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The Genus Tedania (Porifera, Demospongiae, Poecilosclerida) in the Waters of the Iberian Peninsula (Northeast Atlantic) with a Description of Two New Species

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The genus *Tedania* (Porifera, Demospongiae, Poecilosclerida) in the waters of the Iberian Peninsula (Northeast Atlantic) with a description of two new species

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SARSIA

Cristobo FJ. 2002. The genus *Tedania* (Porifera, Demospongiae, Poecilosclerida) in the waters of the Iberian Peninsula (Northeast Atlantic) with a description of two new species. *Sarsia* 87:362–377.

To date, only three species of the sponge genus *Tedania* Gray, 1867 have been cited from the Iberian Peninsula: *T. anhelans* (Lieberkühn, 1859), *T. toxicalis* Laubenfels, 1930, and *T. suctoria* Schmidt, 1870, of which only one (*T. anhelans*) is considered a valid species for these coasts. This work is a study of all references to species belonging to this genus from these coasts and a detailed description of the morphology and anatomy of two new species: *T. pilarriosae* sp. nov. and *T. urgorrii* sp. nov., from the Ría de Ferrol (northwest Iberian Peninsula) characterized by their defined habitus and a spicular morphology. They differ from the other known *Tedania*, especially with regard to the ectosomal skeleton composed of stylotornotes.

Hasta la fecha, solamente se han citado tres especies del género *Tedania* Gray, 1867 en la Península Ibérica: *T. anhelans* (Lieberkühn, 1859), *T. toxicalis* Laubenfels, 1930, y *T. suctoria* Schmidt, 1870, de las cuales, solo una (*T. anhelans*) es considerada como válida en estas costas. En el presente trabajo se estudian todas las referencias bibliográficas correspondientes a las especies de este género en la zona y se describe detalladamente la morfología y anatomía de dos nuevas especies: *T. pilarriosae* sp. nov. y *T. urgorrii* sp. nov., procedentes de la Ría de Ferrol (NW de la Península Ibérica) que se caracterizan por poseer un habitus definido y una morfología espicular similar entre ellas, pero que difiere de las otras especies de *Tedania* conocidas, en especial en lo que se refiere al esqueleto ectosómico compuesto de stylotornotes.

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Keywords: Tedania; Porifera; new species; Northeast Atlantic; taxonomy; Iberian Peninsula.

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INTRODUCTION

In the past, the genus *Tedania* was included in the family Myxillidae Topsent, 1928 (Lévi 1973), but at present most authors recognize two families Tedaniidae and Myxillidae (Desqueyroux-Faúndez & Soest 1996).

Tedania is a controversial genus with a large number of species described all over the world, and is to be found in intertidal waters and at great depths (Hartman 1982). However, there are very few data on the *Tedania* species living in the waters of the Iberian Peninsula, and most of them refer to the same species, *T. anhelans*, originally encountered in the Mediterranean – Atlantic area, which has a wide range of distribution in tropical and subtropical waters from the Atlantic to the Mediterranean Sea (Soest 1987).

The present paper arose from the discovery of two new species of *Tedania* in Galician waters (*T. pilarriosae* nov. sp. and *T. urgorrii* nov. sp.) during the study of Poecilosclerid sponges in the Ría de Ferrol (Cristobo 1997).

MATERIAL AND METHODS

The specimens were collected manually from intertidal locations and by scuba divers in the sublittoral zones of the Galician coast (Fig. 1). The material studied was collected between 1979 and 1995; there are 18 specimens of *T. anhelans*, 11 specimens of *T. urgorrii* sp. nov. and 12 specimens of *T. pilarriosae* sp. nov. The *T. suctoria* material examined belongs to Topsent's collection in the Muséum National d'Histoire Naturelle, Paris (L.B.I.M. N°DT. 988 and L.B.I.M. N°DT. 1936) and to Arndt's collection in the Museum für Naturkunde, Berlin (ZMB 10120; ZMB 10121 from Faro, Portugal; ZMB 7702; ZMB 8419 from West Spitsbergen Region, Svalbard Archipelago). All live material was fixed for 48 h in 5% formol, and then in 70% ethanol. The methods followed were those of Rützler (1978), Uriz (1978), and Cristobo & al. (1993). Spicules were examined under Hitachi S570 and Leo 435VP scanning electron microscopes (SEM). Underwater photographs were taken with a Nikonos V camera with

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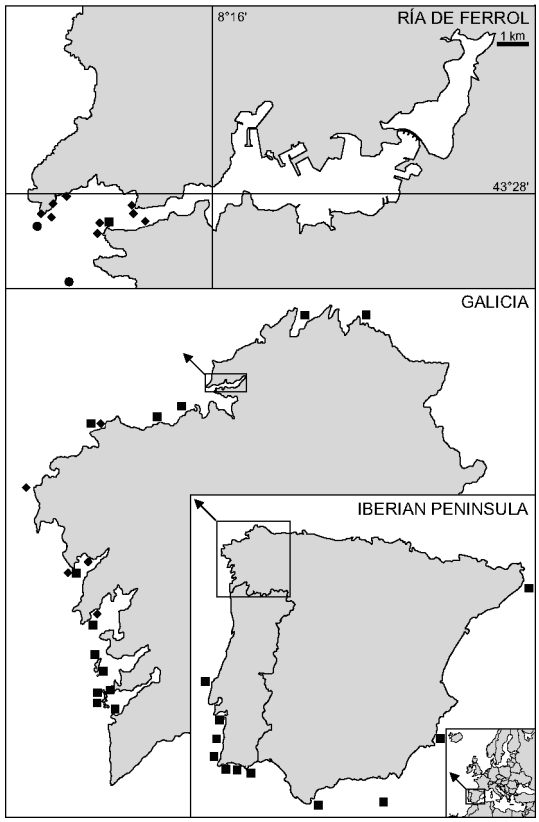

Fig. 1. Map of the Iberian Peninsula showing the collection sites of *Tedania* species: ■ *T. anhelans*; ◆ *T. pilarriosae*; ● *T. urgorrii*.

an SB-102 flash. The megasclere spicules were measured using a light microscope which was adapted to a Kontron Bildanalyse Videoplan, equipped with a CPU, television camera, television monitor and digitalizing tablet. This made it possible to take a large number of measurements. Microscleres were measured using a SEM.

SYSTEMATICS

Phylum Porifera Grant, 1836
Class Demospongiae Sollas, 1885
Subclass Ceractinomorpha Lévi, 1973
Order Poecilosclerida Topsent, 1928
Suborder Myxillina Hajdu, Van Soest & Hooper, 1994
Family Tedaniidae Ridley & Dendy, 1886
Genus *Tedania* Gray, 1867

Diagnosis

Tedaniidae possessing morphologically distinct ectosomal and choanosomal megascleres. The choanosomal skeleton consists of subisodictyal reticulation of monactinal and diactinal megascleres. The ectosomal skeleton consists of diactinal megascleres forming erect spicule brushes. Microscleres are onychaetes.

Type species

Reniera digitata Schmidt, 1862.
Tedania anhelans (Lieberkühn, 1859) (Fig. 2B)
Restricted synonymy. (Soest 1987).

Material examined

Eighteen specimens from Galicia (Spain): Morás, Espasante, Suevos, Caión, Santa Mariña, Punta Queixal, Punta Centoleira, Punta Pasante, Punta Cociñadoiro, Enseada de Monteagudo, south of Monteagudo Island, Baixo do Principe, Punta Carracido, Punta Monte-agudo, Patos, O Segaño. Five specimens from Portugal: Pedra da Anixa, Outão, Cabo Espichel and Faro (Arndt 1940).

