

## New species of *Leptepsilonema* and *Polkepsilonema* (Nemata, Epsilonematidae)

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**Abstract:** Three new species of the genus *Leptepsilonema* and one new species of *Polkepsilonema* are described. *Leptepsilonema antonioi* sp. nov. is mainly characterized by 111-115 overlapping annules with a large vacuolar ornamentation, a large body size and in male, by number and arrangement of copulatory thorns; *L. dauvini* sp. nov. has 149-154 annules, ornamented with numerous fine vacuoles and fine outer ridges, and males possess a field of fine copulatory thorns at level of posterior ambulatory region and five minute thorns precloacally; *L. horridum* sp. nov. is characterized by 130-131 annules, ornamented with large vacuoles and spines, and males with copulatory thorns arranged in four subventral rows, the inner rows with five or six well developed thorns followed at some distance by one to two thorns, and long spicules (67-72  $\mu$ m). *Polkepsilonema guirali* sp. nov. is characterized by the number and location of copulatory thorns, the number of subcephalic setae, and the feature of the dorsal spines. A polytomous key to species level is presented for the genus *Leptepsilonema*.

**Résumé :** *Espèces nouvelles des genres Leptepsilonema et Polkepsilonema (Nemata, Epsilonematidae).* Trois espèces nouvelles du genre *Leptepsilonema* et une espèce nouvelle de *Polkepsilonema* sont décrites. *Leptepsilonema antonioi* sp. nov. est caractérisée par des anneaux au nombre de 111-115, se chevauchant et dont l'ornementation consiste en de larges vacuoles, par une grande taille et chez les mâles par le nombre et la disposition des cornes copulatrices. *L. dauvini* sp. nov. possède 149-154 anneaux présentant de nombreuses petites vacuoles et de minces stries saillantes; le mâle présente un champ de petites cornes copulatrices au niveau postérieur de la région des soies ambulatoires et cinq minuscules cornes précloacales. *L. horridum* sp. nov. a 130-131 anneaux, ornementés de grandes vacuoles et d'épines; chez le mâle, les cornes copulatrices sont alignées sur quatre rangées subventrales, les intérieures comptent cinq ou six cornes bien développées, suivies d'une ou deux cornes supplémentaires et de longs spicules (67-72  $\mu$ m). *Polkepsilonema guirali* sp. nov. est caractérisée par le nombre et la disposition des cornes copulatrices, le nombre élevé des soies subcéphaliques, et par l'aspect des épines dorsales. Pour le genre *Leptepsilonema*, une clé polytomique des espèces a été établie.

**Keywords :** marine nematodes, *Leptepsilonema*, *Polkepsilonema*, taxonomy

### Introduction

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Both genera, *Leptepsilonema* Clasing, 1983 and *Polkepsilonema* Verschelde and Vincx, 1993, were erected quite recently. The first one originally comprised three

species, and the second one was monospecific. Following the latest synthesis of the Epsilonematidae (Gourbault & Decraemer, 1996), seven *Leptepsilonema* and two *Polkepsilonema* are today considered as valid species. Collections in the Mediterranean Sea (*Leptepsilonema antonioi* sp. nov.), the Channel (*Leptepsilonema dauvini* sp. nov.), the Sea of Japan (*Leptepsilonema horridum* sp. nov.), and the Java Sea (*Polkepsilonema guirali* sp. nov.), revealed four new species which are described below.

## Material and methods

All material studied was collected from coarse sediments. Different sampling technique used : Karaman Chappuis digging method (fauna concentrated by filtration through water table from a hole dug deep into sediment, see Gourbault & Warwick (1994) was applied on beaches in the Java Sea, SCUBA diving allowed direct collection in the Mediterranean Sea and the Sea of Japan, and a 50 cm<sup>2</sup> box corer was used in the Channel.

Samples were fixed with 7% neutralized formalin, sorted by elutriation-washing technique and the specimens mounted in anhydrous glycerine, following the standardized methodology.

The material from Livorno was already sorted at family level (Epsilonematidae and Draconematidae) and the epsilonematids from Marseille were already mounted on Cobb slides. Drawings were made with a camera lucida on a Reichert Polyvar microscope.

Type specimens are deposited in the nematode collections of the Muséum national d'Histoire naturelle, Paris (MNHN), the Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels (KBIN), and the University of California, Davis (UCDNC).

### Abbreviations used in text and tables:

abd, body diameter at level of anus (cloacal opening); amph (%), amph w, amphid diameter (as a percentage of the corresponding head diameter); Asl1, length of the most anterior ambulatory seta of the outer sublateral/subventral row; cs, cephalic setae; gub, length of gubernaculum; hw, maximum head width; L, body length; mbd, maximum body diameter at mid body level; (mbd), minimum body diameter; mbd/(mbd), maximum related to minimum body diameter; mbd ph, maximum body diameter in pharyngeal region; N, number of body rings; ph, length of pharynx; spic, length of spicule measured along the median line; Ss1, length of the most anterior supporting seta; subcs, length of subcephalic setae; t, tail length; tnr (%), length of non-annulated tail region (its percentage of the total length of the tail); v, distance vulva from anterior end; a, b, c, proportions of de Man; V, position of vulva as a percentage of total body length from anterior end and c'= tail length divided by body width at anus or cloacal level.

## Taxonomy

### *Leptepsilonema antonioi* sp. nov. (Figs 1-4)

Type material. Holotype, male on slide 3696 (UCDNC); paratypes, 34 males : 3696-3699 (15, UCDNC), RIT 639-643 (9, KBIN), BN 463-466 (9, MNHN); 31 females : 3699-3704 (17, UCDNC), RIT 644-645 (9, KBIN), BN 467 (5, MNHN), 5 juveniles : 3705 (2, UCDNC), RIT 646 (2, KBIN), BN 468 (MNHN),

Type locality. Mediterranean Sea, Marseille, close to the chateau d'If, sample 26 (collected by P. Vitiello, feb. 26, 1972), 15 m depth).

Other material. Marseille: sample 27, slides 3706-3721 UCDNC, RIT 647-650, BN 469-470; sample 29, slide 3722 UCDNC, RIT 651-652, BN 471-474; sample 31, slides 3723-3736 UCDNC, RIT 653-661, BN 475-477; Livorno, slides BN 478-479 and RIT 662.

Other localities. - Marseille (collected by P. Vitiello, feb. 26, 1972: ): SW of the jetty of Pomègues Ratonneau, 20 m depth, samples 27 (13 males, 17 females, 8 juveniles) and 29 (14 males, 8 females). Calanque de Port Miou sample 31 (25 males, 33 females, 25 juveniles). A large number of epsilonematid species was found co-occurring with the new species: *Epsilonema* sp., *E. cf. lasium*, *E. margaritatum*, *E. parvospina*, *Metepsilonema callosum*, *M. comptum*, *M. corrugatum*, *M. hagmeieri*, *Perepsilonema corsicum*, *P. crassum*, *P. longispiculosum*, *Bathypsilonema cf. vulgare*.

- Livorno, Meloria shoals, 7 m depth (collected by A. Todaro, 6 males, 2 females, 2 juveniles). The other epsilonematids identified were : *M. callosum*, *M. corrugatum*, and *Perepsilonema mediterraneum*.

Etymology. Species named in honour of our colleague Dr Antonio Todaro in acknowledgement of his epsilonematid and draconematid material from Livorno.

Measurements in table 1.

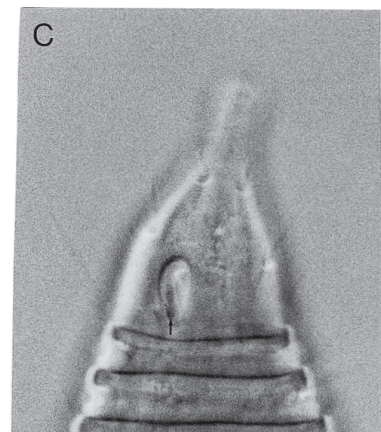
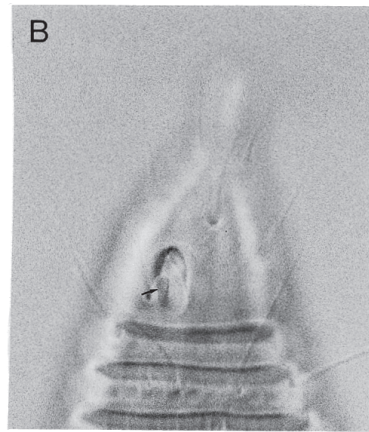
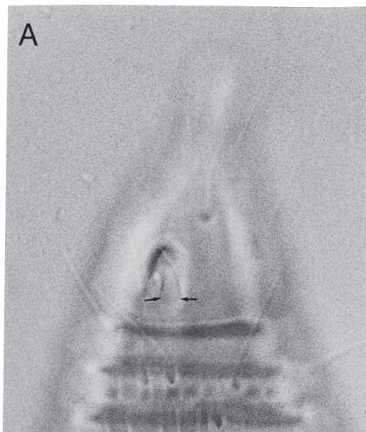
### Description

#### Males

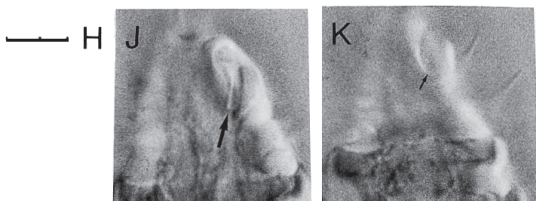
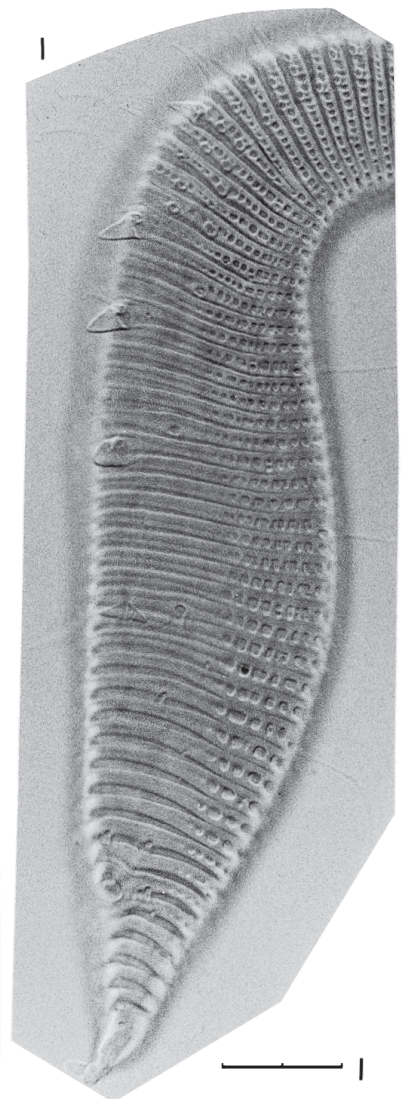
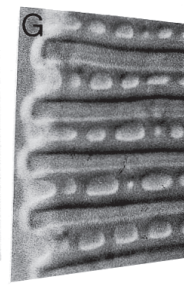
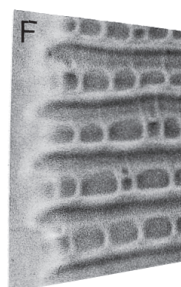
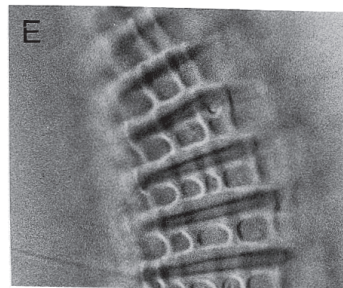
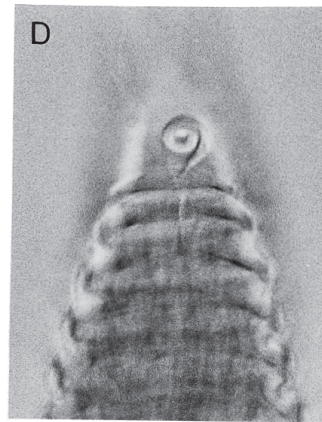
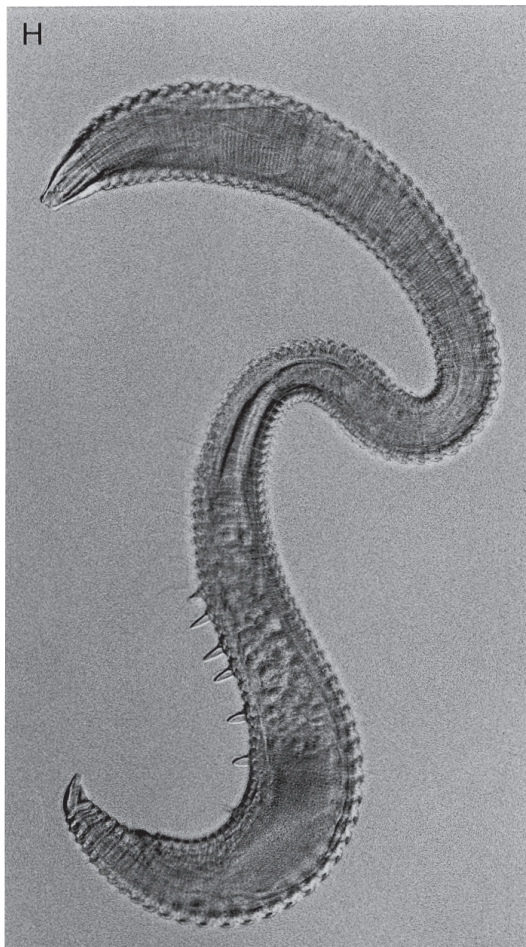
Body epsilon-shaped, small, relatively slender, with wider pharyngeal and posterior body regions. Cuticle with 114-

**Figure 1.** *Leptepsilonema antonioi* sp. nov.. Head region A-C, J-K, paratype males, arrow indicate the amphidial pore in J and the flap in K.

