

LEPTOLAIMIDS (NEMATODA, LEPTOLAIMINA) FROM THE CANARY ISLANDS

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RESUMEN

Siete especies pertenecientes al suborden Leptolaimina fueron colectadas durante un estudio ecológico de los fondos blandos en la costa sur de la isla de Tenerife (islas Canarias). Dos de estas especies (*Dasynemoides* sp. y *Metadasynemella* sp.) fueron determinadas a nivel genérico por la falta de material en buenas condiciones. Las especies restantes fueron *Camacolaimus tardus* De Man, 1889, *Ceramonema yunfengi* Platt & Zhang, 1982, *Diodontolaimus sabulosus* Southern, 1914 *Tarvaia* aff. *peruvensis* Nichols & Musselman, 1979 y *Southernia zosterae* Allgen, 1929. Se realiza una descripción detallada, figuras y datos merísticos de cada una de las especies, así como datos autoecológicos de las localidades de muestreo.

Palabras clave: Nematoda, Leptolaimina, vida libre, fondos blandos, Tenerife, islas Canarias.

ABSTRACT

Seven species belonging to the suborder Leptolaimina were collected during an ecological study of the soft-bottoms on the south coast of Tenerife, Canary Islands. Two of these species (*Dasynemoides* sp. *Metadasynemella* sp.) were determined to genus level due to the lack of material in good conditions. The remaining species were *Camacolaimus tardus* De Man, 1889, *Ceramonema yunfengi* Platt & Zhang, 1982, *Diodontolaimus sabulosus* Southern, 1914 *Tarvaia* aff. *peruvensis* Nichols & Musselman, 1979 and *Southernia zosterae* Allgen, 1929. Descriptions, figures and meristic data of each species are presented, as well as, autoecological data of the sampling stations.

Key words: Nematoda, Leptolaimina, Free-living, soft-bottoms, Tenerife, Canary Islands.

INTRODUCTION

The suborder Leptolaimina Lorenzen, 1981 comprises a heterogeneous group of genera with rather few characters in common, that are all those taxa of the order Chromadorida

which do not belong to the suborders Chromadorida and Desmoscolecina (Lorenzen [9]). Some common features could be cuticle always striated, labial sensilla minute or inconspicuous, outer labial and cephalic setae in different circles and cephalic ones usually longer than outer labial setae. In addition, amphids are ventrally-spiral or non-spiral, buccal cavity minute and, in most of the cases, tubular. Males have two testes and females two ovaries.

During an ecological study of the intertidal and shallow subtidal soft-bottoms from two stations on the south coast of Tenerife, several specimens belonging to the suborder Leptolaimina were collected. A more detailed study revealed that those individuals belong to 7 different taxa: *Camacolaimus tardus* De Man, 1889, *Ceramonema yunfengi* Platt & Zhang, 1982, *Dasynemoides* sp., *Diodontolaimus sabulosus* Southern, 1914, *Metadasynemella* sp., *Southernia zosterae* Allgen, 1929 and *Tarvaia* aff. *peruvensis* Nichols & Musselman, 1979.

MATERIAL AND METHODS

Samples were collected in soft-bottoms of the intertidal and shallow subtidal (3 m deep), of Los Abrigos (SE Tenerife) and Los Cristianos (SW Tenerife). 4.5 inner diameter PVC cores were taken to a depth of 30 cm in the sediment. These samples were fixed with 10% formaldehyde in seawater for one day and decanted through a sieve of 63 mm mesh size, and posteriorly preserved in 70% ethanol. Specimens were mounted in glycerine gel and drawings of these were done using a *camera lucida* on a Leica DMLB microscope equipped with Nomarski interference contrast. All measurements are in micrometers and curves structures are measured along the arc.

To assess the granulometric composition of the sediment, ca. 100 g of sediment from each monthly sample was oven dried at 105°C, passed through a graded series (2 mm, 1 mm, 0.5 mm, 0.25 mm, 0.125 mm and 0.063 mm) of sieves, and then weighted (Buchanan [5]). The method of Walkley & Black [17] was used to determine the organic matter content (% OM) of the sediment. Total nitrogen (%) was determined following the Kjeldahl method (Bradstreet [4]).