Description

Shape: massive-lobose, rarely encrusting, sometimes with projections 5 cm long emerging from the surface, which may branch and anastomose. Size: up to 12×6 cm wide by 15 mm thick. Colour *in vivo* is orange from yellowish-orange to orange-brown. Texture soft and fragile. Surface ornamentation velvet-like, slightly hispid. Minute ostia, dispersed over the entire surface, have been observed *in situ* except in superficial canals. Single circular oscules of less than 1 mm in diameter at the surface and at the end of the projections.

Skeletal structure

Choanosomal skeleton composed of polygonal network of styles with tracts of one to three spicules with nodal sponging. The arrangement of the ectosomal skeleton is subisodictyal with tylotes parallel to the surface. The onychaetes are dispersed over the entire sponge.

Spicules

Entirely smooth, slightly curved styles, sometimes with a slight swelling or knob at the base which is more or less distinct. Size: $170–225 \times 3–4$ μm. The tylotes are straight, thin, with a fine spined swelling at each equal end. Size: $203–210 \times 3–4$ μm. The onychaetes are very thin, straight or slightly curved, strongly microspined, and of one size class: $110–150 \times 1–2$ μm.

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Habitat

This is a species with a wide bathymetric range from intertidal locations to depths of 120 m (Burton 1954). It is very common in semi-exposed habitats from intertidal and sublittoral ecosystems where it colonizes dark vertical walls at Laminarian levels, and is associated with *Geodia cydonium* in chinks, overhangs, and small cavities from mesolittoral areas (Solorzano 1990). On rocks at depths of 8–25 m (Sará & Melone 1963; Sará 1964a), and at depths of 20 m on horizontal surfaces (Boury-Esnault 1971; Boury-Esnault & Lopes 1985). Also in sublittoral caves and overhangs. On sandy and muddy soft bottoms (Babic 1922) as *T. nigrescens*. On *Posidonia oceanica* bottoms (Pansini & Pronzato 1985). On melobesiacean bottoms at 91 m (Topsent 1928) cited as *T. digitata*. Epibionts were cited on a lot of different organisms such as *Cystoseira* and *Laminaria* (Topsent 1936) as *T. anhelans* var. *digitata*, on other Porifera species such as *Hemimycale brevicuspis* (Sará 1961), *Ircinia variabilis, Spongia officinalis* and ascidians such as *Microcosmus sulcatus* (Sará & Melone 1963), on *Balanus* (Sará 1964b), on *Microcosmus, Cystoseira, Eunicella, Paramunicea, Dysidea, Ircinia* and valves of *Ostrea* (Boury-Esnault 1971), on *Inachus thoracicus* (Arroyo & al. 1976), cited as *T. toxicalis* on *Inachus aguiarii* (Maldonado & Uriz 1992).

Distribution

Widely distributed: Mediterranean, Portugal, Galicia, Canary Islands, West Africa, Azores (Soest 1987). Outside these areas it has been reported from Bermuda, the West Indies, Red Sea, Indian Ocean, Indonesia and Australia, but these records need critical re-examination.

Remarks

We have revised Arndt's (1940) specimens from Faro (Portugal) kept in the Museum für Naturkunde in Berlin cited as *T. suctoria* and concluded that they correspond to *T. anhelans*.

Tedania pilarriosae sp. nov. (Figs 2C, 3, 4A, 5, 8A)

Type locality

O Segaño (Ría de Ferrol, Galicia, Spain), (43°27′12″N 08°18′40″W).

Type material

Holotype: Museo Nacional de Ciencias Naturales of Madrid N° MNCN 1.01/185, from O Segaño (Ría de Ferrol, Galicia, Spain) (43°27′12″N 08°18′40″W) 7 m, 17 August 1988, on vertical wall of granitic rocks. Paratype 1: Muséum National d'Histoire Naturelle, Paris, N° MNHN DCL 3668, from O Segaño (Ría de Ferrol, Galicia, Spain) (43°27′12″N 08°18′40″W) 7 m, 17 August 1988, on vertical wall of granitic rocks. Paratype 2: Museo de Historia Natural "Luis Iglesias" Universidade de Santiago de Compostela N° 10006 from O Cú da Raiña (Ría de Ferrol, Galicia, Spain) (43°27′30″N 08°17′27″W) 4 m, 19 August 1988, on vertical wall of granitic rocks. Paratypes 3–12: Laboratorio de Zooloxía Mariña, Universidade de Santiago de Compostela.

Other material examined

Twenty-two specimens of *T. suctoria sensu* Solorzano & Urgorri (1991).

Derivatio nominis

This species is dedicated to Pilar Ríos López, for her constant support and her invaluable help in the development of investigation about Porifera in the Ría de Ferrol. Without her courage and stimulus this work would never have been completed.

Diagnosis

The living specimen is a massive sponge attached directly to the substrate, up to 50 cm long and up to 10 cm thick. Even surface, without marked irregularities, velvety, soft, finely perforated with oscula in special upper areas of the sponge. Orange in colour. Skeleton is composed of ascendant tracts of choanosomal styles and ectosomal stylotornotes in palisade or bouquets. The microscleres are onychaetes of two size classes.

Description

Shape: massive, even sponge, the gross surface profile has smooth lines. In some parts small spines of less than 1 mm long and separated from each other by a distance of 1–2 cm are visible. Small specimens are circular at the base with a single osculiferous central area that in large individuals is more elongated and has a base which forms wide prolongations. Size: 4–45 cm long, 2.7–10.8 cm thick. Consistency firm barely compressible, easy to tear. The surface is even, without marked irregularities, velvety, soft, finely perforated and without hispidation. The live colour is orange to orange-brown on the surface and bright orange inside. Ectosome darker than choanosome. After fixation in

Table 1. Comparison between the sizes of spicules of *Tedania pilarriosae* and *T. suctoria* by different authors. Measurements of spicules are given in μm.

Tedania pilarriosae	Styles	Stylotornotes	Onychaetes
Present paper	197–344 × 2.7–14.4	154–337 × 2.8–11.1	30–70 and 120–257
Tedania suctoria	Styles	Tornotes	Onychaetes
Schmidt (1870)	460	416	-
Topsent (1892)	460 × 14	350 × 4–5	300 × 2
Topsent (1904)	600 × 12	450–480 × 5	380–400 × 2.5–3
Lundbeck (1910)	300–680 × 7–14	250–470 × 3–6	53–500
Topsent (1928)	215–455 × 3–11	320–435 × 5–12	54–60;110–130; 365
Arndt (1935)	300–680	250–450	50–500
Arndt (1940)	210–264	200–302	87–200
Koltum (1959)	300–680 × 7–15	250–470 × 3–6	50–500
Simpson (1968)	254–375 × 5–9.5	260–324 × 2.1–4.5	62.4–197.6

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formalin, alcohol-preserved specimens are dark orange. It may give the alcohol a slight orange tint. Ostia can only be seen in live animals. Oscula on the apex confined to distinct sieve plates with openings less than 1 mm in diameter. Exhalant canals of 5 mm in diameter lead to these areas. Holotype, collected 17 August 1988, has light orange embryos of 1 mm in diameter.

Skeleton

The choanosomal skeleton consists of paucispicular primary tracts of six to 20 styles and secondary tract lines of one to two styles which are more important near the ectosome where the difference between the primary and secondary tracts is not clear. Plumoreticulate appearance. Ectosomal skeleton multispicular with a continuous palisade of stylotornotes in brushes or bouquets perpendicular to the surface. Onychaetes of two size classes occur in ectosome and choanosome.

