

Three new species of the family Actinolaimidae (Nematoda : Dorylaimida) from India

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Summary – Three new species of the family Actinolaimidae (Thorne, 1939) Meyl, 1960 are described and illustrated. Two of these belong to the genus *Neoactinolaimus* Thorne, 1967 and one to *Egitius* Thorne, 1967. *Neoactinolaimus kosambus* sp. n. has 1.99-2.11 mm long body; $b = 3.8-4.3$; $c = 10.5-12.4$; odontostyle = 25-27 μm ; spicules = 48-51 μm and is closely related to *N. thornei* Chaturvedi & Khera, 1979 and *N. barbieri* Vinciguerra & Heyns, 1984. *Neoactinolaimus attenuatus* sp. n. has 2.21-2.43 mm long body; $b = 4.4-4.7$; $c = 18-21$; odontostyle = 21-24 μm and is closely related to *N. agilis* Thorne, 1967 and *N. thornei* Chaturvedi & Khera, 1979. *Egitius itanagrus* sp. n. has 1.7-2.6 mm long body; $b = 3.7-4.8$; $c = 12-19$; odontostyle = 24-28 μm ; spicules = 47-60 μm ; ventromedian supplements 8-10 and is closely related to *E. neoelaboratus* (Rahman *et al.* 1987) Jairajpuri & Ahmad, 1992; *E. zealandicus* (Clark, 1963) Vinciguerra & Heyns, 1934 and *E. bryophilus* Thorne, 1967.

Résumé – Trois nouvelles espèces de la famille des Actinolaimidae (Nematoda : Dorylaimida) provenant de l'Inde – Trois nouvelles espèces appartenant à la famille des Actinolaimidae (Thorne, 1939) Meyl, 1960 sont décrites et illustrées. Deux d'entre elles appartiennent au genre *Neoactinolaimus* Thorne, 1967, la troisième au genre *Egitius* Thorne, 1967. *Neoactinolaimus kosambus* sp. n., très proche de *N. thornei* Chaturvedi & Khera, 1979 et de *N. barbieri* Vinciguerra & Heyns, 1984, est caractérisé par : $L = 1,99-2,11$ mm; $b = 3,8-4,3$; $c = 10,5-12,4$; odontostyle = 25-27 μm ; spicules = 48-51 μm . *Neoactinolaimus attenuatus* sp. n., proche de *N. agilis* Thorne, 1967 et *N. thornei*, est caractérisé par : $L = 2,21-2,43$ mm; $b = 4,4-4,7$; $c = 18-21$; odontostyle = 21-24 μm . *Egitius itanagrus* sp. n. est caractérisé par : $L = 1,7-2,6$ mm; $b = 3,7-4,8$; $c = 12-19$; odontostyle = 24-28 μm ; spicules = 47-60 μm ; suppléments ventromédians = 8-10. Cette nouvelle espèce est proche de *E. neoelaboratus* (Rahman *et al.*, 1987) Jairajpuri & Ahmad, 1992, *E. zealandicus* (Clark, 1963) Vinciguerra & Heyns, 1984 et *E. bryophilus* Thorne, 1967.

Keywords : Dorylaimida, Actinolaimidae, *Neoactinolaimus*, *Egitius*.

Soil samples collected from Gujarat state and Arunachal Pradesh yielded two new species of *Neoactinolaimus* and one of *Egitius*, viz., *Neoactinolaimus kosambus* sp. n., *Neoactinolaimus attenuatus* sp. n. and *Egitius itanagrus* sp. n., they are described and illustrated below.

Specimens were killed and fixed in hot 4 % formaldehyde, dehydrated by the slow method and mounted in dehydrated glycerine. Measurements were made with an ocular micrometer.

Neoactinolaimus kosambus sp. n. (Fig. 1)

MEASUREMENTS

Females (paratype $n = 3$) : $L = 2.00-2.10$ (2.04) mm; $a = 31-39$ (35.8); $b = 3.8-4.3$ (4.02); $c = 10-12$ (11.3); $c' = 5.7-7.9$ (7.2); $V = 47-57$ (51); $G_1 = 18-22$ (20); $G_2 = 17-26$ (22.5); odontostyle = 25 μm ; odontophore = 24-26 (25.6) μm ; neck length = 486-521 (509) μm ; prerectum = 137-171 (153) μm ; rectum = 33-34 (33.5) μm ; tail = 163-190 (181) μm ; ABD = 24-28 (25.5) μm .

