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Exogone species (Polychaeta: Syllidae: Exogoninae) from the Capbreton Canyon (Bay of Biscay, NE Atlantic)

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Abstract : Six species of *Exogone* (Syllidae: Exogoninae) are reported from the Capbreton Canyon, Bay of Biscay. Three new species are described: *Exogone (Parexogone) campoyi*, *Exogone (Exogone) lopezi* and *Exogone (Exogone) sorbei*. The species *Exogone (Parexogone) caribensis* and *Exogone (Parexogone) wolfi* are new to the European waters.

Résumé : *Les espèces d'*Exogone *(Polychaeta: Syllidae: Exogoninae) du canyon du Capbreton (Golfe de Gascogne, Atlantique NE).*
Six espèces du genre *Exogone* (Syllidae : Exogoninae) sont signalées du Canyon de Capbreton, Golfe de Gascogne. Trois espèces nouvelles sont décrites : *Exogone (Parexogone) campoyi*, *Exogone (Exogone) lopezi* and *Exogone (Exogone) sorbei*. Les espèces *Exogone (Parexogone) caribensis*, *Exogone (Parexogone) wolfi*, sont des espèces nouvelles pour les eaux européennes.

Keywords : Polychaeta, Syllidae, Exogoninae, *Exogone*, Bay of Biscay, taxonomy.

Introduction

The Capbreton Canyon begins at 250 m from the coastline, in front of the Hossegor lake, and it stretches from the east to the west along 135 nautical miles. This canyon divides the continental shelf of the Bay of Biscay into two zones: in the north, the wide Aquitanian continental shelf and in the south, the narrow Cantabrian shelf, orientated from the south to the north.

Many studies have been conducted in this area. Le Danois (1948) described the deep communities of the Capbreton Canyon: a synthesis of the results obtained by several scientific expeditions conducted from the end of the last part of the 19th century through first part of the 20th century. Beginning with the 1960s several hydrological, sedimentological and biological studies were conducted: the synthesis of these works was presented in Sorbe (1990).

During 1987 to 90, four oceanographic cruises were conducted in a French-Spanish research project directed by Dr. J.C. Sorbe (CNRS, LOB), on board the RV "Côte d'Aquitaine" in which studies of macrofauna communities are included.

In the samples taken during the Capbreton 88 cruise, 56 specimens in six species belonging to the genus *Exogone* Oersted were collected, three of which are new to science and two of wich are new records for European waters.

Material and Methods

During the first week of July 1988 samples of benthic macrofauna were taken at 8 stations situated along the continental slope (from 492 to 1113 m depth), on both sides of the Canyon and in its axis (Fig. 1, Table 1).

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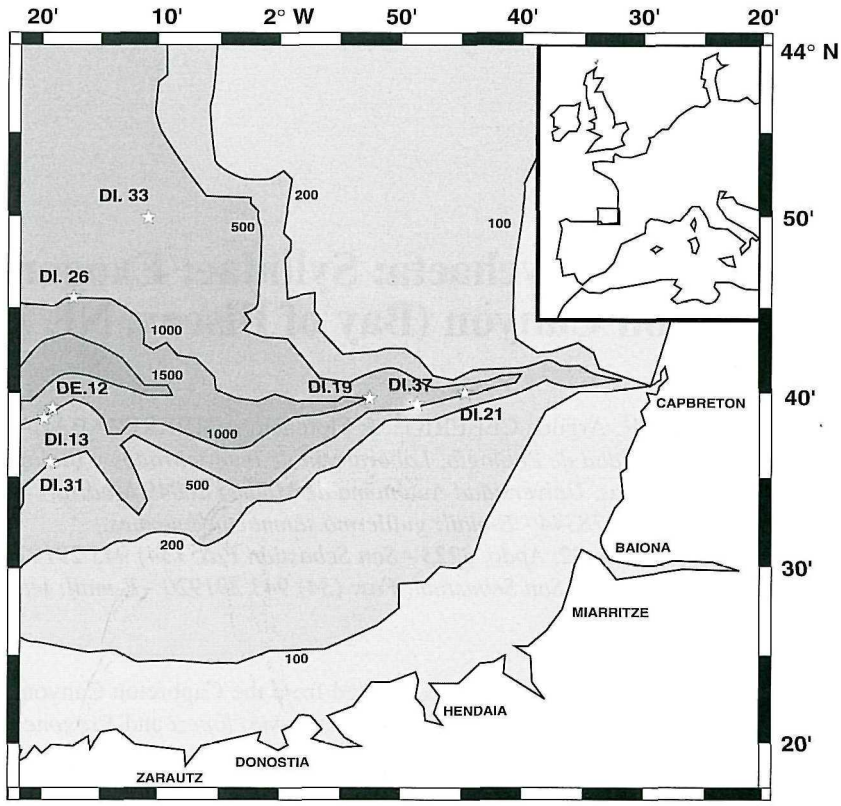

Figure 1. Locations of sampling stations in Capbreton Canyon.
Figure 1. Localisation géographique des stations d'échantillonnage dans le Canyon de Capbreton.

Table 1. Sampling data in the Capbreton Canyon during the cruise CAPBRETON 88 with abundances and diversity of material of the genus *Exogone*.
Tableau 1. Caractéristiques des échantillons du Canyon de Capbreton récoltés pendant la campagne CAPBRETON 88, et abondance et diversité du genre *Exogone*.