**Figure 1.** *Leptepsilonema antonioi* sp. nov.. Région céphalique : A-C, J-K, paratypes mâles, la flèche indique le pore de l'amphide en J et le clapet en K.

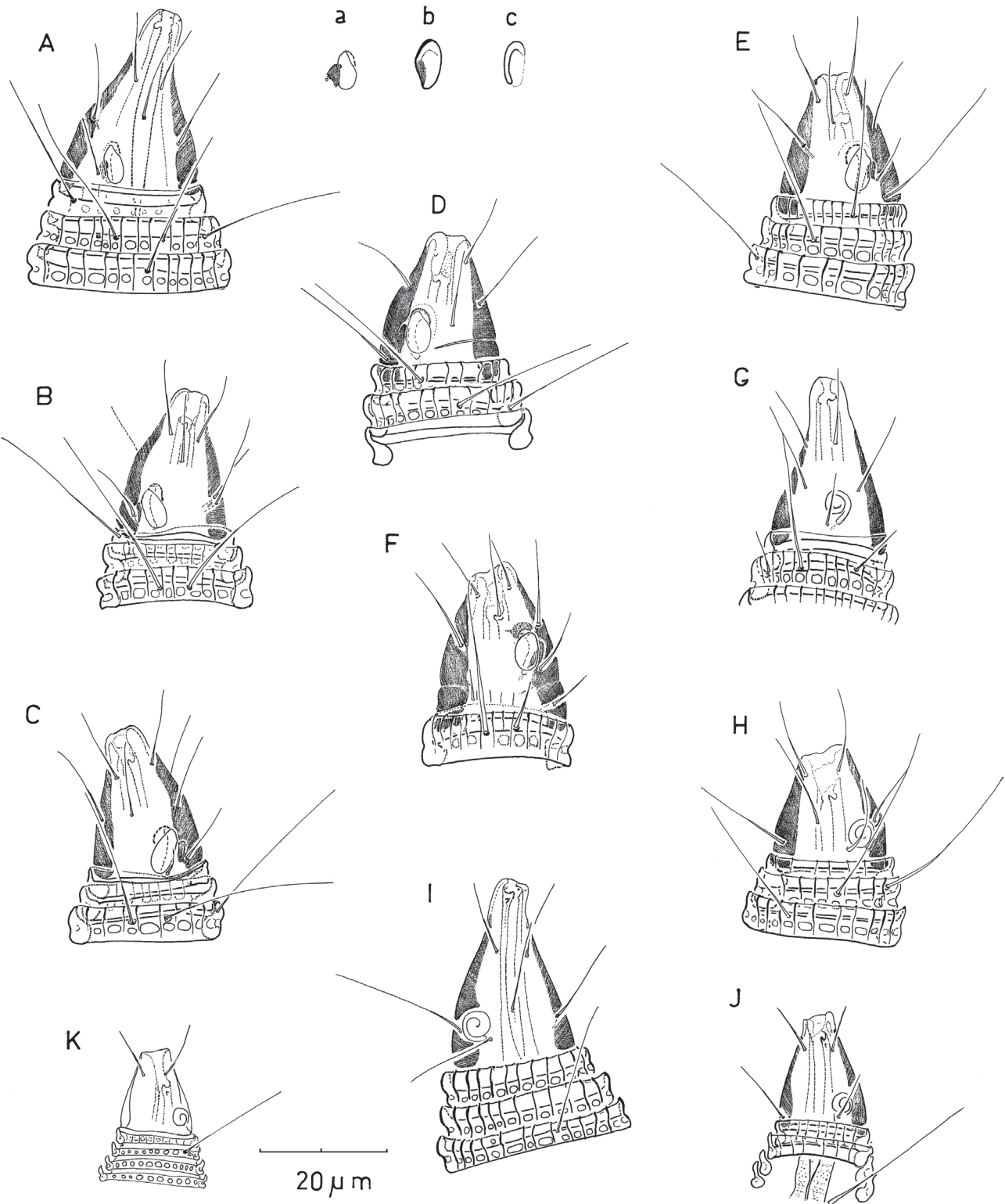


— A-G



— J-K







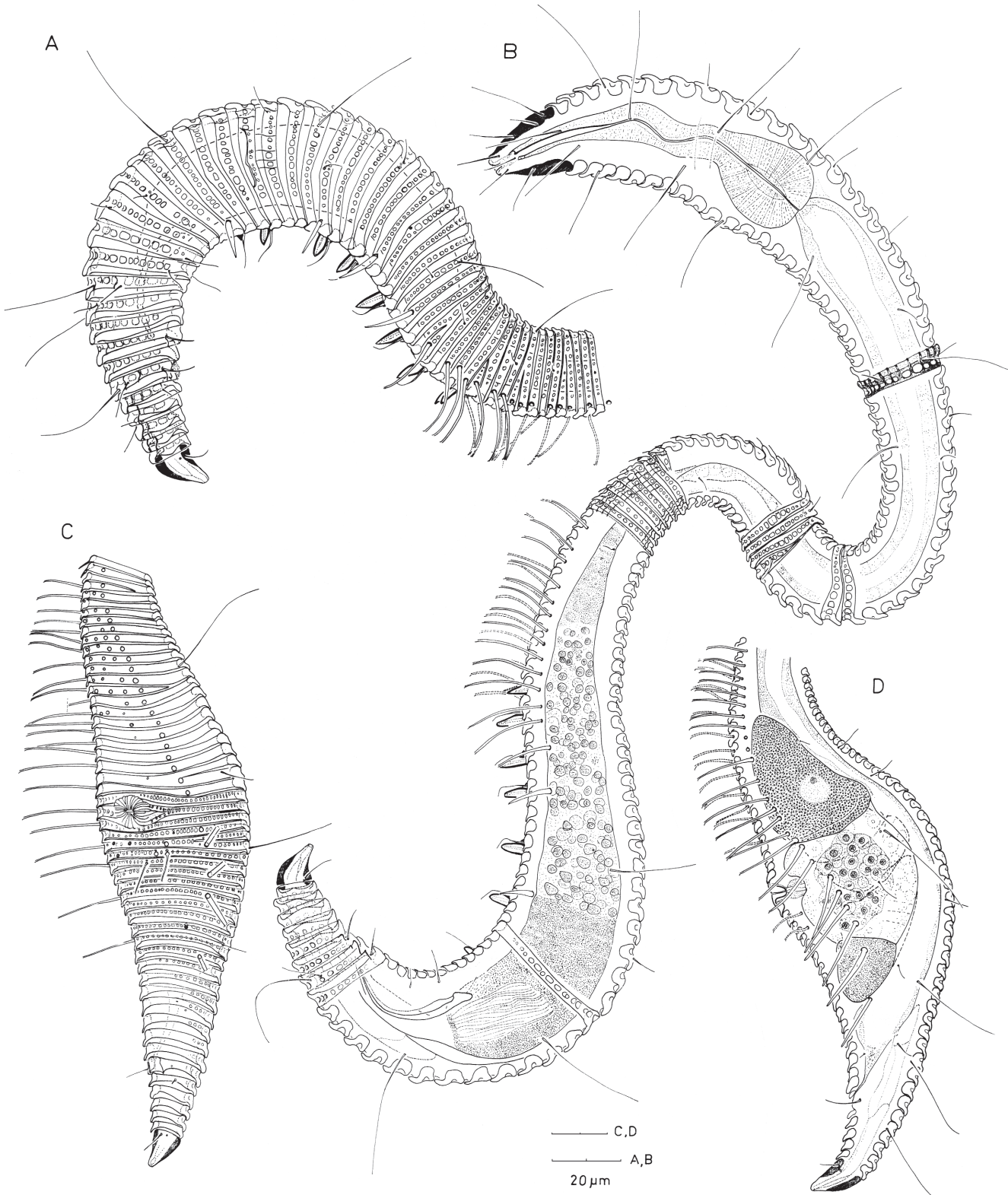
**Table 1.** Morphometric data of *Leptepsilonema antonioi* sp. nov. (measurements in  $\mu\text{m}$ , average and standard deviation).**Tableau 1.** Morphométrie de *Leptepsilonema antonioi* sp. nov. (mesures en  $\mu\text{m}$ , moyenne et écart-type).

