

ORIGINAL PAPER

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Chiloplectus masleni sp. nov. and variability in populations of *Plectus acuminatus* Bastian 1865 (Nematoda: Plectidae) from the nunatak Basen, Vestfjella, Dronning Maud Land, East Antarctica

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Abstract A new species, *Chiloplectus masleni* sp. nov., and 12 populations of *Plectus acuminatus* are described from the nunatak Basen, Vestfjella, Dronning Maud Land, East Antarctica. *C. masleni* sp. nov. is distinguished from the closely related *C. loricatus* by a broader lip region, longer stoma, the more posterior position of amphids, a pear-shaped basal bulb, more narrow annuli, anterior annuli that are evenly rounded and a larger number of tail setae. New information is provided on internal and external morphology of specimens of *P. acuminatus* from Basen.

Introduction

During the Swedish Antarctic Research Expedition (SWEDARP) in the austral summer 1993/1994, samples of terrestrial material were collected from the nunatak Basen in Vestfjella, Dronning Maud Land, East Antarctica (Eriksson 1995). Analyses of the microfauna (nematodes, rotifers and tardigrades) were made and reported by Sohlenius et al. (1996). One sample contained two specimens of a new species of the genus *Chiloplectus* Andrassy 1984, which is described below. Several samples contained specimens of the genus *Plectus* Bastian 1865 and 12 of these populations are described from studies made by light and scanning electron microscopy. The study provides additional information on the morphology and variability of populations belonging to the species *Plectus acuminatus*, which was earlier reported on from Basen by Boström (1995).

Materials and methods

Samples of soil, mosses and lichens for this study were collected from the nunatak Basen, Vestfjella, Dronning Maud Land (Fig. 1) by Dr. Cecilia Eriksson in December 1993 and January 1994. The samples were kept frozen at -20°C prior to extraction in May 1994. The animals were extracted using a modified Baermann funnel method (Sohlenius 1979) and processed as described by Sohlenius et al. (1995). For light microscopy (LM), nematodes were infiltrated with anhydrous glycerine by a slow evaporation method (Hooper 1970) and mounted on slides as described by Boström and Gydemo (1983). For scanning electron microscopy (SEM), they were processed according to Boström (1989). Identification to species level was made using LM.

Specimens of *Plectus acuminatus* were found in 14 samples from Basen (Sohlenius et al. 1996) and from a small peak close by. This study reports on 12 populations collected in the areas labelled A, B, F and G (Fig. 1). Data on each site are presented in Table 1.

Results and discussion

Chiloplectus masleni sp. nov.

See Figs. 2B–F and 3.

Measurements

Holotype female: L = 1029 μm ; body width = 40 μm ; a = 26; pharynx = 248 μm ; b = 4.1; tail = 120 μm ; c = 8.6; c' = 4.6; V = 47%; distance from vulva to anus divided by tail length = 3.5.

Paratype juvenile: L = 624 μm ; body width = 28 μm ; a = 22; pharynx = 178 μm ; b = 3.5; tail = 86 μm ; c = 7.3; c' = 4.2.

Description

Female: Body arcuate ventrad, especially in the posterior region. Cuticle 3.0–3.5 μm thick; annulated, annuli 1.2 μm wide at midbody. Lateral field with two

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Fig. 1 Map of the sampling areas on the nunatak Basen in Dronning Maud Land, East Antarctica

