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Marine nematodes from Guadeloupe and other Caribbean Islands. VII. The genus *Epsilonema* (Epsilonematidae)

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Summary

Five new species of the genus *Epsilonema* (*E. cryptamphis* sp.n., *E. margaritatum* sp.n., *E. meunierorum* sp.n., *E. oodamphis* sp.n. and *E. paralasium* sp.n.) are described from the coralline littoral deposits of Guadeloupe, its satellite islands and other Caribbean islands. Additional information is given for *E. lasium*, and *E. mangrovense* is redescribed.
Key-words: *Epsilonema*, taxonomy, Guadeloupe.

Résumé

Description de cinq espèces nouvelles du genre *Epsilonema* (*E. cryptamphis* n.sp., *E. margaritatum* n.sp., *E. meunierorum* n.sp., *E. oodamphis* n.sp. and *E. paralasium* n.sp.), provenant des sédiments coralliens du littoral de la Guadeloupe, de ses satellites et d'autres îles des Caraïbes. Des données complémentaires sont fournies pour *E. lasium*, et *E. mangrovense* est redécrite.
Mots-clefs: *Epsilonema*, taxonomie, Guadeloupe.

Introduction

As part of a series of papers on the littoral meiobenthos of the Lesser Antilles, this paper deals with a study of the Caribbean nematode fauna. A large number of sediment samples were taken from intertidal and subtidal localities in Guadeloupe and its satellite islands, and in Martinique (RENAUD-MORNANT & GOURBAULT, 1981; RENAUD-MORNANT *et al.*, 1983; GOURBAULT *et al.*, 1985).

Eleven species of *Epsilonema* STEINER, 1927 have been found among the samples: *E. cryptamphis* sp.n., *E. margaritatum* sp.n., *E. meunierorum* sp.n., *E. oodamphis* sp.n., *E. paralasium* sp.n., *E. lasium* LORENZEN, 1973, *E. mangrovense* CLASING, 1983, *E. cf. pustulatum* LORENZEN, 1973, *Epsilonema* sp.1, *Epsilonema* sp.2, *Epsilonema* sp.3 (due to the restricted number of specimens available the three last species are left unnamed).

Material and methods

Epsilonema specimens were collected regularly, but in general in a small number and in a few sampled stations only. The collecting methods have been described elsewhere (Gourbault & Decraemer, 1987). Nematodes were mounted on slides in anhydrous glycerin. The drawings were made with the aid of a camera lucida of Reichert Polyvar. Type specimens are deposited in the nematode collections of the Museum national d'Histoire naturelle, Paris (MNHN) and the Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussel (KBIN).

Abbreviations used in the text

ABD	body diameter at level of anus
A sl	length of anteriormost ambulatory seta of external subventral row
amph (%)	diameter of amphid as a percentage of the corresponding head diameter
cs	length of cephalic setae
gub	length of gubernaculum
hw	maximum headwidth
L	body length
mbd	maximum body diameter posterior body region
(mbd)	minimum body diameter
mbd ph	body diameter at the level of pharyngeal bulb
mbd/(mbd)	maximum body diameter divided by minimum body diameter
N	number of body rings
ph	length of pharynx
spic	length of spicules, measured along the median line
SSph	length of subdorsal somatic setae in pharyngeal region
Ss	length of anteriormost supporting seta
t	tail length
tmr	length of non-annulated tail region

tmr/t non-annulated tail region in relation to tail length
V position of the vulva as a percentage of the total body length from anterior
a,b,c, proportions of de Man (1880)
All measurements are in µm. Mean value between brackets.

Descriptions

Family Epsilonematidae Steiner, 1927
Subfamily Epsilonematinae Steiner, 1927
Genus *Epsilonema* Steiner, 1927

Epsilonema cryptamphis sp.n., Fig. 1

Type specimens:
Holotype male, slide AN611 in MNHN. Paratypes: 2 ♂♂, slides AN565, AN612 and 2 ♂♂, 1 ♀, 1 juv, slides RIT145-147, RIT169 in KBIN.

Type locality:
Iles des Saintes, plage de Pompierre, station 1, sample 223 (04.1984).

Other localities:
Guadeloupe, Grande-Terre, Le Moule, station 4, samples 150 and 152 (12. 1983); La Désirade, anse du Souffleur, station 2, sample 86 (03. 1983).

Habitat:
Marine, in sandy beach interstitial waters. Coarse to medium (Md = 625-280 µm) and mixed or calcareous (69-93% $CaCO_3$) sand, in slight-sloped, low-energy beach. Temperature 26-27 C.

Etymology:
From greek Χρυπτος = hidden; because of the shape and localisation of the amphids, weakly spiralised and half covered by the first annule.

MEASUREMENTS

Holotype male.
L = 505, N = 78, cs = 8, hw = 19, amph (%) = 32, SSph = 18, A sl = 16, Ss = 18, ph = 91, mbd = 42, (mbd) = 24, mbd ph = 40, mbd/(mbd) = 1.8, spic = 60, gub = 7, ABD = 29, t = 43, tmr = 25, a = 12.0, b = 5.5, C = 11.7.

Paratype males (n = 3).
L = 360-490 (420), N = 78-81, cs = 7-9, hw = 17-18, amph (%) = 32-46 (39), SSph = 15-20, A sl = 16-17, Ss = 17-19, ph = 83-91, mbd = 33-44, (mbd) = 17-22, mbd ph = 34-44, mbd/(mbd) = 2.0-2.1, spic = 48-58 (53), gub = 9.5-11, ABD = 23-31, t = 36-51, tmr = 21-29, a = 10.6-11.1, b = 4.3-5.4, c = 9.6-10.6.

Paratype female (n = 1).
L = 435, N = 79, cs = 8.5, hw = 18, amph (%) = 41, SSph = 20, A sl = 15, Ss = 19, ph = 81, mbd = 57, (mbd) = 21, mbd ph = 50, mbd/(mbd) = 2.7, ABD = 22, t = 38, tmr = 27, V = 74%, a = 7.6, b = 5.4, c = 11.4.

Fourth stage juvenile (n = 1).
L = 360, N = 75, cs = 6.5, hw = 16, amph (%) = 54, SSph = 19, A sl = 12, Ss = 16, ph = 77, mbd = 34, (mbd) = 18, mbd ph = 39, mbd/(mbd) = 2.2, ABD = 21, t = 37, tmr = 22, a = 9.2, b = 4.7, c = 9.7.

DESCRIPTION

Males.
Bode ε-shaped, relatively large and stout, slightly enlarged in pharyngeal and posterior regions. Cuticle with 78-81 broad annules, heavy cuticularized, not overlapping (except a slight overlapping ventrally in posterior region), and ornamented with longitudinal bars from the hyaline outerlayer. Ornamentation faint or absent on anteriormost annules and on tail; up to slender mid-body and posterior to dorsal curvature, bars slightly protruding beyond anterior margin as minute spiny structures, reserve posteriorly where spiny projections of posterior margin of the annules are more pronounced (Fig. 1A).
Very fine somatic setae in eight longitudinal rows. Ambulatory setae fine, distally bent, arranged in five longitudinal rows with five to eight setae; external lateroventral rows followed by three fine supporting setae.
Head capsule, 18-19 µm wide at base, anteriorly tapered; lipregion withdrawn. Four cephalic and eight subcephalic setae (setae may be broken off). Amphidial fovea cryptospiral, 5.5-7 µm diameter, 32-46% of corresponding head diameter, ventrally whorled and slightly dorsolaterally shifted (Fig. 1C).
Buccal cavity with a small dorsal tooth and apparently minute (2) subventral denticles. Pharynx subcylindrical, with muscular endbulb; weakly muscular anterior part (28 µm long in holotype) with strong cuticularized lumen wall.
Tail short, with 4-6 annules.
Male reproductive system typical of the genus, but extending rather far anteriorly, up to the ventral curvature of the body. No copulatory thorns; in the ventral body wall of one of the paratypes thickened thorn-like projections are present on annules 14-15, 18-20 anterior to the cloacal aperture. Spicules, 48-60 µm long, arcuate, with offset capitulum; gubernaculum a short narrow cuticularized plate-like structure of the distal part of posterior cloacal wall (Fig. 1B).

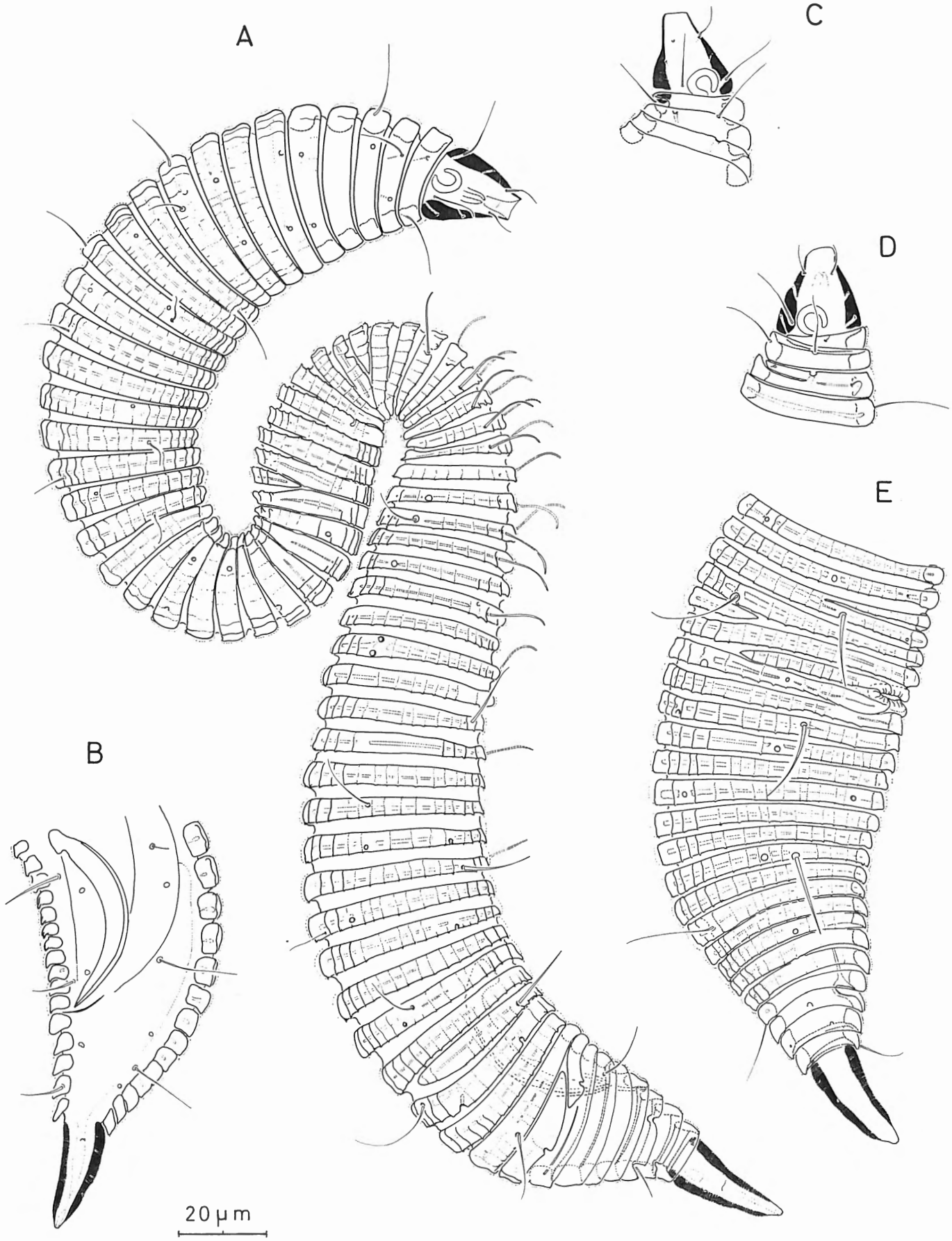

Fig. 1. Epsilonema cryptamphis *sp.n.* – *A. Whole mount of holotype ♂, surface view.* – *B. Male copulatory apparatus and tail (paratype).* – *C. Surface view of head (paratype ♂).* – *D. Surface view of head (paratype ♀).* – *E. Surface view of vulval and posterior body region (paratype).*

Female.
Similar to male in most respects. Body with 79 annules. Reproductive system typical of the genus; vulva at 74% of total body length from anterior. Ambulatory setae as in male, external rows followed by four supporting setae. Tail with four annules (Fig. 1E).

