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Seven new genera of dorylaimid nematodes from Colombian rain forest

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Summary

New genera described from soil in Colombian rain forest are *Fuscheila* (Thornenematidae), *Capilonchus* (Tylencholaiminae, Tylencholaimidae), *Caveonchus* (Tyleptinae, Leptonchidae), *Coronatyleptus* (Belonenchinae, Leptonchidae), *Promumtazium* (Mumtaziinae, Tylencholaimidae), *Tantunema* (Thorniinae, Tylencholaimidae) and *Zalophidera* (Xiphinemellinae, Tylencholaimidae). 12 new species belonging to these genera described and illustrated are: *Fuscheila citrifera* (type species), *F. godmanae*, *Capilonchus lineatus* (type-species), *Caveonchus colombicus* (type species), *C. brevisaccus*, *Coronatyleptus barbarae*, *C. curvus*, *C. robustus*, *Promumtazium pyxidorum* (type species), *Tantunema bothriocephalum* (type species), *Zalophidera tylocephala* (type species) and *Z. idiostoma*. *Caveonchus saccatus* (Goseco, Ferris & Ferris, 1981) n. comb. and *Coronatyleptus coronatus* (Siddiqi & Khan, 1965) n. comb. (type-species) are made for *Basirotyleptus saccatus* and *B. coronatus*, respectively. The composition of the families Leptonchidae and Tylencholamidae is discussed and Leptonchoidae Thorne, 1935 (Ferris, 1970) is made a junior synonym of Tylencholaimoidea Filipjev, 1934 (n.rank).

Introduction

The nematodes reported in this article were collected by Ms Kate Williamson in 1977 during the Colombian Amazonas Expedition, organized by the Royal Geographical Society, London, as part of an ecological survey of shifting and other cultivations in rain forest.

Seven new genera and 12 new species of Dorylaimina are described below. The specimens were heat-killed, fixed in 3 to 5% formaldehyde solution, and mounted in anhydrous glycerin after processing through warm lactophenol.

* Formerly Commonwealth Institute of Helminthology.

New genera and species

Genus *Fuscheila* n.g.

Diagnosis

Thornenematidae *sensu* Siddiqi (1969). Body moderately large (1.2 to 2.5 mm). Cuticle thick, regular, finely striated transversely; longitudinal or radial striae absent. Lip region continuous or slightly offset by expansion; lips amalgamated, with slightly raised papillae; cheilorhabdions strongly sclerotized forming a chamber-like structure. Amphids small, with elongate oval apertures half lip region width or less long. Spear guiding ring double, not sclerotized. Spear (odontostyle) robust, with wide lumen and aperture about one third of its entire length. Spear extension (odontophore) dorylaimid, offset from oesophagus by a constriction. Oesophagus very muscular, slightly expanding near its middle; dorsal gland and its outlet close to the beginning of this expansion. Cardia conoid. Vulva small, transverse. Sclerotization of outer vagina prominent. Didelphic-amphidelphic; ovaries short, usually with 15 to 25 oocytes mostly in two rows.

Prerectum about one body-width long. Tail long, filiform.

Type-species: Fuscheila citrifera n.sp.

Other species: F. godmanae n.sp.

Relationship

Fuscheila n.g. comes close to *Laimydorus* Siddiqi, 1969, but differs from this and other genera of the family Thornenematidae in having sclerotized cheilorhabdions forming a chamber-like structure. The stoma structure is not similar to that found in Actinolaimoidea.

Etymology: The generic name is derived from the Latin *fusca* = brown, and prefix of cheilorhabdions, refers to the sclerotized cheilorhabdions, and is feminine in gender.

***Fuscheila citrifera* n.sp.** (Fig. I, A–G)

Measurements

Holotype ♀: L = 1.67 mm; L′ = 1.34 mm; a = 29; b = 3.9; c = 5.1; c′ = 11.2; V = 7.6 $47.3^{7.9}$; V′ = 59; spear = 29 μm; spear extension = 46 μm.

Paratypes: 13 ♀♀: L = 1.26–1.85 (1.58) mm; L′ (distance between anterior end of body and anus) = 1.07–1.42 (1.3) mm; a = 26–35 (30); b = 3.5–4.1 (3.7); c (n = 7) = 3.9–7.6 (5.5); c′ (n = 7) = 10–16 (12.5); V = 44–52 (47); V′ (vulva as percentage of L′) = 57.7–60.5 (58.3); spear = 24–30 (28) μm; spear extension = 38–49 (45) μm.

Description

Female: Body curved, usually C-shaped. Cuticle thick, very finely striated, lacking radial elements. Lateral hypodermal chords one sixth to one fifth body width; lateral pores 11 to 13 in a row on one side of oesophagus, then forming double rows on body. Lip region offset by expansion, about one third as high as wide, with rounded outer margins; papillae slightly raised. Inner sclerotization of lips strong, dark brown in colour; sclerotization of lateral lips wider and deeper than that of submedian lips (Fig. 1, B). Amphids small, cyathiform, with elongate oval apertures less than half lip region width. Spear robust, with thin walls and wide lumen, aperture about one third of its length. Spear extension dorylaimid, offset from oesophagus, muscular and bulboid posteriorly. Oesophagus very muscular, slightly enlarging near middle; dorsal gland and its orifice near this enlargement, those of posterior subventral glands some distance anterior to base of oesophagus. Cardia conoid. Intestine polycytous, with distinct lumen. Prerectum 35 to 52 (45) μm long; rectum 43 to 47 (45) μm or about one and a half anal body-widths long. Tail filiform with a finely rounded terminus, length very variable so that L′ and V′ are more reliable than L and V.

Vulva small, transverse (Fig. 1, D). Vagina just under half body width long, its outer sclerotization appearing in optical section as two lemons (hence the species name), about 4.5 μm long. Didelphic-amphidelphic; ovaries symmetrical, reflexed, with 13 to 22 oocytes mostly in two rows. Uterine eggs one or two at one time in a uterus, 76 to 90 μm long and 29 to 32 μm wide. Male not found. Juveniles similar to female in most details including lip sclerotization.

Type habitat and locality: Soil from primary forest at Andoche, near Araracuara and river Caquetá, Amazonas, Colombia.

Type material: Holotype ♀, 5♀♀ and five juvenile paratypes at Commonwealth Institute of Parasitology, St. Albans, England (CIP). 2♀♀ paratypes each at these centres: Nematology Department, Rothamsted Experimental Station, Harpenden, England (RES); Landbouwhogeschool, Wageningen, The Netherlands (WAG); Division of Nematology, Indian Agricultural Research Institute, New Delhi, India (IARI); USDA Nematology Laboratory, Beltsville, Maryland, USA (USDA, NL).

***Fuscheila godmanae* n.sp.** (Fig. 1, H–J)

Measurements

Holotype ♀: L = 2.46 mm; L′ = 1.7 mm; a = 42; b = 5.2; c = 3.2; c′ = 24; V = $^{9}39^{11}$; V′ = $^{13-}56^{-16}$; spear = 30 μm; spear extension = 46 μm.