Males (paratype $n = 2$) : $L = 1.99-2.02$ mm; $a = 38-39$; $b = 3.8-4.3$; $c = 132-149$; $c' = 0.45-0.53$; $T =$

66-68; odontostyle = 25-27 μm ; odontophore = 24-25 μm ; neck length = 475-524 μm ; spicules = 48-51 μm ; lateral guiding pieces = 11-12 μm ; prerectum = 220-231 μm ; rectum = 42-45 μm ; tail = 13.5-15.0 μm ; ABD = 28.5-30.0 μm .

Holotype (female) : $L = 2.03$ mm; $a = 31$; $b = 3.9$; $c = 12$; $c' = 5.7$; $V = 54$; $G_1 = 22$; $G_2 = 26$; odontostyle = 25 μm ; odontophore = 25 μm ; neck-length = 521 μm ; prerectum = 171 μm ; rectum = 34 μm ; tail = 163 μm ; ABD = 28 μm .

DESCRIPTION

Adults : Body curved ventrad upon fixation, more so in the posterior region, especially in males. Cuticle marked with transverse striae, 2-4 μm thick at mid-body and 3-4 μm on tail. Lateral chords begin as narrow strands near the base of odontostyle and gradually expand to become one-fifth to one-fourth of corresponding body-width at mid-body. Lip region offset by slight depression, 18-20 μm wide or slightly narrower than adjoining body. Amphids stirrup-shaped, apertures 9 μm or about half of lip region-width wide. Vestibular ring corrugated. Cheilostome armed with four large onchia; each onchium provided with a secondary tooth. Odontostyle 1.4 lip region-widths long, aperture occu-