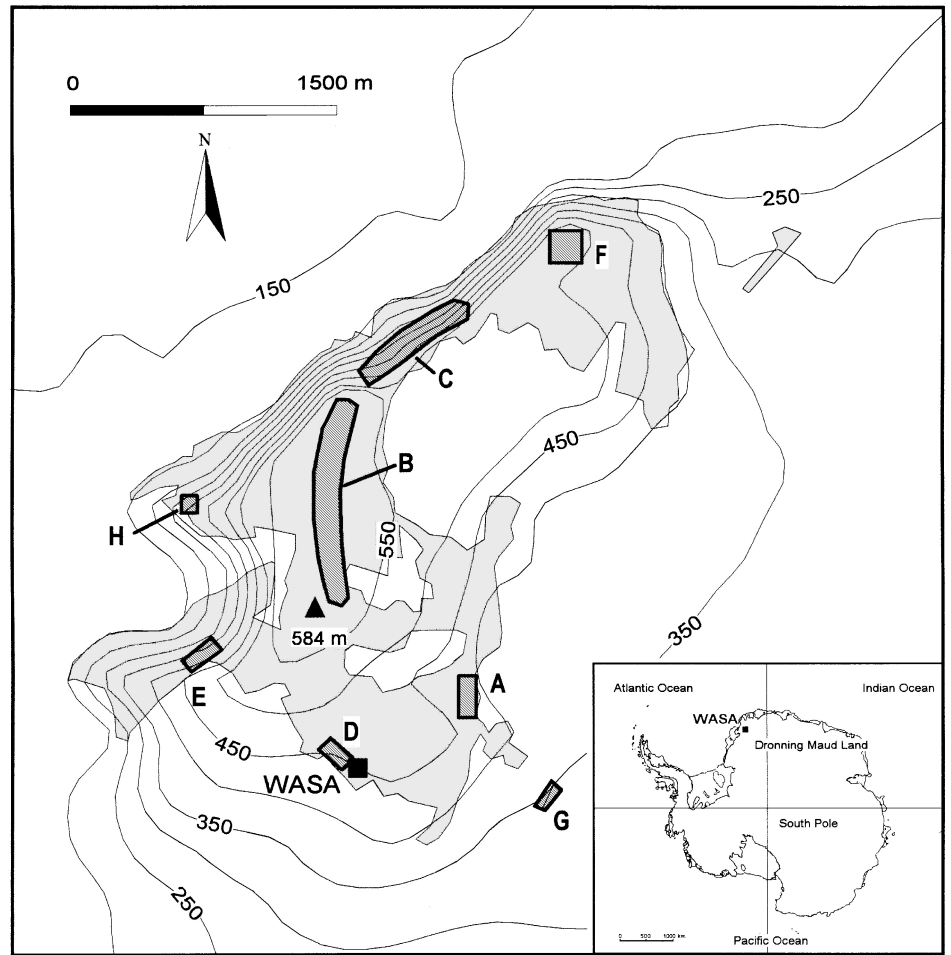


Table 1 Some site characteristics, abundance of *Plectus acuminatus* and presence of *Chiloplectus masleni* sp. nov. in samples taken from the nunatak Basen in Vestfjella, Dronning Maud Land, East Antarc-

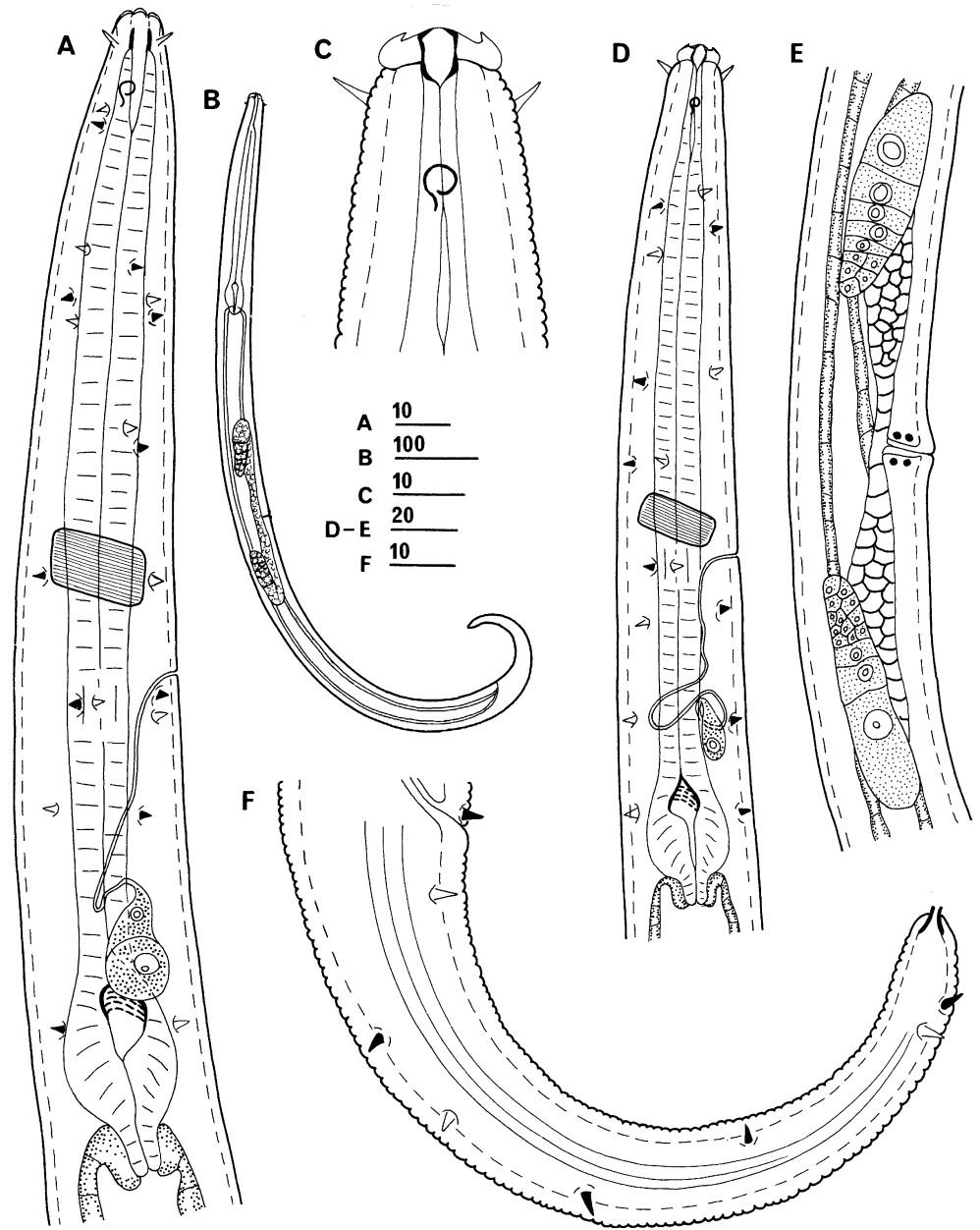
tica during SWEDARP 1993/94. Abbreviations (mosses and lichens): *Bu sp* = *Buellia* sp.; *Ca ci* = *Caloplaca citrina*; *La si* = *Lecidea sipleyi*; *Sa gl* = *Sarconeurum glaciale*

