

Two new species of *Rhigonema* Cobb, 1898 (Oxyurida : Rhigonematidae)

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SUMMARY

Two new species of *Rhigonema* are described from the gut of millipedes collected in Trinidad, West Indies. *Rhigonema lanceacauda* n. sp. is distinguished from *R. longicaudatum* Dollfus, 1952 by the longer and more evenly tapering tail in both sexes and by the male possessing only two pairs of post-cloacal papillae. *R. pinguilabellum* n. sp. is characterized by a thick anterior vulval lip, projecting backwards and just recovering the vulval slit. It is distinguished from *R. critesi* Ramirez, 1974 by both sexes bearing a cuticular pilosity anteriorly (*R. critesi* is glabrous) and by the much shorter spicules (220-340 μm as opposed to 400-600 μm in *R. critesi*). Stereoscan photographs of the anterior ends of the new species are given.

RÉSUMÉ

Deux espèces nouvelles de *Rhigonema* Cobb, 1898 (Oxyurida : Rhigonematidae)

L'auteur décrit et figure deux nouvelles espèces de *Rhigonema* collectées à Trinidad (Antilles) dans l'intestin de myriapodes. *Rhigonema lanceacauda* n. sp. se distingue de *R. longicaudatum* Dollfus, 1952 par une queue plus longue et s'amincissant plus régulièrement chez les deux sexes et par le fait que le mâle ne possède que deux paires de papilles post-cloacales. *R. pinguilabellum* n. sp. est caractérisé par une lèvre vulvaire antérieure épaisse, en relief et recouvrant vers l'arrière la fente vulvaire. Il se distingue de *R. critesi* Ramirez, 1974 par la pilosité de la partie antérieure des deux sexes (*R. critesi* est glabre) et par les spicules plus courts (220-340 μm contre 400-600 μm chez *R. critesi*). Des photographies au Stereoscan des parties antérieures des espèces nouvelles sont données.

The family Rhigonematidae contains several genera, the representatives of which are found in the alimentary tract of various millipedes (Diplopoda). Of these genera, *Rhigonema* Cobb, 1898 is distinctive because of a large anteriorly directed vaginal diverticulum. The function of this structure is unclear, but it may serve as a repository for spermatozoa or ova. Most species of *Rhigonema* exhibit a cuticular 'pilosity' in the anterior region. The presence of such a pilose region appears to assist the nematode in maintaining position within the gut, the hair-like cuticular projections engaging in the tissues of the host's gut wall.

During September 1980, two new species of *Rhigonema* were recovered from two different species of millipede in Trinidad, West Indies. The species are described hereunder and scanning electron micrographs of the anterior ends are included.

Materials and methods

Live millipedes were decapitated, placed in 1% Ringer's solution and the gut withdrawn by making an annular incision in the penultimate intersegmental membrane and carefully pulling the two sections apart. The gut was then dissected and nematodes removed, killed in hot (80°) 1% Ringer's solution and fixed in TAF made up with 1% Ringer's solution instead of distilled water.

Specimens for study under the light microscope were processed to glycerol using a slow evaporation technique. Specimens for scanning electron microscopy were hand-picked and taken through the following alcohol series with 30 minutes at each stage : 30%, 40%, 50%, 60%, 70%, 80%, 90% EtOH, IMS I and II, absolute EtOH I, II and III. Specimens were dried in a critical point dryer, mounted on stubs and

sputter-coated with a 1 000 Å layer of gold. They were examined under an ISI-60 SEM.

***Rhigonema lanceacauda* n. sp.**
(Figs 1 and 3 A-C)

DIMENSIONS

Female (n = 10) : L = 4.7 mm (4.2-5.1); width = 147 µm (126-178); oesophagus = 430 µm (407-451); tail = 687 µm (602-761); anal body-width = 66 µm (63-72); a = 32 (27.5-35.4); b = 10.9 (9.9-12); c = 6.8 (6.1-7.8); c' = 10.4 (8.7-11.5); V = 51.7 (49.8-52.9).

Holotype female: L = 4.8 mm; a = 31.8; b = 10.9; c = 6.8; c' = 10.2; V = 51.9.

