaudatus	2 ♀♀	0.42–0.44	21–22	4.3–4.4	25–27	1.2–1.3	55–58	8.0–8.5	9.5–10	97–101	14–15	37–41	15–17	–	–		
	1 ♂	0.42	24.0	4.0	25.4	1.2	–	8.0	10	105	15	48	16.5	20	1	India	Present study
B. constrictus	9 ♀♀	0.38–0.49	22–26	3.6–4.6	24–30	1.1–1.4	51–56	8.0–8.5	9.0–10	103–112	16–19	30–43	15–18	–	–	India	Present study
B. coronatus	8 ♀♀	0.6–0.90	26–33	4.5–5.8	74–100	0.5	40–44	9	7	125	37	–	8	–	–	India	Siddiqi & Khan 1965
B. curvus	2 ♀♀	0.68–0.77	39–42	4.6–4.8	80–90	0.7	53–54	7	7	–	33	–	10	–	–		
	3 ♂♂	0.7–0.8	41–44	4.9–5.5	60–83	0.7–0.9	–	–	6.0–7.5	–	–	–	12	19–20	2	Colombia	Siddiqi 1982
B. deminutus	8 ♀♀	0.29–0.36	17–20	3.3–3.8	34–47	0.6–0.9	37–42	6	7.5–8.5	83–96	15–16.5	–	9	–	–	Cameroon	Siddiqi 1995
B. discinus	1 ♀	0.45	28	4.0	35	1.3	51.4	6.6	9.5	–	14	–	14	–	–		
	1 ♂	0.45	28.5	4.2	28.5	1.4	–	–	9.0	–	15	–	15	19	1	Cameroon	Siddiqi 1995

Table 12 (continued). Morphometrics of species belonging to the genus *Basirotyleptus* Jairajpuri, 1964.