Spicules

Styles entirely smooth, slightly curved. Isodiametric choanosomal with evenly rounded bases without tyles and with hastate point. Axial filament not seen. Strongyles rare or absent. Size: 197–(268)–344 × 2.7–(8.1)–14.4 μm (figures in parentheses refer to mean values). Stylotornotes smooth, straight or slightly curved ectosomal, isodiametric along the shaft and unequal swelling at each end, one with rounded tylote or subtylote bases and the other with a mucronate or an arrow point-like end. SEM micrographs show a nipple-like point. Size: 154–(306)–337 × 2.8–(6.3)–11.1 μm. Onychaetes: the spines are not clearly seen using a light microscope (×400), appearing slightly rugose; spines of 1.6 μm long and 0.5 μm wide, curved towards the end of the spicule are visible in SEM images. Unequal ends. Size: two size categories: 30–70 μm and 120–257 μm. Size altogether: 30–(134)–257 × 0.3–(1.2)–2.1 μm.

Ecology

Tedania pilarriosae sp. nov. is a very abundant sponge found in the Ría de Ferrol in intertidal environments at the same algae levels as *Chondrus crispus, Bifurcaria bifurcata* and *Saccorhiza polyschides*; and in shallow sublittoral waters (15 m) and at the same levels as *Laminaria hyperborea*, but always in the external zone of the ría. The sponge lives on rocky granitic surfaces and is abundant on vertical and horizontal walls, roofs, small dark caves, and in crevices. The bathymetric range of this species is from intertidal to about 10–15 m, which is clearly distinct from the similar species *T. suctoria*. The latter species was found in deeper waters, cited by Schmidt (1870) from 192 m, by Topsent (1904) from 155, 203, 232, 327, 899, and 1250 m, by Lundbeck (1910) from 33 and 1336 m, and Topsent (1928) from 91–3460 m. The distribution of *T. suctoria* is Arctic-Boreal showing a typical boreal submergence: to the south it has only been found in deeper waters, up to 600 m, while in the Arctic the depth descends to 14 m (Soest 1987).

Remarks

Tedania pilarriosae sp. nov. differs from other species of *Tedania* in its external morphology; massive and very thick. The morphologically most similar species, in terms of its skeleton (presence of styles, tornotes/tylotes and onychaetes), is *T. suctoria* Schmidt, 1870, and for this reason the citations and microscopic preparations of this species have been revised in order that they may be compared with our samples. On

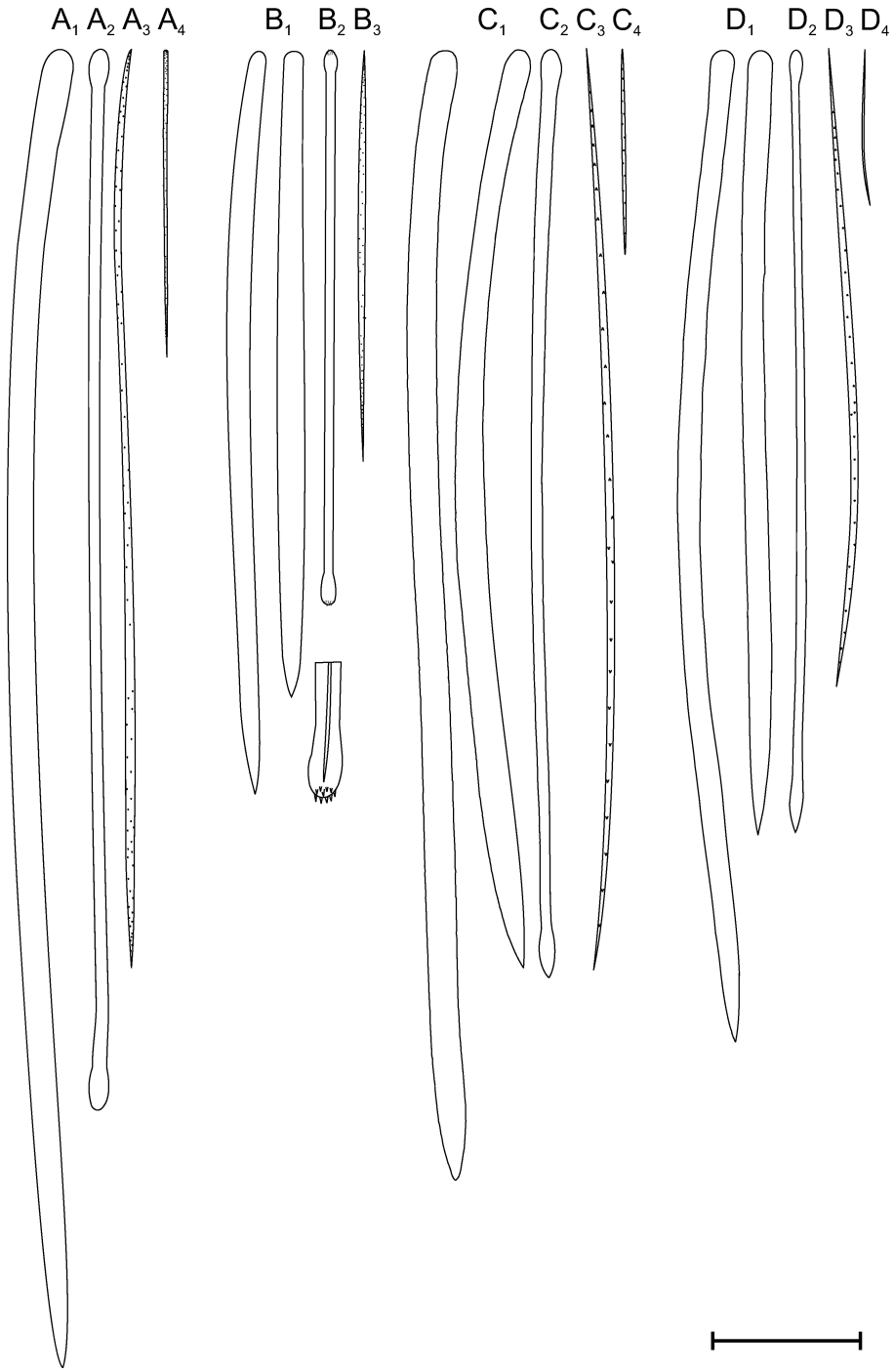

Fig. 2. Camera lucida drawings of spicules of the four species of *Tedania* considered in the present paper (scale bar 50 µm). A. *Tedania suctoria* from West Spitsbergen Region (Svalbard Archipelago), A_1 style, A_2 tylote, A_3 onychaete I, A_4 onychaete II. B. *Tedania anhelans* from Faro (Portugal), B_1 styles, B_2 tylote, B_3 onychaete. C. *Tedania pilarriosae* from Ferrol (Spain), C_1 styles, C_2 stylotornote, C_3 onychaete I, C_4 onychaete II. D. *Tedania urgorrii* from Ferrol (Spain), D_1 styles, D_2 stylotornote, D_3 onychaete I, D_4 onychaete II.