Male (n = 10) : L = 4.0 mm (3.5-4.4); width = 121 µm (99-135); oesophagus = 405 µm (380-425); tail = 488 µm (460-522); anal body-width = 66 µm (59-74); spicules (curved median line) = 131 µm (117-140); a = 33.2 (30.9-35.6); b = 9.9 (9.1-10.4); c = 8.2 (7.0-9.1); c' = 7.4 (6.5-8.4).

DESCRIPTION

Female: Long and slender nematodes, assuming an almost straight posture on heat relaxation. Cuticle with very faint transverse striae (about 2 µm apart in the mid-body region) and densely 'pilose' in the anterior 20% or so of the body (Fig. 3). Lateral alae absent. A number of specimens were found with eccrinids attached to the body cuticle (Fig. 1 G).

Head broad, more or less truncate, and bearing four cephalic papillae, six inner labial papillae and a pair of small amphidial apertures. Surrounding the triangular oral opening are three prominent lips, each bearing a pedunculate projection in a median position on the interior margin (Fig. 3 C, Fig. 1 D).

Stoma triradiate in section, each radius bearing three pairs of interlocking teeth (as in Fig. 2 C). Oesophagus typical for the genus with the anterior oesophageal rods about 110% as long as the posterior rods. Excretory pore prominent and situated about level with the anterior margin of the basal bulb.

Vulva a short, median, transverse slit. Vagina

vera about half a vulval body-width long, forwardly directed, muscular and with a very large vaginal diverticulum extending several body-widths anteriorly (Fig. 1 E). Vagina uterina posteriorly directed. Genital tracts amphididelpic reflexed and containing numerous thick-walled oval eggs about 77 × 54 µm in size.

Tail very long, conical, tapering evenly to a finely pointed terminus.

Male: Heat-relaxed form straight with the tail region curved sharply ventrad. Cuticular and oesophageal features as in the female. Testis single, reflexed. Spicules paired, ventrally arcuate and about 130 µm long. Papillae consisting of four pre-cloacal pairs and a single, small, pre-cloacal papilla, and two pairs of post-cloacal papillae (Fig. 1 C, F). Tail long conical. No bursa visible in ventral view.

The specific epithet refers to the shape of the tail and is derived from the Latin *lancea* = lance and *cauda* = tail.

TYPE HOST AND LOCALITY

Millipede (? *Varyomus* sp.) recovered from a rotting log in rain forest near the Textel Station, Arima Valley, Trinidad, West Indies.

TYPE SLIDES

Holotype female, three paratype females and four paratype males at the Commonwealth Institute of Helminthology, St. Albans, Herts, England and three paratypes of each sex at both Rothamsted Experimental Station, Harpenden, Herts, England and the Laboratoire des Vers, Muséum national d'Histoire naturelle, Paris, France.

DIAGNOSIS AND RELATIONSHIPS

Rhigonema lanceacauda n. sp. is characterized by the cuticular pilosity at the anterior end of both sexes, the form of both male and female tail and the presence of only two pairs of post-cloacal papillae in the male.

It is closest to *R. longicaudatum* Dollfus, 1952, from which it can easily be distinguished by the longer and more evenly tapering tail and in possessing only two pairs of post-cloacal papillae in the male.

