



## New data on the taxonomic status of *Metepsilonema hagmeieri* and *M. emersum* with description of *M. lorenzeni* sp. nov. (Nemata, Epsilonematidae).

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**Abstract:** Redescription of *M. hagmeieri*, type-species of the genus *Metepsilonema*, based on the study of populations from the North Sea and the Channel. *M. emersum* is considered a synonym of the type-species *M. hagmeieri*. *M. lorenzeni* sp. nov. is described from the Mediterranean Sea; it is mainly characterized by a large number of non-overlapping annuli with a thick cuticle and wide inner lumen and long spicules. *M. hagmeieri* sensu Lorenzen 1973 is attributed to the new species *M. lorenzeni*.

**Résumé :** Données nouvelles sur la position taxonomique de *Metepsilonema hagmeieri* et de *M. emersum*, avec description de *M. lorenzeni* sp. nov. (Nemata, Epsilonematidae).

*M. hagmeieri*, espèce-type du genre *Metepsilonema*, est redécrite d'après l'étude de populations de la Mer du Nord et de la Manche. *M. emersum* est tenue pour synonyme de la précédente espèce. Une espèce nouvelle, *M. lorenzeni* sp. nov. est décrite de la Méditerranée; elle est caractérisée essentiellement par son nombre élevé d'anneaux (124-132) qui ne se recouvrent pas et présentent une épaisse cuticule à vaste lumière interne, et par ses spicules particulièrement longs (44-63  $\mu\text{m}$ ). *M. hagmeieri* sensu Lorenzen 1973 est attribuée à cette dernière espèce.

**Keywords :** marine nematodes, *Metepsilonema*, Channel, North Sea, Mediterranean Sea.

### Introduction

During a survey of six sublittoral stations from the Channel characterized by their coarse sediment, a large number of Epsilonematidae and some Draconematidae were collected. Ten species of Epsilonematidae were identified belonging to the genera *Epsilonema*, *Bathyepsilonema*, *Metepsilonema*, *Perepsilonema*, *Leptepsilonema* and *Glochinema*. Among the *Metepsilonema* species we observed specimens belonging to the *M. hagmeieri* complex

*i.e.* resembling *M. hagmeieri* (Stauffer, 1924) Steiner, 1927, *M. hagmeieri* sensu Lorenzen (1973) and *M. emersum* Lorenzen, 1973.

The family Epsilonematidae has been revised recently (Gourbault & Decraemer, 1996). Hitherto 17 species are included in the genus *Metepsilonema*. Only two of them have been recorded in the North Sea: the type species *M. hagmeieri* and *M. emersum*.

*M. hagmeieri* was originally described on a single female; later on, additional information based on females and males was given by Gerlach (1952, intertidal, Kieler Bucht). Lorenzen (1973) redescribed *M. hagmeieri* when

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erecting a new but closely related species, *M. emersum*. In ecological papers *M. hagmeieri* was recorded by Westheide (1967, littoral, North Sea), Schmidt (1969, intertidal zone, Sylt, North Sea and 1972, intertidal, Norway) and Vincx (1986, sublittoral, North Sea); *M. emersum* was recorded by Willems *et al.* (1982, subtidal linear sandbank, Belgian coast), Blome (1983, intertidal, Sylt) and Vincx (1986, sublittoral, North Sea). One record of *M. hagmeieri* from another region (Bay of Biscay, intertidal) was reported by Renaud-Debyser (1963).

Lorenzen (1973) considered all specimens from littoral samples so far described as *M. hagmeieri* to belong to *M. emersum*. Clasing (1981) was the first to doubt of the validity of the separation between these two species. The study of the material from the Channel was performed mainly with the aim to collect more data and clarify this taxonomic question.

### Material and methods

In the coarse sediments of the Channel, benthic samples were collected by a 50 cm<sup>2</sup> box corer in five stations: - Station 1, Trezen vraz, June 1993: 48°51,20' - 3°53,2' W, 75 m depth, coarse sand; Station 2, Plymouth, June 1993: 49°53,37' - 4°13,00' W, - 75 m, medium sand; Station 3, Baie de St-Brieuc, March, August and October 1993: P3 = 48°49,80' - 2°39,80' W, - 40 m, coarse sand + gravel; P2 = 48°45,30' N - 2°43,45' W, - 35m, coarse sand; P1 = 48°38,85' N - 2°38,30' W, - 7 m, maërl; Station 4, Baie de Seine, June 1993: 49°37,60' - 0° 12,57' W, - 29 m depth, medium + coarse sand; Station 6, Pas de Calais, June 1993: 50°48,00' - 1°19,50' E, - 29 m, medium sand.

Direct collection by SCUBA diving was made by Dr Santiago Villora Moreno in Playa de l'Olla de Altea (Alicante, Spain) 16/02/1992.

The samples, fixed with 7% neutralized formalin, were sieved on a 40 µm mesh and the fauna extracted by elutriation-decantation; all the nematodes were mounted in anhydrous glycerine. Drawings were made by using a Reichert Polyvar microscope with a camera lucida.

Type specimens have been deposited in the nematode collections of the Muséum national d'Histoire naturelle, Paris (BN) and of the Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels (RIT). *M. emersum* type specimens and *M. hagmeieri* specimens from Helgoland, North Sea are deposited in the nematode collection of Alfred-Wegener-Institut für Polar- und Meeresforschung, Bremerhaven, Germany (NSIMB).

*Abbreviations used in text and tables:* abd, body diameter at level of anus (cloacal opening); amph (%), 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; 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 (chord), length of spicule measured along the median line (length measured along the chord); 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); tN, number of tail rings; 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.