	Marseille males (n = 12)					Livorno males (n=6)				Marseille females (n = 5 )				Livorno females (n=2)		Marseille juv. IV (n = 5 )				juv. III	juv. II
	Holotype	Min	Max	AVG	SD	Min	Max	AVG	SD	Min	Max	AVG	SD			Min	Max	AVG	SD		
L	580	560	680	600.8	36.5	545	750	668	65	500	620	558	47	500	670	335	485	412	51	325	215
N	115	112	115	114	1	110	113	111	1	111	114	113	1	113	111	120	125	122	2	134	106
amph %										20	29	25	4			27	26.5	26.5	0	22.5	26
amph w	3.7	3	5	4.0	0.7	3	4.5	3.4	0.6	3.0	5.0	3.9	0.9	4	5	1.7	5	3.44	1.2	3	3
cs	12.5	9	12.5	10.7	1.3	9.5	11.3	10.6	0.7	10.0	14.0	11.6	1.5		9	6	10.5	8.3	1.5	6.7	5
hw	19	17	19.8	18.0	0.8	17	19	17.9	0.8	17.0	19.0	18.3	0.8	18	20	16	18.5	17.3	0.9	13.3	11.5
ph	99	99	118	110.0	6.1	39	117	97.7	26.6	106.0	144.0	122.2	14.5	102	126	88	101	93	4.4	73	71
mbd ph	37	34	41	37.0	2.3	32	38.6	35.5	2.1	34.0	41.0	36.8	2.5	35	39	34	41	38.2	2.4	34	28
(mbd)	21.5	20	24	22.2	1.4	20.6	24	22.7	1.2	23.0	25.0	23.8	0.7	20	22	21	27	24.2	2	21	17
mbd	40	32	43	38.8	4.0	36.4	43	39.5	2.1	53.0	62.0	57.0	3.0	55	56	32	36	34.8	1.5	31	18
abd	19	19	24	21.9	1.5	18.2	33	22.6	5.1	22.0	31.0	24.5	3.3	33	19	20	23	21.5	1.3	17	16
t	39	36	43	39.5	2.0	36	45.4	39.4	3.3	40.0	45.0	41.8	1.7	47	42	38	44	40.8	2.3	38	37
tmr	13.5	10.5	15.5	13.1	1.5	12.5	17	14.6	1.8	15.0	19.0	17.0	1.4	20	16	14	16	14.6	0.8	14	13
tmr%	34.6	26.3	41.9	33.2	4.1	31.9	42.7	37.2	3.9	36.6	46.3	40.7	3.1	42.6	38.1	31.8	37.5	35.8	2.3	36.8	35.1
Asl1	15	14	17	15.5	0.8	16	18.6	16.9	0.9	14.0	17.0	15.3	1.1	17	20	14	15	14.4	0.4	12.5	13.5
Asln	25	19	25	22.7	1.8	19	22	19.8	1.1	23.0	26.0	24.9	1.1	22	24	19	22	19.8	1.3	17	14
Ss1	18	15	20	17.1	1.2					24.0	27.0	25.6	1.1	26	25	17	25	19.3	3	23	21
Ss2	14.5	14.5	16	15.0	0.5	13	15	13.6	0.7	23.5	23.5	23.5	0.0	26	25	19	18.5	18.5	0	19	
Ss3	11.5	11	14.5	12.8	1.5	12	14.5	13.4	1	25.0	25.5	25.2	0.2		24						
Ss4	11	11	14	12.8	1.2					25.0	26.0	25.5	0.5	25	22						
Ss5		10.5	12.5	11.9	0.7					16.0	25.5	21.2	3.6	24	18						
spic	43	40	55	47	4	42	47	45	2												
gub/v	15.7	14.3	17.9	16.3	1.0	14.3	19.0	16.9		372	465	414.6	39.4	360	485						
a	5.9	5.0	6.0	5.5	0.3	5.3	17.7	8.0	1.7	8.8	11.4	9.8	1.2	9.1	12.0	9.3	13.9	11.9	1.5	10.5	11.9
b	14.9	13.1	18.1	15.3	1.4	13.9	19.2	17.0	4.4	3.8	4.9	4.6	0.4	4.9	5.3	3.6	5.0	4.4	0.5	4.5	3.0
c	2.1	1.6	2.1	1.8	0.1	1.2	2.3	1.8	1.9	12.5	15.1	13.3	0.9	10.6	16.0	8.6	11.0	10.1	0.9	8.6	5.8
c'	1.9	1.5	2.0	1.8	0.2				0.3	1.3	2.0	1.7	0.2	1.4	2.2	1.7	2.0	1.9	0.1	2.2	2.3
V										71.7	75.2	74.2	1.3	72.0	72.4						
mbd/(mbd)	47.1	47.1	49.4	48.3	1.2	1.6	1.8	1.7	0.1	2.3	2.5	2.4	0.1	2.8	2.5	1.3	1.7	1.4	0.2	1.5	1.1

**Figure 2.** *Leptepsilonema antonioi* sp. nov.. Head region, surface view **A.**, (a-c) paratype male with amphid at different levels a-c, from surface view towards level of amphidial opening; **B-C.** paratype male respectively right and left side; **D-E.** holotype male, respectively right and left side; **F.** male from Marseille, station 29; **G-H.** female paratypes; **I-K.** juvenile specimens from Marseille station 31, respectively fourth stage, third stage and second stage.

**Figure 2.** *Leptepsilonema antonioi* sp. nov.. Région céphalique en vue superficielle **A.**, (a-c) d'un paratype mâle, amphide (a-c) à différents niveaux depuis la surface jusqu'à son ouverture ; **B-C.** paratype mâle, côtés droit et gauche respectivement ; **D-E.** holotype mâle, côtés droit et gauche respectivement ; **F.** mâle provenant de la population de Marseille, station 29 ; **G-H.** paratypes femelles ; **I-K.** spécimens juvéniles de Marseille, station 31, respectivement quatrième, troisième et second stades.

115 annules with well developed overlapping hyaline part; inversion in direction in between both curvatures, dorsally at level of ring 49, ventrally at level of ring 46 in holotype. Cuticle ornamented with large vacuoles except for one or a few annules at the extremities which may appear smooth (tail rings in holotype only dorsally provided with vacuoles). In between vacuoles, the cuticle forms marked ridges in the anterior body region and tail; at the level of the ventral curvature, the ridges protrude as spines. Copulatory thorns well developed, consisting of a single mid-ventral longitudinal row of three to six thorns (mostly three) with a fine seta inserted at their base, preceded by a medium-sized pair of joint thorns with insertion of a posterior ambulatory seta in between, and followed by a minute posterior pair of joint thorns with a fine somatic seta in between, and situated at eleven annules from cloacal opening in holotype. Holotype with five single mid-ventral obvious thorns,



7.4 µm, 8 µm, 6.7 µm, 6 µm and 5.1 µm high respectively from anterior one on. Somatic setae fine, long and short, arranged in eight longitudinal rows in pharyngeal region, in six rows posteriorly. Cloacal opening flanked by a pre- and post-cloacal seta, the ridge at the insertion marked. Ambulatory setae, fine, hardly bent, arranged in five longitudinal rows: mid-ventral row with two to five setae, the inner lateroventral rows each with nine to twelve setae; the outer lateroventral row on each side with eleven to fourteen setae, followed by three shorter supporting seta (four in holotype, two or five in two paratype specimens).

Cephalic capsule slightly longer than wide; lip region mostly retracted in fixed specimens; six minute external labial papillae rarely visible (Fig. 1A). Four cephalic setae and eight subcephalic setae, the latter more or less arranged in two groups: six setae usually anterior to amphidial fovea and two setae laterodorsal at base of each amphidial fovea; total number of subcephalic setae may vary between seven (holotype: lacks right laterodorsal seta at base amphid but with first laterodorsal somatic seta on head on both sides) and eleven (with anteriormost laterodorsal somatic setae moved towards head region, rarely also with anteriormost lateroventral somatic seta). Amphidial fovea, laterodorsal at base of head, at surface with a large membrane-like flap typical of genus, inward with narrow arm.

Buccal cavity with a small dorsal tooth and two minute subventral denticles, extending to halfway first annule when lip region extended. Pharynx cylindrical, slightly enlarged in front of nerve ring, and with well developed muscular posterior bulb. Small cardia, cylindrical intestine.

Reproductive system with a single intestine may extend far anteriorly into narrow body region between both curvatures. Spicules, 42.5-44 µm long, strongly bent, with ventral velum and hooked capitulum. Gubernaculum narrow plate-like, difficult to observe.

Tail with six annules (including end ring). Caudal glands extend anteriorly beyond the cloacal opening.

#### Females

Similar to males in habitus but with more pronounced widened body region. Cuticle with 111-113 annules; inversion in direction dorsally between annules 44-47,

ventrally at level of annule 45 or 46. Five rows of nearly straight ambulatory setae: the few ventral setae (six prevulvar, three postvulvar) not on a strict longitudinal line; the inner lateroventral rows with thirteen pre- and two postvulvar setae and the outer lateroventral rows with nineteen to 21 setae followed by four to seven supporting setae.

Cephalic capsule similar to male, with four cephalic setae and eight subcephalic setae. Amphidial fovea, laterodorsal shortly in front of posterior head border, a small spiral with 1 1/4 coils. Digestive system as in male.

Reproductive system, didelphic, amphidelphic with ovaries reflexed to opposite sides or to the same side (Fig. 2D); whole system ventral to intestine; vagina bipartite with *vagina vera* more or less protruding as a cone; uterus filled with medium-sized globular sperm. Egg 37 µm by 38 µm.

Tail with six annules including end-ring

#### Juveniles

- Fourth juvenile stage. Habitus similar to females. Cuticle with 120 annules, ornamented as in adult. Ambulatory setae about straight with posteriorly bent tip, arranged in four longitudinal rows: inner rows with five to seven setae; outer rows with eleven to fifteen setae, followed by two to four supporting setae; the anteriormost supporting setae are not always clearly differentiated from the posterior ambulatory setae. Head with four cephalic setae and eight subcephalic setae, similar to adult. Amphidial fovea spiral as in female. Reproductive system ventral to intestine, largely developed, 62 µm long in a young female; young males with spicular primordium.

- Third juvenile stage. Cuticle with 134 annules, ornamented as in adult. Ambulatory setae arranged in two large rows of ten setae each row followed by two longer and stout supporting setae. Head with four cephalic setae and five subcephalic setae (one dorsal, two laterodorsal at base of amphids, two lateroventral setae, Fig. 1J). Amphidial fovea spiral as in female. Reproductive system 25 µm long, ventral to intestine. Tail with eleven annules, end-ring included.

- Second juvenile stage. Cuticle with 106 annules, vacuolated. Ambulatory setae in two longitudinal rows of five setae each; one long, stout supporting seta on each side. Head with four cephalic setae; subcephalic setae absent; amphidial fovea spiral as in female. Genital primordium, 7.5 µm, consisting of a few cells. Tail with 13 annules, endring included.

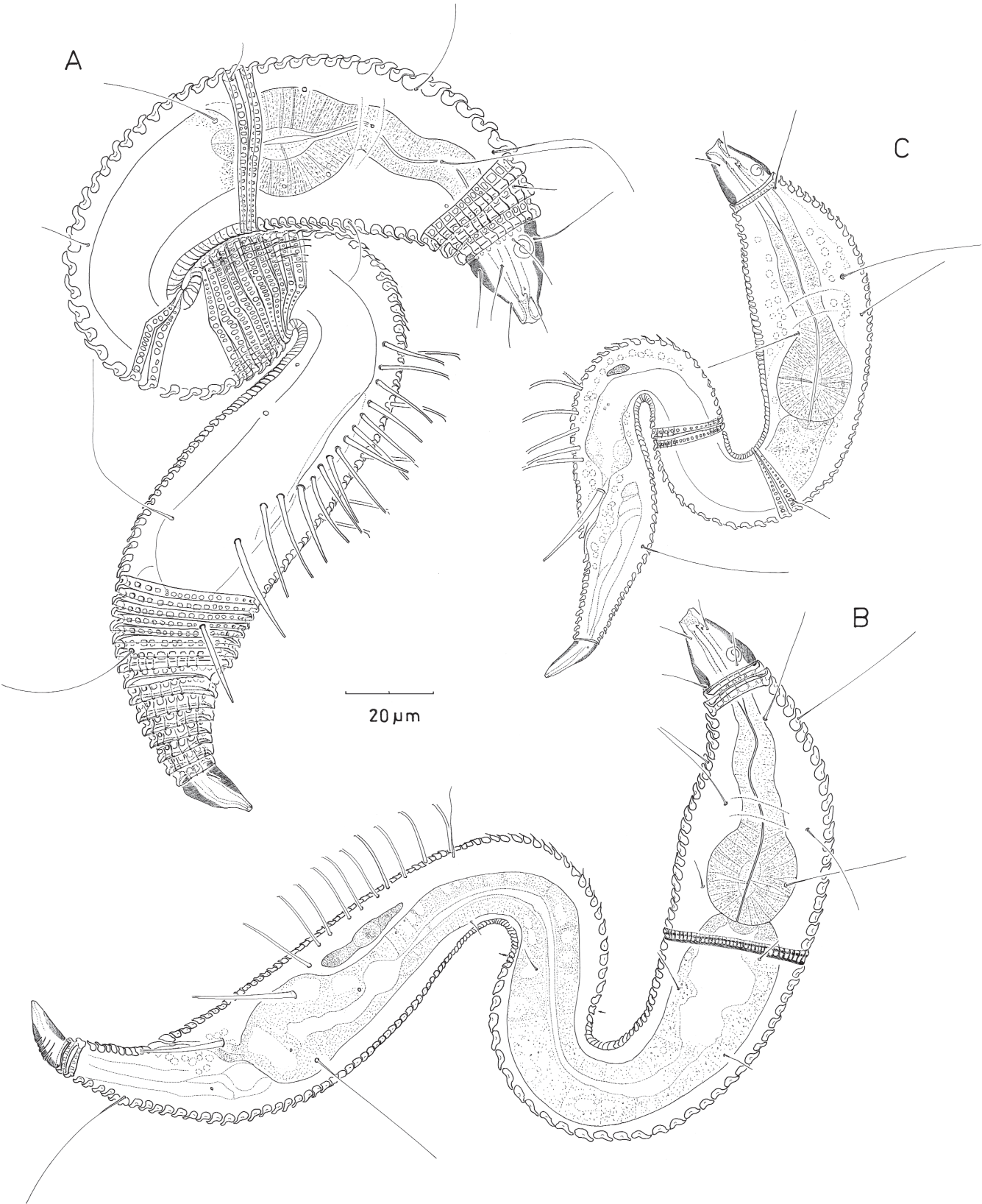
#### Diagnosis

*Leptepsilonema antonioi* sp. nov. is characterized by 111-115 largely overlapping annules, ornamented with a single transverse row of large vacuoles with marked, slightly protruding ridges in between, in anterior and

**Figure 3.** *Leptepsilonema antonioi* sp. nov.. **A.** Posterior body, surface view, paratype male; **B.** holotype male, entire specimen; **C-D.** Posterior body region of female paratypes, respectively in ventral view and side view.