Characters Species	n	L	a	b	c	c'	V	LRD	ODL	NL	PBL	PRM	TL	SPL	VMS	GD	Ref.
B. ethiopicus	8 ♀♀	0.37–0.44	22–25	3.3–4.1	46–70	0.5–0.8	41–48	5.0	6.6	102	15	–	7	–	–	Malawi	Siddiqi 1970
	7 ♀♀	0.38–0.50	20–24	3.8–5.3	42–52	0.7–0.8	36–43	6.0–7.5	8.5–10.5	94–105	14–17	27–37	9–11	–	–	India	Present study
B. eximius	3 ♀♀	0.51–0.54	23–26	4.3–5.2	28–35	1.0	62–63	8.0	11–12	100	16	70	15	–	–	India	Siddiqi & Khan 1964
	2 ♀♀	0.51–0.54	25–26	4.7–5.3	25–26	–	60–63	–	11–12	–	–	–	–	–	–		
	2 ♂♂	0.50–0.55	26–29	4.1–4.2	24–25	–	–	–	12	–	–	–	–	18–19	1	South Wales	Sauer 1966
B. goaensis	8 ♀♀	0.73–0.87	28–32	5.3–6.2	51–62	0.7–0.8	36–38	8.5–10	13–14.5	132–144	22–26	52–73	12–15	–	–	India	Present study
B. heynsi	31 ♀♀	0.45–0.51	18–28	4.4–6.2	19–27	1.4–2.2	56–63	–	10–12	–	–	42–69	18–27	–	–		
	18 ♂♂	0.44–0.56	22–29	4.2–5.4	20–25	1.5–1.9	–	–	10–12	–	–	–	–	15–21	1	Australia	Furstenberg 1980
B. indicus	13 ♀♀	0.70–0.80	28–30	4.3–5.3	53–68	0.6–0.8	43–45	9.0	8.0–9.0	156–163	38	73–104	10–13	–	–	India	Dhanam & Jairajpuri 1999
B. lieberi	6 ♀♀	0.67–0.75	25–28	4.5–5.6	24–34	–	60–68	8.5	10	125–154	21	40–96	21–30	–	–		
	4 ♂♂	0.63–0.75	28–31	5.0–5.8	28–36	–	–	–	–	118–149	–	–	21–24	24–28	1–2	Indiana	Goseco *et al*. 1974
	17 ♀♀	0.73–0.90	27–33	4.6–5.6	22–32	1.5–2.1	62–63	10–11	16–17	149–175	25–31	41–64	25–33	–	–	Spain	Peralta & Peña-Santiago 1996
B. longisaccus	3 ♀♀	0.50–0.58	22–24	4.3–4.4	63–77	0.5–0.6	49–52	8.0	10–12	–	21–23	–	10	–	–	Cameroon	Siddiqi 1995
B. minimus	11 ♀♀	0.47–0.51	21–27	5.2–5.6	53–60	0.9	37–41	8.0	6–7	–	–	36–50	8–10	–	–	India	Jana & Baqri 1981
B. minutus	9 ♀♀	0.38–0.51	23–39	3.8–6.2	29–50	–	32–42	5.0	10–14	–	16	–	12	–	–	India	Khan 1987
	2 ♀♀	0.44–0.48	24	4.0–4.1	45–49	0.8	33–35	7.0	10	111–117	19–20	39–41	10	–	–	India	Present study
B. modestus	15 ♀♀	0.46–0.53	22–26	4.7–5.9	42–44	0.7	36–43	6.0	10	98	13	–	10	–	–	India	Hussain & Khan 1968
B. nemoralis	7 ♀♀	0.41–0.57	27–33	3.8–4.2	45–58	1.0	43–50	5.0	7.0	–	18	–	9.0	–	–	India	Siddiqi 1970
B. neocaudatus	36 ♀♀	0.31–0.44	17–24	3.4–5.2	18–30	1.1–1.7	41–48	6.5–7.0	7.5–9.5	78–105	14–20	27–46	12–20	–	–		
	1 ♂	0.41	21.3	3.9	23.7	1.0	–	7.0	9.5	105	15.5	61	15.5	20.5	2	India	Present study
B. nindei	21 ♀♀	0.38–0.44	22–26	3.7–4.6	35–49	–	40–47	7.0	8.5–10	97	16	–	10.5	–	–	Malawi	Siddiqi 1970
	18 ♀♀	0.39–0.44	19–25	3.5–4.5	30–38	1.0–1.2	39–45	6.0–7.0	9.0–10.5	97–113	15–19	24–37	11–13	–	–	India	Present study
B. penetrans	1 ♀	0.6	23	4.5	83	–	50	–	–	–	–	–		–			
	1 ♂	0.6	22	3.8	40	–	–	–	–	–	–	–	–	–	2	Puerto Rico	Thorne 1964
	5 ♀♀	0.49–0.60	23–29	4.0–5.0	61–94	–	50–52	6.4	10–11	102–128	16–18	41–51	6.4–8.0	–	–	Puerto Rico	Goseco *et al*. 1974
	3 ♀♀	0.44–0.51	23–26	3.4–4.0	44–48	0.4–0.5	50–54	7.0	11–12	–	–	–	7	–	–	West Indies	Siddiqi 1997

Table 12 (continued). Morphometrics of species belonging to the genus *Basirotyleptus* Jairajpuri 1964.