### Results

#### Review of the taxonomic position of *Metepsilonema hagmeieri* (Stauffer, 1924) Steiner, 1927 and *M. emersum* Lorenzen, 1973

*M. hagmeieri* was first described as *Rhabdogaster hagmeieri* by Stauffer (1924) on a female specimen from coarse and fine sand (= Amphioxus-sand, sublittoral) from Helgoland, North Sea. Steiner (1927) designated this species as the type-species of the genus *Metepsilonema*. Lorenzen (1973) described a new closely related species *M. emersum* which he differentiated from what he considered as *M. hagmeieri* by 1) its biotope (littoral vs sublittoral), 2) smaller body length (L = 280-310 µm vs 330-455 µm), 3) higher number of body rings (R = 133-141 vs 116-124), 4) shorter spicules in males (33-34 µm vs 40-42 µm, measured by the chord), 5) females possessing 3 supporting setae vs 2 setae and 6) cuticular base of the body rings never completely massive in *M. emersum* as in *M. hagmeieri*. The author gave a redescription of *M. hagmeieri* based on specimens from the same biotope as Stauffer's specimen. However, by focusing on the habitat, Lorenzen (1973) wrongly correlated the morphometric data of his material with data from former descriptions of *M. hagmeieri*. The female type specimen of *M. hagmeieri* is as small (L = 271 µm) as *M. emersum*, with a similar number of body rings (R ca 140); Gerlach (1952) did not give any data on the number of body rings but his specimens of *M. hagmeieri* were also small: 255-259 µm. Apart from the difference in habitats, the specimens Lorenzen (1973) described as *M. emersum* seem to belong to *M. hagmeieri*. Consequently, *M. emersum* appears to be a synonym of *M. hagmeieri*. To confirm this hypothesis, we studied the type specimens of *M. emersum* and the specimens described as *M. hagmeieri* by Lorenzen (1973).

Clasing (1981, doctoral dissertation) compared data of specimens from littoral (western beach) of Island Sylt

(Germany), a comparable intertidal habitat as the one of the specimens described as *M. emersum* (eastern beach, Island Sylt), and of specimens from sublittoral of the Street of Calais, a similar habitat as for the specimens of *M. hagmeieri* sensu Lorenzen (1973) (sublittoral, Helgoland, North Sea). Three populations (one sublittoral of Street of Calais and both littoral of Island Sylt) had similar ranges for body length:  $L = 260-330 \mu\text{m}$ ,  $260-340 \mu\text{m}$  and  $280-310 \mu\text{m}$  resp., and spicule length (measured by the chord)  $31-39 \mu\text{m}$ ,  $30-37.5 \mu\text{m}$  and  $33-34 \mu\text{m}$ , both characters being smaller than the sublittoral specimens of *M. hagmeieri* sensu Lorenzen (1973) from Helgoland ( $L = 320-420 \mu\text{m}$  and spic. =  $40-42 \mu\text{m}$ ). The number of body rings in both populations from Island Sylt (littoral) was high: 136-149 and 133-141 but lower in both sublittoral populations: 116-124 and 117-133 resp. from Helgoland and Street of Calais). Clasing (1981) concluded that the variability of these diagnostic features was too large to separate both species and *M. emersum* is hereby considered as a synonym of *M. hagmeieri*. Clasing observed up to four supporting setae in female and up to three in male, but did not specify if this observation was similar in both the sublittoral and littoral population. Moreover, Vincx (1986, dissertation p 548) found *M. emersum* and *M. hagmeieri* in similar habitats offshore.

#### Species description

*Metepsilonema hagmeieri* (Stauffer, 1925) Steiner, 1927  
Syn. *M. emersum* Lorenzen, 1973

Revision of type specimens of *M. emersum* Lorenzen, 1973 (Fig. 1)

*M. emersum* type specimens (slide NSIMB 441: 4 males, 3 females) from Island Sylt, eastern beach, agree morphometrically and morphologically (Fig.1) with previous descriptions of *M. hagmeieri* nec Lorenzen (1973).

Measurements on table 1.

**Males.** Body epsilon-shaped, enlarged in pharyngeal and posterior body region. Cuticle with 135-140 annuli, non-overlapping, with wide inner lumen in the anterior body region. Somatic setae numerous in pharyngeal region, long and short, arranged on eight longitudinal rows. Ambulatory setae fine, clearly curved, arranged on four longitudinal rows: the outer subventral rows with 13-15 setae, the inner subventral rows with 6-11 setae. Two supporting setae on each side.

Cephalic helmet, conical, about as long as wide; lip region retracted in fixed specimens. Four short cephalic setae; two lateral subcephalic setae opposite the anterior border of the amphidial fovea; some minute additional setae, or pores of insertion, are present. Amphidial fovea about one third of the corresponding head width, ventrally whirled and about unispiral, located dorsolaterally in

posterior part of helmet. Buccal cavity, narrow, shallow without clear teeth. Pharynx typical of genus, with strong muscular posterior bulb.

**Male reproductive system** typical of the family. The single testis extend in the posterior region of ambulatory setae. Spicules  $43.5-46.5 \mu\text{m}$  long ( $28.5-34.5 \mu\text{m}$  when measured by the chord), gradually ventrally curved, corpus slender with narrow capitulum and a clear velum. Gubernaculum short, slightly curved. Tail conical, with 9 annuli. Caudal glands extend beyond the cloacal opening.

**Females.** Similar to male in most respects. Cuticle with 134-148 annuli. Ambulatory setae in four longitudinal rows of 15 setae on the outer subventral rows and 7-11 setae on the inner subventral rows; three supporting setae on each side. Reproductive system typical of the genus. Ovaries reflexed; spermathecae not clearly marked; vulva at 72-74% of total body length from anterior end; vagina bipartite. Tail with 8-10 annuli; end ring as in male.

**Discussion.** These observations confirm previous remarks on the new taxonomic status of *M. emersum* as a synonym of *M. hagmeieri* (Stauffer, 1924), but for other reasons than proposed by Clasing (1981).

**Emended diagnosis.** *M. hagmeieri* is characterized by the non-overlapping annuli with wide lumen in the anterior body region, a short body ( $L = 280-315 \mu\text{m}$ ) and 134-148 annuli in adult, amphidial fovea unispiral, diameter about one third of the corresponding head width; two supporting setae in male, three in female. Male with slender spicules with narrow head,  $43.5-46.5 \mu\text{m}$  long.