SYSTEMATICS

Subclass CHROMADORIA Pearse, 1942

Order CHROMADORIDA Chitwood, 1933

Suborder LEPTOLAIMINA Lorenzen, 1981

Family Leptolaimidae Örley, 1880

Genus *Camacolaimus* De Man, 1889

Camacolaimus tardus De Man, 1889

(Fig. 1, Tab. 1)

Camacolaimus tardus De Man [6] 184, fig. 2 a-e; Wieser [18] 27, fig. 198 a-g; Vitiello [16] 681, fig. 24 a-d.

Camacolaimus australis Allgen [2] 125, fig. 17 a-e.

Meristic data and studied material.- Tenerife, Abrigos intertidal: august 2000, 1 male (♂1) and 1 juvenile (Juvenil 1).

Description.- *Male.* Body slender, tapering towards both ends. Head slightly round and not set off. Cuticle annulated, lacking lateral differentiation. Amphids are 46% of the corresponding body diameter in width, round and unispiral, located at 1 μm from the anterior end. Buccal cavity narrow, with a style-like tooth. Inner and outer labial setae absent. 4 cephalic setae 0.9 anal diameters long, located in the anterior part of the head. Subcephalic setae lacking. Pharynx slender and cylindrical.

The reproductive system is diorchic with two anterior testes. Spicules 1.4 anal diameters long, paired, arcuated and without capitulum. Gubernaculum 0.6 anal diameters long, with a dorsoventrally directed apophysis. Precloacal supplements absent. Tail 4.4 anal diameters long, cylindrical with posterior tip consisting of thin cuticle. Caudal setae lacking. Spinneret developed.

Discussion.- Canarian specimens present a larger gubernaculum and a dorsolaterally directed apophysis, being dorsocaudally directed in individuals from other geographical areas. Cephalic setae are larger (0.9 cephalic diameters) compared to british specimens (0.6 cephalic diameters) (Platt & Warwick [12]).

	♂1	Juvenile 1
Total body length	1433	1314.3
a	33.4	33.5
b	6.3	5.9
c	12.6	15.3
Cephalic diameter	16	39.3
Outer labial setae	–	7.1
Cephalic setae	14.3	8.6
Buccal cavity diameter	2.9	7.1
Amphid diameter	5.7	5.7
Amphid height	5.7	5.7
Amphid from anterior	2.9	4.3
Pharynx length	228.6	221.4
Pharynx cbd	39.3	39.3
Maximum body diameter	42.9	39.3
Spicule length	37	
Gubernaculum length	17	
s'	1.4	
Tail length	114	85.7
Anal body diameter	26	32.1
c'	4.4	2.7
Spicule length/Tail length	0.3	

Table 1.- Measurements of *Camacolaimus tardus* in μm .

Ecology.- This species was collected in medium sands ($Q_{50} = 0.38$), with a very good selection ($S_0 = 0.87$). The organic matter content was 1.11% and carbonates percentage was 5.13%.

Distribution.- Cosmopolitan (Lorenzen [9]). This species is first recorded from the Canary Islands.

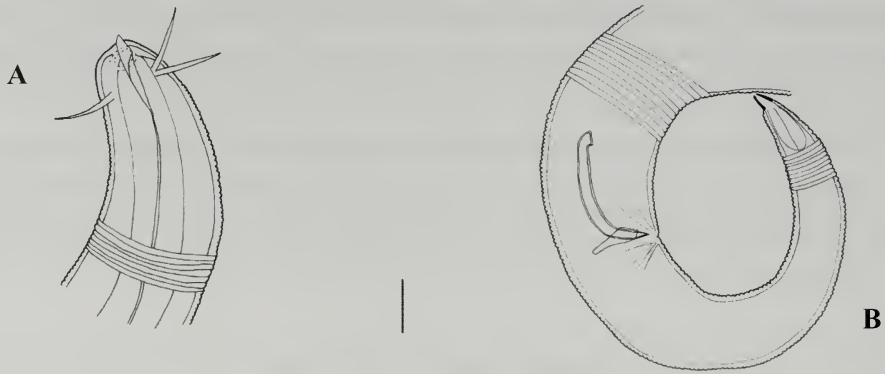


Figure 1.- *Camacolaimus tardus*. Male. **A.** Anterior end. **B.** Posterior end. Scale A = 12 μ m, B = 19 μ m.

Diodontolaimus sabulosus Southern, 1914
(Fig. 2, Tab. 2)

Diodontolaimus sabulosus Southern [15] 31, fig. 11; Platt & Warwick [12] 420, fig. 196; Palacín [11] 319.