| Site number and area | Date | Soil type | Water content% | Mosses | Lichens | Number per gram dry weight |
|----------------------|--------|--------------------------------|----------------|--------|--------------|--------------------------------------|
| 1 (area A) | 26 Dec | Organic material | 1.9 | Sa gl | – | 132 |
| 2 | 26 Dec | Organic material | 41.8 | Sa gl | – | 45 |
| 7 | 26 Dec | Organic material, humus | 39.4 | Sa gl | – | 75 |
| 9 | 26 Dec | Organic material, humus, sand | 15.6 | – | Ca ci | 62 |
| 10 | 26 Dec | Sandy/clayish, grainy | 7.1 | – | – | 0.5 |
| 11 | 26 Dec | Organic material, humus | 60.0 | Sa gl | Ca ci | 36 |
| 12 | 26 Dec | Sandy, grainy | 10.0 | – | – | 1.2 |
| 13 | 26 Dec | Sandy, grainy | 7.7 | – | – | 1.0 |
| 24 (area B) | 26 Dec | Sandy, gravel | 7.1 | – | – | 0.2 |
| 49 (area F) | 14 Jan | Organic material | 2.7 | – | Ca ci | 70 |
| 52 | 14 Jan | Sand, gravel, organic material | 0.9 | – | Bu sp | 1.1 |
| 55 (area G) | 6 Jan | Organic material | 21.2 | Sa gl | Ca ci, La si | 209 |
| 15 (area B) | 3 Jan | Sandy, gravel | 5.8 | – | – | <i>Chiloplectus masleni</i> sp. nov. |

contiguous wings, 6 μm wide, occupying one-seventh of body diameter, merging near middle of tail and extending to tail tip. Pharyngeal region with about 14 somatic setae distributed as follows: 4 at anterior part of pharynx, 4 at one-half to two-thirds of pharynx, 4 at isthmus

and 2 at bulb. Lip region offset from body contour, 13.5 μm wide, 5 μm high. Lips well separated, rounded, narrowing towards the apex, strongly cuticularized. Stoma 34 μm long, cheilo- and prostom wide with strongly sclerotized walls. Four cephalic setae directed

Fig. 2A–F *Plectus acuminatus*
A Pharyngeal region.
Chiloplectus masleni sp. nov.,
B Habitus; **C** lip region;
D pharyngeal region; **E** vulval
 region; **F** tail. *White setae*
 are located on the side of the body
 facing the viewer and *black setae*
 are located on the opposite side.
 Scale bars are given in
 micrometers



obliquely forward, 4 μm long, situated on third to fourth body annule. Amphids 3 μm wide, occupying 20% of corresponding body width, situated 17 μm from anterior end or level with middle part of stoma. Excretory pore at 152 μm from anterior end; deirid in lateral field just posterior to level of excretory pore. Pharyngeal corpus (measured from base of stoma) about 1.5 times longer than isthmus. Basal bulb pear-shaped, 40 \times 25 μm , with valves carrying rows of small denticles. Cardia 10 μm long, embedded by intestine. Vagina straight, about one-third as long as vulval body width, encircled by two sphincter muscles; vulval lips slightly protruding. Genital organs didelphic, amphidelphic, ovary branches reflexed. Each branch

2.6–2.8 times as long as corresponding body width. Rectum about 0.8 times anal body width. Tail stout, arcuate, gradually narrowing, with a conspicuous tubular spinneret about 4 μm long. Tail setae seven in number, terminal seta at 14 μm from tail end.