#### Study of a population of *M. hagmeieri* from the Channel (Fig. 2)

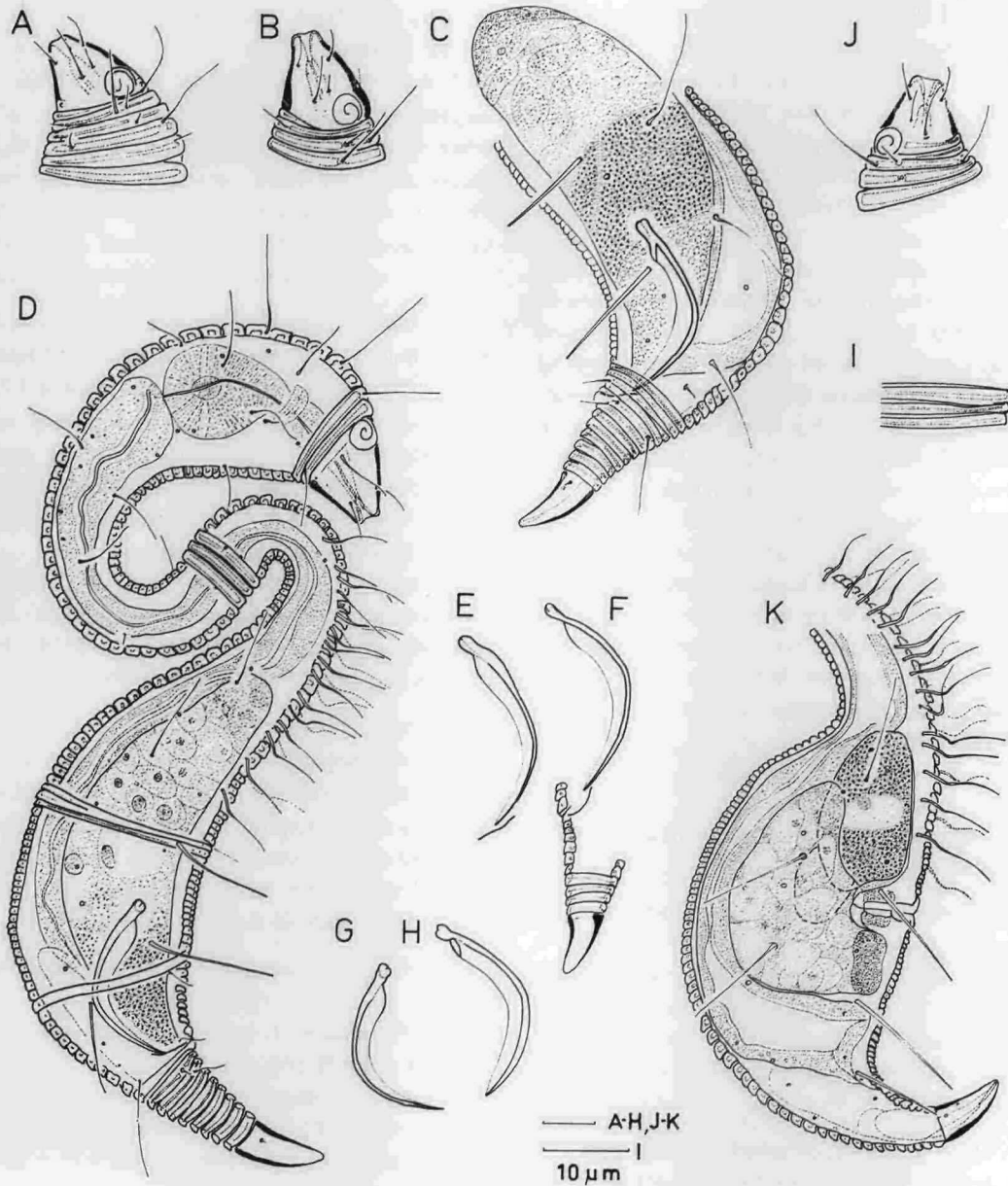
**Material studied.** 12 males and 12 females (on slides BN 365-379 and RIT 568, 569, 572).

**Localities.** Channel, station 1 (1 female); st.2 (3 males, 5 females); st.3 P1 (5 males, 4 females), P2 (2 females), P3 (1 female); st.4 (1 male, 1 female); st.6 (3 males, 3 females, 1 juv).

Measurements on table 2.

The specimens from the Channel largely agree with former description, however, they enlarge the range of several morphometric data; for example: the number of body annuli and body length have both a lower average ( $N = 131$  vs  $138$  and  $L = 285 \mu\text{m}$  vs  $307 \mu\text{m}$ ) in the population from the Channel; the spicules are slightly shorter ( $42.3 \mu\text{m}$  vs  $44.7 \mu\text{m}$  average value) in the specimens from the Channel but the amphidial fovea have a larger diameter in relation to the corresponding head width ( $41.7\%$  vs  $33.7\%$ ).

**Description of a fourth stage juvenile.** Similar to adults, cuticle with 116 annuli. Ambulatory setae in four



**Figure 1.** *Metepsilonema hagmeieri* drawn from Lorenzen's type specimens of *M. emersum*. Males (A-B) head region, lateral surface view; (C) posterior body region; (D) total view; (E-H) copulatory apparatus; (I) detail of body cuticle. Females (J) head region, lateral surface view; (K) posterior body region with reproductive system.

**Figure 1.** *Metepsilonema hagmeieri* redessiné à partir du matériel type de *M. emersum* de Lorenzen. Mâles (A-B) région céphalique, vue latérale de la surface; (C) région postérieure du corps; (D) vue en entier; (E-H) appareil copulateur; (I) détail de la cuticule. Femelles (J) région céphalique, vue latérale de la surface; (K) région postérieure montrant l'appareil génital.

longitudinal rows with 9 setae on the outer subventral rows and 2 to 4 setae on the inner rows; two supporting setae on

each side. Reproductive system 21  $\mu$ m long.

**Table 1.** Morphometric data of *Metepsilonema hagmeieri*, measured from types of *M. emersum* Lorenzen (measurements in  $\mu\text{m}$ , average (AVG) and standard-deviation (SD), slide NSIMB 441.**Tableau 1.** Morphométrie de *M. hagmeieri*, mesures faites sur des spécimens types de *M. emersum* Lorenzen (longueur en  $\mu\text{m}$ , moyenne et écart-type), lame NSIMB 441.