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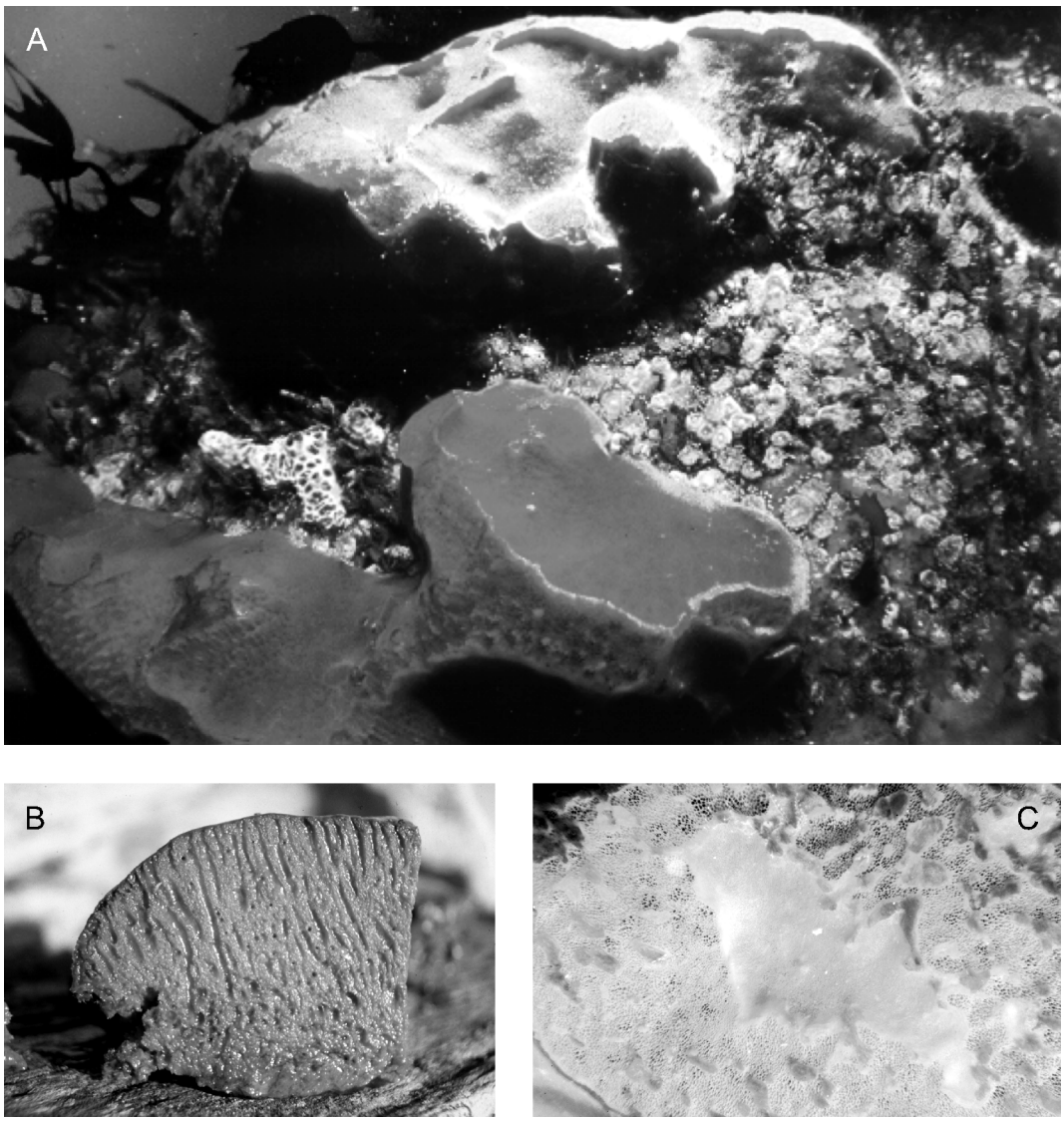

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Fig. 3. *Tedania pilarriosae* sp. nov. A. Habitus of two living specimens (colour brilliant orange; photograph: J. J. Candán). B. Section of a living specimen of 10 cm in thickness showing exhalant canals. C. *In situ* close-up showing oscular areas in the upper part of the sponge.

analysing the original descriptions of *T. suctoria*, and comparing them with the specimens collected in the Ría de Ferrol, it is evident that there are many good reasons to assume that it is a different species. In the first place, with regard to the external morphology of *T. suctoria*, it has a flat surface and hollow warts. Schmidt (1870, fig. 10) shows us an illustration of a species of similar warts (*Papillina suberea*), which is not identifiable with the forms which appear in *T. pilarriosae* sp. nov. from Ferrol and which has already been described. Subsequently, Topsent (1892, 1904, 1928) cites *T. suctoria* collected during the course of several oceanographic voyages, and describes it as a species with numerous conical papillae, 2 mm tall. On the other hand, the dermal membrane is easily separable in *T. suctoria*, while in *T. pilarriosae* sp. nov. this does not occur. The ectosome is intimately linked to the choanosome. Simpson (1968) asserts that *T. suctoria* grows as a fine

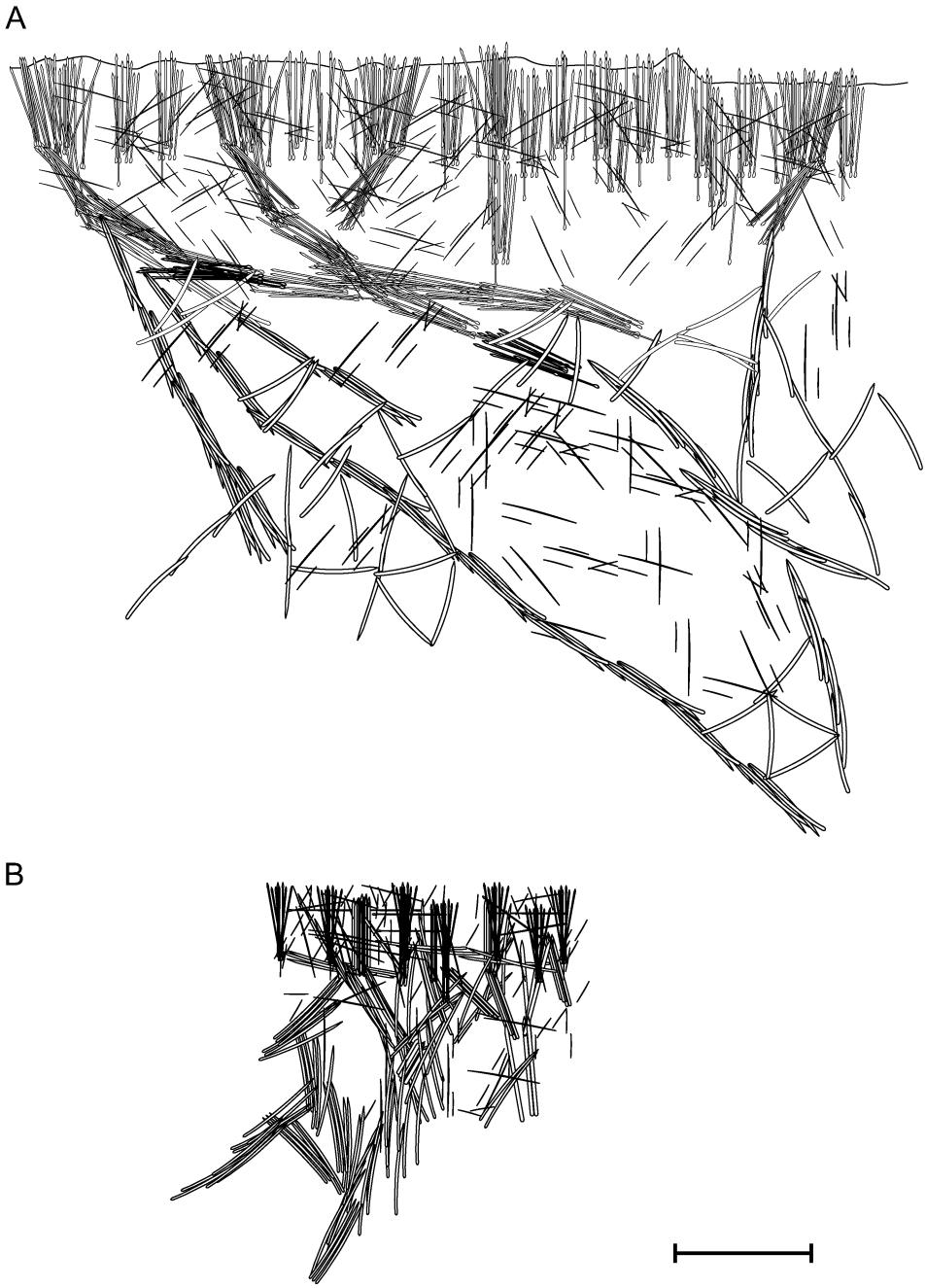

Fig. 4. Schematic representation of the skeletal architecture of two new species (scale bar 500 μm). A. *Tedania pilarriosae* sp. nov. B. *Tedania urgorrii* sp. nov.

incrustation and has many erect papillae. Lundbeck (1910), Arndt (1935, 1940) and Simpson (1968) mentioned papillae in *T. suctoria*, while the new species *T. pilarriosae* sp. nov. does not possess this character. *Tedania suctoria* and *T. pilarriosae* sp. nov. also differ with respect to their spicules (Table 1).