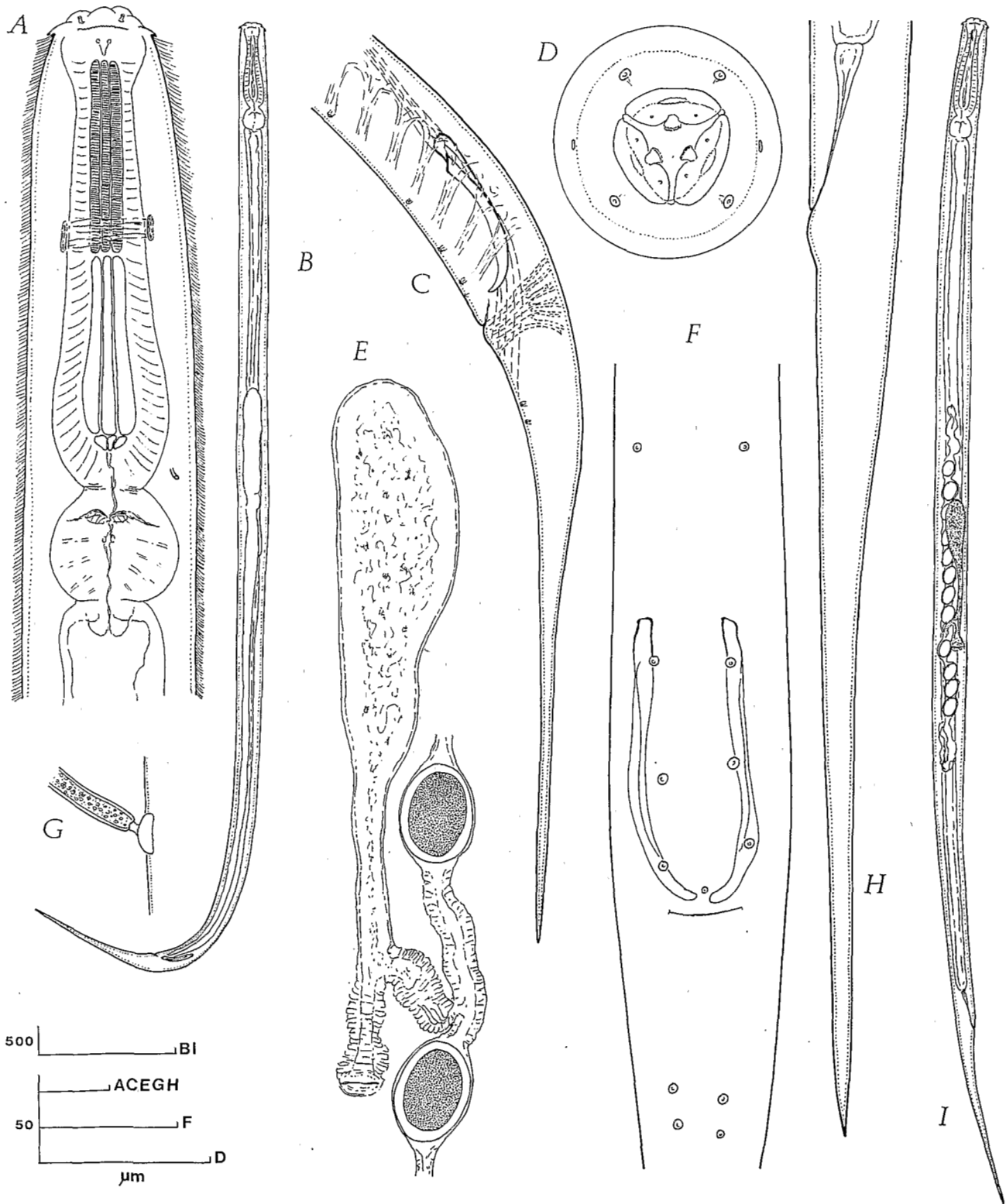


Fig. 1. *Rhigonema lanceacauda* n. sp. A : Female oesophagus ; B : Entire male ; C : Male tail region ; D : En face view ; E : Vaginal diverticulum ; F : Ventral view of male tail region ; G : Eccrinid attached to body cuticle ; H : Female tail ; I : Entire female.