	Min	males (n = 4)		SD	male*	Min	females (n = 3)		SD
		Max	AVG				Max	AVG	
L	300	315	307.5	5.6	302.0	280	305	291.7	10.3
N	135	140	138	2	128.0	134	148	139	6
amph	5.2	5.9	5.4	0.3	7.3	5.2	6.4	5.9	0.5
%amph	30.5	36.2	33.7	2.0	41.0	31.9	38.8	36.2	3.1
cs	5.5	6.7	6.2	0.5	6.0	5.0	6.7	5.6	0.8
subcs	10.0	12.0	11.0	1.0	11.0	12.0	13.0	12.7	0.5
ph	46.0	52.0	49.5	2.3	49.0	31.0	52.0	43.0	8.8
mbd ph	27.5	29.5	28.3	0.8	31.0	27.5	28.0	27.8	0.2
(mbd)	11.0	14.0	12.1	1.1	12.5	11.0	12.0	11.3	0.5
mbd	35.0	42.0	37.5	2.7	34.0	41.0	45.0	43.3	1.7
abd	14.0	16.5	15.4	1.0	18.0	15.0	15.0	15.0	0.0
t	29.0	35.0	30.8	2.5	29.0	29.0	31.5	30.3	1.0
tmr	12.0	15.5	13.9	1.4	13.0	13.5	15.5	14.8	0.9
tmr%	41.4	50.0	45.1	3.1	44.8	46.6	50.8	48.9	1.8
tN	9	9	9	0	8	8	10	9	1
As11	9.5	13.0	11.1	1.2	10.5	15.0	15.0	15.0	0.0
Ss1	20.0	22.0	21.0	0.8	20.5	22.5	24.0	23.3	0.8
Ss2	22.0	26.0	24.0	1.6	22.0	25.0	27.0	26.0	1.0
spic	43.5	46.5	44.7	1.1	44.0				
chord	28.5	34.5	32.5	2.4	33.0				
gub	7.5	9.0	8.0	0.6	7.5				
a	7.5	8.6	8.2	0.4	8.9	6.2	7.1	6.7	0.4
b	5.9	6.8	6.2	0.4	6.2	5.9	9.0	7.1	1.4
c	8.6	10.9	10.1	0.9	10.4	9.2	10.0	9.6	0.3
c'	1.8	2.5	2.0	0.3	1.6	1.9	2.1	2.0	0.1
V						71.9	74.0	73.0	0.9
mbd/(mbd)	2.6	3.5	3.1	0.4	2.7	3.7	4.0	3.8	0.1

\*specimen found among *M. hagmeieri* sensu Lorenzen, slide NSIMB A23*Metepsilonema lorenzeni* sp. nov. (Figs 3-4)Syn. *M. hagmeieri* sensu Lorenzen, 1973

## Description of the type

Type material. Holotype male on slide BN 380; paratypes on slides RIT 570 and 571 (2 males, 4 females and 2 juv. IV), BN 381-382 (2 males) and BN 383 (1 female, 2 juv. IV, 1 juv. III).

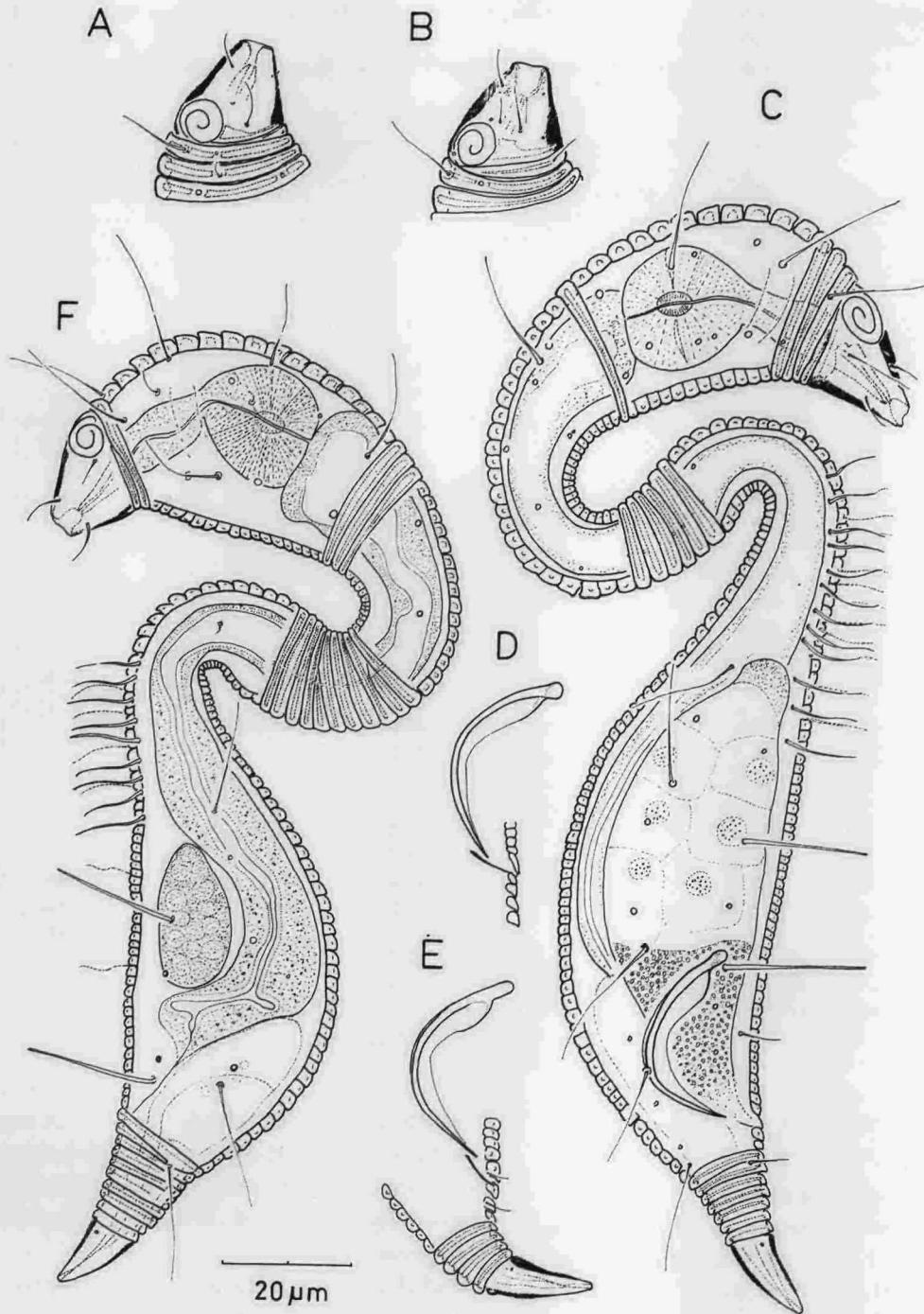
Type localities. Playa de l'Olla de Altea (Alicante, Spain), 9 males, 19 females and 27 juveniles.

Measurements on table 3.

Males. Body epsilon-shaped, clearly enlarged in pharyngeal and posterior body region; rather long body for the genus. Cuticle with 124-131 annuli; annuli non-overlapping, wide, with a thick cuticle, and a wide inner lumen. Somatic setae most numerous in pharyngeal region, long and short, arranged in eight longitudinal rows.

Ambulatory setae fine, clearly knicked, arranged in four longitudinal rows of 11 setae on the outer lateroventral rows and 7 setae on the inner subventral rows in holotype (respectively 9 and 7-8 in paratypes); two stout supporting setae on each side.