Station	Position and depth in m at the beginning and the end of the tow on the sea-floor		Date	*Exogone* n° indiv	material n° species
DE.12	43° 38.57'N - 2° 17.93'W 43° 38.33'N - 2° 18.11'W	1012 1113	88/07/06	29	5
DI.13	43° 38.36'N - 2° 18.03'W 43° 38.08'N - 2° 18.14'W	1040 1007	88/07/06	1	1
DI.19	43° 37.48'N - 1° 52.52'W 43° 37.46'N - 1° 52.66'W	952 968	88/07/07	0	0
DI.21	43° 37.72'N - 1° 41.83'W 43° 37.43'N - 1° 41.99'W	580 480	88/07/07	0	0
DI.26	43° 42.89'N - 2° 18.71'W 43° 43.25'N - 2° 18.80'W	984 1029	88/07/08	10	4
DI.31	43° 35.87'N - 2° 17.43'W 43° 35.87'N - 2° 17.73'W	505 512	88/07/10	9	4
DI.33	43° 50.32'N - 2° 10.94'W 43° 49.78'N - 2° 11.12'W	495 492	88/07/10	7	1
DI.37	43° 36.25'N - 1° 48.24'W 43° 36.45'N - 1° 48.10'W	508 576	88/07/11	0	0

Samples were taken with Sanders-Hessler epibenthic dredges with a mesh size of 0.5 mm. This dredge collects the benthic organisms at the water-sediment interface and in the first centimeters of the sediment layer. Sediments were not analyzed for granulometry but, according to Tauzin (1974 in Sorbe, 1990), the deep sediments of the canyon are mainly composed of mud with high organic content, which proportion increases with depth.

Specimens were preserved in a 10 % formaldehyde-seawater solution. Microscope preparations of some complete specimens were made in glycerine jelly. Observations, camera-lucida drawings, and measurements were made using a microscope with differential interference contrast optics (Nomarsky). Measurements refer to either the holotype or the largest specimen studied; body width was mesured at the proventricular level excluding cirri, parapodia and setae.

Types and other specimens available for study are deposited in the "Museo Nacional de Ciencias Naturales de Madrid" (MNCNM), Spain.

We follow the systematic of *Exogone* proposed by San Martín 1991, where the genus is divided in three subgenera: *Parexogone* Mesnil and Caullery, 1916; *Exogone* Oersted, 1845; and *Sylline* Claparède, 1864. The subgenus *Parexogone* is, apparently, the most primitive, having "normal" heterogomph compound setae, antennae originating separately, and simple setae similar to those of other related genera, such as *Sphaerosyllis*, *Parapionosyllis* or *Brania*. The subgenus *Exogone* is characterized by somewhat modified setae, both simple and compound; the different compound setae of each parapodium have long, filiform, spiniger-like blades, and short blades, each with a small proximal tooth and a long and prominent distal tooth. Furthermore, there are several species with the three antennae very close to each other, in the middle of prostomium, an unusual arrangement in the Syllidae. Finally, the subgenus *Sylline*, comprising only a few species, has species with compound setae bayonet-shaped, by partial fusion of shaft and blade or only simple setae by loss of blade. Only species of the two former subgenera have been found in this collection.

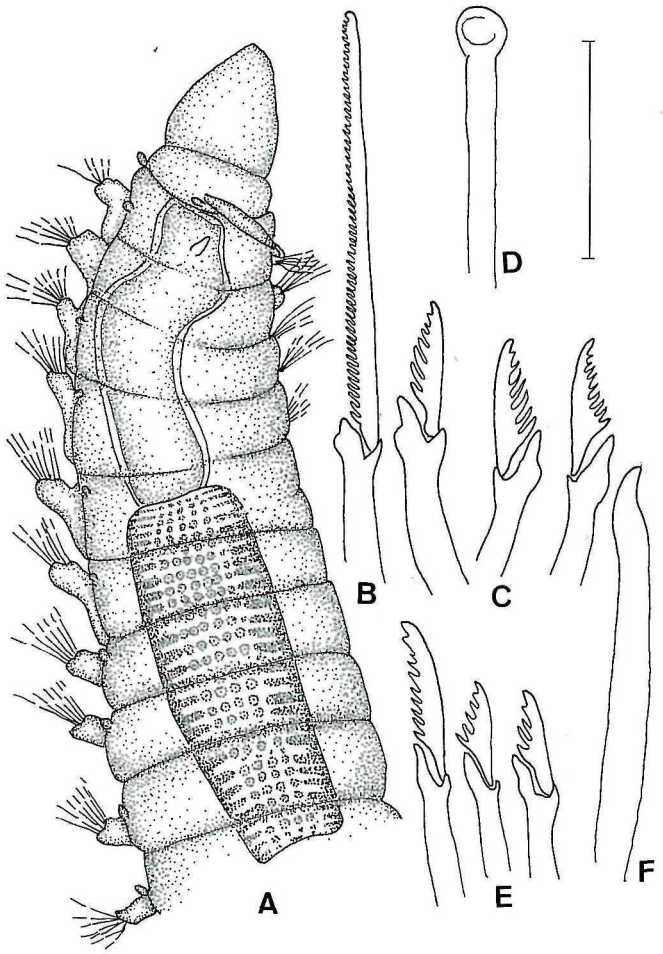

Figure 2. *Exogone (Parexogone) caribensis*. A, anterior end, dorsal view. B, compound seta with long blade, anterior setigers. C, compound setae with short blade, anterior setigers. D, acicula. E, compound setae, posterior setigers. F, dorsal simple seta, posterior setigers.

Scale.- A: 0.18 mm. B-F: 20 µm.

Figure 2. *Exogone (Parexogone) caribensis*. A, région antérieure en vue dorsale. B, soie composée à serpe longue, sétigères antérieurs. C, soies composées à serpe courte, sétigères antérieurs. D, acicule. E, soies composées à serpes, sétigères postérieurs. F, soie simple dorsale, sétigères postérieurs.