Juveniles.
First, second and third stages not found.

Fourth stage juvenile.
Habitus similar to adults. Body cuticle with 75 annules. Head capsule with four cephalic and ?eight subcephalic setae (most broken off). Amphidial fovea cryptospiral, 7.5 µm diameter, 54% of corresponding head diameter. Ambulatory setae arranged in five longitudinal rows with 3-6 setae; external lateroventral rows followed by two supporting setae. Inner structures obscure in the specimen available. Tail with five annules.

Diagnosis.
Epsilonema cryptamphis sp.n. is mainly characterized by its cryptospiral amphids, its habitus with a stout, rather large body with thick cuticularized annules not overlapping and, ornamented with longitudinal bars with spiny extensions, especially in posterior body region; in males, by the regular shape and the length of the copulatory apparatus.

Epsilonema margaritatum sp.n. (Fig. 2)

Type specimen:
Holotype male, slide AN613 in MNHN. Paratypes: 1 ♂, slide AN614 in MNHN; 1 ♂, slide RIT135 and 1 juv, slide RIT148 in KBIN.

Type locality:
Guadeloupe, Grande-Terre, anse Laborde, sublittoral sample, collection F. & C. Monniot (04. 1983).

Other localities:
Guadeloupe, plage des Raisins Clairs (11. 1984); Jamaica, collection P. Wagenaar Hummelinck, nr 1683* (06. 1973) (* stations listed in Wagenaar Hummelinck, 1977).

Habitat:
Marine, in lagoonal sediments as well as in sandy beach interstitial waters, in medium (Md = 225-500 µm), coralline (91-95% $CaCO_3$) sands.

Etymology:
= refers to the pearl-like structure of the body annules.

MEASUREMENTS

Holotype male.
L = 300, N = 104, cs = 6.5, hw = 16, amph (%) = 40, SSph = 16, A sl = 12, Ss = 8.5, ph = 57, mbd = 26, (mbd) = 15, mbd ph = 29, mbd/(mbd) = 1.9, spic = 39, gub = 7, ABD = 15, t = 31, tmr = 14, a = 10.3, b = 5.3, C = 9.7.

Paratypes males (n = 2).
L = 315-335, N = 97-104, cs = 6.5, hw = 15-16, amph (%) = 38-57, SSph = 13-18, A sl = 11-12, Ss = 12, ph = 56, mbd = 27-28, (mbd) = 15-17, mbd ph = 27-29, mbd/(mbd) = 1.7-1.9, spic = 39-41, gub = 7-8, ABD = 14-17, t = 29-34, tmr = 12-14, a = 10.9-12.0, b = 6.0, c = 9.3-11.6.

Fourth juvenile stage (moulting specimen into male) (n = 1).
L = 275, N = 90, cs = 6.5, hw = 17, amph (%) = 30, SSph = 8, A sl = 13, Ss = 17, ph = 64, mbd = 42, (mbd) = 24, mbd ph = 42, spic = 44, gub = 11, ABD = 20, t = 31, tmr = 13.

DESCRIPTION

Males.
Body small, ε-shaped, more or less swollen in pharyngeal and in posterior regions. Cuticle with 97-104 (102) annules. Body annules with rounded rectangular outline (in side view), not overlapping; hyaline outerlayer thin. Annules thickly cuticularized, anterior and posterior border striated (pearl-like impression), but cuticle smooth in anteriormost rings and endrings.
Somatic setae with well marked insertion, arranged in èight longitudinal rows of short and long setae. Ambulatory setae in four longitudinal rows, almost straight setae with slightly bent tip; external lateroventral rows with 7-8 setae followed by four longer supporting setae, and internal subventral rows with 12-13 setae extending far posteriorly.
Head capsule, 15-16 µm wide at its base, anteriorly tapered; lipregion withdrawn. Four cephalic and eight subcephalic setae. Amphidial fovea oblique, shepard's crook shaped, dorsolaterally in position.
Buccal cavity with small dorsal tooth; possible presence of two subventral denticles but not properly to identify (retracted lipregion). Pharynx more or less cylindrical with endbulb; anterior region (20 µm long) weakly muscular, with innerwall lumen more heavily cuticularized. Small cardia. Intestine with small finely granular cells.
Tail short, conical, with 9 annules. Caudal glands extending far anteriorly beyond anus. Two pair of preanal setae and usually one pair of short anal setae.
Male reproductive systeme typical of the genus, restricted to posterior body region (Fig. 2D). Copu-

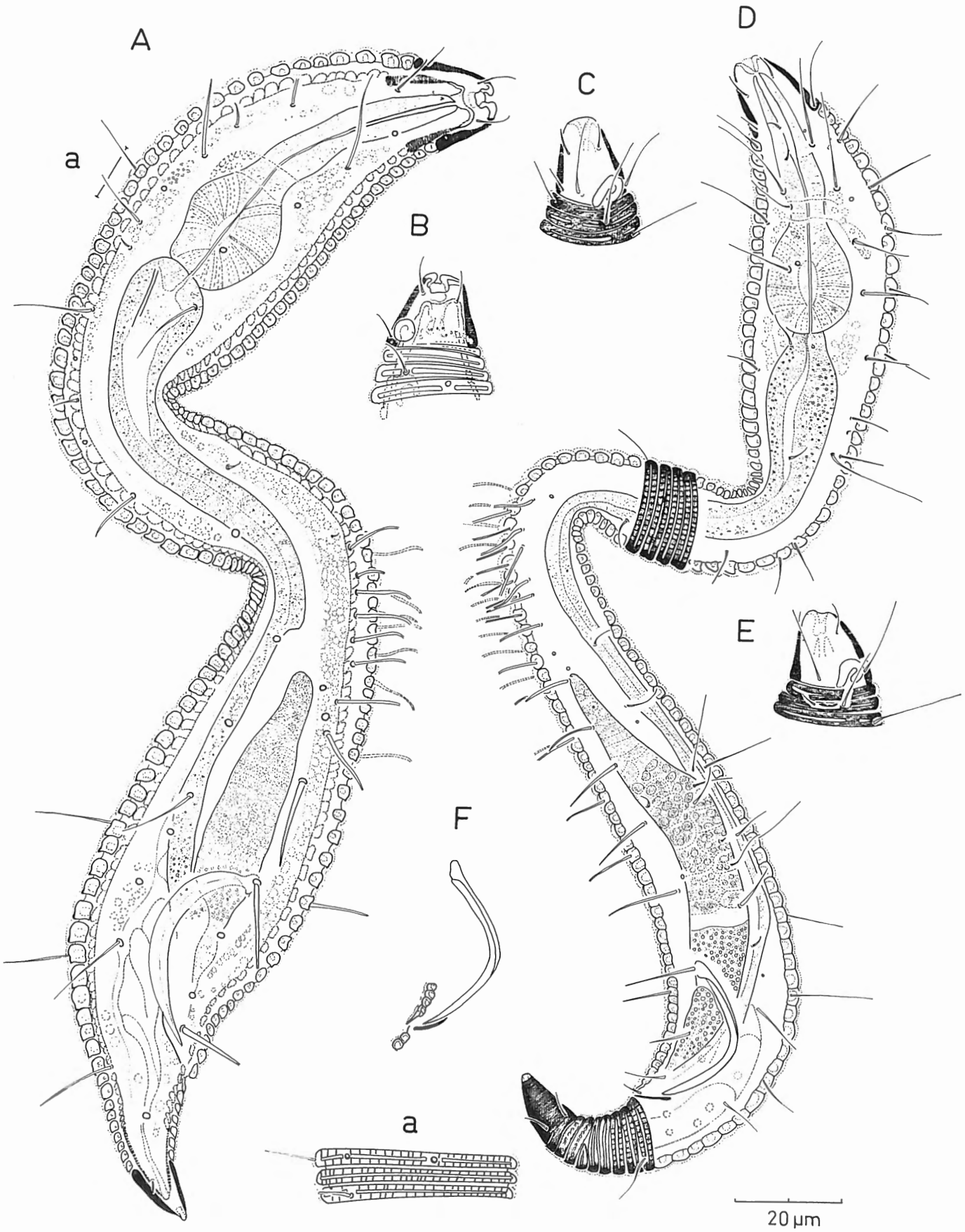

Fig. 2. Epsilonema margaritatum *sp.n.* – *A. Whole mount of a fourth stage juvenile moulting into male, longitudinal optical section with indication a of a surface view of body rings at level of base pharynx (paratype).* – *B. Surface view of head (fourth stage juvenile moulting specimen, paratype).* – *C. Surface view of head (holotype ♂).* – *D. Whole mount of holotype ♂, longitudinal optical section.* – *E. Surface view of head (paratype ♂).* – *F. Copulatory apparatus (paratype ♂).*

latory thorns absent. Spicules, 39-41 μm long, strongly arched, corpus relatively slender with slightly marked capitulum. Gubernaculum a short (7-8 μm long) bar-like structure in side view (Fig. 2F).

Female.
Unknown.

Juveniles.
First, second and third stages not found.

Fourth stage juvenile.
Habitus, ornamentation body cuticle (Fig. 2a) and arrangement of somatic setae as in adults, but cuticle with 90 annules only. Ambulatory setae as in adults, arranged in four longitudinal rows with 7-9 setae, outer rows followed by four supporting setae.
Head capsule with four cephalic and apparently four subcephalic setae. Amphidial fovea small spiral structures, about one single coil and ventrally whorled (Fig. 2B).
Digestive system as in adults. In the moulting specimen, male reproductive system as well as copulatory apparatus completely formed (Fig. 2A).
Tail with eight annules.

Diagnosis.
Epsilonema margaritatum sp.n. can be distinguished from all other species of the genus by:
— the structure of the body annules with rounded rectangular outline and with striated walls giving a pearl-like look,
— the shepard's crook shape of the amphidial fovea in males and small spiral amphids in juveniles;
— in males, by the narrow shape of the copulatory apparatus.

Epsilonema meunierorum sp.n. (Figs. 3-4)

Type specimens:
Holotype male, slide AN603 in MNHN. Paratypes: 14 ♂♂, 9 ♀♀, 3 juv, slides A,560, AN562, AN568, AN571, AN603-609, AN618; 7 ♂♂, 6 ♀♀, 3 juv, slides RIT131, RIT137-143, RIT146 in KBIN; 1 ♀ in RUG slide 843.

Type locality:
Iles des Saintes, plage de Pompierre, station 1, sample 223 (04. 1984).

Other localities:
La Désirade, anse du Souffleur, station 2, samples 86 (03. 1983) and 259 (05. 1984); anse Petite Rivière, station 3, samples 254 and 258 (05. 1984); Guadeloupe, Basse-Terre, La Grande Anse, station 14, sample 99 (03. 1983).

Habitat:
Marine, in sandy beach interstitial waters. Coarse to fine (Md = 625-180 μm) mixed but well irrigated sands.