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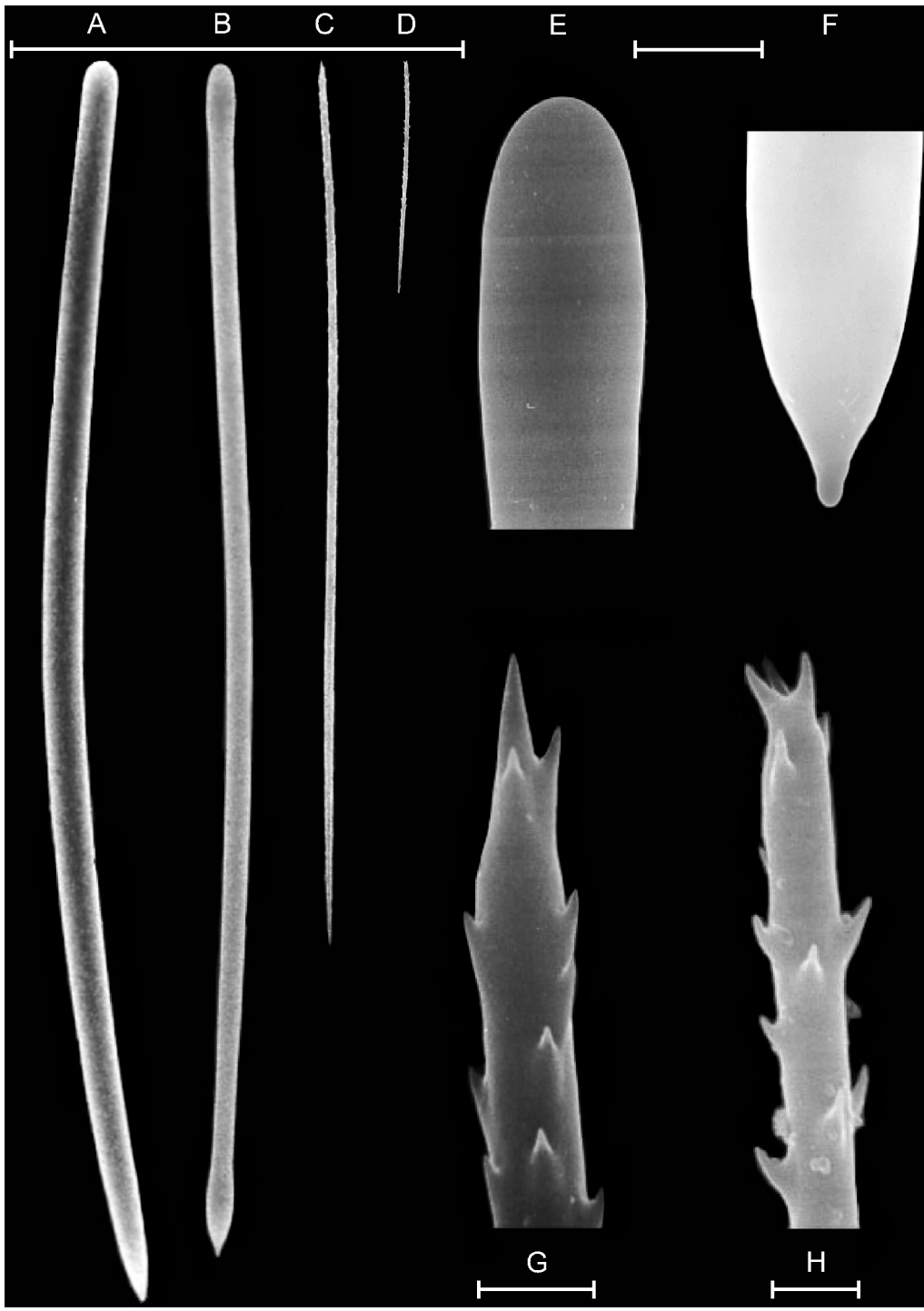

Fig. 5. Scanning electron micrographs of *Tedania pilarriosae* sp. nov. spicules. A. Style. B. Stylotornote. C. Onychaete I. D. Onychaete II (A–D scale bar 100 μm). E. Head of stylotornote. F. End of the same stylotornote (E, F scale bar 5 μm). G. End of onychaete I (scale bar 2 μm). H. End of onychaete II (scale bar 1 μm).

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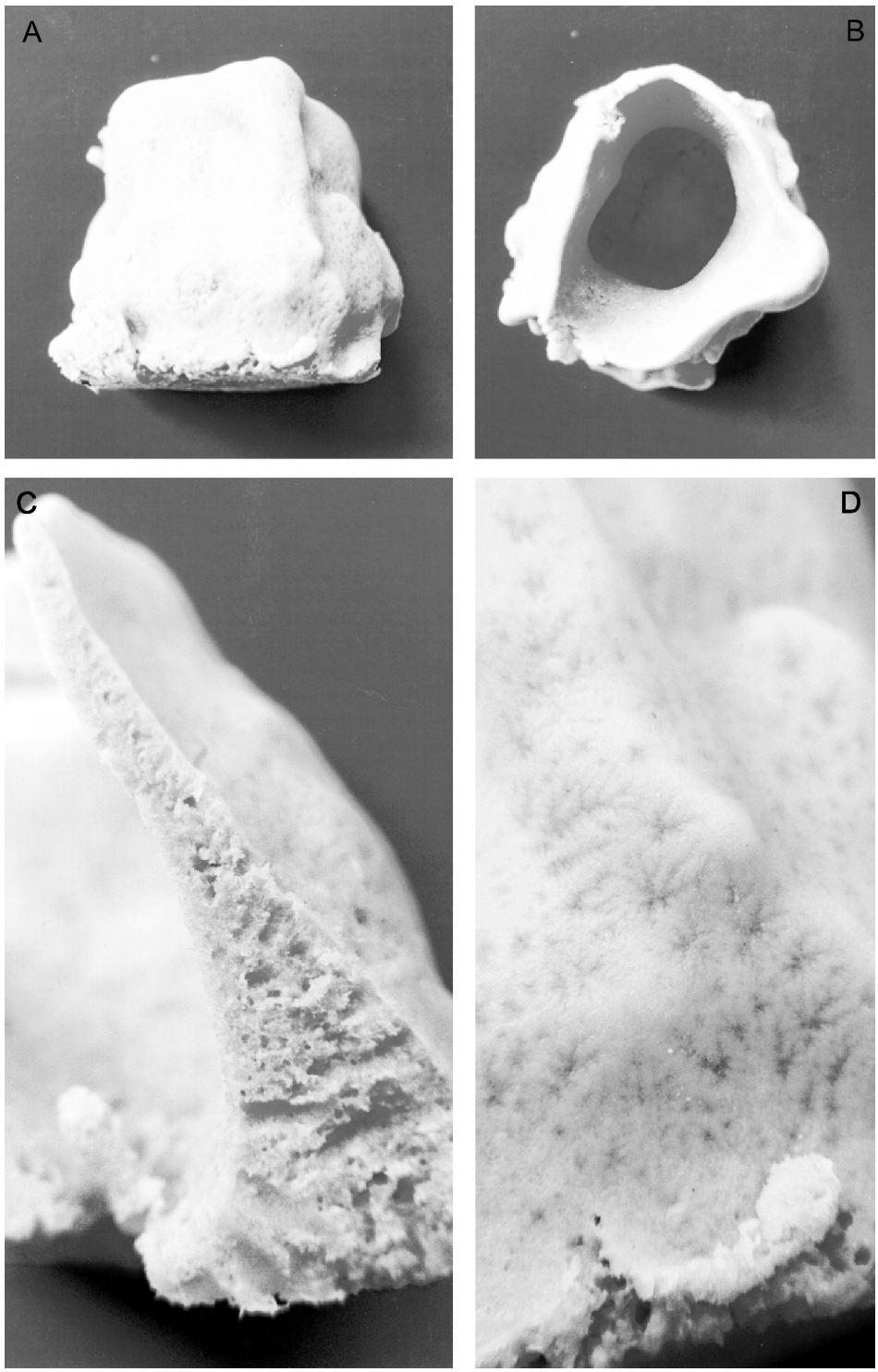