Cephalic helmet wide triangular in lateral view, with thickened sclerotized wall; lip region usually withdrawn in fixed specimens. Four short cephalic setae; two lateral subcephalic setae opposite the anterior border of the amphidial fovea; some minute additional setae are present or the pores of their insertion. Amphidial fovea about one third of the corresponding head width, ventrally whorled and about unispiral, located dorsolaterally in posterior part of helmet. Buccal cavity, narrow, shallow without clear teeth. Pharynx typical of genus, with strong muscular posterior bulb.



**Figure 2.** *Metepsilonema hagmeieri*, specimens from the Channel (A) female, head region; (B) male, head region; (C) male in toto; (D-E) copulatory apparatus; (F) fourth stage juvenile in toto.

**Figure 2.** *Metepsilonema hagmeieri*, specimens de la Manche (A) femelle, région céphalique; (B) mâle, région céphalique; (C) mâle, vue en entier; (D-E) appareil copulateur; (F) juvénile du quatrième stade, vue en entier.

Male reproductive system typical of the family. The single testis extends in the posterior region of ambulatory setae. Spicules 54-63  $\mu\text{m}$  long (34-44  $\mu\text{m}$  when measured by the chord), gradually ventrally curved, corpus slender with small capitulum and a rather thin velum.

Gubernaculum short, slightly curved. Tail conical, with 7-8 annuli; end ring short and stout. Caudal glands extend well beyond.

Females. Similar to male in most respects. Cuticle with

**Table 2.** Morphometric data of *Metepsilonema hagmeieri*, measured on specimens from the Channel (measurements in  $\mu\text{m}$ , average and standard-deviation).**Tableau 2.** Morphométrie de *M. hagmeieri*, mesures faites sur des spécimens de la Manche (mesures en  $\mu\text{m}$ , moyenne et écart-type).

	Min	males (n = 12)		SD	female (n = 12)			SD	juv. IV
		Max	AVG		Min	Max	AVG		
L	265	320	285.0	14.0	250	345	285.8	29.5	215
N	126	140	131	4	125	136	130	3	116
amph	6	7.2	6.4	0.4	4.5	6.5	5.7	0.5	5
%amph	36.7	48	41.7	3.2	30.8	42.0	36.6	2.9	30
cs	6.2	7.9	7.1	0.5	4.5	7.0	5.9	0.8	5.2
ph	44	51	48.1	2.4	15.0	18.0	16.6	1.0	43
mbd ph	23	30	26.3	2.2	43.0	52.0	49.3	2.7	32
(mbd)	10	14	11.4	1.1	25.0	36.0	29.2	3.1	11
mbd	30	40	34.9	2.5	10.0	11.5	10.8	0.5	33
abd	13	17	15	1.2	38.6	50.0	44.7	3.5	13.6
t	28	31	28.8	1	11.4	16.0	13.8	1.5	26.1
tmr	11	16	14.3	1.3	24.0	30.7	27.2	2.0	11.5
tmr%	39.3	56.1	49.7	4.1	11.0	16.0	13.6	1.3	44
tr	7	10	8	1	45.8	57.1	50.0	3.0	9
Asl1	9.5	11.8	10.7	0.9	6.0	8.0	7.3	0.7	11
Ss1	18	22	20.5	1.3	7.0	13.0	10.4	1.9	18
Ss2	19	24	22.4	1.3	15.0	24.8	20.6	2.5	19
Ss3					20.3	26.0	23.4	1.4	
spic	38.5	48	42.3	2.6	12.0	18.0	14.7	1.7	
gub/v	6	7	6.5	0.3	175.0	240.0	199.0	19.7	
a	7	9.7	8.2	0.7	5.6	7.7	6.4	0.6	8.8
b	5.3	7.3	5.9	0.5	5.3	6.6	5.8	0.4	6.0
c	8.7	11.2	9.9	0.6	9.0	11.9	10.5	0.9	9.5
c'	1.7	2.2	1.9	0.1	1.7	2.4	2.0	0.2	1.9
mbd/(mbd)	2.5	3.5	3.1	0.3	67.4	72.7	69.7	1.5	3.0
					3.9	4.5	4.1	0.2	

126-132 annuli. Ambulatory setae in four longitudinal rows of 10-12 setae on the outer lateroventral rows and 8-9 setae on the inner rows; three supporting setae on each side. Reproductive system typical of the genus. Reflexed ovaries usually to the same side; spermathecae not clearly marked; vulva at 70-73.5% of total body length from anterior end; vagina bipartite. Subventrally on each side, one prevulvar and one postvulvar seta present. Tail with 7 complete annuli; end ring as in male.

Juveniles belonging to third and fourth stage.

Third stage. Cuticle with 111 annuli; tail with 9 annuli. Habitus similar to adults. Helmet without subcephalic setae; amphidial fovea unispiral, 41-46% of corresponding head width. Ambulatory setae in two longitudinal rows with 5-6 setae. Two stout supporting setae present on each side.

Fourth stage. Cuticle with 113-117 annuli; tail with 7-8 annuli; helmet without subcephalic setae; amphidial fovea resp. 29 and 45% of corresponding head width. Ambulatory setae arranged in four longitudinal rows: the outer lateroventral rows with 6-8 setae, the inner rows with 2-4

setae; two supporting setae on each side. Young moulting male with reproductive system reaching to the posterior ambulatory seta of the outer row; spicules completely formed, 56  $\mu\text{m}$  long.

