

# Acoetidae (Annelida, Polychaeta) from the Iberian Peninsula, Madeira and Canary islands, with description of a new species

ANA M. PALMERO, A. MARTÍNEZ, M.C. BRITO & J. NÚÑEZ



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Six species of acoetid polychaetes are reported from the Iberian Peninsula and Macaronesia: *Euarche tubifex* Ehlers, 1887, *Euarche cristata* Núñez, n. sp., *Eupanthalis kinbergi* McIntosh, 1876, *Eupolyodontes gulo* (Grube, 1855), *Polyodontes maxillosus* (Ranzani, 1817), and *Panthalis oerstedii* (Kinberg, 1856). Material was collected during several sublittoral benthic surveys. Descriptions, figures, and a key for the six species are included. The new species *Euarche cristata* is characterized by its prostomium with cristate or serrated posterior margin.

Key words: *Euarche cristata*, Macaronesia, identification key, northeast Atlantic, sublittoral

Ana María Palmero (e-mail: anitapalmero@gmail.com), Alejandro Martínez, María del Carmen Brito & Jorge Núñez, Laboratorio de Bentos, Departamento de Biología Animal (Zoología), Facultad de Biología, Universidad de La Laguna. ES-38206 La Laguna, Tenerife, Islas Canarias, Spain.

## INTRODUCTION

Acoetidae is a widespread family of marine scaleworms, with 9 genera and 43 species described (Hutchings 2000). Members of this family usually occur in soft sediments in self-made permanent tubes built by specialized notopodial spinning glands. Mucous and fibrous secretions are mixed with sediment and sand debris to make a tube. They are carnivorous 'sit-and-wait' predators, not leaving their tubes more than partially when they feed. The family was revised by Pettibone (1989), who renamed it from Polyodontidae Augener, 1918, a family name already used for fishes. Other important revisions from the Mediterranean Sea are Ben-Eliahu and Fiege (1994), Barnich and Fiege (2003). Campoy (1982) recorded three species from the Iberian Peninsula: *Euarche tubifex* Ehlers, 1887 [non *Eupanthalis kinbergi* McIntosh, 1876 *sensu* Pettibone, 1989], *Panthalis oerstedii* Kinberg,

1856 and *Polyodontes maxillosus* (Ranzani, 1817). Four species were previously recorded from the Canary islands: *Euarche tubifex*, *Eupanthalis kinbergi*, *Eupolyodontes gulo*, and *Polyodontes maxillosus* (Núñez et al. 2005; Martínez et al. 2007).

Generally, acoetids are quite rare in benthic samples, hence the low number of publications on the family. On account of their life strategy, they are mainly taken by dredging and most of them are known only from fragments. Despite of being widely distributed and present in the low intertidal zone, acoetids are more abundant from moderate depths down to 1500 m (Pettibone 1989). This also explains the lack of knowledge about their life cycles and ecology.

In the present paper, recently collected material from Madeira, Canaries and the Iberian Peninsula is investigated; it comprises six species, of which one is new to science i.e. *Euarche tubifex*, *Euarche cristata* n. sp., *Eupanthalis kinbergi*,

*Eupolyodontes gulo*, *Panthalis oerstedii* and *Polyodontes maxillosus*.

## MATERIAL AND METHODS

The material was collected during several sampling expeditions to the Iberian Peninsula and the Macaronesian archipelagos of Madeira and Canaries, between 1975 and 2003. The specimens from the Iberian Peninsula were collected during the Capbreton 1988 Cruise and the Fauna Ibérica II Expedition 1991 Cruise to the Northern Iberian Peninsula, using Marinovich and Bou de Varas trawls. Material from the Macaronesia region was collected during the Taliarte 9709-1997 Cruise to South-Western Fuerteventura with trawl nets, and during several biodiversity surveys to Lanzarote in 2000 and 2001 with a Can-Foster dredge. Specimens from Tenerife were collected in 1975, 1989 and 1991, associated with the deep coral community of *Dendrophyllia ramea*, recovered as by-catch of fishermen's trammel nets and from shallow soft bottom, using vacuum dredges. Material from Madeira Island was collected during a sampling expedition in 2003 with a van Veen grab.

Samples were fixed with a solution of 10% formaldehyde for 48 hours, and selected specimens were subsequently preserved in 70% alcohol for storing. Drawings of complete specimens were made using a camera lucida mounted on an Olympus SZX9 stereomicroscope. Studied parapodia were mounted on a slide in glycerine gel and drawn using a camera lucida on a Leica DMLB microscope equipped with Nomarski interference contrast optics. Scanning electron microscope studies (SEM, Jeol JSM-6300), were also made, after critical point drying and gold sputtering the samples. All specimens were deposited at the collection of the Departamento de Biología Animal (Zoología), Universidad de la Laguna (DBAULL).

## SYSTEMATICS

Aphroditoidea Kinberg, 1856  
Acoetidae Kinberg, 1856

*Euarche tubifex* Ehlers, 1887  
(Fig. 1)

*Euarche tubifex* Ehlers, 1887: 54, pl. 12, figs. 1-7, pl. 13, fig. 1; Pettibone 1989: 14, figs. 1-5; Ben-Eliahu & Fiege 1994: 154, figs. 6-8e; Imajima 1997: 117, figs. 57-59; Barnich & Fiege 2003: 95, fig. 49.

*Eupanthalis* sp. A, Wolf, 1984: 22-10, figs. 22-5, 22-6.

*Material examined*: Fauna Ibérica II Expedition, Ribadeo (Northern Spain), station 108, beginning 43°42'51"N - 6°59'30"W, ending 43°42'82"N - 7°01'10"W, 125 m depth, muddy sand, 1 median fragment, 75 mm length, 11 mm width. Macaronesian Archipelago: Madeira, station 16/22, 32°38'07"N - 16°50'00"W, 75 m depth, medium and fine sand, 1 specimen, 26 mm length, 4 mm width. Canary islands: Lanzarote, station 489, 28°54'22"N - 13°42'27"W, 48 m depth, medium sand, 2 specimens, 23 and 20 mm length, 3 and 2 mm width; station 766, 28°51'11"N - 13°48'33"W, 20-40 m depth, fine sand, 1 specimen, 6 mm length, 1 mm width.

