

## New and little known Laimydorinae species from Fynbos in the south-western Cape (Nematoda: Dorylaimidae)

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*Calcaridorylaimus sirgeli* n.sp. is described from Cape Fynbos in mountains in the south-western Cape Province. It differs from all known species in the genus by the presence of advulval ornamentation, and is compared in detail with *Calcaridorylaimus signatus* (Loof, 1975) and *Calcaridorylaimus ruwenzorii* (De Coninck, 1935). A single specimen of *Drepanodorylaimus williamsi* (Heyns & Kruger, 1983) is compared with specimens from the Transvaal and Mauritius. *Mesodorylaimus* sp. cf. *graciosus* Andrassy, 1986 is reported from South Africa for the first time.

*Calcaridorylaimus sirgeli* n.sp. word van Fynbos in die Hottentotshollandberge beskryf. Dit verskil van alle ander spesies in die genus deur die teenwoordigheid van advulvale ornamentasie, en word noukeurig vergelyk met *Calcaridorylaimus signatus* (Loof, 1975) en *Calcaridorylaimus ruwenzorii* (De Coninck, 1935). 'n Enkele eksemplaar van *Drepanodorylaimus williamsi* (Heyns & Kruger, 1983) word met eksemplare uit die Transvaal en Mauritius vergelyk, en *Mesodorylaimus* sp. cf. *graciosus* Andrassy, 1986 word vir die eerste keer uit Suid-Afrika aangemeld.

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Nematodes were collected under Cape Fynbos (a macchia-like vegetation type typical of the south-western Cape) and various mosses in Landdroeskloof in the Hottentots-Holland Mountains at an altitude of about 1 350 m during November 1984 and again in February 1994. For more details about this locality, as well as for methods of extraction and preparation for LM and SEM, see Swart, Meyer & Heyns (1989). Measurements in tables are in  $\mu\text{m}$ , except body length which is in mm. The terminology used in the description of vaginal characters is that recently proposed by De Ley, Loof & Coomans (1993). Slide numbers refer to the collection of the Department of Zoology, Rand Afrikaans University, unless otherwise indicated.

### *Calcaridorylaimus sirgeli* n. sp.

(Figures 1A–M; 2A–F)

**Measurements:** See Table 1

Heat-relaxed body posture slightly curved ventrad in female, more strongly curved in posterior part of male. Cuticle 1–1,2  $\mu\text{m}$  thick on neck, 1,8–2, 2  $\mu\text{m}$  at midbody, and 2,8–3,5  $\mu\text{m}$  at thickest part dorsally on tail. Outer surface appears smooth under LM, but with faint transverse striae on inner layer just behind lip region. Striae visible with SEM. Body pores absent or indistinct, except several subdorsal and subventral pairs near base of tail of female, and several pairs of larger papillae and numerous small ones around tail terminus of male. Both in females and males those areas possessing many pores are, in most specimens, covered with an apparently sticky substance, resulting in a dirty appearance of these areas. Body width at base of pharynx 1,7 (1,6–2,0) times the width of the lip region. Lateral chord 9,5–11  $\mu\text{m}$  wide, or 20–27% body width at midbody. Amphid wineglass-shaped, the aperture situated 5–6  $\mu\text{m}$  from the anterior end, and 40–45% of the corresponding body diameter.