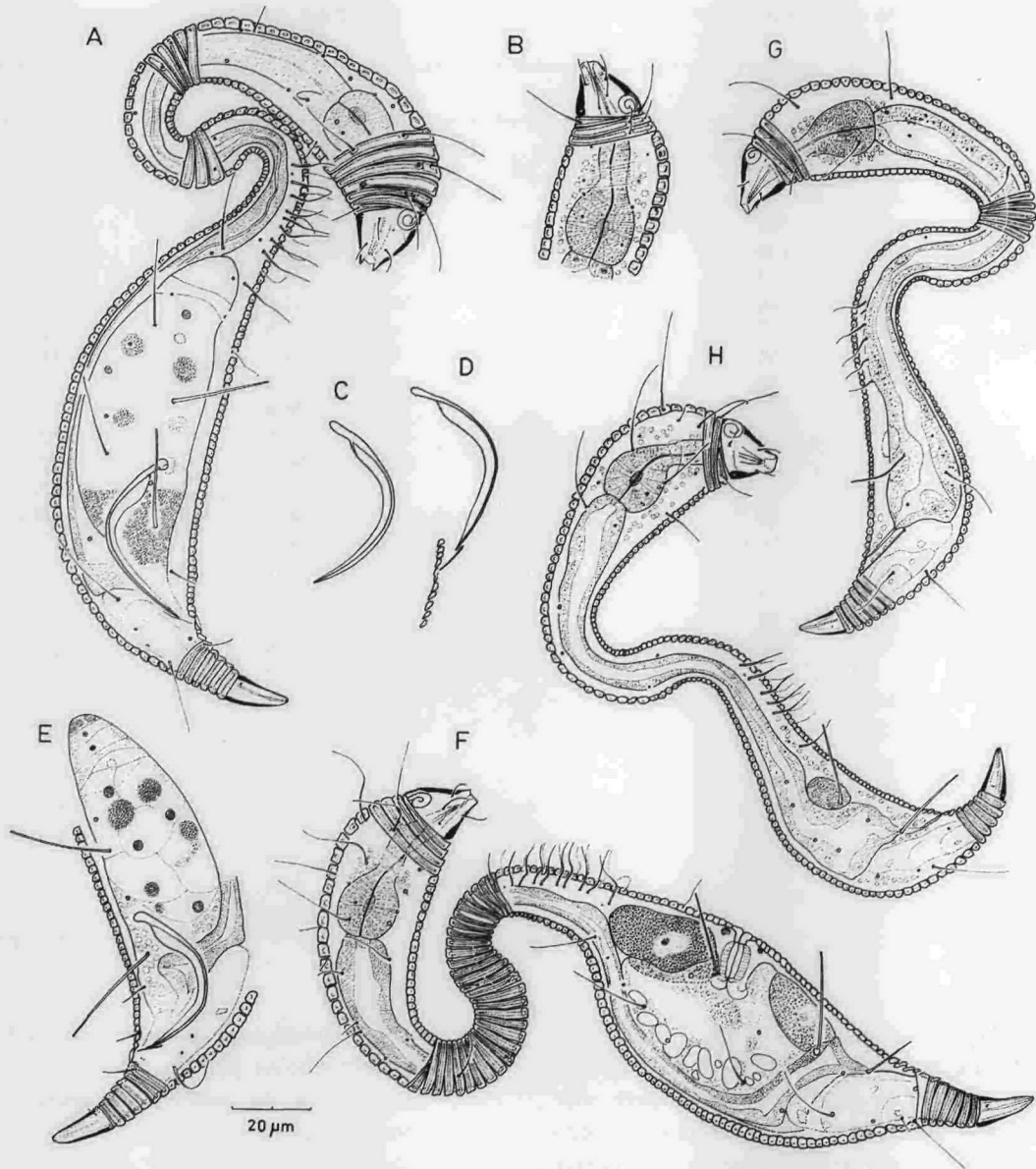
Study of the population from Helgoland, North Sea, sublittoral, described as *M. hagmeieri* by Lorenzen (1973), differences with the type population (Fig. 4)

Material. slide NSIMB A 23, 5 males, 4 females. Measurements on table 4.

Additional data:

the specimens from Helgoland are similar to the type population but with a lower number of annuli.

Males. Cuticle with 118-124 annuli; annuli, non-overlapping, wide, with a thick cuticle with faint to more pronounced pearl-like thickenings on their anterior and posterior borders, and a wide inner lumen. Ambulatory setae arranged in four longitudinal rows of 11-14 setae on the outer subventral rows and 8-10 setae on the inner subventral rows; usually three (rarely two) supporting setae



**Figure 3.** *Metepsilonema lorenzeni* sp.nov. type specimens. Males (A) total view; (B) anterior body region, holotype; (C-D) copulatory apparatus; (E) posterior body region, holotype. Female (F) total view. Juveniles, total view (G) third stage; (H) fourth stage.

**Figure 3.** *Metepsilonema lorenzeni* sp.nov. spécimens types. Mâles (A) vue en entier ; (B) région antérieure du corps, holotype ; (C-D) appareil copulateur ; (E) partie postérieure du corps, holotype. Femelle (F) vue en entier. Juvéniles, vue en entier; (G) troisième stade ; (H) quatrième stade.

on each side. Spicules 53-58  $\mu\text{m}$  long (38-41.5  $\mu\text{m}$  when measured by the chord). Tail conical, with 6 (5-7) annuli; end ring short and stout. Caudal glands may be confined to the tail (Fig. 4C) or extend well beyond; spinneret well developed.

