

# *Macrolaimus richteri* spec. nov. (Nematoda: Chambersiellidae) from the Richtersveld, South Africa

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Specimens of *Macrolaimus richteri* spec. nov. were examined with the aid of a scanning electron microscope (SEM) and some hitherto undescribed features of *Macrolaimus* were discovered. The sense organs are arranged in an inner circllet of six huge outer labial setae, a second circllet of four small cephalic setae and two pore-like amphid apertures in the first annule posterior to the head. The stomatal opening is surrounded by six flap-like lips covering the peculiar triangular cheilorhabdions which seem to be protrusible. The prominent anterior lip of the vulval opening is ornamented with about ten horizontal grooves. Distinctive characters of *M. richteri* spec. nov. are the strongly annulated cuticle, slightly dorsad curved tail terminus and the length of the cheilorhabdions (1.6 - 1.8 times prorhabdion length).

Keywords: *Macrolaimus*, SEM, morphology, taxonomy, Richtersveld, South Africa.

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## Introduction

The genus *Macrolaimus* Andr ssy, 1966 is represented world-wide by only eight species (Andr ssy, 1984), ranging in habitat from cultivated soil to moss and decaying wood. During 1991 specimens of *M. richteri* spec. nov. were collected from very dry, sandy soil in the rocky desert of the Richtersveld, north-western Cape Province. This is the first report of *Macrolaimus* from South Africa and the first species of the genus to be found in such a dry habitat.

## Methods

Specimens were extracted from the soil with a modified sieving-sedimentation method (Loubser, 1985). Specimens for permanent mounts and study with light microscopy (LM) were killed and fixed in hot FAA (70 °C), dehydrated, processed into anhydrous glycerine and mounted on double coverslip slides. Drawings and measurements were made with a Zeiss Standard 18 research microscope with differential interference contrast. Coiled and curved structures were measured along the median line. Specimens for SEM were killed with gentle heat, fixed in buffered 2.5 % glutaraldehyde, post-fixed in buffered 1 % OsO<sub>4</sub> and dehydrated in a graded ethanol-amyacetate series. They were sputter-coated with gold and viewed with an ISI SS 60 scanning electron microscope at 10kV.

## Description

*Macrolaimus richteri* spec. nov. (Fig. 1A-H; 2A-F)

Holotype female: L=0,86 mm; a=27,8; b=4,6; c=13,5; c'=3,5; tail length=64 µm; V=58 %.

Paratype females (n=27): L=0,83 ± 0,04 (0,74-0,9) mm; a=29,3 ± 1,4 (27,2-32,2); b=4,5 ± 0,2 (4,2-4,8); c=13,1 ± 0,7 (11,9-13,8); c'=4,2 ± 0,3 (3,5-4,8); tail length=64 ± 3,5 (57-69) µm V=57,7 ± 1,0 (56,5-60) %.

No males were found.

Body small, slender, with protruding vulva a conspicuous feature. Body width almost similar anterior and posterior to vulva. Heat-relaxed body curved ventrad from almost straight to an open C. Cuticle thin, ranging from 0,8 µm to 1,5 µm thick with prominent annules (1,5-2 µm wide). Lateral field marked by five incisures, obscure in most specimens, well-defined with SEM (Fig. 2E). Head appears flattened, continuous with body contour, dominated by a whorl of six huge outer labial setae (3-3,5 µm long or equal to one third the head width). Four small

