Zootaxa 2096: 137–172 (2009)
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

Deep-sea nematodes of the family Microlaimidae from the Clarion-Clipperton Fracture Zone (North-Eastern Tropic Pacific), with the descriptions of three new species*

DMITRY M. MILJUTIN[#] & MARIA A. MILJUTINA
Abt. DZMB, Forschungsinstitut Senckenberg, Südstrand 44,26382 Wilhelmshaven, Germany
[#] corresponding author: dmiljutin@senckenberg.de

* *In*: Brökeland, W. & George, K.H. (eds) (2009) Deep-sea taxonomy — a contribution to our knowledge of biodiversity. *Zootaxa*, 2096, 1–488.

Abstract

The description of six species of family Microlaimidae (Nematoda), from 5,000 m depth at the Clarion-Clipperton Fracture Zone (North-Eastern Tropic Pacific), is given. Three previously described species (*Microlaimus discolensis* Bussau et Vopel, 1999; *M. porosus* Bussau et Vopel, 1999; and *Caligocanna mirabilis* Bussau et Vopel, 1999) were found about 5200 km far from the area where the type specimens were originally discovered (the Peru Basin, South-East Pacific). Of the new species, *Aponema martinezi* sp. n. is closest to two other *Aponema* species, *A. minutissima* Kovalyov and Miljutina, 2008 and *A. nanum* (Blome, 1982). However, it differs from them in having a non-set-off head, amphids located quite far from the non-annulated cephalic capsule, and by possessing the gubernaculum with the apophysis. *Microlaimus abyssalis* sp. n. belongs to a group of *Microlaimus* species with dorsocaudal apophyses of gubernaculum. It differs from other four *Microlaimus* species which have apophyses of similar shape (*M. crassiceps* Gerlach, 1953; *M. decraemerae* (Muthumbi & Vincx, 1999); *M. mnazi* (Muthumbi & Vincx, 1999); and *M. undulates* Gerlach, 1953) by lacking of supplementary precloacal organs in males and some other body parameters. *Microlaimus parviporosus* sp. n. possesses four submedian rows of pores along its entire body length. In this feature it resembles three other *Microlaimus* species (*M. cyatholaimoides* de Man, 1922; *M. discolensis* Bussau and Vopel, 1999; and M. *porosus* Bussau and Vopel, 1999). The new species differs from *M. cyatholaimoides* and *M. porosus* by the ratio of the length of the outer labial setae and of the cephalic setae (approximately of equal length in the new species vs. the much longer cephalic setae in two latter species) as well as some other parameters. The new species differs from *M. discolensis* by its shorter head setae of two rings (1.2 µm vs. 6–9 µm) and some other parameters.

Key words: *Aponema*, biodiversity, *Caligocanna*, deep sea, *Microlaimus*, manganese nodules, oozy sediments, taxonomy

Introduction

In the current paper we present the results from studying the nematode collection of the “Nodinaut” cruise conducted in 2004 to the Clarion-Clipperton Fracture Zone (North-Eastern Tropic Pacific). This region is considered to be one of the most commercially important nodule areas of the World Ocean (Thiel 2001). The main goal of the cruise was the study of macro- and meiofauna of nodule fields.

The seabed at the sample area is characterized by abyssal hills from 100 to 300 m in height spaced from 5 to 10 km apart. Most of the area (about 90%) between seabed hills and their slopes is covered by ferromanganese nodules (2 cm to 15+ cm in diameter). Sediments between nodules are very fine-grained (<2µm) silicate oozes (radiolarian and diatomaceous) (Khripounoff et al. 2006).

Accepted by K.H. George: 11 Mar. 2009; published: 11 May 2009

In the current study we examine nematodes of the family Microlaimidae Micoletzky, 1922.

Material and methods

The scientific cruise "Nodinaut" was conducted by the French RV "L'Atalante" (IFREMER,) on the area of French mining claims in the Clarion-Clipperton Fracture Zone (CCFZ) (9–14°N, 130–150°W, ~5000 m depth) in summer 2004 (Fig. 1; Table 1).

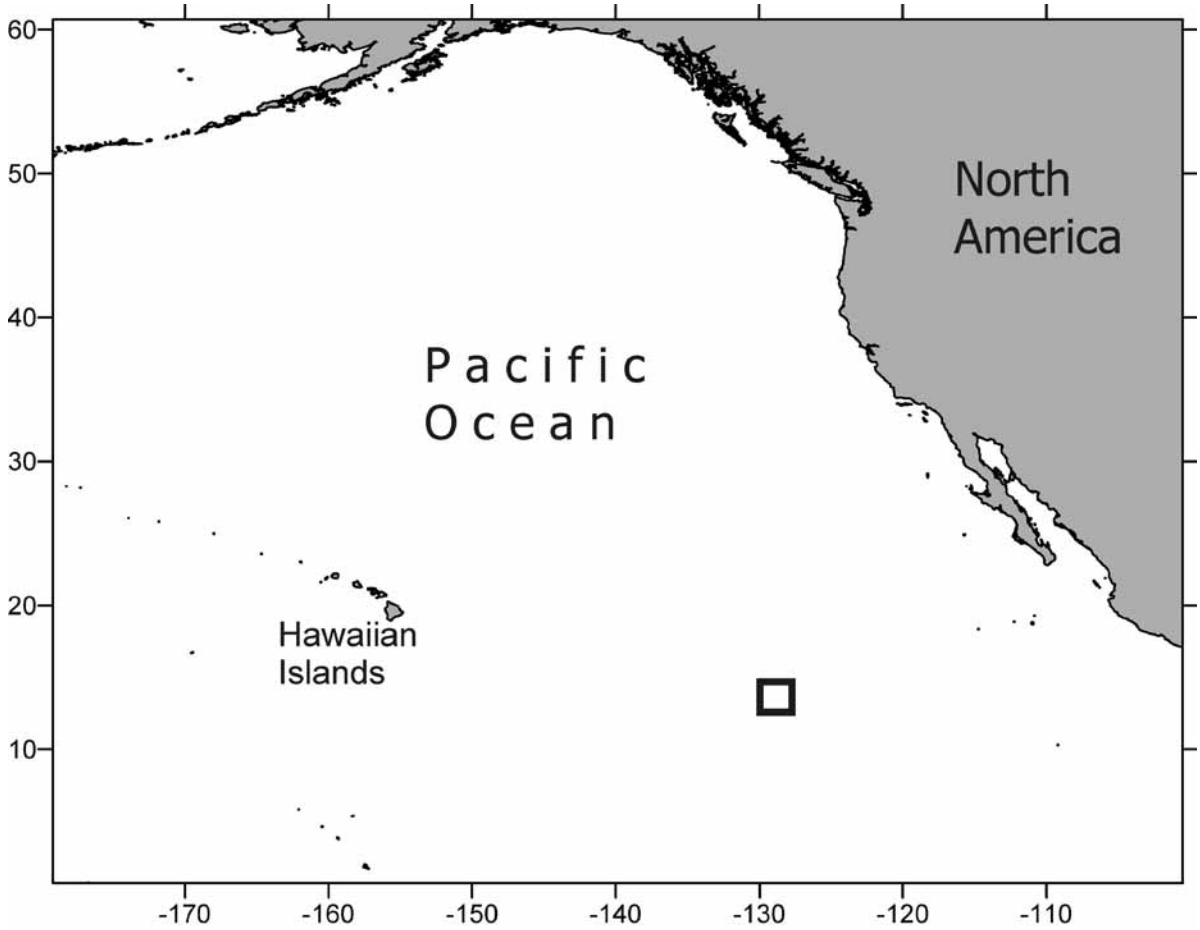

FIGURE 1. Sampling area and location of stations (marked with a square).

TABLE 1. Positions of study stations with sample dates, depths, and gear type.

Station	Date	Latitude (N)	Longitude (W)	Depth (m)	Device
MTB-2	27.05.2004	14°03.40′	130°05.58′	5013	Multicorer
MTB-3	28.05.2004	14°02.74′	130°05.11′	5046	Multicorer
MTB-4	28.05.2004	14°02.93′	130°04.74′	5029	Multicorer
MTB-6	30.05.2004	14°02.86′	130°05.35′	5040	Multicorer
KGS-6	28.05.2004	14°03.01′	130°06.93′	4974	Usnel corer
MTB-7	30.05.2004	14°02.88′	130°04.97′	5042	Multicorer
MTB-8	31.05.2004	14°02.55′	130°05.35′	5035	Multicorer
MTB-10	01.06.2004	14°02.80′	130°05.00′	5035	Multicorer
MTB-11	01.06.2004	14°02.94′	130°04.73′	5035	Multicorer
MTB-15	03.06.2004	14°02.69′	130°07.84′	4947	Multicorer
MTB-16	03.06.2004	14°02.70′	130°07.73′	4950	Multicorer
MTB-18	07.06.2004	14°02.52′	130°07.98′	4950	Multicorer

Samples were collected using the 8-tubes-multicorer (tube diameter 100 mm) and USNEL corer (0.5m x 0.5m). On board, the samples were initially fixed with 4% formalin in seawater.

Meiobenthic organisms were separated from sediments using Levasil®-kaolin medium (McIntyre & Warwick 1984) with the following triple-time centrifugation at 4000 rpm for 6 min. After centrifugation, the upper fraction containing meiobenthic organisms was sieved using a mesh size of 40 μm and washed with fresh water. The concentrate obtained was fixed with 70% alcohol in fresh water and placed in plastic bowls with air-tight covers for storage.

Subsequently, the content of containers with meiobenthic organisms was placed in a Bogorov's chamber and checked under a stereomicroscope. Nematodes were sorted out, processed into glycerin using Seinhorst's (1959) method of slow evaporation, and permanently mounted on glycerin-paraffin slides.

The subsequent work consisted of studying nematodes using the LEICA DMR interference contrast microscope with the x1.5 and x2.0 magnifier), equipped with the camera lucida. Initially, all nematodes were identified to family and genus level. Afterwards, species of Microlaimidae presenting sufficiently high number of specimens of both sexes were selected for further study and description. Photographs were taken with a LEICA DMLB microscope furnished with a digital camera.

All type specimens were deposited in the Muséum National d'Histoire Naturelle, Paris (MNHN) collection.

Abbreviations used

a:	ratio "body length/ maximum body diameter"
Amph.diam.:	body diameter at level of middle of amphid
Amph.dist.:	distance from anterior end to amphid
An.diam.:	body diameter at level of anus
Ann.w.:	width of annuli
Apoph.l.:	length of apophysis
b:	ratio "body length / length of pharynx"
Bulb.l.:	length of pharyngeal bulbus
Bulb.w.	width of pharyngeal bulbus
c:	ratio "body length / length of tail"
c':	ratio "length of tail / anal corresponding body diameter"
C.b.d.:	corresponding body diameter
Caps.l.:	length of cephalic capsule
Caps.w.:	width of cephalic capsule
Card.diam.:	body diameter at level of cardia
I.l.s.:	length of inner labial setae
O.l.s.:	length of outer labial setae
C.s.:	length of cephalic setae
Diam.amph.:	diameter of amphid
f:	Female
Gubern.l.:	length of gubernaculum
L:	body length
m:	Male
Max.b.diam.:	maximum body diameter
Midb.diam.:	body diameter at level of midbody
Num.ann.:	number of annuli anterior to amphid
Num.por.dors.:	number of pores in dorsolateral row
Num.por.ventr.:	number of pores in ventrolateral row
Phar.l.:	length of pharynx
Spic.arc.l.:	length of spicula in arc
Spic.ch.l.:	length of spicula in chord

Tail.l.:	length of tail
V%:	ratio "distance from anterior end to vulva / total body length" (%)
Vulv.dist.:	Distance from anterior end to vulva

Results

In total, 71 individuals (2.6% of examined nematodes) belong to the family Microlaimidae, which comprised 22 juveniles, 22 females and 27 males. Five of these microlaimids were not identified to genus level because of their poor condition. The rest belonged to 10 species: 1 species of the genus *Bathynox* Bussau and Vopel, 1999 (2 specimens), 1 species of the genus *Caligocanna* Bussau and Vopel, 1999 (15 specimens), 2 species of *Aponema* Jensen, 1978 (2 and 3 specimens), and 6 species of *Microlaimus* de Man, 1880 (2, 4, 5, 5, 8, and 17 specimens). Because of poor condition or lack of males or females, it was possible to describe 6 valid species only: 1 *Aponema* species, 1 *Caligocanna* species, and 4 *Microlaimus* species. Three of them were found to be new finds of previously described species.

Taxonomy

Nematoda
Microlaimidae Micoletzky, 1922
***Aponema* Jensen, 1978**

Generic diagnosis. Microlaimidae. Cephalic sensilla longer or approximately equal with outer labial sensilla. Amphid monospiral, rounded. Somatic setae never situated on processes. Cuticle annulated or optically smooth, without thorns. Shape of oesophagial bulb varying from spherical to pyrifom. Testis single, directed anterior, outstretched. Gubernaculum capable bearing apophysis. Ovaries outstretched. Tail conical or elongated.

***Aponema martinezi* sp. n.**
(Figs 2–4, Table 2)

Type material: Collection number MNHN-BN490. Holotype: one male. Paratype: one female.

Locality: Tables 1, 2.

Etymology: In honor of Dr. Prof. Pedro Martínez Arbizu (German Centre for Marine Biodiversity Research (DZMB), Wilhelmshaven, Germany).

Measurements: Table 2.

Description of male: Very small nematode. Body cylindrical, with slightly narrowed anterior end and conical tail. Cuticle annulated along whole body except cephalic capsule. Cuticular annuli strongly pronounced, each about 1 µm width. Cuticle thickness approximately 0.3 µm at level of cephalic capsule and approximately 1 µm at rest body. Somatic setae not found. Sensilla of cephalic end arranged in 2 rings spaced far apart: 6 very short (0.4 µm) outer labial setae at level of cephalic tip and 4 submedian cephalic setae (0.6 µm) near posterior border of cephalic capsule. Amphid monospiral, round, with fine but distinct sclerotized margins, approximately 1/2 of c.b.d. in its diameter. There are 10 cuticular annules between anterior rim of amphid and cephalic capsule. Buccal cavity narrow, distinguished from rest, posterior pharynx by its thicker cuticular walls of its internal lumen. One small dorsal sclerotized tooth visible at its medium part. Pharynx cylindrical but possessnig a well-developed terminal oval bulb approximately 75% of c.b.d. in its width. Single pair of plasmatic inclusions visible on optical transversal section at level of middle of pharyngeal bulb.

Nerve ring at a distance 2/3–3/4 of pharyngeal length from anterior end. Cellular body of renetta located at level of beginning of intestine. Cardia large, triangular, approximately 1/2 of c.b.d. in its width. Reproductive system monorchic, with single outstretched testis lying to the left of intestine. Testis gradually widening to *vas deferens* without forming morphologically distinct border. Large nuclei of spermatids visible in latter. Spicules long and thin, curved, with feebly marked knob at its distal end. Gubernaculum in shape of a curved, thin rod. Distal end of gubernaculum directed anteriorly, and possessing a long, curved apophysis of similar thickness, distal end of which being directed dorsally. Supplementary organs not visible. Whole reproductive system occupies approximately 45% of total body length. Tail conical. Three cellular bodies of caudal glands located close to anus. Outlet of caudal glands visible in caudal tip.

Female: Females very similar to males in most parameters, however amphids being smaller (44% of c.b.d.). Reproductive system very short, didelphic, amphidelphic, with outstretched ovaries. Whole reproductive system occupying approximately 30% of total body length. Posterior branch of reproductive system 2.5 times longer than anterior one. There are no morphologically distinct borders between ovaries, oviducts and uterus. Most of uterus also located in posterior branch. One big, long oocyte (35 x 9 µm) visible in uterus. One oval spermatozoon 13 x 6 µm in size situated in uterus opposite vulva. Intestine pushed to dorsal side by short anterior ovary, whereas longer posterior one lying to the left of intestine. Every ovary containing one mature elongated oocyte. No vulvar glands seen.

TABLE 2. *Aponema martinezi* sp. n. Measurements and body indices.