Lips closely amalgamated. Lip region rather flattened anteriorly, slightly angular but without protruding papillae; weakly separated from the body by a shallow depression. Odontostyle mostly slightly longer (1,0–1,3 times) than lip region width. Odontostyle diameter 1,5–2,0  $\mu\text{m}$ , or about one-seventh to one-sixth of the lip region width. Odontostyle aperture 4,5–5  $\mu\text{m}$ , or 33–38% of the odontostyle length. Odontophore simple, linear. Guiding ring situated 8,4 (7,5–9,5)  $\mu\text{m}$  from anterior end, weakly sclerotized, usually appearing single, rarely with a second weaker ring as shown in Figure 1B. Nerve ring surrounding pharynx beyond middle of slender anterior part, at 112 (103–122)  $\mu\text{m}$  from anterior end. Hemizonid at same level as nerve ring. Pharynx 309 (265–344)  $\mu\text{m}$  long, measured from anterior body end, and beginning to widen at 49–54% and attaining full width at 51–57% of its length. Basal bulb 144 (118–158)  $\mu\text{m}$  long by 18,1 (15–20)  $\mu\text{m}$  wide. DO and DN usually distinct, but nuclei of both pairs of subventral glands and their openings often difficult to discern. Positions of gland nuclei and their openings ( $n = 10$  for DO and DN;  $n = 6$  for subventrals) DO = 57,4 (54,1–59,6)%; DN = 59,5 (56,2–60,8)%; DO–DN = 2,0 (1,5–2,3)% or 6,5 (5–8)  $\mu\text{m}$ ; S<sub>1</sub>O = 78,8 (78,3–79,3)%; S<sub>1</sub>N = 79,3 (76,0–79,7)%; S<sub>2</sub>O = 92,6 (91,4–93,3)%; S<sub>2</sub>N = 91,9 (90,5–93,7)%. Cardia a conspicuous feature, elongate conoid. Anterior part of intestine with prominent microvilli; intestinal walls containing numerous small refractive granules.

**Female:** Didelphic, amphidelphic. Cuticle anterior and posterior to vulva ornamented by invaginations, highly variable in number, from none to seven on each side. Vulva a large round opening. *Pars distalis vaginae* 3–5  $\mu\text{m}$  long; *pars refringens vaginae* conspicuous, 4–6  $\mu\text{m}$  long, the refractive ring appearing roughly triangular in optical section; *pars proximalis vaginae* 12–17  $\mu\text{m}$  long, 9,3 (8–10)  $\mu\text{m}$  wide, roughly cylindrical in outline. Uteri broad, without special features, separated from oviducts by sphincter muscles. Ovaries long, well