Fig. 6. *Tedania urgorrii* sp. nov. A, B. Habitus of holotype (colour pale orange). C. Section of a specimen showing cuneiform wall. D. Stelliform ostia on the external surface (inhalant).

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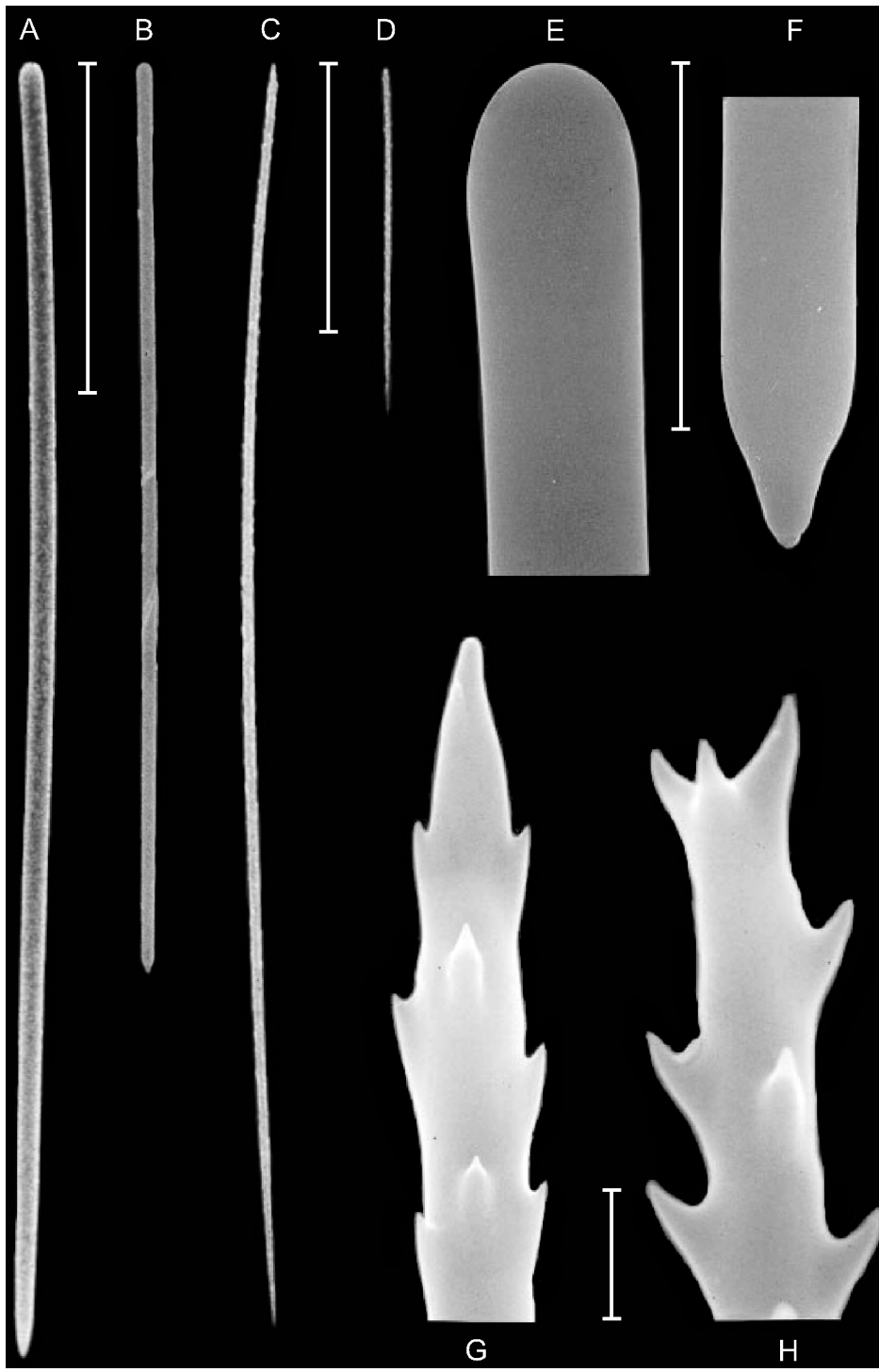

Fig. 7. Scanning electron micrographs of *Tedania urgorrii* sp. nov. spicules. A. Style. B. Stylotornote (A, B scale bar 100 μm). C. Onychaete I. D. Onychaete II (C, D scale bar 50 μm). E. Head of stylotornote. F. End of the same stylotornote (E, F scale bar 10 μm). G. End of onychaete I. H. End of onychaete II (G, H scale bar 1 μm).

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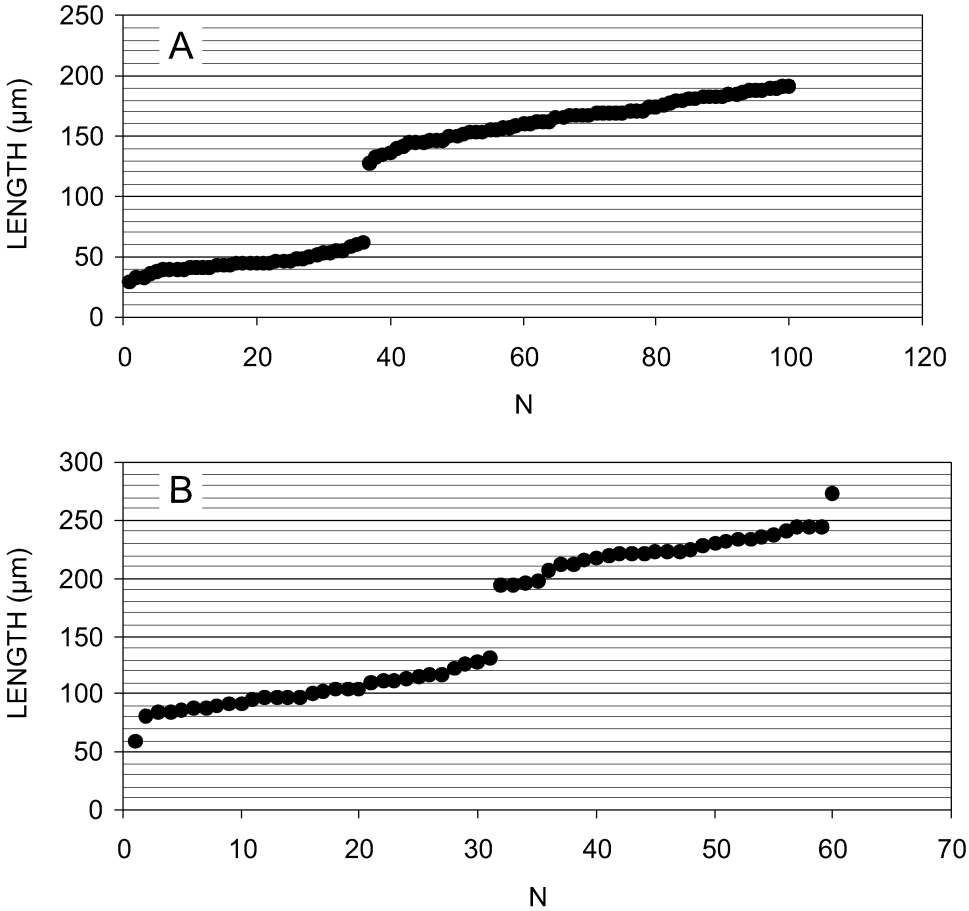

Fig. 8. Graphs of size frequency distribution according to the length of onychaetes. The data show that the distribution is discontinuous and differentiates the two size classes. A. *Tedania pilarriosae* sp. nov. B. *Tedania urgorrii* sp. nov.