Specimen status	holotype	paratype
Slide No.	1-27	2-36
Gender	m	f
Station	MTB-2	MTB-6
L	260	270
Amph.dist.	14	12
Phar.l.	58	57
Tail.l.	51	53
Vulv.dist.	–	140
Num.ann.	10	11
Caps.l.	3.4	4.3
Caps.w.	4.7	4.3
Bulb.l.	12	9
Bulb.w.	9	9
Amph.diam.	8	8
Card.diam.	11	13
Midb.diam.	14	14
An.diam.	9	8
Max.b.diam.	13	13
Diam.amph.	4.3	3.4
Spic.ch.l.	12	–
Spic.arc.l.	15	–
Gubern.l.	5	–
Apoph.l.	8	
a	18.9	19.8
b	4.5	4.7
c	5.1	5.1
c'	5.5	6.2
V, %	–	52.1

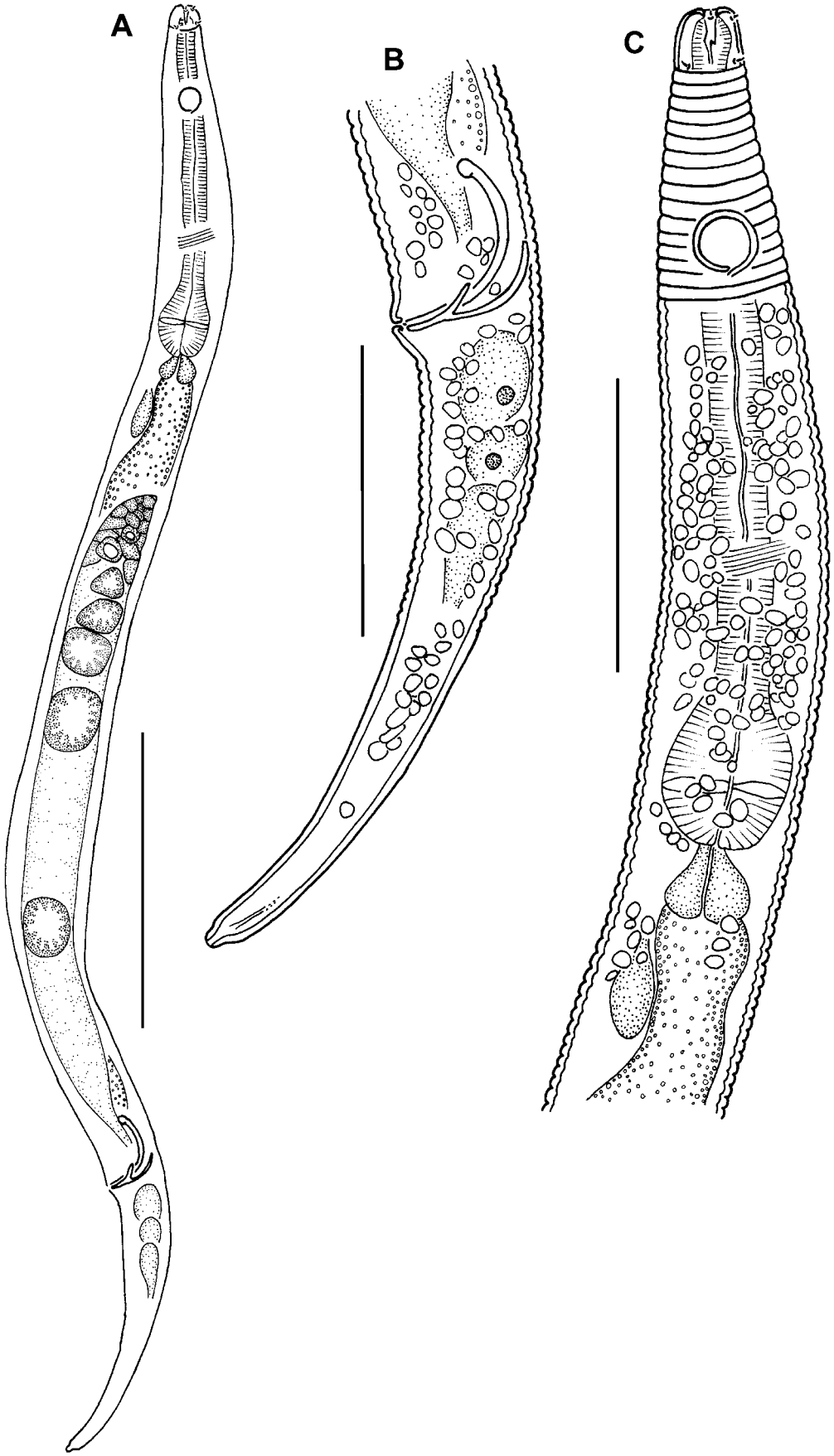

FIGURE 2. *Aponema martinezi* sp. n., male, holotype. A, total view; B, posterior end; C, anterior end. Scale bars: A = 50 µm; B, C = 20 µm.

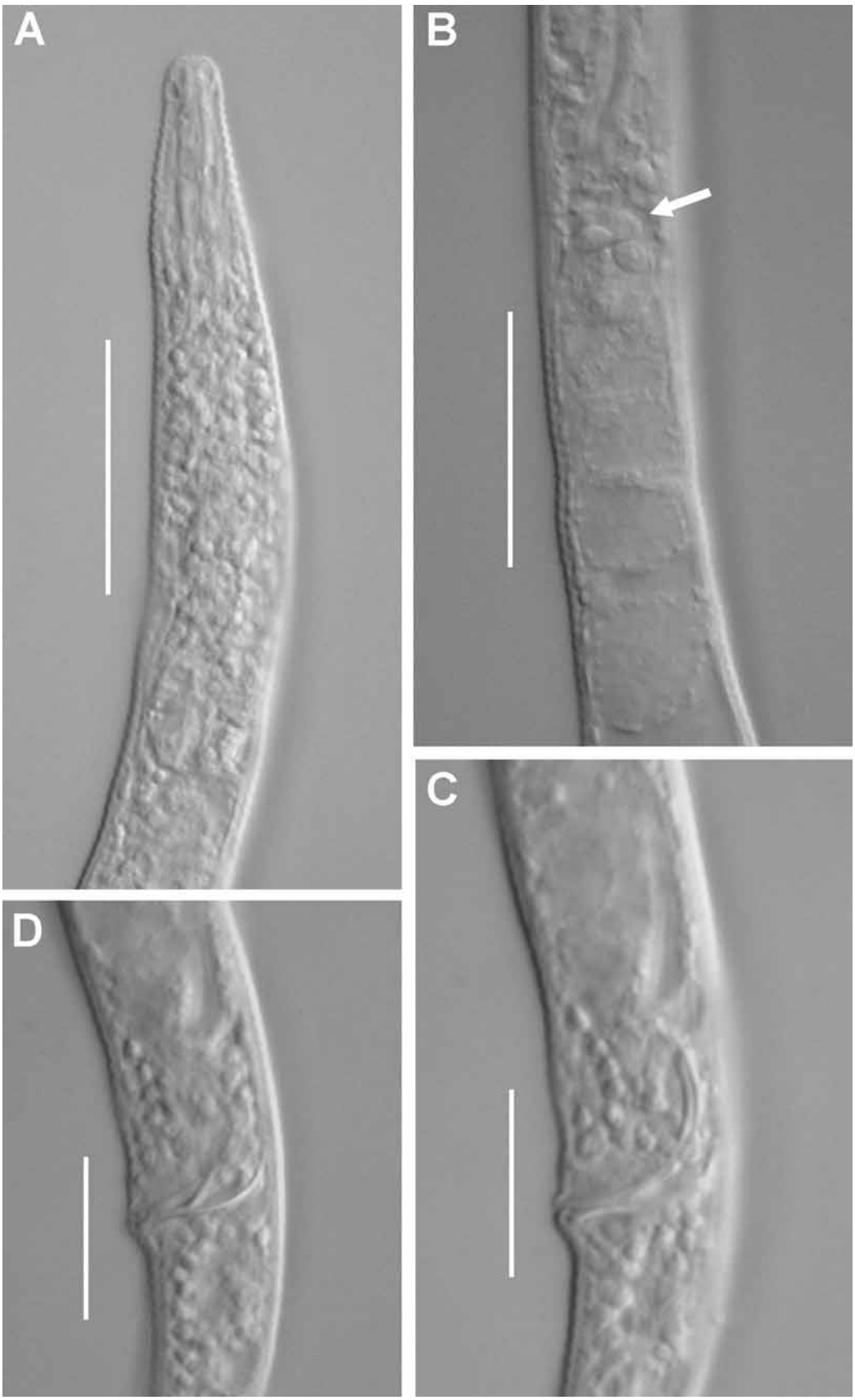

FIGURE 3. *Aponema martinezi* sp. n., male, holotype, light micrographs. A, anterior end; B, beginning of testis (marked by arrow); C, anal region, optical section at level of distal part of spicule; D, anal region, optical section at level of gubernaculum. Scale bars: A, B = 20 μm; C, D = 10 μm.

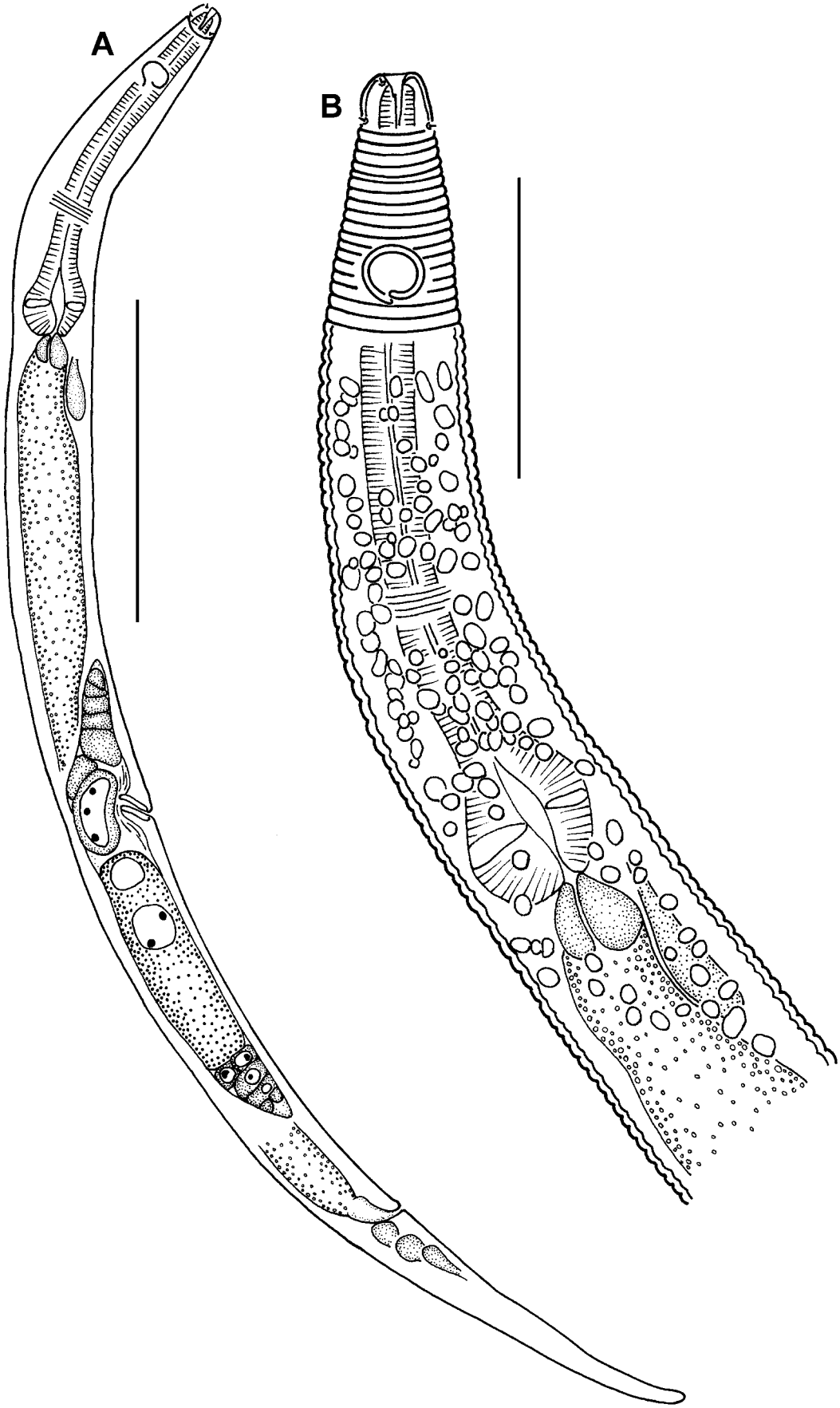

FIGURE 4. *Aponema martinezi* sp. n., female, paratype. A, total view; B, anterior end. Scale bars: A = 50 µm; B = 20 µm.

Abundance: The density of this species did not exceed 1 ind/10cm^2 and relative abundance within the nematode community was about 1% at the stations where it was found.

Differential diagnosis: There are 7 valid species of *Aponema* at present (Kovalyev & Miljutina 2008). *A. martinezi* sp. n. differs from most *Aponema* species by possessing non-set-off head and amphids located quite a far from the non-annulated cephalic capsule (there are 10 cuticular annules between anterior rim of amphid and cephalic capsule). Only two species possess these features: *A. minutissima* Kovalyov et Miljutina, 2008 and *A. nanum* (Blome, 1982) (see Kovalyev & Miljutina 2008). The new species also bears the cephalic sensilla of two rings of about the same length, like *A. minutissima*, and their total body length are similar (260–270 μm in *A. martinezi* sp. n. vs. 209–424 μm *A. minutissima*). However, *A. martinezi* sp. n. differs from these two species by possessing a gubernaculum with apophysis, whereas apophyses have been not detected in *A. minutissima* and *A. nanum*.

Caligocanna Bussau et Vopel, 1999

Generic diagnosis. Microlaimidae. Outer labial setae longer than cephalic setae. Cuticle annulated, each annulus with numeruos fine longitudinal bars. Amphid monospiral, rounded. Testes paired, opposed, outstretched. Ovaries paired, outstretched. Caudal glands possessing a common terminal outlet.

Caligocanna mirabilis Bussau et Vopel, 1999

(Figs 5–8, Table 3)

Material examined: 5 males and 2 females (Table 3).

Locality: Tables 1, 3.

Measurements: Table 3.

Description of male: Body cylindrical, with slightly narrowed anterior end and conical tail. Cuticle annulated along whole body except at anteriormost cephalic capsule. Cephalic capsule short, its length less than its width. Cuticular annuli strongly pronounced, each approximately 1.7 μm in width, with very close and fine longitudinal bars. There are distinctly bordered deep furrows between annuli. Cuticle thickness approximately 0.7 μm at level of cephalic capsule and approximately 1 μm at rest body. Cuticle thickness being equal both under annuli and under furrows between annuli. Somatic setae not found. Sensilla of cephalic end arranged in 3 rings spaced from each other: 6 very short papilloid inner labial sensilla approximately 0.3 μm long at level of cephalic tip, 6 outer labial setae approximately 1.3 μm at level of middle of cephalic capsula, and 4 submedian cephalic setae approximately 0.5 μm long near posterior border of cephalic capsule. Amphid monospiral, round, 58–70% c.b.d. in diameter. Anterior half of amphid situated on cephalic capsule, whereas posterior one lying at annulated zone of body under the cuticle. Small pore visible behind amphid. Vestibulum possessing 12 slight ribs. Cuticular walls of pharyngeal internal lumen of stegostoma looking thicker than in other, more posteror part of pharynx. Length of whole stoma approximately 4 μm. Two long dorsal teeth and two short ventral teeth visible in anterior part of stegostoma. Pharynx cylindrical but having a terminal oval bulb 68–85% of c.b.d. in width. Thin radial plasmatic interruptions visible in bulb. Anterior part of pharynx bearing stoma bordered from posterior part by plasmatic interruptions. Nerve ring at a middle of pharynx. Cardia cylindrical, approximately 1/3 of c.b.d. in width. Both testes lying ventrally from intestine. Two zones of spermatogenesis visible in anterior testes: small roundish spermatogonia with fine-graned content, large oval spermatogonia with fibrillar content. Largest spermatogonium 10 x 40 μm in size. A single large intracellular structure resembling long meandering coniferous branch with needles visible in each of mostly matured spermatogonia. *Vas deferens* thick, approximately 1/3 of total body length, filled with puck-shaped spermatids approximately 6 μm in diameter with large-grained content. Spicules strongly curved, thick, with complex proximal knob and velum. There is

also longitudinal rib at distal half of spicule. Gubernaculum in shape of a curved, thin rod. Supplementary organs not found. Length of whole reproductive system occupying about a half of total body length. Tail conical. Tail of all examined specimens being S-shaped.

Female: Females very similar to males in most parameters, except their pharyngeal bulbus being smaller relative to c.b.d. (50–67%). Reproductive system short, didelphic, amphidelphic, with outstretched ovaries. Anterior ovary lying to the right of intestine, posterior one lying to the left of intestine. There are no morphologically distinct borders between ovaries, oviducts and uterus. Whole reproductive system occupying approximately 30% of total body length. Size of mature oocyte 16x38 μm. Spermatozoa not found. Vulvar glands present. Both females possessing shelters consisting of some mucus covered with small inorganic particles.

Abundance: The density of this species was 0.6–1.6 inds/10cm^2 and relative abundance within nematode community was 1–2% at the stations where it was found.

TABLE 3. *Caligocanna mirabilis* Bussau *et* Vopel 1999. Measurements and body indices.