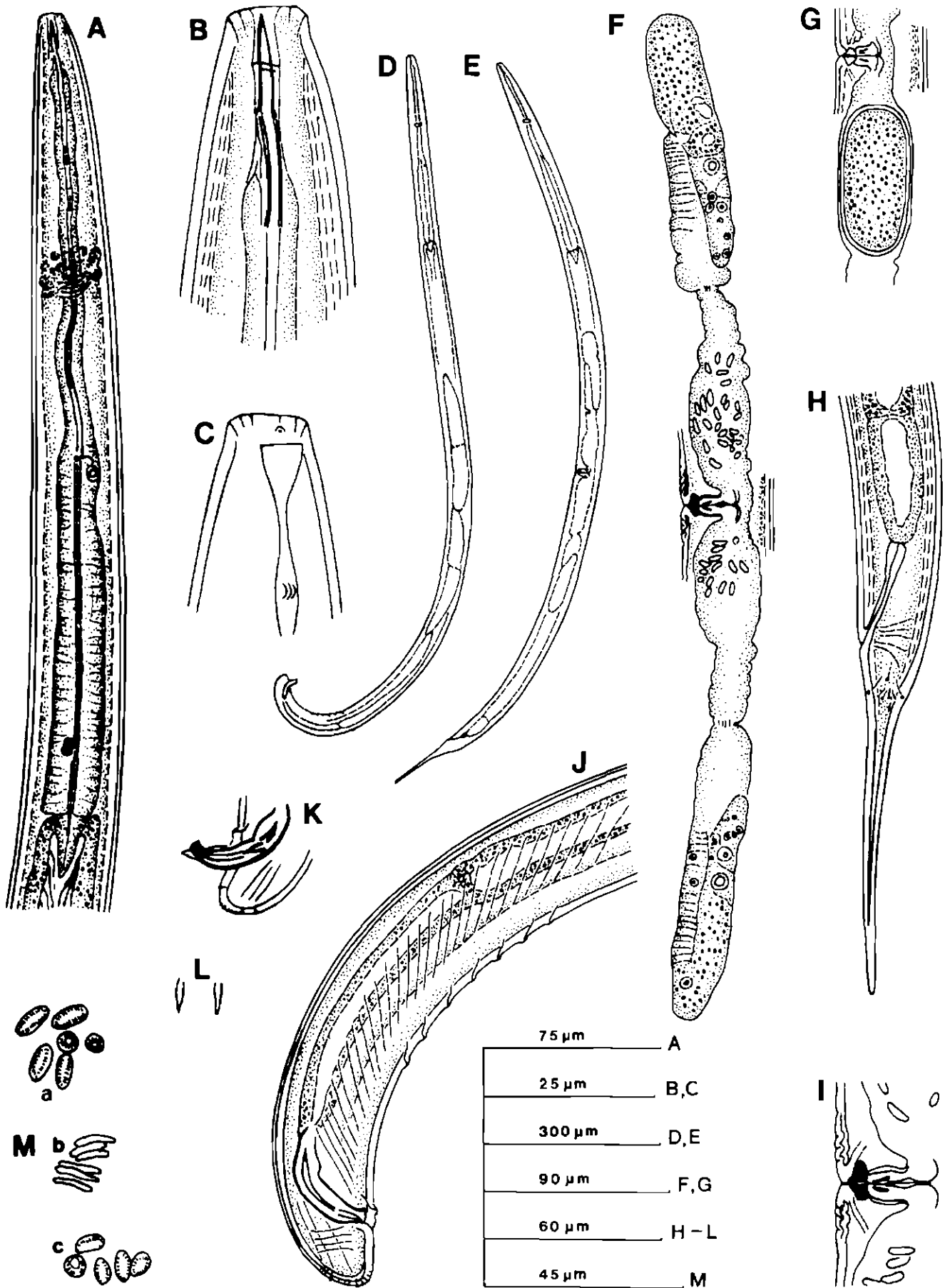
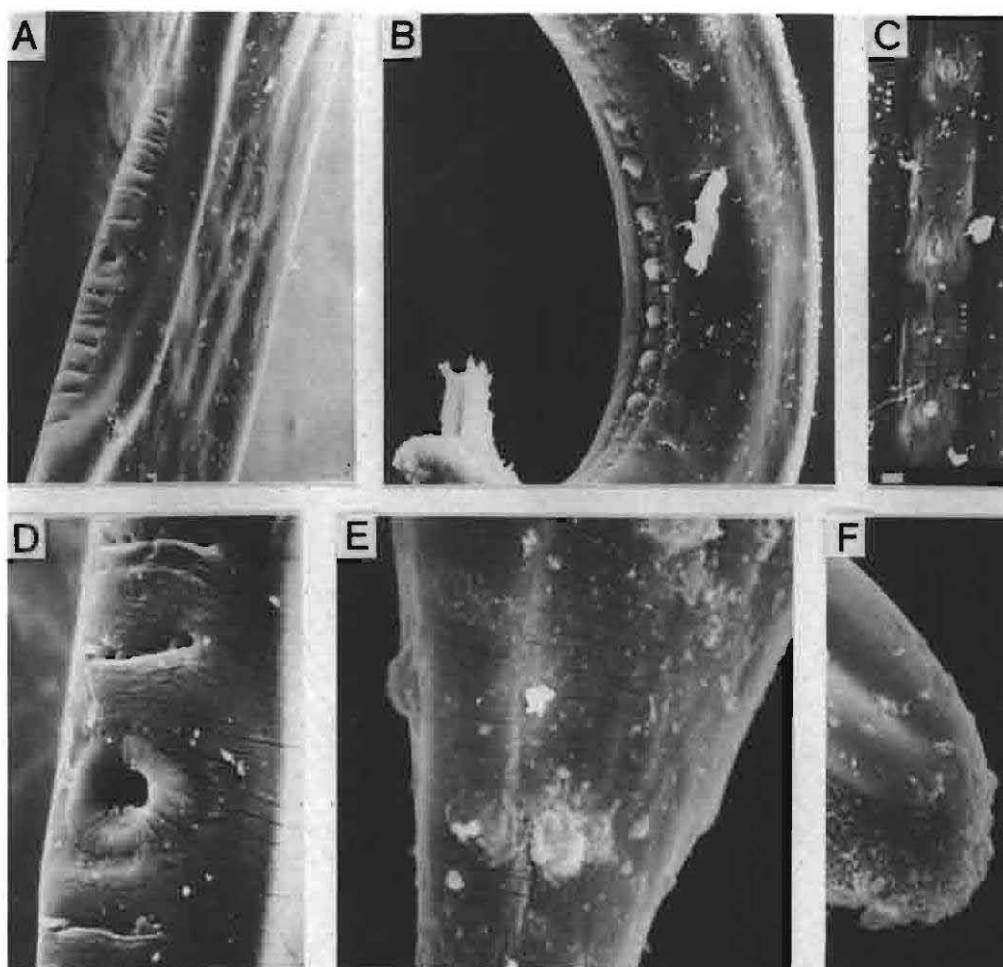