*Description*: Body long, dorsoventrally flattened, yellow coloured with darker transversal bands on dorsum of living specimens, in fixed specimens pigmented bands less intense. Prostomium oval, with two pairs of sessile eyes, anterior pair slightly larger than posterior pair. Three antennae smooth and tapering, lateral pair attached to anterior margin of prostomium, shorter than palps. Median antenna inserted posteriorly on prostomium. Tapering papillate palps. Tentacular segment with smooth, dorsal nuchal lobe and paired tentaculophores lateral to prostomium, each with a bundle of capillary chaetae on tentaculophores and a pair of smooth cirri (Fig. 1A). Anteriormost parapodia biramous with numerous capillary notochaetae, the following parapodia subbiramous with reduced notopodia and without notochaetae. (Fig. 1B-C). Parapodia of second chaetiger with first, largest pair of elytra, overlapping prostomium, small notopodia, larger neuropodia, and long ventral cirri. Elytra translucent without lateral pouches, except for

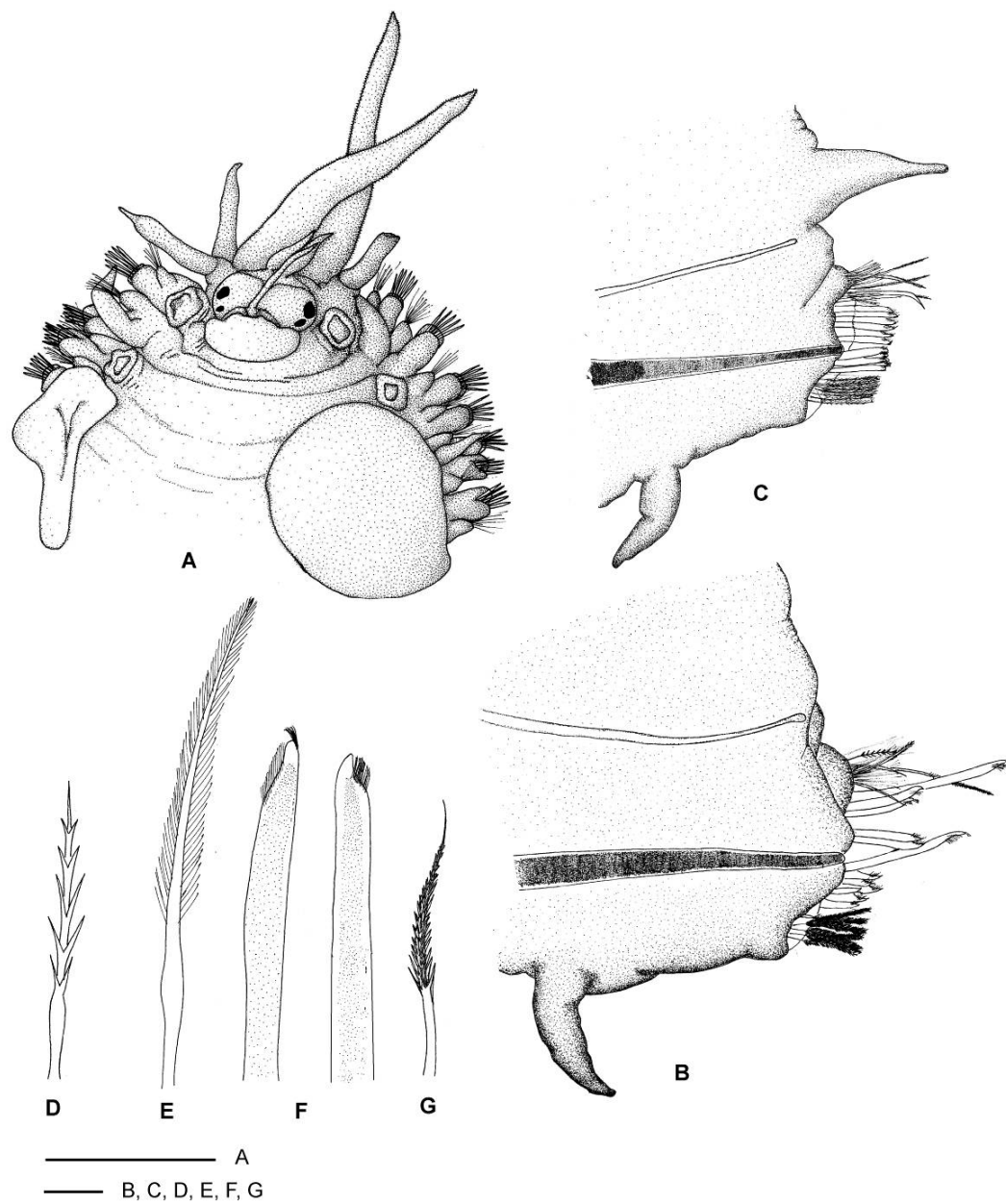


Fig. 1. *Euarche tubifex*. A. Anterior end, dorsal view. B. Mid-body elytrigerous parapodium. C. Mid-body cirriferous parapodium. D. Spiked neurochaeta of the upper bundle. E. Distally spinous neurochaeta of the upper bundle. F. Acicular neurochaeta of the middle bundle. G. Curved, spinous neurochaeta of the lower bundle. Scale bar: A = 1 mm; B, C = 0.2 mm; D-G = 0.05 mm.

first pair, small, leaving middorsum uncovered. Dorsal and ventral cirri smooth and tapering, shorter than neurochaetae. Middle and posterior parapodia with reduced achaetous notopodia and spinning gland present from chaetiger 9. Neuropodia well-developed, with neurochaetae distributed in three bundles. Upper bundle with two kinds of neurochaetae: short, capillary with rows of strong spinules (spiked chaetae) (Fig. 1D), and long capillary chaetae, distally densely spinous (Fig. 1E). Middle bundle with smooth acicular chaetae, showing a thick and large, hooked tip with subdistal hairs (Fig. 1F), and with or without aristae. Lower bundle with numerous curved, spinous chaetae (Fig. 1G).

**Discussion:** The examined specimens agree with the descriptions given in Imajima (1997) for Japan, and Barnich & Fiege (2003) for the Mediterranean Sea. Regarding the chaetal types, Barnich and Fiege do not describe acicular aristate chaetae for *E. tubifex*, while according to Imajima acicular chaetae are with or without aristae. In our material, most acicular chaetae are without and only some with aristae.