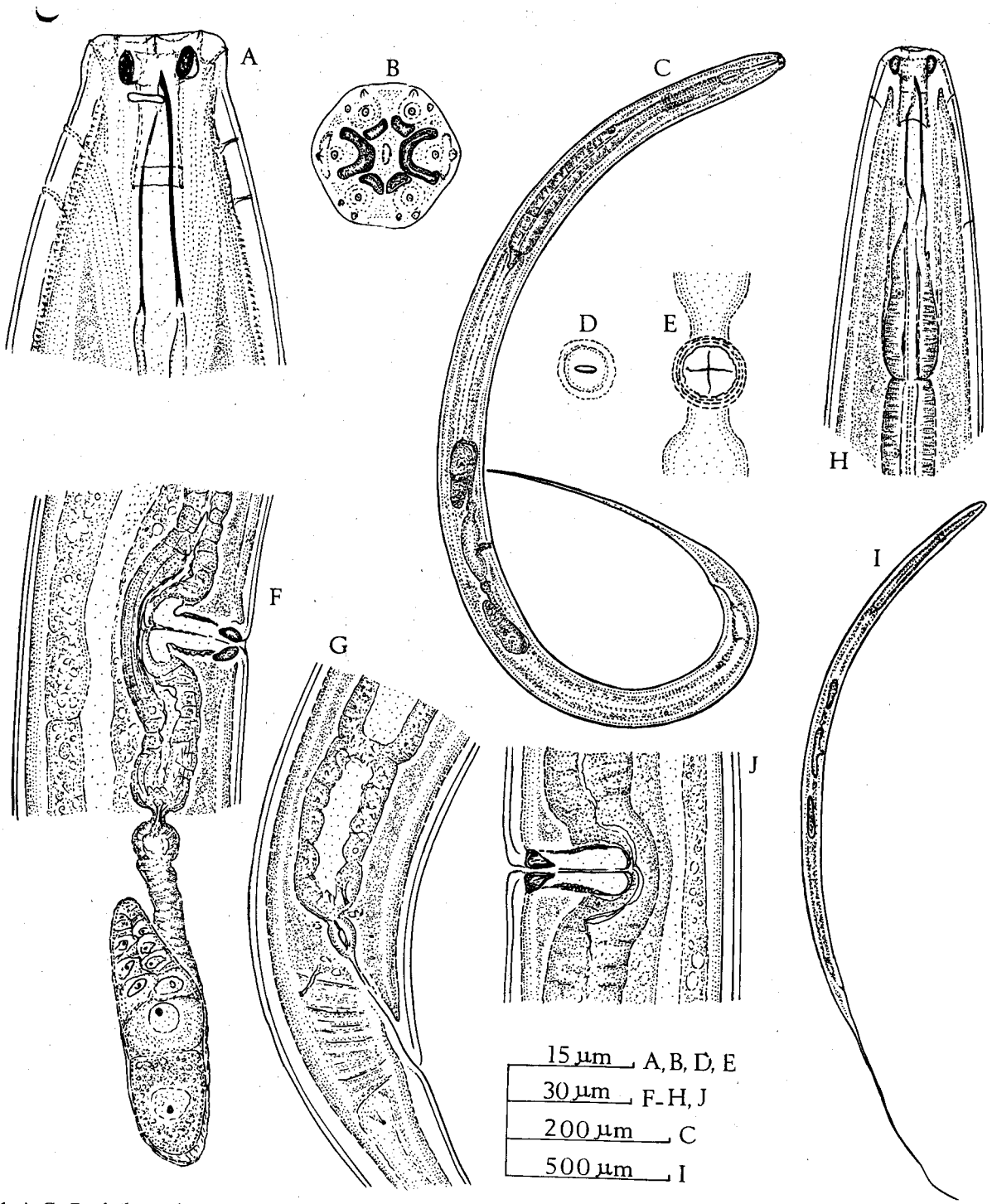


Fig 1. A–G. *Fuscheila citrifera* n.g., n.sp.
A. Holotype female, head end;
B. Paratype female, *en face* view;
C. Holotype female;
D. Paratype female, vulva, ventral view;
E. Paratype female, vagina, ventral view;
F. Holotype female, vulval region, lateral view;
G. Holotype female, prerectum and anal region.
H–J. *Fuscheila godmanae* n.sp.
H. Holotype female, head end;
I. Holotype female;
J. Holotype female, vulval region, lateral view.

Paratypes: 4♀♀: L = 2–2.36 (2.13) mm; L = 1.53–1.8 (1.62) mm; a = 37–39 (38); b = 4.5–5 (4.7); c = 4–4.6 (4.3); c′ = 14–18 (16); V = 41–43 (41.7); V′ = 54–56 (55); spear = 27–29 (28) μm; spear extension = 46–47 (46.5) μm.

Description

Female: Body straight to arcuate. Cuticle very finely striated. Lateral hypodermal chords one seventh body width. Lip region almost continuous, rounded, with slightly raised papillae; lip sclerotization strong. Amphid apertures less than half lip region width. Spear robust, 27 to 30 μm long and about 4.5 μm wide, aperture 7 to 9 μm long, base furcate. Spear extension bulboid posteriorly, offset by a constriction from anterior part of oesophagus. Oesophagus very muscular, enlarging near middle at 48 to 52% of its length. Cardia conoid. Intestine polycytous, with distinct lumen. Vulva a small transverse slit. Vagina about half body width long; its sclerotization compact, appearing roughly triangular in lateral view (Fig. 1, J). Didelphic-amphidelphic; ovaries reflexed. Prerectum 50 to 74 μm long. Rectum 42 to 48 μm or about one and a half anal body-widths long. Tail hair-like for most of its length.

Type habitat and locality: Same as for *F. citrifera*.
Type material: Holotype and one ♀ paratype at CIP, one ♀ paratype each at RES, WAG and IARI.

Relationship

F. godmanae n.sp. differs from *F. citrifera* n.sp. in having a longer body and tail, a continuous lip region and differently shaped vaginal sclerotization.

This species is named after Audrey M. Godman who has given me technical assistance for more than ten years.

Genus *Capilonchus* n.g.

Diagnosis

Tylencholaiminae, Tylencholaimidae. Body large (>1.5 mm) and very slender (a = >50). Cuticle with fine radial elements, lacking fixation folds. Lip region offset, with a prominent perioral disc. Stoma sclerotized, inverted thistle funnel-shaped. Spear attenuated, with capillary lumen. Spear extension dorylaimid, elongate, slightly arcuate. Enlarged part of oesophagus cylindrical, over two body widths long, offset from anterior slender part by a depression. Vulva transverse. Monodelphic-prodelphic; with a long posterior uterine sac. Tail obtusely rounded, less than one anal body width long.

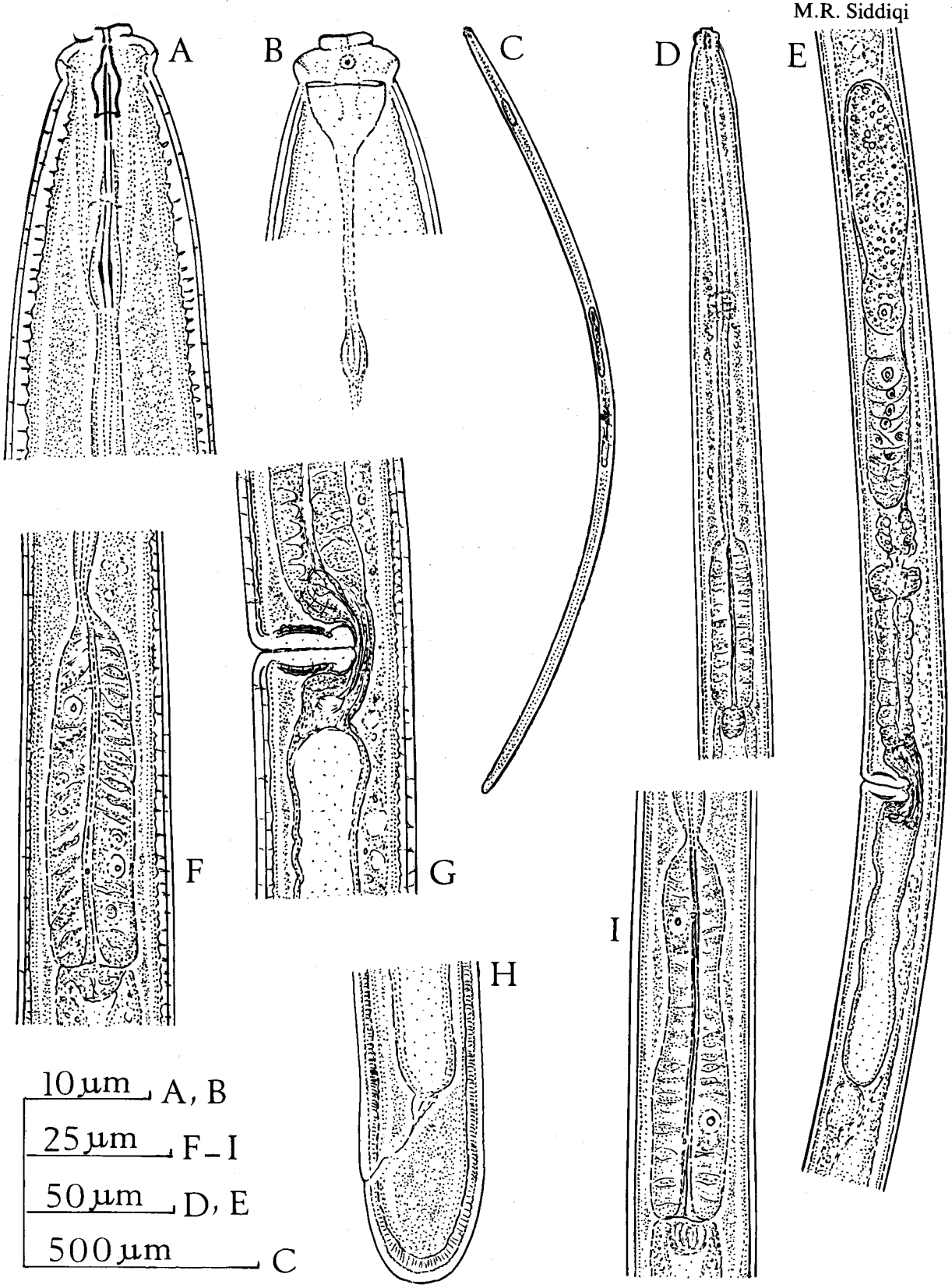
Type-species: *Capilonchus lineatus* n.sp.
No other species.

