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New sponge species from Seno Magdalena, Puyuhuapi Fjord and Jacaf Canal (Chile)

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Marco Bertolino and Gabriele Costa equally contributed to the paper and are first co-authors.

Abstract. Until now, only 177 species of sponges (Porifera) have been reported for Chilean coastal waters. Here we describe recent scuba diving surveys undertaken to improve our knowledge of the diversity of the sponge fauna of the Seno Magdalena, Puyuhuapi Fjord and Jacaf Canal in Chilean Patagonia. Despite these relatively harsh environments, our study yielded 23 species of Demospongiae, nine of which are new to science and described here: *Hymerabdia imperfecta* Bertolino, Costa & Pansini sp. nov., *Axinella cylindrica* Bertolino, Costa & Pansini sp. nov., *Axinella coronata* Bertolino, Costa & Pansini sp. nov., *Biemna aurantiaca* Bertolino, Costa & Pansini sp. nov., *Biemna erecta* Bertolino, Costa & Pansini sp. nov., *Biemna typica* Bertolino, Costa & Pansini sp. nov., *Scopalina cribrosa* Bertolino, Costa & Pansini sp. nov., *Rhizaxinella strongylata* Bertolino, Costa & Pansini sp. nov. and *Darwinella pronzatoi* Bertolino, Costa & Pansini sp. nov. One species, *Hymedesmia* (*Stylopus*) *lissostyla* (Bergquist & Fromont, 1988), is reported for the first time for Chile.

Keywords. Chilean fjords, Porifera, taxonomy, benthos.

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Introduction

The southern tip of South America is of particular interest for ecological and biogeographic studies of marine organisms. The relative proximity of Antarctica makes this subantarctic coast a transitional zone between South America, Antarctica and the temperate Pacific area (Escribano *et al.* 2003).

The subantarctic inner shelf of southern Chile (41–55° S) is characterized by a complex system of fjords, channels, gulf, estuaries and bays, each affected by local physical processes that strongly modulate biological productivity (Iriarte *et al.* 2014). Patagonian fjords are influenced by saline subantarctic surface waters and freshwater input from the continent; these waters interact to form modified subantarctic waters characterized by sharp vertical and horizontal salinity gradients (Iriarte *et al.* 2014 and references therein). These fjords can, therefore, be considered transitional marine systems where marked contrasts in marine biodiversity and distribution can be observed (Escribano *et al.* 2003).

The fjords of Chilean Patagonia cover an area of nearly 240 000 km^2 in one of the least densely populated areas of the country (1–8 inhabitants per 10 km^2) (Pantoja *et al.* 2011). In the last three decades, however, the influence of anthropogenic activities on these mostly pristine terrestrial and aquatic ecosystems has increased. Exploitation of the natural resources of the region (fisheries, tourism) and the expansion of commercial salmon and mussel farming (Pantoja *et al.* 2011) are increasing the pressure on these fragile fjord ecosystems, and they now require enhanced scientific surveillance and protection.

The coastal waters of Chilean Patagonia host more than 1700 species of benthic animals (Häussermann & Försterra 2009). The biodiversity of filter-feeding organisms is of particular interest given the high levels of primary productivity and complex physico-chemical processes occurring in these ecosystems. For example, filter-feeding cnidarians (such as hydrozoans and anthozoans) have been extensively studied in Chilean fjords in recent decades because of their role within the benthic community and subsequent ecological importance (Försterra & Häussermann 2003; Häussermann 2006; Häussermann & Försterra 2007a, 2007b; Sinniger & Häussermann 2009).