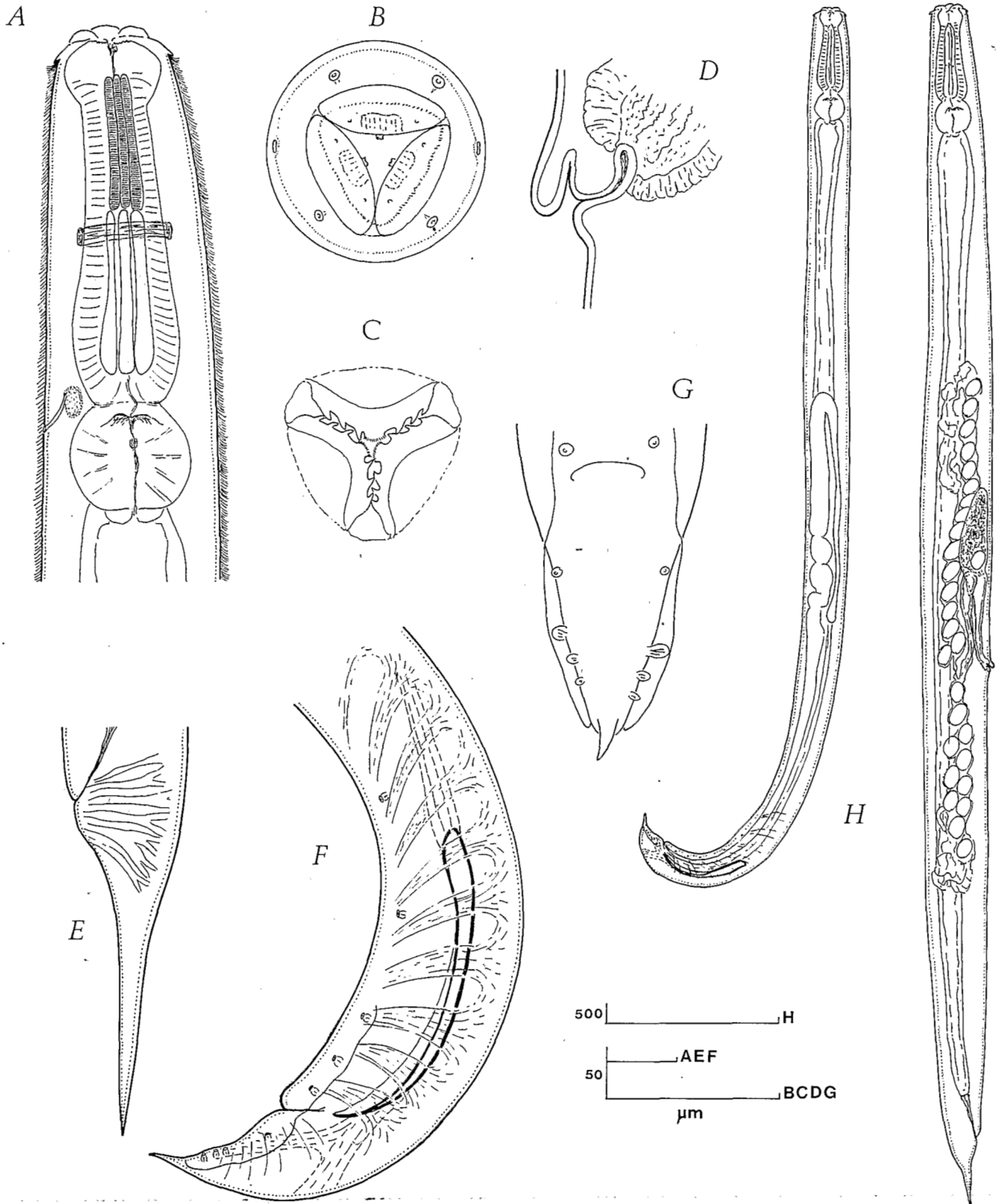


Fig. 2. *Rhigonema pinguilabellum* n. sp. A : Male oesophagus ; B : En face view ; C : Optical section of stoma ; D : Vulval flap ; E : Female tail ; F : Male tail region ; G : Male tail in ventral view ; H : Entire male and female.

***Rhigonema pinguilabellum* n. sp.**
(Fig. 2, Fig. 3 D)

DIMENSIONS

Female (n = 10) : L = 4.1 mm (3.5-4.7); width = 212 μ m (178-248); oesophagus = 395 μ m (369-439); tail = 211 μ m (191-247); anal body-width = 86 μ m (77-95); a = 19.2 (17.6-23.4); b = 10.3 (9.2-12.8); c = 19.3 (14.3-25.7); c' = 2.5 (2-3.2); V = 53.1 (52.1-56.7).