Échelle.- A : 0.18 mm. B-F : 20 µm.

Systematics

Subgenus *Parexogone* Mesnil and Caullery, 1916

Exogone (Parexogone) caribensis San Martín, 1991

Fig. 2

Exogone (Parexogone) caribensis San Martín, 1991: 725, fig. 5.

Material examined.- CB 88/DI 31, 1 specimen. CB 88/DE 12, 1 specimen.

Description.- Both specimens incomplete; the largest one 3.6 mm long, 0.24 mm wide, 34 setigers. Prostomium rectangular; eyes absent, probably obscured after fixation; lateral antennae minute, median antenna long, shorter than prostomium and palps together, antennae very close to each other, originating on posterior margin of prostomium. Palps long, broad, fused along entire length (Fig. 2 A). Tentacular and dorsal cirri minute, dorsal cirri absent on setiger 2. Anterior parapodia each with 1-2, sometimes 3, compound setae with long (36 µm), distally rounded unidentate blades, with short, coarse spines on margin (Fig. 2 B), and 10-12 compound setae with short blades, 14 µm, unidentate or

sub-bidentate, margin coarsely serrated (Fig. 2 C). Long-bladed setae disappearing posteriorly; only compound setae with short blades present on posterior setigers, numbering about 5 per parapodium; each about 12 µm long, similar to those of anterior setigers (Fig. 2 E). Dorsal simple setae present from anterior setigers, sigmoid, nearly smooth on posterior parapodia (Fig. 2 F). Solitary ventral simple setae not seen. Only one acicula in each parapodium, with enlarged rounded tip; tip circular, concave laterally (Fig. 2 D). Pharynx extending through 4 1/2 segments, pharyngeal tooth on anterior margin. Proventriculus extending through about 5 segments, with about 23 muscle cell rows (Fig. 2 A). Pygidium missing in the collected material.

Distribution.- Gulf of Mexico. Capbreton Canyon, Bay of Biscay, at depths of 500 and 1100 m, new record for European waters.

Exogone (Parexogone) wolfi San Martín, 1991
Fig. 3

Exogone (Parexogone) wolfi San Martín, 1991: 726, fig. 6.

Material examined.- CB 88/DI 26, 3 specimens.

Description.- All specimens incomplete; up to 5.1 mm long, 1.6 mm wide, 47 setigers. Body long, slender. Prostomium rectangular, partially covered dorsally by peristomium. Antennae broken in the specimens; only one with a median antenna longer than prostomium and palps together. Four eyes in open trapezoidal arrangement. Palps long, stout, triangular, completely fused along entire length. Dorsal cirri oval, on all setigers. Tentacular cirri similar to dorsal cirri, slightly smaller (Fig. 3 A). Anterior parapodia each with 1-3 compound setae, with blades long (about 30 µm), bidentate, with long, upwardly dressed spines on margin (Fig. 3 B), and about 10 compound setae with blades similar but shorter, about 22-14 µm long (Fig. 3 C). Long blades progressively longer posteriorly, reaching about 60 µm on posterior parapodia (Fig. 3 G); remaining setae similar to those of anterior parapodia; blades with long spines on margin, longer distally, reaching tips, 24 µm above, 10 µm below (Fig. 3 H, I). Solitary dorsal simple setae present from proventricular segments, bidentate, provided with few long spines surpassing tips (Fig. 3 E). Solitary ventral simple setae similar to the dorsal ones, but with shorter spines, present on posterior parapodia (Fig. 3 F). Acicula solitary, with rounded tips, somewhat circular with concave sides distally (Fig. 3 D). Pharynx short, extending through 4 segments; pharyngeal tooth o anterior margin. Proventriculus short, extending throug 3 segments, with about 18 muscle cell rows (Fig. 3 A Pygidium missing in all collected specimens.