Male not found.

Etymology: The new species is named in honour of Dr. N.R. Maslen, who has made significant contributions to the knowledge of nematodes in the Antarctic region.

Type locality: Sand and gravel at the nunatak Basen, about 1000 m north of the station Wasa (area B in

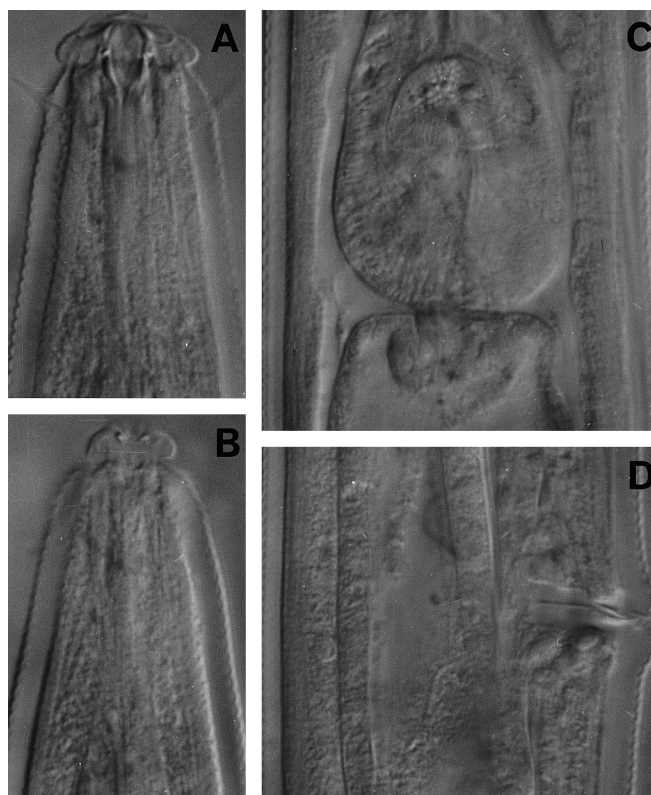


Fig. 3A–D *Chiloptectus masleni* sp. nov. A lip region, median section; B lip region, surface view; C pharyngeal bulb and cardia; D vulval region

Fig. 1), Vestfjella, Dronning Maud Land, East Antarctica.

Type specimens: Holotype female and paratype juvenile (access no. 4796) are deposited at the Swedish Museum of Natural History, Department of Invertebrate Zoology, Box 50007, S-104 05 Stockholm, Sweden.

Differential diagnosis and relationships

Chiloptectus masleni sp. nov. is close to *C. globilabiatus* (Kirjanova, 1958) Andrassy 1984 and *C. loricatus* Andrassy 1985 in the development of a strong cuticle (3.0–3.5 μm thick). *C. globilabiatus* was considered *species inquirenda* by Kito et al. (1991) and Zell (1993) and is not discussed here (see Comments below).

C. masleni sp. nov. is distinguished from *C. loricatus* by the following features: a broader lip region (13.5 μm vs 8.5–9 μm), a longer stoma (34 μm vs 22–26 μm), a more posterior position of the amphids (17 μm vs 12–15 μm), a pear-shaped versus ovoid basal bulb, more narrow annuli (1.2 μm vs 1.4–1.8 μm), the anterior 10–14 annules being evenly rounded versus directed forward, and a larger number of tail setae (7 vs 5).