On the other hand, sponges have long been studied in Patagonia since the historical campaigns of the nineteenth and twentieth centuries, such as: H.M.S. Alert (1876–1880) (Ridley 1881), H.M.S. Challenger (1873–1876) (Ridley & Dendy 1887), S.Y. Belgica (1897–1899) (Topsent 1901) and the extensive sponge collections of Thiele (1905). Desqueyroux & Moyano (1987), in their biogeographic analysis of the Chilean coast, listed 94 sponge species, a very limited number considering the latitudinal extent (more than 500 km) and intricate morphology of the Chilean coast (Hajdu & Desqueyroux-Faúndez 2008). This knowledge has recently been improved by scuba diving surveys and the list of Chilean Porifera now encompasses 177 species (Carvalho *et al.* 2007, 2011; Esteves *et al.* 2007; Hajdu & Desqueyroux-Faúndez 2008; Lee *et al.* 2008; Azevedo *et al.* 2009; Willenz *et al.* 2009, 2016; Lopes *et al.* 2011; Hajdu *et al.* 2006, 2013; Fernandez *et al.* 2016; Bertolino *et al.* 2019; Costa *et al.* 2020). However, this number remains relatively low considering the huge extent of the Patagonian coastline (Försterra 2009), suggesting that further surveys of this important benthic taxon may be fruitful.

The aim of the present work is to document the diversity of sponge fauna in Seno Magdalena, Puyuhuapi Fjord and Jacaf Canal (Chile) (Fig. 1) and thus to improve the understanding of benthic communities more generally in these coastal waters.

Material and methods

The study area is located within the Aysen Region of northern Chilean Patagonia (Fig. 1). The study focussed on Seno Magdalena, Puyuhuapi Fjord and Jacaf Canal (Fig. 1). Puyuhuapi Fjord – located in the Chilean XI region – extends to a length of 90 km and a maximum width of 7 km (Fig. 1). The mouth of the fjord connects to the larger Moraleda Channel, which opens into the Pacific Ocean, while the head of the fjord consists of a large bay, around 2 km wide, close to Puyuhuapi village. Within the COPAS Sur Austral Program, one area of focus is a sampling program designated to improve our knowledge of the richness of the Porifera in this area from the qualitative point of view.

Sampling was conducted in August 2016 through scuba diving. Twelve sites were chosen with depths of sampling ranging between 5 and 30 m. Sponges were mainly collected from rocky substrates and photographed *in situ* with a Canon Digital IXUS 900 Ti (Fig. 1; Table 1). The specimens were fixed in 70% ethanol and processed by standard methods for sponge identification (Rützler 1978). Taxonomic decisions were made according to the revision of Demospongiae of Morrow & Cárdenas (2015) and the classification present in the World Porifera Database (WPD) (van Soest *et al.* 2020). Length and width of at least 30 spicules per type were measured for each species/specimen collected. Minimum, mean (in parentheses) and maximum values of spicule dimensions are reported. For a Scanning Electron Microscope (SEM) Vega3 TESCAN type LMU analyses, dissociated spicules and dried tissues were transferred onto stubs, and then sputter coated with gold. The type specimens of any proposed new species were entrusted to the Museo Civico di Storia Naturale G. Doria of Genoa (collection acronym MSNG). Spicule slides and the other examined specimens (paratypes) are deposited in the sponge collection of the Dipartimento di Scienze della Terra dell'Ambiente e della Vita (DISTAV), Università degli Studi di Genova. All the specimens collected during the campaign were marked by the code CILE number.