Specimen No.	1	2	3	4	5	6	7
Slide No.	1-65	2-57	2-55	2-81	3-17	3-40	1-10
Gender	m	m	m	m	m	f	f
Station	MTB-18	MTB-16	MTB-16	MTB-8	MTB-10	KGS-6	MTB-16
L	483	462	450	385	424	436	460
Amph.dist.	6	5	6	6	6	6	5
Phar.l.	96	109	109	87	93	99	*
Tail.l.	66	59	57	56	56	**	71
Vulv.dist.	–	–	–	–	–	240	245
Caps.l.	7	6	6	6	6	6	6
Caps.w.	12	11	11	12	11	11	11
Bulb.l.	22	24	21	21	22	16	17
Bulb.w.	17	14	14	15	15	14	10
Amph.diam.	12	12	12	13	13	11	9
Card.diam.	20	19	20	22	19	21	20
Midb.diam.	22	18	23	22	19	20	21
An.diam.	17	16	15	16	14		14
Max.b.diam.	22	19	25	22	19	21	21
Diam.amph.	8.0	7.0	8.5	8.0	9.0	8.0	6.5
Spic.ch.l.	14	13	15	14	14	–	–
Spic.arc.l.	22	19	19	19	22	–	–
Gubern.l.	9	9	11	10	14	–	–
a	22.0	24.3	18.0	17.5	22.3	20.8	21.9
b	5.0	4.2	4.1	4.4	4.6	4.4	*
c	7.3	7.8	7.9	6.9	7.6	**	6.5
c’	3.9	3.7	3.8	3.5	4.0	**	5.1
V, %	–	–	–	–	–	55.0	53.3

* posterior end of pharynx not visible because sand tube covers this specimen

** - tail not visible because sand tube covers this specimen

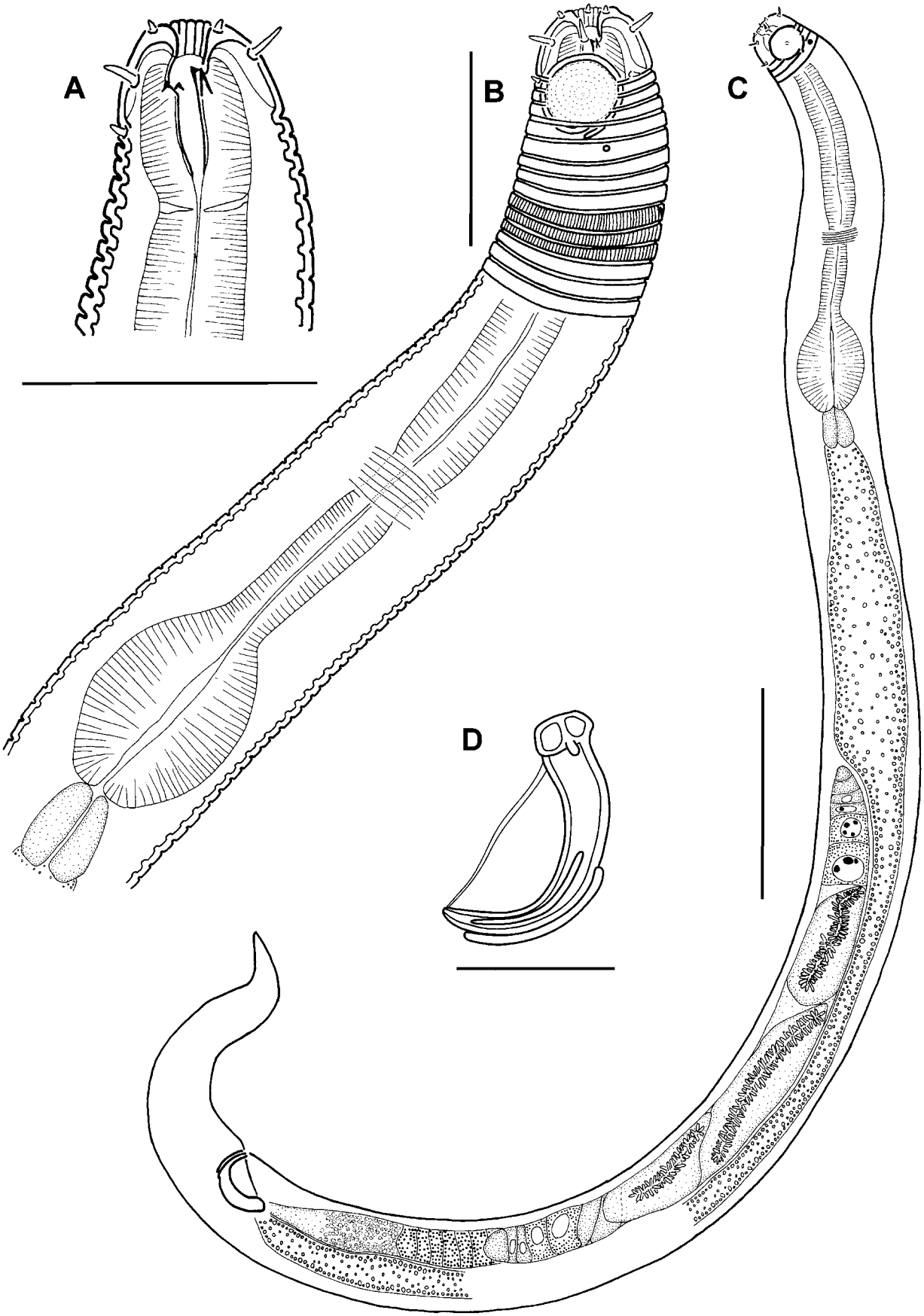

FIGURE 5. *Caligocanna mirabilis*, males. A, specimen No. 1, head; B, specimen No. 1, anterior end; C, specimen No. 1, total view; D, specimen No. 3, copulatory apparatus. Scale bars: A, B = 20 µm; C = 100 µm; D = 10 µm.

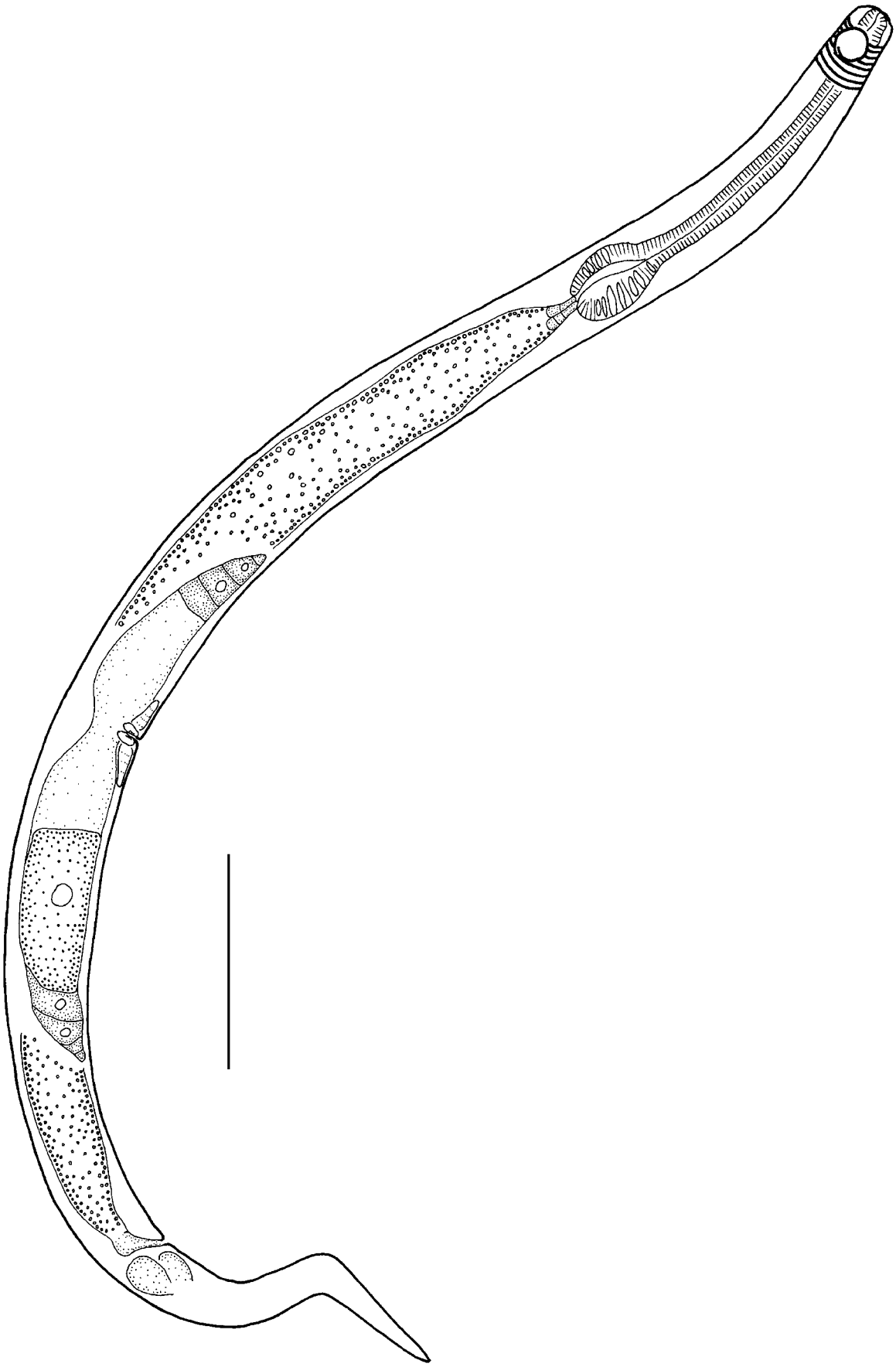

FIGURE 6. *Caligocanna mirabilis*, female, specimen No. 7, a total view. Scale bar = 50 μm.

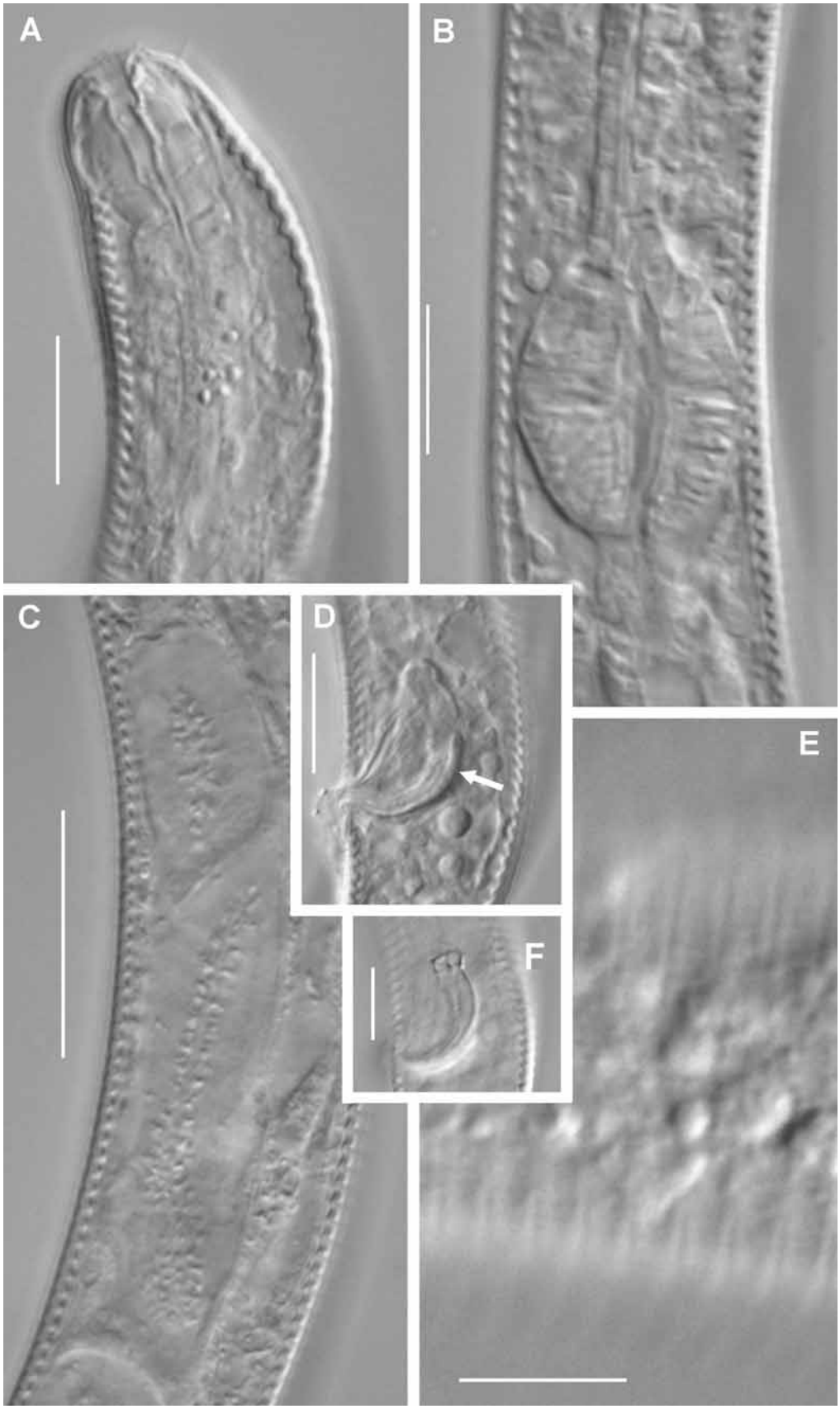

FIGURE 7. *Caligocanna mirabilis*, males, light micrographs. A, specimen No. 1, head; B, specimen No. 1, region pharyngeal bulb; C, specimen No. 1, spermatogonia; D, specimen No. 1, anal region, optical section at level of gubernaculum (marked by arrow); E, specimen No. 1, longitudinal striation of cuticular annuli; F, specimen No. 3, anal region, optical section at level of distal part of spicule. Scale bars: A, B, D, F = 10 µm; C = 20 µm; E = 5 µm.

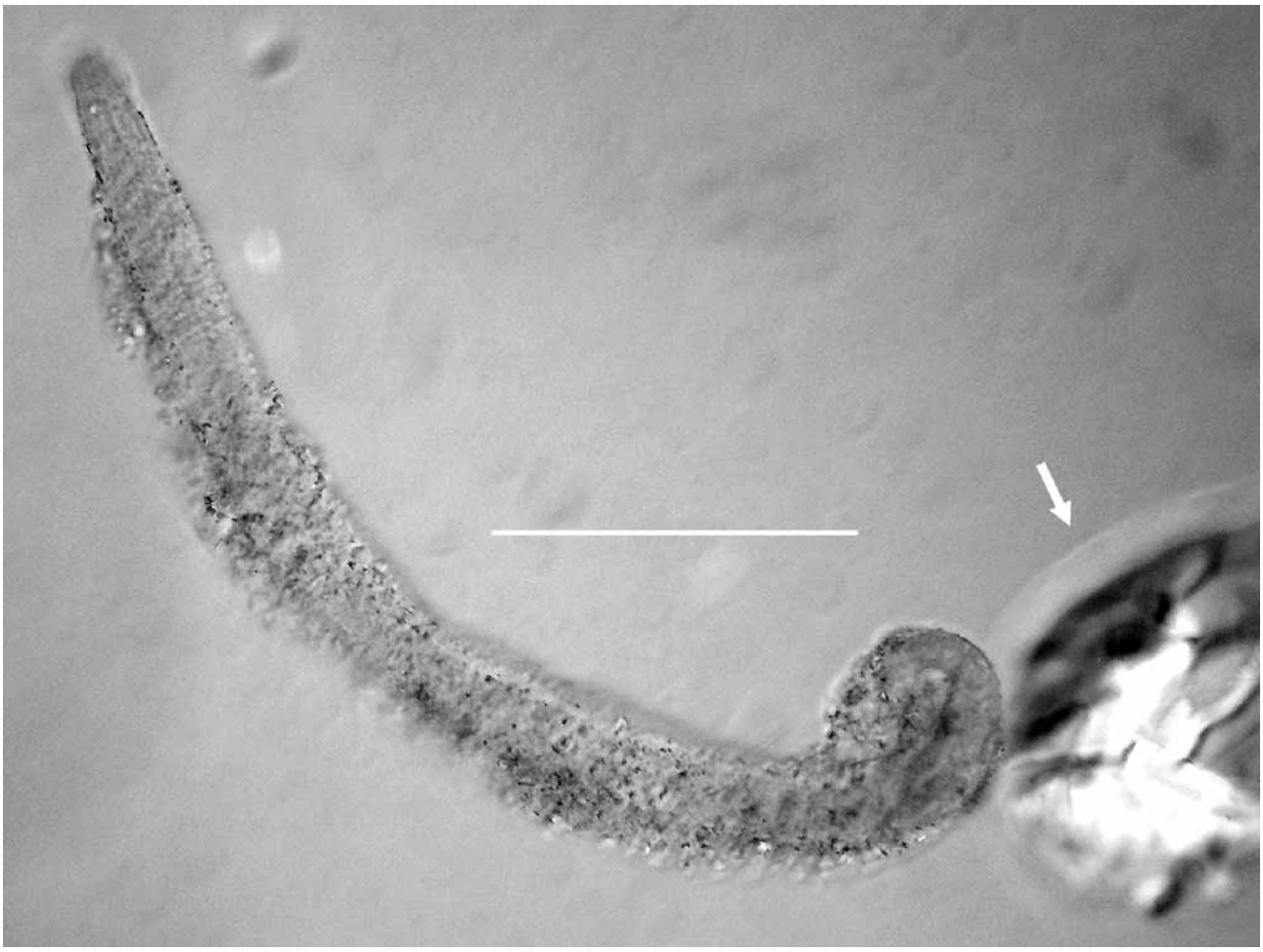

FIGURE 8. *Caligocanna mirabilis*, light micrograph. Female (specimen No. 6) in the tube of fine-grained ground particles attached to the grain of sand (the latter is marked with arrow). Scale bar = 100 μm.