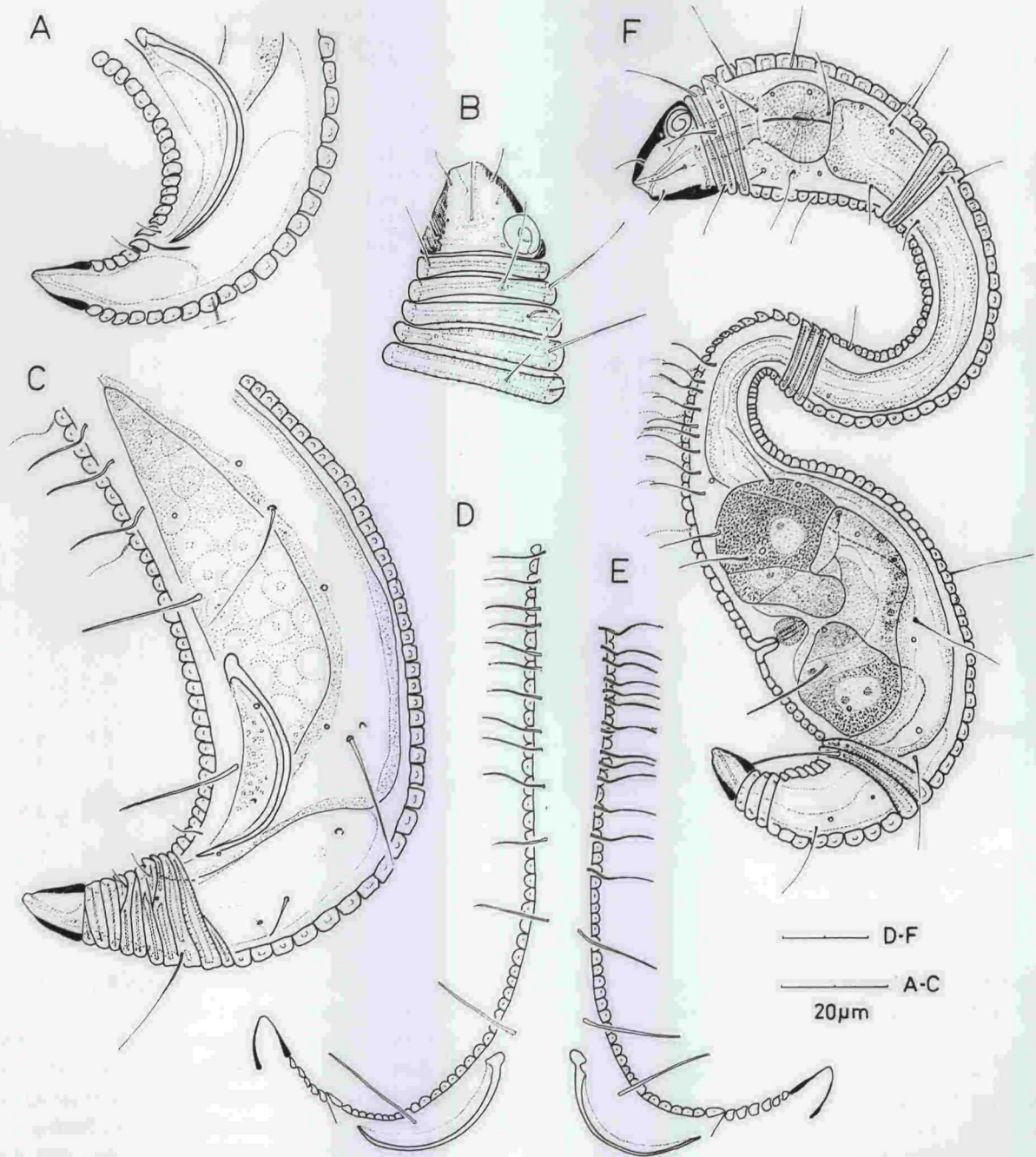
Females: Cuticle with 118-126 annuli. Ambulatory setae in four longitudinal rows of 9-13 setae on the outer rows and 9-12 setae on the inner rows; two supporting setae on each side. Tail with 5 complete annuli.

Juveniles belonging to third and fourth stage.

Third stage. Cuticle with 115 annuli; tail with 8 annuli. Habitus similar to adults but swollen parts less pronounced. Amphidial fovea unispiral, about 30% of corresponding head width. Ambulatory setae in three longitudinal rows: the outer subventral rows with 8-9 setae, the mid-ventral row with 3.

Fourth stage. A young male and a young female moulting to adult have been observed. Cuticle with 111 annuli in





**Figure 4.** *Metepsilonema lorenzeni* sp.nov., specimens of *M. hagmeieri* sensu Lorenzen. Males (A) copulatory apparatus and posterior body region; (B) anterior body region; (C) posterior body region; (D-E) arrangement of ambulatory setae and supporting setae. Female (F) entire body.

**Figure 4.** *Metepsilonema lorenzeni* sp.nov., d'après des spécimens de *M. hagmeieri* sensu Lorenzen. Mâles (A) appareil copulateur et région postérieure; (B) partie antérieure du corps; (C) partie postérieure du corps; (D-E) arrangement des soies ambulatoires et des soies de support. Femelle (F) vue en entier.

juvenile male and 107 annuli in moulting young female; tail respectively with 7 and 6 annuli counted subdorsally

(5 complete annuli). Amphidial fovea respectively 33.5 and 32.5% of corresponding head width. Ambulatory setae

**Table 3.** Morphometric data of type-specimens of *Metepsilonema lorenzeni* sp.nov. (measurements in  $\mu\text{m}$ , average and standard-deviation).**Tableau 3.** Morphométrie des spécimens types de *M. lorenzeni* sp.nov. (mesures en  $\mu\text{m}$ , moyenne et écart-type).

	male		males (n = 5)				jIV moult	females (n = 5)				juv.IV (n = 5)				juv.III	
	Holotype	Min	Max	AVG	SD	male	Min	Max	AVG	SD	Min	Max	AVG	SD	1	2	
L	320	320	330	324	3	290	298	335	315	15.3	230	290	252.0	23.8	200	230	
N	124	124	131	127	2	113	126	132	129	2	113	117	115	1	111	111	
amph	7.0	5.0	7.0	6.0	1.0		5.0	7.7	6.1	0.9	4.5	6.7	5.6	0.8	6.2	5.4	
%amph	45.2	27.5	48.0	39.4	7.5		31.3	49.7	38.6	6.2	29.0	44.7	38.4	5.9	46.3	40.9	
cs				6.0			4.5	6.3	5.6	0.8	4.5	6.0	5.3	0.7	3.5	4.5	
subc s				9.5			6.5	13.5	10.7	3.0					10		
ph				48.0			44.0	52.0	48.8	2.7	43.0	46.0	45.0	1.2	41.0	39.0	
mbd ph	28.0	27.5	39.0	31.9	5.0	33	27.0	29.0	28.2	0.7	25.0	31.0	27.5	2.2	25	26	
(mbd)	11.5	10.0	15.0	12.2	1.6	13	11.0	12.0	11.6	0.5	11.0	13.0	11.6	0.8	10	11.5	
mbd	39.0	33.0	50.0	41.6	6.1	34	41.0	50.0	45.0	3.5	27.0	38.0	31.0	4.0	25	26	
abd	14.0	14.0	20.0	16.2	2.0	17	12.0	15.0	14.0	1.1	12.0	16.0	14.7	1.4	15	15	
t	32.0	31.0	35.0	33.0	1.7	29	24.5	30.0	28.7	2.1	23.5	29.0	25.7	2.0	24	27	
tmr	15.5	15.0	16.0	15.5	0.4	11	11.0	16.0	13.6	1.6	11.0	12.5	12.1	0.6	10	10	
tmr%	48.4	45.7	48.4	47.0	1.2	37.9	43.3	53.3	47.3	3.4	41.4	53.2	47.6	4.4	41.7	37.0	
t N	8	7	8	8	0	8	7	7	7	0	7	8	8	0	9	9	
Asl1				11.0			10.5	12.0	11.4	0.6	11.0	12.5	11.5	0.6	8.0	10.0	
Ss1	27.0	25.0	27.0	26.0	1.0	21.0	23.0	27.0	24.8	1.5	19.0	22.0	20.9	1.0	17.5	15.5	
Ss2	29.0	24.5	29.0	26.8	2.3	21.0	27.5	31.0	29.1	1.2	21.0	23.5	22.1	1.0	20.0	18.5	
Ss3							15.5	17.5	16.5	0.7							
spic	54.0	54.0	63.0	58.4	3.3	56.0											
(chord)	34.0	34.0	44.0	40.4	3.5												
grub		7.5	10.0	9.0	1.1	9.5											
a		6.4	9.8	8.0	1.2	8.5	6.2	7.6	7.0	0.5	7.6	8.5	8.2	0.4	8.0	8.8	
b				6.9			6.2	6.8	6.5	0.2	5.1	5.9	5.4	0.3	4.9	5.9	
c		9.2	10.4	9.8	0.5	10.0	10.3	12.2	11.0	0.7	9.2	10.0	9.8	0.3	8.3	8.5	
c'		2.1	2.2	2.1	0.1	1.7	2.0	2.1	2.1	0.1	1.6	2.1	1.8	0.2	1.6	1.8	
V							70.0	73.5	71.2	1.3							
mbd/(mbd)		2.8	3.9	3.4	0.4	2.6	3.4	4.5	3.9	0.4	2.5	2.9	2.7	0.2	2.5	2.3	