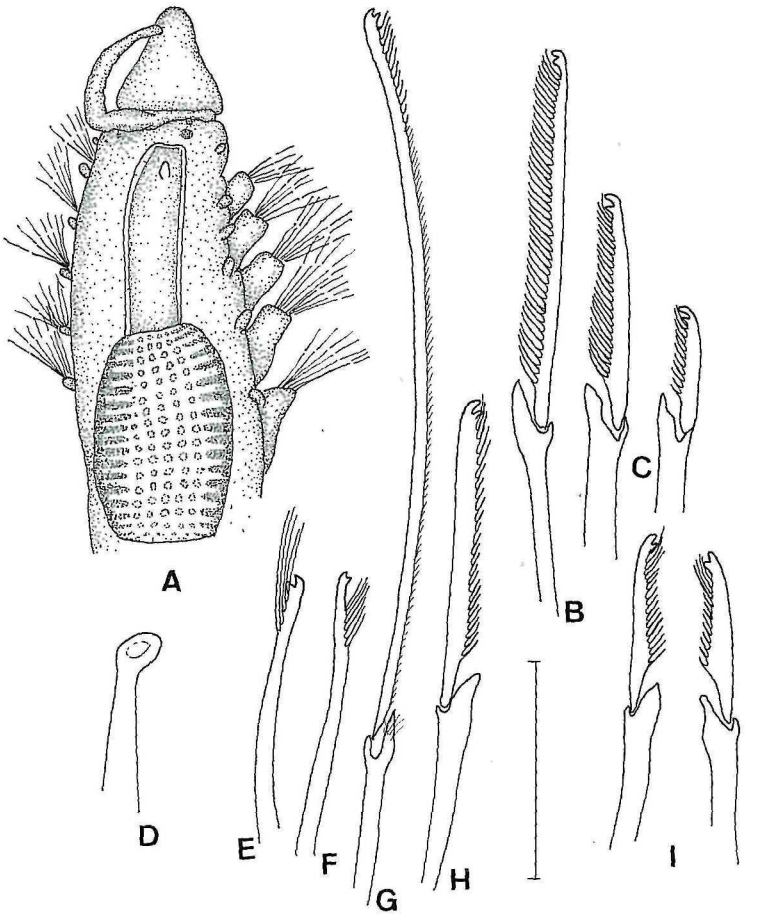

Figure 3. *Exogone (Exogone) wolfi.* A, anterior end, dorsal view. B, compound seta with long blade, anterior parapodia. C, compound setae, anterior parapodia. D, acicula. E, dorsal simple seta. F, ventral simple seta. G, compound seta with long blade, posterior parapodia. H, I, compound setae, posterior parapodia.

Scale. A: 0.18 mm. B-I: 20 µm.

Figure 3. *Exogone (Exogone) wolfi.* A, région antérieure en vue dorsale. B, soie composée à serpe longue, parapodes antérieurs. C, soies composées à serpes, parapodes antérieurs. D, acicule. E, soie simple dorsale. F, soie simple ventrale. G, soie composée en arête, parapodes postérieurs. H, I, soies composées à serpes, parapodes postérieurs.

Échelle. A : 0.18 mm. B-I : 20 µm.

Distribution.- Florida and Gulf of Mexico. Capbreto Canyon, Bay of Biscay, at a depth of 1000 m, new record f European waters.

Exogone (Parexogone) campoyi, sp. nov.
Figs. 4, 5

Material examined.- CB 88/DI 26, holotype and paratypes. CB 88/ DE 12, 14 paratypes.

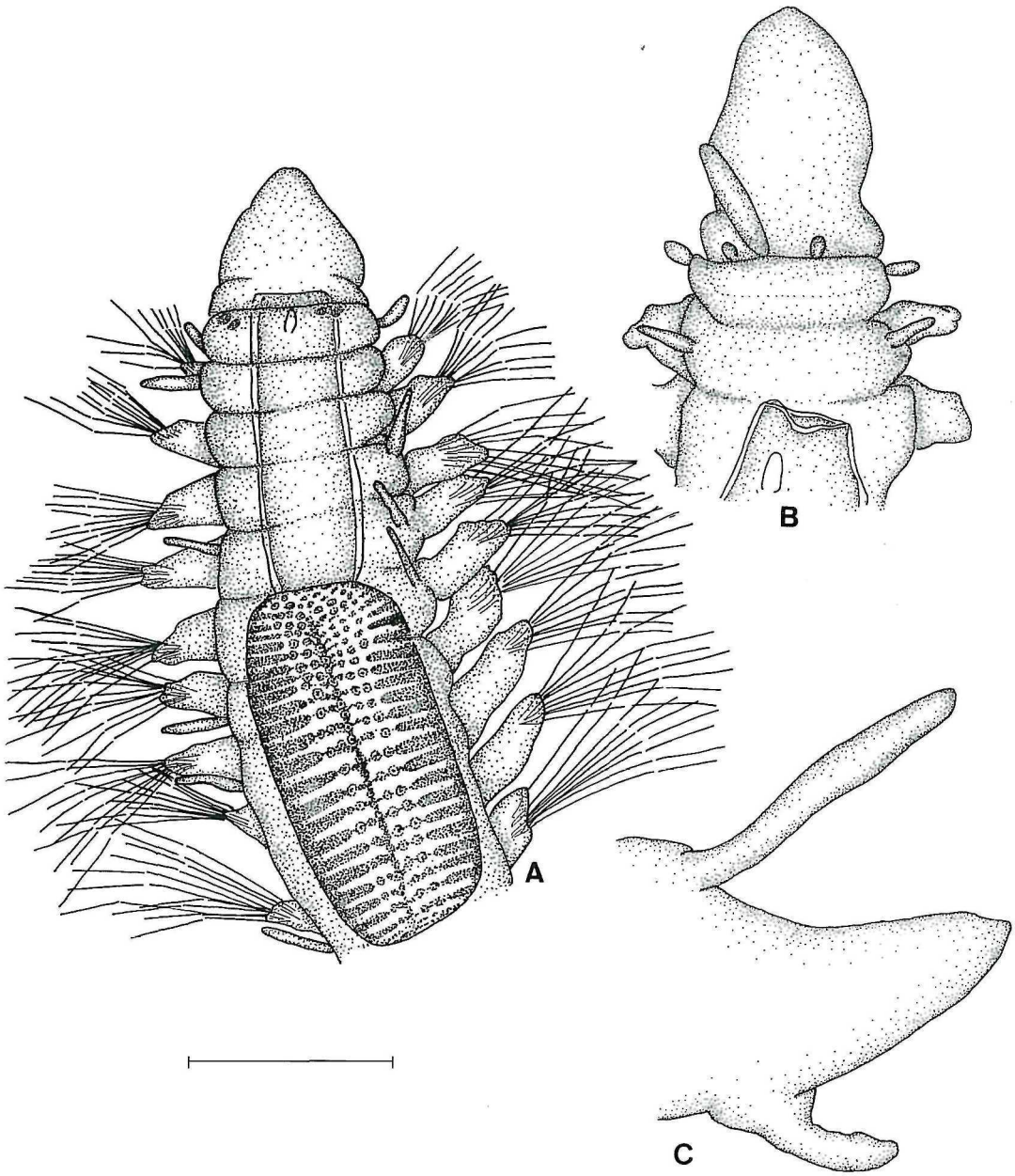

Figure 4. *Exogone (Parexogone) campoyi*. A, anterior end, dorsal view, holotype. B, anterior end, dorsal view, paratype. C, posterior parapodium (setae not drawn), holotype.