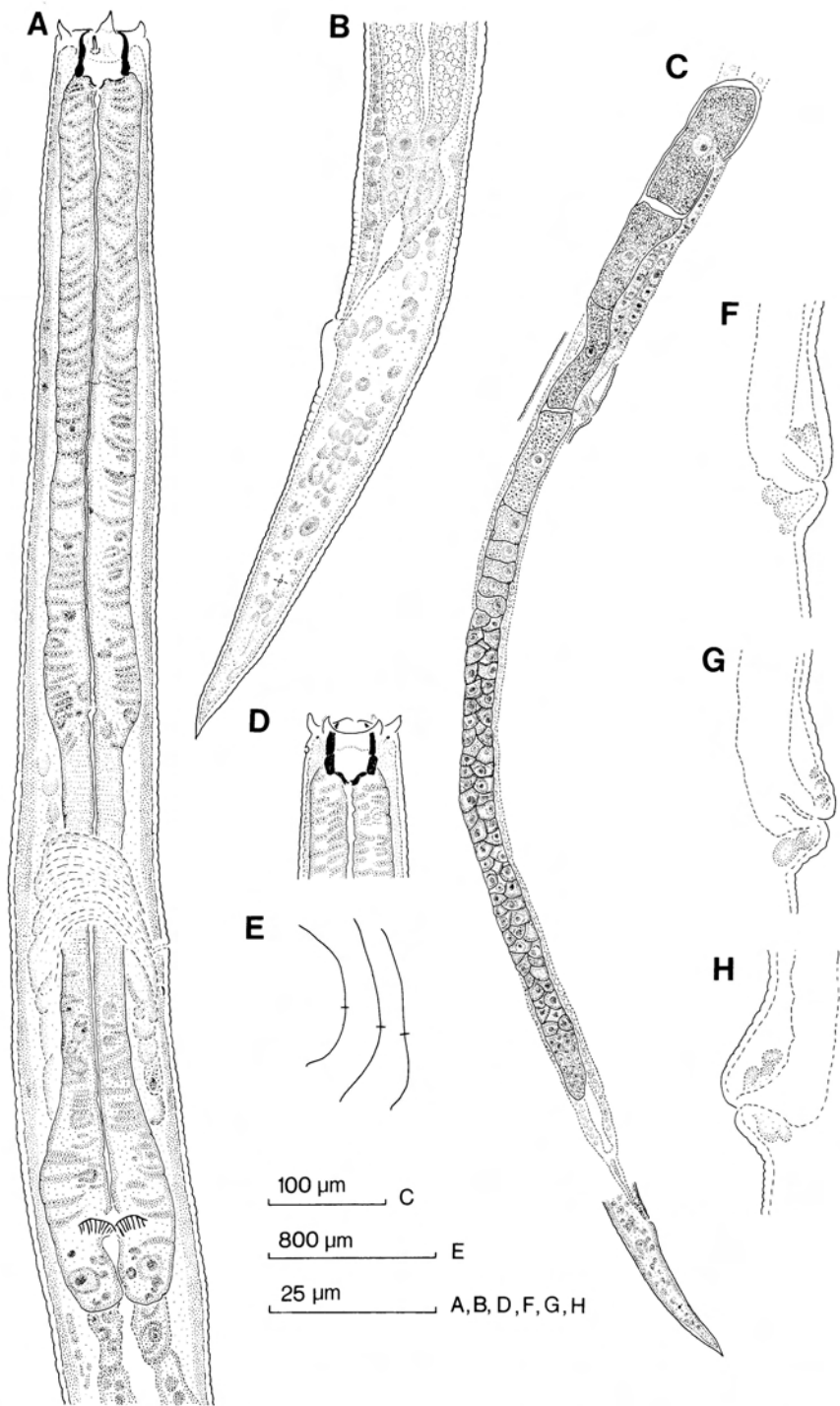


Fig. 1. *Macrolaimus richteri* spec. nov. **A:** Anterior region of female; **B:** Tail region of female; **C:** Reproductive system of female; **D:** Head region; **E:** Heat-relaxed body posture; **F, G & H:** Vulval lips of different females, showing variation in structure.

cephalic setae situated on lip region just posterior to outer labial setae. Two laterally situated pore-like amphid apertures visible on first annule posterior to head (Fig. 2A-D). Stomatal opening surrounded and covered by six flap-like lips. Cheilostom appears to be protrusible and can be seen between the lips as a triangular, sclerotized structure (Fig. 2D). Buccal cavity 8-11  $\mu\text{m}$  long, 5-6  $\mu\text{m}$  wide, divided into a large anterior chamber (cheilostom) and shallower posterior chamber (prostom). Ratio of cheilo- and prostom length is about 5:3. Cheilorhabdions broad at base, curving and narrowing anteriorly to thin points near stomatal opening. Prorhabdions broad, well-sclerotised, 1,5-2  $\mu\text{m}$  thick. Meso- meta- and telorhabdions form a slightly to well-sclerotized shallow funnel posterior to prostom. Oesophagus long, enveloping bases of prorhabdions. Median bulb absent but portion of oesophagus just anterior to isthmus slightly broadened. A slight break noticeable within the lumen of this region. Isthmus notably thinner than rest of oesophagus with a finely striated appearance. Basal bulb well-developed (25-35  $\mu\text{m}$  x 16-19  $\mu\text{m}$ ) with well-defined comb-like valves in posterior half. Two large nuclei observed in base of basal bulb. Oesophageal lumen dilated just posterior to valves. Cardia cellular, 4-10  $\mu\text{m}$  long. Intestine appears very granular. Rectum well-defined, cuticularised, 25-35  $\mu\text{m}$  long (about 2 times anal body width). Two huge cells present in area where intestine joins rectum (Fig. 1B).