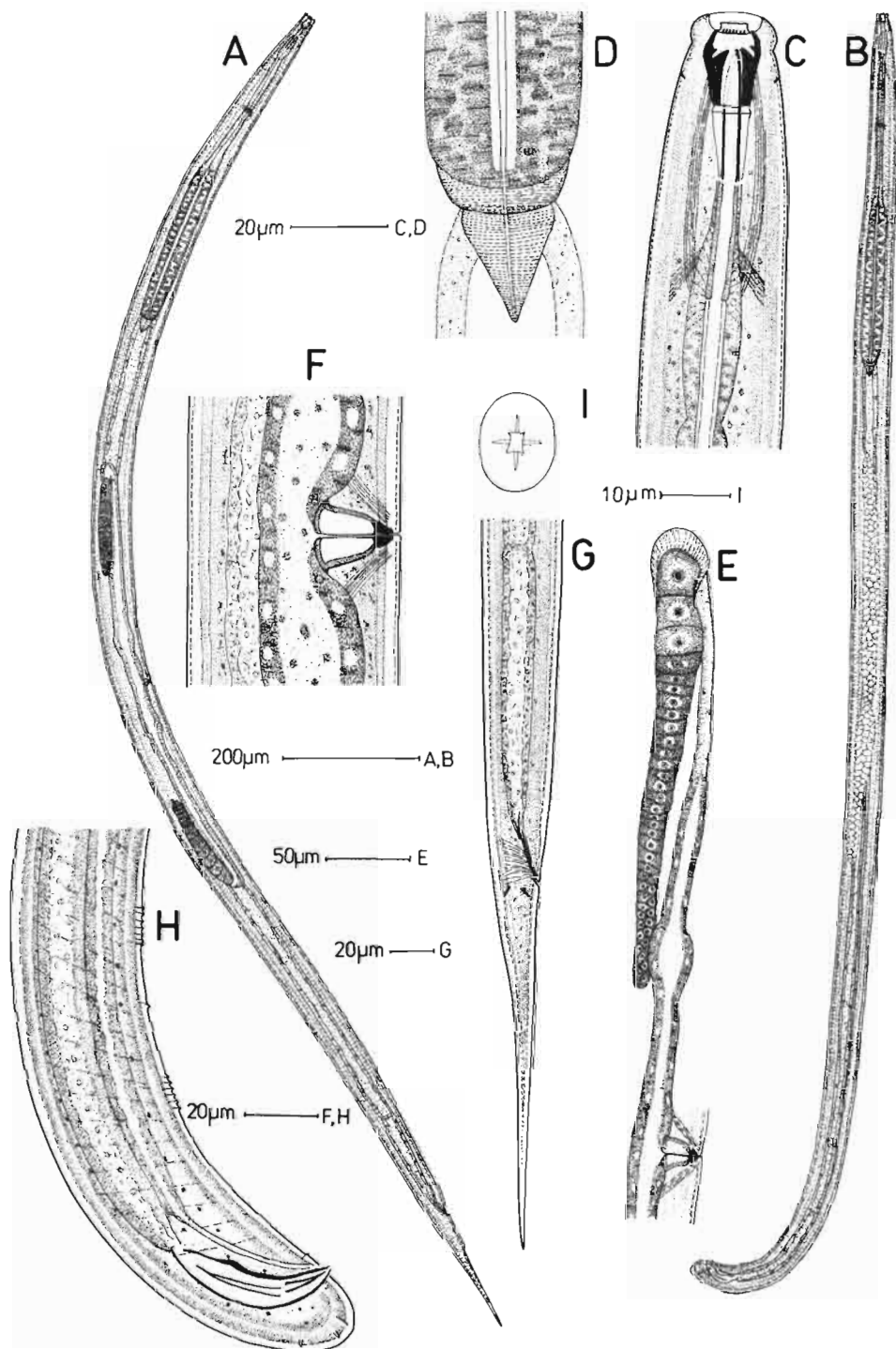


Fig. 1. *Neoactinolaimus kosambus* sp. n., A : Entire female; B : Entire male; C : Anterior region; D : Oesophago-intestinal junction; E : Female gonad (anterior); F : vulval region; G : Female posterior region; H : Male posterior region; I : Ventral view of vulva.

pying about two-fifths of its length. Odontophore about as long as odontostyle. Guiding ring "double", fixed ring at 18.0-19.5 μm or 0.9-1.1 lip region widths from anterior end of body. Post-extension constriction of oesophagus present at 41-45 μm from the base of odontostyle and 72-78 μm from anterior end of body. Nerve ring at 151-154 μm from anterior end. The oesophagus begins to widen at 49-52 % and attains its full width at 51-55 % of neck length from anterior end. Basal shield of oesophagus present. Cardia elongate-conoid, 29-32 μm long. Oesophageal gland nuclei and their orifices located as follows: DO = 53-56; DN = 55-58; DO-DN = 2.0-2.3; S₁N₁ = 69-74; S₁N₂ = 72-76; S₂N = 85-89; S₂O = 86-90.

Female: Reproductive system amphidelphic. Vulva irregular in shape; vagina thick-walled, sclerotized, 24-29 μm or slightly less than half corresponding body-width deep. Both sexual branches equally developed. Ovaries well-developed, 304-364 μm long with oocytes arranged in a single row except near tip. Oviduct 242-319 μm long; sphincter present at oviduct-uterus junction. Uterus 148-224 μm long. Prerectum 5.7-6.3 anal body-widths long. Rectum 1.2-1.4 anal body-widths long. Tail 5.7-7.9 anal body-widths long, uniformly tapering to become attenuated with pointed tip. A pair of caudal pores present on each side of tail.

Male: Testes paired, opposed, dorylaimoid; sperms spindle-shaped, 6-8 μm long. Spicules dorylaimoid, 1.6-1.9 anal body-widths long. Lateral guiding pieces 1/5-1/4th of spicules length. Supplements an adanal pair and ventromedians arranged in two groups (fascicles) each with 6-7 innervations. A solitary supplement present between the fascicles. Posterior fascicle 68-75 μm from cloacal aperture. Prerectum 7.7 anal body-widths long, terminating well beyond the range of supplements. Cloaca about 1.5 anal body-widths long. Tail bluntly rounded about half of anal body-width long, with 3-4 caudal pores on each side.

TYPE HABITAT AND LOCALITY

Soil around the roots of mango tree (*Mangifera indica* L.) from Kosamba Village, District Surat, Gujarat State India.

TYPE MATERIAL

Collected in June 1991. Holotype female on slide *Neoactinolaimus kosambus* sp. n./1; paratype males and females on slides *Neoactinolaimus kosambus* sp. n./2-3, deposited in the nematode collection of Zoology Department, Aligarh Muslim University, Aligarh. A paratype female and male deposited at Muséum National d'Histoire Naturelle, Paris, France.

DIAGNOSIS AND RELATIONSHIP

Neoactinolaimus kosambus sp. n. is distinctive in having slightly offset lip region, large odontostyle, vulva irregular in shape with lips almost covering the aperture,

elongate attenuated female tail and ventromedian supplements in fascicles.