Scale.- A: 0.18 mm. B: 64 µm. C: 33 µm.

Figure 4. *Exogone (Parexogone) campoyi*. A, région antérieure en vue dorsale, holotype. B, région antérieure en vue dorsale, paratype. C, parapode postérieur (soies non dessinées), holotype.

Échelle.- A : 0.18 mm. B : 64 µm. C : 33 µm.

Description.- All specimens incomplete. Body relatively short; holotype 3.5 mm long, 0.24 mm wide, 31 setigers. Prostomium rectangular, broader than long, partially covered dorsally by peristomium. Four eyes in open trapezoidal arrangement, usually not perceptible after fixation. Antennae missing on all specimens except for one paratype (Fig. 4 B); lateral antennae small, ovoid; median antenna elongate, shorter than prostomium and palps together. Palps long, broad, triangular, completely fused along entire length and also fused with prostomium

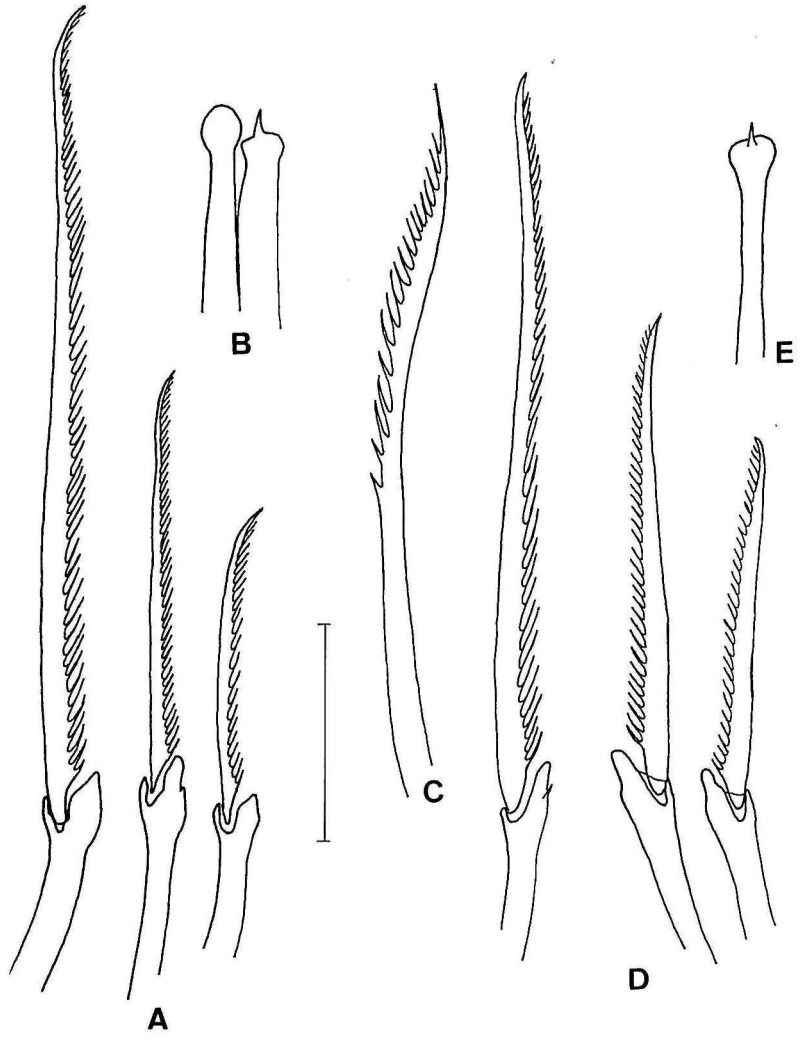

Figure 5. *Exogone (Parexogone) campoyi.* A, compound setae, anterior parapodia. B, aciculae, anterior parapodia. C, dorsal simple seta. D, compound setae, posterior parapodia. E, acicula, posterior parapodia.

Scale.- A-E: 20 µm.

Figure 5. *Exogone (Parexogone) campoyi.* A, soies composées à serpes, parapodes antérieurs. B, acicules, parapodes antérieurs. C, soie simple dorsale. D, soies composées à serpes, parapodes postérieurs. E, acicule, parapodes postérieurs.

Échelle.- A-E : 20 µm.

(Fig. 4 A, B). Tentacular cirri elongate. Dorsal cirri long and slender (Fig. 4 A), gradually longer posteriorly (Fig. 4 C), reaching up and even surpassing tips of parapodial lobes; absent on setiger 2. Parapodial lobes broad on anterior setigers (Fig. 4 A), conical on posterior ones (Fig. 4 C). Ventral cirri digitiform, shorter than parapodial lobes. Compound setae with blades long, slender, unidentate, pointed, distally somewhat curved, provided with moderately long, upwardly dressed spines on margin (Fig. 5 A, D); blades similar throughout, with strong dorsoventral gradation in lengths, about 80 µm above, 20 µm below. Anterior parapodia each with about 15 compound setae, with very long shafts; posterior parapodia each with 9-10 compound setae, with shorter shafts. Solitary dorsal simple setae present from midbody segments, slender, pointed, with long, upwardly dressed subdistal spines (Fig. 5 C). Ventral simple setae not observed. Anterior parapodia with 2 aciculae, one with a rounded tip, the other

with a filiform tip (Fig. 5 B); parapodia from midbody with one acicula, with enlarged tip and a short, pointed, distal spine (Fig. 5 E). Pharynx extending through 5 segments; pharyngeal tooth on anterior margin. Proventriculus barrel-shaped, extending through 5 setigers, with 21 muscle cell rows. Pygidium missing in the collected specimens.