Excretory pore well-defined, situated opposite about middle of isthmus (119-139  $\mu\text{m}$  from anterior end) with hemizonid three to four annules posterior to excretory pore. Nerve ring well-defined, situated around anterior part of isthmus (111-128  $\mu\text{m}$  from anterior end).

Vulva post-equatorial with protruding lips. Anterior lip most prominent and large, ornamented with 9-11 transverse grooves. Posterior lip small with 2-3 transverse indentations (Fig. 2E & F). Due to shrinkage during fixation, the vulva seems less prominent in SEM photomicrographs than in live or mounted specimens. Reproductive system

monodelphic, prodelphic, reflexed. Ovary stretching to 50-131  $\mu\text{m}$  anterior to anus. Uterus small, no sperm observed. Post-vulval sac very small to non-existent.

Tail elongate-conoid, tapering to a slightly dorsad curved, conical point. Phasmids situated about one third of tail length from tip.

### *Juveniles*

Two juvenile stages could be distinguished within this population.

J2/3: one specimen

L=0,69 mm; a=33,3; b=4,2; c=12,1; c'=4; tail length=58  $\mu\text{m}$ .

Internal organs not well preserved. Genital primordium an elongated structure with only six cells visible. Rest of description as for adults.

J4: one specimen

L=0,69 mm; a=35,3; b=4,2; c=12,1; c'=4,1; tail length=57  $\mu\text{m}$ .

Genital tract almost fully developed, vagina already formed. Approximate position of future vulva at 58 % of body length. Description as for adult.

### *Type locality and habitat*

Richtersveld, about one kilometer from Klipbok in very dry, sandy soil among the roots of Mesembryanthemaceae. Collected by A. Swart on 11th July, 1991.

### *Type specimens*

Holotype on slide RAU 7178. Paratypes on slides RAU 7176-7184, deposited in the nematode collection of the Rand Afrikaans University, and slide RAU 7175, deposited in the Instituut voor Dierkunde, Rijksuniversiteit Gent, Ghent, Belgium.