**Figure 3.** *Leptepsilonema antonioi* sp. nov.. **A.** Région postérieure du corps, en vue superficielle, paratype mâle ; **B.** habitus de l'holotype mâle ; **C-D.** Région postérieure du corps de paratypes femelles, respectivement en vue ventrale et latérale.





posterior body region and a relative long body (575-580 µm). Male with copulatory thorns consisting of a single row of three to five thorns preceded and followed by a pair of thorns, each associated with a seta, by shape and length of spicules (clearly curved corpus with ventral velum and hooked head, 42-44 µm long); outer rows of ambulatory setae followed by usually three supporting setae in male, four to six in female.

Relationships. *Leptepsilonema antonioi* sp.nov. is at present the longest species within the genus. It has a similar number of annules as in *L. exile* (112-113), *L. macrum* (113-115) and *L. parafiliforme* (112-115) and a comparable large vacuolar ornamentation as in *L. parafiliforme*, *L. procerum*, *L. richardii* and *L. horridum* sp. nov. but a different aspect of the ridges in between the vacuoles. The males in this species differ from others, most obviously by the number and arrangement of the copulatory thorns; both male and female by body size and number, arrangement and size of supporting setae.

*Leptepsilonema dauvini* sp. nov. (Fig. 5)

Type material. Holotype, male on slide BN 451 (MNHN); two paratypes, males BN 452 and RIT 631 (KBIN).

Type locality. Channel, Trezen Vraz (48°51,20'N; 3°53,42'W, 75 m depth, gravel md 3160 µm) collected March and June 1993. In the same samples were collected *Metepsilonema callosum*, *M. comptum*, *M. corrugatum*, *M. amphidoxum*, *Epsilonema margaritatum*, *Perepsilonema crassum* and *Perepsilonema* sp.

Etymology. Species named in honour of our colleague Professor Dr Jean Claude Dauvin, in charge of the Channel project.

Measurements in table 2.

Description

Male

Body epsilon-shaped, small, relatively slender, with wider pharyngeal and posterior body regions. Cuticle with 149-154 annules; inversion in direction in holotype, ventrally between annules 50 and 51 at level of dorsal curvature, and dorsally between annules 57 and 58, just anterior to ventral curvature (Fig. 5A, arrows). Cuticle ornamented with

**Table 2.** Morphometric data of *Leptepsilonema dauvini* sp.nov.  
**Tableau 2.** Morphométrie de *Leptepsilonema dauvini* sp.nov.

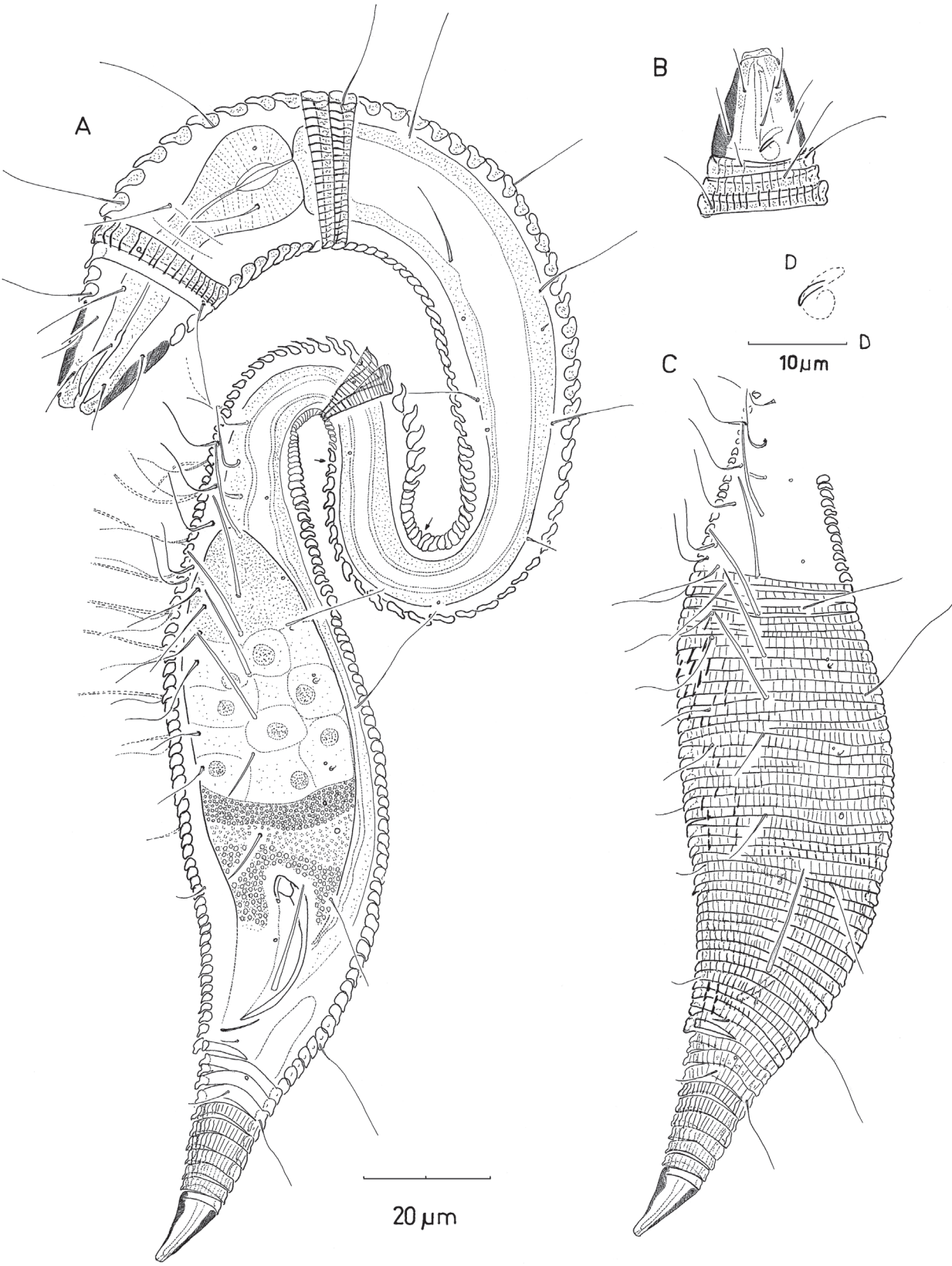
	Holotype male 1	Paratypes male 2	male 3
L	335	340	350
N	149	152	154
amph	4.5	3.4	3.9
amph %	29.6	23	29.2
cs	7.6	7.3	7
hw	16	17	15
ph	50	53	59
mbd ph	27	31	23
(mbd)	12	11	11
mbd	31	37	42
abd	17	21	17
t	36	43	40
tmr	11	14	12
tmr%	30.6	32.6	30.0
Asl1	12.5	16.4	15.8
Ss1	17.5		
spic	30.0	30.5	30.0
gub/v	7	8.5	8.5
a	12.4	11.0	15.2
b	6.7	6.4	5.9
c	9.3	7.9	8.8
c'	2.1	2.0	2.4
mbd/(mbd)	2.6	3.4	3.8

numerous minute vacuoles and outer overlapping layer with fine ridges; ridges more pronounced and slightly protruding from the posterior border of the annules ventrally to lateroventrally from narrow body region to end ambulatory region. At level of posteriormost ambulatory setae, they form a field of small copulatory spines. Precloacally, on each side, two (more ventrally) and three lateroventral small thorns present. Somatic setae fine, long, arranged in eight longitudinal rows in pharyngeal region, where setae most numerous. Ambulatory setae, fine, bent, arranged in five longitudinal rows: mid-ventral row with three setae, the inner lateroventral rows each with eight setae extending to the ventral curvature; the outer row on each side, anteriorly with two fine typical setae, followed by six stout and straight setae and further two shorter and finer somatic setae; a single stout supporting seta precloacally on each side.

Cephalic capsule slightly longer than wide, lip region largely retracted in fixed specimens. Four cephalic setae and eight subcephalic setae in two circles: six setae anterior to the amphidial fovea, two setae at mid-amphid level. Amphidial fovea spiral, less than one turn, with aperture dorsally and anterior part covered by a flap.

**Figure 4.** *Leptepsilonema antonioi* sp. nov.. A-C. juveniles specimens from Marseille station 31, respectively fourth stage, third stage and second stage.

**Figure 4.** *Leptepsilonema antonioi* sp. nov.. A-C. Spécimens juvéniles provenant de Marseille, station 31, respectivement quatrième, troisième et second stades.





Buccal cavity with a minute dorsal tooth; subventral denticles not clearly visible. Pharynx cylindrical, slightly enlarged in front of nerve ring, and with well developed muscular posterior bulb.

Reproductive system relatively short, not extending to ventral curvature. Spicules, 30  $\mu\text{m}$  long, slightly bent, with ventral velum and hooked capitulum. Gubernaculum narrow plate-like and parallel to distal end of spicules.

Tail with eleven annules (including end ring). Caudal glands extend anteriorly beyond the cloacal opening.

Females and juveniles. Not observed.

#### Diagnosis

Males of *L. dauvini* sp. nov. are characterized by a large number of annules (149-154), a cuticular ornamentation of numerous fine vacuoles and fine outer ridges, protruding as minute spines ventrally in narrow and posterior body regions, a field of fine copulatory thorns at level of posterior ambulatory region and five minute thorns precloacally, on each side and by shape (fine, with hooked head) and length (30  $\mu\text{m}$ ) of spicules.

#### *Leptepsilonema horridum* sp. nov. (Figs 6-8)

Type material. Holotype, male on slide BN 453 (MNHN); paratypes, 3 males BN 453 (2) and RIT627 (2) (KBIN), 3 females RIT628 (2) and BN458, 8 juveniles BN 453 (2), BN 457-458 and RIT632 (2)- 633 (2).

Type locality. Miyakojima, Bora Bay, Riukin Island, Japan, 24°38'N-123°35'E, 3.5 - 4 m depth, medium to fine sand, collected by G. Boucher, October 20 1995.

Etymology in relation with the spiny cuticle, from Latin *horridus* = bristling.

Measurements in table 3.

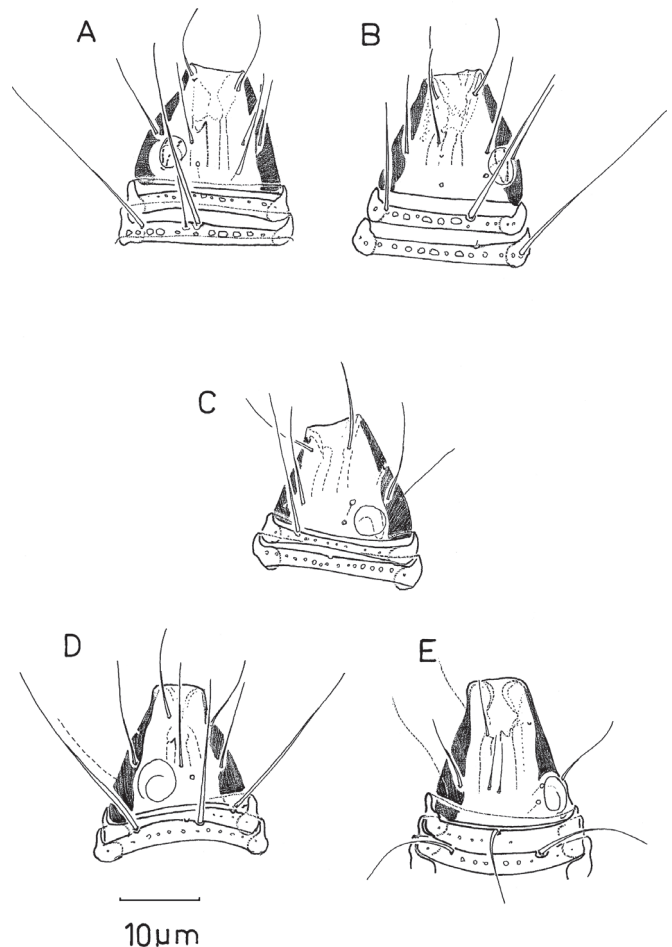
#### Description

##### Males

Body epsilon-shaped almost cylindrical ( $\text{mbd}/(\text{mbd} + \text{mbd}) = 1.4$ ). 130-131 overlapping annules with inversion dorsally in 55th annule in holotype (51st or 54th in paratypes) and ventrally between 43rd and 44th annule in holotype (between 41st and 44th in paratypes). One row of small vacuoles on the four anterior annules; on the rest of the body, vacuoles large and rectangular, dorsally to laterally, vacuoles smaller on

**Figure 5.** *Leptepsilonema dauvini* sp. nov.. Holotype male **A.** entire specimen; **B.** head, surface view; **C.** posterior body region, surface view; **D.** flap covering amphidial fovea.