Comments

The genus *Chiloptectus* was proposed by Andrassy (1984) for the species of *Plectus* with a strongly offset lip region and well-separated globular lips, each with a single small setose projection on its inner side. In his revision of the genus, Andrassy (1985) placed three species within it, viz. *C. andrassyi* (Timm 1971) Andrassy 1984, *C. globilabiatus* (Kirjanova 1958) Andrassy 1984 and *C. loricatus* Andrassy 1985. Zell (1993) added the species *C. coloradiensis* Zell 1993 to this list, but also removed *C. globilabiatus*, which he considered *species inquirenda*. *C. globilabiatus* was described as *Plectus globilabiatus* from a freshwater pool in the Bunger Hills, Antarctica, by Kirjanova (1958). Her description is rather short and there are no illustrations to accompany it. The description begins, “There are two rings of setae-shaped papillae, ten around the mouth and ten at some distance from the cephalic end of the body.” It is not obvious what the meaning of this sentence is, but it points to groups of nematodes other than plectids. As the type material does not exist any longer (Zell 1993), we may never know what this specimen really looked like and I therefore follow Kito et al. (1991) and Zell (1993) in considering *C. globilabiatus* as *species inquirenda*. Of the remaining three species, the specimens at hand most closely resemble *C. loricatus* but can be separated by the characters listed in the differential diagnosis above.

Plectus acuminatus Bastian 1865

See Figs. 2A and 4.

Measurements

See Table 2.

Description

Female: Body arcuate ventrad when relaxed by heat. Cuticle 1.5–2.0 μm thick; annulated, annuli 1.0–1.5 μm wide. Lateral field with three incisures, middle incisure ends at about halfway along tail and two incisures extend to terminal seta on tail. Pharyngeal region with 16–20 scattered somatic setae (20 females studied by LM or SEM). Lip region rounded, not offset from body; 3.5–5.0 μm high, 9.5–12.0 μm wide. Six lips, well separated from each other; six labial papillae close to mouth opening. Four cephalic setae, directed forward and outward, on third to fifth annule from anterior end. Amphids circular, at 12.5–18.5 μm from anterior end, somewhat posterior to middle of stoma. Stoma length 19–28 μm , width 3–4 μm in the anterior portion. Excretory pore at 110–143 μm and deirids at 125–152 μm