Meristic data and studied material.- Tenerife, Abrigos intertidal: june 2000, 1 male (σ 1) and 1 juvenile (Juvenile 1), april 2001, 1 male (σ 2).

Description.- *Male:* Body slender, attenuating on both ends. Head set off. Cuticle annulated, without lateral differentiation. Amphids 26% of the corresponding body diameter in width, unispiral, located at 2 μ m from the anterior end. Buccal cavity conical, with a noticeable dorsal tooth. Inner and outer labial setae lacking. 4 cephalic setae 0.9 cephalic diameters long, situated in the median part of the head. Subcephalic setae absent. Ventral gland and nerve ring not seen.

Reproductive system not discernible. Spicules 1 anal diameter long, paired, arcuated with a capitulum. Gubernaculum 0.3 anal diameters long, with a dorsoventrally directed apophysis. 13 precloacal supplements 23 μ m long, being the posteriormost located at 29 μ m from the cloaca. Tail 1.8-2.1 anal diameters long, conical with an acuminate tail tip. Caudal setae lacking. Spinneret inconspicuous.

Discussion.- Canarian specimens bear 13 precloacal supplements, being observed 9 or 11 precloacal supplements in this species (Southern [15]; Vitiello [16]). Moreover, a papilla located between 4^o-5^o precloacal supplement (Vitiello [16]) is lacking in the studied material.

Ecology.- This species was collected in medium sands ($Q_{50} = 0.32-0.36$), with a very good selection ($S_0 = 0.79-0.84$). The organic matter content ranged from 0.96% to 1.30% and carbonates percentage varied between 4.44% and 6.15%.

Distribution.- Amphiatlantic (Hopper & Myers [7]; Platt & Warwick [12]). Mediterranean Sea (Palacín [11]).

	♂1	♂2	Juvenile 1
Total body length	3442.9	2714.3	1600
a	45.9	42.2	26.7
b	11.5	31.1	7.5
c	37.1	47.5	21.3
Cephalic diameter			
	14	14.3	10
Cephalic setae			
	13	13.1	17.1
Buccal cavity diameter	5.7	7.1	4.3
Amphid diameter	7.1	7.1	7.1
Amphid height	7.1	5.7	4.3
Amphid from anterior	4.3	4.3	0
Pharynx length	300	87.1	214.3
Pharynx cbd	64.3	57.1	57.1
Maximum body diameter	75	64.3	60
Spicule length	53	44.3	
Gubernaculum length	16.1	12.4	
s'	1	1.1	
Tail length	92.9	87.1	75
Anal body diameter	51	41.5	53.6
c'	1.8	2.1	1.4
Spicule length/Tail length	0.6	0.5	

Table 2.- Measurements of *Diodontolaimus sabulosus* in μm .

Distribution.- This species is first recorded from the Canary Islands.

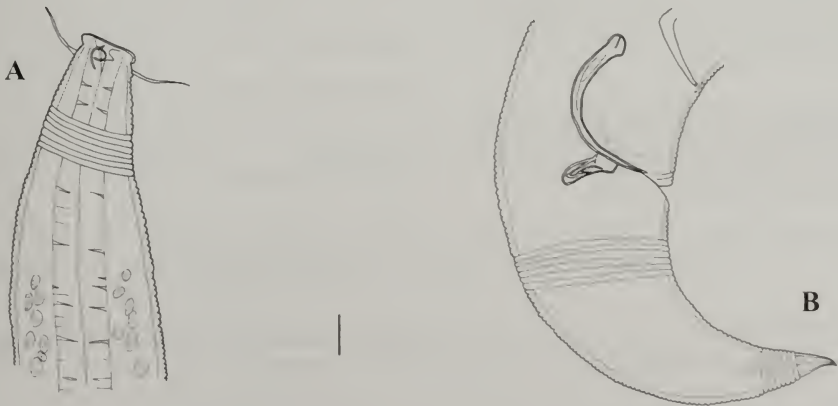


Figure 2.- *Diodontolaimus sabulosus*. Male. **A.** Anterior end. **B.** Posterior end. Scale A = 10 μm , B = 15 μm .