N. kosambus sp. n. is closely related to *N. thornei* Chaturvedi & Khera, 1979 in body length, cheilostomal structure and in the shape and size of tail and spicules, but differs from it in having longer odontostyle, more posterior vulva, comparatively longer and more pointed tail and longer prerectum (odontostyle = 21 μm ; V = 43; c = 13; prerectum = 4 anal body-widths long in *N. thornei*). The new species also resembles *N. barbieri* Vinciguerra & Heyns, 1984 but differs from it in having longer odontostyle and odontophore, in the shape of amphids; longer prerectum, presence of single supplement between fascicles, lesser number of innervations in anterior fascicle and smaller spicules (odontostyle = 14-17 μm ; odontophore = 19-22 μm ; amphids duplex; prerectum = 4-5 anal body widths long; no free supplement between the fascicles; anterior fascicle with 11-14 innervations; spicules 55-67 μm long in *N. barbieri*).

Neoactinolaimus attenuatus sp. n.

(Fig. 2)

MEASUREMENTS

Females (paratype n = 7): L = 2.20-2.40 (2.28 \pm 0.08) mm; a = 53-65 (58.4 \pm 4.9); b = 4.4-4.7 (4.5 \pm 1.00); c = 18-21 (19.8 \pm 1.14); c' = 4.4-5.7 (5.1 \pm 0.43); V = 51-55 (53.4 \pm 1.31); G₁ = 7-8 (7.4 \pm 0.68); G₂ = 8-9 (8 \pm 0.17); odontostyle = 21-24 (22.5 \pm 0.95) μm ; odontophore = 18-20 (19.2 \pm 0.60) μm ; oesophagus = 494-521 (510.5 \pm 10.10) μm ; prerectum = 109-157 (132.9 \pm 20.30) μm ; rectum = 23-33 (26.7 \pm 4.12) μm ; tail = 106-129 (115.9 \pm 7.77) μm ; ABD = 22-24 (22.8 \pm 0.61) μm .

Holotype (female): L = 2.23 mm; a = 53; b = 4.4; c = 21; c' = 4.4; V = 55; G₁ = 8; G₂ = 8; odontostyle = 22 μm ; odontophore = 19.5 μm ; oesophagus = 509 μm ; prerectum = 120 μm ; rectum = 22 μm ; tail = 106 μm ; ABD = 24 μm .

DESCRIPTION

Female: Body curved ventrad upon fixation, tapering slightly anterior to base of oesophagus. Cuticle marked with fine transverse striae, 2-3 μm thick at mid-body and 4-5 μm on tail. Lateral chords about 1/4-1/3 of corresponding body-width at mid-body. Lip region rounded, expanded, offset by deep constriction; 21-23 μm or 2-2.5 times as wide as high. Amphids stirrup-shaped with slit-like apertures, 9-10 μm or about half of lip region-width wide. Vestibular ring corrugated. Cheilostome armed with four large onchia, each onchium provided with a secondary tooth. Odontostyle about one lip region-width long, with aperture about two-fifths of its length. Guiding ring "double"; fixed ring at 15-16 μm or 0.6-0.7 lip region widths from anterior end of body. Odontophore simple, rod-like, 0.8-0.9 times odontostyle length. Post-extension constriction of oe-