Holotype female: L = 3.7 mm; a = 19.8; b = 9.9; c = 16.8; c' = 2.8; V = 52.1.

Male (n = 10) : L = 3.0 mm (2.4-4.1); width = 150 μ m (101-227); oesophagus = 336 μ m (313-374); tail = 124 μ m (108-140); anal body-width = 66 μ m (54-79); spicules (curved median line) = 276 μ m (221-342); a = 20.2 (16.1-24.6); b = 9.0 (7.6-11.2); c = 24.5 (18.2-32.4); c' = 1.9 (1.5-2.4).

DESCRIPTION

Female: Long, fairly plump nematodes, assuming an almost straight posture on heat relaxation. Cuticle with very faint transverse striae (about 2 μ m apart in the mid-body region) and densely pilose in the anterior 15-20% of the body. The pilosity is shorter and more closely appressed to the body than in *R. lanceacauda* n. sp. Lateral alae absent and no eccrinids seen attached to body cuticle.

Head broadly truncate with four cephalic papillae, six inner labial papillae and a pair of small amphidial openings. There are three lips, each with a small protuberance in a median position along the inner margin (Fig. 2 B, Fig. 3 D). The protuberances appear to be considerably smaller than those of *R. lanceacauda* n. sp. (cf. Fig. 3 C and D).

The triradiate stoma is equipped with three pairs of interlocking teeth along each radius (Fig. 2 C). Oesophagus typical for the genus with the anterior oesophageal rods about 85% as long as the posterior rods. Excretory pore prominent and about level with the anterior margin of the basal bulb.

Vulva a median transverse slit with a broad flap-like structure extending posteriorly

and slightly outwardly from the anterior lip (Fig. 2 D). Vagina vera 1-1.5 vulval body-widths long, very muscular and directed anteriorly. Genital tracts amphi-didelphic, reflexed. Numerous thick-walled eggs in uteri, approximately 74 \times 58 μ m in size.

Tail irregularly conoid, narrowing abruptly posterior to the anus on the ventral surface and terminating in a fine point.

Male: With general features of the female as described above. Heat-relaxed form straight with the tail region curved sharply ventrad. Spicules paired, ventrally arcuate and about 276 μ m long. Papillae comprising five pre-cloacal and four post-cloacal pairs arranged as in Fig. 2 C. Bursa present (Fig. 2 G). Tail short, conoid, with a finely pointed digitiform process.

The specific epithet refers to the anterior vulval lip and is derived from the Latin *pinguis* = fleshy or fat and *labellum* = a small lip.

TYPE HOST AND LOCALITY

Aphelidesmus divergens Chamberlin (Diplopoda) found abundantly under rotting leaves in an old cocoa estate about 1 km upstream from the first bridge in the San Miguel valley, Trinidad, West Indies.

TYPE SLIDES

Holotype female, three paratype females and four paratype males at the Commonwealth Institute of Helminthology, St. Albans, Herts, England and three paratypes of each sex at both Rothamsted Experimental Station, Harpenden, Herts, England and the Laboratoire des Vers, Muséum national d'Histoire naturelle, Paris, France.

DIAGNOSIS AND RELATIONSHIPS

Rhigonema pinguilabellum n. sp. is characterized by the cuticular pilosity at the anterior end of both sexes, tail shape and presence of a vulval flap.

