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Taxonomy of *Discocriconemella* (Nematoda: Criconematoidea) with a Redescription of *D. mauritiensis*

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Abstract: The form of the cephalic disc and its taxonomic significance at the species level in the genus *Discocriconemella* De Grisse & Loof, 1965 is discussed. By light (LM) and scanning electron microscopy (SEM), four groups of disc configurations in females and juveniles are distinguishable. The disc is either round with an uninterrupted margin (group 1), has a deep dorsal and ventral indentation (group 2), is indented medially and laterally giving a four-lobed appearance (group 3), or is round with paired dorsal and ventral projections (group 4). There is no apparent correlation between groups of cephalic discs and other characters such as tail shape or number of body annules. *Discocriconemella mauritiensis* (Williams, 1960) De Grisse & Loof, 1965 is redescribed from a sugar cane population collected in Mauritius, and the diagnosis of the genus is emended.

Key words: Criconematoidea, *Discocriconemella mauritiensis*, Mauritius, morphology, Nematoda, ring nematode, scanning electron microscopy, taxonomy.

The genus *Discocriconemella,* proposed by De Grisse and Loof, 1965 (1) contains 22 species showing great interspecific diversity. The primary distinguishing character common to all species is the greatly enlarged first cephalic annule, which is modified into a disc. There is, however, substantial interspecific variability in this character state. Therefore, I conducted a study of the disc in representative species of the genus to determine if there was constancy in patterns to aid in classification of the diverse species. The disc and other diagnostic characteristics of *D. mauritiensis* are amplified and supplemented with additional observations made on a population collected by Lamberti in sugar cane fields at Quatre Soeurs, in Mauritius.

Material and Methods

Specimens of *D. conicaudata* Vovlas & Sharma, 1989, *D. degrissei* Loof & Sharma, 1980, *D. mauritiensis* (Williams, 1960) De Grisse & Loof, 1965, *D. mineira* Vovlas, Ferraz & Santos, 1989, *D. paraglabrannulata* Vovlas & Sharma, 1989, and *D. repleta* Pinochet & Raski, 1976 were fixed in hot 4% formaldehyde:1% propionic acid and processed to glycerol by Seinhorst's rapid method. Specimens were prepared for SEM using Wergin's method (8) and then coated with gold and observed with a Joel 50A stereoscan at 5–10 kV of accelerating voltage. SEM photos of the face of *D. caudaventer* Williams, 1979 were reproduced from Orton Williams (4) illustration and used for comparison. Abbreviations used are defined in Siddiqi (7). All measurements are in micrometers (μm) unless otherwise stated.

Systematics

Genus *Discocriconemella* De Grisse and Loof, 1965

Cephalic disc morphology

The genus *Discocriconemella* is composed of 22 diverse species, having in common an enlarged cephalic annule or disc. Light and scanning electron microscope studies show for the first time that the species can be conveniently assigned to one of four groups based on configuration of the cephalic disc (Fig. 1). The following key is suggested to group its 21 species. *Discocriconemella recensi* Khan, Seshadri, Weisher, and Methen, 1971, for which the