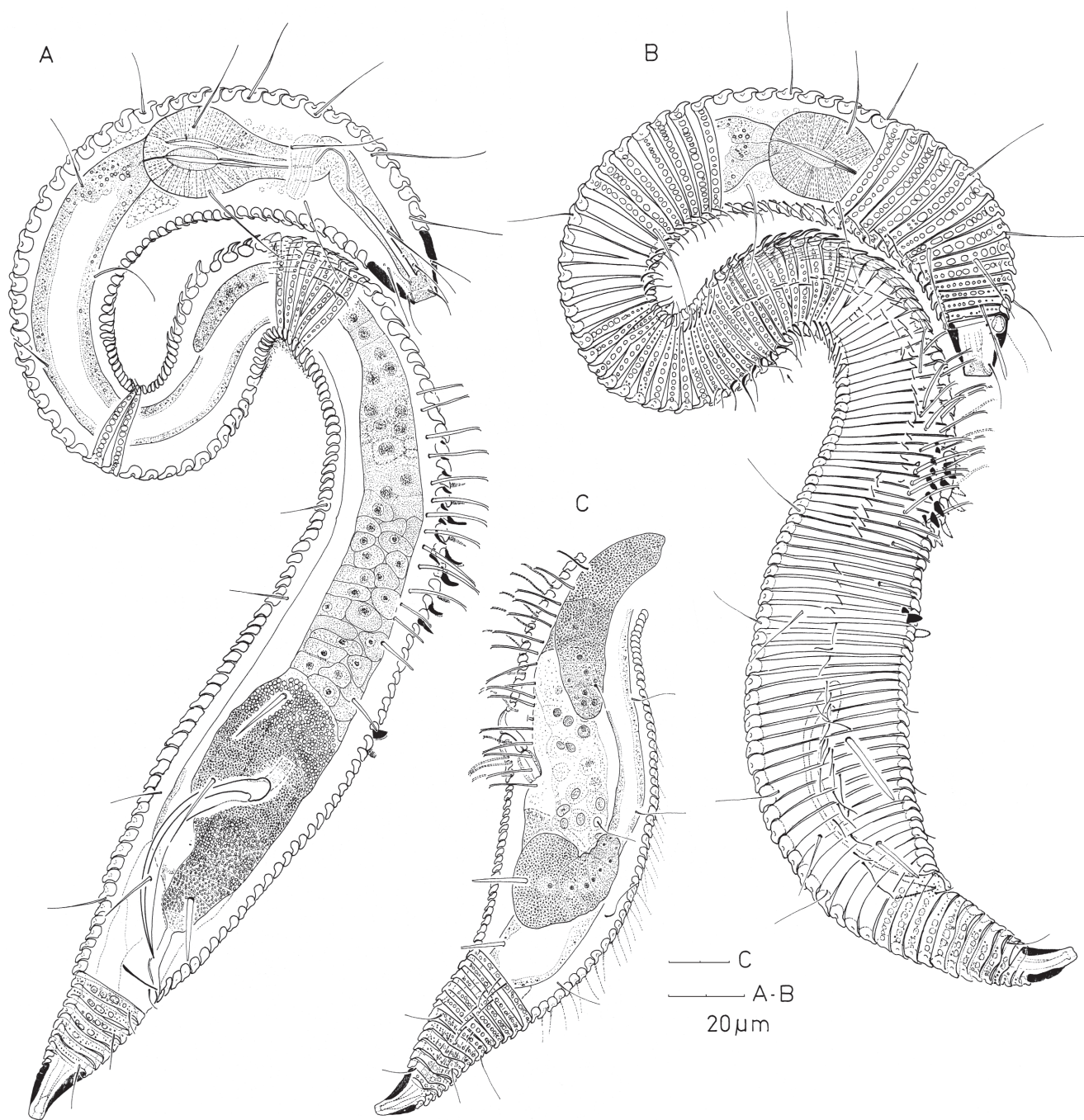
**Figure 5.** *Leptepsilonema dauvini* sp. nov.. Holotype mâle: **A.** habitus, **B.** région céphalique, et **C.** région postérieure du corps en vue superficielle; **D.** clapet de l'amphide.



**Figure 6.** *Leptepsilonema horridum* sp. nov.. Head region, surface view. **A-B.** Holotype male, respectively right and left side; **C.** paratype male, left side; **D-E.** paratype female, respectively left and right side.

**Figure 6.** *Leptepsilonema horridum* sp. nov.. Région céphalique en vue superficielle : **A-B.** holotype mâle, côtés droit et gauche respectivement, **C.** paratype mâle, côté gauche ; **D-E.** paratype femelle, côtés gauche et droit respectivement.

the ventral body side; on tail vacuolar ornamentation irregular. Additional spiny ornamentation consists of a ventral field of relative long spines reaching the level of the fifth annule and extending to the ambulatory setae with the outer spines continuing as a longitudinal row along the outer ambulatory row; dorsally, another field of spines (6.5  $\mu\text{m}$  long) begins slightly anterior to the second curvature and extend to mid spicule when retracted, and laterally on each side a longitudinal row starts in the posterior ambulatory region to level of cloaca. Somatic setae relatively long, most numerous in pharyngeal region where arranged in eight longitudinal rows. On both sides, a pre- and post-cloacal seta, 5.5  $\mu\text{m}$  long flank the cloacal opening.



**Figure 7.** *Leptepsilonema horridum* sp. nov.. **A.** Holotype male; **B.** paratype male with detail of cuticular ornamentation; **C.** reproductive system and posterior body region, female paratype.

**Figure 7.** *Leptepsilonema horridum* sp. nov. **A.** Holotype male; **B.** paratype mâle, détails de l'ornementation cuticulaire; **C.** système reproducteur et région postérieure du corps d'un paratype femelle.

Ambulatory setae, about straight with bifid bent tip, arranged in five longitudinal rows: the outer and inner subventral rows each with twelve to sixteen setae, the mid-

ventral row with five to seven setae; the three – four posteriormost setae of the outer rows are short. Two strong supporting setae on each side; often one seta may be broken

**Table 3.** Morphometric data of *Leptepsilonema horridum* sp.nov.  
**Tableau 3.** Morphométrie de *Leptepsilonema horridum* sp.nov.

	Holotype	males (n = 3)					females (n = 3)				juv. IV	
		Min	Max	AVG	SD	Min	Max	AVG	SD	male	female	
L	525	405	525	472	49.9	440	530	477	39	375	380	
N	130	130	131	130	0	130	131	130	0	138	139	
amph	3.8	3.0	3.8	3.4	0.4	4	6	5.3	0.9	3.8	4.5	
amph %	21	19.0	21.0	20.0	1.0	25.5	32	29.0	2.5	26.8	33.3	
cs	14.5	12.5	14.5	13.5	1.0	10.5	14	11.7	1.3	11	11	
ph	99	96.0	100.0	98.3	1.7	94	98	96.3	1.7	84	86	
mbd ph	36	35.0	36.0	35.3	0.5	37	39	37.7	0.9	33	36	
(mbd)	25	25.0	26.0	25.3	0.5	28	29	28.7	0.5	25	25.5	
mbd	45	43.0	45.0	44.0	0.8	42	52	48.0	4.3	34.5	36	
abd	25	24.0	25.0	24.7	0.5	20	25	23.0	2.2	22.5	25	
t	46	46.0	46.0	46.0	0.0	41	41	41.0	0.0	38	41	
tmr	17	16.0	18.0	17.0	0.8	19	22	20.3	1.2	16	16	
tmr%	37	35.0	39.0	37.0	1.6	46.3	54	49.6	3.1	42	39	
Asl1	13	12.5	14.0	13.2	0.6	14	14	14.0	0.0	12	17	
Asln	18					18.5	20	19.5	10.7			
Ss1	20					20	23	21.5	1.2	17	17	
Ss2	19	19.0	20.0	19.5	0.5	18.5	20	19.5	0.7	17	15	
spic	72	67.0	69.5	72.0								
gub/v	13	12.0	13.4	13.0		290	364	319.7	31.9			
a	11.7	9.4	11.7	10.7	0.9	8.8	10.6	10.0	0.8	10.9	10.6	
b	5.3	4.2	5.3	4.8	0.4	4.5	5.4	4.9	0.4	4.5	4.4	
c	11.4	8.8	11.4	10.3	1.1	10.7	12.9	11.6	0.9	9.9	9.3	
c'	1.8	1.8	1.9	1.8	0.0	1.6	2.1	1.8	0.2	1.7	1.6	
V						65.9	68.7	67.0	1.2			
mbd/(mbd)	1.8	1.7	1.8	1.7	0.0	1.6	2.1	1.8	0.2	1.4	1.4	

off in mounted specimens. Copulatory thorns well developed arranged in four subventral rows: the inner rows with four to seven strong thorns, followed at some distance by one or two thorns, the outer rows with four to eight finer and smaller thorns.

Cephalic capsule with four cephalic setae. Eight or nine subcephalic setae and four pores; a transverse row of four setae on each side at level of the anterior border of the amphids, in addition a single seta located at the posterior head border or at the anterior border of the first ring; presence of one or two pores on each side (dorsal at anterior head half, laterodorsal near mid-amphid). Circular outline (flap) of amphidial fovea with inner loop. Buccal cavity anteriorly with a small well developed dorsal tooth and two obscure ventral denticles, posteriorly long, narrow with thickened wall, extending to level of the fifth annule. Pharynx typical for the family. Distal part of cloaca with refractive wall.

Reproductive system with a single testis situated ventrally to the intestine, extending far anteriorly in narrow body region in between both curvatures. Long paired

spicules, ventrally bent, with a marked capitulum and a ventral velum; gubernaculum with a small trough-like corpus and two narrow oblique apophyses.

Tail with nine annules including end-ring. Three caudal glands extending beyond the cloacal opening.