Relationship

Capilonchus n.g. differs from *Tylencholaimus* de Man, 1876 in having a very slender body, a prominent perioral disc, inverted thistle funnel-shaped sclerotized stoma and a dorylaimid spear extension lacking basal knobs or flanges. It is also related to *Meylis* Goseco, Ferris & Ferris, 1974 and *Proleptonchus* Lordello, 1955 of the family Leptonchidae (which have a cylindroid oesophageal enlargement and may belong to Tylencholaimidae). From *Meylis* it differs by the slenderness of the body, the shape of the stoma and the loss of the posterior ovary. From *Proleptonchus* it can be differentiated by the slenderness of the body and the presence of a perioral disc.

Etymology: The generic name is derived from the Latin *capillus* = hair-like, capillary, and *onchium* = tooth, refers to the attenuated spear, and is masculine in gender.

Fig. 2. A–I. *Capilonchus lineatus* n.g., n.sp.
A. Holotype female, head end;
B. Holotype female, head end, surface view;
C. Holotype female;
D. Holotype female, oesophageal region;
E. Holotype female, reproductive organs;
F. Holotype female, basal oesophageal bulb;
G. Holotype female, vulval region, lateral view;
H. Holotype female, tail end;
I. Juvenile, basal oesophageal bulb.


A
B
C
D
E
F
G
H
I
10 µm
A, B
25 µm
F–I
50 µm
D, E
500 µm
C

***Capilonchus lineatus* n.sp.** (Fig. 2, A–I)

Measurements

Holotype ♀: L = 1.76 mm; a = 61.7; b = 7.4; c = 100; c′ = 0.87; V = $^{13.5}$ 5.1 ^{6}; spear = 7.5 μm; spear extension = 15 μm.

Paratype ♀: L = 1.95 mm; a = 67; b = 8; c = 108; c′ = 0.78; V = 51; spear = 7.5 μm; spear extension = 15 μm.

Juvenile: L = 0.95 mm; a = 47; b = 5.9; c = 0.88; c′ = 0.66; spear = 6 μm; spear extension = 12 μm.

Juvenile: L = 1.39 mm; a = 63; b = 5.1; c = 92.6; c′ = 0.75; spear = 6 μm; spear extension = 13 μm.

Description

Female: Body very slender, lineate (hence the species name), slightly arcuate, Cuticle regular, thick, with fine but distinct radial elements, finely striated. Lateral hypodermal chords about one third body width; pores widely spaced. Lip region offset by a constriction, with a conspicuous, offset perioral disc. Amphids large, stirrup-shaped; aperture elongate oval, about three quarters lip region width long. Stoma sclerotized, inverted thistle funnel-shaped, 7.5 to 8 μm long. Spear attenuated, with fine lumen, small aperture and smooth base. Spear extension dorylaimid, about twice as long as spear, swollen at base. Oesophagus abruptly enlarging in its posterior fourth to form a cylindrical bulb, 60 to 63 μm × 14 to 15 μm. Cardia large, rounded. Intestine two or three cells in cross section, with wide lumen. Prerectum 4 to 7.6 times body width long. Rectum about one anal body width long. Tail rounded.

Type habitat and locality: Same as for *F. citrifera*.
Type material: Holotype ♀ and two juvenile paratypes at CIP, one ♀ paratype at IARI.

Genus *Caveonchus* n.g.

Diagnosis

Tyleptinae, Leptonchidae. Body moderately long (about one mm), slender; cuticle with radial elements. Lip region offset, with a perioral disc. Amphids with elongate oval aperture. Stoma goblet-shaped, lightly sclerotized, expanding within the lip region. Spear short (less than 10 μm), attenuated, lightly sclerotized, with small aperture and fine lumen. Spear extension elongate-arcuate, lightly sclerotized. Anterior slender part of oesophagus long, with distinct lumen and cuticular lining; bulb elongate-saccate, anteriorly tapering, longer than body width, with elongate valvular thickening of the inner walls near base. Monodelphic-opisthodelphic; with anterior uterine sac. Tail obtusely rounded, less than one anal body width long. Spicules broad in anterior half and narrow posteriorly. Supplements a preanal pair and two or three widely spaced ventromedian papillae.
Type-species: Caveonchus colombicus n.sp.
Other species: C. brevisaccus n.sp., *C. saccatus* (Goseco, Ferris & Ferris, 1981) n.comb. Syn. *Basirotyleptus saccatus* Goseco, Ferris & Ferris, 1981.

Relationship

Caveonchus n.g. appears to occupy an intermediate position between *Tyleptus* Thorne, 1939 and *Coronatyleptus* n.g. The shape of the perioral disc, stoma, spear extension and basal oesophageal bulb is similar to *Coronatyleptus*, and the hollow tubular spear, although attenuated and with a fine lumen, is similar to that of *Tyleptus*. With the proposal of *Caveonchus* the demarcation between Tyleptinae and Belonenchinae becomes weak and also the members of these two subfamilies are difficult to group separately from those of the Leptonchinae. The spear in *Caveonchus* is very similar to that of *Proleptonchus* and the valvular thickening in the basal oesophageal bulb of Tyleptinae-Belonenchinae is also found in some species of *Leptonchus* (Leptonchinae). However, the long, anterior, slender part of the oesophagus, which has a constant width and distinct lumen and cuticular lining, differentiates the subfamily Tyleptinae from Leptonchinae and Belonenchinae. On the basis of the oesophageal structure and a hollow spear, *Caveonchus* is so distinct from *Basirotyleptus* as to be considered under a separate subfamily.
Etymology: The generic name, derived from the

Latin *cavi* = hollow and *onchium* = tooth, refers to the attenuated but hollow spear, and is masculine in gender.

***Caveonchus colombicus* n.sp.** (Fig. 3, A–F)

Measurements

Holotype ♀; L = 1.22 mm; a = 44; b = 4.4; c = 144; c′ = 0.55; V = $^{6.5}$ 49 ^{25}; spear = 7 μm; spear extension = 16 μm.

Paratypes: 5 ♀♀: L = 1.11–1.40 (1.3) mm; a = 42–50 (45); b = 3.5–4.8 (4); c = 107–178(140); c′ = 0.44–0.74 (0.57); V = 46–54 (49); spear = 6.5–7.5 (6.8) μm; spear extension = 13–16 (14) μm.

3♂♂: L = 1.11–1.27 (1.18) mm; a = 45–52 (48); b = 4.1–4.7 (4.4); c = 91–112 (96); c′ = 0.65–0.74 (0.68); T = 49–54 (51); spear = 7.0–7.5 μm; spear extension = 13–15 μm; spicules = 27–28 μm.

Description

Female: Body straight to arcuate. Cuticle and subcuticle finely but prominently annulated, with radial striae and fixation folds. Lateral hypodermal chords one third body width; pores widely spaced. Lip region offset by sudden expansion, its outer margins appear angular due to slightly raised papillae; with a low, offset perioral disc about one half lip region-width in diameter. Amphid apertures elongate-oval, two fifths lip region width long. Stoma sclerotized, goblet-shaped, 8 to 9.5 μm, about one head width long. Spear with exceedingly fine lumen and small aperture. Spear extension slightly arcuate dorsally, with lightly sclerotized inner lining. Oesophagus 276 to 380 (313) μm long; its slender part of uniform width throughout and with distinct lumen and cuticular lining. Posterior bulb elongate-saccate, 35 to 40 μm long, being widest (13 to 15 μm) at level of inner valvular thickening (cf. Fig. 3, F). Cardia rounded.