arranged in four longitudinal rows; the outer subventral rows with 9-10 setae, the inner rows with 5 setae; two supporting setae on each side. Young moulting female specimen with reproductive system largely formed, with two reflexed branches; future vulva at 74.3% of total female body length from anterior end. Young male with reproductive system reaching the posterior ambulatory seta of the outer row; spicular primordium with spicules not yet formed.

**Diagnosis:** *M. lorenzeni* sp.nov. is characterized by a thick cuticle with wide lumen and non-overlapping annuli, 118-132 annuli in adults; amphidial fovea unispiral, 30-40% of corresponding head width; two supporting setae in female, mainly three in male; spicules 53 to 61  $\mu\text{m}$  long.

**Relationships:** *M. lorenzeni* sp.nov. resembles *M. hagmeieri* largely in general habitus (type of body rings, amphidial fovea), but differs by the combination of a few

characters: lower average of the number of body rings, larger body size and clearly longer spicules.

**Remark:** Among the six male specimens of *M. hagmeieri* sensu Lorenzen, 1973 from the Helgoland population, two different species were observed: one specimen agreed with *M. hagmeieri* (= *M. emersum*, Table 1) having a shorter body than the other males, shorter spicules, narrower body rings, a fine short tail, but possessing a number of body rings in between both species.

### Discussion

Within the genus *Metepsilonema* some groups of closely related species have been distinguished e.g. *M. callosum* group (Decraemer & Gourbault, 1990). Within each group, species differentiation is very complex. This is due to the relative small populations taken into account for taxonomic purposes and the limited number of diagnostic characters, which leads to underestimation and ignorance of their

**Table 4.** Morphometric data of *Metepsilonema lorenzeni* measured from specimens of *M. hagmeieri* sensu Lorenzen (measurements in  $\mu\text{m}$ , average and standard-deviation), slide NSIMB A 23.**Tableau 4.** Morphométrie de *M. lorenzeni*, d'après des spécimens de *M. jagmeieri* sensu Lorenzen (mesures en  $\mu\text{m}$ , moyenne et écart-type), lame NSIMB A 23.

	Min	Max	males (n = 5)		Min	females (n = 4)		SD	juv. IV*	juv IV	
			AVG	SD		Max	AVG			1	2
L	393	442	409.4	18.0	332	387	369.0	22.1	316	285	230
N	118	124	122	2	118	126	122	3	107	111	115
amph	7.2	9.0	8.0	0.6	6.7	9.0	7.5	0.9	6.2	6.7	5.4
%amph	31.3	39.0	34.2	2.6	30.5	45.0	35.6	5.5	32.6	33.5	31.7
cs	5.2	8.0	7.0	1.0	6.0	6.5	6.4	0.2	6.5	6.5	4.5
subcs	11.0	13.0	12.1	0.8	9.0	13.0	11.0	2.0			
ph	49.0	54.0	51.8	1.7	50.0	53.0	51.5	1.1	47.0	48.0	44.0
mbd ph	32.0	34.0	32.8	0.7	30.5	35.0	33.0	1.7	37.0	32.0	25.0
(mbd)	13.0	15.0	13.9	0.7	12.5	15.0	13.6	1.0	15.5	15.5	11.5
mbd	42.0	44.0	42.6	0.8	47.0	56.0	51.3	3.3	46.0	34.0	26.0
abd	17.0	19.0	18.2	0.7	13.0	15.5	14.0	0.9	17.0	16.0	14.0
t	22.0	28.0	25.2	1.9	21.0	22.0	21.8	0.4	23.5	21.0	26.0
tmr	10.0	13.0	11.9	1.0	10.0	13.0	11.9	1.2	11.5	9.0	11.0
tmr%	45.5	50.0	47.2	1.6	47.6	59.1	54.5	4.9	48.9	42.9	42.3
tN	5	7	6	1	5	5	5	0	5	8	9
Asl1	13.5	15.5	14.4	0.7	13.0	14.5	13.8	0.6	12.5	14.0	12.5
Ss1	24.0	26.5	25.6	1.0	22.5	29.0	25.8	3.0	24.0	21.5	20.0
Ss2	19.5	27.5	24.3	3.5	22.0	29.0	25.4	2.9	24.5	23.0	21.5
spic	53.0	58.0	54.8	1.7							
chord	38.0	41.5	38.9	1.4							
gub/v	7.2	9.0	8.3	0.7	243.0	290.0	271.5	18.4			
a	9.3	10.5	9.6	0.5	6.4	8.2	7.2	0.7	6.9	8.4	8.9
b	7.4	8.7	7.9	0.4	6.4	7.7	7.2	0.5		5.9	5.2
c	14.0	18.3	16.3	1.4	15.1	17.7	17.0	1.1	13.5	13.6	8.8
c'	1.2	1.6	1.4	0.2	1.4	1.7	1.6	0.1	1.4	1.3	1.9
V					72.0	75.0	73.6	1.2			
mbd/(mbd)	2.9	3.2	3.1	0.1	3.5	4.0	2.8	0.2	3.0	2.2	2.3

\*moulting to female

variability, with misidentification as result. In a first approach, a species group is characterized by its body cuticle : type of annulation (overlapping or non-overlapping) and type of ornamentation. Herein after the *M. hagmeieri* group displays non-overlapping and smooth annuli with a wide inner lumen. Within the group, further distinction is largely based on a combination of morphometric data.

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