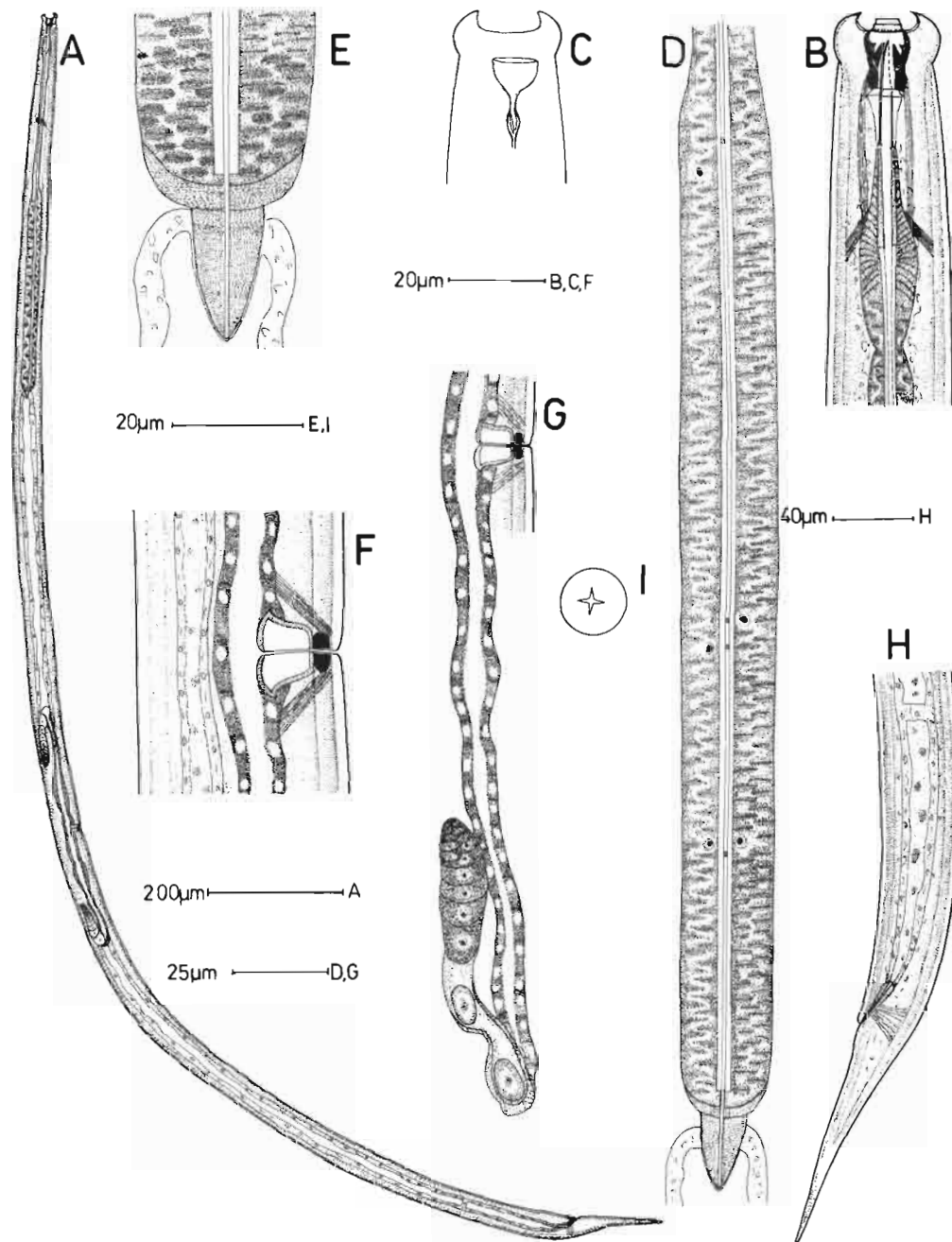


Fig. 2. *Neoaclinolaimus attenuatus* sp. n., A : Entire female; B : Anterior region; C : Anterior region showing amphid; D : Posterior expanded part of oesophagus; E : Oesophago-intestinal junction; F : Vulval region; G : Female gonad (posterior); H : Female posterior region; I : Ventral view of vulva.

sophagus present at 38-40 μm from base of odontostyle and 63-66 μm from anterior end of body. Nerve ring at 143-163 μm from anterior end. The oesophagus begins to widen at 42-46 % and attains its full width at 45-48 % of its neck length from anterior end. Basal shield of

oesophagus present. Cardia elongate-conoid, 20-26 μm long. Oesophageal gland nuclei and their orifices located as follows : DO = 48-50; DN = 50-52; DO-DN = 1.9-2.2; S₁N₁ = 73-78; S₁N₂ = 76-80; S₂N = 86-88; S₂O = 87-89. Reproductive system amphidelphic. Vulva irreg-

ular in shape; vagina distally sclerotized, 15-18 μm or about two-fifths to half of corresponding body-width deep. Both sexual branches equally developed. Ovaries well-developed, 61-103 μm long with oocytes arranged in a single row except near tip. The junction between oviduct and uterus obscured because of body granulation. Prerectum 5-7 anal body-widths long. Rectum 1.0-1.6 anal body-widths long. Tail elongate-conoid, 4.4-5.7 anal body-widths long, terminus uniformly conoid.

Male : Not found.