Vulva transverse. Vagina about one third body width long. Anterior uterine sac 2.5 to 3 body widths long. Uterus with sperm. Ovary reflexed, with less than 10 oocytes. Intestine two cells in cross section. Prerectum 2.5 to 3 body widths long. Rectum one and a half anal body widths long. Tail hemispherical.

Male: Posterior end of body strongly curved ventrally. Sperm elongate spindle-shaped. Spicules conoid with broad base in anterior third, curved and narrowed in the middle third and narrow cylindrical in posterior third (Fig. 3, E); lateral spicule guiding piece narrow rod-like 9 μm long. Preanal pair at 7 μm and two ventromedian papillae at 40 μm and 77 μm from cloacal aperture. Tail rounded, shorter than anal body-width.

Type habitat and locality: Same as for *F. citrifera*.
Type material: Holotype ♀, one ♀, one ♂ paratypes at CIP, one ♀, one ♂ each at RES, WAG and IARI; one ♀ paratype at USDA, NL.

***Caveonchus brevisaccus* n.sp.** (Fig. 3, G–K)

Measurements

Holotype ♀: L = 0.82 mm; a = 30; b = 3.7; c = 91; c′ = 0.6; V = 43 ^{20}; spear = 7 μm; spear extension = 12 μm.

Description

Female: Body straight in anterior and arcuate in posterior half . Cuticle with radial elements and fixation folds. Lip region rounded, slightly offset, with an offset perioral disc. Amphids with wide apertures. Sclerotized stoma 6 μm long. Spear with thin walls, small aperture and distinct lumen. Spear extension dorsally arcuate, lightly sclerotized. Basal oesophageal bulb elongate-saccate, more than a body width long, with elongate valvular thickening in its posterior half. Cardia rounded.

Vulva transverse. Vagina about half body width long. Anterior uterine sac rudimentary, short (hence the species name); about one third body width long. Gonad opisthodelphic; ovary well developed. Prerectum 100 μm long. Rectum about one and a half anal body widths long. Tail hemispherical, with a pair of lateral pores.
Type habitat and locality: Same as for *F. citrifera*.
Type material: Holotype at CIP.
Relationship

C. brevisaccus n.sp. differs from *C. colombicus* n.sp. and *C. saccatus* (Goseco, Ferris & Ferris,

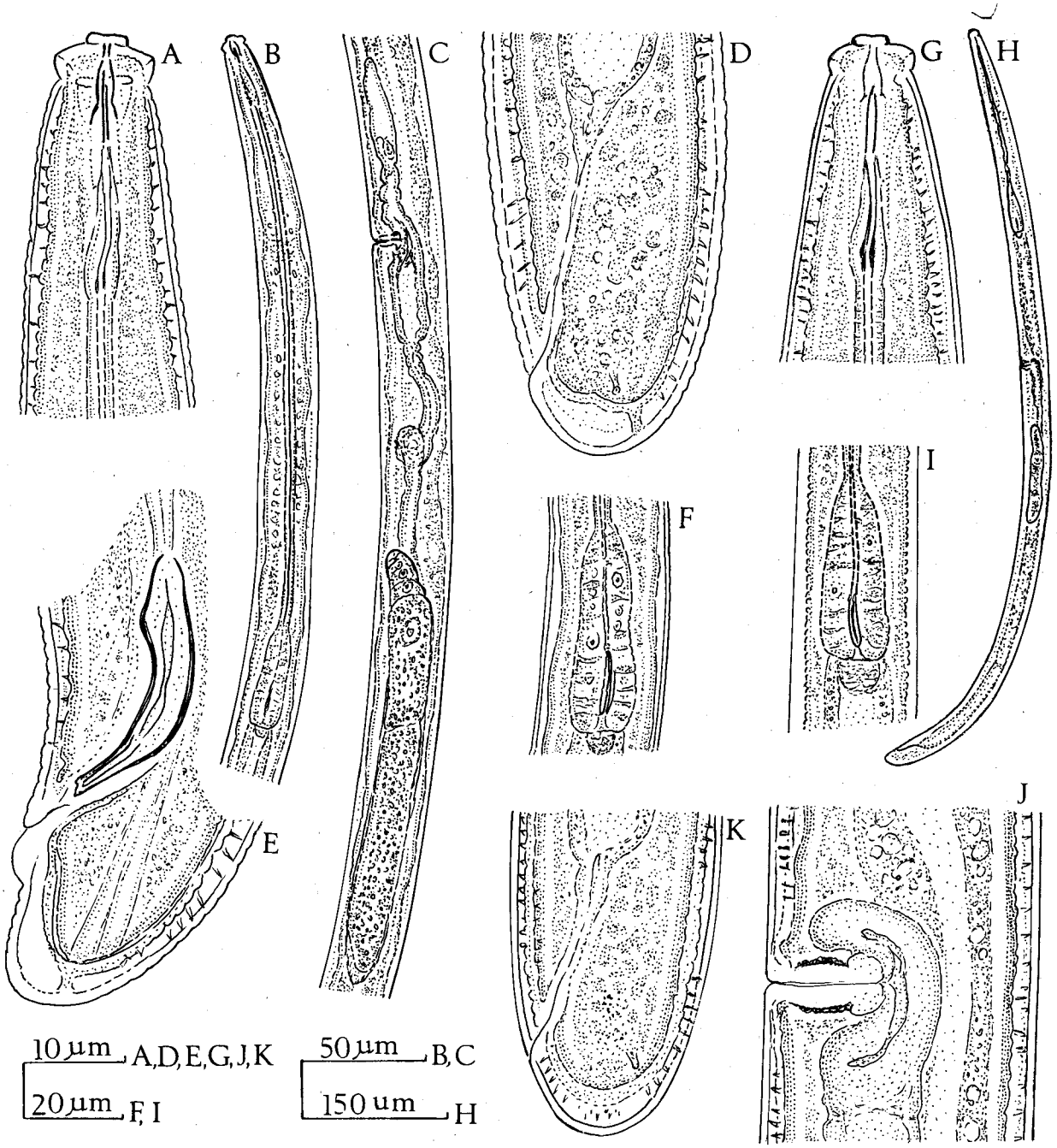


Fig. 3. A–F. *Caveonchus colombicus* n.g., n.sp.
A. Holotype female, head end;
B. Holotype female, oesophageal region;
C. Holotype female, reproductive organs;
D. Holotype female, tail end;
E. Paratype male, tail end;
F. Paratype male, basal oesophageal bulb.

G–K. *Caveonchus brevisaccus* n.sp.
G. Holotype female, head end;
H. Holotype female;
I. Holotype female, basal oesophageal bulb;
J. Holotype female, vulval region, lateral;
K. Holotype female, tail end.

1981) n.comb. in having a short rudimentary anterior uterine sac and a more prominent lumen of the spear.

Caveonchus saccatus (Goseco, Ferris & Ferris, 1981) n.comb.

Syn. *Basirotyleptus saccatus* Goseco, Ferris & Ferris, 1981.

Measurements

One ♀: L = 0.92 mm; a = 26; b = 4.3; c = 76; c′ = 0.57; V = $^{6.8}$ 43 ^{25}; spear = 7 μm; spear extension = 16 μm.

The species is based on a single female from forest soil in Panama. The present specimen from forest soil, Andoche, Colombia, has a shorter spear, longer spear extension and sclerotized part of the stoma (= 9 μm), but in other details is similar to the holotype.

Genus _Coronatyleptus_ n.g.

Diagnosis

Belonenchinae, Leptonchidae. Body moderately long (0.6 to 1 mm). Cuticle with radial elements. Lip region offset by a constriction with an offset perioral disc. Spear attenuated, solid, needle-like. Spear extension simple, arcuate, with inner cuticular lining lightly sclerotized, without knobs or flanges at base. Sclerotized part of stoma goblet-shaped, expanding within the lip region, one lip region width or less long. Basal oesophageal bulb elongate-saccate, anteriorly tapering, more than one body width long, with elongate valvular thickening in posterior half. Monodelphic-opisthodelphic. Tail short, rounded to hemispherical.

Type-species: Coronatyleptus coronatus (Siddiqi & Khan, 1965) n.comb.

Syn. *Basirotyleptus coronatus* Siddiqi & Khan, 1965.

Other species: Coronatyleptus barbarae n.sp., *C. curvus* n.sp., *C. robustus* n.sp.

Etymology: The generic name is derived from the Latin *corono* = crown (referring to the perioral disc) and *Tyleptus*, and is masculine in gender.