Remarks.- *Exogone (Parexogone) campoyi* is the only species of the genus having both compound setae with long, slender, unidentate, long spined blades and similar simple setae and aciculae provided distally with an acute, distal spine. Furthermore, the dorsal cirri are unusually long and slender among the species of *Exogone*.

Distribution.- Capbreton Canyon, Bay of Biscay, at a depth of 1000 - 1100 m.

Etymology.-This species is named in honor of the late Dr. Antonio Campoy, prestigious Spanish polychaetologist. His work, Fauna de Anélidos Poliquetos de la Península Ibérica, has been essential for all the Iberian polychaetologists and still is.

Subgenus *Exogone* Oersted, 1845

Exogone (Exogone) lopezi, sp. nov.

Fig. 6

Material examined.- CB 88/DI 26, holotype; CB 88/DE 12, 10 paratypes; CB 88/DI 31, 1 paratype.

Description.- Body long and very slender, thread-like, all specimens incomplete, holotype 4.1 mm long, 0.24 mm wide, 40 setigers; largest specimen 7.2 mm long, 0.24 wide, 50 setigers. Prostomium rectangular, broader than long. Four very small eyes, in open trapezoidal arrangement; antennae ovoid, minute, inconspicuous, usually covered by peristomium and not visible dorsally (Fig. 6 A, B). Palps long, broad, fused for most of length, with a terminal notch. Dorsal cirri oval, shorter than parapodial lobes, present on all setigers; tentacular cirri similar to dorsal cirri but smaller (Fig. 6 A). Ventral cirri similar to dorsal cirri, but shorter. Anterior parapodia each with 1-2, occasionally 3, compound setae with elongated, spiniger-like blades, 50 µm in length, unidentate, with fine and moderately long spines on margin (Fig. 6 D), and 6-8 compound bidentate falcigers, blades 14 µm in length, each with a small to minute distal tooth, a long and bigger proximal tooth, and fine long spines on margin, surpassing tips of blades (Fig. 6 E). Compound setae similar throughout body; midbody and posterior parapodia each with one compound seta with elongated, spiniger-like blade, similar to those of anterior setigers (Fig. 6 G) but somewhat shorter (40 µm), and 2-3 falcigers with shorter blades (12-8 µm) (Fig. 6 H). Solitary dorsal simple setae on all setigers, smooth, provided with a distal, rounded tip surrounded by short subdistal spines, thin anteriorly (Fig. 6 C) and thicker on posterior setigers (Fig. 6 I). Solitary ventral simple setae not observed. Acicula solitary, with rounded tip (Fig. 6 F, J). Pharynx relatively long and narrow (Fig. 6 A) extending through 5-6 setigers; pharyngeal tooth on anterior margin (Fig. 6 A, B). Proventriculus long and narrow, somewhat longer than pharynx, extending through about 5 1/2 segments (Fig. 6 A), with about 27-30 muscle cell rows. Pygidium missing on all specimens.

Remarks.- *Exogone (Exogone) lopezi* is similar to *E. (E.) longispinulata* San Martín, 1991, from Puerto Rico and *E. (E.) aristata* Hartmann-Schröder, 1982, from Australia, in the shape of the falcigerous setae, i.e. with falcigers provided with long spines surpassing the tips. However, *E. (E.) aristata* differs from the other two species in having both dorsal and ventral simple setae with long spines (aristae) (Hartmann-Schröder, 1982), which are lacking on both *E. (E.) longispinulata* and *E. (E.). lopezi*.

E. (E.) longispinulata has long antennae, lacks dorsal cirri on setiger 2, has a short pharynx, a proventriculus with only 16 muscle cell rows, and lacks compound setae with long, spiniger-like blades on anterior setigers (San Martín, 1991), thus differing from *E. (E.) lopezi*.

Distribution.- Capbreton Canyon, Bay of Biscay, at depths of 500 and 1100 m.

Etymology.- The new species is named in honor of the young Spanish polychaetologist Dr. Eduardo López García.

Exogone (Exogone) sorbei, sp. nov.

Fig. 7

Material examined.- CB 88/DI 31, holotype. CB 88/DE 12, paratype.

Description.- Holotype and paratype incomplete and broken, posterior part missing; holotype 3.2 mm long, 0.36 mm wide, 17 setigers. Prostomium rectangular, broader than long; four large eyes in open trapezoidal arrangement; antennae missing, except for the right lateral one of the holotype (Fig. 7 A). Palps long, stout, triangular, completely fused along entire length. Dorsal cirri small, oval, on all setigers (Fig. 7 A). Tentacular cirri small, papilliform. Parapodial lobes and ventral cirri small. Anterior 5 setigers each with 10-12 compound setae with thick, broad shafts and long, unidentate blades; blades provided with numerous, fine, long spines, surpassing tips, arranged in about 3 rows (Fig. 7 B); strong dorso-ventral gradation in length of blades, dorsalmost setae with blades 60 µm long, median ones 40 µm long, and ventralmost about 20 µm long. From setiger 5, each parapodium with one compound seta with elongate, spiniger-like blade, distally rounded, 44 µm long, provided with long fine spines surpassing tip (Fig. 7 E), and 3-4 falcigers, blades 20 µm above, 12 µm below, with minute distal tooth and long proximal tooth, provided with moderate spines proximally and very long spines distally on margin, surpassing tips (Fig. 7 F). Shafts