**Distribution:** Temperate and subtropical Atlantic Ocean, from North Carolina to south Brazil in the west, and Iberian Peninsula to West Africa in the east, Mediterranean Sea, Arabian Sea and Japan.

***Euarche cristata*** Núñez n. sp.  
(Fig. 2)

**Material examined:** Madeira, station 17/18, 32°38'11"N - 16°48'92"W, 75 m depth, coarse sand. Holotype (DBAULL- PO 17/18), 16 mm length, 4 mm width.

**Description:** Holotype incomplete posteriorly, with 33 segments. Body dorsoventrally flattened, unpigmented, without marked bands; second segment with small dorsal papillae. Prostomium oval, with two pairs of sessile eyes, anterior pair slightly larger than posterior pair. Two lateral antennae on short ceratophores, styles tapering. Posterior border of prostomium typically cristate or serrated (Fig. 2A). Palps short, thick and tapered, with regularly arranged five rows of long filiform papillae. Tentacular segment indistinct

dorsally, paired tentaculophores lateral to prostomium, each with a bundle of capillary chaetae and a pair of tentacular cirri, dorsal and ventral cirri subequal, longer and stouter than antennae and shorter than palps. Elytra delicate, transparent, first pair larger than following and overlapping prostomium, following pairs rounded to oval in outline, without ornamentation, not overlapping middorsally. Segment two (buccal segment) with first pair of elytraphores and small notopodia with capillary notochaetae, larger neuropodia and long ventral cirri. Parapodia of segment three with dorsal cirri longer than following, small notopodia with capillary notochaetae, and larger neuropodia, ventral cirri shorter than on segment two. From segment 9 subbiramous parapodia with reduced notopodia without notochaetae (Fig. 2B, C) and spinning glands with thread-like fibres. Neuropodia with three bundles of chaetae: upper neurochaetae of two types, short spiked chaetae (Fig. 2D) and long distally spinous chaetae (Fig. 2E), middle bundle consisting of 8-16 acicular chaetae with a large, hooked tip with subdistal hairs (Fig. 2F); lower bundle consisting of curved, spinous chaetae (Fig. 2G). Pygidium and pharynx unknown.

**Discussion:** Most of the species that belong to the genus *Euarche* are characterized by a prostomium with two pairs of sessile eyes, two lateral and one median occipital antennae, a pair of papillate palps, tentaculophores with numerous notochaetae, segments 2-8 with biramous parapodia and four kinds of chaeta from segment 9: spiked chaetae, long distally spinous chaetae, acicular chaetae with hooked tip with or without distal arista, and curved, spinous chaetae. The specimen described above is close to *Euarche tubifex*, but differs in the presence of a prostomium with cristate posterior margin the absence of a median antennae, and the second segment with small dorsal papillae, not present in *E. tubifex*. Parapodial and chaetal characters do not differ significantly from *E. tubifex*.

**Distribution:** Madeira Island.

**Etymology:** The species is named for its characteristic cristate posterior margin of the protomium, (Latin: *crista* = crest).

**Type locality:** Caniço Baixo, Madeira.

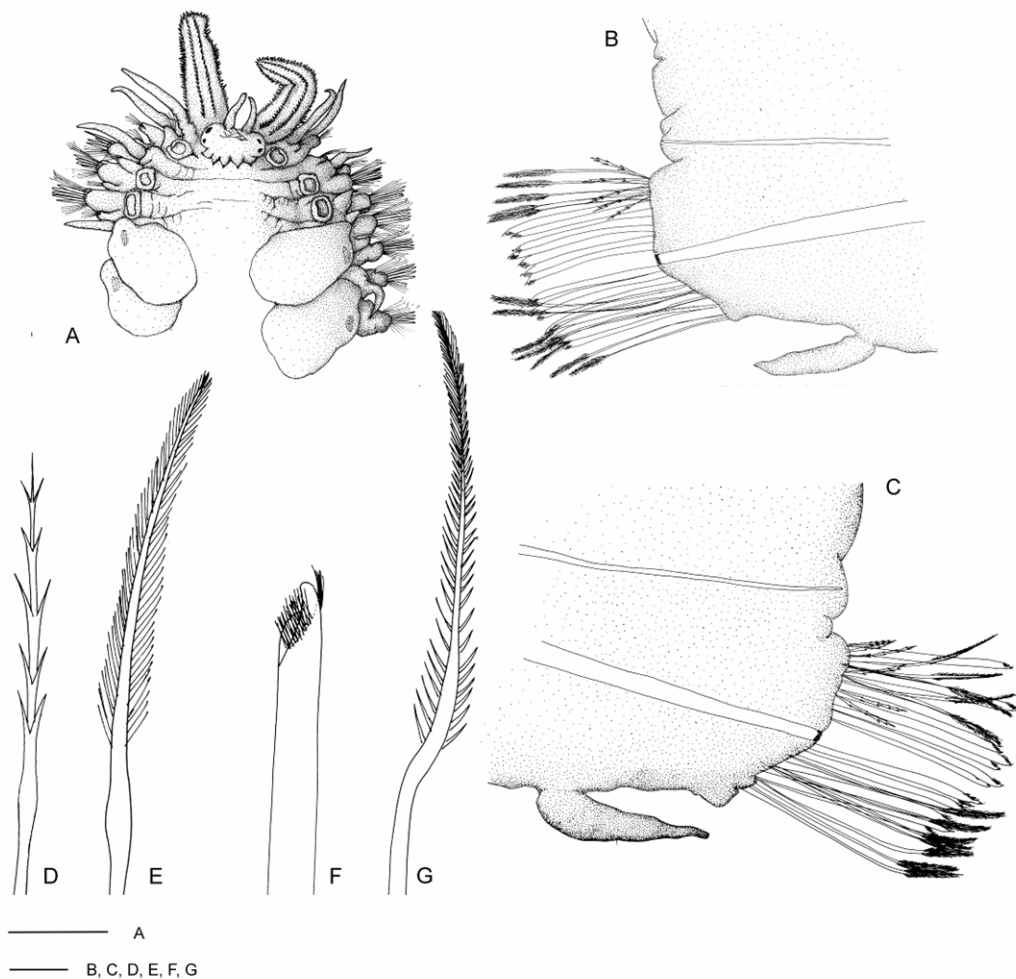


Fig. 2. *Euarche cristata* n. sp.; A. Anterior end, dorsal view. B. Mid-body elytrigerous parapodium. C. Mid-body cirriferous parapodium. D. Spiked neurochaeta of the upper bundle. E. Distally spinous neurochaeta of the upper bundle. F. Acicular neurochaeta of the middle bundle. G. Curved, spinous chaeta of the lower bundle. Scale bar: A = 1 mm; B, C = 0.2 mm; D, E, F, G = 0.05 mm.