Etymologie:
Species dedicated to Annick and Dr. Jean-Jacques Meunier (MNHN) in aknowledgement of their help during our initial collecting trip.

MEASUREMENTS

Holotype male.
L = 380, N = 87, cs = 6.5, hw = 16, amph (%) = 75, SSph = 14, A sl = 17, Ss = 9.5-10, ph = 80, mbd = 32, (mbd) = 18, mbd ph = 29, mbd/(mbd) = 1.8, spic = 35, gub = 10, ABD = 18, t = 39, tmr = 20, a = 11.9, b = 4.8, c = 9.7.

Paratype males (n = 9).
L = 350-420 (385), N = 84-94 (88), cs = 6.5-9, hw = 15-16, amph (%) = 69-81 (74.5), SSph = 11-16, A sl = 11-18, Ss = 6.5-11, ph = 73-85, mbd = 27-31, (mbd) = 17-21, mbd ph = 26-30, mbd/(mbd) = 1.5-1.8 (1.6), spic = 31-37 (35), gub = 6.5-11 (8), ABD = 17-20, t = 34-42, tmr = 17-22, a = 11.8-14.4, b = 4.1-5.1, c = 9.5-11.9.

Paratype females (n = 10).
L = 340-410 (380), N = 83-90 (86), cs = 6.5-9, hw = 15-16, amph (%) = 56-67 (59.5), SSph = 11-13, A sl = 16-19, Ss = 9-11, ph = 74-98, mbd = 32-42, (mbd) = 18-20, mbd ph = 24-35 (29), mbd/(mbd) = 1.7-2.2 (1.9), ABD = 16-19, t = 33-40 (36), tmr = 19-21, V = 68-74% (71%), a = 8.8-11.3 (10.5), b = 3.8-5.0 (4.7), c = 9.0-11.5 (10.7).

Fourth stage juveniles (n = 4).
L = 270-340 (315), N = 84-86, cs = 6.5-7, hw = 14-15, amph (%) = 50-61 (58), SSph = 11-12, A sl = 16-17, Ss = 10-11, ph = 66-74, mbd = 21-27, (mbd) = 18-20, mbd ph = 25-28, mbd/(mbd) = 1.4-1.5, ABD = 16-19, t = 35-39, tmr = 18-22, a = 10.8-12.6, b = 4.0-4.9, c = 7.5-9.7.

Third stage juvenile (n = 1).
L = 245, N = 83, cs = 6, hw = 12, amph (%) = 66.5, A sl = 17, Ss = 10, ph = 63, mbd = 16, (mbd) = 16, mbd ph = 22, mbd/(mbd) = 1.4, ABD = 15, t = 32, tmr = 17, a = 11.1, b = 3.9, c = 7.7.

DESCRIPTION

Males.
Body small, ε-shaped, slightly swollen in posterior pharyngeal and in posterior body regions. Cuticle with 84-94 annules. Annules with well developed hyaline

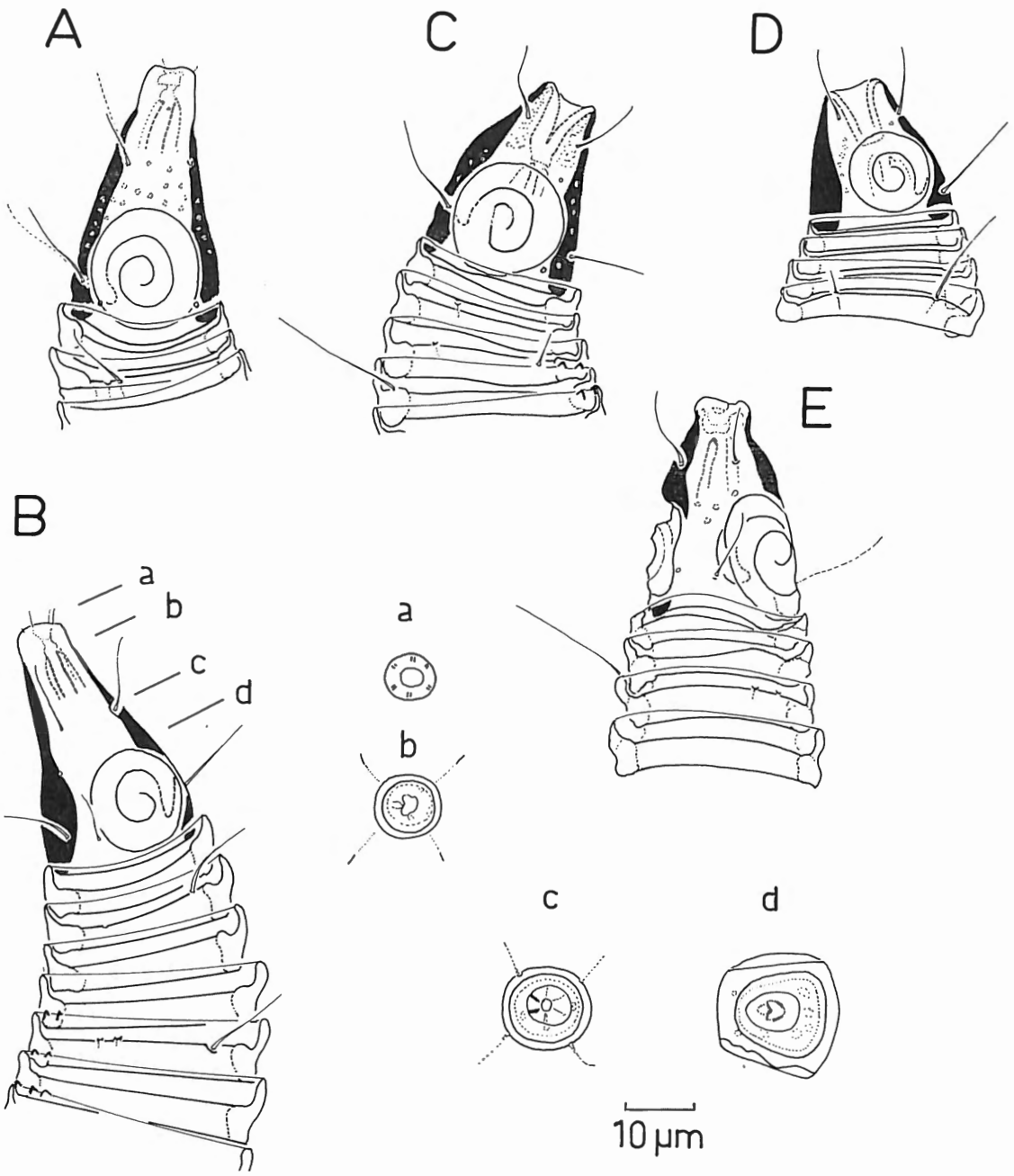

Fig. 3. Epsilonema meunierorum *sp.n.* – *Surface view of head in A. paratype ♂. – C. holotype ♂. – D. paratype juvenile fourth stage. – E. paratype ♂. – B. paratype ♀ with indications a-d of the levels at which the optical sections were made from another male; a: en face view, b-d: buccal cavity.*

outerlayer. Inversion in direction of the annules, ventrally at anterior curvature (between rings 35-36, holotype), and dorsally just before posterior curvature (ring 29, holotype). Cuticle with obscure vacuolar ornamentation, but anteriormost annules and tail rings smooth. In pharyngeal region, from about third ring on anterior margin of annules subventrally provided with small spines (Fig. 4b); in narrow mid-body region, posterior margin of posteriorly directed annules with minute spines, more pronounced in region ambulatory setae (Fig. 4D).

Short and long somatic setae intermingled, arranged in eight longitudinal rows, and more numerous in pharyngeal region. Ambulatory setae, knicked, with bent tip, arranged in four longitudinal rows: both external lateroventral rows with 6-8 setae and both inner subventral rows with 6-7 setae. Three to four supporting setae on each side.

Head end tapering; lipregion usually withdrawn in fixed specimens. Head 25 µm long when fully extended. Four cephalic and eight subcephalic setae, six apical labial papillae (Fig. 3a). Amphidial fovea a very large (12 µm diameter) spiral structure, ventrally whorled with 1¼th coil, located in posterior half of head and slightly laterally shifted. Cuticle head capsule with minute vacuoles (Fig. 3A, E, D).

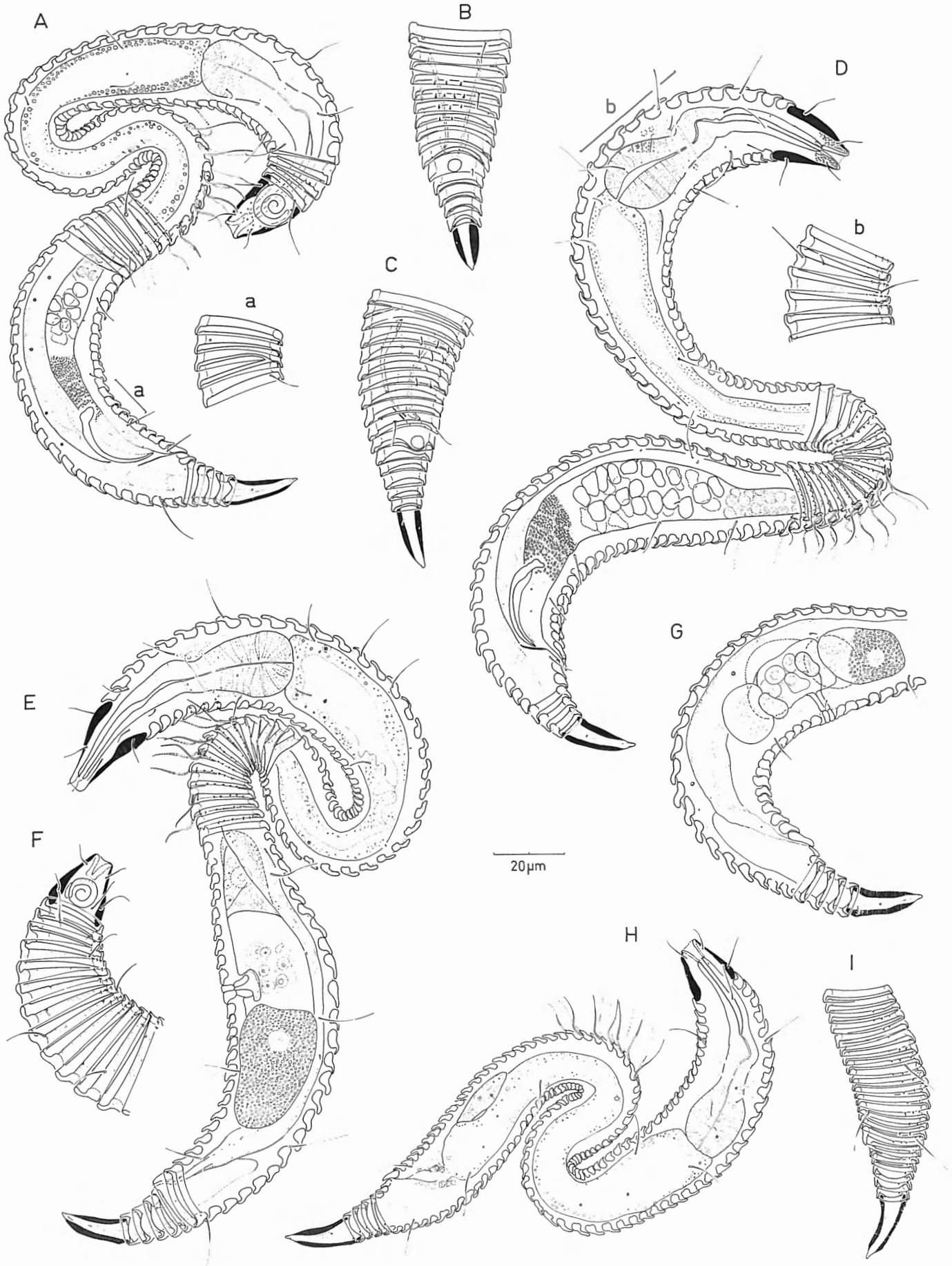

Fig. 4. Epsilonema meunierorum *sp.n. – A. Whole mount op paratype ♂with indication a, level at which body annules are represented in surface view. – B. Ventral view of posterior body region of paratype ♂, surface view. – C. Posterior body region (paratype ♂). – D. Whole mount of holotype ♂ with indication b, level at which body cuticle shown in surface view. – E. Whole mount of a paratype ♀, with part of body cuticle in surface view. – F. Surface view of anterior body region (paratype ♀). – G. Female reproductive system and surface view of tail (a paratype ♀). – H. Whole mount of a fourth stage juvenile (paratype). – I. Surface view of posterior body region of a fourth stage juvenile (paratype).*

Buccal cavity small, more or less subdivided by cuticular projections of the wall (Fig. 3A,B). Pharynx slightly protruding in buccal cavity with a small dorsal tooth and two minute denticles (Fig. 3A,d). Narrow cylindrical, weakly muscular anterior pharyngeal part with well cuticularized lumen wall (30 µm long in holotype); pharynx extending into a slightly wider muscular part with terminal bulb (Fig. 4D). Intestine with coarsely granular cells.
Tail short, conical, with 5-7 annules.