Figure 1 *Calcaridorylaimus sirgeli* n. sp. A: Anterior body region; B: Head, median view; C: Head, surface view; D & E: Male and female in relaxed body posture; F: Female reproductive system; G: Part of female reproductive system containing intra-uterine egg and lacking advulval ornamentation; H: Female tail; I: Vulva and vagina; J: male posterior region; K: Extruded spicules; L: Lateral guiding pieces; M: sperm cells: a - in vas deferens, b - in uterus, c - in oviduct.



**Figure 2** *Calcaridorylaimus sirgeli* n. sp. A: Vulval area showing ornamentation,  $\times 1200$ ; B: Part of posterior male body showing midventral supplements in longitudinal groove, and small triangular flaps near apex of extruded spicules,  $\times 850$ ; C: More enlarged view of three supplements,  $\times 2250$ ; D: Vulva and three cuticular invaginations,  $\times 3750$ ; E: Base of female tail showing several large papillae,  $\times 3500$ ; F: Apex of male tail showing sticky appearance,  $\times 2000$ .

**Table 1** Morphometrical data of *Calcaridorylaimus sirgeli* n.sp.

	Holotype female	Paratypes 10 females	Paratypes 10 males	Juveniles 14
L ( mm)	1,36	1,34(1,08–1,54)	1,36(1,15–1,46)	1,13(0,92–1,31)
a	32,4	33,2(30–36)	37,7(35–38)	36,7(33–40)
b	4,1	4,1(3,9–4,3)	4,1(3,9–4,3)	3,9(3,5–4,3)
c	11,6	10,6(9,7–11,3)	77(63–85)	10,0(9,2–12,3)
c'	5,3	6,1(5,3–6,7)	0,7(0,6–0,8)	5,8(5,0–6,5)
V	51,9	53,4 (52–56)	–	–
Lip region width	11,5	11,5(10–12,5)	11,3(10–12,5)	10,4(9,5–11)
Body width:				
at base of pharynx	39	35(31–37)	36(34–40)	28(26–30)
at midbody	44	42(35–47)	39(37–41)	30(25–33)
at anus	22	20(18–22)	24 (22–27)	19(17–20)
Odontostyle length	13,5	13,6(12–15)	13,1(12,5–14)	11,2(9,5–12)
Replacement odontostyle length	–	–	–	12,7(12–13,5)
Odontophore length	17,5	17,9(16–20,5)	18,2(16–21)	16,1(11,5–18)
Tail length	117	127(105–148)	17,9(15–22)	111(85–123)
Rectum length	37	33,3 (26–38)	–	30,0(25–37)
Prerectum length	43	48,4(34–62)	98(74–110)	41,6 (39–45)

developed. Three intra-uterine eggs measure 72–81 × 30–32 µm including a 2–3 µm thick shell. First one-sixth of tail conoid, followed by a gradually narrowing cylindroid part ending in a bluntly rounded terminus. Hyaline tip 18,8 (5–32) µm long.

**Male:** Spicules dorylaimid, 42,4 (39–45) µm long, the dorsal contour strongly sclerotized, probably conforming to Andrassy's (1986) description of 'dorsal contours double' for the genus *Calcaridorylaimus*. Each spicule dorsally with a prominent triangular flap very close to the apex, distinctly visible where spicules are extruded. Lateral guiding pieces 10,3 (9–11) µm long. Adanal pair plus six to nine (mostly seven or eight) small, spaced, ventromedian supplements, the posterior-most one lying well beyond the proximal end of the retracted spicules. Junction between intestine and prerectum posterior to anterior-most supplement. Testes two, opposed. Sperm cells in vas deferens ovoid, measuring 8–9 × 4,5–5 µm. In the uteri of impregnated females the spermatozoa are more slender, measuring 9–10 × 1–1,5 µm. Small groups of spermatozoa sometimes also present in *pars dilata oviductus*, almost similar in appearance to those seen in the vas deferens, but slightly smaller, 6–7 × 3,5–4 µm in size. Tail bluntly rounded, with several small caudal papillae, and numerous very small papillae around the apex which has a dirty, sticky appearance in all specimens found.