***Eupanthalis kinbergi* McIntosh, 1876**  
(Figs. 3, 7A,B)

*Eupanthalis kinbergi* McIntosh, 1876: 404, pl. 72, figs. 12-15; Pettibone 1989: 24, figs. 11b-j, 12 [in part]; Barnich & Fiege 2003: 97, fig. 50; Martínez, Palmero, Brito & Núñez 2007: 3, fig. 1. *Eupanthalis glabra* Ben-Eliahu & Fiege, 1994: 149, figs. 2-5.

*Material examined:* Madeira, station 16/21, 32°38'07"N - 16°50'00"W, 75 m depth, medium and fine sand, 1 specimen, 6 mm length, 1 mm width. Canary islands: Lanzarote, station 438, dredge 29°04'72"N - 13°45'94"W, 42 m depth, medium sand, 1 specimen, 23 mm length, 3 mm width. Fuerteventura, station 37, starting 28°08'50"N - 14°33'60"W, 146 m depth, ending: 28°08'98"N - 14°34'38"W, 157 m depth, organic

sand, 1 specimen, 50 mm length, 4 mm width.

**Description:** Body long, flattened dorsoventrally, pale pink translucent colouration, with an irregular white band in each chaetiger before fixation, darker in the prostomium. Prostomium oval and slightly bilobed, with two pairs of sessile eyes, anterior pair larger than posterior pair. A pair of lateral antennae smooth and tapering on anterior part of prostomium, shorter than palps. Median antenna absent. Very long palps tapering and smooth. Tentaculophores paired, achaetous with a pair of smooth tentacular cirri each; a small nuchal lobe (Fig. 3A). Parapodia subbiramous from chaetiger 2 (Fig. 3B, C). Elytra delicate and translucent, with lateral pouches bigger from chaetiger 24. Dorsal and ventral cirri short, smooth and tapering. Second chaetiger with ventral cirri longer (buccal cirri) than the following. Notopodia reduced and achaetous, with spinning gland from chaetiger 9. Neuropodia with aciculum and neurochaetae distributed in three bundles. Upper bundle with two kinds of chaetae: long and slender distally spinous chaetae (Fig. 3F) and capillary, short, distinctly spiked chaetae. Middle bundle consisting of acicular chaetae with subdistal hair and with a long distal arista (Figs. 3D, 7A, 7B). Lower bundle with curved, spinous chaetae, long and slender, with well-developed spines, getting stronger basally. Tube soft consisting of mucus with sand and debris attached to a fibrous framework.

**Distribution:** Atlantic Ocean and Mediterranean and Red Sea.

***Eupolyodontes gulo*** (Grube, 1855)  
(Figs. 4, 7D,F)

*Polyodontes gulo* Grube, 1855: 83, pl. 3, fig. 2.

*Eupolyodontes gulo*, Fiege & Barnich 1998: 83, figs. 1-3; Barnich & Fiege 2003: 99, fig. 51.

*Eupolyodontes cornishii*, Pettibone 1989: 36, figs. 20-22; Ben-Eliahu & Fiege 1994: 155, figs. 7, 8 a-c.

*Eupolyodontes mitsukurii*, Pettibone 1989: 51; Nishi 1996: 31, figs. 1-5.

**Material examined:** Tenerife (Canary islands),

28°20'16"N -16°21'30"W, 72 m depth, associated with deep coral community of *Dendrophyllia ramea*, 1 fragment, 80 mm length, 30 mm width.

**Description:** Body long, dorsoventrally flattened and brown pigmented after fixation. Only median fragment with 33 chaetigers studied. All parapodia subbiramous, elytrigerous and cirriferous (Fig. 4A-B). Elytra large, delicate and translucent, with lateral pouches and arborescent branched veins. Dorsal and ventral cirri smooth and tapering, shorter than chaetigerous lobe. Notopodia reduced and achaetous, with a number of dorsal and lateral digitiform branchial papillae and conspicuous spinning gland. Upper bundle of neurosetae with double brush-shaped, long and slender neurochaetae (pseudopenicillate; Fig. 4C) and short spiked chaetae. Middle bundle with smooth acicular chaetae, with few hairs subdistally (Figs. 4D, 7D). Lower bundle with numerous curved, spinous chaetae (Figs. 4E, 7F).

**Discussion:** The chaetal and parapodial characters agree with the description of Pettibone (1989) of *Eupolyodontes cornishii* Buchanan, 1894, a junior synonym of *E. gulo*, and of Barnich & Fiege (2003). The species is characterized by knob-like or digitiform parapodial branchiae from segment 9, and pseudopenicillate neurochaetae in the upper bundle.

**Distribution:** East Atlantic, Mediterranean Sea, Red Sea, New Caledonia and Japan.

***Panthalis oerstedii*** Kinberg, 1856  
(Fig. 5)

*Panthalis oerstedii* Kinberg, 1856: 387; Kinberg 1858: 25, pl. 7, fig. 34a-h, pl. 10, fig. 60; Fauvel 1923: 98, fig. 38; Pettibone 1989: 53, figs. 32-34; Ben-Eliahu & Fiege 1994: 156, figs. 8f, 9a-c; Chambers & Muir 1997: 138, fig. 43; Barnich & Fiege 2003: 101, fig. 52.

**Material examined:** Cap Breton (Cantabric Sea), start: 43°35'42"N - 1°57'00"W, 994 m depth, ending: 43°37'00"N - 1°57'60"W, 976 m depth, 2 specimens, 56 mm length and 32 mm length, 19 mm and 9 mm width.