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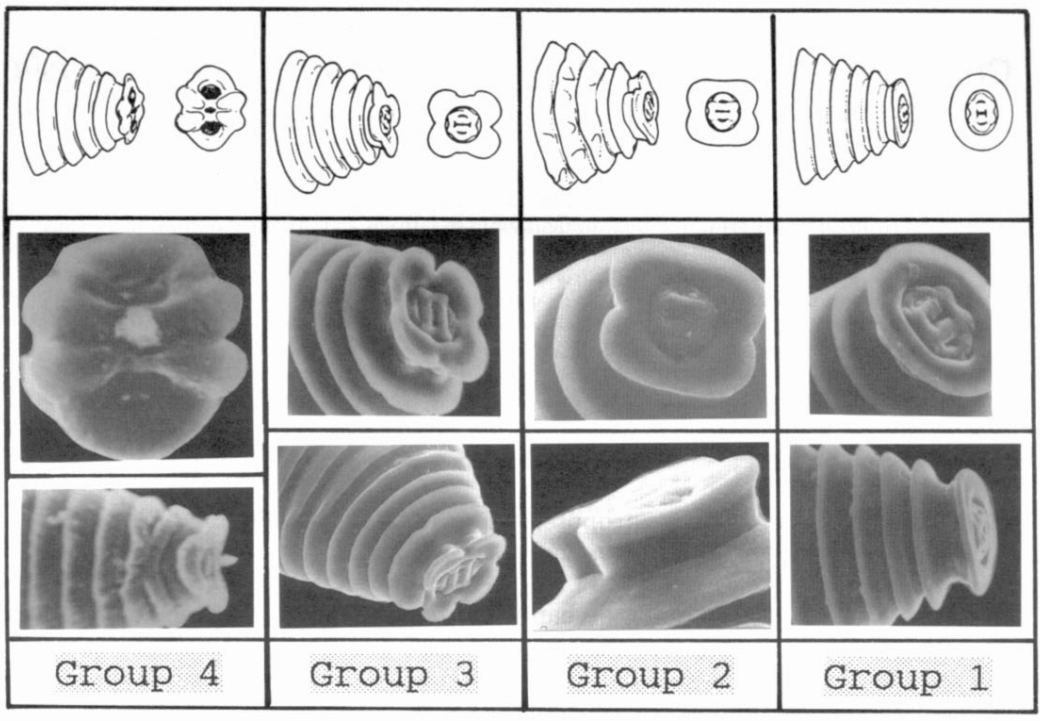

FIG. 1. Four main groups of the cephalic disc structure distinguished in the genus *Discocriconemella*.

facial features are unknown, is not included.

Key for grouping *Discocriconemella* species

1. Cephalic disc round with an uninterrupted margin.....*Group 1*
2. Disc with dorsal and ventral deep indentations .....*Group 2*
3. Disc indented medially and laterally giving a four-lobed appearance .....*Group 3*
4. Disc round with paired dorsal and ventral projections .....*Group 4*

Group 1: (Figs. 2,5). Cephalic disc uniformly round, without interruptions. Species with this disc configuration are *D. discolabia* (Diab & Jenkins, 1966) De Grisse 1967, *D. inarata* Hoffmann, 1974, *D. mauritiensis* (Williams, 1960) De Grisse & Loof, 1965, *D. mineira* Vovlas, Ferraz & Santos, 1989, and *D. perseae* Cid del Prado Vera & Loof, 1985. The main diagnostic characteristics for the species of this group appear in Table 1.

Group 2: (Figs. 3,4D–F). Disc deeply indented dorsally and ventrally; species included are *D. baforti* De Grisse, 1967, *D. colbrani* (Luc, 1970) Loof and De Grisse, 1974, *D. limitanea* (Luc, 1959) De Grisse and Loof, 1965, *D. paraglabrannulata* Vovlas and Sharma, 1989, *D. repleta* Pinochet and Raski, 1976, *D. theobromae* (Chawla and Samathanam, 1980) Raski and Luc, 1987, and *D. elettariae* Sharma and Edward,

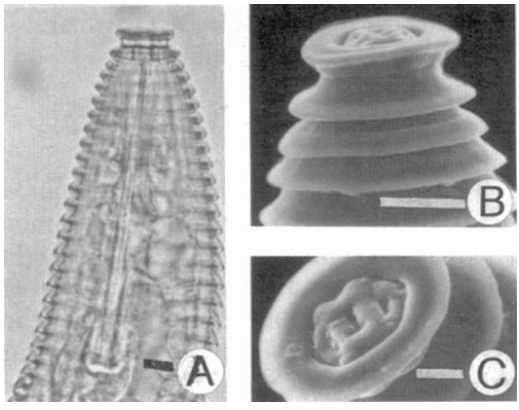

FIG. 2. *Discocriconemella mineira* profile and face view of cephalic disc structure group 1. (Scale bar = 5 μm).

TABLE 1. Diagnostic compendium for grouping *Discocriconemella* species based on morphometric criteria.