#### Females

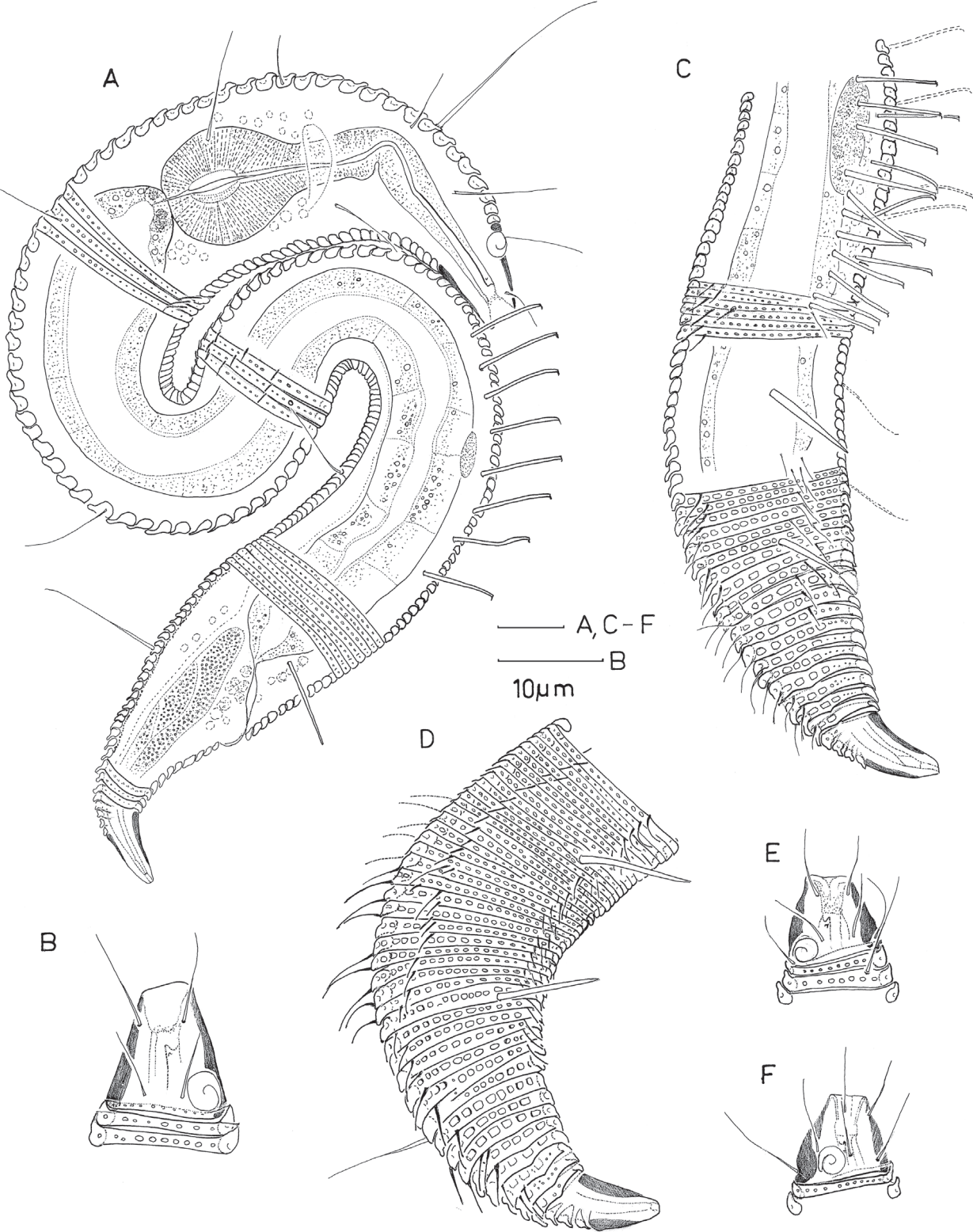
Similar to males in habitus, number of annules and spiny ornamentation. Five rows of ambulatory setae: external rows with 18, inner rows with 15 and unclear mid-ventral row with three or four setae; posteriormost setae of outer row not clearly shorter. Two well developed supporting setae.

Cephalic capsule with four cephalic setae and eight or nine subcephalic setae arranged as in male. Amphidial fovea, small spiral with circular outline. Digestive system as in male.

Reproductive system didelphic, amphidelphic with reflexed ovaries, ventral to intestine; vagina bipartite and strongly oblique, spermathecae not well differentiated.

Tail with seven or eight annules including end-ring





### Juveniles

Habitus similar to females.

- Fourth juvenile stage (n= 5). 138-139 annules with vacuoles and spiny ornamentation as in adults except for lateral longitudinal rows being more laterodorsal and an additional dorsal row of long (9µm) spines. Ambulatory setae in four rows: external rows with eight to 14 setae, and internal rows with four or five setae. Two pairs of strong supporting setae. Four cephalic and eight subcephalic setae (four on each side). Amphidial fovea as in female. Buccal cavity extending to fifth ring. Reproductive system 37-43 µm long. Tail with nine annules including end-ring

- Third juvenile stage (n= 3). 143-148 annules with vacuoles and spiny ornamentation as in adults except the lateral longitudinal rows, laterodorsal and developed into a field. Ambulatory setae in two rows with eight setae. One supporting seta on each side. Four cephalic and two subcephalic setae and two pores all together. Amphidial fovea as in female. Tail with 13 annules including end-ring.

### Diagnosis

*Leptepsilonema horridum* sp. nov. is characterized by the number of annules (130-131 in adult), the cuticular ornamentation of large vacuoles and spines (large ventral and long dorsal fields plus lateral longitudinal row in posterior body), two strong supporting setae on each side, eight to nine subcephalic setae; sexual dimorphism in amphidial fovea: lope shaped with flap with circular outline in male, spiral in female; copulatory thorns arranged in four subventral rows, the inner rows with five or six well developed thorns followed at some distance by one to two thorns, long spicules (67-72 µm) and gubernaculum with a small trough-like corpus and two narrow oblique apophyses.

### Relationships and discussion

Obviously, the spiny cuticular ornamentation, as well as the long spicules and the display of copulatory thorns in male, distinguishes this new species from all other *Leptepsilonema*. Additionally, arrangement and number of subcephalic setae are aberrant for the genus: the typical division in an anterior group of six setae, and a posterior group of two setae, is less obvious in the new species with eight setae more or less anterior to the fovea and one seta either on the posterior part of the head or inserted on the first annule only on one side.

Variability in number of subcephalic setae is known from other epsilonematid genera, for example in *Epsilonema*, a

genus where the majority of the members have eight setae at the base of the cephalic capsule, but two (of the 23 taxa) have six, and one has 10-16 setae. In *Polkepsilonema*, the number of subcephalic setae varies from 13 to 21.

### Characters and codes used in the polytomous key (Tables 5 and 6)

Seven discriminating characters were chosen for erecting the key, four being common to both sexes. The “prime characters” (indicated by bold in the key) placed first, which permits an early easy differentiation into smaller groups.

### MALES

#### A. Number of body rings

1. < 120
2. 120 – 140
3. > 140

#### B. Main cuticular ornamentation

1. small vacuoles
2. large rectangular vacuoles
3. striae or ridges
4. spines/thorns

#### C. Body length (in µm)

1. < 300
2. 300 – 399
3. 400 – 500
4. > 500

#### D. Relation maximum / minimum body diameter

1. < 1.5
2. 1.5-2.5
3. > 2.5

#### E. Copulatory thorns

1. absent
2. in one group: either one or a few longitudinal rows or a field
3. in two groups: representing either a longitudinal row of single and/or paired thorns or a field
4. in three groups: representing a longitudinal row of single and/or paired thorns, or a field

#### F. Spicule length (in µm)

1. < 30
2. 30 – 39
3. 40 – 49
4. 50 – 59
5. > 60

**Figure 8.** *Leptepsilonema horridum* sp. nov.. Juvenile type specimens **A-B**, third stage, entire body and head region, surface view; **C-F**, fourth stage, posterior body region and head region.

**Figure 8.** *Leptepsilonema horridum* sp. nov.. Spécimens types, juvéniles : **A-B**, habitus et région céphalique d'un troisième stade en vue superficielle ; **C-F**, régions postérieure et céphalique d'un quatrième stade.

### G. Geographic distribution

1. ANE (Channel, North Sea)
2. ASW (West Indies)
3. INW (Japan)
4. ISE (Galapagos)
5. ISEW (Indonesia ; New Caledonia)
6. ISW (Kenya))
7. MED (Mediterranean)
8. PSW (North Chile)

### FEMALES

Same discriminating characters A-D

### E. Supporting setae

1. well differentiated from ambulatory setae
2. not clearly differentiated

### *Polkepsilonema guirali* sp. nov. (Figs 9-11)

Type material. Holotype, male on slide BN 454 (MNHN); paratypes, 5 males BN 454- 455 and RIT 625 (2)- 626 (KBIN), 3 females BN 456 (2) and RIT 626, 37 juveniles BN 456, 459-462 and RIT 634-638.

Type locality. Indonesia, beach on Seribu Island, NW Djakarta, Java. Habitat, intertidal in coarse sand; collected by D. Guiral September 1994. The population is co-occurring with *Leptepsilonema filiforme* and *Perepsilonema kellyae*.

Etymology. Species named in honour of our colleague and collaborator Dr Daniel Guiral, ORSTOM.

Measurements: in table 4.

### Description

#### Males

Body epsilon-shaped, with greatest body width in the posterior region. 122-124 annules, cuticle well developed with clear hyaline overlap; annules in pharyngeal region, 4.5 µm wide dorsally (hyaline part not included) and 7 µm wide with overlapping hyaline part; six anteriormost rings smooth or finely granulated, from sixth ring on, a single row of large rectangular vacuoles. From the narrow body region between the curvatures on, annular ridges can be observed between the vacuoles, protruding from the posterior border of the annule as small spiny structures, being most obvious ventrolaterally in the anterior ambulatory region; dorsally, fine spines are present in narrow body region in between

both curvatures; inversion in direction occurring dorsally at the ventral curvature opposite annule 59 in holotype (60-62 in paratypes) and ventrally at the level of the dorsal curvature opposite annule 42 in holotype (40-44 in paratypes). Copulatory thorns, varying intraspecifically in total number (from 6 to 10), in position (in a continuous longitudinal row Fig. 10 F or arranged in two consecutive groups, Figs 10 C-E) and in size (the anterior two or three thorns strongly developed, followed by medium-sized and small thorns). Posterior-most thorn followed by a fine ventral seta. In the cloacal region, two small subventral thorns present shortly anterior to the cloacal opening and cloacal opening flanked by a pre- and a post-cloacal thorn. Somatic setae rather long but some very short setae are present dorsolaterally in pharyngeal region.

Ambulatory setae of two types: a) the typical fine, double bent setae with distally bent tip, arranged in six longitudinal rows (9-10 setae on the four inner rows and four to six on the external row; b) halfway the ambulatory region, on each side an outer row of three to four stout setae, slightly curved. Posterior to them, three groups of respectively three, two and three short strong subventral somatic setae.

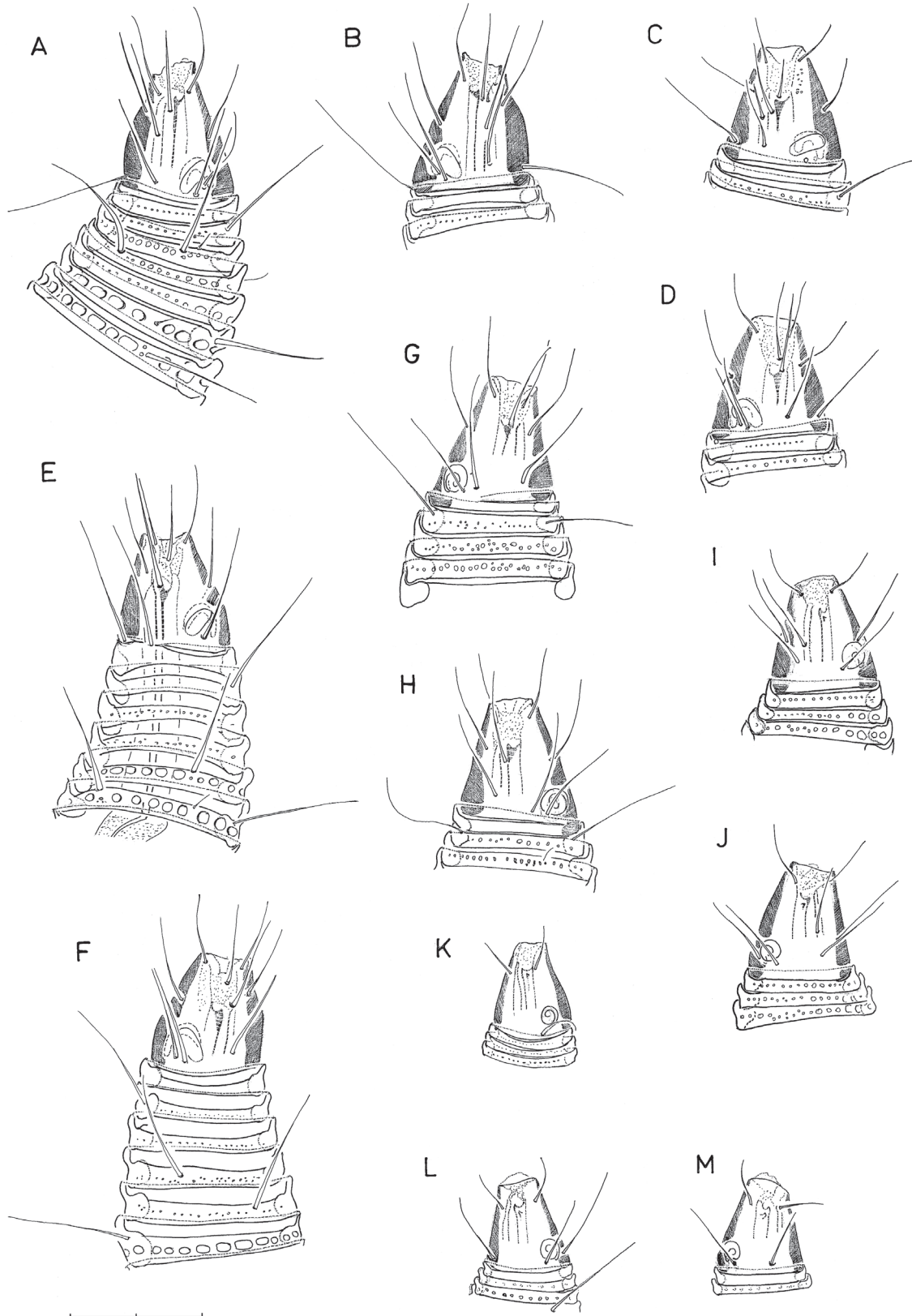
Cephalic capsule tapered anteriorly, labial region retracted in fixed specimens; four cephalic setae and 16 subcephalic setae in holotype (13 to 17 in paratypes). Subcephalic setae in holotype arranged as follows: - a posterior transverse row of four setae on each side just in front of the head border, one subventral, one lateroventral and two laterodorsal at the base of the amphidial fovea; - anteriorly, just posterior to the cephalic setae are two setae (one subventral and one lateroventral) and at mid-rostrum two setae (one subdorsal and one lateroventral). The posterior row of four setae on each side of the head is constant except for one male with 13 subcephalic setae having two setae inserted on the anterior border of the first body ring; in some specimens an additional seta was observed lateroventrally at mid-rostrum. Amphidial fovea loop-shaped with flap.