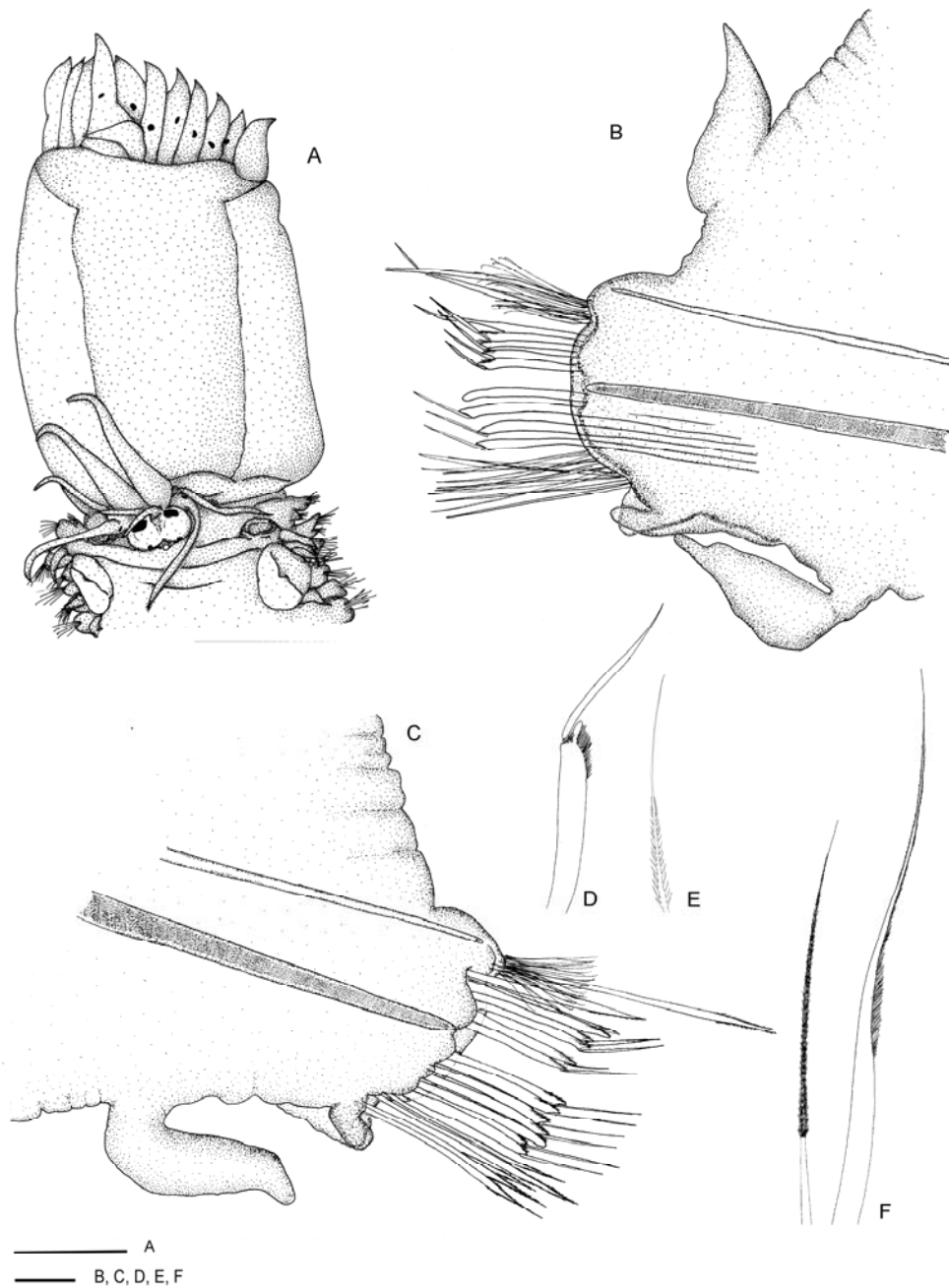


Fig. 3. *Eupanthalis kinbergi*. A. Anterior end, dorsal view. B. Mid-body cirrigiferous parapodium. C. Mid-body elytriferous parapodium. D. Acicular aristate neurochaeta of the middle bundle. E. Curved, spinous neurochaeta of the lower bundle. F. Distally spinous neurochaeta of the upper bundle, frontal and lateral view. Scale bar: A = 1 mm; B, C = 0.2 mm.; D, E = 0.05 mm; F: 0.1 mm.