TYPE HABITAT AND LOCALITY

Residue from bio-gas plant from Kosamba village, district Surat, Gujarat state, India.

TYPE MATERIAL

Collected in July 1991. Holotype female on slide *Neoactinolaimus attenuatus* sp. n./1, paratype females on slides *Neoactinolaimus attenuatus* sp. n./2-6 deposited in nematode collection of Zoology Department, Aligarh Muslim University, Aligarh. A paratype female deposited at Muséum National d'Histoire Naturelle, Paris, France.

DIAGNOSIS AND RELATIONSHIP

Neoactinolaimus attenuatus sp. n. is distinctive in having slender body, wide rounded well offset lip region and relatively short tail.

It is closely related to *N. agilis* Thorne, 1967 but differs from it in having smaller body, presence of basal shield at oesophago-intestinal junction, in the position and shape of vulva, longer prerectum and differently shaped tail (body length 3.0 mm; basal shield absent, $V = 43$; vulva pore like; prerectum 4 anal body-widths long and tail with sharply pointed tip in *N. agilis*). The new species is also related to *N. thornei* Chaturvedi & Khera, 1979 but differs from it in having slender body, well offset, expanded lip region, in the shape and position of vulva and in the shape and size of tail (lip region low, rounded; $a = 46$; $c = 13$; $V = 43$; vulva pore-like; tail long filiform with pointed tip in *N. thornei*).

***Egtitus itanagrus* sp. n.**

(Fig. 3)

MEASUREMENTS

Females (paratype $n = 7$) : $L = 2.00-2.60$ (2.34 ± 0.18) mm; $a = 32-40$ (36.6 ± 2.57); $b = 4.1-4.7$ (4.4 ± 0.27); $c = 12-19$ (16.6 ± 2.25); $c' = 3.6-6.8$ (4.4 ± 1.09); $V = 49-53$ (51.6 ± 1.46); $G_1 = 9-16$ (14 ± 2.76); $G_2 = 8-15$ (12.5 ± 3.71); odontostyle = 24-27 (25.5 ± 1.22) μm ; odontophore = 26-32 (29 ± 2.79) μm ; oesophagus = 494-600 (543.9 ± 35.41) μm ; prerectum = 89-143 (118.1 ± 21.7) μm ; rectum = 18-39 (26 ± 6.81) μm ; tail = 118-194 (143 ± 26.03) μm ; ABD = 29-36 (33 ± 2.87) μm .

Males (paratype $n = 7$) : $L = 1.70-2.50$ (2.2 ± 0.30) mm; $a = 35-44$ (39.1 ± 3.69); $b = 3.7-4.8$ (4.3 ± 0.36); $c = 70-91$ (79.4 ± 9.02); $c' = 0.7-0.8$ (0.77 ± 0.04); $T = 58-70$ (62.0 ± 5.23); odontostyle = 24-28 (25.6 ± 1.18) μm ; odontophore = 24-30 (27.7 ± 2.36) μm ; oesophagus = 410-574 (500 ± 59.4) μm ; spicules = 47-60 (52.6 ± 6.22) μm ; lateral guiding pieces = 10-13 (11 ± 1.46) μm ; ventromedian supplements = 8-10; prerectum = 90-195 (134 ± 42.69) μm ; rectum = 37-58 (44 ± 7.18) μm ; tail = 22.5-30.0 (27.2 ± 3.51) μm ; ABD = 30-42 (35.4 ± 4.49) μm .

Holotype (female) : $L = 2.46$ mm; $a = 36$; $b = 4.1$; $c = 16$; $c' = 4.4$; $V = 49$; $G_1 = 15$; $G_2 = 16$; odontostyle = 27 μm ; odontophore = 31.5 μm ; oesophagus = 600 μm ; prerectum = 143 μm ; rectum = 44 μm ; tail = 152 μm ; ABD = 34 μm .