Characters Species	n	L	a	b	c	c'	V	LRD	ODL	NL	PBL	PRM	TL	SPL	VMS	GD	Ref.
B. pini	11 ♀♀	0.49–0.62	22–26	4.3–4.9	45–53	0.7	35–38	7.0	13–15	123	20	–	13	–	–	India	Siddiqi & Khan 1965
	10 ♀♀	0.47–0.54	24–32	4.4–5.0	50–60	0.6–0.7	32–38	–	8.0–9.0	–	–	–	8.0–9.0	–	–	India	Baqri 1991
	18 ♀♀	0.45–0.57	22–26	4.0–4.9	33–43	0.7–1.0	37–40	8.5–9.0	11.0–12.5	105–124	17–20	29–49	12–16	–	–	India	Present study
B. robustus	8 ♀♀	0.85–1.0	25–31	5.3–7.5	56–107	0.4–0.6	41–46	7.0	7.5–8.5	–	–	–	17	–	–		
	5 ♂♂	0.74–0.91	28–36	4.4–5.7	51–72	0.6–0.8	–	–	7.0–8.5	–	–	–	15	29–32	3	Colombia	Siddiqi 1982
B. rotundicaudatus	11 ♀♀	0.68–0.98	25–37	5.0–6.0	42–47	0.6–0.8	39–44	–	10–15	–	–	60	–	–	–		
	6 ♂♂	0.69–0.80	22–28	4.0–6.0	34–54	0.6–0.7	–	–	9–15	–	–	–	–	45	2	India	Khan 1987
B. rugosus	12 ♀♀	0.74–0.89	26–33	5.2–6.3	43–57	1.0	51–56	9.0	19–21	–	17	–	14	–	–	South Wales	Sauer 1966
B. safiae	16 ♀♀	0.44–0.59	23–27	3.8–4.9	47–67	0.6–0.8	42–47	–	10–11	110–124	18–22	33–78	8	–	–	West Indies	Siddiqi 1997
B. siddiqii	2 ♀♀	0.36	20–21	3.4–3.8	40	0.9	54–56	7.5	7.5–8.0	95–106	15–16	60–63	9.0	–	–	India	Present study
B. siremps	5 ♀♀	0.30–0.39	20–26	3.5–4.0	30–43	1.2–1.7	47–53	6	7.5–8.5	75–92	13	–	12	–	–		
	1 ♂	0.3	27.9	3.6	39	0.9	–	–	7.5	–	–	–	10	12.5	0	Colombia	Siddiqi 1995
B. soueastus	4 ♀♀	0.46–0.55	29–30	3.8–4.7	38–42	1.0	47–48	8	9–10	115–128	17–19	36–50	12–13	–	–	Malaysia	Ahmad & Jairajpuri 1979
B. striatus	1 ♀	0.50	25	4.3	42	–	40	–	–	–	–	–	–	–	–	Puerto Rico	Thorne 1964
	3 ♀♀	0.49–0.50	28–30	4.2–4.3	51–52	–	37–40	7	4.6	115	18	32–56	9.6	–	–	Puerto Rico	Goseco *et al*. 1974
B. syncheilus	8 ♀♀	0.36–0.43	22–26	3.4–4.0	34–53	0.9–1.1	52–57	5	9–10	110–119	19	–	12	–	–	Malaysia	Ahmad & Jairajpuri 1979
	2 ♂♂	0.41–0.43	21–28	3.7–3.8	41–44	1.0	–	–	8–10	–	–	–	–	15–16	0	Colombia	Siddiqi 1995
B. upicus	4 ♀♀	0.77–0.85	33–37	5.6–6.3	41–48	0.9–1.0	39–42	12	13–15	130–155	20–22	45–50	17–19	–	–		
	4 ♂♂	0.73–0.82	33–36	5.7–6.0	40–48	0.9	–	–	13–14	127–135	–	–	17–19	29–30	2–3	India	Ahmad & Jairajpuri 1979
B. westralis	16 ♀♀	0.55–0.75	24–30	5.3–6.0	23–29	1.4–1.9	47–52	10	10–12	115	18	–	28	–	–		
	8 ♂♂	0.54–0.64	24–29	4.9–5.6	23–26	–	–	–	10–11	–	–	–	25	22–25	0	Western Australia	Siddiqi 1970

and only three of them (*B*. *rotundicaudatus* Khan, 1987, *B*. *minutus* Khan, 1987 and *B*. *indicus* Dhanam & Jairajpuri, 1999) from this biodiversity hotspot. In the ongoing study, 18 populations representing the genus *Basirotyleptus* were collected from different localities in the Western Ghats, India. Based on a detailed taxonomic study, they were found to represent eleven species, six known and five new, making a total of 36 valid species under the genus *Basirotyleptus*. As a result of this survey, the Western Ghats fauna is now represented by 13 species of the genus *Basirotyleptus*, which constitutes about 68% of Indian's *Basirotyleptus* fauna and 36% of the World's *Basirotyleptus* fauna. Three species (*B*. *acus*, *B*. *ethiopicus* and *B*. *nindei*) were recorded here for the first time from India.