Relationship

Coronatyleptus n.g. differs from *Basirotyleptus* Jairajpuri, 1964 and *Sclerostylus* Goseco, Ferris & Ferris, 1981 in having a short goblet-shaped stoma that widens within the lip region and an elongate arcuate spear extension lacking basal flanges, and an elongate-saccate basal oesophageal bulb.

Glochidorella Siddiqi, 1981 has a similar lip region and sclerotized stoma but its spear extension is knobbed and gonad is didelphic.

Coronatyleptus barbarae n.sp. (Fig. 4, A–D)

Measurements

Holotype ♀: L = 0.75 mm; a = 27; b = 5.3; c = 88; c′ = 0.56; V = $^{5.7}$ 42 ^{25}; spear = 6 μm; spear extension = 10.5 μm.

Paratype ♂: L = 0.72 mm; a = 31; b = 4.9; c = 60; c′ = 0.72; T = 64; spear = 6 μm; spear extension = 11 μm; spicules = 24 μm.

Description

Female: Body slightly arcuate. Cuticle with prominent radial elements and fixation folds. Lip region offset by a depression; perioral disc low. Amphids cup-shaped. Stoma lightly sclerotized, narrow, three quarters lip region width long. Spear solid, just under one lip region width long. Spear extension simple, slightly arcuate, lightly sclerotized. Basal oesophageal bulb 33 × 15 μm, with elongate arcuate valvular apparatus. Cardia large, rounded. Vulva transverse.

Vagina two fifths body width long. Anterior uterine sac collapsed, one and a half body widths long. Posterior gonad normal, ovary reflexed, with oocytes mostly in a row. Prerectum indistinct. Rectum about one and a half anal body widths long: anus subterminal. Tail hemispherical.

Male: Similar to female in most details. Spicules slightly arcuate, with tapering ends. Ventromedian papillae 8 μm in front of cloacal aperture. Two ventromedian papillae at 37 μm and 104 μm from cloacal aperture.

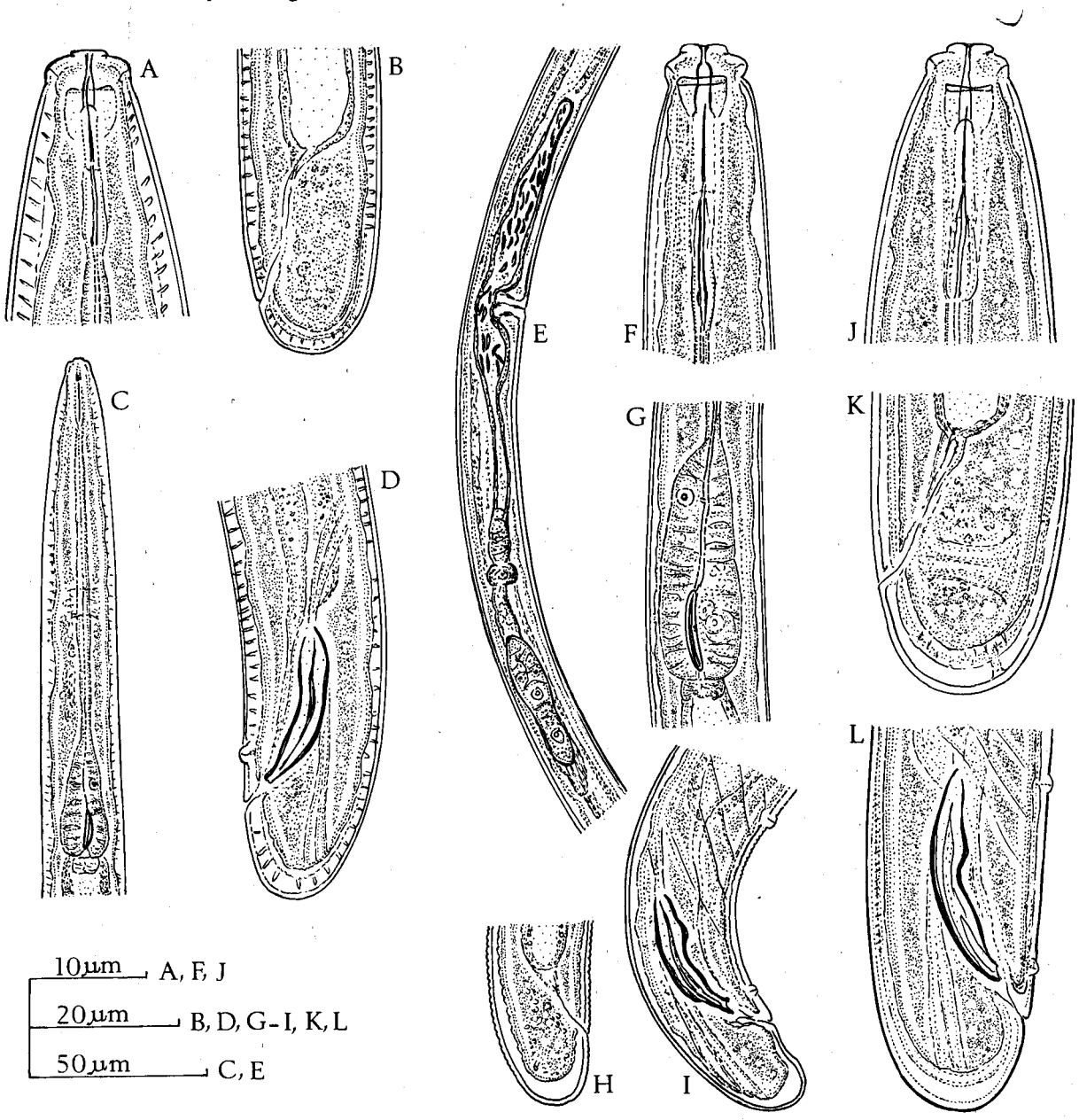


Fig. 4. A–D. *Coronatyleptus barbarae* n.g., n.sp.
A. Holotype female, head end;
B. Holotype female, tail end;
C. Holotype female, oesophageal region;
D. Paratype male, tail end.

E–I. *Coronatyleptus curvus* n.sp.
E. Holotype female, reproductive organs;
F. Holotype female, head end;
G. Holotype female, basal oesophageal bulb;
H. Holotype female, tail end;
I. Paratype male, tail end.

J–L. *Coronatyleptus robustus* n.sp.
J. Holotype female, head end;
K. Holotype female, tail end;
L. Paratype male, tail end.

This species is named after Barbara Gibson of the Commonwealth Institute of Parasitology.

Type habitat and locality: Same as for *F. citrifera*.
Type material: At CIP.

Relationship

Coromatyleptus barbarae n.sp. differs from *C. coronatus* (Siddiqi & Khan, 1965) n.comb. in having a low flat perioral disc and a long anterior uterine sac and in being bisexual.

***Coronatyleptus curvus* n.sp.** (Fig. 4, E–I)

Measurements

Holotype ♀: L = 0.77 mm; a = 42; b = 4.8; c = 91; c′ = 0.7; V = ^{8} 54 ^{18}; spear = 7 μm; spear extension = 13 μm.

Paratypes: one ♀: L = 0.68 mm; a = 39; b = 4.6; c = 80; c′ = 0.7; V = $^{8.8}$ 53 ^{21}; spear = 7 μm; spear extension = 12 μm.

Three ♂♂: L = 0.7–0.83 (0.75) mm; a = 41–44 (43); b = 4.9–5.5 (5); c = 60–83 (68); c′ = 0.7–0.9 (0.85); T = 39–54 (46); spear = 6.5–7.5 (7) μm; spear extension = 13–14 (13.5) μm; spicules = 19–20 (19.6) μm.

Description

Female: Body slender, well curved ventrally when relaxed (hence the species name). Cuticle with coarse striae, radial elements and fixation folds. Lateral hypodermal chords about two fifths body width. Lip region offset, with a prominent perioral disc. Stoma goblet-shaped, lightly sclerotized, one lip region width long. Spear solid, straight; its extension slightly arcuate and faintly sclerotized. Oesophagus a very slender tube until it enlarges to form the basal bulb 31 to 33 μm × 11 to 12 μm. Basal bulb saccate, about twice width of body at neck base, with elongate valvular thickening posteriorly. Cardia large, rounded. Vulva transverse. Vagina about half body width long. Anterior uterine sac 3.6 body widths long, containing sperm. Ovary single, reflexed (Fig. 4, E). Prerectum four and a half times body width long. Rectum one anal body width long. Tail obtusely rounded, less than one anal body width long.