**Juvenile:** Fourteen juvenile specimens, all similar to adult female in appearance. Although these may represent a mixture of J4 and J3 stages, it was impossible to separate these into two groups, since there is a continuous variation in measurements of all characters, including length of odontostyle and replacement odontostyle.

**Type specimens:** Holotype female on slide RAU type 290;

paratype females, males and juveniles on slides RAU type 291–296; further paratypes deposited at Institute for Zoology, University of Ghent, Belgium and Department of Nematology, Agricultural University of Wageningen, The Netherlands.

**Type locality and habitat:** Collected during February 1994 in moist soil under Fynbos and mosses in Landdroskloof, Hotentots-Holland Mountains, western Cape Province.

**Differential diagnosis:** *Calcaridorylaimus sirgeli* n.sp. differs from all known species in the genus by the presence of advulval ornamentation. Although similar ornamentation is illustrated for an intersex specimen of *Calcaridorylaimus signatus* (Loof, 1975) Andrassy, 1986 (described by Loof, 1975 as a 'wrinkled cuticle'), it is apparently not present in any of the normal females of that species. Apart from advulval ornamentation, *C. sirgeli* n. sp. can be distinguished from *C. signatus* by lesser body length (female 1,08–1,54 µm; male 1,15–1,46 µm vs female 1,30–1,69 µm; male 1,70 µm in *C. signatus*); shorter odontostyle (12–15 µm vs 16–18 µm); smaller c-ratio in female (9,7–11,3 vs 12–18); larger c'-ratio in female (5,3–6,7 vs 2,9–4,2); less ventromedian supplements (6–9 vs 12 in *C. signatus*) and spicule length 39–45 µm vs 72 µm in *C. signatus*.

The new species is also very similar to *Calcaridorylaimus ruwenzorii* (De Coninck, 1935) Andrassy, 1986 in many respects, but can be easily distinguished by the less angular and more flattened lip region, and the much shorter odontostyle (12–15 µm vs 19,5–25 µm in *C. ruwenzorii*, according to De Coninck, 1935).

From the type species, *C. calcarifer* Andrassy, 1986, as well as from *C. promissus* Andrassy, 1986 and *C. simillimus* Andrassy, 1986 the new species differs mainly in the thicker

**Table 2** Morphometric data of *Drepanodorylaimus williamsi* (Heyns & Kruger, 1983) and *Mesodorylaimus* sp. cf. *graciosus* Andrassy, 1986

	<i>D. williamsi</i> 1 female	<i>Mesodorylaimus</i> sp. cf. <i>graciosus</i>		<i>M. graciosus</i>	
		3 females	One J4	Two J3	Female acc. to Andrassy, 1986*
L (mm)	1,64	1,35–1,53	1,27	0,91–0,98	1,45
a	53	40–46	38	33–35	41
b	6,6	5,1–5,8		3,8–4,3	4,9
c	4,3	3,2–4,2	3,7	3,7–4,1	4,1
c'	20,5	20–24	19	14–14,5	20
V	45,1	38,8–43,3	–	–	44
Lip region width	10	11–12,5	11	9,5–10	10–12
Body width:					
at base of pharynx	30	30–33	31	26–29	ca 33
at midbody	31	33–35	33	26–30	33–35
at anus	18,5	18–18,5	18	17	ca 17,5
Odontostyle length	20	10–11,5	11	10	12–13
Replacement odontostyle length	–	–	12	10,5–12,5	–
Odontophore length	18	14–19	19	14,5–18	ca 18
Tail length	380	365–434	344	237–245	350
Rectum length	34	25–27	28	23–25	ca 34
Prerectum length	?	30–42	45	36–37	ca 43

\* Some measurements calculated from data in Andrassy's (1986) description and illustration.

cuticle (1,8–2,2  $\mu\text{m}$  at midbody, vs 1–1,2  $\mu\text{m}$  in *C. calcarifer* and 1  $\mu\text{m}$  in *C. promissus* and *C. simillimus*) and shorter female tail (105–148  $\mu\text{m}$ ) than in *C. promissus* (158–178  $\mu\text{m}$ ) and *C. simillimus* (175  $\mu\text{m}$ ) (Andr ssy, 1986).