Species	Stylet	Body length	R	RV
		Group 1		
mauritiensis	33–38	290–390	141–152	9–11
discolabia	37–40	240–260	162–174	15–17
inarata	51–61	354–486	77–100	8–9
mineira	61–71	253–342	78–88	6–8
perseae	69–86	220–370	108–176	14–20
		Group 2		
paraglabrannulata	44–49	366–464	104–112	7–9
limitanea	43–52	190–280	99–111	8–14
colbrani	54–59	220–260	76–82	6–8
repleta	59–66	250–290	107–116	10–12
theobromae	65–69	275–340	95–104	12–14
elettariae	80	278–292	94–98	11–13
baforti	99–113	316–433	119–142	15
		Group 3		
glabrannulata	37–44	330	83–92	8–9
morelensis	50–67	280–470	74–89	5–8
conicaudata	40–45	253–366	91–100	7–9
degrissei	56–68	250–390	71–82	6–11
		Group 4		
macramphidia	57–65	280–320	68–82	10–12
caudaventer	68–77	245–290	108–112	14–17
retroversa	88–97	250–310	94–105	11–14
pannosa	96–113	300–390	65–72	10
hengsungica	104–108	285–315	82–92	13

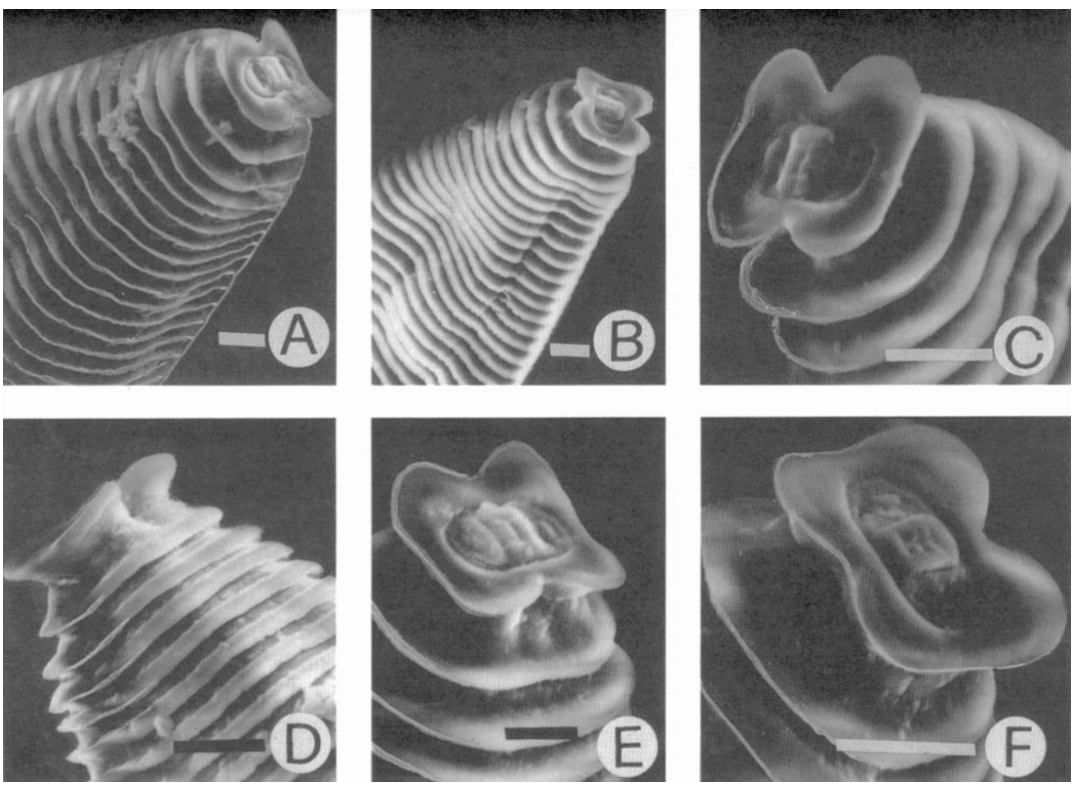

FIG. 3. *Discocriconemella repleta*, retouched profile and face view of the cephalic disc structure group 2. (Scale bar = 5 μm).