Family Tarvaidae Lorenzen, 1981
Tarvaia aff. *peruvensis* Nichols & Musselman, 1979
 (Fig. 3; Tab. 3)

Tarvaia peruvensis Nichols & Musselman [10]: 125, fig. 1 a-c; Lamshead [8]: 67, fig. 8 a-f.

Meristic data and studied material.- Tenerife, Abrigos subtidal: June 2000, 1 juvenile (Juvenile 1).

Description.- Juvenil: Body slender, tapering towards both ends. Head round, slightly set off with a cephalic capsule. Cuticle ornamented with transversal annulations, lateral differentiation lacking. Amphids are 86% of the corresponding body diameter in width, large, "U-inverted" shape, located at 4 µm from the anterior end. Buccal cavity small and enlarged, without noticeable teeth. Inner and outer labial setae absent. 4 cephalic setae 1.3 head diameters long, situated in the anterior half of the cephalic capsule. Subcephalic setae lacking. Pharynx slender and cylindrical.

Reproductive system not developed. Precloacal supplements absent. Tail 3.9 anal diameters long, cylindrical, with posterior tip truncated. Caudal setae lacking. Spinneret developed.

Discussion.- The examined specimen closely resembles *Tarvaia peruvensis* Nichols & Musselman, 1979 in amphid shape, the presence of an anterior cuticularized shield and having amphids inside the cephalic capsule. This species was determined as *Tarvaia* aff. *peruvensis* due to the lack of adult specimens.

Ecology.- This species was collected in medium sands ($Q_{50} = 0.26$), with a very good selection ($S_0 = 0.75$). The organic matter percentage was 1.54% and 6.84% of carbonates content.

Distribution.- East Pacific (Nichols & Musselman [10]). This species is first recorded in the Atlantic Ocean.

	Juvenile 1
Total body length	1342.9
a	44.8
b	10.5
c	18.4
Cephalic diameter	46.4
Inner labial setae	15
Cephalic setae	19
Amphid height	12.9
Amphid from anterior	30
Pharynx cbd	128
Maximum body diameter	35
Vulva from anterior	35
% V	nd
Spicule length	nd
Gubernaculum length	
s'	
Tail length	
Anal body diameter	72.9
c'	18.6
Spicule length/Tail length	3.9
Total body length	

Table 3.- Measurements of *Tarvaia* aff. *peruvensis* in µm; nd= no discernible.



Figure 3.- *Tarvaia* aff. *peruvensis*. Juvenil. **A.** Anterior end. **B.** Posterior end. Scale = 15 μ m.

Family Aegialoalaimidae Lorenzen, 1981
Southernia zosteriae Allgen, 1929
 (Fig. 4, Tab. 4)

Southernia zosteriae Allgen [1] 427, fig. 3; Allgen [3] 148, fig. 74 a, b.
Southernia rubra Schulz [14] 405, fig. 41 a-e.

Meristic data and studied material.- Tenerife, Abrigos subtidal: october 2000, 1 male (σ^1).

Description.- Male: Body slender, slightly tapering towards both ends. Head round and not set off. Cuticle annulated with transversal striations, lacking lateral differentiation. Amphids are 63% of the corresponding body diameter in width, simple, strongly cuticularised (in plaque) and round, located at 5 μ m from the anterior end. Buccal cavity minute and unarmed. Inner and outer labial setae absent. 4 cephalic setae 0.5 head diameters long, located at the median part of the head. Subcephalic setae absent. Pharynx short, poorly developed and without define posterior bulb.

Reproductive system not discernible. Spicules 0.4 anal diameters long, paired, arcuated, proximally cephalated. Tail 2.3 anal diameters long, cylindrical with a rounded posterior tip. Precloacal supplements and caudal setae absent. Spinneret poorly developed.

Discussion.- This species is characterized by having an amphid in plaque, gubernacular apophyses dorsocaudally directed and tail cylindrical with a rounded end.

Ecology.- This species was collected in fine sands ($Q_{50} = 0.24$), with a very good selection ($S_0 = 0.73$). The organic matter content was 0.51% and 4.61% of carbonates percentage.

Distribution.- East Atlantic Ocean (Platt & Warwick [12]). This species is first recorded in the Canary Islands.