Stoma with a small dorsal tooth and two (?) subventral denticles, posteriorly narrow, with thickened wall, extending to anterior end of the sixth body annule. Pharynx with a thinner lumen wall except at the level of the large rounded muscular posterior terminal bulb with thickened and well sclerotized lumen wall.

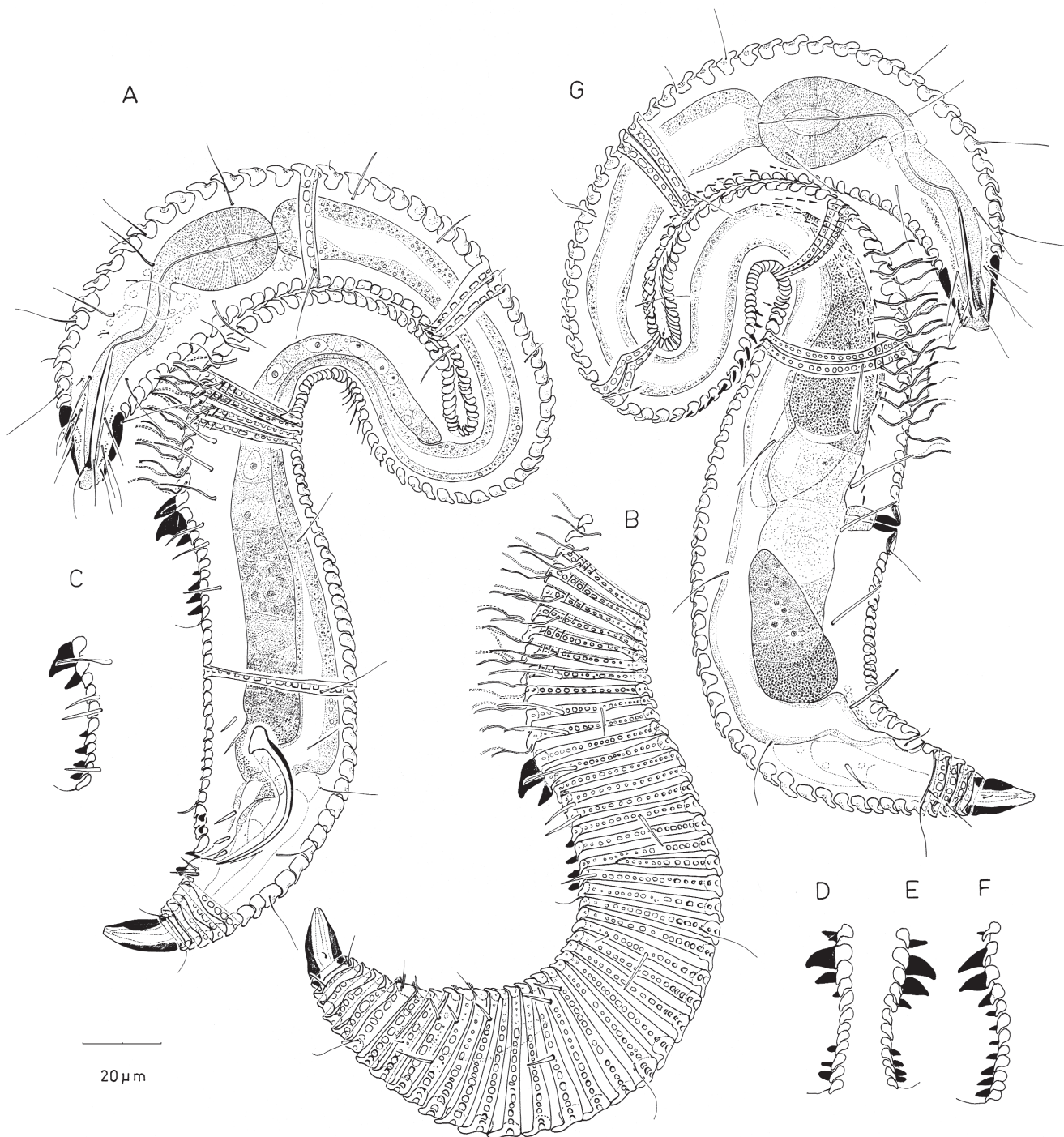
**Figure 9.** *Polkepsilonema guirali* sp. nov.. Head region, surface view A-B. holotype male, respectively left and right side; C-D. paratype male, respectively left and right side; E-F. paratype male, respectively left and right side; G-H. paratype female, respectively right and left side; juvenile paratype specimens I-J. fourth stage, respectively left and right side; K. second stage; L-M. third stage, respectively left and right side.

**Figure 9.** *Polkepsilonema guirali* sp. nov.. Région céphalique en vue superficielle, A-F côtés gauche et droit respectivement : A-B. holotype mâle, C-D. paratype mâle, E-F. autre paratype mâle ; G-H. paratype femelle, respectivement côtés droit et gauche. Paratypes juvéniles, côtés gauche et droit respectivement des I-J. quatrième stade, K. second et L-M. troisième stades.



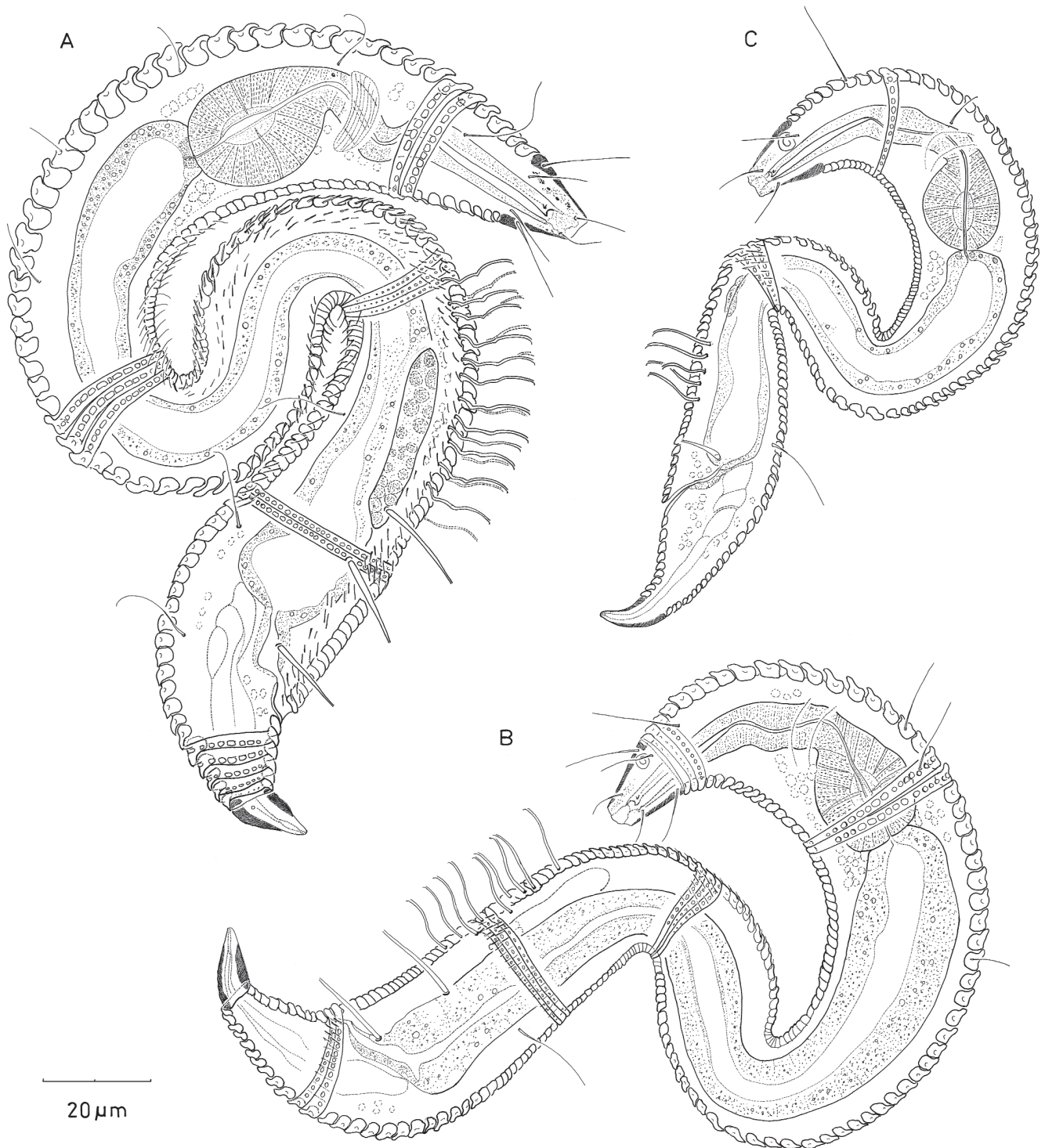


20  $\mu\text{m}$



**Figure 10.** *Polkepsilonema guirali* sp. nov.. Holotype male: **A.** entire body; **B.** posterior body region, surface view; **C-F.** copulatory thorns, paratype males; **G.** paratype female, entire body.

**Figure 10.** *Polkepsilonema guirali* sp. nov.. Holotype male : **A.** habitus ; **B.** région postérieure du corps en vue superficielle ; **C-F.** cornes copulatrices de paratypes mâles; **G.** habitus d'un paratype femelle.



**Figure 11.** *Polkepsilonema guirali* sp. nov.. A-C. juvenile paratype specimens, respectively fourth, third and second stage.

**Figure 11.** *Polkepsilonema guirali* sp. nov.. A-C. Paratypes juvéniles respectivement des quatrième, troisième et second stades.

**Table 4.** Morphometric data of *Polkepsilonema guirali* sp. nov.  
**Tableau 4.** Morphométrie de *Polkepsilonema guirali* sp. nov.