Remarks: C. mirabilis was initially described by Bussau and Vopel (1999) from the abyssal eastern tropical South Pacific (Peru Basin), which is located about 5200 km from the area we report them from. The specimens from the new area resemble those described by Bussau and Vopel (1999) very well. There are several insignificant distinctions only. The maximum body length of new specimens is slightly more than in specimens of type series (483 μm vs. 450 μm respectively); body is thinner (a=17.5–24.3 vs. 12.6–18.0), tail is shorter (c=6.5–7.9 vs. 5.1–6.4). The ring of labial papillae was not described in the original description, whereas this ring, consisting of 6 papilloid sensilla, was found in new specimens. Several somatic setae were found in type specimens, whereas they were not visible in new individuals. However, such distinctions are insufficient for assigning new species and may be explained by intraspecific variation and by difference in methods of treatment (new specimens were preserved in alcohol, whereas type specimens were kept in formaldehyde).

The characteristic number of teeth in the stegostoma is three for the genus *Microlaimus*. However, four teeth were found in the buccal cavity of *C. mirabilis* both in the Bussau's and Vopel's (1999) original description and in the present work. So, the presence of four teeth cannot be considered an error. It may be due to a secondary division of the initially single dorsal tooth.

Intracellular structures resembling long winding non-ramifying coniferous branch with needles visible in each of mostly matured spermatids are probably major sperm proteins (MSP). This unique cytoskeleton was found only in nematodes and only in male germ cells (Justine 2002).

***Microlaimus* de Man, 1880**

= *Microlaimoides* Hoeppli, 1926, op. Andrassy (1960); =*Paracothonolaimus* Schulz, 1932, op. Schuurmans-Stekhoven & De Coninck (1933).

Generic diagnosis: Microlaimidae. Stoma with dorsal and pair of subventral teeth, without numerous subventral denticles. Cephalic sensilla longer or approximately equal to outer labial sensilla and being more than 1/3 of c.b.d. distance from latter. Cuticle usually annulated, rarely optically smooth. Amphid usually monospiral and rounded, rarely with several turns. Testes usually paired, opposed, outstretched. Ovaries paired, outstretched. Caudal glands possessing a common terminal outlet.

***Microlaimus abyssalis* sp. n.**

(Figs 9–12, Table 4)

Type material: Collection number MNHN-BN491. Holotype: one male. Paratype: 5 males, 4 females (Table 4).

Locality: Tables 1, 4.

TABLE 4. *Microlaimus abyssalis sp. n.* Measurements and body indices.

Collection	Holotype	Paratype	Paratype	Paratype	Paratype	Paratype	Paratype	Paratype	Paratype	Paratype
Slide No.	1-57	3-42	3-32	2-98	1-5	1-15	3-71	2-98	1-52	1-13
Gender	m	m	m	m	m	m	f	f	f	f
Station	MTB-18	MTB-4	MTB-15	MTB-6	MTB-16	MTB-18	MTB-2	MTB-6	MTB-11	MTB-18
L	475	522	536	511	500	454	541	466	427	568
Amph.dist.	16	20	18	15	19	18	20	18	19	20
Phar.l.	87	92	99	87	91	88	93	93	81	98
Tail.l.	62	77	75	69	70	62	83	70	61	78
Vulv.dist.	–	–	–	–	–	–	258	230	210	275
Num.ann.	15	15	15	15	17	15	15	16–17	19–20	17–18
Caps.l.	6	5	5	6	4.5	6	5	5	5	6
Caps.w.	8	8	6	8	7	8	8	7	7	8
Bulb.l.	19	16	20	19	16	18	19	19	17	18
Bulb.w.	14	14	14	15	14	14	16	16	14	14
Amph.diam.	12	14	12	12	13	12	14	13	7	12
Card.diam.	19	19	19	19	19	19	23	22	19	18
Midb.diam.	18	20	21	19	19	20	28	23	21	23
An.diam.	17	18	17	16	17	17	17	14	14	14
Max.b.diam.	19	20	21	19	19	20	28	23	21	23
Diam.amph.	7	7	6	6	6	6	5	5	5	5
Spic.ch.l.	19	18	19	19	20	22	–	–	–	–
Spic.arc.l.	23	21	23	22	22	*	–	–	–	–
Gubern.l.	4	5	5	*	3	*	–	–	–	–
Apoph.l.	7	7	7	*	6	*	–	–	–	–
a	25.0	26.7	25.5	26.9	26.3	22.7	19.3	20.3	20.3	24.7
b	5.5	5.7	5.4	5.9	5.5	5.2	5.8	5.0	5.3	5.8
c	7.7	6.8	7.1	7.4	7.1	7.3	6.5	6.7	7.0	7.3
c'	3.6	4.3	4.4	4.3	4.1	3.6	4.9	5.0	4.4	5.6
V, %	–	–	–	–	–	–	47.7	49.4	49.2	48.4

* poor position of specimen.

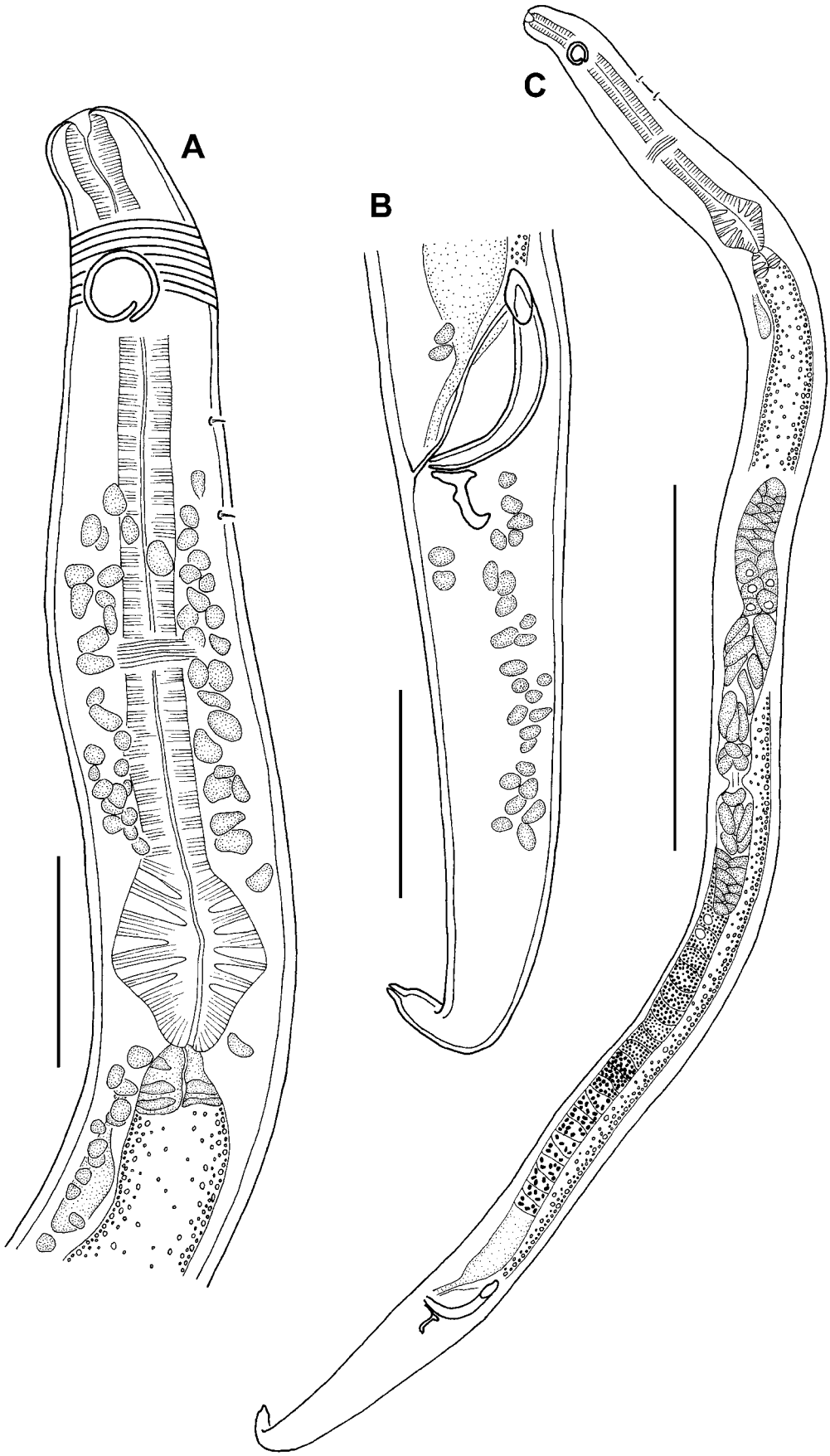

FIGURE 9. *Microlaimus abyssalis* sp. n., male, holotype. A, head; B, tail; C, total view. Scale bars: A, B = 20 μm; C = 100 μm.

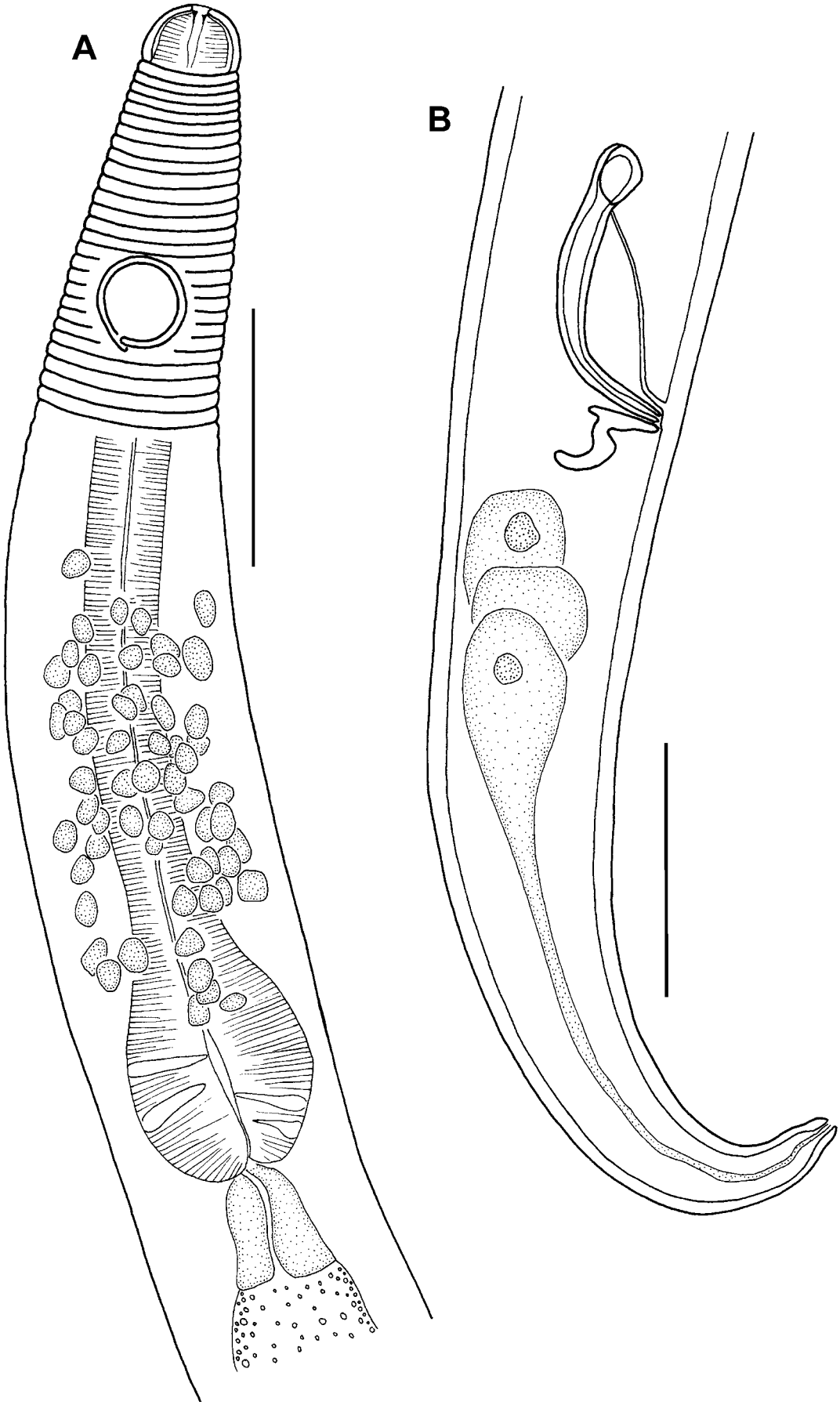

FIGURE 10. *Microlaimus abyssalis* sp. n., males. A, paratype No. 1, head; B, paratype No. 2, tail. Scale bars = 20 µm.

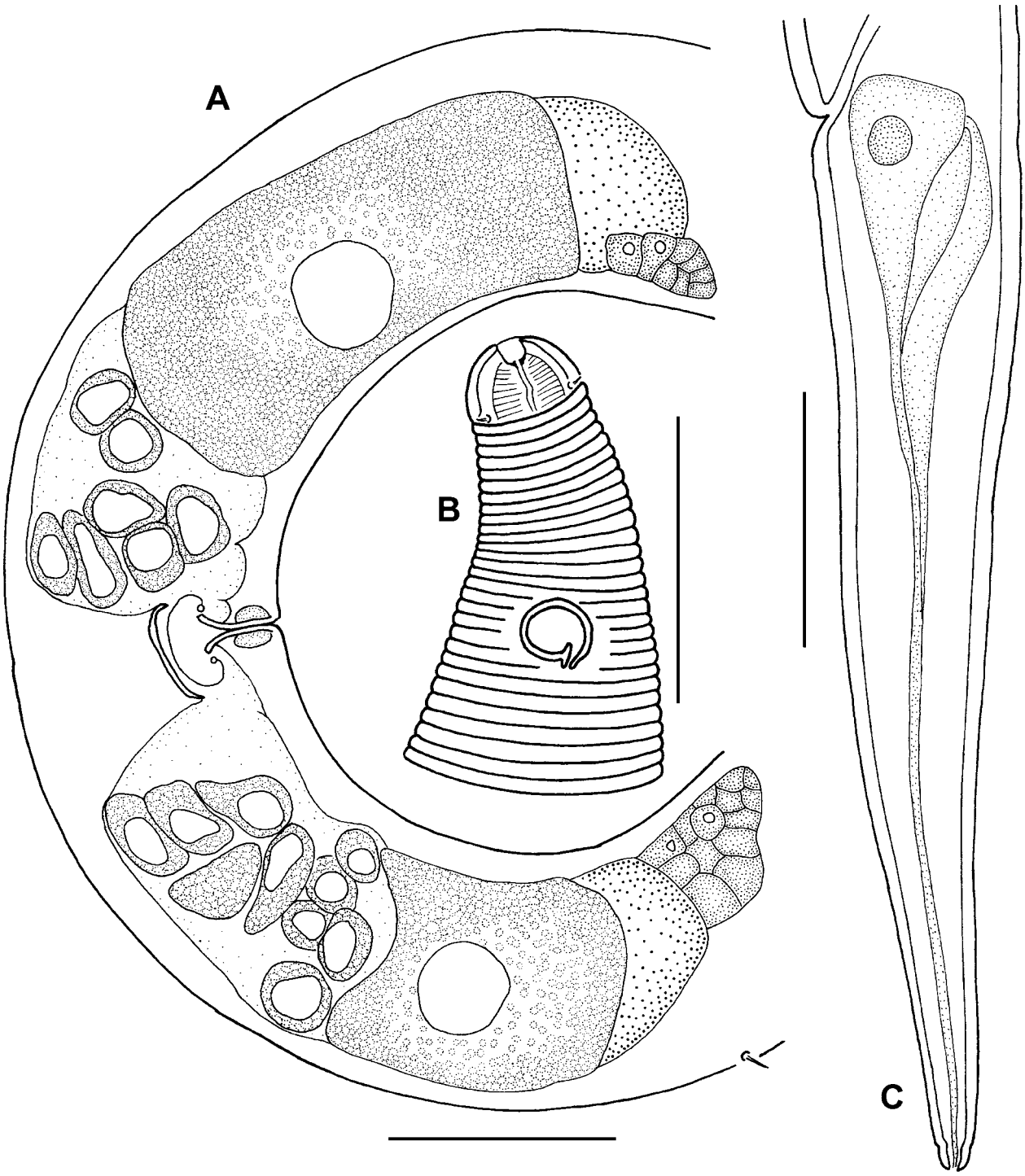

FIGURE 11. *Microlaimus abyssalis* sp. n., females. A, paratype No. 7, genital system; B, female, paratype No. 6, head; C, female, paratype No. 6, tail. Scale bars = 20 μm.