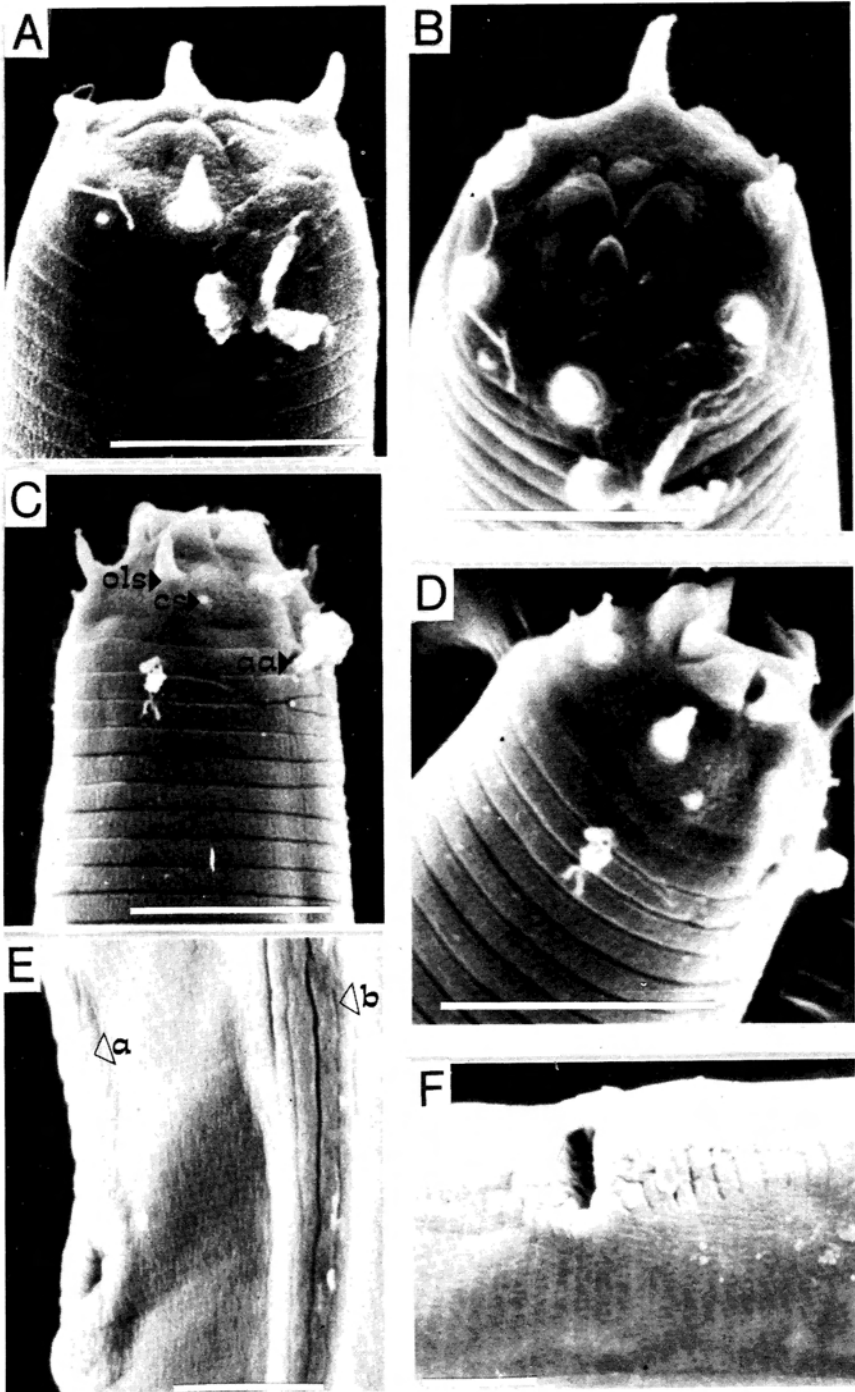


Fig. 2. SEM photomicrographs of *Macrolaimus richteri* spec. nov. **A:** Lateral view of head; **B:** En-face view showing six lips covering the stomatal opening; **C:** Subventral view of head, showing cheilostom protruding from among the lips. Arrows indicate outer labial setum (o.l.s.); cephalic setum (c.s.) and amphid aperture (a.a.); **D:** Subventral view of head, showing the protruding cheilorhabdions; **E:** Lateral view of vulval opening, showing ornamentations on anterior lip (arrow a) and five lines in the lateral field (arrow b); **F:** Subventral view of vulval opening. Bar equals 10  $\mu$ m.

## Diagnosis

*M. richteri* spec. nov. can be distinguished by its slender body, well-defined annules and prominent, ornamented vulval lips. The buccal cavity is divided into a cheilo- and prostom with the cheilostom almost twice the length of the prostom. The outer labial setae are prominent and robust, their length about one third the head width. The amphids are pore-like and situated on the first annule posterior to the head. The tail is elongate-conoid with a slightly dorsad curved terminus.

## Differential diagnosis

*M. richteri* spec. nov. is very close to *M. crucis* Maupas, 1900, especially since males are absent in both species. The two species differ from each other in the size of body annules (prominent in *M. richteri* spec. nov., very fine in *M. crucis*) and the curvature of the tail terminus (dorsad curved in *M. richteri* spec. nov., ventrad curved in *M. crucis*). The a- and c- values also differ (a=27-32 vs a=22 and c=11,9-13,8 vs c=15).

*M. richteri* spec. nov. also resembles *M. somniorum* Andr assy, 1984 but can be distinguished from this species by the following: The tail terminus of *M. richteri* spec. nov. is only slightly curved dorsad, while that of *M. somniorum* is hook-like, curved dorsad. The lateral field of *M. richteri* spec. nov. is fairly wide with five incisures against the narrow lateral field of *M. somniorum* (number of incisures not known). The body width is the same posterior and anterior to the vulva in *M.*

*richteri* spec. nov. but noticeably narrower posterior to the vulva in *M. somniorum*. The cheilostom length of *M. richteri* spec. nov. is also just less than twice the prostom length whereas that of *M. somniorum* is 2-2,5 times the prostom length.

*M. richteri* spec. nov. is also close to *M. arboreus* Truskova & Eroshenko, 1977 but can be distinguished from this species in the following: The c- value is lower (c=11,9-13,8 vs c=13-17; the shape of the tail terminus (slightly curved dorsad vs a hook-like, dorsad curved terminus; a smaller body (L=0,74-0,9 mm vs L=1 mm).

## Remarks

The SEM-study revealed hitherto unknown features for the genus *Macrolaimus*. The fused, triangular cheilorhabdions, the six flap-like lips surrounding the stomatal opening and the ornamented vulval lips were observed for the first time. Two big nuclei, which resemble oesophageal gland nuclei were observed within the base of the basal bulb, and the peculiar, broken and dilated oesophageal lumen anterior of the isthmus also suggests oesophageal gland openings. However, the presence of oesophageal glands cannot be confirmed at this stage without further study, preferably by TEM.

## References

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