The species is named after Dr. Willie Sirgel of the Department of Zoology, University of Stellenbosch, in recognition of his assistance in obtaining soil samples from Landdroskloof.

***Drepanodorylaimus williamsi* (Heyns & Kruger, 1983) Andr ssy, 1986**

Syn.: *Mesodorylaimus williamsi* Heyns & Kruger, 1983

*Dorylaimus filicaudatus* Daday, 1905 apud Williams, 1959

nec *Mesodorylaimus filicaudatus* (Daday, 1905) Andr ssy, 1969

(Figure 3A–D)

Measurements: See Table 2

A single female was collected under Fynbos on the bank of a small stream near the top of Landdroskloof. Unfortunately this specimen is not very well preserved, with the pharynx shrunken and somewhat convoluted.

Additional measurements, not listed in Table 2, are as follows: diameter of odontostyle = 2  $\mu\text{m}$ ; odontostyle aperture 5  $\mu\text{m}$ ; amphid aperture = 7  $\mu\text{m}$ ; width of cuticle = 1,8  $\mu\text{m}$  on neck behind lip region, 1,8  $\mu\text{m}$  at midbody, and 3  $\mu\text{m}$  dorsally on tail; hyaline tail tip = 75  $\mu\text{m}$ ; *pars distalis vaginae* 4  $\mu\text{m}$ ; *pars refringens vaginae* absent; *pars proximalis vaginae* 5  $\mu\text{m}$ ; size of intra-uterine egg, including the egg shell of 3–4  $\mu\text{m}$  is 77  $\times$  29  $\mu\text{m}$ .

These measurements, along with the general morphology, agree fairly well with those of the type specimens from Rustenburg Kloof as well as Mauritian specimens from sugar cane fields, as reported by Heyns & Kruger (1983). However, the cardia is bluntly conoid and only about 8  $\mu\text{m}$  long (precise length uncertain since pharyngeal lumen is pushed through base of pharynx). Both Heyns & Kruger (1983) and Williams (1959) illustrated an exceptionally long cardia, (their Figures 19 and 18d respectively), recorded as 40–44  $\mu\text{m}$  long by Heyns & Kruger (1983). Examination of paratypes of *D. williamsi* revealed that in most specimens the cardia is rather indistinct, and that Figure 19 of Heyns & Kruger may have depicted an artifact, misinterpreted as part of the cardia. The junction between the intestine and preectum is also not well preserved in the present specimen, so that the presence or absence of a slender tubular organ in the base of the intestine could not be determined.

***Mesodorylaimus* sp. cf. *graciosus* Andr ssy, 1986**

(Figure 4A–F)

Measurements: See Table 2

Several females and juveniles were collected under mosses and Fynbos on Landdroskloof. Additional measurements not listed in Table 2 are as follows: Lip region height = 4,5–5  $\mu\text{m}$ ; diameter of odontostyle = 1,6–1,7  $\mu\text{m}$ ; odontostyle aperture = 4,5  $\mu\text{m}$ ; width of cuticle = 1,8  $\mu\text{m}$  on neck behind lip region, 1,3–1,8  $\mu\text{m}$  at midbody, and 1,5–1,8  $\mu\text{m}$  on thickest point on tail; *pars distalis vaginae* = 1,5–2  $\mu\text{m}$ ; *pars refringens vaginae* = 2  $\mu\text{m}$ ; *pars proximalis vaginae* = 12–15  $\mu\text{m}$ .