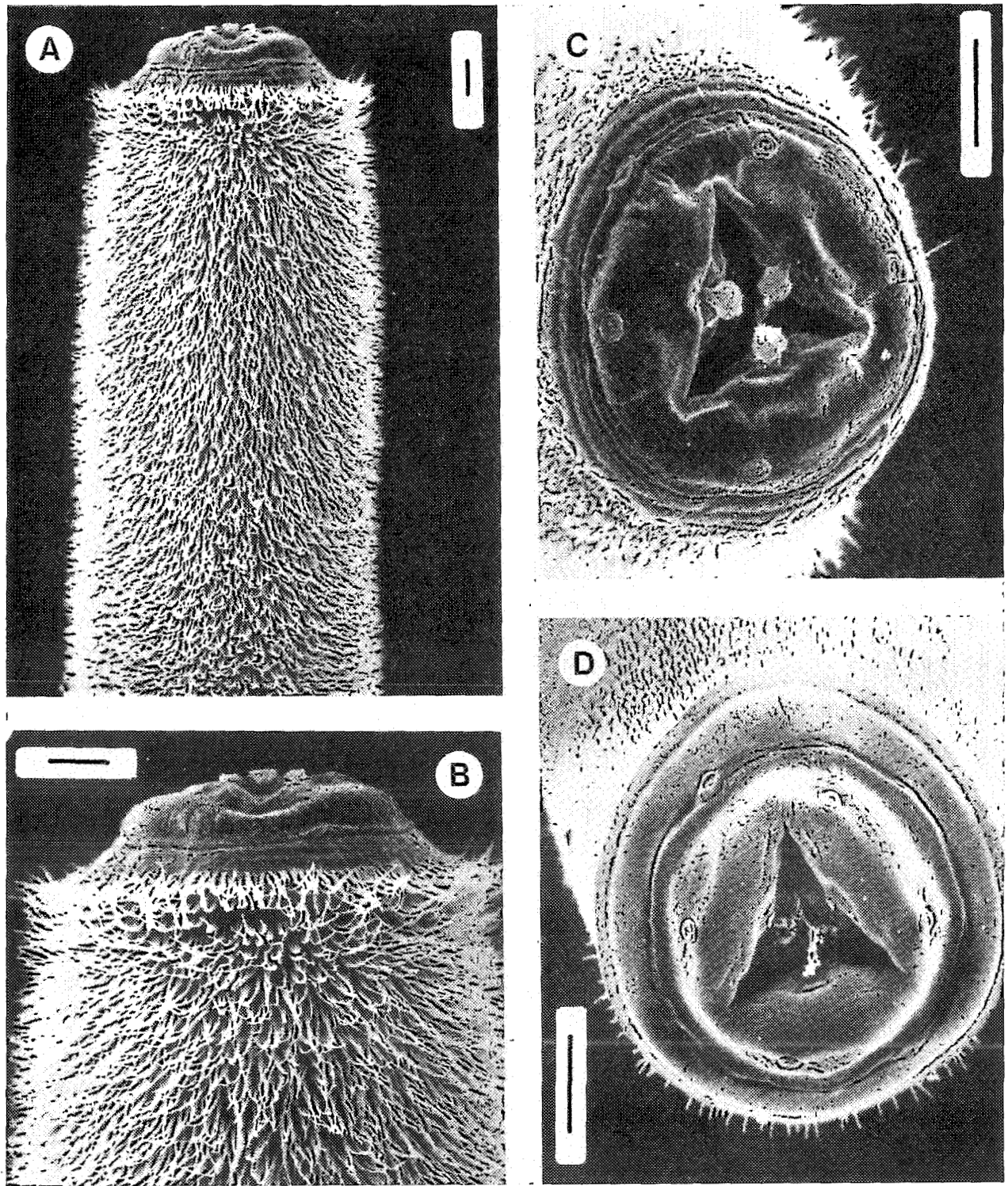


Fig. 3. *Rhigonema lanceacauda* n. sp. A, B : Female anterior end ; C : En face view. *Rhigonema pinguilabellum* n. sp. D : En face view. (Scale bar = 10 μ m).

Ramírez (1974) described *R. critesi*, the only other species of *Rhigonema* with a protruding anterior vulval lip. However, *R. critesi* lacks the cuticular pilosity of *R. pinguilabellum* n. sp. and has longer spicules (400-600 μm as opposed to 220-340 μm in *R. pinguilabellum* n. sp.).

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REFERENCES

- DOLLFUS, R.-P. (1952). Quelques Oxyuroidea de Myriapodes. *Ann. Parasit. hum. comp.*, 27 : 143-236.
- RAMÍREZ, J. (1974). *Rhigonema critesi* sp. n. (Nematoda : Rhigonematidae), a parasite of the millipede, *Orthoporus typtopyge* (Brölemann, 1905) from Costa Rica. *Proc. helminth. Soc. Wash.*, 41 : 131-134.