Male reproductive system typical of the genus and limited to the posterior body region. Testis with short germinative zone; growth zone with obscure spermatides lying ventral to the intestine and reaching at most to the posterior part of the ambulatory setae (Fig. 4A). Vas deferens with large, finely granular cells. Spicules 31-37 µm long, ventrally arcuate, with offset capitulum and corpus tapering to a pointed end. Gubernaculum, a thin sclerotized plate-like structure, 6.5-11 µm long, parallel to the spicules. Ventral to subventral field of 10-12 small copulatory thorns dispersed over four annules in spicules region (Fig. 4A-C).

Females.
Similar to males in most respects. Relation amphidial fovea/head diameter slightly smaller than in male (Figs. 3B, 4F).
Reproductive system didelphic-amphidelphic, with reflexed ovaries. Vagina bipartite, distal part sclerotized (Fig. 4E).

Juveniles.
First and second stages not found.

Fourth stage juveniles.
Habitus similar to adults (Fig. 4H). 84-86 annules. Body cuticle as in adults except for the presence of small spines dorsal to dorsolateral at posterior margin of the annules in posterior body region (Fig. 41). Only a faint indication of a few minute subventral spines at anterior margin of annules in pharyngeal region.
Head capsule with four cephalic and (?) four subcephalic setae (only subdorsal ones visible). Labial region retracted. Amphidial fovea, spiral, 7-9 µm diameter, ventrally whorled and a little over one coil (Fig. 3D); relation amphid/corresponding head diameter as large as in female.
Ambulatory setae in four subventral longitudinal rows of 6-7 setae. Two pairs of fine supporting setae.
Reproductive system short, with two branches with a few cells.
Tail with 6-7 annules.

Third stage juvenile.
Habitus similar to adults. Body cuticle 83 annules with similar ornamentation as in adults except for the lack of a spiny subventral field in pharyngeal region, and for the presence of small dorsal to subdorsal spines at the posterior margin of the annules in posterior body region. Head capsule with four cephalic and two subcephalic setae; lipregion retracted. Large spiral amphidial fovea, 8 µm in diameter at head base. Ambulatory setae arranged in two longitudinal rows of seven setae, each followed by two supporting setae. Reproductive system slightly developed, two small branches with a few cells. Tail with seven annules.

Diagnosis.
Epsilonema meunierorum sp.n. is characterized by the very large spiral amphids in posterior head region, by the ornamentation of the body annules with well developed hyaline outerlayer, with faint vacuoles and small spines in a subventral field in the pharyngeal region, at mid-body and in region of ambulatory setae in adults, with additional laterodorsal minute spines in juveniles posterior body region; in males, by the arcuate shape of the spicules and the presence preanally of a ventral to subventral field of small copulatory thorns.

Epsilonema oodamphis sp.n. (Fig. 5)

Type specimens:
Holotype male, slide AN610 in MNHN. Paratypes: 1 ♀, 1 ♂, slide AN610 in MNHN; 1 juv, slide RIT144 in KBIN.

Type locality:
Martinique. Grande anse du Diamant, station 13, sample 29 (02. 1981).

Habitat and distribution:
Marine, in sandy beach interstitial waters; medium and mixed sands (67% $CaCO_3$).

Etymology:
From Greek ωωδης, oval.

MEASUREMENTS

Holotype male.
L = 335, N = 101, cs = 4.5, hw = 13, amph (%) = 73, SSph = 11-12, A sl = 15, Ss = 10, ph = 73, mbd = 27, (mbd) = 18, mbd ph = 26, mbd/(mbd) = 1.5, spic = 37, gub = –, ABD = 18, t = 39, tmr = 17, a = 12.4, b = 4.6, c = 8.6.

Paratypes males (n = 1).
L = 360, N = 99, cs = 5.5, hw = 13, amph (%) = 74, SSph = 11, A sl = 14.5, Ss = 9.5, ph = 74, mbd = 24, (mbd) = 16, mbd ph = 24, mbd/(mbd) = 1.5, spic = 38, gub = 8, ABD = 17, t = 40, tmr = 17, a = 15.0, b = 4.9, c = 9.0.

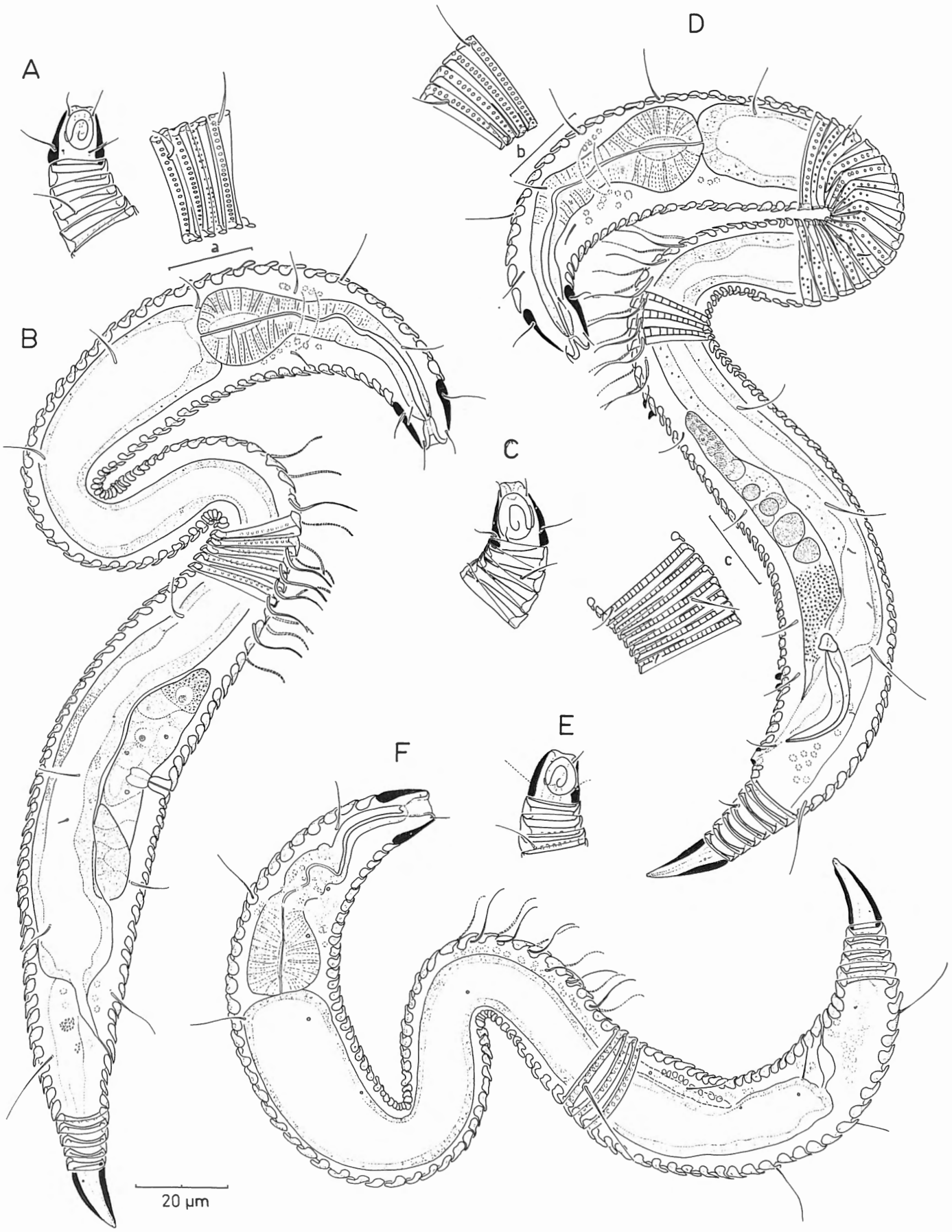

Fig. 5. Epsilonema oodamphis *sp.n.* – *A. Surface view of head region (paratype ♀). – B. Whole mount of paratype ♀ with indication a of the level at which the body cuticle is shown in surface view. – C. Surface view of head region (holotype ♂). – D. Whole mount of holotype ♂ with indications b,c of the levels at which the body cuticle is represented in surface view. – E. Surface view of head region of a third stage juvenile (paratype). – F. Whole mount of a third stage juvenile with parts of body cuticle in surface view (Paratype).*

Paratype female (n = 1).
L = 340, N = 100, cs = 5.5, hw = 12, amph (%) = 75, SSph = 16, A sl = 17, Ss = 14, ph = 67, mbd = 31, (mbd) = 19, mbd ph = 27, mbd/(mbd) = 1.6, ABD = 18, t = 39, tmr = 15, V = 70%, a = 11.0, b = 5.1, c = 8.7.

Paratype juvenile, third stage (n = 1).
L = 295, N = 92, cs = 3, hw = 11, amph (%) = 66, SSph = 12, A sl = 16, Ss = 10, ph = 66, mbd = 24, (mbd) = 18, mbd ph = 25, mbd/(mbd) = 1.4, ABD = 17, t = 38, tmr = 17, a = 11.8, b = 4.5, c = 7.8.

DESCRIPTION

Males.
Body small, ε-shaped, slightly swollen in pharyngeal and in posterior body regions. Cuticle with 99-101 annules, ornamented with a transverse row of rather large vacuoles; vacuoles at mid-body minute, numerous and irregularly dispersed (Fig. 5a, c); anteriormost rings and tail rings smooth. Annules overlapping by well developed hyaline outerlayer. Annales inversion ventrally at dorsal curvature (ring 30 in holotype), and dorsally at ventral curvature (ring 40 in holotype). Posterior margin of annules with minute subventral spines in region of anterior group of copulatory thorns.
Somatic setae in eight longitudinal rows in pharyngeal region, six rows posteriorly. Ambulatory setae, slightly bent at tip, arranged in four longitudinal rows: outer lateroventral rows with 6-7 setae and inner subventral rows with 8-9 setae. Five pairs of slender supporting setae.
Head capsule 13 μm wide at its base; lipregion withdrawn. Four cephalic and eight subcephalic setae. Amphidial fovea large spiral structure nearly oval in outline (8 × 10 μm, holotype), 1 to 1⅓ coil and ventrally whorled; largely covering the lateral sides of the head between cephalic and subcephalic setae (Fig. 5C).
Buccal cavity with small dorsal tooth. Pharynx with narrow cylindrical weakly muscular anterior part with strongly cuticularized lumen wall (26 μm long), and extending into a slightly wider muscular part with terminal bulb (Fig. 5D). Intestine finely granular.
Tail short, conical, with nine annules.
Male reproductive system typical of the genus and limited to the posterior body region. Testis with short germinative and growth zones; vesicula seminalis with a few large spermatozoa. Vas deferens with granular cells. Small copulatory thorns in two groups: three medioventral thorns with the anteriormost among the posterior ambulatory setae, and two medioventral thorns located on the 5-6 annules ahead to the cloacal opening (Fig. 5D). Short anal tube with reinforced wall. Spicules, 37-38 μm long, ventrally curved, corpus with marked capitulum, and tapering distally to a pointed end. Gubernaculum obscure.