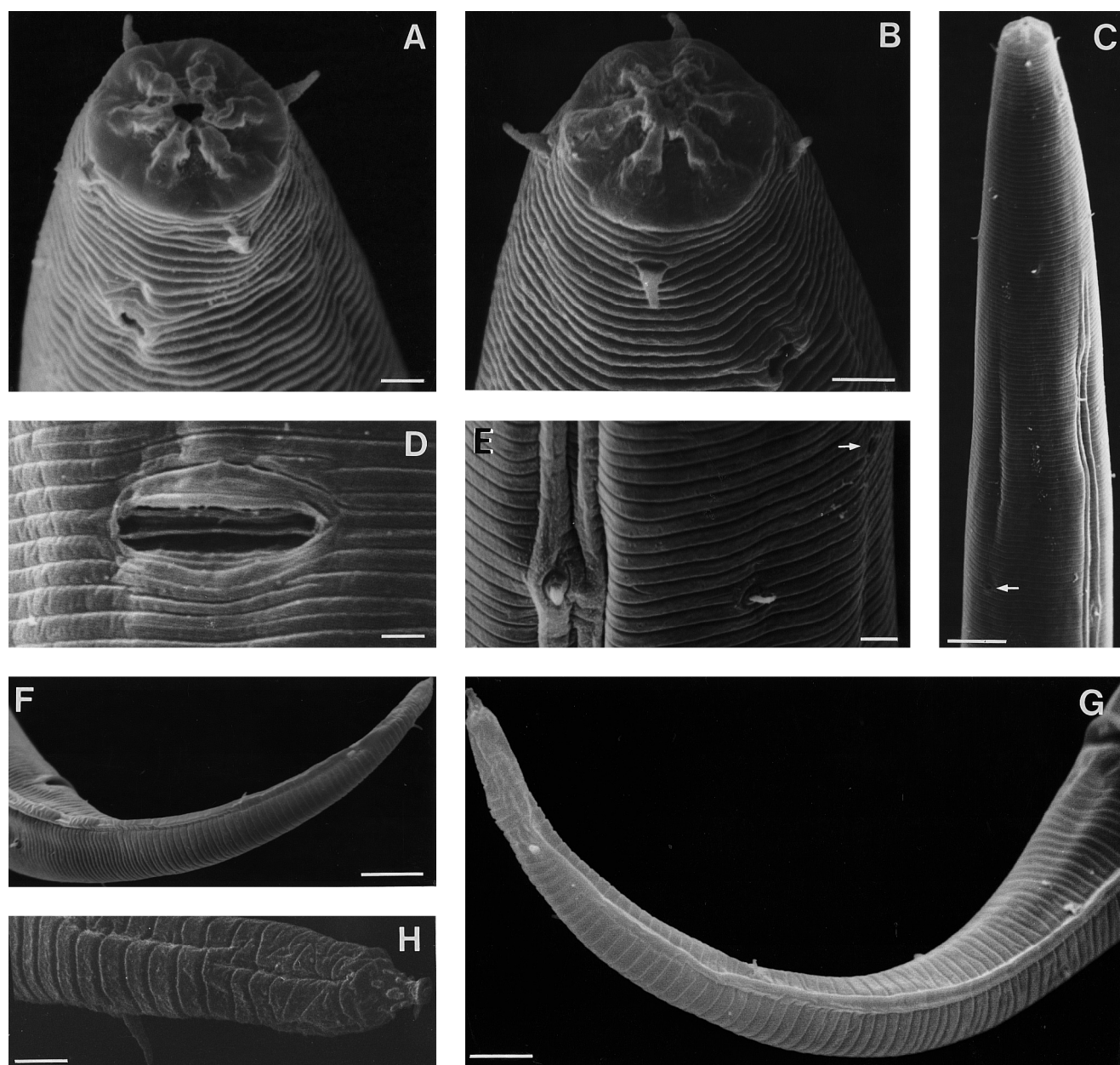


Fig. 4A–H *Plectus acuminatus* **A–B** lip region; **C** pharyngeal region; **D** vulva with vaginal transverse extensions; **E** deirid, seta and excretory pore; **F–G** tail; **H** tail terminus with terminal seta and spinneret. *Arrows* point at excretory pore. *Scale bars*: **A, B, D, E, H** = 2 μ m; **C** = 0.01 mm; **F** = 10 μ m; **G** = 5 μ m

from anterior end. Genital organs didelphic, amphidelphic, ovary branches reflexed. Several eggs may be present in the uterus, egg 50–72 μ m long, 28–35 μ m broad. Vulva equatorial, vulval lips not or slightly protruding. Vagina straight, encircled by two rather weak bands of muscles with transverse extensions between the bands, 9.0–12.5 μ m long, occupying 20–35% of vulval body width. Tail conoid, elongate, arcuate ventrad with six to seven setae, of which the most posterior one is positioned at 12–17 μ m from tail terminus. Spinneret

tubular with what may be a circle of papillae as seen by SEM.

Male not found.

Comments

The genus *Plectus* Bastian 1865 contains many species of which several are less distinct morphologically. There are some recent keys to the genus by Andr ssy (1984, 1985), Ebsary (1985) and Zell (1993), but correct identifications are not always achieved based on the diagnostic characters given therein. De Ley and Coomans (1994), therefore, introduced some characters commonly used in other groups of nematodes, viz. distribution of somatic setae (especially in pharyngeal

Table 2 Measurements in micrometers and ratios of females of *Plecticus acuminatus* from the nunatak Basen in Vestfjella, Dronning Maud Land, East Antarctica, sampled in 1993/1994