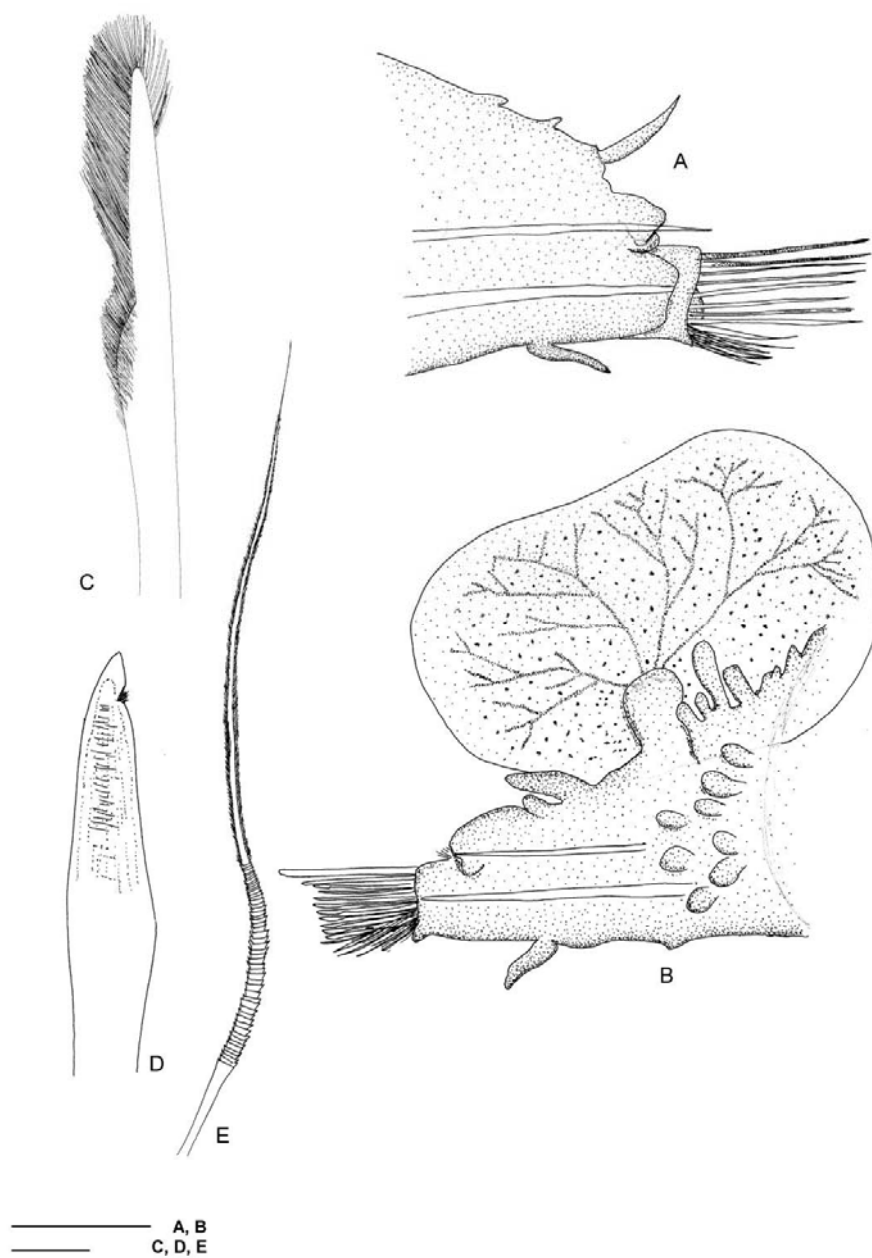


Fig. 4. *Eupolyodontes gulo*. A. Mid-body cirriferous parapodium. B. Mid-body elytriferous parapodium. C. Double brush-shaped (pseudopenicilliate) neurochaeta of the upper bundle. D. Acicular neurochaeta of the middle bundle. E. Curved, spinous neurochaeta of the lower bundle. Scale bar: A, B = 0.156 mm; C = 0.062 mm; D = 0.122 mm; E = 0.031 mm.



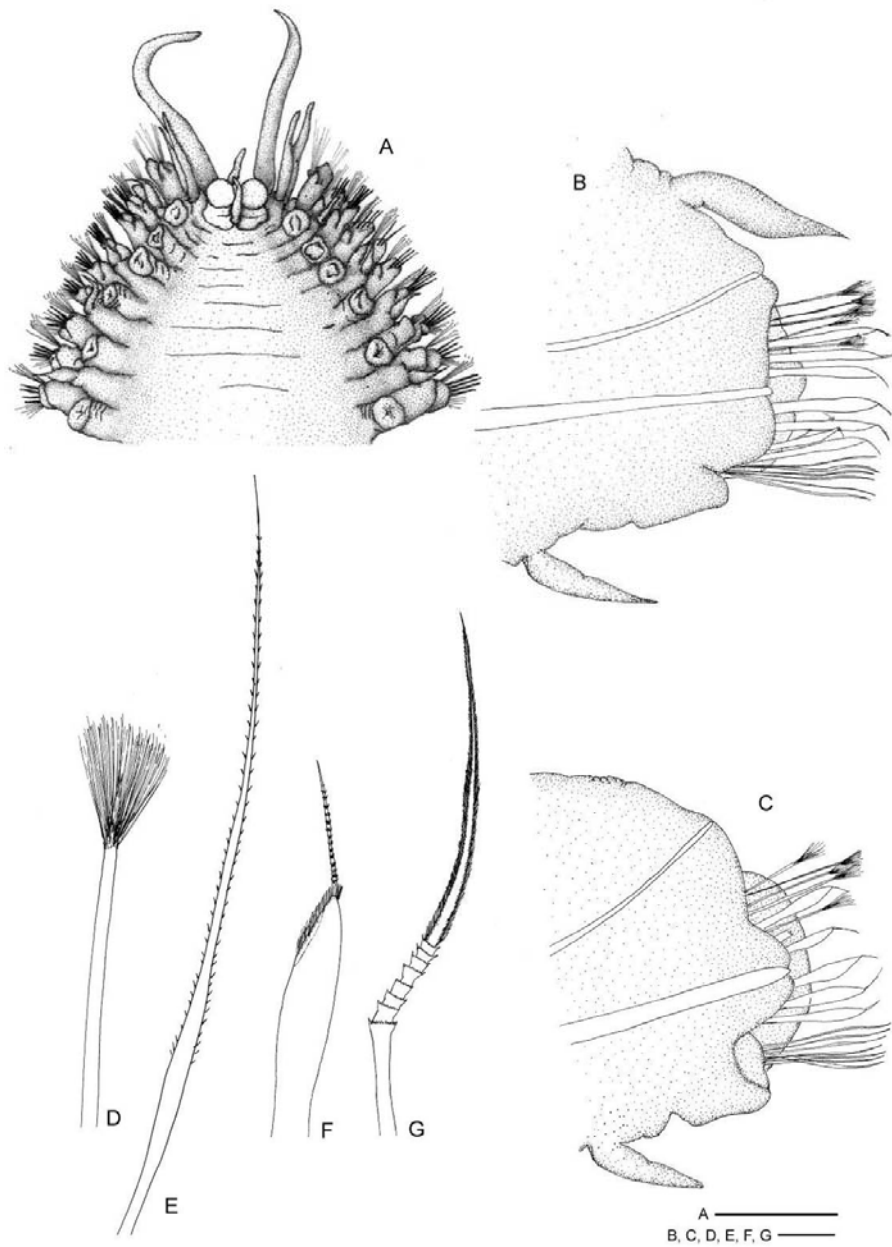


Fig. 5. *Panthalis oerstedii*. A. Anterior end, dorsal view. B. Mid-body elytrigerous parapodium. C. Mid-body cirriferous parapodium. D. Brush-shaped (penicillate) neurochaeta of the upper bundle. E. Spiked capillary neurochaeta of the upper bundle. F. Acicular aristate neurochaeta of the middle bundle. G. Curved spinous neurochaeta of the lower bundle. Scale bar: A = 1 mm; B, C = 0.2 mm; D-G = 0.05 mm.