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Styles

In the original description (Schmidt 1870), they are 460 µm in length; dimensions similar to those indicated by Topsent (1892) (460 × 14 µm) and slightly different from those obtained by Lundbeck (1910) (300–680 × 7–14 µm). In any case, the styles of *T. pilarriosae* sp. nov. are situated in a range of maximum and minimum values between 197–344 × 2–14 µm, the average being 268 × 8.1 µm; values clearly inferior to those of *T. suctoria*. With respect to its form, in Topsent's preparation of *T. suctoria* (1904) located in the Muséum National d'Histoire Naturelle in Paris with the L.B.I.M. NDT 988, we have seen that detailed studies prove that the styles are somewhat straighter than those of *T. pilarriosae* sp. nov. and considerably larger (580 × 11 µm) as had already been indicated in Topsent's publication.

Tornotes

A clear difference that different sponge experts who have described *T. suctoria* have pointed out is that its terminations are elliptical, swollen, and its head is flat, that is to say what is known as a tylote in spicular morphology (Koltun 1959). However, the homologous spicules in *T. pilarriosae* sp. nov. are stylotornotes, with clearly different morphological terminations, the dimensions of which range between 154–337 × 2.8–11.1 µm, the average being 237.8 × 6.3 µm. Lundbeck (1910) noticed that the tylotes had a distinct protruberance on each termination, but this difference only means that it is a little more elongated than the other, and he concluded that the completely developed tylotes have unequal terminations, even though unusual situations in which the tylote is originally monactinal have been seen.

Table 2. Comparison between *Tedania urgorrii* and *T. infundibuliformis*.

	T. urgorrii	*T. infundibuliformis*
Habitus	Crateriform	Funnel shaped
Colour	Orange	Pale yellow
Size of styles	220–416 × 4.3–11.4 μm	540 × 15 μm
Tornotes	Different heads, oval and pointed	Equal oval heads
Size of tornotes	166–333 × 2.8–8.9 μm	280 × 6.3 μm
Onychaetes	Two size classes	One size class
Size of onychaetes	58–130 and 193–272 μm	350 μm

Onychaetes

With regard to size, the first data come from Topsent (1892) (300 × 2 μm). Lundbeck (1910) suggested that their length was highly variable (53–500 μm), assuming that the three medium-sized categories of onychaetes were present. Topsent recognized two categories (70–80 and 310–340 μm). The previously described onychaetes of *T. pilarriosae* sp. nov. have two totally different size ranges, neither of which is medium-sized (30–70 and 120–200 μm).

The reference of *T. suctoria* by Solorzano & Urgorri (1991) from some localities on the Galician coast corresponds to *T. pilarriosae* sp. nov.

Tedania urgorrii sp. nov. (Figs 2D, 4B, 6, 7, 8B)

Type locality

As Merloeiras, in the confluence of the Rias de Ferrol and Ares (Galicia, Spain) (43°26′24″N 08°19′24″W).

Type material

Holotype: Museo Nacional de Ciencias Naturales of Madrid N° MNCN 1.01/186, from As Merloeiras (43°26′24″N 08°19′24″W) 37.5 m, 17 August 1991. Paratype 1: Muséum National d'Histoire Naturelle, Paris, N° MNHN DCL 3669, from As Merloeiras (43°26′24″N 08°19′24″W) 37.5 m, 17 August 1991. Paratype 2: Museo de Historia Natural "Luis Iglesias" Universidade de Santiago de Compostela N° 10007, from As Merloeiras (43°26′24″N 08°19′24″W) 37.5 m, 17 August 1991. Paratypes 3–10: Laboratorio de Zooloxía Mariña, Universidade de Santiago de Compostela.

Derivatio nominis

This species is dedicated to Dr Victoriano Urgorri Carrasco from Ferrol, a malacologist and Professor of the University of Santiago de Compostela, for his perseverance in the study of the marine fauna of the Ría de Ferrol and his pertinacious defence of its ecological and zoological importance.

Diagnosis

Tedania with characteristic external crateriform appearance with its lateral wall from 2 to 7 cm in height, thickness decreasing from the base to the upper border. Stelliform ostia on the external face of the crater and oscula of 1 mm in diameter in the wide atrium. Skeleton composed of reticulated choanosomal style tracts and ectosomal stylotornotes in palisade and bouquets. The microscleres are onychaetes of two size classes. Orange in colour.

Description

Shape: massive, crateriform, with irregular bases but with a tendency to be circular or elliptical. Large open atrium, ovoid or circular in form. Cuneiform lateral walls from 2 to 7 cm in height, thickness decreasing from the base (15 mm) to the upper border (2 mm). Sometimes several craters of different sizes can be seen, anastomosed at their bases. Stelliform ostia on the external face (inhalant) of the crater where swollen areas of the wall may lead to increased solidity of the sponge. Oscula of 1 mm in diameter easily visible in the wide atrium. Even, smooth and velvety surface. Consistency *in vivo* slightly compressible, but fragile in alcohol. Colour orange inside and outside. It may give the alcohol a slightly yellow tint.

Skeleton

Typical of this genus. The choanosomal skeleton consists of paucispicular tracts of 10–20 styles without differences in the primary and secondary ones, from the base to the surface. Plumoreticulate appearance. Ectosomal skeleton multispicular with a continuous palisade of stylotornotes in brushes or bouquets perpendicular to the surface. Onychaetes of two size classes in the ectosome and choanosome.

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Table 3. Spicule sizes (μm) of *Tedania* species considered in the discussion. A. Choanosomal spicules. B. Ectosomal spicules. C. Onychaetes.