| Area | Basen (A) | Basen (A) | Basen (A) | Basen (A) | Basen (A) | Basen (A) | Basen (A) | Basen (A) | Basen (A) | Basen (A) | Basen (A) | Basen (A) | Basen (B) | Basen (F) | Basen (F) | Basen (G) | |
|--------------------------------|--------------------------|-------------------------|--------------------------|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-----------|-------------------------|-------------------------|-------------------------|-----------|-----------|-----------|-----------|--|
| Site number | 1 | 2 | 7 | 9 | 10 | 11 | 12 | 13 | 24 | 49 | 52 | 55 | | | | | |
| <i>n</i> | 10 | 6 | 10 | 9 | 3 | 8 | 4 | 6 | 1 | 10 | 5 | 8 | | | | | |
| L | 904 ± 7 (870-938) | 770 ± 21 (739-827) | 821 ± 10 (778-864) | 802 ± 15 (728-848) | 757 ± 28 (701-791) | 919 ± 16 (861-979) | 1011 ± 14 (937-1039) | 778 ± 10 (744-812) | 731 | 800 ± 11 (771-887) | 814 ± 9 (786-831) | 894 ± 18 (827-939) | | | | | |
| Body diameter | 38 ± 1 (35-41) | 30 ± 1 (25-32) | 36.5 ± 1 (33-40) | 34 ± 0.6 (30-36) | 29 ± 2 (25-32) | 40 ± 0.6 (38-42) | 46 ± 1 (43-49) | 31 ± 0.7 (28-33) | 31 | 32 ± 0.6 (29-35) | 35 ± 1 (30-37) | 38 ± 1 (35-42) | | | | | |
| Pharynx | 208 ± 1 (201-214) | 195 ± 3 (184-206) | 201 ± 2 (188-210) | 193 ± 2 (184-204) | 189 ± 2 (184-191) | 212 ± 3 (199-221) | 211 ± 2.4 (204-214) | 197 ± 1.6 (193-204) | 199 | 201 ± 1.5 (195-206) | 203 ± 1 (201-206) | 208 ± 4 (193-219) | | | | | |
| Tail | 97 ± 2 (90-109) | 81 ± 4 (68-90) | 89 ± 1.3 (83-94) | 87 ± 2.5 (83-96) | 89 ± 6 (83-98) | 96 ± 3 (83-105) | 107 ± 3 (101-113) | 83 ± 1 (79-86) | 83 | 86 ± 2.4 (83-98) | 92 ± 1.5 (88-96) | 93.5 ± 2 (83-101) | | | | | |
| V-A/T ^a | 3.8 ± 0.1 (3.5-4.0) | 3.7 ± 0.1 (3.3-4.1) | 3.75 ± 0.04 (3.6-3.9) | 3.7 ± 0.06 (3.4-3.9) | 3.4 ± 0.15 (3.2-3.7) | 3.9 ± 0.1 (3.8-4.3) | 3.85 ± 0.1 (3.5-4.1) | 3.7 ± 0.05 (3.5-3.9) | 3.5 | 3.7 ± 0.1 (3.2-4.3) | 3.5 ± 0.1 (3.3-3.8) | 3.8 ± 0.05 (3.7-4.1) | | | | | |
| a | 24 ± 0.3 (22-25) | 26 ± 1 (24-30) | 22.5 ± 0.4 (20-24) | 23 ± 0.4 (21-25) | 26 ± 1 (24-28) | 23 ± 0.3 (22-25) | 22 ± 0.8 (21-24) | 25 ± 0.4 (24-27) | 24 | 25 ± 0.3 (24-27) | 24 ± 0.7 (22-26) | 23 ± 0.4 (22-25) | | | | | |
| b | 4.35 ± 0.02 (4.3-4.5) | 3.95 ± 0.1 (3.8-4.4) | 4.1 ± 0.03 (3.9-4.2) | 4.0 ± 0.4 (4.0-4.4) | 4.0 ± 0.1 (3.8-4.1) | 4.3 ± 0.04 (4.2-4.5) | 4.8 ± 0.1 (4.6-5.0) | 3.95 ± 0.03 (3.9-4.1) | 3.7 | 4.0 ± 0.03 (3.8-4.2) | 4.0 ± 0.03 (3.9-4.1) | 4.3 ± 0.02 (4.2-4.4) | | | | | |
| c | 9.4 ± 0.15 (8.5-10.0) | 9.6 ± 0.3 (9.6-10.4) | 9.2 ± 0.1 (8.8-9.6) | 9.2 ± 0.2 (8.3-9.7) | 8.5 ± 0.3 (8.1-9.0) | 9.6 ± 0.15 (9.2-10.4) | 9.5 ± 0.2 (9.0-9.7) | 9.4 ± 0.1 (8.9-9.6) | 8.8 | 9.4 ± 0.2 (8.4-10.4) | 8.8 ± 0.15 (8.4-9.2) | 9.6 ± 0.1 (9.3-10.0) | | | | | |
| c' | 4.9 ± 0.1 (4.5-5.0) | 4.9 ± 0.1 (4.5-5.3) | 4.7 ± 0.1 (4.4-5.2) | 4.9 ± 0.1 (4.4-5.1) | 4.9 ± 0.2 (4.6-5.2) | 4.8 ± 0.1 (4.4-5.1) | 4.75 ± 0.1 (4.5-5.0) | 4.75 ± 0.1 (4.4-5.1) | 4.9 | 4.9 ± 0.1 (4.4-5.3) | 5.1 ± 0.1 (4.8-5.6) | 4.7 ± 0.1 (4.3-5.0) | | | | | |
| V | 49 ± 0.2 (48-50) | 51 ± 0.4 (49-52) | 49 ± 0.2 (48-50) | 49 ± 0.4 (47-51) | 49 ± 0.7 (48-50) | 48.5 ± 0.3 (47-49) | 49 ± 1 (47-51) | 50 ± 0.4 (49-51) | 50 | 50 ± 0.4 (48-51) | 49 ± 0.4 (48-50) | 49.5 ± 0.2 (49-50) | | | | | |
| Height of labial region | 4.0-5.0 | 3.5-4.0 | 4.5-5.0 | 3.5-4.0 | 4.0 | 3.5-4.5 | 4.5-5.0 | 4.0-5.0 | 4.0 | 4.0-5.0 | 4.0-5.0 | 4.0-5.0 | | | | | |
| Head diameter | 11.0-11.5 | 9.5-10.5 | 10.5-11.5 | 9.5-11.0 | 9.5-10.5 | 10.5-11.5 | 11.5-12.0 | 10.5-11.5 | 10.0 | 10.0-11.5 | 10.5-11.5 | 9.5-10.5 | | | | | |
| Amphid to anterior end | 14.0-18.5 | 13.5-16.0 | 13.0-15.5 | 13.0-15.5 | 13.5-14.0 | 12.5-16.5 | 15.5-19.5 | 12.5-16.5 | 15.5 | 14.6-16.5 | 14.5-16.5 | 13.5-16.5 | | | | | |
| Excretory pore to anterior end | 126-135 | 116-125 | 112-124 | 111-125 | 110-118 | 122-139 | 130-143 | 118-126 | 114 | 123-131 | 120-127 | 116-141 | | | | | |
| Rectum | 20-22 | 18-20 | 19-22 | 19-22 | 19-21 | 20-23 | 21 | 18-23 | 20 | 19-21 | 19-22 | 20-24 | | | | | |
| Anal body diameter | 18-21 | 15-18 | 18-21 | 17-19 | 16-18 | 19-21 | 22-24 | 16-18 | 17 | 17-20 | 17-19 | 18-21 | | | | | |
| Annule width | 1.2-1.4 | 1.0-1.2 | 1.2-1.3 | 1.0-1.3 | 1.0-1.1 | 1.2-1.4 | 1.4-1.5 | 1.0-1.2 | 1.1 | 1.1-1.5 | 1.1-1.2 | 1.2-1.4 | | | | | |