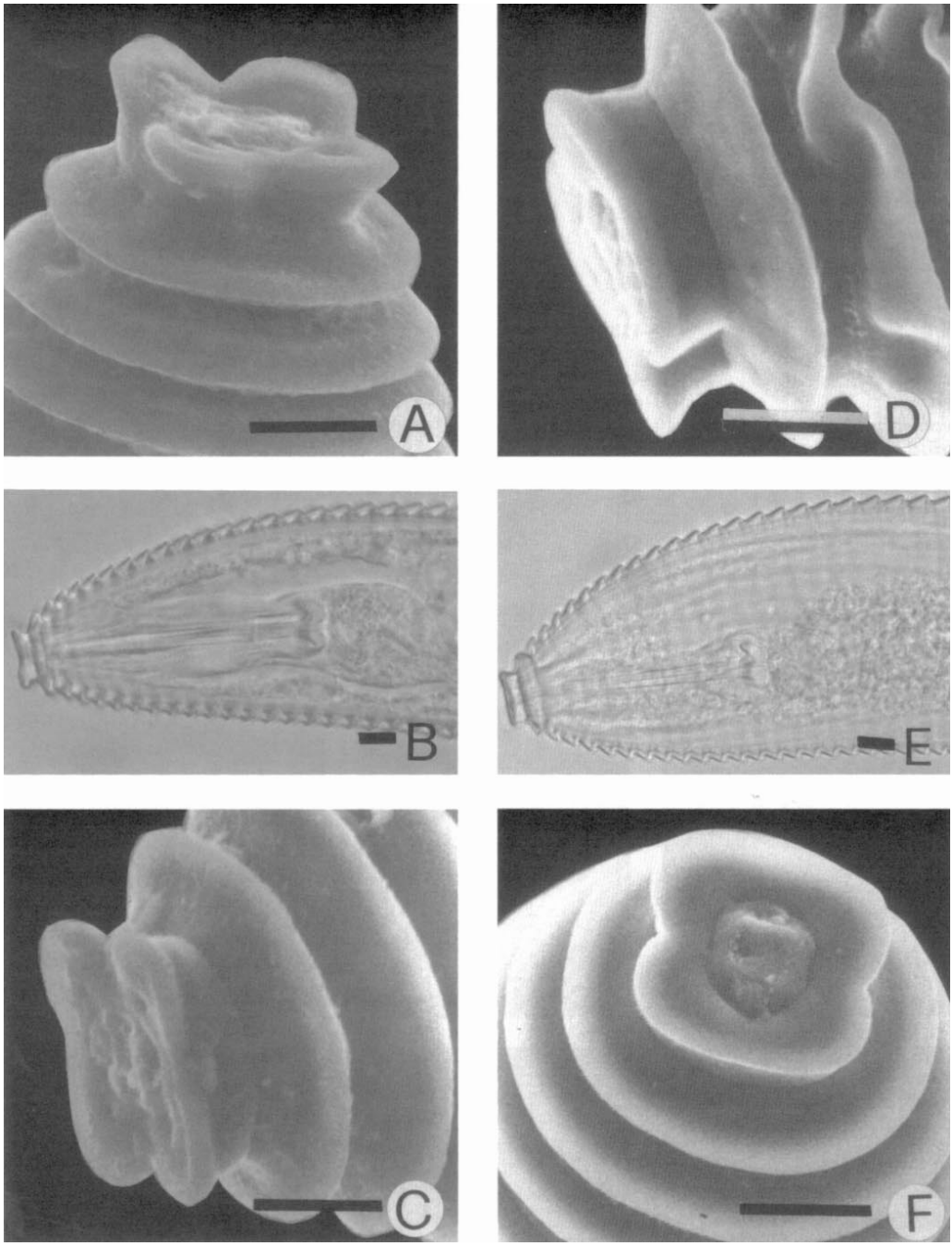

FIG. 4. (A–C) *Discocriconemella conicaudata.* (D–F) *D. paraglabrannulata.* Cephalic disc structure, respectively, of group 3 and 2. (Scale bar = 5 μm).

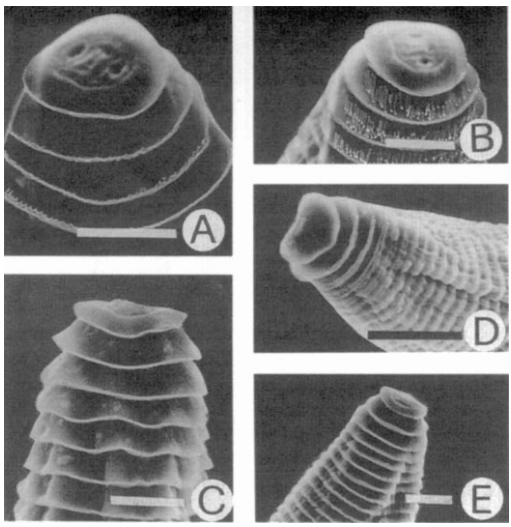

FIG. 5. Retouched SEM micrographs of anterior body of *Discocriconemella mauritiensis* showing the round cephalic disc with uninterrupted margin. (Scale bar = 5 μm).