DESCRIPTION

Adults : Body straight to slightly ventrally curved upon fixation, more so in the posterior region; especially in males. Cuticle finely transversely striated, 3 μm thick at mid-body and 5-6 μm on tail. Lateral chords starting as narrow strands near the base of odontostyle and gradually expanding to become about 1/5-1/4th of body-width at mid-body. Lip region rounded, offset by constriction, 22-25 μm or 2.5 times wider than high. Amphids cup-shaped, aperture 10-15 μm or about half of lip region-width wide. Vestibular ring corrugated. Cheilostome armed with four large onchia. Odontostyle 1.0-1.2 lip region-widths long with aperture about two-fifths of its length. Guiding ring "double", fixed ring at 15-19 μm or 0.6-0.8 lip region-widths from anterior end. Odontophore simple rod-like, 1.0-1.3 times odontostyle length. Postextension constriction of oesophagus present at 47-54 μm from the base of odontostyle and 77-90 μm from anterior end of body. Nerve ring at 160-198 μm from anterior end. The oesophagus widens at 45-50% and attains its full width at 47-52% of neck length from anterior end. Basal shield of oesophagus present. Cardia elongate-conoid, 22-33 μm long. Oesophageal gland nuclei and their orifices located as follows : DO = 52-56; DN = 54-58; DO-DN = 2.2-2.7; $S_1N_1 = 74-77$; $S_1N_2 = 77-79$; $S_2N = 87-88$; $S_2O = 88-90$.

Female : Reproductive system amphidelphic. Vulva star-shaped; vagina 18-22 μm or about one-third of corresponding body width deep. Both sexual branches equally developed. Ovaries well developed, 129-210 μm long with oocytes arranged in a single row except near tip. Uterus 129-219 μm long, median muscular part containing Z-differentiation, *pars dilatata* not well defined. Oviduct 168-202 μm long with well defined *pars dilatata* filled with spindle-shaped sperms. Sphincter present at oviduct-uterus junction. Prerectum 2.3-4.6 anal body-widths long. Rectum 0.9-1.6 anal body-