**Description:** Prostomium bilobed, with a pair of well-developed ommatophores without pigmentation. Lateral antennae smooth and tapering ventral to ommatophores. Median antenna present, near posterior margin of prostomium, shorter than lateral antennae. Palps smooth, tapering, extending far beyond ommatophores. Tentaculophores papillate on inner side, paired each with capillary notochaetae and a pair of smooth, short tentacular cirri (Fig. 5A). Anteriormost parapodia biramous, becoming subbiramous posteriorly, elytrigerous and cirriferous (Fig. 5B, C). Elytra delicate and translucent, with lateral pouches. Dorsal and ventral cirri smooth and tapering, not reaching tip of neurochaetae. Median and posterior notopodia reduced and achaetous, with spinning gland from chaetiger 9. Neuropodia with well-developed aciculum and three bundles of neurochaetae. Upper bundle with long, penicillate chaetae (brush-shaped) (Fig. 5D) and spiked capillary chaetae, shorter than the former (Fig. 5E). Middle bundle with smooth acicular chaetae, hairy subdistally, and with long apical arista (Fig. 5F). Lower bundle with numerous curved, spinous chaetae (Fig. 5G).

**Distribution:** North East Atlantic Ocean and Mediterranean Sea.

***Polyodontes maxillosus*** (Ranzani, 1817)  
(Figs. 6, 7C, E)

*Phyllodoce maxillosa* Ranzani, 1817: 105, pl. 4.  
*Polyodontes maxillosus*, Pettibone 1989: 101, figs. 70-72; Ben-Eliahu & Fiege 1994: 157, figs. 8d, 9d; Barnich & Fiege 2003: 103 fig. 53.

**Material examined:** Tenerife, 28°25'9"N - 16°32'20"W, 8-10 m depth, fine sand, 1 specimen, 30 mm length, 9 mm width.

**Description:** Body long, flattened dorsoventrally, yellow coloured, darker dorsally before fixation. Prostomium bilobed, with a pair of well-developed, darkly pigmented ommatophores. Lateral antennae smooth and tapering, shorter than palps, ventral to ommatophores. Median antenna inserted near middle of prostomium, with distinct ceratophore. Palps long, tapering and smooth. Tentaculophores with papillae on dorsal and inner sides, paired, each with capillary

notochaetae and a pair of short tentacular cirri (Fig. 6A). Parapodia biramous on first segments and subbiramous posteriorly (Fig. 6B, C). Elytra delicate, translucent and with lateral pouches. Dorsal and ventral cirri short, smooth and tapering. From chaetiger 9 notopodia reduced and achaetous, with spinning gland. Neuropodia with well-developed aciculum and neurochaetae in three bundles. Upper bundle with short, spiked chaetae (Fig. 6G), and dense group of long and slender, distally spinous chaetae (Fig. 6D). Middle bundle with smooth acicular chaetae, sometimes with aristate tip (Figs. 6F, H; 7C). Lower bundle of curved, spinous chaetae (Figs. 6E, 7E).

**Distribution:** North East Atlantic Ocean, Western and Eastern Mediterranean Sea, including the Adriatic and the Aegean Sea, Red Sea.

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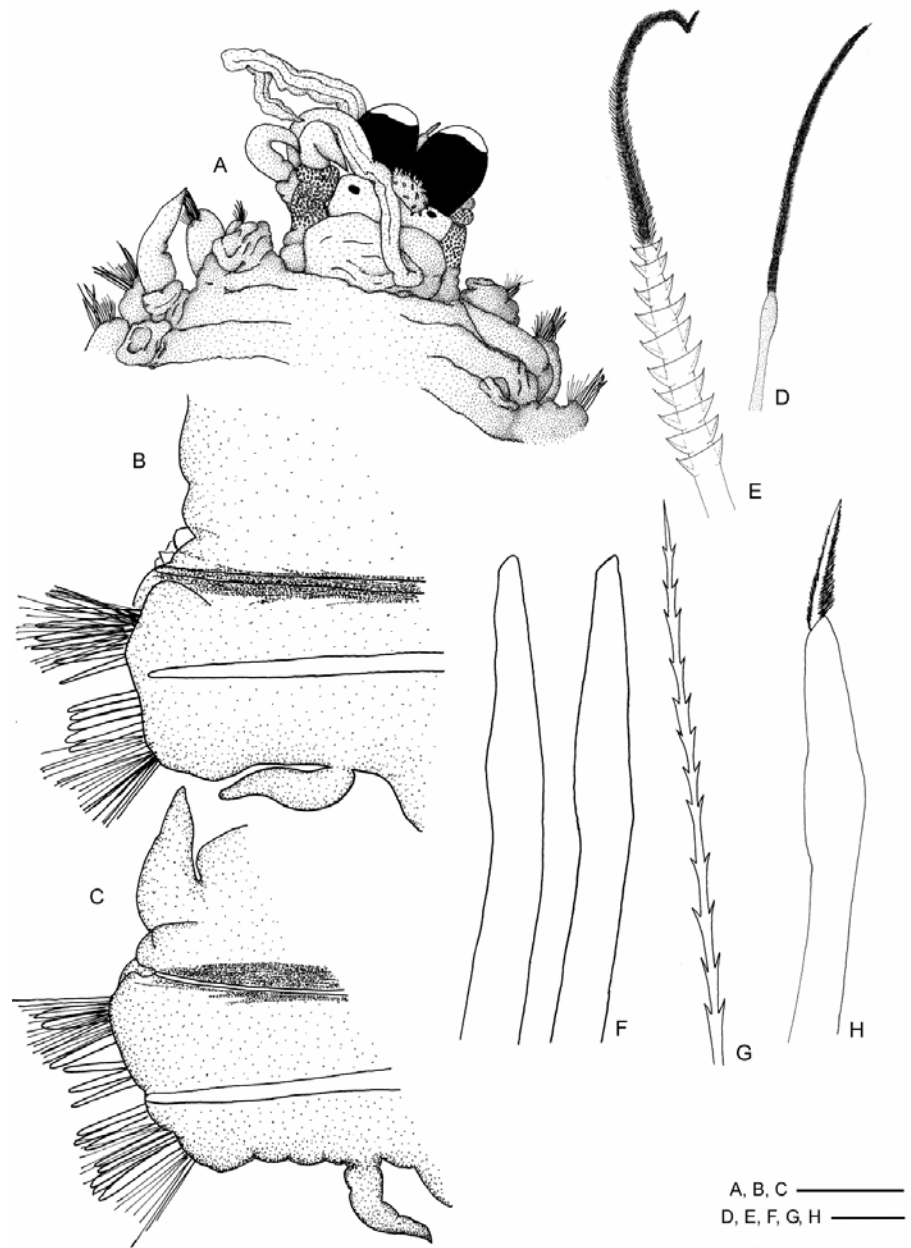