	♂1
Total body length	1342.9
a	31.3
b	30.3
c	15.9
Cephalic diameter	20
Cephalic setae	10
Amphid diameter	22.9
Amphid height	21
Amphid from anterior	7.1
Pharynx length	44.3
Pharynx cbd	32.9
Maximum body diameter	42.9
Spicule length	
Gubernaculum length	47
s'	20
Tail length	1.3
Anal body diameter	84.3
c'	36
Spicule length/Tail length	2.3
Total body length	0.6

Table 4.- Measurements of *Southernia zosteriae* in μm .

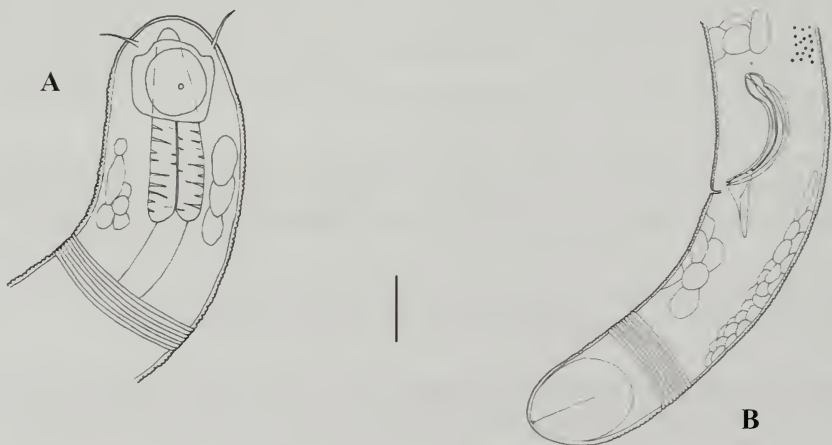


Figure 4.- *Southernia zosteriae*. **A.** Anterior end. **B.** Posterior end. Scale A = 25 μm , B = 32 μm .

Family Ceramonematidae Cobb, 1933
Ceramonema yunfengi Platt & Zhang, 1982
 (Fig. 5, Tab. 5)

Ceramonema yunfengi Platt & Zhang [13]: 236, fig. 5; Platt & Warwick [12]: 466, fig. 219.

Meristic data and studied material.- Abrigos subtidal: july, 1 female (♀1), october, 1 female (♀2).

Description.-

Female: Body slender, attenuating on both ends. Head slightly round, not set off and with a cephalic capsule. Cuticle ornamented with transversal ridges, lateral differentiation lacking. Amphids are 30% of the corresponding body diameter in width, “U-inverted” shape, located at 16 µm from the anterior end. Buccal cavity and inner labial setae absent. 6 outer labial setae 0.7 cephalic diameters long and 4 cephalic setae 0.8 cephalic diameters long, situated in the media part of the head capsule. Subcephalic setae lacking. Pharynx slender and cylindrical. Reproductive system not discernible. Vulva located at the level of the 38% of the total body length. Tail 3.8-5.4 anal diameters long, slender and cylindrical, with conical posterior tip. Caudal setae absent. Spinneret poorly developed.

	♀1	♀2
Total body length	1200	1671.4
a	28	34.9
b	10.2	12.8
c	6.2	12.2
Cephalic diameter	23	35.7
Inner labial setae	17.1	21.4
Cephalic setae	11.9	12.9
Subcephalic setae	14.6	15
Amphid diameter	7.1	10
Amphid height	11.4	10.7
Amphid from anterior	15.7	14.3
Pharynx length	–	14.3
Pharynx cbd	117.9	130.7
Maximum body diameter	39.3	28.9
Vulva from anterior	42.9	47.8
% V	457.1	nd
Spicule length	38.1	nd
Tail length		
Anal body diameter	192.9	137.1
c'	35.7	35.4
Spicule length/Tail length	5.4	3.8

Table 5.- Measurements of *Ceramonema yunfengi* in µm; nd= no discernible.

Discussion.- This species is characterized by having amphids “U-inverted” shape, cuticular ornamentation formed by ridges, and by the outer labial and cephalic setae arrangement. Canarian specimens have a De Man index ($a=28-35$) shorter than british individuals ($a=54-78$), and females tail length (4-5 anal diameters long) are less developed than british ones (11-12 anal diameters long) (Platt & Zhang [13]).