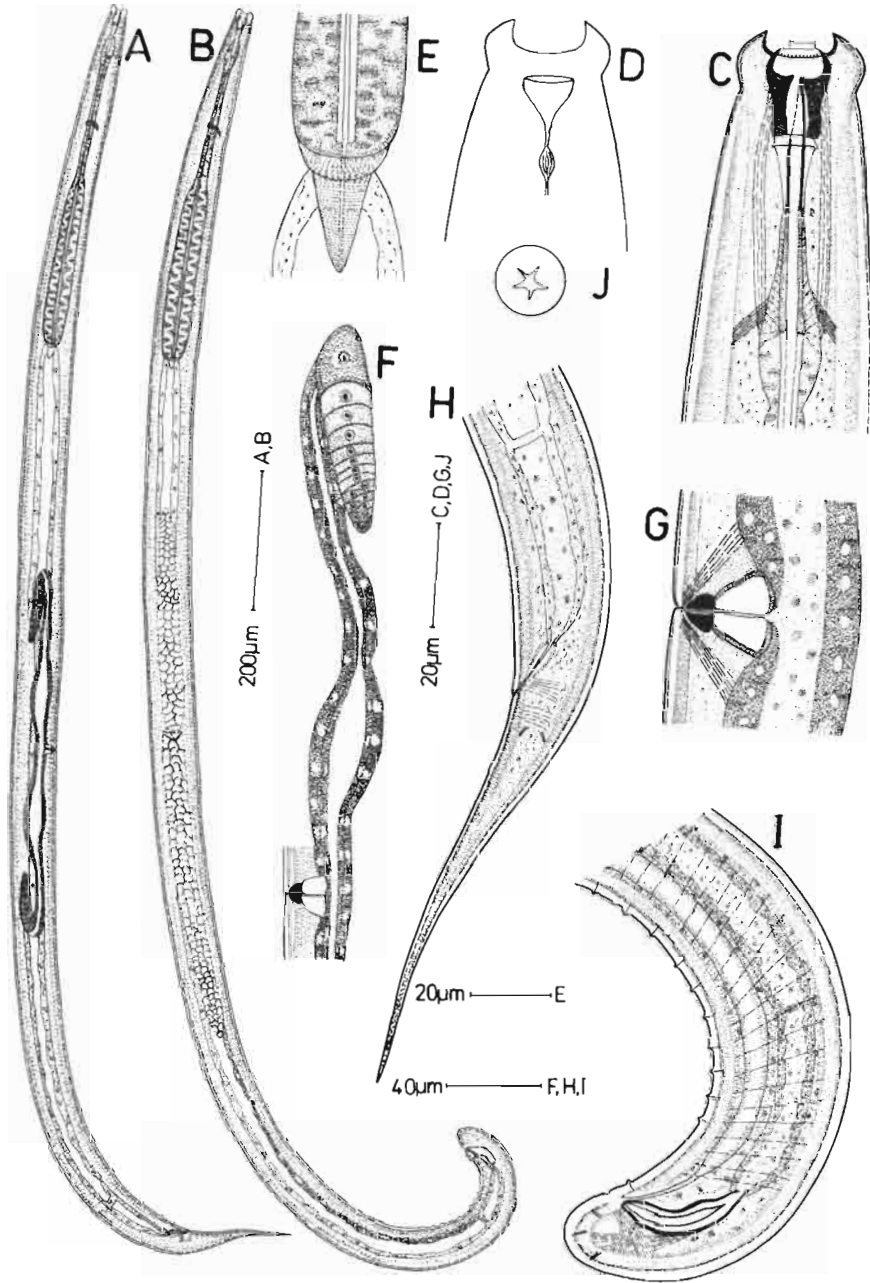


Fig. 3. *Egitus itanagrus* sp. n. A: Entire female; B: Entire male; C: Anterior region; D: Anterior region showing amphid; E: Oesophago-intestinal junction; F: Female gonad (anterior); G: Vulval region; H: Female posterior region; I: Male posterior region; J: Ventral view of vulva.

widths long. Tail 3.6-6.8 anal body-widths long, gradually tapering to become long filiform; ending in an acute tip, with two caudal pores on each side.

Male: Testes paired, opposed, dorylaimoid; sperms spindle-shaped, 7-9 µm long. Spicules dorylaimoid, 1.3-1.6 anal body-widths long. Lateral guiding pieces rod-like, one-fifth to one-fourth of spicules length. Sup-

plements: an adanal pair and 8-10 ventromedians. The posterior supplement at 45-78 µm from cloacal aperture, others 10-15 µm apart. Prerectum 2.3-4.6 anal body-widths long, terminating within the range of supplements. Cloaca 1.2-1.6 anal body-widths long. Tail bluntly rounded, 0.5-0.6 anal body-widths long with 2-3 caudal pores on each side.

TYPE HABITAT AND LOCALITY

Soil around the roots of bamboo from ganga lake, Itanagar, Arunachal Pradesh, India.

TYPE MATERIAL

Collected in March 1990. Holotype female and a paratype male on slide *Egtitus itanagrus* sp. n./1, other paratype males and females on slides *Egtitus itanagrus* sp. n./2-7, deposited in the nematode collection of Zoology Department, Aligarh Muslim University, Aligarh. A paratype female and male deposited at Muséum National d'Histoire Naturelle, Paris, France.

DIAGNOSIS AND RELATIONSHIP

Egtitus itanagrus sp. n. is distinctive in having post extension constriction of oesophagus, longer odontostyle, star-shaped vulva and tail long filiform ending in an acute tip.

E. itanagrus sp. n. is closely related to *E. neolaboratus* (Rahman *et al.*, 1987) Jairajpuri & Ahmad, 1992 and *E. lacustris* Loof, 1973 in the presence of a post-extension constriction of oesophagus. However, it differs from the former in having longer odontostyle, shorter tail, longer spicules and comparatively longer prerectum (odontostyle 22-24 μm ; $c = 8.1-11.1$, $c' = 8.1-10.1$, spicules = 40.5-48.0 μm ; prerectum = 57-94 μm in *E. neolaboratus*). From *E. lacustris* it differs in the presence of cardiac disc, in having shorter tail, in the number of ventromedial supplements and in the size of prerectum in males (cardiac disc absent; $c = 7.3-8.7$; ventromedial supplements 16 and prerectum in males terminating well beyond the range of supplements in *E. lacustris*). The new species also resembles *E. zealandicus* (Clark, 1963) Vinciguerra & Heyns, 1984 but differs in having longer odontostyle, presence of a post-extension constriction of oesophagus, fewer ventromedial supplements and simple lateral guiding pieces (odontostyle 21 μm ; post-extension constriction of oesophagus absent; ventromedial supplements = 9-18

(generally 12-15); lateral guiding pieces bifid in *E. zealandicus*). *E. itanagrus* sp. n. also resembles *E. bryophilus* Thorne, 1967 but differs from it in the size of odontostyle, absence of glandular structure at the base of oesophagus, and the prerectum in males terminating within the range of supplements (odontostyle = 16 μm ; a conspicuous gland located left dorso-submedian at base of oesophagus and prerectum in males extending beyond the range of supplements in *E. bryophilus*).

Acknowledgements

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