Fig. 6. *Polyodontes maxillosus*. A. Anterior end, dorsal view. B. Mid-body elytrigerous parapodium. C. Mid-body cirriferous parapodium. D. Distally spinous neurochaetae of upper bundle. E. Curved, spinous neurochaeta of lower bundle. F. Simple, acicular neurochaeta of middle bundle. G. Spiked neurochaeta of upper bundle. H. Aristate, acicular neurochaeta of middle bundle. Scale bar: A = 1 mm; B-C = 0.75 mm; D, E, F, H = 0.1 mm; G = 0.05 mm.

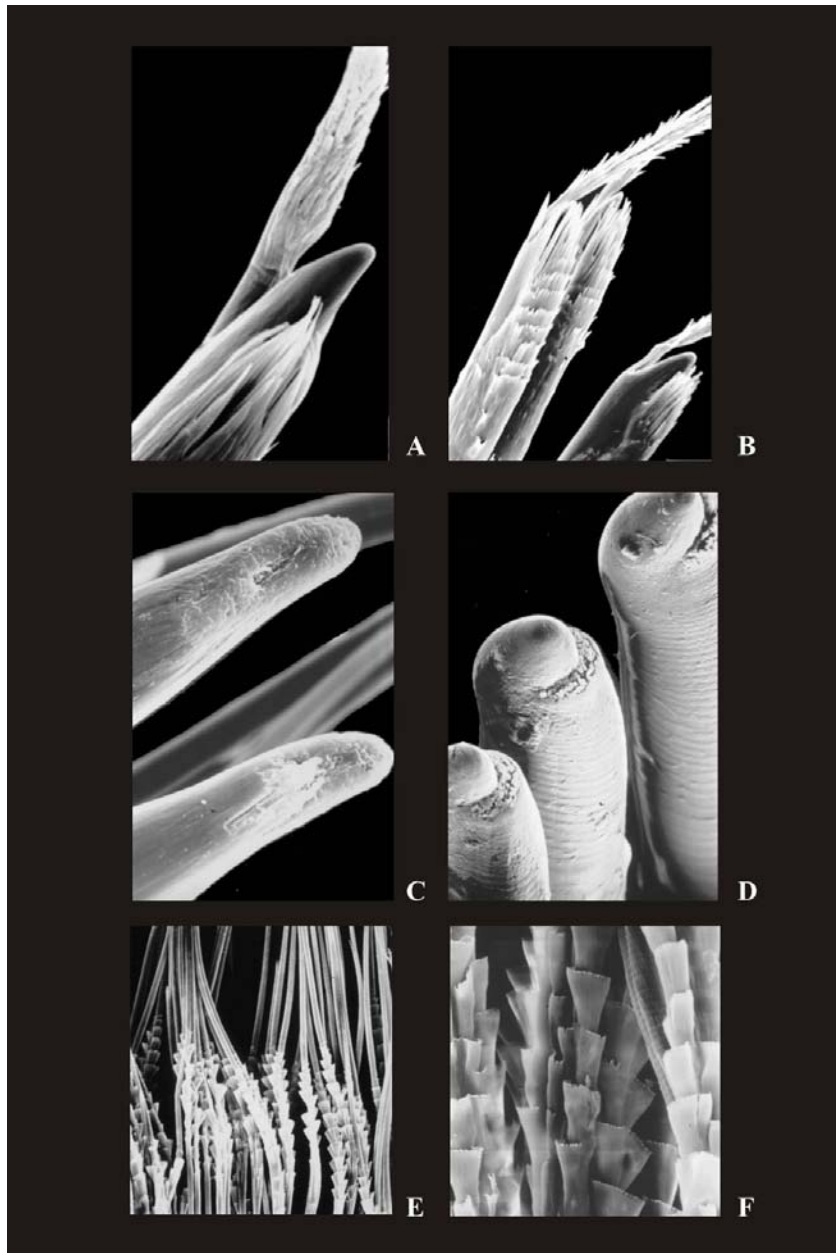


Fig. 7. Scanning Electronic Microscope image. A, B. *Eupanthalis kinbergi*, acicular neurochaeta, detail of the tip and arista. C. *Polyodontes maxillosus*, acicular neurochaeta, detail of the tip. D. *Eupolyodontes gulo*, acicular neurochaeta, detail of the tip. E. *Polyodontes maxillosus*, curved, spinous neurochaetae of the lower bundle. F. *Eupolyodontes gulo*, curved, spinous neurochaetae, detail. Scale: A = 2,500 x; B = 1,000 x; C = 850 x; D = 350 x; E = 170 x; F = 700 x.

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## KEY TO THE IBERIAN AND MACARONESIAN ACOETIDAE

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- 1. With a pair of large ommatophores.....2
    - Without ommatophores.....4
  - 2 Ommatophores darkly pigmented.....3
    - Ommatophores not pigmented..... *Panthalis oerstedii* (pp. 57)
  - 3 Double brush-shaped, pseudopenicillate neurochaetae present
    - .....*Eupolyodontes gulo* (pp. 56)
    - Pseudopenicillate neurochaeta absent.....*Polyodontes maxillosus* (pp. 59)
  - 4 Prostomium with cristate posterior margin..... *Euarche cristata* n.sp. (pp. 53)
    - Prostomium with smooth posterior margin.....5
  - 5 Prostomium with three antennae.....*Euarche tubifex* (pp. 51)
    - Prostomium with two antennae.....*Eupanthalis kinbergi* (pp. 55)
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