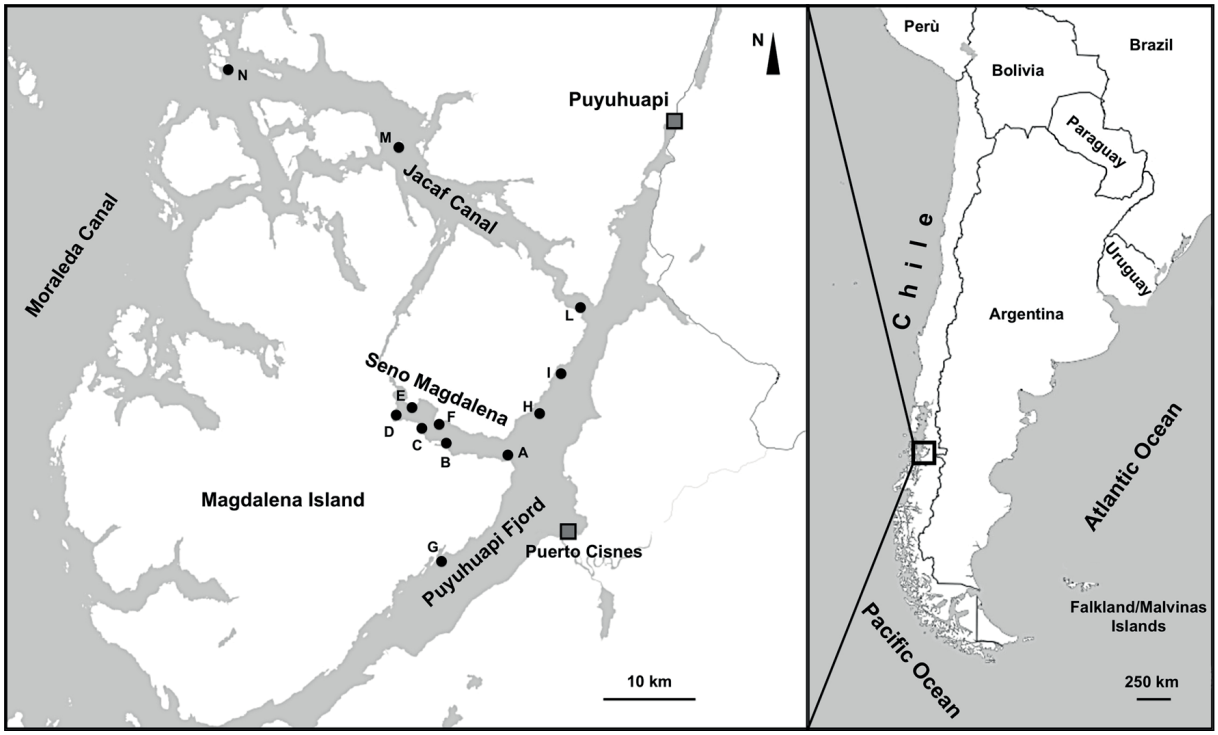

Fig. 1. Study area with twelve sampling sites (A–I, L–N).

Table 1. Sampling sites with descripions.

	SITES	COORDINATES	DESCRIPTIONS	DEPTH
Seno Magdalena	**A**	44.669581° S 72.798496° W	Rocky slope covered by coralline algae and debris at the entrance of a channel	0–31 m
	B	44.650167° S 72.890850° W	Rocky cliff interrupted by large submarine detrital heights	0–32 m
	C	44.631113° S 72.929130° W	Rocky wall and detritus slope	0–32 m
	D	44.614863° S 72.958312° W	Vertical wall, ending at a depth of 20 m on a rocky bottom that slopes down to 32 m	0–32 m
	E **(Punta Tabla)**	44.613885° S 72.941490° W	Rocky cliff	0–35 m
	F **(Punta Angostura)**	44.631235° S 72.904239° W	Rocky cliff and debris slope	0–32 m
	G	44.763254° S 72.891581° W	South side of a rocky slope covered by coralline algae and debris	0–20 m
Other Sites	**H** **(Bouy W)**	44.609000° S 72.757667° W	Vertical rocky wall with debris slope	0–30 m
	I **(Bouy W)**	44.580650° S 72.730850° W	Vertical rocky wall with debris slope	0–30 m
	L **Canal Jacaf** **(Ite Carlos)**	44.522694° S 72.693722° W	Rocky wall ending on a debris bottom inside the channel located between the coast and the island	0–24 m
	M **Canal Jacaf**	44.345000° S 72.951528° W	Rocky walls ending on a debris bottom inside the channel located between the coast and the island	0–24 m
	N **Canal Jacaf**	44.271194° S 73.209222° W	Rocky walls ending on a debris bottom inside the channel located between the coast and the island	0–24 m