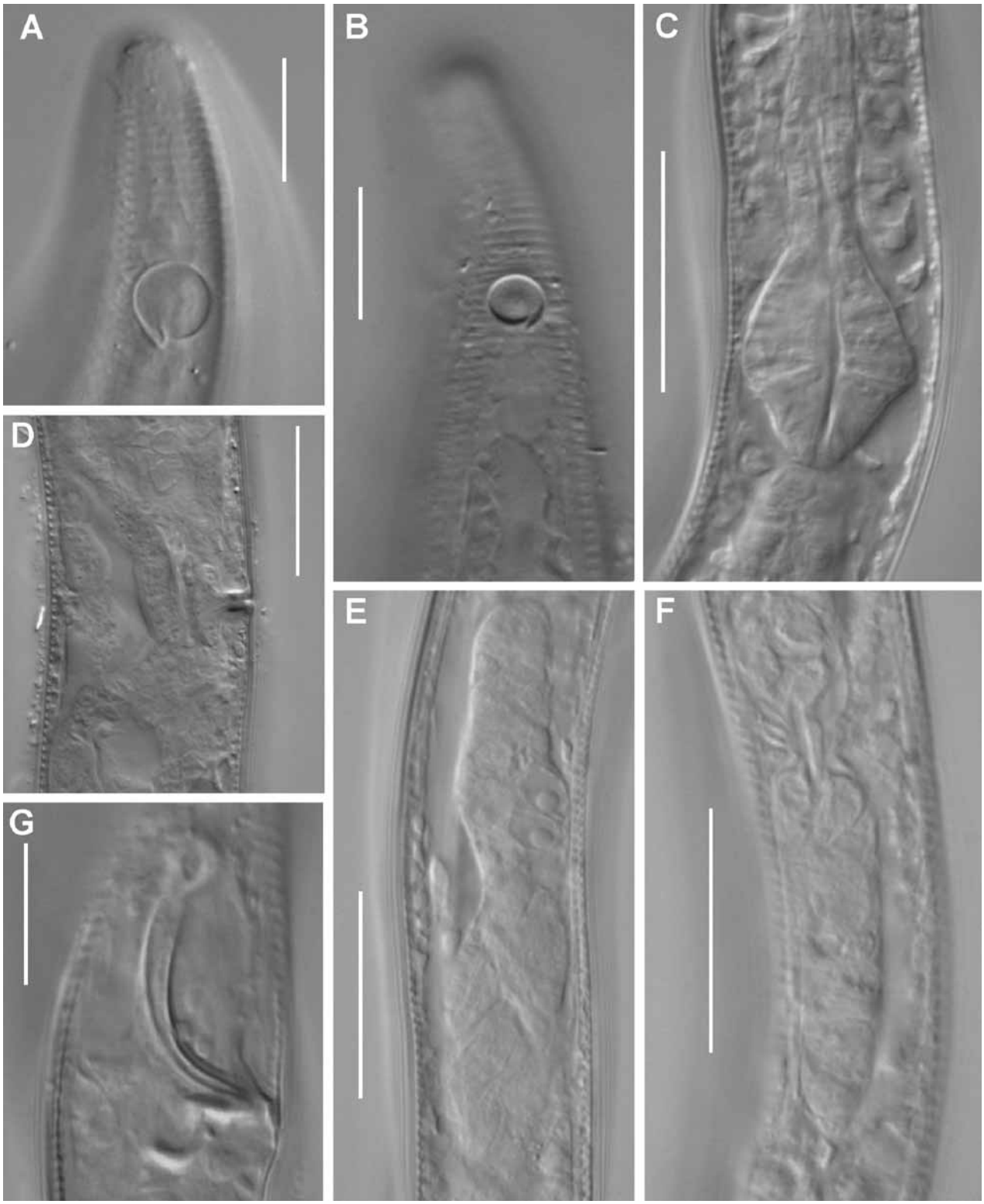

FIGURE 12. *Microlaimus abyssalis* sp. n., light micrographs. A, male, paratype No. 2, head; B, female, paratype No. 6, head; C, male, holotype, pharyngeal bulb; D, female, paratype No. 6, vulvar region; E, male, holotype, anterior testis; F, male, holotype, posterior testis; G, male, paratype No. 2, spicula and gubernaculum. Scale bars: A, B, G = 10 μm; C–F = 20 μm.

Etymology: Greek *abyssos* (= precipice, abyss).

Measurements: Table 4.

Description of male: Body cylindrical, with slightly narrowed anterior end and conical tail. Cuticle annulated along whole body except cephalic capsule. Cuticular annuli approximately 1 μm in width. Cuticle thickness approximately 0.6 μm at level of cephalic capsule, 0.8 μm at level of midbody and approximately 0.7 μm at level of tail. Holotype possessing two small somatic setae 1.5–2.0 μm long at pharyngeal part of the body between amphid and nerve ring. Cephalic end of holotype male was hard to discern, so the main characteristics of the apical end were described using paratypes. Paratype possessing 1 circle of 4 minute cephalic setae of approximately 1 μm length. Amphid monospiral, round, distinct cuticular edging, 58% (46–58%) of c.b.d. in its diameter. In holotype, there are 15 (15–17 in paratypes) cuticular annules between anterior end of amphid and cephalic capsule. Buccal cavity present, its cuticular walls looking thicker than in more posterior part of pharynx. Three small sclerotized teeth visible in anterior part of buccal cavity (one bigger dorsal one and two smaller subventral ones). Pharynx consisting of slender cylindrical anterior part with well developed muscular elements and posterior terminal muscular bulb with plasmatic interruptions. Bulb rhomboid with rounded corners or oval, 74% (74–95%) of c.b.d. in width with several plasmatic interruptions. Length of bulb 19 (16–19) μm. Nerve ring at a distance 2/3 of pharyngeal length from anterior end. Cellular body of renetta located at level of beginning of intestine. Cardia large, triangular, 43% of c.b.d. in its width. Holotype possesses plasmatic interruptions in cardia. Reproductive system diorchic, with outstretched anterior testis, and reflected posterior one. Anterior testis lies to the left of intestine. Posterior testis shorter than anterior one and lying to the right of intestine. *Vas deferens* thick, 36% of total body length, filled with big spermatids of approximately 9 μm in diameter with coarse-grained content. Spicules rather large, curved, with feebly developed capitulum at its distal end and thin velum. Gubernaculum in shape of a curved, thick rod. Thick prominent bent, hook-like apophysis present which liyng perpendicularly to gubernaculum to caudal direction in its basal part and than changing to be dorsal. Supplementary organs not visible. Whole reproductive system occupying 52% of total body length. Tail conical. Caudal glands of holotype not visible. Paratypes possess three cellular bodies of caudal glands located close to anus. Outlet of caudal glands visible in caudal tip.

Female: Females very similar to males in most parameters, however amphids being smaller, 36–38% of c.b.d. Reproductive system didelphic, with outstretched ovaries. Oocytes large, with granular cytoplasm. Anterior ovary lying to the right of intestine, posterior one lying to the left of intestine. Every ovary containing one mature elongated oocyte. Whole reproductive system occupying 29% of total body length. Several oval or roundish spermatozoa approximately 21x42 μm in size situated in uterus. Small part of dorsal wall of uterus located opposite vulva being thicker and strongly sclerotized. Middle part of uterus opposite vulva narrow. No vulvar glands seen.

*Abundance***:** The density of this species was 1.0–3.4 inds/10cm^2 and relative abundance within the nematode community was 1–2% at the stations where it was found.

Differential diagnosis: M. abyssalis sp. n. is characterized by presence of large hook-like apophysis directed perpendicularly to gubernaculum in caudal direction in its basal part and than turning to dorsal direction. The presence of apophysis perpendicular to gubernaculum is a rare feature within *Microlaimus* species. Only *M. crassiceps* Gerlach, 1953, *M. undulatus* Gerlach, 1953, *M. decraemerae* (Muthumbi et Vinx, 1999), and *M. mnazi* (Muthumbi et Vinx, 1999) possess similar apophyses. [*M. decraemerae* and *M. mnazi* were transferred from *Aponema* to *Microlaimus* because of the presence of 2 testes in these species (Kovalyov and Miljutina 2008)].

M. abyssalis sp.n. may be distinguished from *M. crassiceps* and *M. undulatus* in several features. In the new species cephalic setae are very short, and outer labial setae are not visible, whereas cephalic setae of *M. crassiceps* and *M. undulatus* are quite long, and outer labial setae are discernible. The amphids in the new species are located far from the cephalic end (about in 2 amphidial c.b.d.), 15–17 annuli are present between the anterior rim of amphids and the posterior border of non-annulated cephalic capsule. The amphids of *M. crassiceps* are located at a level of cephalic setae, at the posterior half of the cephalic capsule. The amphids of

M. undulatus are located close to the cephalic capsule (only 1 annule is between the amphidial anterior rim and the posterior border of cephalic capsule). Besides these features, the body length of *M. abyssalis* sp.n. is half the body length of *M. crassiceps* (427–568 μm vs. 1095–11120 μm).

M. abyssalis sp. *n.* differs from *M. mnazi* by being longer (427–568 μm vs. 253–328 μm in *M. mnazi*); by shorter pharyngeal region (b = 5.0–5.9 vs. 4.0–4.7); by the shape of spicules (possessing distinct round capitulum it their distal end vs. edged distal end of spicula); by absence of supplemental precloacal organs (whereas *M. mnazi* possess 1 easily discernible one).

M. abyssalis sp. n. most resembles *M. decraemerae*. However the new species differs from *M. decraemerae* by its body length (427–568 μm vs. 296–378 μm in *M. decraemerae*); by shorter tail (c = 6.5–7.3 vs. 5.1–6.0). The main difference is in the proportions and the shape of gubernaculum and apophysis: the length of the gubernaculum and the apophysis is approximately equal in the new species, whereas, in *M. decraemerae*, the apophysis is twice as long as the gubernaculum. The distal end of the apophysis is rounded in the new species in spite of the apophysis of *M. decraemerae* possessing an edged distal end.

***Microlaimus discolensis* Bussau et Vopel, 1999**
(Figs 13–16, Table 5)

Material examined: 1 male, 3 females (Table 5)

Locality: Tables 1, 5.

Measurements: Table 5.

Description of male: Body cylindrical, with slightly narrowed anterior end and conical tail. Cuticle annulated. Annuli beginning posterior to cephalic capsule (width of every annulus 1.2 μm). Cuticle thickness 0.9 μm at level of cephalic capsula, and 1.2 μm at rest body. Four submedian rows of short cylindrical tubes 1 μm long and 1–1.5 μm in their diameter with pores on its tips situated along whole body. Almost every pore associated with large hypodermal gland 4–8 μm in diameter. The number of tubes in dorsolateral rows 3.5 times more than in ventrolateral ones. The content of glands depending on their size. Smaller glands containing fine-grained content, whereas content of bigger glands being coarse-grained. The anteriormost group of 4 tubes situated at the level of posterior rim of amphidial fovea. The posteriormost tube of dorsolateral rows situated at middle of tail; posteriormost tube of ventrolateral rows located behind anus. Location of tubes in rows not absolutely regular, e.g. distance between tubes varying. Tubes of ventrolateral rows situated more sparsely at region of midbody. Four somatic setae of 3 μm length visible at caudal region. No other somatic setae found. Head sensilla arranged in three circles: 6 inner labial papillae 2 μm long of first ring; 6 thick outer labial setae 6 μm long of second one; 4 cephalic setae 6 μm long of third circle situated near posterior border of cephalic capsule. Amphidial fovea monospiral, round, 59% of c.b.d. in diameter. The amphidial aperture less in diameter than subcuticular amphidial fovea. There are 4.5 cuticular annules between anterior rim of amphid and cephalic capsule. Vestibulum short, bowl-shaped, possessing 12 cuticularized ribs. One big dorsal sclerotized tooth visible in stegostoma. Pharynx thick, muscular, its anterior part at level of stoma slightly set off from its more posterior part. Well-developed terminal pear-shaped bulb about 1/3 of c.b.d. in its width present. Nerve ring not found. Renetta with large cellular body located at level of beginning of intestine. Its outlet opening not visible. Cardia short. Reproductive system diorchic, with opposite outstretched testes. Posterior testis shorter then anterior one. The anterior one lies to the right of intestine, and posterior one lies to the left. *Vas deferens* thick, 26% of total body length, filled with spermatids with coarse-grained content. Spicules rather large and curved. Gubernaculum rod-like. Supplementary organs not found. Whole reproductive system occupying approximately 1/2 of total body length. Tail conical, with protruded tip. Caudal gland not found.

Female: Females resembling male but differing in some parameters, such as their amphids being smaller (41–44% of c.b.d.). There are 6 cuticular annules between anterior rim of amphid and cephalic capsule of all female individuals. Posteriormost pore of ventrolateral rows situated before anus. Number of pores in rows

varying in different specimens from 35 to 40 in dorsolateral rows and from 9 to 13 in ventrolateral rows. Number of pores in dorsolateral rows in 2.6–4.0 times more than in ventrolateral ones. There are only a few pores associated with hypodermal glands. Glands being bigger then males ones (up to 2/3 of c.b.d. in its diameter) and possessing more coarse-grained content. Somatic setae not found. Reproductive system didelphic, amphidelphic, with outstretched ovaries, occupying 2/5 of total body length. Anterior ovary lying to the left of intestine and posterior one lying to the right. Posterior ovary containing one mature elongated oocyte 69 μm long. Spermatozoa 3x12 μm in size visible in uterus. Vulvar glands not visible.

Abundance: The average density of this species was 0.03 inds/10cm^2. The relative abundance of this species within the nematode community was 1–2% at the stations where it was found.

TABLE 5. *Microlaimus discolensis.* Measurements and body indices.

Specimen No.	1	2	3	4
Slide No.	2-64	1-49	1-28	1-25
Gender	m	f	f	f
Station	MTB-15	KGS-6	MTB-2	MTB-2
L	711	663	647	497
Amph.dist.	16	19	14	15
Phar.l.	110	112	104	92
Tail.l.	70	61	57	53
Vulv.dist.	–	379	376	293
Num.ann.	4–5	6	6	6
Num.por.dors.	45	40	35	37
Num.por.ventr.	13	13	13	9
Caps.l.	10	9	8	6
Caps.w.	14	16	14	11
Bulb.l.	21	24	23	20
Bulb.w.	17	22	21	18
Amph.diam.	17	19	20	14
Card.diam.	23	31	27	28
Midb.diam.	30	39	38	33
An.diam.	17	22	19	20
Max.b.diam.	30	22	38	33
Diam.amph.	10	8	9	6
I.l.s.	2.0	1.4	1.7	2.0
O.l.s.	6.0	5.1	6.8	7.0
C.s.	6.0	5.0	6.0	7.0
Spic.ch.l.	28	–	–	–
Spic.arc.l.	33	–	–	–
Gubern.l.	11	–	–	–
a	23.7	30.0	16.9	15.0
b	6.5	5.9	6.2	5.4
c	10.2	10.8	11.4	9.4
c'	4.1	2.8	3.0	2.6
V, %	–	57.2	58.1	59.0

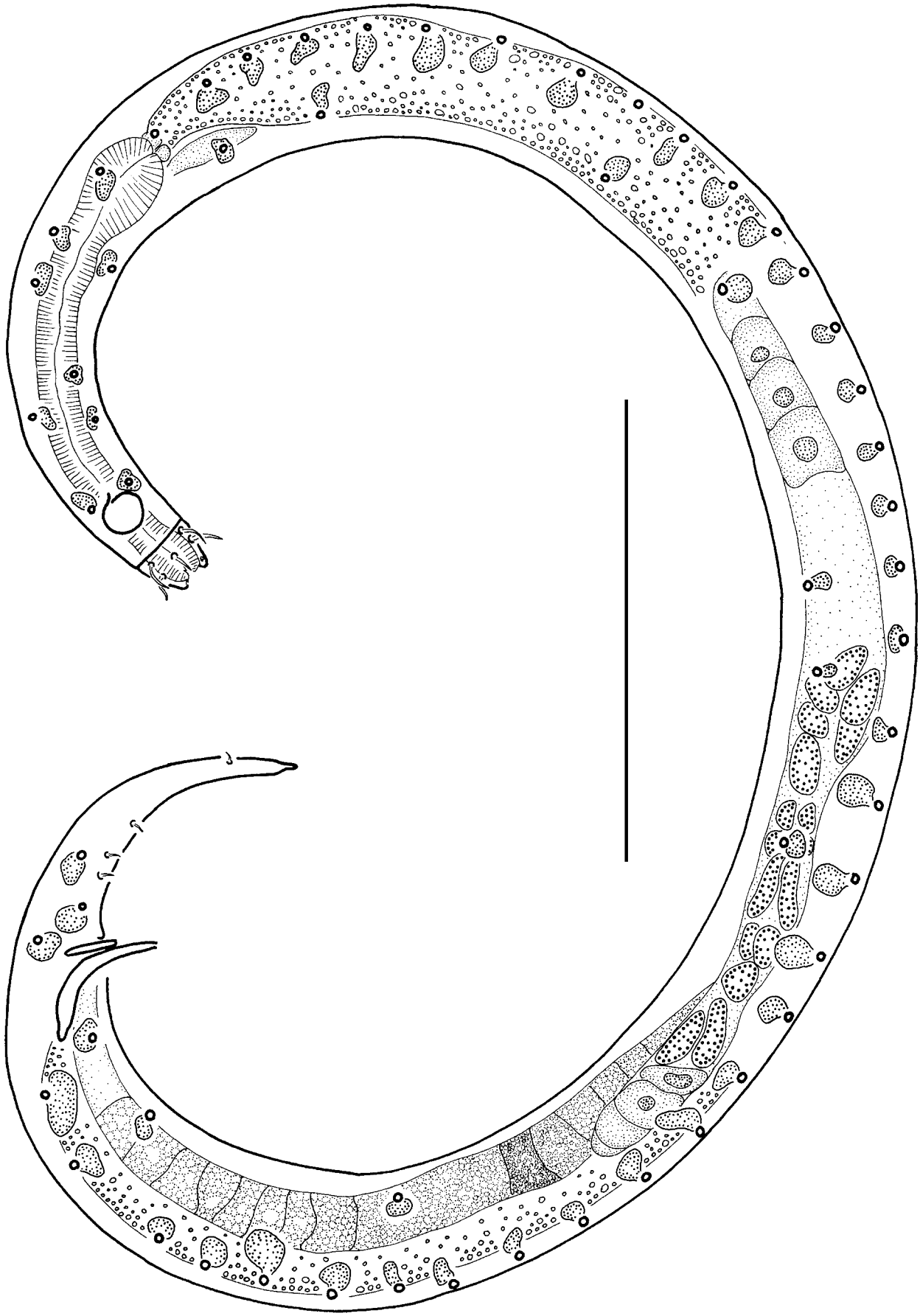

FIGURE 13. *Microlaimus discolensis*, specimen No. 1, male, total view. Scale bar = 100 µm.