Species	A	B	C	Locality	Authority
T. pilarriosae	197–344	154–337	30–70; 120–257	Ferrol	Present paper
T. urgorrii	220–416	166–339	58–130; 193–272	Ferrol	Present paper
T. anhelans	170–225	203–210	110–150	Faro	Present paper
T. suctoria	368–504	280–400	68–120; 260–312	Svalvard	Present paper
T. chevreuxi	215–230	180–200	150–160	Senegal	Topsent 1891
T. phacellina	515–550	440–470	70–80; 290–330	Azores	Topsent 1912
T. commixa	300	350	130	Bass Strait	Ridley & Dendy 1887
T. infundibuliformis	540	280	350	Patagonia	Ridley & Dendy 1887
T. actiniiformis	870	560	560	Chile	Ridley & Dendy 1887
T. massa	700	450	800	Rio de Plata	Ridley & Dendy 1887
T. charcoti	420–450	305–340	90–120	Antarctic	Topsent 1908
T. connectens	430	300	200	New Zealand	Brøndsted 1924
T. diversirhaphidiophora	360	280	50; 190	New Zealand	Brøndsted 1923
T. battershilli	200–320	160–310	30–73; 105–163	New Zealand	Bergquist & Fromont 1988
T. purpurescens	230–300	270–300	45–55; 110–133	New Zealand	Bergquist & Fromont 1988
T. digitata	190–290	152–265	40–239	Adriatic	Koltun 1959
T. vahhoffeni	616–728	336–376	88–112; 440–480	Antarctic	Hentschel 1914
T. murdochi	225–250	200–240	40–175	Antarctic	Topsent 1913
T. brevispiculata	218–265	244–265	190	Indonesia	Hoshino 1981
T. levigotylota	345–375	280–345	190	Japan	Hoshino 1981
T. palola	225–330	185–260	150	Japan	Hoshino 1981
T. ignis	220–240	210–225	50; 180	Caribbean	Soest 1984
T. mucosa	280–310	190–210	190–210	Chile	Thiele 1905
T. scottiaee	280–375	220–300	125–150; 150–175	South Africa	Stephens 1915
T. stylonychaeta	600–700	325–500	70–80; 200–250	South Africa	Lévi 1963
T. tubulifera	450–500	225–250	50–65; 160–300	South Africa	Lévi 1963
T. oxeata	680	450	80; 500	Antarctic	Topsent 1916
T. tenuicapitata	380	278	316	Patagonia	Ridley 1881
T. brasiliensis	151–228	151–256	40–78; 62–200	Brazil	Mothes & al. 2000
T. strongylostyla	210–304	213–240	43–103; 118–220	West Pacific	Kennedy & Hooper 2000

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Spicules

Styles entirely smooth, strong, slightly curved. Isodiametric choanosomal with evenly rounded bases without tyles and with a hastate point. Axial filament not seen. Size: 220.6–(331.8)–416.9 × 4.3–(8.4)–11.4 μm. Stylotornotes smooth, straight or slightly curved ectosomal, isodiametric in the shaft and unequal swelling at each end, one with rounded tylote or subtylote bases and the other with mucronate or arrow-like pointed end that in SEM micrographs shows a nipple-like point. Size: 166.6–(248.9)–333.9 × 2.8–(4.8)–8.9 μm. Onychaetes, clearly differentiated into two size categories: onychaetes I, 193–272 × 0.7–2.5 μm and onychaetes II, 58–130 × 0.3–1.1 μm. Small onychaetes are straight, entirely spined with spines directed towards the same apex. Unequal ends. Onychaetes I are straight or slightly curved and entirely spined.

Ecology

The specimens were collected on a rocky bottom of granite at depths of 37–45 m, occupying the same ecological niche as *Guitarra solorzanoi* (Cristobo 1998). It lives on vertical or inclined walls and often on horizontal areas of granitic rocks. The habitat can be characterized as a light slope with a decreasing intensity of light, with a resulting scarcity of phytobenthic organisms. Only small calcareous and red seaweeds were seen. The bottom had few filter feeder organisms and an abundance of brushy bryozoans incrusted under the stones. The most important species of associated macrofauna were the cnidarians *Eunicella verrucosa* and *Leptogorgia sarmentosa,* the mollusc *Charonia lampax* and the echinoderms *Echinus esculentus* and *Holoturia forskali*; none of these was found in great quantity.

Remarks

In the case of *T. urgorrii* sp. nov., the species most similar, with respect to external aspect, is *T. infundibuliformis* Ridley & Dendy, 1887, although it is easy to establish clear differences in its habitus,

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colour, size and form of the spicules, which are reflected in Table 2.

DISCUSSION

There is already a long list of species described within the genus *Tedania*, the majority of which are incrusting or massive with no precise morphology. The two new species, *T. pilarriosae* sp. nov. and *T. urgorrii* sp. nov. have several characteristics which make them different from the rest of the species in the genus, both with respect to their spicular dimensions (Table 3) and their morphology. As already mentioned, the stylotornotes of *T. pilarriosae* sp. nov. and *T. urgorrii* sp. nov. have unequal terminations: one has a very slight tylotism and the other is straight or slightly mucronated and its termination is short. Hence, the tornotes with asymmetrical terminations (stylotornotes) set the new species apart from species whose tornotes have symmetrical terminations (mucronated or with a more or less pronounced tyle). This trend differentiates them from: *T. chevreuxi* Topsent, 1891; *T. phacellina* Topsent, 1912; *T. commixta* Ridley & Dendy, 1887; *T. infundibuliformis* Ridley & Dendy, 1887; *T. actiniiformis* Ridley & Dendy, 1887; *T. massa* Ridley & Dendy, 1887; *T. charcoti* Topsent, 1905; *T. anhelans* (Lieberkühn, 1859); *T. conuligera* Topsent, 1892 (= *T. suctoria*) (Topsent 1897); *T. connectens* (Brøndsted, 1924); *T. diversirhaphidiophora* Brøndsted, 1923; *T. battershilli* Bergquist & Fromont, 1988; *T. purpurescens* Bergquist & Fromont, 1988; *T. digitata* (Schmidt, 1862); *T. vanhoffeni* Hentschel, 1914; *T. murdochi* Topsent, 1913; *T. brevispiculata* Thiele, 1903; *T. levigotylota* Hoshino, 1981; *T. palola* Hoshino, 1981; *T. ignis* (Duchassaing & Michelotti, 1864); *T. mucosa* Thiele, 1905; *T. scottiae* Stephens, 1915 (= *T. brøndstedi* Burton, 1936); *T. stylonychaeta* Lévi, 1963; *T. tubulifera* Lévi, 1963; and *T. strongylostyla* Kennedy & Hooper, 2000.

Other species which possess tornotes with different terminations may be distinguished from *T. urgorrii* sp. nov. and *T. pilarriosae* sp. nov. by the following: *T. suctoria* Schmidt, 1870 has thin and elongated tornotes which are all very similar (Lundbeck 1910); *T. oxeata* Topsent, 1916 has choanosomal oxeas (Topsent 1916); *T. tenuicapitata* Ridley, 1881 has flat, unequal, slightly marked tylotes and the ends are spined, a feature which may also be appreciated in *T. anhelans* (Lieberkühn, 1959), *T. tubulifera* Lévi, 1963, *T. ignis* (Duchassaing & Michelotti, 1864) and *T. brasiliensis* Mothes, Hajdu & Soest, 2000; besides, the latter may be differentiated from the new species because it possesses strongyles as choanosomal megascleres, and microspined ectosomal tylotes (Mothes & al. 2000).

With regard to the onychaetes, both new species have two different sizes, while the majority of the species have only one. In order to check this, a large sample of spicules has been measured (Fig. 8), which makes it possible to distinguish one species from another, in many cases without affecting the parameters already cited. When the onychaete measurements are ordered from the lowest to the highest (Doumenc & Lévi 1987), graphs are obtained in which their discontinuous distribution may clearly be appreciated. It is this which separates the two size classes in each species and makes it possible to use those values for the purposes of biometric discrimination of the two types of onychaete.

Tedania urgorrii sp. nov. and *T. pilarriosae* sp. nov. may be clearly distinguished from one another by their external forms (massive/crateriform); skeletal arrangement (differentiation of the bunches of styles in main and secondary lines in the case of *T. pilarriosae* sp. nov. and similar bunches in *T. urgorrii* sp. nov.); spicular dimensions (mainly those of the styles); oscula on the apex confined to distinct sieve plates in *T. pilarriosae* and confined to a wide atrium in *T. urgorrii*; ostia all over the surface of the sponge in *T. pilarriosae* while in *T. urgorrii* they are only present on the external part of the crater; the ectosome of *T. pilarriosae* is dark orange and unclear in *T. urgorrii*; the consistency of *T. pilarriosae* is firm while it is fragile in the case of *T. urgorrii*; the colour of *T. pilarriosae* is bright orange while that of *T. urgorrii* is a pale orange.

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