Male: Body slender, curved, becoming hooked in tail region. Head, spear and oesophagus as described for female. Supplements a pair of ventrosubmedian papillae 6 to 7 μm from cloacal aperture and two ventromedian papillae at 30 to 31 μm and 63 to 64 μm from cloacal aperture. Spicules dorylaimid, with distal portion considerably narrowed and tip appearing notched (Fig. 4, I). Tail obtusely rounded.

Type habitat and locality: Same as for *F. citrifera*.
Type material: Holotype ♀ and a paratype male at CIP. One ♀, one ♂ paratype at RES; one ♂ paratype at IARI.

Relationship

C. curvus n.sp. differs from *C. barbarae* n.sp. in having a more curved body when relaxed, a higher perioral disc, a more posterior vulva and shorter spicules.

***Coronatyleptus robustus* n.sp.** (Fig. 4, J–L)

Measurements

Holotype ♀: L = 1.05 mm; a = 29; b = 6.6; c = 70; c′ = 0.6; V = ^{9} 41 ^{24}; spear = 7.5 μm; spear extension = 15 μm.

Paratypes: 7 ♀♀: L = 0.85–0.97 (0.93) mm; a = 25–31 (29); b = 5.3–7.5 (5.6); c = 56–107 (83); c′ = 0.44–0.65 (0.5); V = 41–46 (43); spear = 8–8.5 μm; spear extension = 12–15 μm.

5♂♂: L = 0.74–0.91 (0.8) mm; a = 28–36 (30); b = 4.4–5.7 (5); c = 51–72 (60); c = 0.6–0.8 (0.7); T = 60–69 (64); spear = 7–8.5 μm; spear extension = 14–15 μm; spicules = 29–32 (30) μm.

Description

Female: Body robust, straight to slightly arcuate. Cuticle thick and regular, with radial elements but lacking fixation folds. Lateral hypodermal chords about one third body width; lateral pores widely spaced, in two lines over most of body. Lip region slightly offset, rounded, with an offset disc at top.

Stoma elongate-narrow, goblet-shaped, as long as spear. Spear solid, appearing as a dark line. Spear extension rod-like, slightly arcuate, sclerotization indistinct. Oesophageal bulb about one body width long or 22 to 24% of entire oesophageal length, with elongate-oval valvular apparatus one third of bulb length. Cardia large, rounded.

Vulva transverse. Vagina extending half-way across body. Anterior uterine sac 60 to 95 (83) μm long, usually collapsed. Uterus elongate, with elongate spindle-shaped sperm. Ovary posterior, reflexed. Prerectum 137 to 157 (148) μm long. Rectum one anal body width long. Tail hemispherical (Fig. 4, K).

Male: Similar to female. Body slightly arcuate. Testes dorylaimid; sperm spindle-shaped, 7 to 8 μm long. Supplementary papillae a ventrosubmedian pair at 5 to 7 μm in front of cloacal aperture and first and second ventromedian papillae at 33 to 49 and 81 to 110 μm from cloacal aperture; in one male third ventromedian papilla seen at 96 μm from cloaca. Spicules elongate, spindle-shaped, only slightly arcuate, distally notched; lateral guiding piece 9 to 10 μm long. Tail rounded.

Type habitat and locality: Same as for *F. citrifera*. Also collected by D.J. Hunt from forest soil in Dominica.

Type material

Holotype ♀ and 3 ♀, one ♂ paratypes at CIP; one ♀, one ♂ paratypes each at RES, WAG, IARI and USDA, NL.

Relationship

C. robustus n.sp. differs from *C. barbarae* n.sp. in having a regular cuticle lacking fixation folds, a distinct perioral disc and longer spear, spear extension and spicules.

Genus *Promumtazium* n.g.

Diagnosis

Mumtaziinae, Tylencholaimidae. Medium-sized (0.5 to 1.0 mm). Cuticle with indistinct radial striae and fixation folds. Lip region offset by a constriction; papillae raised; perioral disc absent. Amphid small, with oval aperture. Stoma not sclerotized. Spear guiding ring single. Spear asymmetrical, fusiform, with thin walls and wide lumen and aperture, less than lip region width long; spear tip distinctly sclerotized. Spear extension straight, dorylaimid, not sclerotized, knobbed or flanged. Oesophagus muscular, enlarging gradually behind middle. Vulva transverse, post-median. Didelphic-amphidelphic. Tail short (about one anal body width long), obtusely rounded. Spicules dorylaimid, robust, slightly arcuate. Supplements comprising a preanal pair and two widely spaced ventromedian papillae in type-species.

Type-species: Promumtazium pyxidorum n.sp.

No other species.

Relationship

Promumtazium n.g. is related to *Mumtazium* Siddiqi, 1969 especially in the asymmetrical, wide-lumened spear and small pocket-like amphid aperture, but differs in having a didelphic gonad and a short rounded tail as compared to a filiform tail in the latter.

Promumtazium pyxidorum n.sp. (Fig. 5, A–F)

Measurements

Holotype ♀: L = 0.89 mm; a = 37; b = 4.5; c = 59; c′ = 0.8; V = ^{16} 65 ^{13}; spear = 5.2 μm; spear extension = 10.5 μm.

Paratypes: 10 ♀♀: L = 0.72–0.91 (0.8) mm; a = 28–36 (32); b = 3.7–4.5 (3.9); c = 43–59 (49); c′ = 0.7–1 (0.9); V = 61–66 (64); spear = 5–6 (5.6.) μm; spear extension = 7–10 (8.5) μm.

One ♂: L = 0.71 mm; a = 31; b = 3.8; c = 59; c′ 0.7–1 (0.9); V = 61–66 (64); spear = 5–6 (5.6) μm; spicules = 25 μm.

Description

Female: Body straight to arcuate; cuticle with faint radial elements and fixation folds. Lateral hypodermal chords irregular, about one fourth body width; pores indistinct, widely spaced. Lip region offset by sudden expansion; papillae slightly