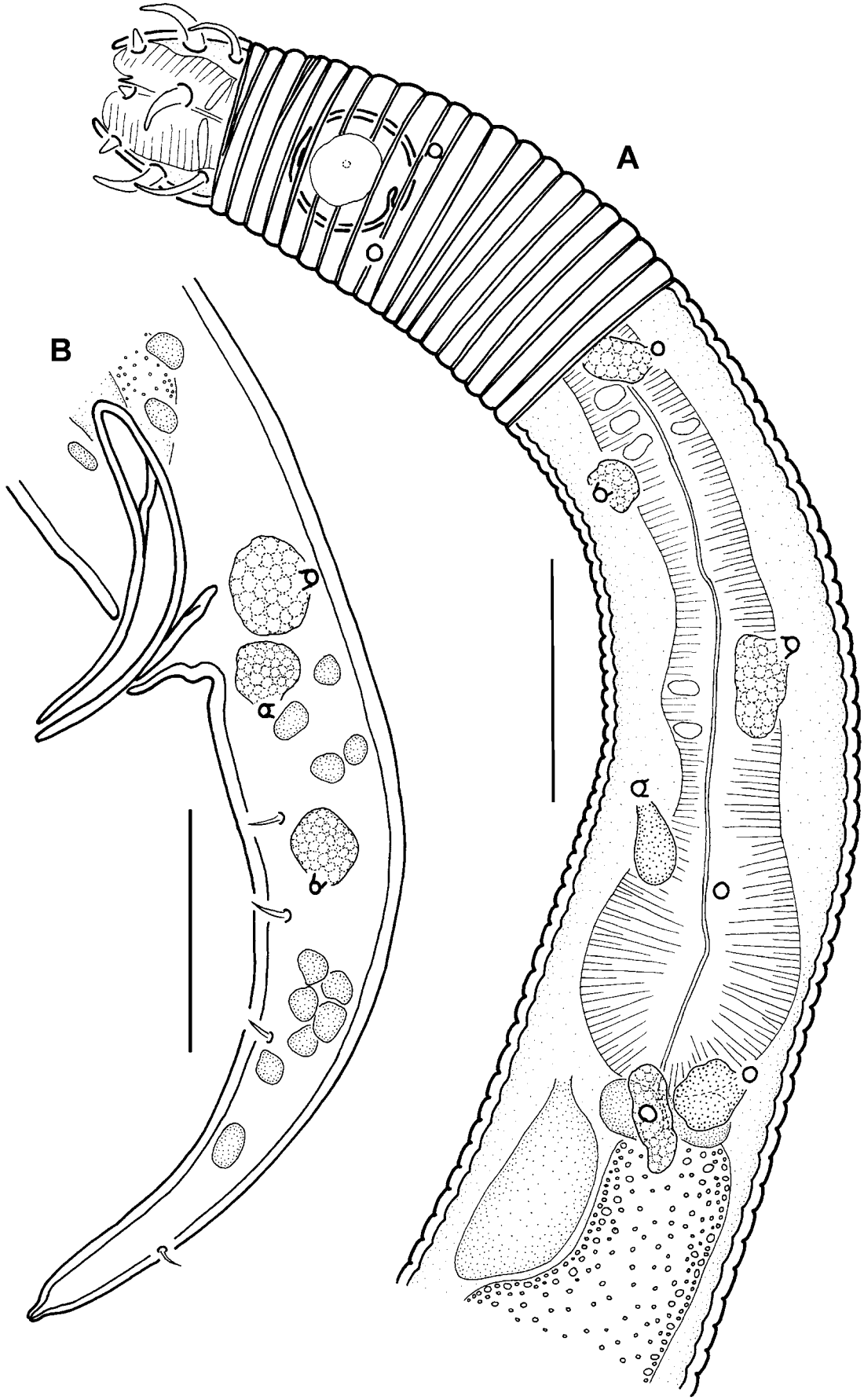

FIGURE 14. *Microlaimus discolensis*, specimen No. 1, male. A, anterior end; B, posterior end. Scale bars = 20 µm.

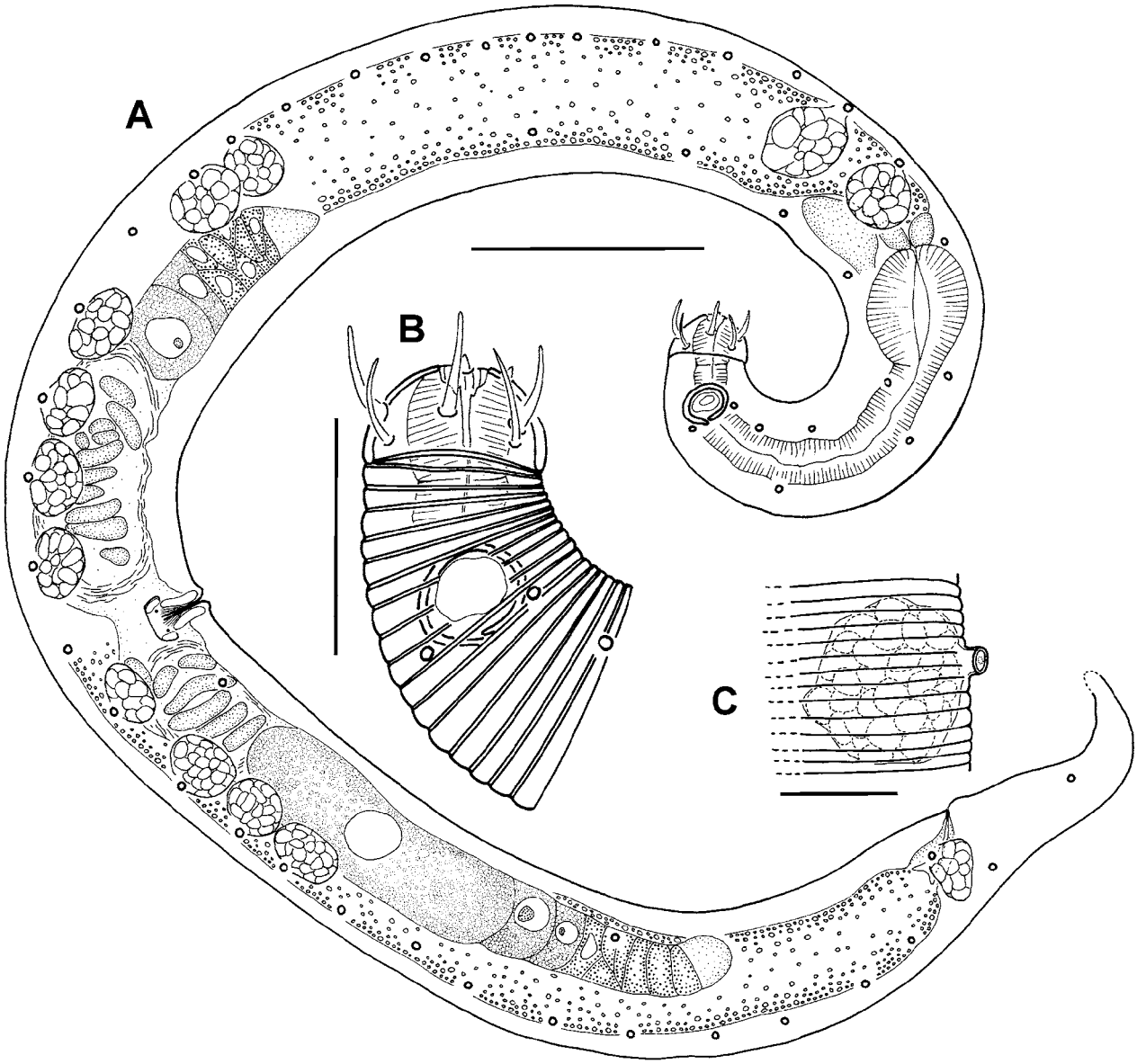

FIGURE 15. *Microlaimus discolensis*, females. A, specimen No. 3, total view; B, specimen No. 3, head; C, specimen No. 2, dorsal pore and associated gland. Scale bars: A = 50 µm; B = 20 µm; C = 10 µm.

Remarks: This species was initially found in the Peru Basin (the South Pacific), at a depth of 4100–4200 m, in ooze containing nodules (cauliflower type nodules) (Bussau & Vopel 1999). Our find is the second record of *M. discolensis*. The place of new finding locates about 5200 km NM far from the place where the type specimens were found. Environments of the CCFZ are similar to that in the Peru Basin, but the depth of the new finding was about 1 km deeper. Two of our individuals were found in sediment with nodules and two other in the area adjacent to nodule field.

The new specimens fit very well the original description as no strong differences were found.

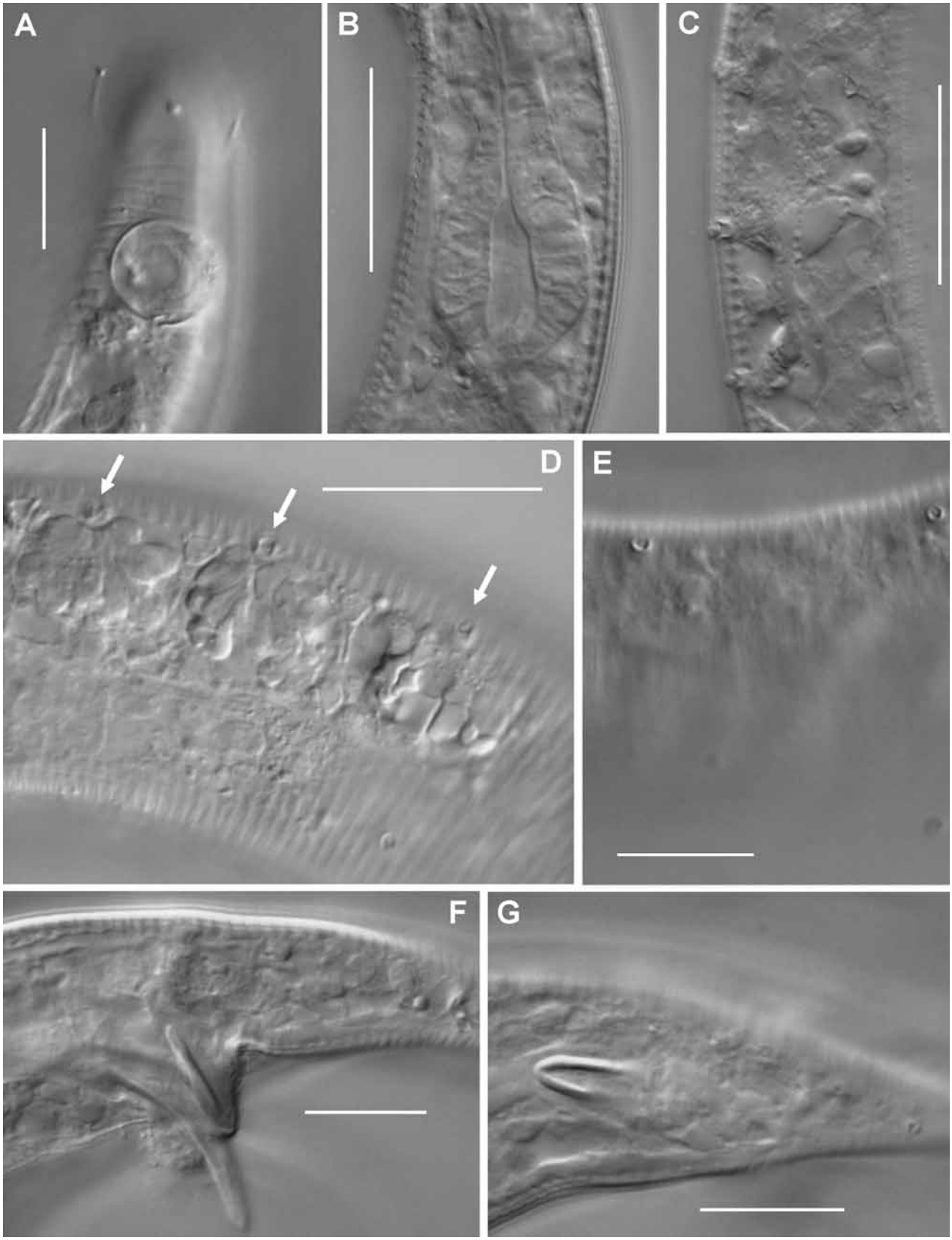

FIGURE 16. *Microlaimus discolensis*, light micrographs. A, specimen No. 1, male, head; B, specimen No. 1, male, region of pharyngeal bulb; C, specimen No. 1, male, dorsolateral row of pores; D, female No. 3, dorsolateral row of pores (marked by arrows) and associated glands; E, specimen No. 1, male, ventrolateral row of pores; F, specimen No. 1, male, anal region, optical section at level of gubernaculum; G, No. 1, male, anal region, optical section at level of distal part of spicules. Scale bars: A, E–G = 10 μm; B–D = 20 μm.

***Microlaimus parviporosus* sp. n.**
(Figs 17–19, Table 6)

Type material: Collection number MNHN-BN492. Holotype: one male. Paratype: 4 males, 3 females (Table 6).

Locality: Tables 1, 6.

Etymology: From Latin *parvus* (scanty, hidden) and *porus* (pore).

Measurements: Table 6.

Description of males: Body cylindrical, with slightly narrowed anterior end and conical tail. Cuticle with strongly pronounced annuli, which beginning at posterior of cephalic capsule (width of every annulus 1.1–1.3 μm). Cuticle thickness 0.3 μm at level of cephalic capsula and 0.6–0.7 μm along rest of body. Four submedian rows of round pores 0.5 μm in diameter situated along whole body. Number of pores in dorsolateral rows 1.2–1.5 times more than in ventrolateral ones. Anteriormost pore of dorsolateral rows situated at a distance less than amphidial c.b.d. behind amphid, and posteriormost one situated at posterior third of tail. Anteriormost pore of ventrolateral rows situated at a distance of approximately 1.5 amphidial c.b.d. behind amphid, and posteriormost one situated at anterior third of tail. Number of pores in rows varying in different specimens from 21 to 28 in dorsolateral rows and from 17 to 21 in ventrolateral rows. Location of pores in rows not absolutely regular, as distance between pores varying. As a rule, pores situated more sparsely in ventrolateral rows in region of midbody. Somatic setae 1.2–1.5 μm long, rare and irregularly situated. Sensilla of cephalic end arranged in 2 rings: 6 short, outer, labial setae 1.2 μm long at level of cephalic tip and there 4 submedian cephalic setae of about the same length near posterior border of cephalic capsule. Amphidial fovea monospiral, round, 55–67% of c.b.d. in its diameter. There an amphidial aperture visible in holotype, which is less in diameter than amphidial fovea. From 5 to 7 cuticular annules visible between anterior end of amphid and cephalic capsule. Vestibulum short, cup-shaped, possessing 3 small sclerotized odontia. Small dorsal tooth visible in anterior quarter of stegostoma. Pharynx thin but has a well-developed terminal pear-shaped, or oval, bulb which being 61–86% of c.b.d. in its width. Nerve ring being 2/3 of pharyngeal length from anterior end. Renetta with large cellular body located at level of beginning of intestine and outlet opening at 21 μm (approximately 2 amphidial c.b.d.) from anterior end. Cardia large and triangular. Reproductive system diorchic, with outstretched anterior testis, and with reflected posterior one. Posterior testis shorter and thinner then anterior one, situated at dorsal side, and poorly visible. Anterior testis lying dorsally from intestine, and small posterior one being to the right from intestine. Two zones of spermatogenesis are visible in anterior testes: small roundish spermatogonia with fine-grained content, large oval spermatogonia with fibrillar content. *Vas deferens* thick, 29% of total body length, filled with puck-shaped spermatids approximately 6 μm in diameter with large-grained content. Spicules rather large, curved, 6 μm, with feebly marked knob at its distal end. Gubernaculum rod-like, slightly bent anteriorly. Supplementary organs not visible. Whole reproductive system occupying about a half of total body length. Tail conical. Three roundish cellular bodies of caudal glands visible close to anus.