Acknowledgements

The first author thanks the University Grants Commission for a UGC-Non-Net Fellowship. The authors are also thankful to the DST-PURSE programme for financial assistance and the Chairman, Department of Zoology, Aligarh Muslim University for providing laboratory facilities.

References

Ahmad M. & Jairajpuri M.S. 1979. Four new species of Leptonchidae (Nematoda: Dorylaimida). *Indian Journal of Nematology* 9: 125–135.

Andrássy I. 2009. Free-living nematodes of Hungary (Nematoda errantia). Vol. III. *Pedozoologica Hungarica 5*. Hungarian Natural History Museum, Budapest, Hungary.

Baqri Q.H. 1991. Contribution to the fauna of Sikkim. Nematodes associated with citrus from Sikkim, India. *Records of the Zoological Survey of India, Occassional Paper* 128: 1–103.

Cobb N.A. 1918. Estimating the nema population of the soil. *United States Department of Agriculture, Bureau of Plant Industry, Agriculture Technical Circular* 1: 1–48.

de Maeseneer J. & d'Herde J. 1963. Méthodes utilisées pour l'étude des anguillules libres du sol. *Revue de Agriculture Bureaux* 16: 441–447.

Dhanam M. & Jairajpuri M.S. 1999. New leptonchid nematodes: one new genus and eleven new species from Malnad tracts of Karnataka, India. *International Journal of Nematology* 9: 205–209.

Furstenberg J.P. 1980. A new species and some new records of *Basirotyleptus* (Nematoda: Dorylaimida: (Belonchinae) from Australia and Malaysia. *Nematologica* 26: 149–156. https://doi.org/10.1163/187529280X00035

Goseco C.G., Ferris V.R. & Ferris J.M. 1974. Revision in Leptonchoidea (Nematoda: Dorylaimida). *Tyleptus* in Leptonchidae, Tyleptinae; *Basirotyleptus* in Leptonchidae, Belonenchinae and *Loncharionema* n. gen. in Leptonchidae, Xiphinemellinae. *Research Bulletin, Purdue University Agriculture Experimental Station* 913: 1–24.

Husain S.I. & Khan A.M. 1968. *Basirotyleptus modestus* n. sp. and two new species of *Dorylaimoides* Thorne & Swanger, 1936 from India. *Nematologica* 14: 362–368. https://doi.org/10.1163/187529268X00039

Jairajpuri M.S. 1964. Studies on Campydoridae and Leptonchidae (Nematode: Dorylaimoidea) with description of *Basirotyleptus basiri* n. gen., n. sp. from India. *Proceedings of the Helminthological Society of Washington* 31: 59–64.

Jairajpuri M.S. 1966. On *Basirotyleptus caudatus* n. sp. and a redescription of *Thornenema thienemanni* (Schneider, 1937) Andrássy, 1959 (Nematoda: Dorylaimoidea). *Proceedings of the Helminthological Society of Washington* 33: 30–33.

Jairajpuri M.S. & Ahmad W. 1992. *Dorylaimida. Free-Living*, *Predaceous and Plant-Parasitic Nematodes.* E.J. Brill, Leiden, The Netherlands & Oxford & IBH, New Delhi.

Jana A. & Baqri Q.H. 1981. Nematodes from West Bengal (India) XI. Studies on the species of the superfamily Leptonchoidea (Dorylaimida). *Journal of Zoological Society of India* 33: 1–24.

Khan E. 1987. *Punctoleptus rotundicaudatus* gen. n., sp. n. and *Basirotyleptus minutus* sp. n. (Nematoda: Leptonchoidea) from India. *Indian Journal of Nematology* 16: 175–179.