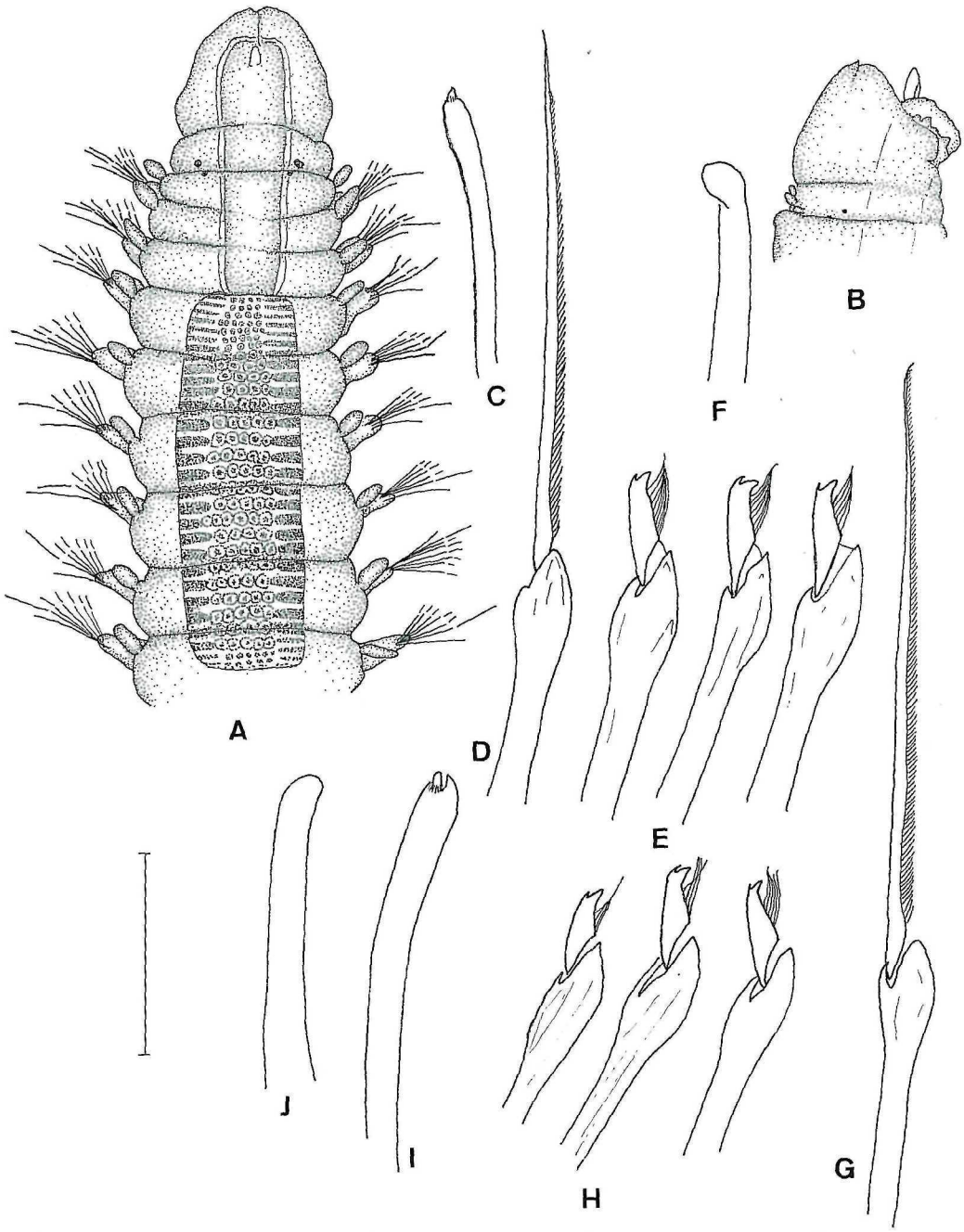

Figure 6. *Exogone (Exogone) lopezi*. A, anterior end, dorsal view, holotype. B, detail of prostomium and palps, lateral view, everted pharynx, paratype. C, dorsal simple seta, anterior parapodia. D, compound seta with spiniger-like blade, anterior parapodia. E, falcigers, anterior parapodia. F, acicula, anterior parapodia. G, compound seta with spiniger-like blade, midbody-posterior parapodia. H, falcigers, posterior parapodia. I, dorsal simple seta, midbody-posterior parapodia. J, acicula, midbody-posterior parapodia. Setae and aciculae after holotype.

Scale.- A, B: 0.18 mm. C-J: 20 µm.

Figure 6. *Exogone (Exogone) lopezi*. A, région antérieure en vue dorsale, holotype. B, détail du prostomium et des palpes en vue latérale, pharynx dévaginé, paratype. C, soie simple dorsale, parapodes antérieurs. D, soie composée en arête, parapodes antérieurs. E, soies composées à serpe courte, parapodes antérieurs. F, acicule, parapodes antérieurs. G, soie composée en arête, parapodes de la moitié postérieure du corps. H, soies composées à serpe courte, parapodes postérieurs. I, soie simple dorsale, parapodes de la moitié postérieure du corps. J, acicule, parapodes de la moitié postérieure du corps. Soies et acicules de l'holotype.

Échelle.- A, B : 0.18 mm. C-J : 20 µm.