1985. Morphometric criteria separating the seven species belonging to this group are in Table 1.

Group 3: (Fig. 4A–C). Disc indented medially and laterally giving a four-lobed appearance. To this group belong *D. conicaudata* Vovlas and Sharma, 1989, *D. degrissei* Loof and Sharma, 1980, *D. glabrannulata* De Grisse, 1967, and *D. morelensis* Cid del Prado Vera and Loof, 1985, with morphometric data placed in Table 1.

Group 4: (Fig. 1). Disc round, with paired, dorsal and ventral submedian projections. Five species belong to this group: *D. caudaventer* Williams, 1979, *D. hengsungica* Choi and Geraert, 1975, *D. macramphidia* De Grisse, 1967, *D. pannosa* Sauer and Winoto, 1975, and *D. retroversa* Sawer and Winoto, 1975. The main morphometric data of the five species of this group appear in Table 1.

Generic diagnosis (emended)

Criconematinae. Female: Morphologically diverse species having in common an enlarged cephalic annule resembling a disc. Disc configuration diagnostic, permitting placement of species in four groups. Body 180–490 (μm) long, arcuate to C-shaped when relaxed. Annules smooth or crenate, outline angular or rounded, R = 65–174. Stylet of variable length, 33–113 μm, rigid or flexible. Amphid apertures small pore or slit-like. Submedian lobes weakly developed when present. Rudimentary submedian lobes are reported for *D. degrissei, D. mineira,* and *D. morelensis.* Vulva usually closed, occasionally open. Postvulval part rounded to elongate-conoid, sometimes curved dorsally. *Male.* Known for six species. All have conoid or rounded lip region surmounted by a distinct knob or disc, which seems to be a rudimentary head disc. Lateral field with two or four lines. Tail varies in shape from rounded to conical; the terminus is with or without a short projection.

Discocriconemella mauritiensis
(Williams, 1960)
De Grisse & Loof, 1965
(Figs. 5–7)

Redescription

Female (n = 15): Morphometric data in Table 2. Relaxed body strongly crescentic, cylindrical, tapering towards extremities. Cephalic disc 8 ± 0.4 (7.5–8.6) wide, flattened anteriorly. In face view, the disc is roughly circular without indentations. Labial disc with small projections, resembling rudimentary lobes. Oral opening I-like. Amphidial apertures conspicuous, slit-like. Body annules (R = 146 ± 4.0 [141–152]) retrorse, posterior edges finely crenate, 2.4 ± 0.3 (2.1–2.9) wide at midbody. Esophagous typically criconematoid. Gonad 235 ± 27 (199–262) long, outstretched, rarely with single flexure. Spermatheca not observed. Vulva open, anterior lip enlarged, on annule 7 or 8. Anal opening distinct on ventrally mounted specimens, near vulva (RVan = 1).