Li Y., Baniyamuddin M., Ahmad W. & Wu J. 2008. Four new and four known species of Tylencholaimoidea (Dorylaimida: Nematoda) from China. *Journal of Natural History* 42: 1991–2010. https://doi.org/10.1080/00222930802254722

Peña-Santiago R. 2006. Dorylaimida Part I: Superfamilies Belondiroidea, Nygolaimoidea and Tylencholaimoidea. *In*: Abebe E., Traunspurger W. & Andrássy I. (eds) *Freshwater Nematodes: Ecology and Taxonomy*: 326–391. CAB International. Wallingford, UK. https://doi.org/10.1079/9780851990095.0326

Peralta M. & Peña-Santiago R. 1996. Nematodes of the order Dorylaimida from Andalucia Oriental, Spain. The families Leptonchidae Thome, 1935 and Aulolaimoididae Jairajpuri, 1964. *Fundamental and Applied Nematology* 19: 481–497.

Sauer M.R. 1966. A new species of *Basirotyleptus* and the male of *B. eximus* (Siddiqi & Khan, 1964) Siddiqi & Khan, 1965. *Nematologica* 12: 215–218. https://doi.org/10.1163/187529266X00626

Seinhorst J.W. 1959. A rapid method for the transfer of nematodes from fixative to anhydrous glycerine. *Nematologica* 15: 81–100. https://doi.org/10.1163/187529259X00381

Shamim S., Nasira K. & Shahina F. 2014. Fresh water nematodes from Sindh, Pakistan. *International Journal of Biology and Biotechnology* 11: 497–504.

Siddiqi M.R. 1969. *Crateronema* n. gen. (Crateronematidae n. fam.), *Poronemella* n. gen. (Lodellonematinae n. subfam.), and *Chrysonemoides* n. gen. (Chrysonematidae n. fam.) with a revised classification of Dorylaimoidea (Nematoda). *Nematologica* 15: 81–100. https://doi.org/10.1163/187529269X00128

Siddiqi M.R. 1970. Five new species of *Basirotyleptus* and the description of *Leptonchus baccatus* n. sp. (Nematoda: Dorylaimoidea). *Nematologica* 16: 203–212. https://doi.org/10.1163/187529270X00216

Siddiqi M.R. 1982. Seven new genera of dorylaimoid nematodes from Colombian rain forest. *Systematic Parasitology* 4: 69–87. https://doi.org/10.1007/BF00012230

Siddiqi M.R. 1983. Three new species of *Aculonchus* gen. n. and *Zetalaimus blepheronchus* gen. n. sp. n. (Dorylaimida: Belonenchinae). *Indian Journal of Nematology* 12: 312–319.

Siddiqi M.R. 1995. Nematodes of tropical rainforests, 5. Seven new genera and forty two new species of dorylaims. *Afro-Asian Journal of Nematology* 5: 72–109.

Siddiqi M.R. 1997. *Basirotyleptus safiae* sp. n., *B. penetrans* (Thorne) and *Actinolaimoides attenuatus* sp. n. (Nematoda: Dorylaimida) from Guadeloupe, French West Indies. *International Journal of Nematology* 7: 132–136.

Siddiqi M.R. & Khan S.H. 1964. *Trichonchium* n. g. (Nematoda: Campydoridae), with descriptions of two new species from tea soil, Assam, India. *Nematologica* 9: 641–645. https://doi.org/10.1163/187529263X00755

Siddiqi M.R. & Khan E. 1965. A review of the nematode genus *Basirotyleptus* (Dorylaimida) with descriptions of two new species. *Proceedings of the Helminthological Society of Washington* 32: 23–31.

Thorne G. 1964. Nematodes of Puerto Rico: Belondiroidea, new superfamily, Leptonchidae Thorne, 1935, and Belonenchidae new family (Nematoda, Adenophorea, Dorylaimida). *University of Puerto Rico Agricultural Experiment Station, Technical Papers* 39: 1–51.

Yeates G.W. 2007. Abundance, diversity, and resilience of nematode assemblages in forest soils. *Canadian Journal of Forest Research* 37: 216–225. https://doi.org/10.1139/x06-172

Manuscript received: 15 September 2021
Manuscript accepted: 25 October 2021
Published on: 7 February 2022
Topic editor: Tony Robillard
Desk editor: Pepe Fernández