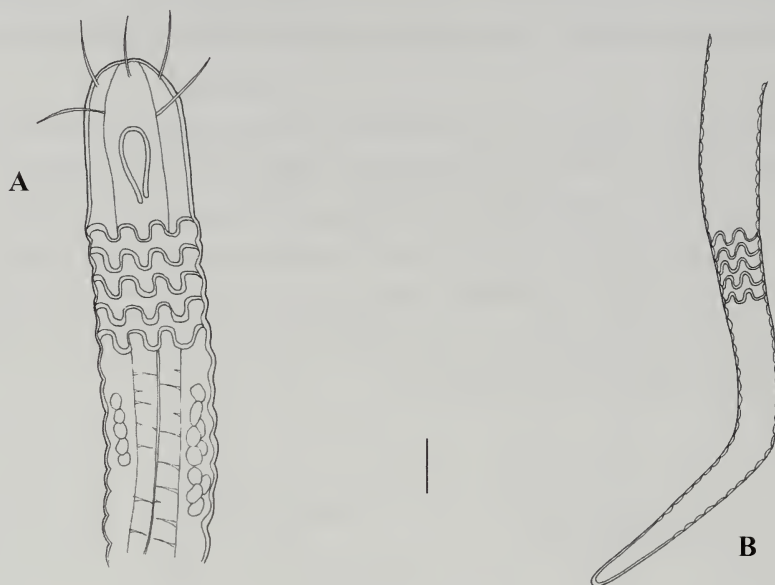


Figure 5.- *Ceramonema yunfengi*. Male. A. Anterior end. B. Posterior end. Scale = 12 μ m.

Ecology.- This species was recorded in median sands ($Q_{50} = 0.24$), with a very good selection ($S_0 = 0.73-0.75$). The organic matter content ranged from 0.51% to 0.78% and carbonates percentage varied between 4.61% and 5.47%.

Distribution.- East Atlantic (Platt & Zhang [13]). This species is first recorded in the Canary Islands.

Dasynemoides sp.

(Fig. 6, Tab. 6)

Meristic data and studied material.- Tenerife, Cristianos subtidal: october 2000, 1 female ($\text{♀}1$).

Description.-

Female: Body slender, tapering towards both ends. Head round, slightly set off, with a cephalic capsule. Cuticle ornamented with transversal striations. Amphids 40% of the corresponding body diameter in width, unispiral and located at 10 μ m from the anterior end. Buccal cavity and inner labial setae lacking. Six outer labial setae, 1.1 cephalic diameters long. Four cephalic setae, 1.6 head diameters long, situated in the median part of the cephalic capsule. Subcephalic setae absent. Pharynx slender and cylindrical. Ventral gland and nerve ring not seen.

The reproductive system is diorchic with two reflexed ovaries. Vulva located at the level of 56% of the total body length. Tail 5.5 anal diameters long, cylindrical, with round posterior end. Caudal setae absent. Spinneret poorly developed.

Discussion.- The studied specimen resembles *Dasyneimoides albaensis* (Warwick & Platt, 1973) in total body length and the arrangement of outer labial and cephalic setae as well as in amphid size and shape. However, females of *D. albaensis* present a larger and more cuticularized cephalic capsule. Canarian specimen was determined to genus level due to former reasons and due to the lack of males in good conditions.

Ecology.- This species was collected in fine sands ($Q_{50} = 0.16$), with a very good selection ($S_0 = 0.58$). The organic matter percentage was 0.67% and carbonates content was 24.52%.

Distribution.- This genus is first recorded in the Canary Islands.

	♀ 1
Total body length	1385.7
a	35.3
b	10.2
c	15.7
Cephalic diameter	11
Outer labial setae	12
Cephalic setae	18
Amphid diameter	5.7
Amphid height	10
Amphid from anterior	15.7
Pharynx length	135.7
Pharynx cbd	32.1
Maximum body diameter	39.3
Vulva from anterior	771.4
% V	55.7
Tail length	88
Anal body diameter	16
c'	5.5
Spicule length/Tail length	

Table 6.- Measurements of *Dasyneimoides* sp in μm .



Figure 6.- *Dasyneimoides* sp. Female. **A.** Anterior end. **B.** Posterior end. Scale A = 15 μm , B = 30 μm .

Metadasynemella sp.

(Fig. 7, Tab. 7)

Meristic data and studied material.- Tenerife, Abrigos intertidal: november 2000, 1 female (♀1); Cristianos subtidal: february 2001, 1 female (♀2).