Females: Females similar to males in most parameters, however amphids smaller, 44–56% of c.b.d. Reproductive system didelphic, amphidelphic, with outstretched ovaries, and occupying about 2/5 of total body length. Intestine pushed to dorsal side by reproductive system. Small part of dorsal wall of uterus opposite vulva being thicker and strongly sclerotized. Every ovary containing one mature elongated oocyte approximately 40 μm long. Spermatozoa 5.5x4.8 μm in size visible in uterus. Two pairs of vulvar glands seen.

Abundance: The density of this species was 0.8–2.9 inds/10cm^2 and relative abundance within the nematode community was 1–3% at the stations where it was found.

Differential diagnosis: The peculiar feature of *M. parviporosus* sp. n. is the occurrence of four submedian rows of pores spreading along the whole body length. Only three *Microlaimus* species possessing the same feature have been described before: *M. cyatholaimoides* de Man, 1922 (according to Jensen (1978), whereas Hopper and Meyers (1967) mentioned the presence of four rows of short, fleshy setae associated with hypodermal glands for this species), *M. porosus* Bussau and Vopel, 1999, and *M. discolensis* Bussau and Vopel, 1999.

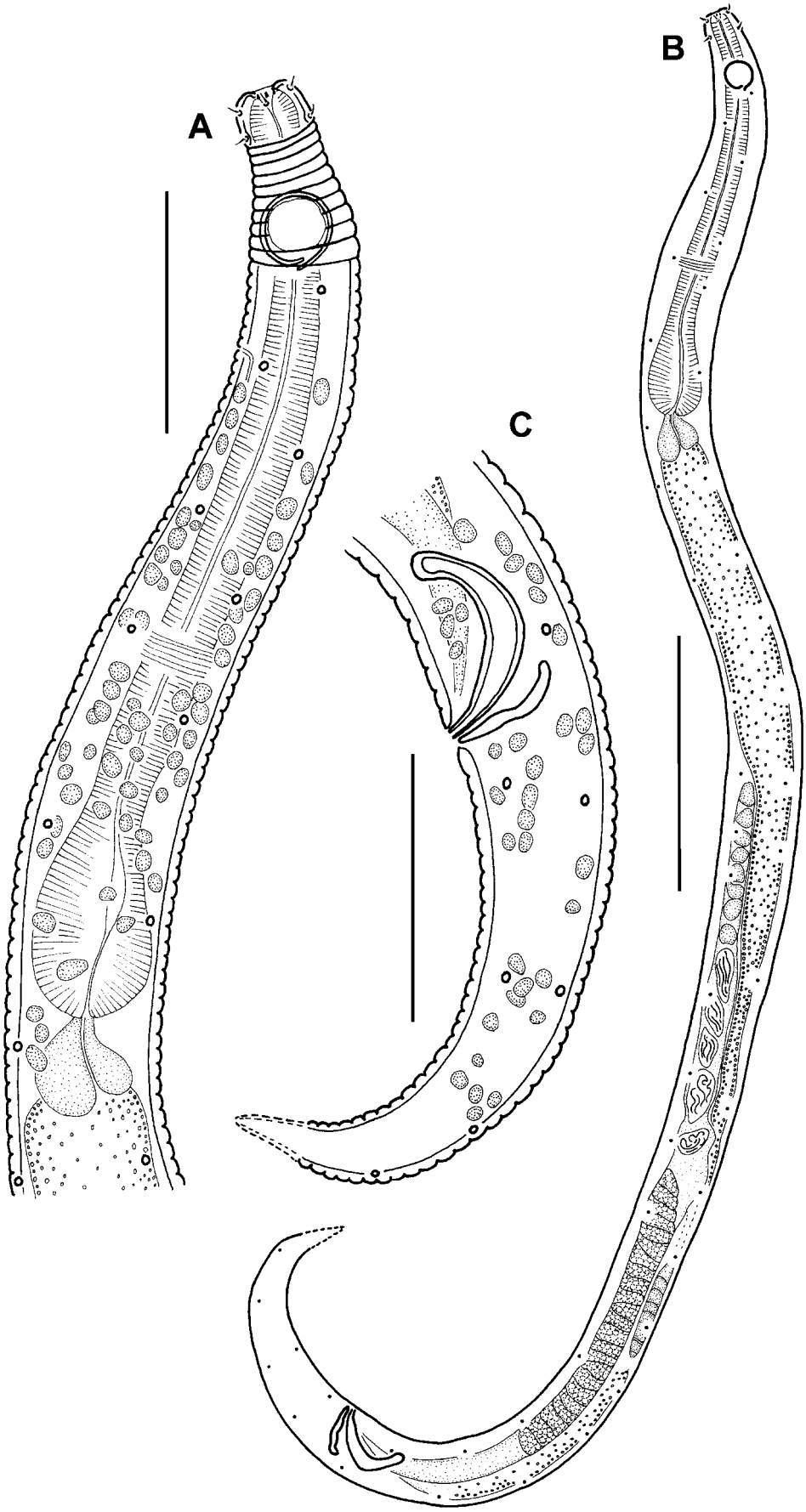

FIGURE 17. *Microlaimus parviporosus sp. n.*, male, holotype. A, anterior end; B, total view; C, posterior end. Scale bars: A, C = 20 μm; B = 50 μm.

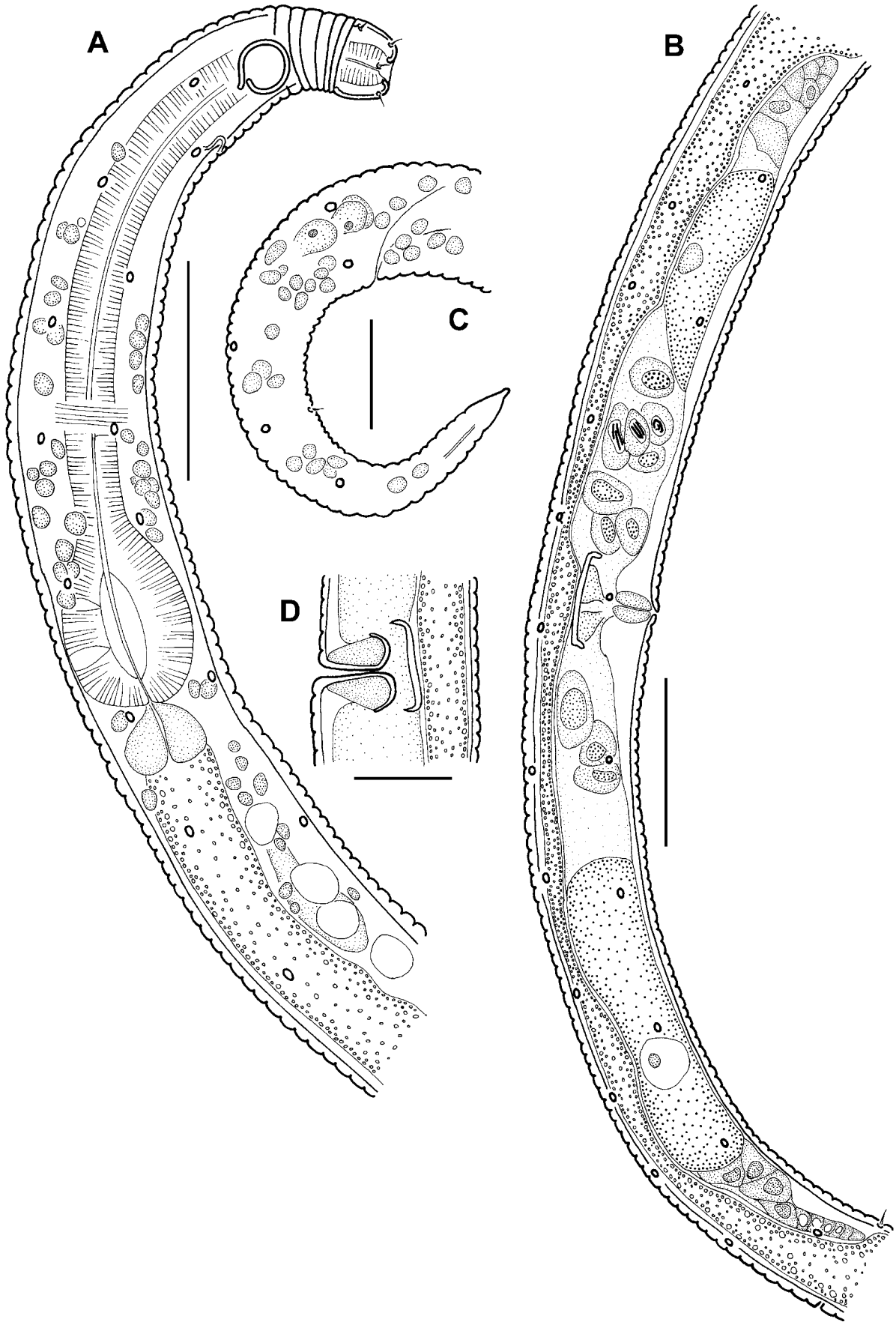

FIGURE 18. *Microlaimus parviporosus sp. n.*, females. A, paratype No. 5, anterior end; B, paratype No. 5, reproductive system; C, paratype No. 5, posterior end; D, paratype No. 7, region of vulva. Scale bars: A, B = 20 µm; C, D = 10 µm.

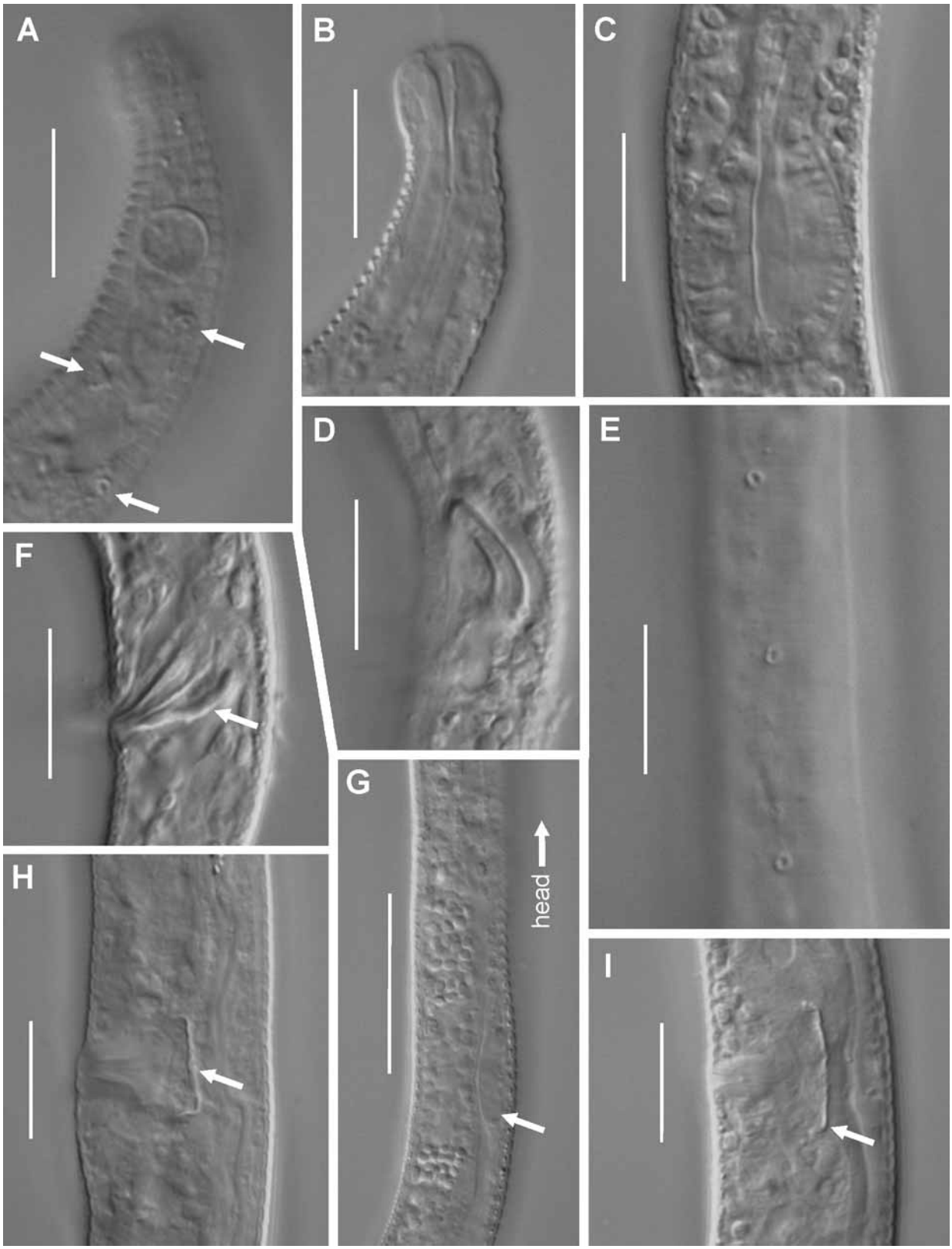

FIGURE 19. *Microlaimus parviporosus sp. n.*, light micrographs. A, female, paratype No. 7, pores at cervical part (marked by arrows); B, female, paratype No. 7, head, optical section at level of stoma; C, paratype No. 5, female, pharyngeal bulb; D, male, holotype, anal region, optical section at level of distal part of spicule; E, male, paratype No. 4, dorsal row of pores; F, male, holotype, anal region, optical section at level of gubernaculum (marked by arrow); G, male, holotype, posterior testis (marked by arrow); H, female, paratype No. 7, vulvar region (thickened sclerotized part of dorsal wall of uterus marked by arrow); I, female, paratype No. 5, vulvar region (thickened sclerotized part of dorsal wall of uterus marked by arrow). Scale bars: A–F, H–I = 10 μm; G = 20 μm.

TABLE 6. M*icrolaimus parviporosus* sp. n. Measurements and body indices.

Collection status	Holotype	Paratype	Paratype	Paratype	Paratype	Paratype	Paratype	Paratype
Slide No.	1-91	2-22	1-14	1-17	1-20	1-87	2-5	2-97
Gender	m	m	m	m	m	f	f	f
Station	MTB-7	MTB-3	MTB-18	MTB-18	MTB-18	MTB-7	MTB-18	MTB-6
L	390	360	380	365	415	385	400	395
Amph.dist.	9	10	11	12	12	12	12	12
Phar.l.	83	69	76	79	82	68	80	81
Tail.l.	49	43	52	50	54	48	48	45
Vulv.dist.	–	–	–	–	–	218	220	213
Num.ann.	5	5	7	7	6	6	6	7
Num.por.dors.	21	25	27	24	28	27	25	23
Num.por.ventr.	17	18	20	18	21	18	19	20
Caps.l.	4.5	6	6	6	6	5	6	5.5
Caps.w.	6	7	6.5	6.5	7	7	6.5	7
Bulb.l.	16	10	14	14	16	14	16	17
	10	8	11	11	12	12	12	12
Amph.diam.	9	8	10	10	9	9	9	8
Card.diam.	13	13	14	14	14	14	15	16
Midb.diam.	13	12	13	12	16	19	16	16
An.diam.	12	11	10	9	12	8	11	10
Max.b.diam.	13	13	14	14	16	19	16	16
Diam.amph.	6	4.5	5.5	6	6	4	4.4	4.5
Spic.ch.l.	13	12	16	16	17	–	–	–
Spic.arc.l.	18	16	18	18	18	–	–	–
Gubern.l.	9	7	7	7	7	–	–	–
a	30.2	27.5	27.1	26.0	25.9	20.2	25.0	24.8
b	4.7	5.2	5.0	4.6	5.1	5.6	5.0	4.9
c	8.0	8.3	7.3	7.3	7.7	8.0	8.3	8.8
c'	4.1	3.9	5.2	5.6	4.5	6.0	4.4	4.5
V, %	–	–	–	–	–	56.9	55.0	53.7

M. parviporosus sp. n. differs from *M. cyatholaimoides* by the absence of preanal supplementary organs; by the total body length (360–415 μm vs 700–1000 μm in the latter species); by weakly cuticularized stoma with inconspicuous teeth vs. very sclerotized stoma with quite large teeth. The outer labial setae and the cephalic setae are of about equal length in the new species whereas the cephalic setae are much longer in *M. cyatholaimoides*.

The new species differs from *M. porosus* by its 2 rings of head setae similar in length, whereas the cephalic setae are much longer than the outer labial ones in *M. porosus*. Besides, it differs from *M. porosus* by the shorter spicule (16–18 μm vs. 24 μm) and by the shape of spicule and gubernaculum (more curved and thicker spicule and gubernaculum are observed in the new species). The aperture of the amphid of the new species is narrower than the fovea, whereas it is of similar diameter in *M. porosus*.

The new species differs from *M. discolensis* by its shorter head setae of two rings (1.2 μm vs. 6–9 μm); by the width of cephalic capsule (6–7 μm vs. 11–16 μm) by the number of pores on submedian rows (21–28 in dorsal rows and 17–21 in ventral rows vs. 35–45 and 9–15 respectively in *M. discolensis*); by the shape of outlet openings of hypodermal glands (pores vs short tubes with pores on its distal ends); by the length of spicule (16–18 μm in arc vs. 28–33 μm); by the shape of gubernaculum (curved vs. straight); by the character of annulation (there are wide furrows between the annuli in *M. discolensis*, whereas *M. parviporosus* does not

possess such a feature). The hypodermal glands associated with pores were not observed in *M. parviporosus* in spite of *M. discolensis*, where these glands are very big and noticeable.