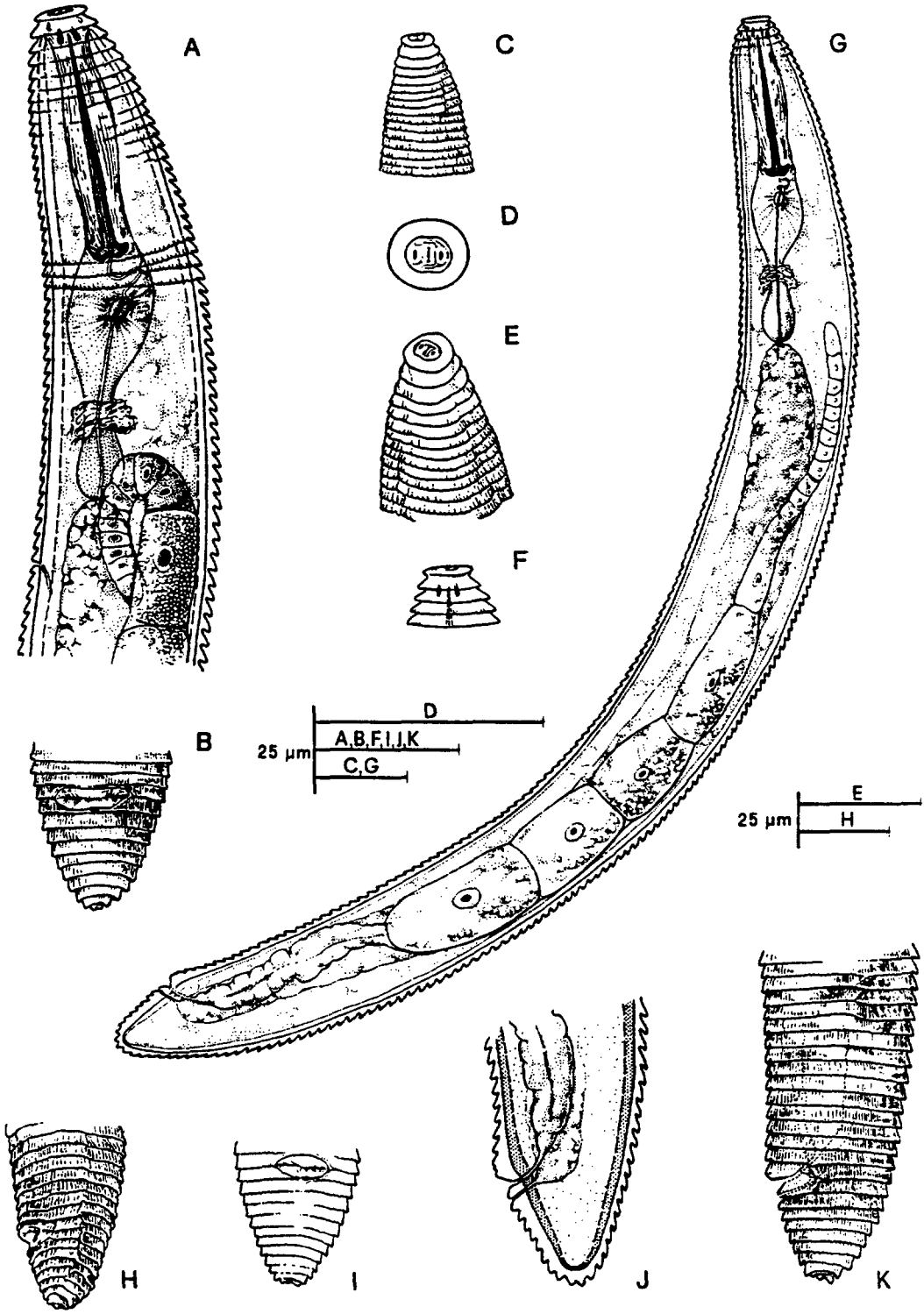

FIG. 6. *Discocriconemella mauritiensis* female. A) Anterior region. B,H–K) Lateral and ventral posterior body portions. C–F.) Profile or face view of the cephalic disc. G) Whole female.