Our specimens are very similar to *Mesodorylaimus gracio-*

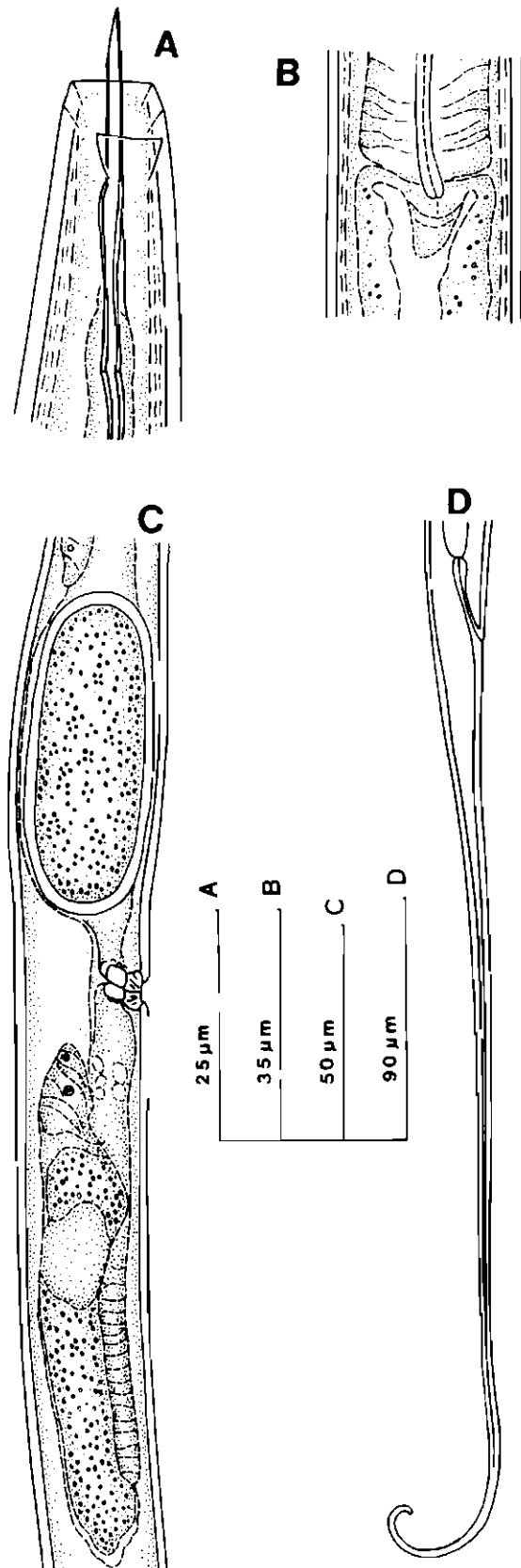
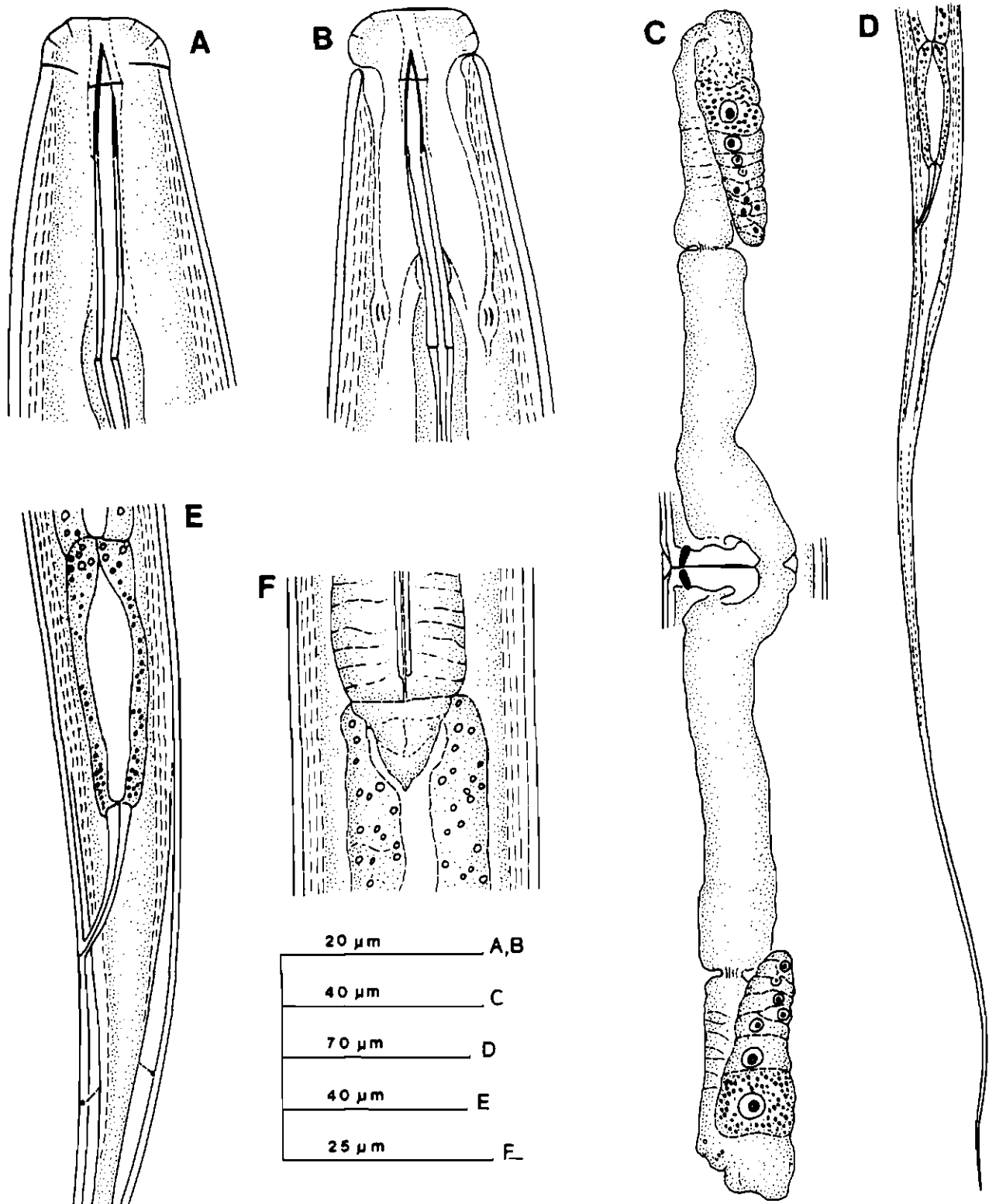