Female.
Similar to male in most respects.
Reproductive system didelphic-amphidelphic with reflexed ovaries: anterior one reflexed to the left side, and posterior branch to the right side. Vagina bipartite; both parts about equal in length, distal part sclerotized (Fig. 5B).

Juveniles.
First, second and fourth stages not found.

Third stage juvenile.
Only differences with the adults are mentioned.
Body cuticle with 92 annules. Annules inversion ventrally between annules 36-37, dorsally between annules 40-41. Head capsule, 11 μm wide at its base. Four cephalic and four subcephalic setae. Amphidial fovea 5.5 × 8.5 μm diameter (Fig. 5E). Ambulatory setae in two subventral longitudinal rows of six setae, followed by two pairs of supporting setae. Relation tail/body length higher than in adults (Fig. 5F).

Diagnosis.
Epsilonema oodamphis sp.n. is characterized by:
— its large spiral amphidial fovea with oval-shaped outline,
— the ornamentation of the body cuticle with small to large vacuoles;
— in males, by the number and position of the copulatory thorns in two separate groups, and by the shape of the spicules with marked capitulum.

Epsilonema paralasium sp.n. (Fig. 6)

Type specimens:
Holotype male, slide AN601 in MNHN. Paratypes: 1 juv, slide AN619 and 1 ♀, 1 juv, slide RIT135 in KBIN.

Type locality:
Guadeloupe, le Moule, station 4, sample 27 (04. 1979).

Other localities:
Guadeloupe, anse Laborde, sublittoral sample, collection F. & C. Monniot (04. 1983).

Habitat:
Marine, in sandy beach interstitial waters. Coarse sand, close to embedded rocks, with silty elements.

Etymology:
related to *E. lasium.*

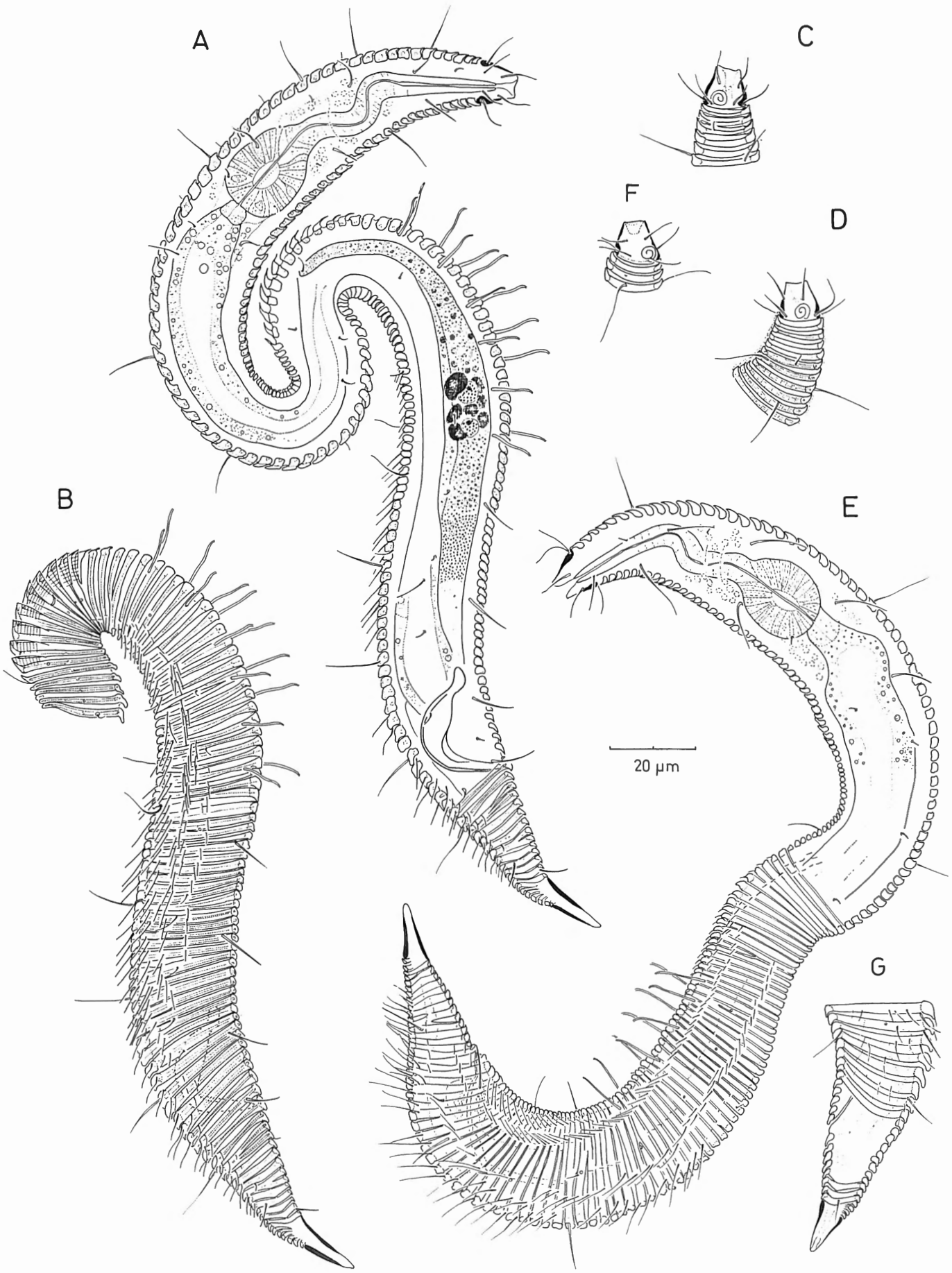

Fig. 6. Epsilonema paralasium *sp.n.* – *A. Whole mount of holotype ♂, surface view.* – *B. Surface view of posterior body region of holotype ♂.* – *C. Surface view of head region of holotype ♂.* – *D. Surface view of anterior body region of a fourth stage juvenile (paratype).* – *E. Whole mount of a fourth stage juvenile, posterior half in surface view (paratype).* – *F. Surface view of head (paratype ♀).* – *G. Posterior body region, partly in surface view (paratype ♀).*

MEASUREMENTS

Holotype male.
L = 395, N = 141, cs = 8.5, hw = 10, amph (%) = 45, SSph = 13, A sl = 13, Ss = 12, ph = 77, mbd = 25, (mbd) = 19, mbd ph = 25, mbd/(mbd) = 1.3, spic = 39, gub = 8, ABD = 20, t = 47, tmr = 19, a = 15.8, b = 5.1, c = 8.4.

Paratype female (n = 1).
L = 350, N = 135, cs = 8.5, hw = 11, amph (%) = 45, SSph = 18, A sl = 14, ph = 68, mbd = 29, (mbd) = 19, mbd ph = 24, mbd/(mbd) = 1.5, ABD = 16, t = 33, tmr = 19, V = 62%, a = 12.1, b = 5.1, c = 10.6.

Fourth stage juveniles (n = 2).
L = 270-325, N = 151, cs = 7, hw = 9-11, amph (%) = 45-50, SSph = 14, A sl = 12-13, Ss = 11, ph = 65-70, mbd = 20-27, (mbd) = 19-24, mbd ph = 23-27, mbd/(mbd) = 1.1-1.2, ABD = 16-19, t = 38-41, tmr = 15-16, a = 11.7-12.0, b = 4.2-4.6, c = 7.1-7.9.

DESCRIPTION

Male.
Body ε-shaped, slender, slightly wider in pharyngeal and in posterior body regions. Cuticle with 141 annules with slightly overlapping hyaline outerlayer. Annules inversion dorsally between rings 63-64 right in front of the ventral body curvature and, ventrally at the level of the dorsal body curvature between rings 54-55. Posterior margin of annules of mid-body region with ventral to subventral spine-like extensions being noticeably well developed between rings 63-72. Cuticle dorsally to dorsolaterally provided with longitudinal rows of well developed spines (6-7 μm long) from the ventral body curvature on to halfway along the tail; the long spines are flanked by a short row of short (2 μm) fine spines, less numerous and disappearing preanally (Fig. 6B).
Somatic setae in eight longitudinal rows, more numerous in pharyngeal region than on rest of the body. Ambulatory setae with bent distal tip, arranged in four longitudinal rows: external ventrolateral rows with six setae followed by four supporting setae; inner subventral rows with eight setae.
Head capsule short, 10 μm wide at base; lipregion withdrawn (Fig. 6C). Four cephalic setae, 8 μm long, and eight subcephalic setae. Amphidial fovea, a ventrally wound up spiral structure with 1¼th coil, 4.5 μm diameter and in a slightly dorsally shifted position.
Buccal cavity presumably with a minute dorsal tooth, difficult to observe. Pharynx, more or less cylindrical and with a muscular endbulb. In anterior part (24 μm long) pharynx weakly muscular and lumen wall more strongly cuticularized (Fig. 6A).
Tail conical, with 14 annules; endring slender, conical, dorsally to dorsolaterally subdivided by eight incomplete rings. Caudal glands anteriorly extending beyond cloaca.
Male reproductive system typical of the genus, but extending far anteriorly, slightly beyond the ventral body curvature (Fig. 6A). Testis with narrow germinal and growth zones; spermatids rather large granular cells. Vesicula seminalis with globular sperm cells, 3.5 by 4.5-5 μm in diameter. Spicules, 39 μm long, semicircularly arched, with large offset capitulum, and corpus proximally enlarged ventrally behind head and distally tapered. Gubernaculum, 8 μm, a thin trough-shaped structure. No copulatory thorns.

Female.
Body cuticle with 135 annules, with inversion in direction ventrally between annules 43-44 and, dorsally between rings 68-69. Annules showing a fine striation of the hyaline outerlayer; spiny ornamentation more or less as in male, except for the spines becoming longer, more numerous preanally and further dispersed over the annules.
Head and sensory organs (Fig. 6F), somatic setae, and digestive system as in male. Ambulatory setae in four longitudinal rows, extending posteriorly beyond vulva; external lateroventral rows with nine setae followed by two supporting setae, inner subventral rows with 7-9 setae.
Reproductive system typical of the genus, both branches reflexed to the right side; posterior branch with a developed oocyte, 18 × 43 μm. Vulva bipartite, with a sclerotized distal part (5 μm long) and a weakly cuticularized proximal part (4.5 μm long).
Tail with eight annules; endring subdorsally annulated, resulting in three incomplete rings (Fig. 6G).

Juveniles.
First, second and third stages not found.

Fourth stage juveniles.
Similar to adults for most characters. Cuticle with a larger number of annules (151) and ornamented as in female (Fig. 6E). Ambulatory setae in four longitudinal rows, outer lateroventral rows with 4-5 setae followed by 1-2 supporting setae, inner subventral rows with 5-6 setae.
Tail with 14-16 annules; endring dorsally subannulated with 3-4 incomplete rings.
Reproductive system of a young female consisting of two branches of several cells; future vulva region indicated by many nuclei. In a young male, spicular primordium present, reproductive system largely formed and anteriorly reaching the ventral body curvature.