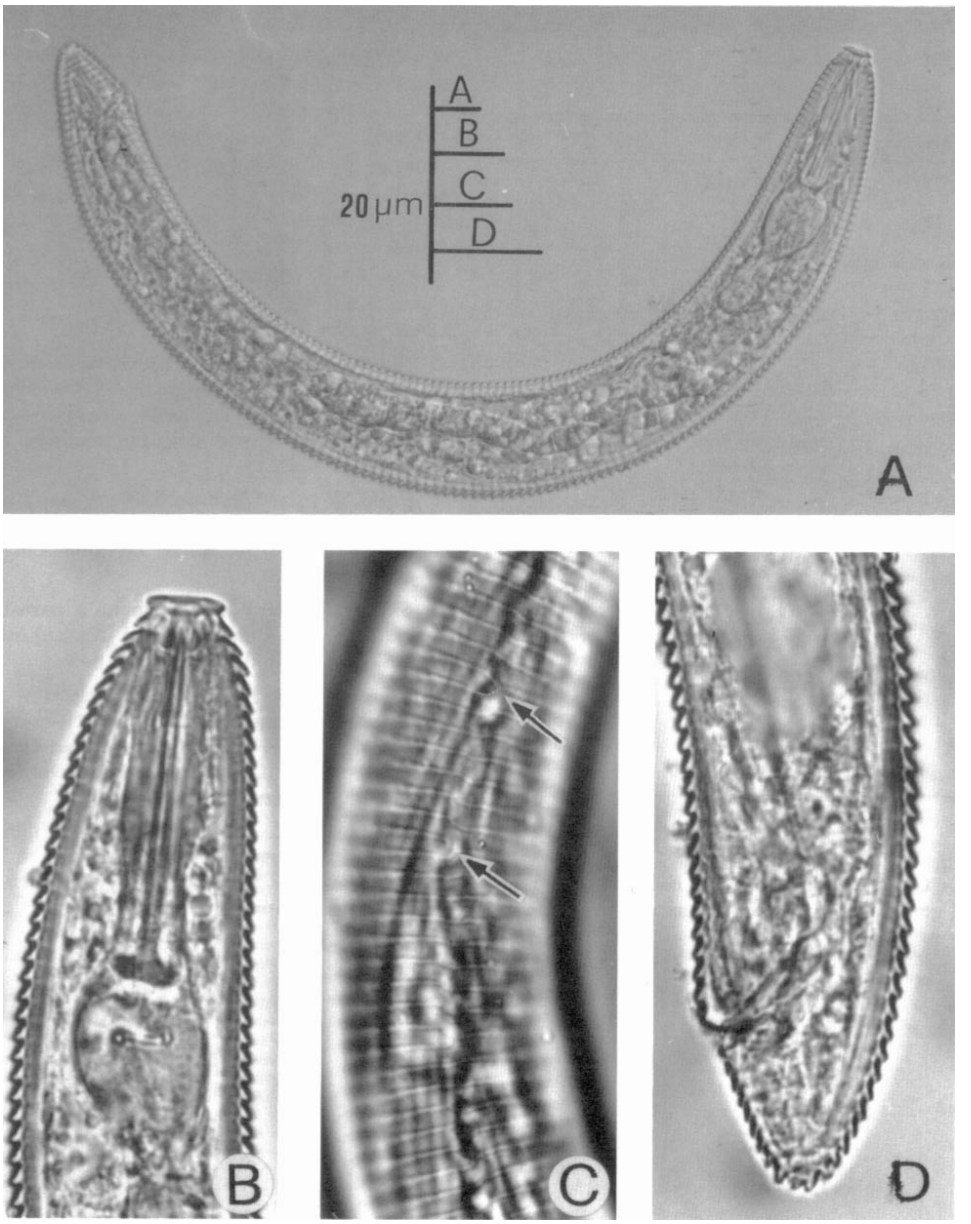

FIG. 7. Photomicrographs of *Discocriconemella mauritiensis* female. A) Whole body. B) Anterior body. C) Anastomosed annules (arrow). D) Posterior body.

Remarks

The fine crenations of body annules of this species are easily overlooked. Loof and De Grisse (3) reported crenate annules for *D. mauritiensis* paratypes, but no mention of this character was given in the original description. *Discocriconemella mauritiensis* shares the characteristic round disc of the cephalic annule without indentations (group 1) with four other nominal species: *D. perseae, D. discolabia, D. inarata,* and *D. mineira.* The anal opening is also easily overlooked because of its close proximity (RVan = 1) to the vulva, which was not reported in the original description. *Discocriconemella mauritiensis* was found often in large numbers in 30% of 200 samples examined (2) from sugar cane in Mauritius.

TABLE 2. Morphometric data for 15 females of *Discocriconemella mauritiensis* from sugar cane fields in Mauritius.

Character	Range	Mean	SD
	Linear (µm)		
L	296–372	342	24.0
Body width	26–36	30	3.3
Esophagus length	77–84	81	3.2
Excretory pore	87–99	91	3.6
Stylet length	33–38	36	1.4
Stylet knobs width	5.4–7.5	6.6	0.6
Tail length	12–15	14	1.1
	Annule number		
R (ventral side)	141–152	146	4.0
Rst	19–22	21	1.0
Roes	39–43	41	1.5
RV	9–11	10	0.8
Ran	8–10	9	0.9
	Percentage		
V	93–96	95	0.9
St%L	9–12	10	0.8
St%oes	42–48	44	2.4
	Ratio		
a	10–13	11	0.9
b	3.5–4.5	4.1	0.3
c	20–29	24	2.8
VL/VB	0.7–1.0	0.8	0.1
VL/St	0.4–0.5	0.5	0.05

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