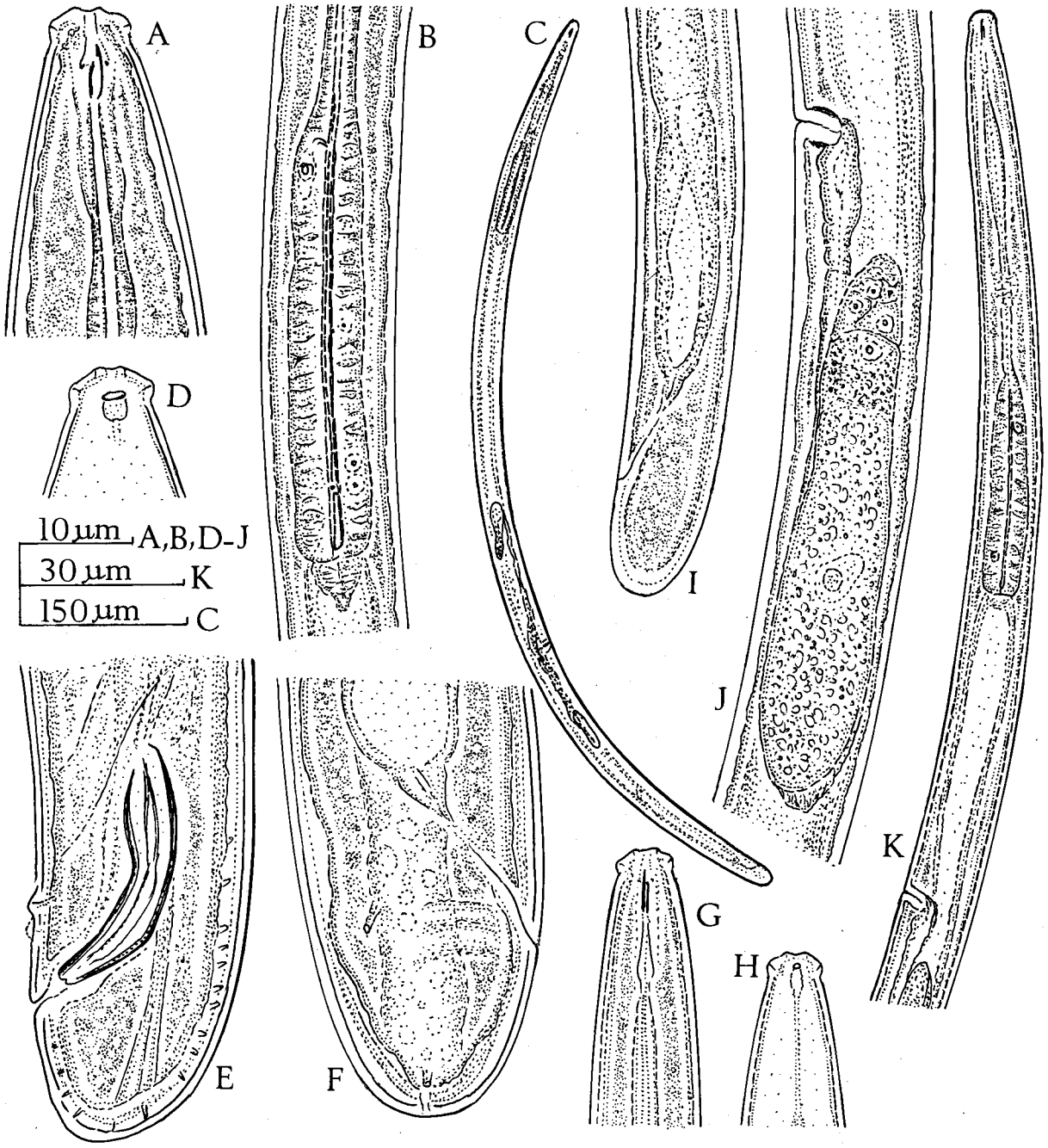


Fig. 5. A–F. *Promumtazium pyxidorum* n.g., n.sp.
A. Holotype female, head end;
B. Holotype female, enlarged part of oesophagus;
C. Holotype female;
D. Holotype female, head end showing amphids;
E. Paratype male, tail end;
F. Holotype female, tail end.

G–K. *Tantunema bothriocephalum* n.g., n.sp.
G. Holotype female, head end;
H. Holotype female, head end showing amphids;
I. Holotype female, tail end;
J. Holotype female, reproductive organs;
K. Holotype female, anterior part of body.

uterine sac. Ovary reflexed, with a few oocytes. Prerectum one to two body widths long. Rectum about as long as tail. Tail slightly tapering to an obtusely rounded terminus, usually a little over one anal body width long.

Type habiat and locality: Soil around roots of grasses (mostly *Axinopus*) at Araracuara. Colombia. Also collected from primary forest soil at Vincente and Andoche regions near Araracuara.

Type material: Holotype ♀ and 8 ♀♀ paratypes at CIP: 3 ♀♀ paratypes at each of these centres: RES, WAG, IARI and USDA, NL.

Genus *Zalophidera* n.g.

Diagnosis

Xiphinemellinae, Tylencholaimidae. Body large (> 1mm). Cuticle with distinct radial elements and fixation folds. Lip region smoothly rounded, offset by a deep constriction; labial papillae indistinct; perioral disc absent; perioral sclerotization radial, narrow rod-like in optical section, sclerotized stoma tubular, longer than head width. Spear greatly attenuated, apparently with exceedingly fine lumen, aperture obscure. Spear extension rod-like, flanged at base. Basal oesophageal bulb cylindrical, one fifth to one quarter of entire oesophageal length, set off from anterior slender part by a depression. Vulva transverse. Vagina conspicuous. Didelphic-amphidelphic, ovaries reflexed. Tails of both sexes short, rounded. Spicules slender, arcuate. Supplements in the form of a preanal pair and two or three widely spaced ventromedian papillae.
Type-species: Zalophidera tylocephala n.sp.
Other species: Z. idiostoma n.sp.

Relationship

Among Xiphinemellinae, *Zalophidera* n.g. comes close to *Xiphinemella* Loos, 1950 but differs from it by the structure of the lip region which is smoothly rounded and devoid of a perioral disc. The type and all nominal species of *Xiphinemella* have a well developed perioral disc similar to that of *Meylis* and *Capilonchus*. In fact *Xiphinemella* is very similar to *Meylis* differing only in having a longer stoma, spear and spear extension.

The lip region and spear are similar to those of *Kantbhala* Siddiqi, 1981 but *Kantbhala* has a small body, an unsclerotized stoma, an inconspicuous vagina and a pore-like vulva.
Etymology: The generic name is derived from the Greek *Za* = intensive, *lophos* = crests, and *derma* = skin, and refers to the irregular cuticle bearing radial elements and fixation folds. It is feminine in gender.

***Zalophidera tylocephala* n.sp.** (Fig. 6, A–F)

Measurements

Holotype ♀: L = 2.2 mm; a = 44; b = 8.4; c = 129; c′ = 2; V = ^{16}63^{16}; spear = 36 μm; spear extension = 40 μm.

Paratypes: 5 ♀♀: L = 1.6–2.2 (1.8) mm; a = 38–46 (41); b = 6.6–8.3 (7.4): c = 115–122 (118); c′ = 0.5–0.6; V = 52–55 (54); spear = 35–37 (36) μm; spear extension = 35–38 (37) μm.
4 ♂♂ L = 1.9–2.1 (2) mm; a = 42–50 (46); b = 7.5–8.5 (8); c = 90–118 (104); c′ = 0.58–0.72 (0.64); T = 50–55 (52); spear = 36–37 μm; spear extension = 36–38 (37) μm; spicules = 45–49 (47) μm.

Description

Female: Anterior half of body usually straight, posterior ventrally curved. Cuticle with thick radial elements and fixation folds; outer cuticle finely striated, hypodermis coarsely annulated. Lateral hypodermal chords irregular in width, about one third as wide as body; pores distinct – one female has 8 pores in a line in the oesophageal region, two rows of 35 pores between the oesophagus and vulva and two rows of 30 pores in the post-vulval part of body. Lip region hemispherical, knob-like (hence the species name), offset by a deep constriction; papillae not elevated; perioral disc absent; thin radial rod-like perioral sclerotization visible in optical lateral view (Fig. 6, A and B). Stoma tubular, lightly sclerotized 31 to 36 (33) μm; its