Results

In total, the survey collected 44 specimens of demosponges belonging to 23 species (Table 2), with nine species that are new to science: *Hymerhabdia imperfecta* Bertolino, Costa & Pansini sp. nov., *Axinella cylindrica* Bertolino, Costa & Pansini sp. nov., *A. coronata* Bertolino, Costa & Pansini sp. nov., *Biemna aurantiaca* Bertolino, Costa & Pansini sp. nov., *B. erecta* Bertolino, Costa & Pansini sp. nov., *B. typica* Bertolino, Costa & Pansini sp. nov., *Scopalina cribrosa* Bertolino, Costa & Pansini sp. nov., *Rhizaxinella strongylata* Bertolino, Costa & Pansini sp. nov., *Darwinella pronzatoi* Bertolino, Costa & Pansini sp. nov. One species, *Hymedesmia* (*Stylopus*) *lissostyla* (Bergquist & Fromont, 1988) was reported for the first time in Chile. *Axinella cylindrica* was the species with the largest number of specimens (4) and was recorded at four sites (Table 2). The site with the largest number of collected specimens (14) and species was site E in Seno Magdalena. The geographical distribution of the collected and described species is shown in Table 2.

Table 2 (continued on the next page). List of species with the number of specimens collected at each site and their previously known distribution. Total number of specimens is also given for each site. * = new record for the Chilean fjord region.

Species	Sites												Distribution	
	A	B	C	D	E	F	G	H	I	L	M	N	outside fjords	outside Chile
Hymerabdia imperfecta Bertolino, Costa & Pansini sp. nov.					1	1								
Axinella crinita Thiele, 1905								2	1				×	
Axinella cylindrica Bertolino, Costa & Pansini sp. nov.		1		1	1				1					
Axinella coronata Bertolino, Costa & Pansini sp. nov.		1	1		1									
Eurypon miniaceum Thiele, 1905					3								×	Antarctica
Biemna chilensis Thiele, 1905	1												×	Antarctica
Biemna lutea Bertolino, Costa & Pansini, 2018					1									
Biemna typica Bertolino, Costa & Pansini sp. nov							1							
Biemna erecta Bertolino, Costa & Pansini sp. nov				1										
Biemna aurantiaca Bertolino, Costa & Pansini sp. nov							1							
Cliona chilensis Thiele, 1905								1	1			1	×	Galapagos
Clionaopsis platei (Thiele, 1905)					1			1					×	
Amphilectus americanus (Ridley & Dendy, 1887)		1			2									Tierra del Fuego (Argentina)
Hymedesmia* (*Stylopus*) *lissostyla (Bergquist & Fromont, 1988) *				2	1									New Zealand
Latrunculia* (*Latrunculia*) *ciruela Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013					1								×	
Clathria* (*Thalysias*) *amabilis (Thiele, 1905)								1		1			×	Argentina
Myxilla* (*Burtonanchora*) *araucana Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013				1									×	
Myxilla* (*Ectyomyxilla*) *chilensis Thiele, 1905										1			×	Antarctica, Brazil, South Africa

Table 2 (continued). List of species with the number of specimens collected at each site and their previously known distribution. Total number of specimens is also given for each site.

Species	Sites												Distribution	
	A	B	C	D	E	F	G	H	I	L	M	N	outside fjords	outside Chile
Neopodospongia tupecomareni Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013					1						1		×	
Scopalina cribrosa Bertolino, Costa & Pansini sp. nov		1			1							1		
Rhizaxinella unica Bertolino, Costa & Pansini sp. nov				1										
Tethya papillosa (Thiele, 1905)			1										×	
Darwinella pronzatoi Bertolino, Costa & Pansini sp. nov.			1											
Total specimens collected at each site	1	4	3	6	14	1	2	5	3	2	1	2		

Results

Class Desmospongiae Sollas, 1885
Subclass Heteroscleromorpha Cárdenas, Pérez & Boury-Esnault, 2012
Order Agelasida Hartman, 1980
Family Hymerhabdiidae Morrow, Picton, Erpenbeck, Boury-Esnault, Maggs & Allcock, 2012
Genus *Hymerhabdia* Topsent, 1892

Hymerhabdia imperfecta Bertolino, Costa & Pansini sp. nov.
urn:lsid:zoobank.org:act:FF9FC2BD-D935-4B83-B345-228C74D457B2
Fig. 2; Table 3

Etymology

The new species is named after the presence of imperfect rhabdostyles.