Diagnosis.
Epsilonema paralasium sp.n. is characterized by the non-vacuolate ornamentation of the body cuticle, provided with longitudinal rows of spines; in male by the

enlarged shape of the spicules and the absence of copulatory thorns.

Differential diagnosis.
Epsilonema paralasium sp.n. is very close to *E. lasium* but differs by lacking a vacuolar ornamentation of the body cuticle and by a different arrangement of cuticular spines; by the presence of eight subcephalic setae instead of six in *E. lasium*; in male by the absence of copulatory thorns and by the thickening of spicules; the structure of the sperm cells is different.

Epsilonema lasium LORENZEN, 1973 (Fig. 7)

Localities and material:
Guadeloupe, Grande-Terre, anse à la Baie, station 5, sample 47 (04. 1979): 2 ♀♀, 1 juv; îles des Saintes, plage de Pompierre, station 1, sample 35 (04. 1979): 1 juv; La Désirade, anse d'échelle, station 1, sample 33 (04. 1979): 1 ♀, anse du Souffleur, station 2, sample 43 (12. 1982): 1 ♂, sample 181 (12. 1983): 1 ♀, 1 ♂, anse Petite Rivière, station 3, sample 178 (12. 1983): 1 juv, sample 179: 1 ♀; La Marie-Galante, baie de Saint-Louis, station 7, sample 6 (02. 1981): 3 ♂♂, 1 ♀, 1 juv; Martinique, anse Figuiers, station 11, sample 34 (02. 1981): 2 ♂♂, 2 ♀♀, 2 juv; Grande anse du Diamant, station 13, sample 29 (02. 1981): 1 ♀.

Specimens deposited in collections:
3 ♂♂, 3 ♀♀, slides AN597-AN600 in MNHN, and 2 ♂♂, 4 ♀♀, 4 juv, slides RIT416, RIT149-RIT152 in KBIN.

MEASUREMENTS

Males (n = 2).
L = 270, N = 153-154, cs = 7.5, hw = 9.5, SSph = 12-14, A sl = 12-13, Ss = 4.5-6, ph = 54-58, mbd = 20-21, (mbd) = 15-16, mbd ph = 20-21, mbd/(mbd) = 1.3-1.4, spic = 35-38, gub = 3.5-4.5, ABD = 14, t = 33-36, tmr = 14-15, a = 12.9, b = 4.7-5.0, c = 7.5-8.2.

Females (n = 4), with ventral thorn-like spines.
L = 230-280, N = 146-151, cs = 7-8, hw = 9-10, amph (%) = 35-44, SSph = 12-16, A sl = 13, ph = 56-65, mbd = 25-27, (mbd) = 16-17, mbd ph = 21-23, mbd/(mbd) = 1.5-1.6, ABD = 13-14, t = 30-34, tmr = 13-14, V = 54-66% (63.5%), a = 8.9-11.2, b = 4.1-4.9, c = 7.0-9.3.

Female (n = 1), without ventral thorn-like spines.
L = 340, N = 160, cs = 7, hw = 10, amph (%) = 42, SSph = 15, A sl = 14, ph = 61, mbd = 28, (mbd) = 18, mbd ph = 28, mbd/(mbd) = 1.6, ABD = 15, t = 36, tmr = 15, V = 65%, a = 12.1, b = 5.6, c = 9.4.

Fourth stage juvenile moulting into adult male (n = 1).
L = 310, N = 162, cs = 5, hw = 11, amph (%) = 40, A sl = 11, Ss = 12, ph (♂) = 61, mbd = 25, (mbd) = 19, mbd ph = 25, ABD = 16, t = 28, tmr = 10, spic (♂) = 42, t. (♂) = 33, tmr (♂) = 14, ABD (♂) = 14, t = 28, tmr = 10, ABD = 16.

Fourth stage juveniles (n = 3).
L = 275-345, N = 162-165, cs = 6.5-7.5, amph (%) = 32-45, SSph = 15, A sl = 12-14, ph = 51-57, mbd = 19-24, (mbd) = 16-19, mbd ph = 19-23, ABD = 14, t = 27-32, tmr = 10-12, a = 12.0-18.2, b = 4.8-6.8, c = 8.6-12.8.

Fourth stage juvenile (n = 1).
L = 285, N = 151, cs = 7.5, amph (%) = 35, A sl = 12, ph = 60, mbd = 24, (mbd) = 19, mbd ph = 23, mbd/(mbd) = 1.3, ABD = 14, t = 31, tmr = 13, a = 11.9, b = 4.8, c = 9.2.

ADDITIONAL INFORMATION:

Males.
Ambulatory setae in four longitudinal rows of 6-7 setae with external lateroventral rows followed by three supporting setae.
At mid-body, cuticle ventrally to subventrally with thin striae-like extensions of the hyaline outerlayer at posterior margin of the annules; not clearly spiny as in female.
Male reproductive systeme typical of the genus, maximally extending almost up to the dorsal curvature of the body. Anterior group of large copulatory thorns with 3-5 thorns on each side (Fig. 7F). Spicules, 32-39 µm (3 specimens): longer than in the type specimens (25 µm), the Bermuda specimens (24-26 µm, Lorenzen, 1973) or the Galapagos specimens (24-28 µm, Clasing, 1983). Gubernaculum, a short (3.5-4.5 µm) thin bar-like cuticularization (in side view) of the distal cloacal wall.
Tail with 13-14 annules. Endring dorsally to dorsolaterally subdivided in 7-8 partial annules.

Females.
Body cuticle with a strong spiny ornamentation (sexual dimorphism). The spiny ornamentation starts at the narrow mid-body region with ventral to subventral spiny extensions of the posterior margin of the annules (fine spiny of thorn-like ones); they continue posteriorly in longitudinal rows and become longer beyond the vulva. Posterior to the ventral body curvature longitudinal rows of dorsal and dorsolateral spines, 8.5-11 µm long. Anterior to the vulva about three ventral to subventral rows of thorn-like spines (the medioventral row with about 10-12 thorns, number different according to the individuals). In a few specimens the prevulvar thorn-like spines are apparently absent (Fig. 7D), or only a few small ones

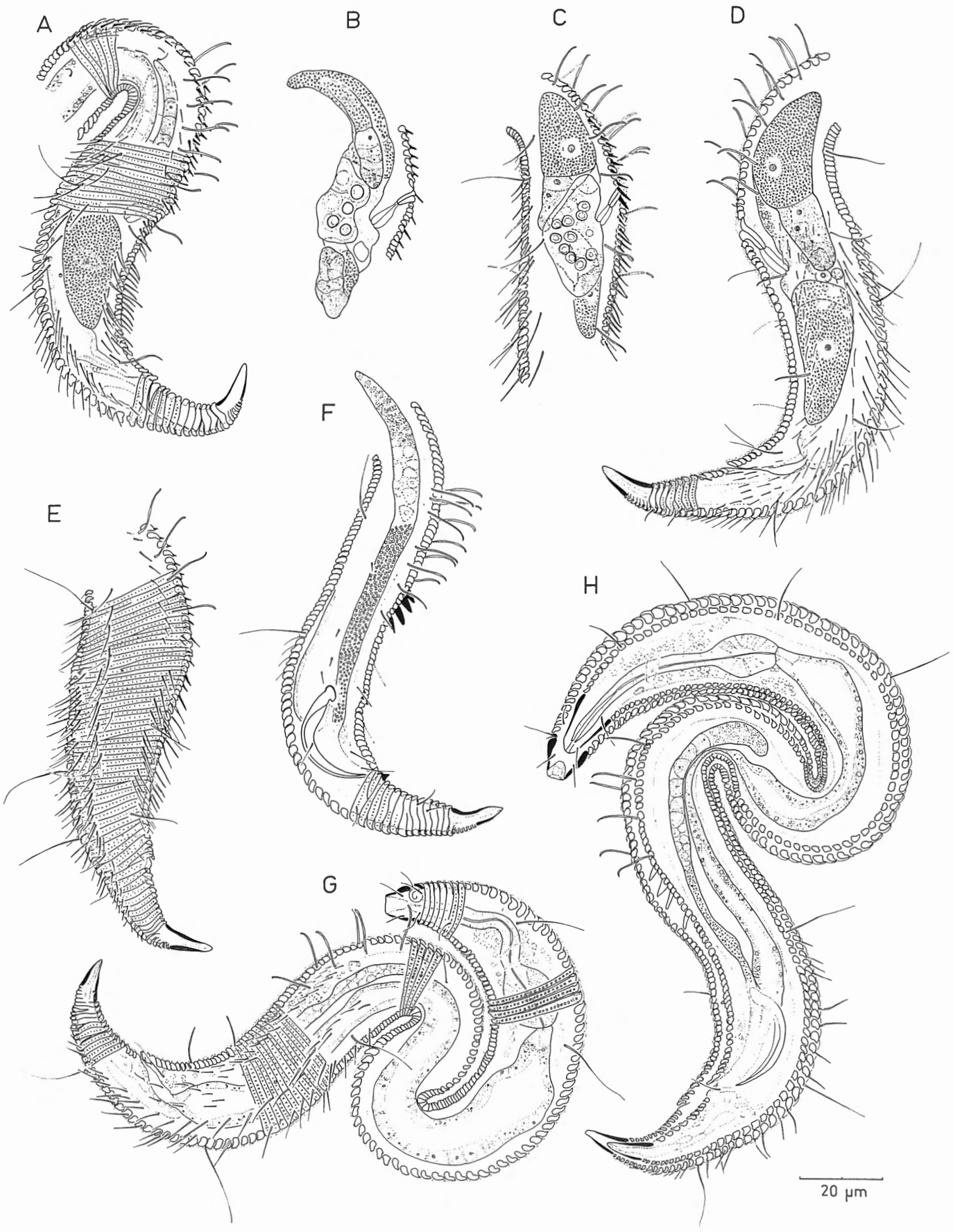

Fig. 7. Epsilonema lasium *Lorenzen, 1973. – A. Posterior body region female, part of body cuticle in surface view. – B-C. Female reproductive system. – D. Female reproductive system and surface view of tail. – E. Surface view of posterior body region of female. – F. Male reproductive system and surface view of tail. – G. Whole mount of a fourth stage juvenile female, parts of body cuticle in surface view. – H. Whole mount of a fourth stage male, moulting into adult.*

remain. At the level of the vulva fine spines more dispersed appear; postvulvar region without stout ventral spines, and preanal region with long spines, dispersed over the entire annules. These last female specimens may possess a slightly larger number of annules (156-160).
Reproductive system didelphic-amphidelphic with reflexed ovaries, anterior branch to the left side, posterior branch to the right side or reverse (Fig. 7B-D). Vagina 10-12 µm long, bipartite with a 4.5-5.5 µm long, sclerotized distal part and a 5.5-6.5 µm long proximal weakly cuticularized part. Two spermathecae including relatively large sperm cells with a globular nucleus (3 µm diameter). Prevulval annule with flap-like posterior projection of the hyaline outerlayer over the vulva opening.

Juveniles.
First, second and third stages not found.

Fourth stage juvenile.
Similar to adults in most respects. Spiny ornamentation of the cuticle resembling that of females: from mid-body on fine ventral spine-like extensions of posterior margin of annules continue posteriorly in longitudinal rows of short spines; dorsal to dorsolateral longitudinal rows of long (8-12 µm) spines start posteriorly to the ventral body curvature; spines more or less dispersed over the entire annule in the anal region. Ambulatory setae in four longitudinal rows: outer subventral rows with 4-5 setae, followed by 1-2 supporting setae, inner subventral rows with 1-4 setae.
In fourth stage juveniles as in female a large variability in the number of annules is found: one specimen had a smaller number of rings (151 against 162-165 rings in the other specimens).
In a specimen, moulting into an adult male (Fig. 7H), complete reproductive system, copulatory apparatus and copulatory thorns are formed. Spicules are 42 µm long, four pairs of anterior large copulatory thorns and, testis extending halfway along the narrow mid-body region are observed.