Figure 3 *Drepanodorylaimus williamsi* (Heyns & Kruger, 1983). A: Head; B: Cardiac region; C: Part of female reproductive system; D: Female tail.

us as described by Andr ssy (1986) from 2 000 m on Volcano Cotopaxi in Ecuador, differing only in minor details:



**Figure 4** *Mesodorylaimus* sp. cf. *graciosus* Andrassy, 1986. A: Head, sublateral view; B: Head, dorso-ventral view; C: Female reproductive system; D: Female tail; E: Rectum and prerectum; F: Cardiac region.

Cuticle on anterior part of tail only 1,5–1,8 μm thick, vs 3 μm (This may be due to a difference in interpretation. On the anterior part of the tail there seems to be an additional layer between the cuticle and the somatic muscle layer.) Width of lip region 11–12,5 μm vs 10–12 μm; body at base of pharynx 2,4–2,8 times width of lip region vs 2,8–3,1 in *M. graciosus*; odontostyle 10–11,5 μm, just less than width of lip region;

length of pharynx measured from front end 261–275 μm vs 280–307 μm; basal bulb only 45–49% of pharynx length vs 51–58%; both rectum and prerectum shorter in relation to anal body diameter than in *M. graciosus*; tail length 365–434 μm vs 350 μm. In the single female of *M. graciosus* both gonads are reported to be on the left side of the body. In our specimens their position is variable: in one specimen both are

on the right side, in another the anterior is right, the posterior left, and in the third specimen the anterior is left, the posterior right. In spite of the fact that all these differences are rather small and could well be attributed to geographical variation, we are hesitant to make a definite identification until more specimens and especially males are found.

Of the known South African species of *Mesodorylaimus*, the present specimens come closest to *M. bainsi* Basson & Heyns, 1975. It differs in that it has a narrower, less expanded and less angular lip region, shorter body length and shorter odontostyle, namely, 10–11,5 µm vs 14,1–18,9 µm (Basson & Heyns 1975).

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