Description.-

Female: Body slender, tapering towards posterior end. Head not round, not set off with a developed cephalic capsule. Cuticle ornamented with transversal striations. Amphids are 24% of the corresponding body diameter, round and simple, located at 14 µm from the anterior end. Buccal cavity and inner labial setae absent. Outer labial and cephalic setae situated in the same level. Outer labial setae 0.6 cephalic diameters long and 4 cephalic setae 0.2 cephalic diameters long, located at the anterior part of the head capsule. Subcephalic setae lacking. Pharynx slender and cylindrical. Ventral gland and nerve ring not seen.

Reproductive system and vulva not discernible. Tail 4.6 anal diameters long, cylindrical with acuminated posterior tip. Caudal setae absent. Spinneret poorly developed.

	♀1	♀2
Total body length	1757.1	1857.1
a	43.8	43.3
b	12.6	14.9
c	14.9	13.7
Cephalic diameter	22.9	24.6
Cephalic setae	13.8	14.3
Subcephalic setae	6	5.7
Amphid height	10	11.4
Amphid from anterior	11	10
Pharynx length	14	14.5
Pharynx cbd	139.3	125
Maximum body diameter	39.3	35.7
Vulva from anterior	40.1	42.9
% V		
Spicule length	nd	nd
Gubernaculum length	nd	nd
s'		
Tail length		
Anal body diameter	117.9	135.7
c'	26.1	28.7
Spicule length/Tail length	4.5	4.7

Table 7.- Measurements of *Metadasynemella* sp in µm.

Discussion.- The studied specimens are closely related to *Metadasynemella picrocephala* (Haspelslagh, 1973) in amphid shape and cephalic setae length. However, *M. picrocephala*

has a more cuticularised cephalic capsule and broaden transversal striations. The remaining species of the genus are characterized by having shorter cephalic setae (< 0.5 head diameters long) and amphids “U-inverted” shape. Canarian specimen has been determined to genus level due to the lack of males.

Ecology.- This species was recorded in the intertidal of Los Abrigos in medium sands ($Q_{50} = 0.38$), with a very good selection ($S_0 = 0.87$). The organic matter content was 1.07% and 5.12% of carbonates percentage. In the subtidal of Los Cristianos was recorded in fine sands ($Q_{50} = 0.18$), with a very good selection ($S_0 = 0.73$). The organic matter content was 0.33% and 23.08% of carbonates percentage.

Distribution.- This genus is first recorded in the Canary Islands.

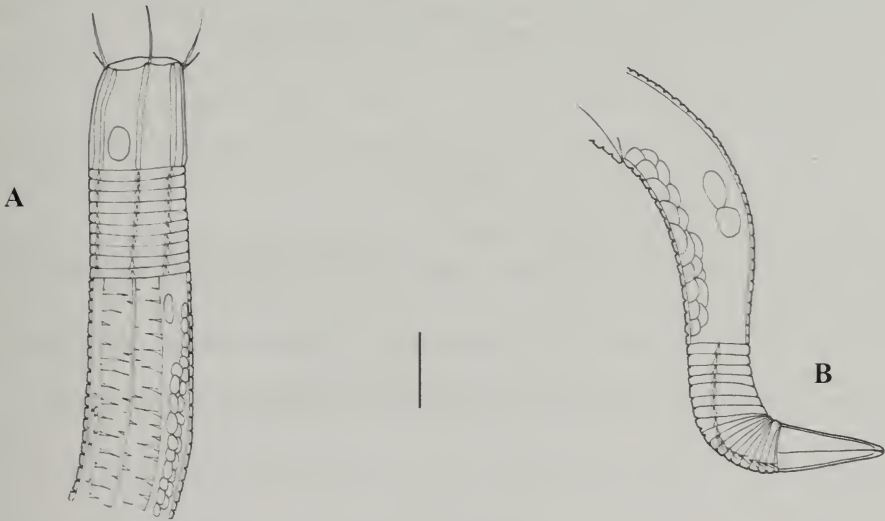


Figure 7.- *Metadasynemella* sp. Female. A. Anterior end. B. Posterior end. Scale A = 20 μ m, B = 25 μ m.

ACKNOWLEDGEMENTS

The first author (R.R.) thanks P.J. Somerfield (Plymouth Marine Laboratory, UK) for taxonomical advice during the beginning of his research on free-living marine nematodes. Authors also acknowledge Dr. Catalina Pastor de Ward (Centro Nacional Patagónico, Argentina) for interchange of ideas and encouragement.

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