Epsilonema mangrovense Clasing, 1984 (Figs. 8-9)

Localities and material:
Guadeloupe, Grande-Terre: anse Laborde, station 2, sample 175 (12. 1983): 1 ♀, sample 323: 1 ♂, sublittoral sample, collection F. & C. Monniot (04. 1983): 3 ♂♂, 2 ♀♀, 1 juv; Le Moule, station 4, sample 25 (04. 1979): 1 ♂, sample 150 (12. 1983): 1 ♂; plage des Raisins clairs, sample 187 (12. 1983): 1 ♀, plage de Bois Jolan, sublittoral sample 251 (05. 1984): 1 ♀. Iles des Saintes, plage de Pompierre, station 1, sample 223 (04. 1984): 1 juv; Grosse Pointe, station 2, sample 37 (04. 1979): 1 ♂, 1 juv, sample 224 (04. 1984): 1 ♀, 1 juv. La Marie-Galante (02. 1981), les Galets, station 1, sample 8: 1 ♂, 1 ♀, 2 juv: anse du Vieux Fort, station 9, sample 2: 5 ♂♂, 6 ♀♀, 8 juv, sample 3: 5 ♂♂, 3 ♀♀, 2 juv. Martinique (02. 1981), baie du Vauclin, station 5, sample 20: 14 ♂♂, 16 ♀♀, 7 juv; anse Trabaud, station 7, sample 41: 1 ♀, 1 juv, les anses d'Arlets, station 14, sample 33: 1 ♀. Antigua, collection P. Wagenaar Hummelinck, nr 1393 (07. 1955): 13 ♂♂, 24 ♀♀, 14 juv. Porto Rico, collection P. Wagenaar Hummelinck, nr 1419 (09. 1963): 3 ♂♂, 4 ♀♀, 4 juv. Jamaica, collection P. Wagenaar Hummelinck, nr 1683 (06. 1973): 3 ♂♂, 5 ♀♀, 10 juv; Cayman Islands, collection P. Wagenaar Hummelinck, nr 1700 (06. 1973): 5 ♀♀, 5 juv.

Material deposited in collection.
19 ♂♂, 16 ♀♀, 11 juv, slides AN584-596 in MNHN and 9 ♂♂, 6 ♀♀, 10 juv, slides RIT135, RIT148, RIT153-157 in KBIN.

MEASUREMENTS

Males (n = 10).
L = 390-430 (405), N = 156-165 (160), cs = 8-11 (9), hw = 13-14, amph (%) = 42-54, SSph = 16-21, A sl = 12-17, Ss = 7-12 (11), ph = 71-76, mbd = 29-37, (mbd) = 21-24, mbd ph = 28-34, mbd/(mbd) = 1.3-1.8 (1.5), spic = 42-49 (46), gub = 6.5-10, ABD = 19-24, t = 42-55 (48), tmr = 17-22, a = 10.5-13.8, b = 5.3-5.8, c = 7.1-9.9.

Females (n = 10).
L = 330-445 (395), N = 153-160, cs = 8-15, hw = 12-15, amph (%) = 32-45, SSph = 16-23, A sl = 14-16, Ss = 6.5-10, ph = 66-77, mbd = 31-41, (mbd) = 19-23, mbd ph = 27-31, mbd/(mbd) = 1.5-1.9, ABD = 17-19, t = 38-46, tmr = 17-25, V = 60-65% (63%), a = 9.8-12.1, b = 4.8-6.2, c = 8.5-10.3.

Fourth stage juveniles (n = 5).
L = 255-335 (295), N = 167-172, cs = 7-9.5, hw = 11-12, amph (%) = 38-50, SSph = 21-24, A sl = 15, ph = 58-67, mbd = 22-31, (mbd) = 20-24, mbd ph = 27-31, mbd/(mbd) = 1.1-1.4 (1.3), ABD = 18-20, t = 35-39, tmr = 14-16, a = 9.1-11.7, b = 4.1-5.1, c = 7.3-9.0.

Third stage juveniles (n = 3).
L = 245-270, N = 174-178, cs = 7-8, hw = 10-11, amph (%) = 36-45, SSph = 21, A sl = 12-15, Ss = 6.5, ph = 53-63, mbd = 20-24, (mbd) = 20-22, mbd ph = 26-28, mbd/(mbd) = 1.2-1.3, ABD = 17-19, t = 32-34, tmr = 11-14, a = 9.1-10.0, b = 4.1-4.6, c = 7.4-8.4.

Second stage juvenile moulting into third stage juvenile (n = 1).
L = 225, N = 136, cs = 6, hw = 10, amph (%) = 35, SSph = 9, A sl = 12, ph (3rd stage) = 55, mbd =

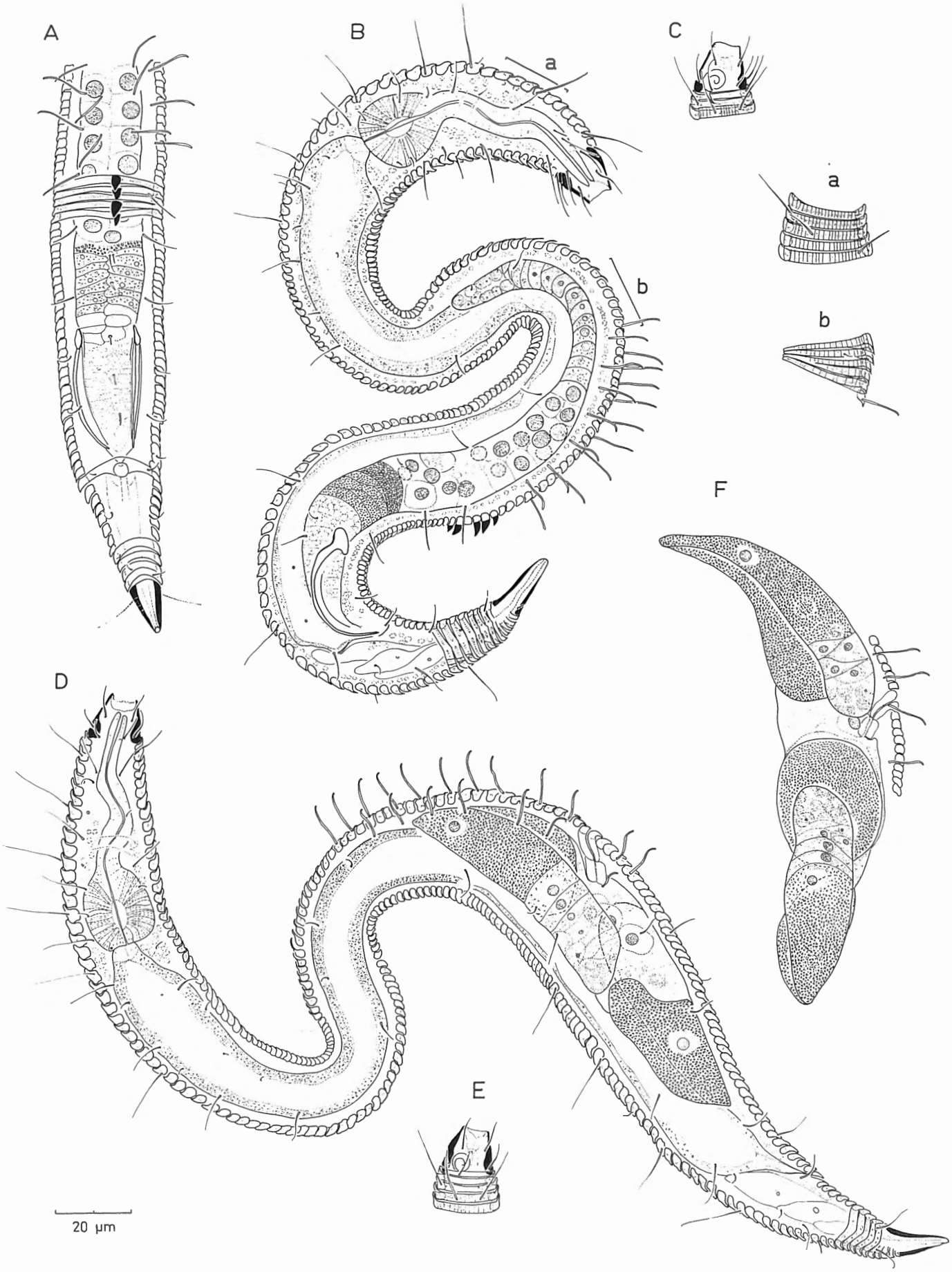

Fig. 8. Epsilonema mangrovense *Clasing, 1984. – A. Ventral view of posterior body region in male. – B. Whole mount of a male with indications a,b of levels at which the body cuticle is shown in surface view. – C. Surface view of head in male. – D. Whole mount of a female. – E. Surface view of head in female. – F. Female reproductive system.*