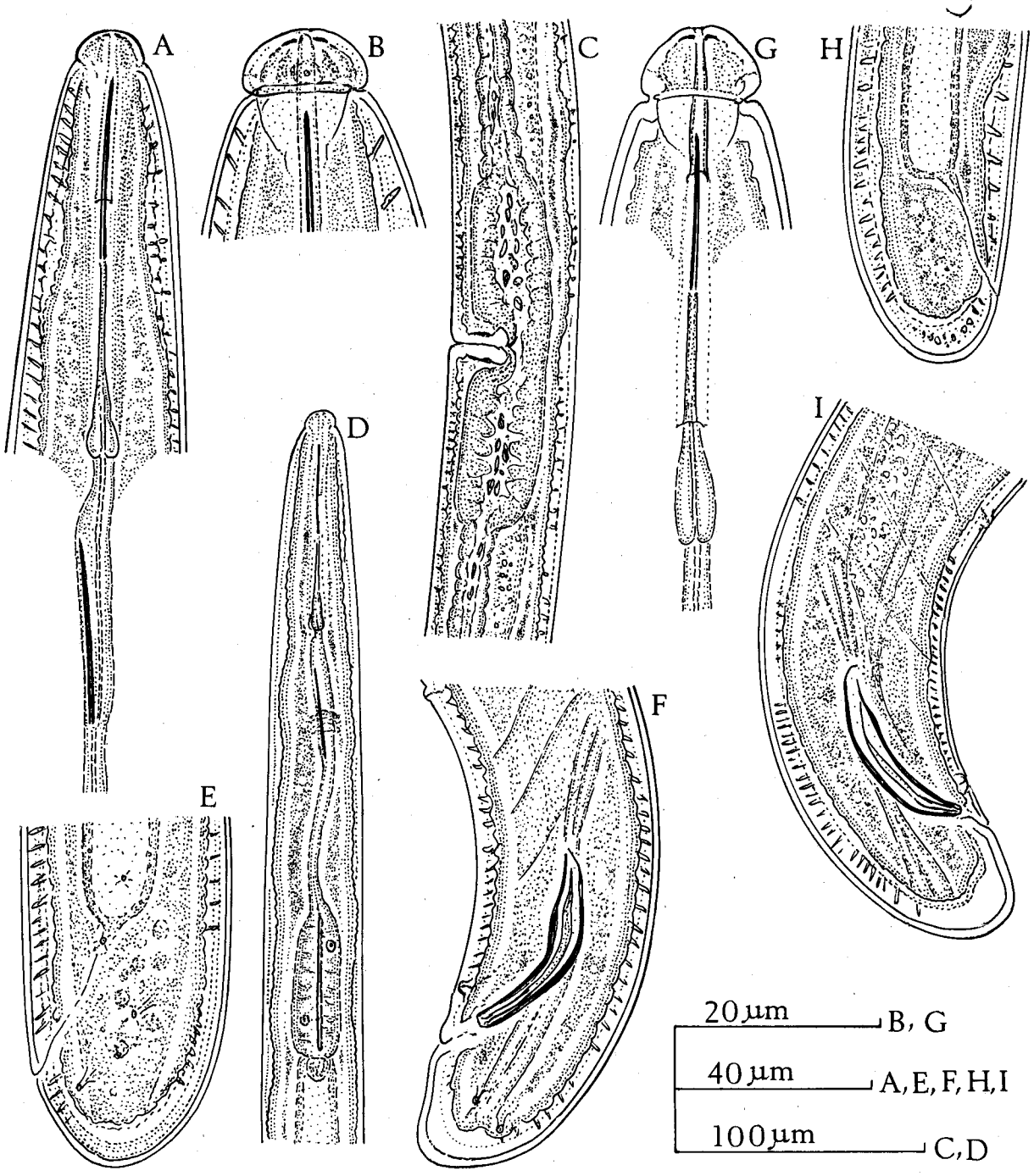


Fig. 6 A–F. *Zalophidera tylocephala* n.g., n.sp.
A. Holotype female, head end;
B. Paratype male, head end;
C. Holotype female, vulval region, lateral;
D. Holotype female, oesophageal region;
E. Holotype female, tail end;
F. Paratype male, tail end.

G–I *Zalophidera idiostoma* n.sp.
G. Paratype male, head end;
H. Holotype female, tail end;
I. Paratype male, tail end.

posterior end gives the impression of a truncated cone-shaped spear guiding ring. Amphids stirrup-shaped, aperture about two thirds of lip region width. Spear greatly attenuated, with very fine lumen, obscure aperture and smoothly rounded base. Spear extension rod-like, posteriorly bearing conspicuous tri-radiate flanges. Oesophagus a narrow tube until it expands in its posterior fourth to form a cylindrical bulb about 60 μm long and 20 μm wide. Cardia rounded. Intestine two or three cells in cross section, with a distinct lumen. Prerectum indistinct. Rectum 1.2 to 1.5 anal body widths long. Tail hemispherical, with a pair of lateral pores. Vulva transverse. Vagina with thick walls, about half body width long. Gonads paired, opposed, well developed; ovaries reflexed; uteri with spindle-shaped sperm.

Male: General morphology as described for female. Body arcuate with ventrally curved tail end. Spicules slender, arcuate (Fig. 6, F). Preanal paired papillae 11 to 14 μm in front of cloacal aperture; three ventromedian papillae at 74 to 86 μm, 110 to 124 μm and 137 to 156 μm from cloacal aperture. Tail conoid-rounded, less than anal body width long.

Type habitat and locality: Soil from primary forest adjacent to Vincente Chagra, near river Caquetá, and Araracuara, Colombia. Also collected from primary forest soil in Andoche region, close to Vincente Chagra.

Type material: Holotype ♀ and one ♀, one ♂ paratypes at CIH. One ♀, one ♂ paratypes each at RES, WAG and IARI.

***Zalophidera idiostoma* n.sp.** (Fig. 6. G–I)

Measurements

Holotype ♀: L = 1.36 mm; a = 31; b = 6.2; c = 113; c′ = 0.5; V = ^{22} 53 ^{24}; spear = 17.5 μm; spear extension = 23 μm.

Paratypes: 3 ♂♂: L = 1.34–1.40 (1.37) mm; a = 34–39 (36); b = 6.2–6.4 (6.3); c = 68–77 (74); c′ = 0.64–0.70 (0.66); T = 50–53 (51); spear = 15.5–17.5 (16) μm; spear extension = 24–26 (25) μm; spicules = 38–41 (40 μm).

Description

Female: Body arcuate. Cuticle with distinct radial elements and fixation folds. Lateral hypodermal chords irregular in outline, about one third body width; pores distinct. Lip region sharply offset, hemispherical, with front region slightly raised; perioral disc absent. Amphids cyathiform, aperture about two thirds of lip region width. Stoma distinct (hence the species name), slightly enlarging behind lip region, 16 μm or about one and one third lip region widths long. Spear attenuated, with exceedingly fine lumen; aperture obscure. Spear extension narrow, rod-like in anterior half and swollen, flange-like in posterior, offset from slender part of oesophagus. Basal enlarged part of oesophagus cylindrical, 43 μm × 17,5 μm, about one fifth of total oesophageal length. Cardia rounded. Prerectum obscure. Rectum about one anal body width long. Tail obtusely rounded, half anal body width long. Vulva transverse. Vagina about half body width long. Both branches of reproductive organs well developed; uteri with sperm; posterior uterus with an egg 106 μm long and 32 μm wide.

Male: Tail end more strongly curved ventrally. Spicules slender, slightly arcuate; lateral guiding piece 11 μm long. Preanal paired papillae 10 to 12 μm anterior to cloacal aperture. Three ventromedian papillae at 57 to 73 μm, 96 to 110 μm and 119 to 140 μm from cloacal aperture. Tail dorsally convex, obtusely rounded, less than anal body width long.

Type habitat and locality: Same as for *F. citrifera*.

Type material: Holotype ♀ and one ♂ paratype at CIP, one ♂ paratype each at WAG and IARI.

Relationship

Zalophidera idiostoma n.sp. differs from *Z. tylocephala* n.sp. in having a smaller body, spear, spear extension and spicules and a shorter, more distinct stoma.

Discussion

As discussed above under the relationships of the genera *Capilonchus*, *Caveonchus*, *Coronatyleptus* and *Zalophidera*, the systematics of the families Tylencholaimidae, Belonenchidae and Leptonchidae as conceived by Siddiqi (1969) warrant a reappraisal. Belonenchidae is not recognized here as a family, but as a subfamily, Belonenchinae, of the family Leptonchidae, the character of the solid needle-like spear being the basis for its separation from the Leptochinae and Tyleptinae. The transfer of *Basirotyleptus saccatus* to *Caveonchus* of the Tyleptinae demonstrates the closeness of Belonenchinae and Tyleptinae.

The families Tylencholaimidae and Leptonchidae are so closely related to each other that Loof & Jairajpuri (1968) and Khera (1970) considered Tylencholaiminae as a subfamily of the Leptonchidae.

The family Tylencholaimidae can be differentiated from the Leptonchidae by its elongate, cylindrical, basal oesophageal enlargement in contrast to a bulboid or saccate and anteriorly tapering oesophageal enlargement in the Leptonchidae. Among the Tylencholaimidae, the cylindrical oesophageal enlargement is relatively short (as compared to the total oesophageal length) and the spear is long in the genera *Xiphinemella*, *Zalophidera*, *Utahnema*, *Kantbhala* etc. and on these criteria they can be assigned to Xiphinemellinae, separately from Tylencholaiminae. The subfamilies Metadorylaiminae, Mumtaziinae, Thorniinae, Tylencholaiminae, Vanderlindiinae and Xiphinemellinae constitute the family Tylencholaimidae, while Athernematinae, Belonenchinae, Leptonchinae, Tylencholaimellinae and Tyleptinae make up the family Leptonchidae.

I consider that the families Tylencholaimidae and Leptonchidae are so closely related to each other that they belong to one superfamily. The family group name Tylencholaiminae Filipjev, 1934 has priority over that of Leptonchinae Thorne, 1935 and, following Article 36 of the International Code of Zoological Nomenclature, the superfamily name Tylencholaimoidea Filipjev, 1934 (n.rank) is here recognized in place of Leptonchoidea Thorne, 1935 (Ferris, 1970). Systematics of this group have been discussed by several authors – Siddiqi (1969), Khera (1970), Ferris (1971), Goseco, Ferris & Ferris (1974), etc.

Most of the Tylencholaimoidea have a thin elongate spear and short muscular basal oesophageal bulb – adaptations suitable for root parasitism. Siddiqi & Khan (1965) stated that the solid needle-like spear of *Basirotyleptus* was reminiscent of that of *Trichodorus* and they suspected *Basirotyleptus* to be plant parasitic. The solid needle-like spear of *Coronatyleptus* and the hypodermic needle-like spear of *Capilonchus*, *Caveonchus* and *Zalophidera* suggest root parasitism of these genera.

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