***Microlaimus porosus* Bussau et Vopel, 1999**
(Figs 20–21, Table 7)

Material examined: 4 females (Table 7).
Locality: Tables 1, 7.
Measurements: Table 7.

TABLE 7. *Microlaimus porosus* Bussau *et* Vopel 1999. Measurements and body indices.

Specimen No.	1	2	3	4
Slide No.	1-38	3-75	1-91	1-41
Gender	f	f	f	f
Station	KGS-6	MTB-2	MTB-7	KGS-6
L	420	428	644	420
Amph.dist.	17	13	17	14
Phar.l.	85	88	96	78
Tail.l.	56	60	91	60
Vulv.dist.	201	224	305	207
Num.ann.	11	9	9–10	8
Num.por.dors.	31	26	42	27
Num.por.ventr.	19	17	33	18
Caps.l.	4.5	6	7	5
Caps.w.	6	7	8	6.5
Bulb.l.	16	15	19	16
Bulb.w.	12	14	17	11
Amph.diam.	9	10	12	8
Card.diam.	17	17	23	14
Midb.diam.	22	23	26	19
An.diam.	12	13	16	12
Max.b.diam.	22	23	26	19
Diam.amph.	4	4	4.5	4
a	19.1	18.6	24.8	22.1
b	4.9	4.9	6.7	5.4
c	7.5	7.1	7.1	7.0
c'	4.7	4.6	5.7	5.0
V, %	47.9	52.3	47.4	49.3

Description of female: Body in shape of elongated spindle, with narrowed anterior end and conical tail. Non-annulated cephalic capsule present at anteriormost part of cephalic end. Length of cephalic capsule slightly more than its width. Cuticle of rest body annulated, annuli strongly pronounced, their width 0.9–1.1 μm. Cuticle thickness 0.7 μm at level of cephalic capsula and 1.0–1.1 μm along rest of body. Four submedian rows of round pores 1 μm in diameter situated along whole body. Number of pores in dorsolateral rows 1.2–1.5 times more than those in ventrolateral rows. Anteriormost pore of dorsolateral rows situated behind amphid at a distance approximately equal to amphidial c.b.d., and posteriormost one situated at posterior quarter of tail. Anteriormost pore of ventrolateral rows situated behind amphid close to it, and posteriormost

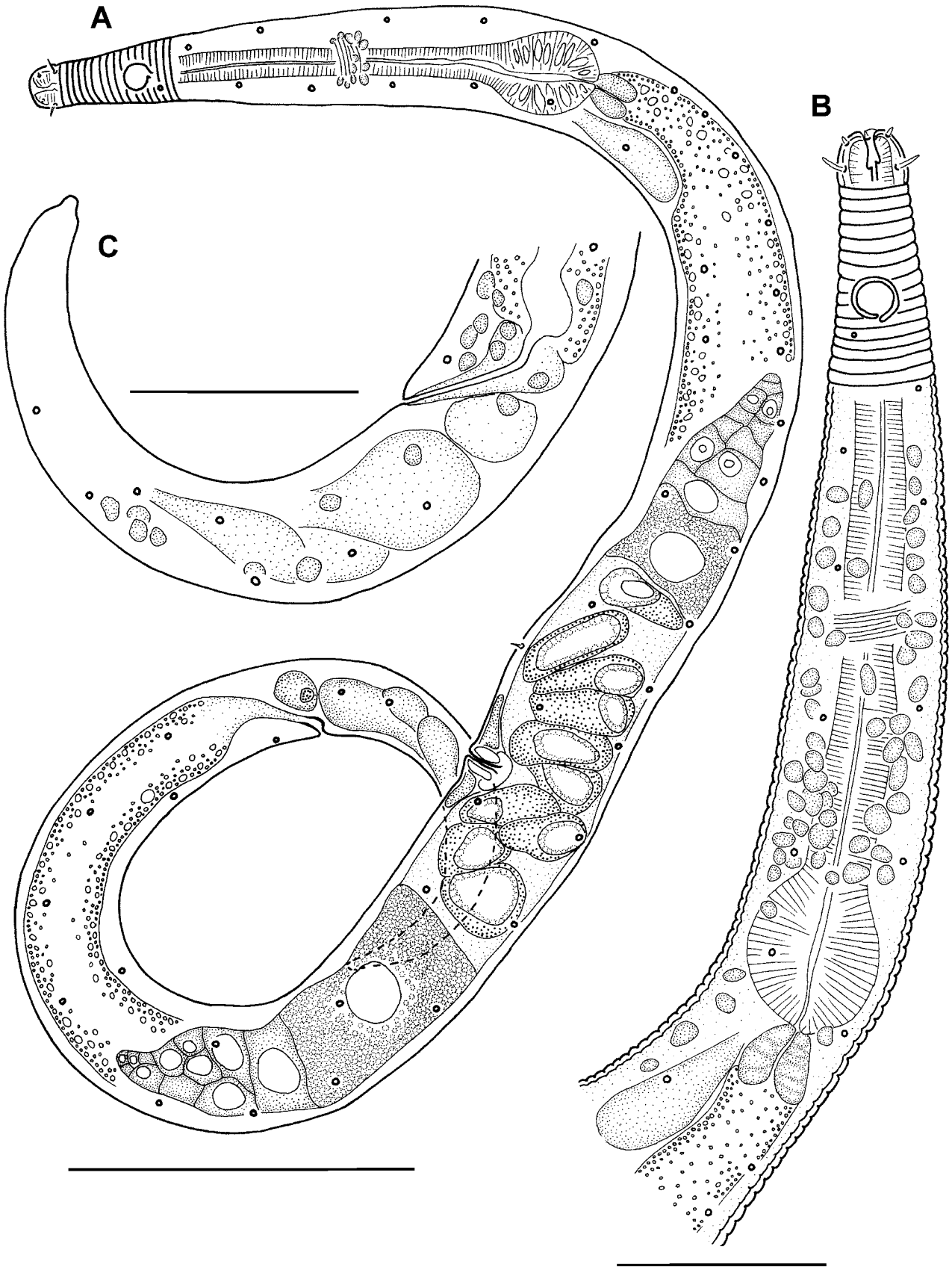

FIGURE 20. *Microlaimus porosus*, female, specimen No. 1. A, total view; B, head; C, tail. Scale bars: A = 50 µm; B, C = 20 µm.

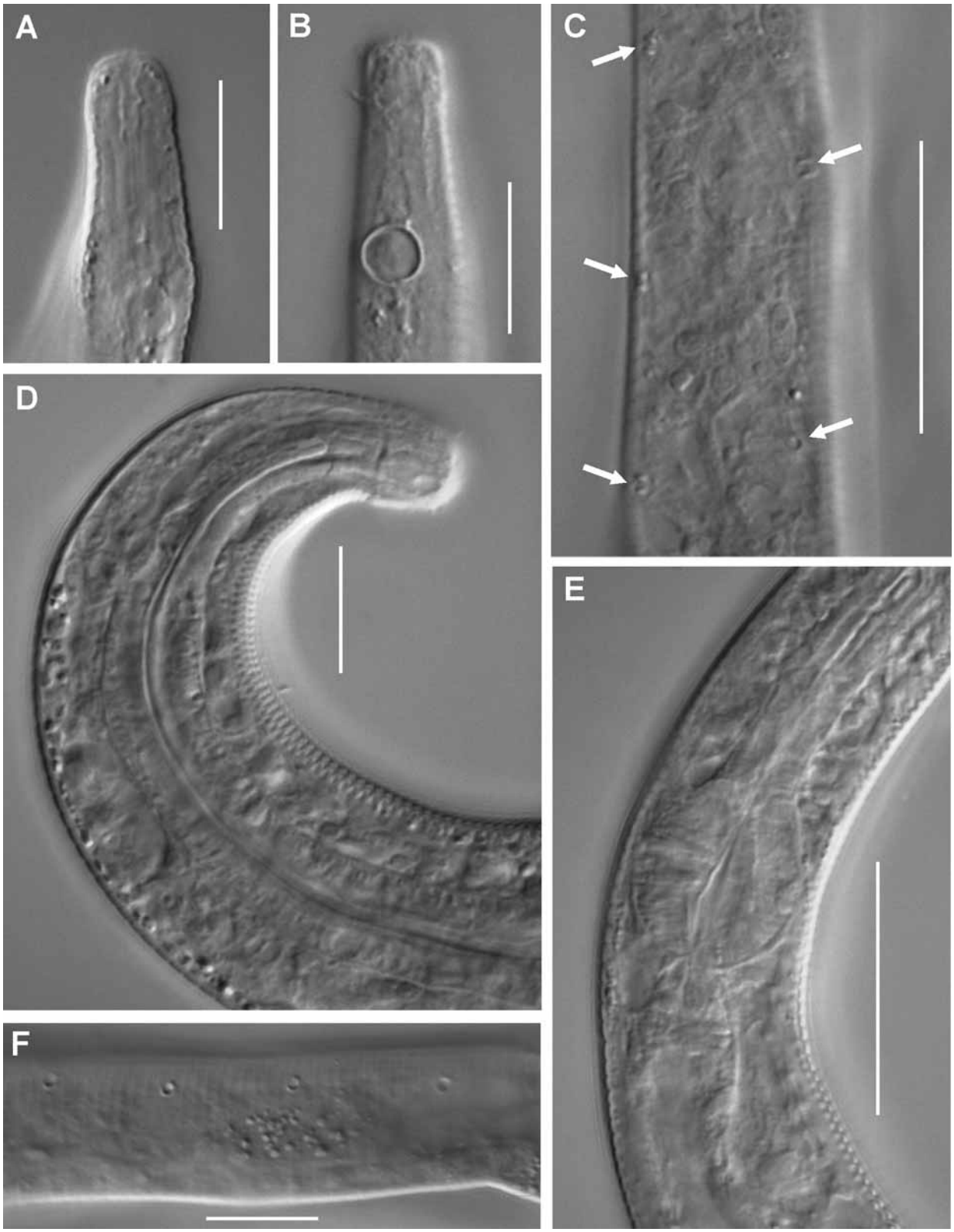

FIGURE 21. *Microlaimus porosus*, females, light micrographs. A, specimen No. 1, head; B, specimen No. 2, head; C, specimen No. 1, two rows of ventrolateral pores (marked by arrows); D, specimen No. 3, anterior end; E, specimen No. 2, region of pharyngeal bulb; F, specimen No. 3, row of ventrolateral pores. Scale bars: A, B, D, F = 10 μm; C, E = 20 μm.

one situated at a middle part of tail. Number of pores in rows varying in different specimens from 27 to 42 in dorsolateral rows and from 17 to 33 in ventrolateral rows. Pores located in rows regularly. Somatic setae very rare, irregularly situated, 1.5 μm long. Sensilla of cephalic end arranged in 2 rings: 6 short outer labial setae 1 μm long situated at anterior part of cephalic capsule and 4 submedian cephalic setae 2.5 μm long, situated at a distance of 2/3 of length of cephalic capsule from anterior end. Amphid monospiral, round, 40–50% of c.b.d. in diameter. There are 8–11 cuticular annules between anterior end of amphid and cephalic capsule. Stoma present, with a greater length than that of cephalic capsula, however its posterior end not clearly visible. Walls of stoma thicker than in posterior pharyngeal lumen. Two teeth visible in stegostoma. Pharynx thin but having a well-developed terminal oval bulb, constituting 70–80% of c.b.d. in width. Nerve ring situated at a level of middle of pharynx. Large cellular body of renetta located at level of beginning of intestine. Cardia quite large and round. Reproductive system didelphic, amphidelphic, with outstretched ovaries. It occupying approximately 40% of total body length. Anterior ovary lies to the right of intestine, posterior one lies to the left of intestine. Mature oocyte elongated, its size 15x27 μm. Large spermatozoa of different shape visible in uterus. Vulvar glands seen.

Abundance: The average density of this species was about 1.5 inds/10cm^2 and relative abundance within the nematode community was 1–2% at the stations where it was found.

Remarks: *M. porosus* was initially described by Bussau and Vopel (1999) from the South-Eastern Pacific area which is located about 5200 km from the area of the new finding. The specimens from the new area bear a good resemblance to the original description.

The presence of 2 teeth in the stegostoma is unusual feature in the genus *Microlaimus*, where three teeth are described as a rule. Meanwhile, Bussau and Vopel (1999) also mentioned two teeth in the original description of *M. porosus*. Perhaps, 2 subventral teeth are touched very closely and optically seem fused when viewedunder light microscope.

Acknowlegements

The authors thanks Dr. Pedro Martínez Arbizu (Senckenberg am Meer, Germany) for sampling the material, Dr. Joelle Galéron (IFREMER, France), chief scientist of the "Nodinaut" cruise, the captain and crew of RV *l'Atalante*, and the *Nautile* team. Authors are also grateful to the German Centre for Marine Biodiversity Research (Abt. DZMB, Senckenberg am Meer, Germany) and its team, who made this work possible. The authors also express their gratitude to two anonymous reviewers and the guest editor Dr. Kai Horst George (Senckenberg am Meer, Germany) for valuable remarks. The study was financially supported by CeDAMar and CoML.

References

Andrássy, I. (1960) Beiträge zur Kenntnis der freilebenden Nematoden Chinas. *Annales Historico-Naturales Musei Nationalis Hungarici*, 52, 201–216.

Blome, D. (1982) Systematik der Nematoda eines Sandstrandes der Nordseeinsel Sylt. *Mikrofauna des Meeresbodens*, 86, 271–462.

Bussau, C. & Vopel, K. (1999) New nematode species and genera (Chromadorida, Microlaimidae) from the deep sea of the eastern tropical South Pacific (Peru Basin). *Annalen des Naturhistorischen Museums in Wien*, 101 B, 405–421.

De Man, J.G. (1880) Die einhemischen, frei in der reinen Erde und im süßen Wasser lebende Nematoden monographisch bearbeitet. Vorläufiger Bericht und deskriptive-systematischer Theil. *Tijdschrift Der Nederlandsche Dierkundige Vereeninging*, 5, 1–104.

De Man, J.G. (1922) Über einige marine Nematoden von der Küste von Walcheren, neu für die Wissenschaft und für unsere Fauna, unter welchen der sehr merkwürdige *Catalaimus Max Weberi* n.sp. *Bijdragen Tot de Dierkunde (Feest-Nummer Max Weber)*, 117–124.

Gerlach, S.A. (1953) Die Nematodenbesiedlung des Sandstrandes und des Küstengrundwassers an der italienischen Küste. I Systematischer Teil. *Estratto dall'archivio zoologico italiano*, 37, 517–640.
Hoeppli, R.J.C. (1926) Studies of free-living nematodes from the thermal waters of Yellowstone Park. *Transactions of the American Mathematical Society*, 45, 234–255.
Hopper, B.E. & Meyers, S.P. (1967) Folicolous marine nematodes on turtle grass, *Thalassia testudinum* König, in Biscayne Bay, Florida. *Bulletin of Marine Science*, 17(2), 471–517.
Jensen, P. (1978) Revision of Microlaimidae, erection of Molgolaimidae fam.n., and remarks on the systematic position of *Paramicrolaimus* (Nematoda, Desmodorida). *Zoologica Scripta*, 7, 159–173.
Justine, J.-L. (2002) Male and female gametes and fertilization. In: *The biology of nematodes* (edited by D.L.Lee). CRC press. Pp. 73–120.
Khripounoff, A., Caprais, J.-C. & Crassous, P. (2006) Geochemical and biological recovery of the disturbed seafloor in polymetallic nodule fields of the Clipperton-Clarion Fracture Zone (CCFZ) at 5,000-m depth. *Limnology and Oceanography*, 51(5) 203, 32–41.
Kovalyev, S.V. & Miljutina, M.A. (2008) A review of the genus *Aponema* Jensen, 1978 (Nematoda: Chromadoria, Microlaimidae) with description of three new species. *Zootaxa*, in press.
McIntyre, A.D. & Warwick, R.M. (1984) Meiofauna techniques. *In:* Holme, N.A. & McIntyre, A.D. (Eds.), *Methods for the Study of Marine Benthos.* Blackwell Scientific Publishers, Oxford, pp. 217–244.
Micoletzky, H. (1922) Die freilebenden Erdnematoden. *Archiv für Naturgeschichte*, 87A, 1-650.
Muthumbi, A.W. & Vincx, M. (1999) Microlaimidae (Microlaimoidea: Nematoda) from Indian Ocean: description of nine new and known species. *Hydrobiologia*, 397, 39–58.
Seinhorst, J.W. (1959) A rapid method for the transfer of nematodes from fixative to anhydrous glycerin. *Nematologica*, 4, 67–69.
Schulz, E. (1932) Beitrage zur Kenntnis mariner Nematoden aus der Kileler Bucht. *Zoologische Jahrbucher (Syst.)*, 62, 331–430.
Schuurmans-Stekhoven, J.H. & De Coninck, L. (1933) Diagnoses of new Belgian marine nemas. *Bulletin du Musée d'Histoire naturelle de Belgique*, 9, 1–13.
Thiel, H. (2001) Use and protection of the deep sea — an introduction. *Deep-Sea Research II*, 48, 3427–3431.