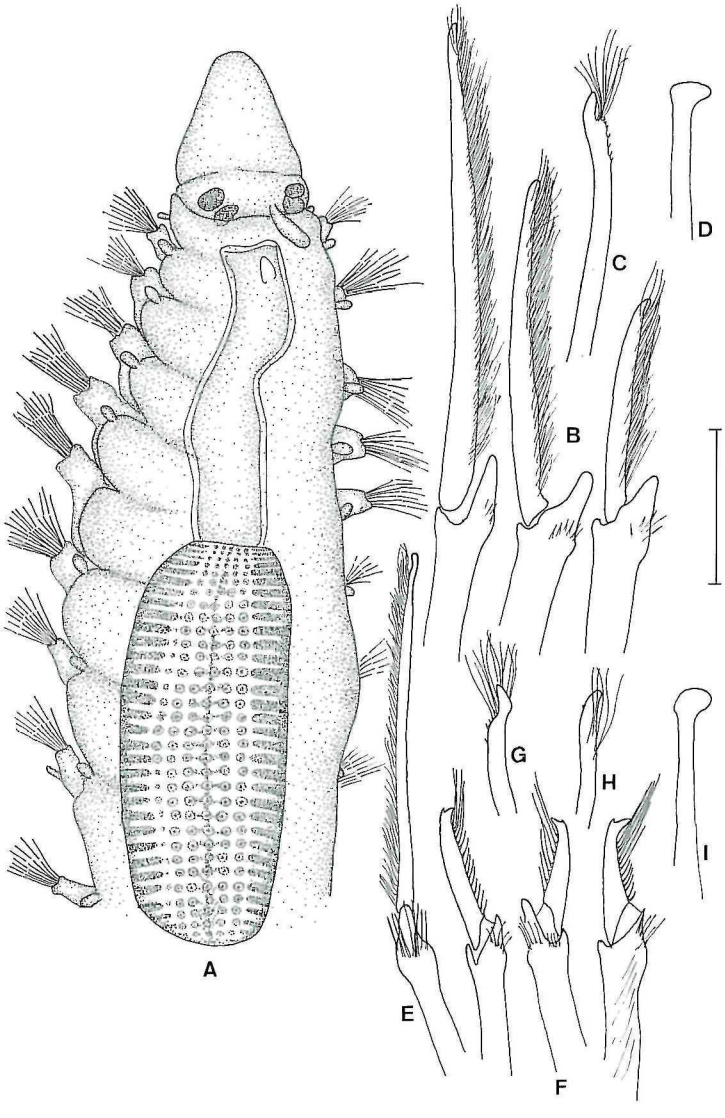

Figure 7. *Exogone (Exogone) sorbei*, holotype. A, anterior end, dorsal view. B, compound setae, anterior parapodia. C, dorsal simple seta, anterior parapodia. D, acicula, anterior parapodia. E, compound spiniger-like seta, midbody. F, falcigers, midbody. G, dorsal simple seta, midbody. H, ventral simple seta, midbody. I, acicula, midbody.

Scale.- A: 0.18 mm. B-I: 20 µm.

Figure 7. *Exogone (Exogone) sorbei*, holotype. A, région antérieure en vue dorsale. B, soies composées à serpes, parapodes antérieurs. C, soie simple dorsale, parapodes antérieurs. D, acicule, parapodes antérieurs. E, soie composée en arête, région moyenne. F, soies composées à serpe courte, région moyenne . G, soie simple dorsale, région moyenne. H, soie simple ventrale, région moyenne. I, acicule, région moyenne.

Échelle.- A : 0.18 mm. B-I : 20 µm.

of compound setae provided subdistally with long spines, especially posteriorly (Fig. 7, E, F). Solitary dorsal simple setae present from setiger 1, unidentate, slightly curved, provided with several long fine spines subdistally (Fig. 7 C, G). Solitary ventral simple setae only on posterior setigers, slightly curved provided with a minute, inconspicuous point-like tooth distally on the outer side of the seta, and few long fine subdistal spines (Fig. 7 H). Acicula solitary with enlarged tip (Fig. 7 D, I). Pharynx extending through about 4-5 segments; pharyngeal tooth on anterior margin. Proventriculus barrel-shaped, slightly longer than pharynx, extending through 4-5 segments (Fig. 7 A), with about 25 muscle cell rows. Pygidium missing on both specimens.

Remarks.- *Exogone (E.) sorbei* is unique within the genus in having anterior compound setae with long, stout, unidentate blades with very long spines arranged in several rows and in having dorsal simple setae with several long spines. *E. (E.) sorbei* is related to *E. (E.) aristata*, *E. (E.) longispinulata*, and *E. (E.) lopezi*. All of these species have falcigers with long spines surpassing tips of blades (see above). However the shapes of anterior compound setae and dorsal simple setae of *E. (E.) sorbei* are very different from those of the others (see description of *E. (E.) lopezi* and Figs. 6D, E). Although we only have two incomplete, partially broken specimens and since the character of the length of the antennae is unknown, we describe it as a new species because the setae are completely different from those of all other species of the genus.

Distribution.- Capbreton Canyon, Bay of Biscay, at depths of 500 and 1100 m.

Etymology.- This new species is named in honor of Dr. Jean Claude Sorbe, eminent French suprabenthologist, director of the Capbreton expedition.

Exogone (Exogone) verugera Claparède, 1868

Exogone verugera Fauvel 1923: 307, fig. 117 m-r. Campoy 1982: 292; San Martín (1984): 218, pl. 51.

Material examined.- CB 88/DE 12, 3 specimens. CB 88/DI 13, 1 specimen. CB 88/DI 26, 2 specimens. CB 88/DI 31, 6 specimens. CB 88/DI 33, 7 specimens.

Distribution.- Mediterranean Sea. Black Sea. North Atlantic.

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