^a Distance vulva to anus divided by tail length

region), vagina structure, spinneret structure, lateral field (especially extension on tail) and lip structure. Some of these characters require SEM to be resolved properly and the others are also often lacking in older descriptions, which limits their practical usefulness. However, for a better comparison with descriptions of more recent dates, the characters proposed by De Ley and Coomans (1994) have been included to supplement the description in Boström (1995).

The genus *Plectus* is represented by several species in the Antarctic (Boström 1995; Heyns 1995; Kito et al. 1991; Maslen 1979). Recently, Boström (1995) and Heyns (1995) described *P. acuminatus* and *P. antarcticus* de Man 1904, respectively, from nunataks in Dronning Maud Land. The distinction between *P. antarcticus* and *P. acuminatus* (and some other *Plectus* species) was discussed by Kito et al. (1991). Females of *P. antarcticus* and *P. acuminatus* can be separated only by the number of caudal setae (two or three vs three or four on each side of the tail). Males of the two species are more easily distinguished by the number of prelocal tubular supplements (single vs two) and the presence of a gubernaculum (absent vs present). There is only one drawback – males are extremely rare. Among the 80 specimens from Basen studied here, no males were found and Heyns (1995) did not record any males in the population of *P. antarcticus* from Robertskollen.

The specimens of the populations described from Basen agree in most respects with those described from Robertskollen (Heyns 1995), although the ranges of measurements and ratios are often more extensive because of the greater volume of material from Basen ($n = 80$ vs $n = 10$). Heyns (1995) pointed at a few differences between his specimens and *P. antarcticus* from the Soya Coast (Kito et al. 1991): width of annuli (1.2–1.5 μm vs 0.7–1.3 μm), lateral lines (3 vs 2 – probably a lapsus in the drawings of Kito et al.) and length of stoma (20–24 μm vs 19 μm – calculated by Heyns from the drawings of Kito et al.). [Heyns actually gave two different ranges for stoma length: 20–24 μm (in the text p. 2) and 23–28 μm (in Table 1), of which the latter probably was confused with the a-values.] Heyns did not, however, consider these discrepancies crucial and identified his specimens as *P. antarcticus*.

The specimens from Basen differ from *P. antarcticus* described by Kito et al. (1991), mainly by the c-ratio (8.3–10.4 vs 7.8–8.8) and c'-ratio (4.4–5.6 vs 5.5–6.8). However, they agree in these respects with the specimens described by Heyns (1995) from Robertskollen (c-ratio: 8.3–10.4 vs 8.5–10.2; c'-ratio: 4.4–5.6 vs 4.6–5.7).

Identification of the specimens from Basen cannot be made with certainty, as key characters for species identity, at least with the present knowledge, seem to be held by the males. Although the specimens are very similar to those from Robertskollen identified by Heyns (1995)

as *P. antarcticus*, I maintain the name *P. acuminatus* for the populations from Basen until other evidence is found (cf. Boström 1995).

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