	Holotype	males (n = 6)			females (n = 3)			juv. female	juv. III (n = 10)			juv. II (n=10)							
		Min	Max	AVG	SD	Min	Max		AVG	SD	Min	Max	AVG	SD					
L	455	455	545	485.8	31.3	445	465	451.7	9.4	365	335	250	300	270.4	14.4	185	230	208.0	12.3
N	122	122	124	122.5	0.8	121	123	121.7	0.9	129	131	136	144	140	2	107	113	110	2
amph	4.5	4	6	4.9	0.6	3.7	4.5	4.1	0.3	3	3.9	2.5	3.4	2.9	0.2	2.0	3.0	2.7	0.4
amph %	26	26	33	29.3	2.3	24	30	26.3	2.6	20	29.0	22.0	30.0	23.8	2.4	21.0	28.0	24.7	2.6
cs	12	8	12	10.3	1.5	10	12	11	0.8	12	10.5	5.7	9.0	7.2	1.1	4.5	8.0	6.5	1.1
subes	12	11	12	11.6	0.5	12	18	14.3	2.6	13									
hl	19	18	20	18.8	0.9	18	20	19	0.8	16									
hw	19	17	19	18.3	0.7	17	20	18.3	1.2	15	16.8	12.0	14.6	13.4	0.8	11.0	12.0	11.2	0.4
ph	91	87	100	92.2	4.1	94	99	97.3	2.4	88	77.0	67.0	75.0	71.5	2.8	59.0	66.0	62.0	2.2
mbd ph	32	31	34	33	1.2	36	40	37.7	1.7	34	33.0	26.0	33.0	30.2	1.8	20.0	25.0	23.7	1.4
(mbd)	22	21	23	22.3	0.7	19	21	19.7	0.9	23	22.0	16.0	24.0	19.1	2.6	14.0	17.0	15.4	1.0
mbd	39	37	40	38.3	1.1	49	54	52	2.2	36	34.0	21.0	28.0	25.7	2.2	18.0	23.0	20.0	1.4
abd	24	23	29	25.2	2.2	21	28	24.7	2.9	24	22.0	18.0	23.0	20.2	1.8	13.0	18.0	15.9	1.5
t	36	36	45	40.8	3.3	34	40	36.7	2.5	36	31.0	26.0	37.0	32.0	3.0	24.0	33.0	27.9	2.7
tnr	15	15	20	17	1.5	15	18	16.7	1.2	15.5	10.5	9.0	12.5	11.1	1.0	7.0	12.5	9.6	1.7
tnr %	41.7	37.8	44.7	41.7	2.4	44	47	45.3	1.2	43	33.9	29.7	37.9	34.7	2.3	26.9	41.7	35.0	4.9
Asl	11	11	13	12.4	0.8	12	15	13.3	1.2	16	12.0	10.0	14.7	13.3	1.4	10.0	14.0	12.1	1.2
Ssl	11	10	17	13.8	2.8	18.5	20	19.2	0.6	22	18.0	13.6	18.0	15.7	1.4	11.0	17.0	13.2	2.2
spic	52	45	52	48.5	2.4														
gub/v	8	8	12	10.3	1.2	318	339	329.3	8.7										
a	11.7	11.7	14.7	12.7	1.1	8.2	9.1	8.7	0.3	10.1	9.9	9.5	12.4	10.6	0.8	9.3	12.1	10.4	0.7
b	5.0	5.0	5.6	5.3	0.2	4.5	4.7	4.6	0.1	4.1	4.4	3.4	4.2	3.8	0.2	3.1	3.7	3.4	0.2
c	12.6	10.9	13.3	12.0	0.9	11.1	13.1	12.4	0.9	10.1	10.8	7.0	10.8	8.5	1.1	6.3	9.2	7.5	0.8
c'	1.5	1.4	2.0	1.6	0.2	1.4	1.7	1.5	0.2	1.5	1.4	1.2	1.9	1.6	0.2	1.6	1.9	1.8	0.1
V						71.5	74.4	72.9	1.2										
mbd/(mbd)	1.8	1.6	1.9	1.7	0.1	2.3	2.8	2.7	0.2	1.6	1.5	1.1	1.6	1.4	0.2	1.1	1.4	1.3	0.1



**Table 5.** Polytomous key to species of the genus *Leptepsilonema* : males.**Tableau 5.** Clé polytomique pour les mâles des espèces du genre *Leptepsilonema*.

	number specimens	A n° rings	E cop. thorn	B cuticle	C L	D mbd/ (mbd)	F spic. L.	G geo. distr.
<i>macrum</i>	2	1	<b>1</b>	<b>140</b>	333	111	333	80
<i>exile</i>	3	1	<b>2</b>	<b>100</b>	333	111	333	80
<i>parafiliforme</i>	3	1	<b>2</b>	<b>200</b>	122	222	111	20
<i>antonioi</i>	18	1	<b>2</b>	<b>230</b>	444	222	333	70
<i>procerum</i>	4	1	<b>2</b>	<b>230</b>	333	111	243	20
<i>filiforme</i>	13	1	<b>3</b>	<b>100</b>	132	121	142	45
<i>richardi</i>	4	1	<b>3</b>	<b>230</b>	333	122	333	60
<i>horridum</i>	3	2	<b>3</b>	<b>240</b>	343	111	555	30
<i>santii</i>	10	2	<b>4</b>	<b>130</b>	333	121	344	70
<i>guirali</i>	7	2	<b>4</b>	<b>234</b>	343	222	343	50
<i>dauvini</i>	3	3	<b>3</b>	<b>130</b>	222	333	222	10

Reproductive system: a single testis situated ventrally and left of the intestine and reaching to the dorsal curvature. Spicules paired, strongly ventrally bent, provided with a marked beak-like capitulum and a ventral velum; gubernaculum small, trough-like.

Tail with seven annules including the end-ring; end-ring with or without a minute lateral seta on each side. Three caudal glands extending beyond the cloacal opening which is flanked by two short setae on each side.

**Table 6.** Polytomous key to species of the genus *Leptepsilonema* : females.**Tableau 6.** Clé polytomique pour les femelles des espèces du genre *Leptepsilonema*.

	number specimens	A n° rings	B cuticle	C L	D mbd/ (mbd)	E SS diff.	G geo. distr.
<i>filiforme</i>	12	<b>1</b>	<b>100</b>	132	222	1	45
<i>exile</i>	5	<b>1</b>	<b>100</b>	333	222	1	80
<i>macrum</i>	1	<b>1</b>	<b>140</b>	333	222	1	80
<i>parafiliforme</i>	1	<b>1</b>	<b>200</b>	122	222	1	20
<i>procerum</i>	4	<b>1</b>	<b>230</b>	333	222	1	20
<i>richardi</i>	1	<b>1</b>	<b>230</b>	222	222	1	60
<i>antonioi</i>	7	<b>1</b>	<b>230</b>	444	232	2	70
<i>santii</i>	10	<b>2</b>	<b>130</b>	333	222	1	70
<i>guirali</i>	3	<b>2</b>	<b>234</b>	343	233	1	50
<i>horridum</i>	3	<b>2</b>	<b>240</b>			1	30

## Females

Habitus similar to males. Body with 121 or 123 annules, largely ornamented as in males except for a field of fine spines ventrally from mid-bulb to dorsal curvature and on each side, a subdorsal longitudinal row of short thorn-like structures in narrow body region. Ambulatory setae arranged in six longitudinal rows with seven to twelve setae (mostly nine). On each side, five supporting setae, two of them anterior to the vulva, just posterior or at the level of the posteriormost ambulatory seta of the external row; one pair of adanal setae.

Cephalic capsule with four cephalic setae and twelve subcephalic setae: on each side, at posterior head border three setae (one lateroventral and two laterodorsal at the base of the amphidial fovea), one subdorsal seta at mid rostrum and just anterior to it two setae (lateroventral or lateroventral and subventral). Amphidial fovea small, spiral with 1 1/2 turns, ventrally wound and shifted subdorsally.

Reproductive system didelphic, amphidelphic with reflexed ovaries in opposite direction in relation of the intestine: anterior branch reflexed left, posterior reflexed right of the intestine, or reverse. Vagina bipartite, the *vagina vera* 6 µm long, *vagina uterina* 8 µm long; no differentiated spermathecae. Vulva between the 95th and 96th annule.

Tail with six annules, including conical end ring. Caudal glands as in male.

## Juveniles

Habitus similar to female. Several specimens with head covered with rod-shaped bacteria.

- Fourth stage juveniles (n = 2). Body with 129-131 annules with vacuolar ornamentation as in adults but with a more extended spiny ornamentation: a field of fine spines ventrally extending from pharyngeal bulb to anus and dorsally from dorsal curvature to halfway between posterior end of ambulatory region and anus; inversion of annule direction dorsally between annules 65-66 or 67-68, and ventrally between annules 50-51 or 46-47. Ambulatory setae fine, double bent, arranged in four longitudinal rows, the external rows with ten to eleven setae, the inner rows with six to eighth setae; one specimen had on the left side an additional seta outside of the external row and just anterior to the first supporting seta. Three pairs of strong supporting setae. Tail with eight annules, including conical end ring. Rostrum with four cephalic setae and ten subcephalic setae: in front of posterior head border: one seta laterodorsal at the base of the amphidial fovea and one seta lateroventral on both sides of the head, more anteriorly three setae on each side: one subdorsal at the level of the amphidial fovea or just anterior to it, one seta lateroventral and one setae subventral at level of the anterior border of the fovea. Amphidial fovea as in female, spiral with 1 1/2 turns.

Young females with genital system 32-39 µm long.

- Third stage juveniles (n = 20). Body with 136-144 annules, ornamented as in fourth stage but dorsal spiny ornamentation may extend to anal region. Ambulatory setae double bent, arranged on two rows but with setae not strictly lined up, each row with nine to eleven setae. Two strong supporting setae. Tail mostly with ten annules, including end ring. Rostrum with four cephalic setae and five subcephalic setae (three setae in one specimen), with on each side one laterodorsal seta at the base of the amphidial fovea, one lateroventral seta, and a single dorsal seta. Amphidial fovea as in female, a laterodorsal spiral structure with 1 1/2 turns. Genital system 27-35 µm long.

- Second stage juveniles (n = 15). Body with 107-112 annules with vacuolar ornamentation as in adults; ridges between vacuoles slightly protruding from anterior border in anterior body region, reverse in posterior body region; spiny field dorsally in narrow body region and ventrally from ventral curvature to anus. Ambulatory setae fine, bent at distal tip, arranged more or less on two longitudinal rows of five setae but with the third and fifth setae (counting from anterior) inserted slightly more laterally. One pair of strong supporting setae. Tail with ten or eleven annules including end ring. Rostrum with four cephalic setae; rarely one laterodorsal subcephalic seta on each side but mostly with a laterodorsal seta on each side on the anterior border of the first body annule (rarely second annule). Amphidial fovea as in female, spiral with about two turns. Genital primordium, 7.5-9.5 µm long, consisting of a few cells.

#### Diagnosis

*Polkepsilonema guirali* sp. nov. is characterized by the number and location of copulatory thorns, the number of subcephalic setae, and the appearance of the dorsal spines.

Differential diagnosis. The new species most closely resembles the type species, *P. mombasae* Verschelde & Vincx, 1993, in having about the same number of annules in adults (although with a narrower range), the same number of subcephalic setae, and a similar vacuolar ornamentation. It also resembles *P. firmatum* Goubault & Decraemer, 1994 in annule number and vacuolar ornamentation but differs in possessing fewer subcephalic setae. The differences between the three species in the genus are summarized in Table 7.

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**Table 7.** Comparison between the three species of the genus *Polkepsilonema*.

**Tableau 7.** Tableau comparatif des trois espèces du genre *Polkepsilonema*.

	<i>guirali</i>	<i>mombasae</i>	<i>firmatum</i>
N° of annules:			
- males	122-124	112-122	120-122
- females	121-123	110-119	120-124
- juv IV	129-131	116, 117	130, 135
- juv III	136-144	117	127-132
- juv II	107-112	122	140
L: males (µm)	455-545	538-604	430-500
Spicule length (µm)	45-52	55-61	38-47
Copulatory thorns	one or two groups of 2-4 + 3-4 mid-ventral thorns + 2 pairs of precloacal thorns	7 pairs of subventral thorns + 3-5 single mid-ventral thorns	one ventral field of thorns
N° subcephalic setae:			
- males	16 (13, 17)	16 (14-18)	21
- females	12	16	19
- juv IV	10	10	10
- juv III	5	8	9
- juv II	0 (1)	4	5
dorsal spines	fine	thorn-like	fine
supporting setae:			
- females	5	5-7	5
- juv IV	3	3	3
- juv III	2	2	3
- juv II	1	2	2

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