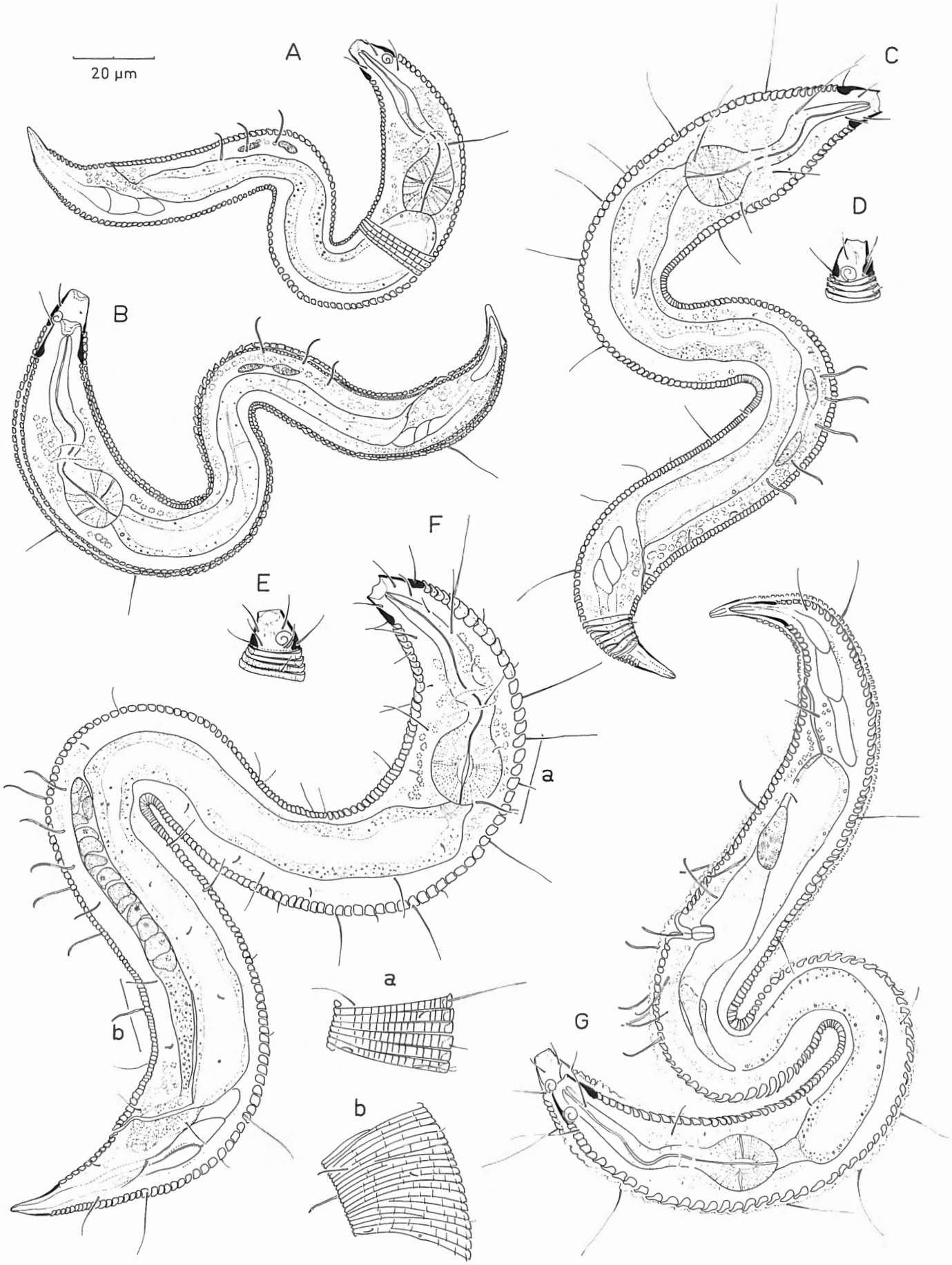

Fig. 9. Epsilonema mangrovense *Clasing, 1984. – A. Whole mount of a second stage juvenile. – B. Whole mount of a second stage juvenile, moulting into third stage. – C. Whole mount of a third stage juvenile. – D. Surface view of head of a third stage juvenile. – E. Surface view of head of a fourth stage juvenile. – F. Whole mount of a fourth stage juvenile male with indications a,b of the levels at which the body cuticle is represented in surface view. – G. Whole mount of a fourth stage juvenile female, moulting into adult.*

18, (mbd) = 14, mbd ph = 24, mbd/(mbd) = 1.3, ABD = 20, t = 31, tmr = 10.

Second stage juveniles (n = 2).
L = 190-200, N = 127-130, cs = 6-7,5, hw = 9.5-11, amph (%) = 32-37, SSph = 17-19, A sl = 10, ph = 51-52, mbd = 17-22, (mbd) = 14-16, mbd ph = 22, mbd/(mbd) = 1.4-1.6, ABD = 15, t = 29-30, tmr = 10, a = 8.6-9.1, b = 3.7-3.9, c = 6.3-6.9.

REDESCRIPTION

Males.
Body cuticle with 156-165 annules (Guadeloupe specimens), 162-184 annules (type specimens). Annules slightly overlapping by expending hyaline outerlayer. Annules inversion ventrally right behind the dorsal body curvature (between rings 66-67 in the holotype) and, dorsally just ahead of the ventral body curvature (at ring 82 in the holotype). Body cuticle with a fine striated ornamentation of the outer hyaline layer slightly protruding from the posterior margin of the annules as minute spines in posterior body region, at mid-body well developed ventral spiny structures (Fig. 8b). Tail with about 14 annules, endring conical, subdorsally annulated (3-5 incomplete rings). Three well developed caudal glands, anteriorly extending beyond the cloaca.
Somatic setae in eight longitudinal rows, with short and long setae intermingled. Ambulatory setae with bent distal tip, arranged in four longitudinal rows: outer rows with 6-8 setae, followed by supporting setae; inner subventral rows with 8-14 setae.
Head capsule wider at base; lipregion withdrawn. Four cephalic and eight subcephalic setae. Amphidial fovea, 5.5-7.5 µm diameter in Guadeloupe specimens (42-54% of the corresponding headwidth), 4-4.5 µm in type specimens (28.5% in holotype, 37% in a paratype), is a spiral structure, ventrally whorled with 1¼th coil, and dorsolaterally located near the head base (Fig. 8C).
Buccal cavity with minute dorsal tooth, usually difficult to observe (withdrawn lipregion). Pharynx cylindrical with muscular terminal bulb.
Male reproductive system typical of the genus, but testis extending far anteriorly, maximally shortly before the dorsal body curvature (Fig. 8B). Narrow and elongated germinal and growth zones, vesicula seminalis with large sperm cells (10-11 µm diameter), and a granulated nucleus (4.5-5.5 µm diameter), vas deferens finely granular. Apical part of testis occasionally reflexed. Spicules, 44 µm long (holotype), 41 µm (a paratype), 42-49 µm (Guadeloupe specimens); corpus arched, tapering distally and proximally with a large offset knoblike capitulum. Gubernaculum, 6.5-10.0 µm long, thin, parallel to the spicules. Small to relatively large copulatory thorns, 2-6 in number in a medioventral position, but not always on a single longitudinal row (Fig. 8A).

Females.
Similar to males in most respects. Amphidial fovea as in male (Fig. 8E), 32-45% of the corresponding headwidth in Guadeloupe specimens. Ambulatory setae in four longitudinal rows, external rows usually with eight setae (7-9), followed by four (3-4) supporting setae, inner subventral rows with 12 setae.
Reproductive system didelphic-amphidelphic (Fig. 8D, F); both branches reflexed to the same side (right) or to opposite side (anterior to the right, posterior to the left). Spermathecae usually not clearly differentiated. Vagina bipartite, with a sclerotized proximal part (8-9.5 µm long) and a weakly cuticularized distal part (5-6 µm long).

Juveniles.
First stage not found.

Fourth stage juveniles.
Similar to adult in most respects. Cuticle with 167-172 annules in Guadeloupe specimens, number slightly larger than in adults. Ornamentation with striae, more pronounced than in adults, with spine-like extensions from margin annules in posterior body region. Ambulatory setae in four longitudinal rows, with 4-7 setae each, outer rows followed by 1-2 supporting setae. In a young male (Fig. 9F), reproductive system largely formed, extending to the ventral body curvature, spicular primordium with many nuclei. Three well developed caudal glands. In a young female (Fig. 9G), both branches of the reproductive system completely formed, ovaries reflexed and vagina apparent.

Third stage juveniles.
Cuticle with 174-178 annules; number of annules higher than in adults. Annules slightly overlapping. Ornamentation body cuticle with short longitudinal striae. Somatic setae long, in eight longitudinal rows in pharyngeal region. Head with four cephalic and five subcephalic setae, amphidial fovea as in adults. Ambulatory setae in two longitudinal rows of six setae followed by a short fine supporting seta. Reproductive system with two short branches in future females (Fig. 9C); young males with spicular primordium and reproductive system observable as an elongated structure of several cells. Caudal glands well developed.

Second stage juveniles.
Cuticle with 127-135 annules, obviously less than in older juvenile stages and in adults. Ornamentation with longitudinal striae, dispersed over the ring, but laterally forming one longitudinal strand at mid-body. Head with four cephalic setae and one pair of subcephalic setae at level of 1st or 2nd annule in a sublateral location. Ambulatory setae in two rows of three setae each. Reproductive system consisting of

two small parts (5.5 µm long) each with a few cells, separated by a few nuclei.

Remark and discussion.
A re-examination of type material (slide NSIMB 546h) with holotype ♂ and a paratype ♂, showed the spicules to be longer than originally mentioned by Clasing (1983): 41-44 µm instead of 31-35 µm.
The specimens from the Caribbean islands largely agree with the original description of *E. mangrovense* and the type material, but differ by having a larger amphid. Hereby, the diagnostic differences with *E. fernandinense* are less significative and are left as follows:
— body length (390-430 µm against 240-270 µm in ♂),
— number of body rings (156-184 against 135-141),
— length and shape of spicules (41-44 µm against 23-24 µm).
Unfortunately, both species descriptions were based upon a restricted number of specimens: 4 ♂♂, 3 ♀♀, 4 juv IV for *E. mangrovense,* and 5 ♂♂, 2 ♀♀, 1 juv IV for *E. fernandinense.* As far as habitat is concerned and contrary to its name etymology *E. mangrovense* has been collected frequently from clear coralline sand and sampled quite a distance from mangrove swamp.

General remarks

Within the genus *Epsilonema* the following characters are of major diagnostic importance:
— body length,
— number of body annules,
— ornamentation of the body cuticle: vacuolar or smooth, provided or not with bars of spines,
— shape of the annules: with rounded outline or overlapping by hyaline outerlayer,
— structure of the amphidial fovea: spiral, cryptospiral, loop-shaped,
— relation diameter amphid/corresponding head width;
in males,
— the presence or absence of copulatory thorns,
— their number and location when present,
— length and shape of the copulatory apparatus,
— structure of the sperm cells,
— anterior extension of the genital system;
in female,
— structure and length of the vagina,
— structure of the genital system with or without spermathecae and structure of including sperm cells,
— presence or absence of spiny differentiations in vulva region.
Taking the revision of Lorenzen (1973) into account the genus *Epsilonema* contains at present 18 species. Lorenzen (1973) synonimized *E. cyrtum* Steiner, 1931 (based upon a single female) with all 33 *Prochaetosoma* species, all 16 *Epsilonemoides* species and all 47 *Epsilonema* species from Steiner (1931). However, due to this large synonimization, the variability of the diagnostic characters become broad. The ornamentation of the body cuticle varies from striated to smooth, and spiny extensions at the posterior margin of the annules are present or absent. In males, copulatory thorns vary from 0 to 4 large medioventral thorns (*P. microctenum*), over 2 rows of 2-7 thorns or a small field of thorns (*P. hadroctenum*). Probably several species are involved instead of one species. So, we decided not to include keys for males and females of the genus *Epsilonema.* A revision of the genus, based upon a study of type material of the species described by Steiner (1931) and on material from the type localities is needed to elucidate beyond doubt the validity of the species described by Steiner (1931).

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References

CLASING, E., 1984. Interstitielle Fauna von Galapagos. XXXII. Epsilonematidae (Nematodes). *Microfauna Marina,* 1: 149-189.

GOURBAULT, N. & DECRAEMER, W., 1987. Nématodes marins de Guadeloupe. VI. Les genres *Bathyepsilonema* et *Leptepsilonema. Bulletin du Muséum national d'Histoire naturelle,* Paris, 4e sér., 9, sect. A (3): 603-629.

GOURBAULT, N., RENAUD-MORNANT, J. & HELLÉOUET, M.N., 1985. Biotopes et peuplements méiofaunistiques des Petites Antilles (La Marie-Galante, les Saintes, la Désirade). Premières données. *Bulletin du Muséum national d'Histoire naturelle,* Paris, 4e sér. 7, sect. A (2): 419-432.

LORENZEN, S., 1973. Die Familie Epsilonematidae (Nematodes). *Mikrofauna Meeresboden,* 25: 1-86.

RENAUD-MORNANT, J. & GOURBAULT, N., 1981. Premières prospections méiofaunistiques en Guadeloupe. I. Les biotopes et leurs peuplements. *Bulletin du Muséum national d'Histoire naturelle,* Paris, 4e sér. 3, sect. A (4): 1011-1034.

RENAUD-MORNANT, J., GOURBAULT, N. & HELLÉOUET, M.N., 1983. Prospections méiofaunistiques en Martique. I. Les biotopes et leurs peuplement. *Bulletin du Muséum national d'Histoire naturelle,* Paris, 4e sér. 5, sect. A (1): 221-234.

STEINER, G., 1927. Epsilonematidae, a new nemic family. *Journal of Parasitology* 14: 65-66.

WAGENAAR HUMMELINCK, P., 1977. Marine localities. In Studies on the fauna of Curacao and other Caribbean islands, nr 167, LI: 68. *Publication Foundation Scientific Research in Surinam and netherlands Antilles,* Utrecht.

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