Type material

Holotype

CHILE – **Puerto Cisnes** • Seno Magdalena E; 44.613885° S, 72.94149° W; depth 30 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a rocky cliff by scuba diving; CILE 63; MSGN 60889.

Paratype

CHILE – **Puerto Cisnes** • 1 specimen; Seno Magdalena F (Punta Angostura); 44.6312,35° S, 72.904239° W; depth 25 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a rocky cliff by scuba diving; CILE 43; DISTAV.

Description

Habitus. Encrusting, 5 mm thick and 5 cm long (Fig. 2A). Surface rugose and hispid, with visible canals converging towards oscules. Colour in life bright orange (Fig. 2A). Consistency of live specimens friable.

Skeleton. Choanosomal skeleton formed by bundles of long styles and tylostyles with heads embedded in basal layer of rhabdostyles and sinuous sub-tylostyles.

Spicules. Megascleres: Smooth styles, long and thin, sometimes with modified heads (Fig. 2B), 800–(888.33)–1000 µm long and 5–(7.16)–10 µm thick. Smooth tylostyles 410–(552.5)–700 µm long and 15–(18.9)–25 µm thick (Fig. 2C). Rather short rhabdostyles with heads variable in shape and with pointed or round extremities (Fig. 2D), 140–(252.42)–415 µm long and 7.5–(9.75)–12.5 µm thick. Rhabdostyles often sinuous or modified into oxeas or strongyles (Fig. 2E).

Habitat

Species lives on a rocky cliff at a depth of 25–30 m; Chilean fjords.

Remarks

Out of the nine species of *Hymerhabdia* previously described around the world (Table 3), none have been recorded along Chilean coasts. The only species of this genus from the Southern Hemisphere is *Hymerhabdia oxeata* (Dendy, 1924) recorded at a depth of 183 m in northern New Zealand. *Hymerabdia imperfecta* sp. nov. differs from *H. oxeata* in having a red colour whereas in *H. oxeata* the colour is dark brown. As to spicules, *H. oxeata* has oxeas whereas the new species has tylostyles and rhabdostyles that are not present in *H. oxeata*. Moreover, the styles of the new species are much larger (Table 3). A comparison with the other 8 species of *Hymerhabdia* (from the Atlantic Ocean and the Mediterranean Sea reported in Table 3) shows remarkable differences in presence or absence of spicules (oxeas, rhabdostrongyles, toxostrongyles) and in their shape and size.

Fig. 2. *Hymerhabdia imperfecta* Bertolino, Costa & Pansini sp. nov., holotype (CILE 63; MSGN 60889). **A**. The holotype in life. **B**. Smooth styles. **C**. Smooth thicker tylostyles. **D**. Rhabdostyles. **E**. Rhabdostyles are often sinuous or modified in oxeas or strogyles.

Table 3 (continued on the next page). Morphological characters and distribution of the species of *Hymerhabdia* Topsent, 1892 of all the world. The distribution refers to that present in the World Porifera Database (van Soest *et al*. 2020).

Species	Shape	Colour	Surface	Consistency	Spicules (µm)	Distribution
Hymerhabdia imperfecta Bertolino, Costa & Pansini, sp. nov.	Encrusting	Bright red	Hispid	Friable	Styles: 800–(888.33)–1000 × 5–(7.16)–10 Tylostyles: 410–(552.5)–700 × 15–(18.9)–25 Rhabdostyles: 140–(252.42)–415 × 7.5–(9.75)–12.5	Chile
Hymerhabdia contracta Sarà & Siribelli, 1960	Encrusting	Golden yellow	–	–	Tylostyles: 512–1600 × 6.2–10 Rhabdostyles: 102–152 × 5–7.5 Rhabdostrongyles: 37.5–55 × 7.5–10	Mediterranean Sea
Hymerhabdia intermedia Sarà & Siribelli, 1960	Encrusting	Brownish yellow	Hispid	–	Styles I: 510–1480 × 10.5–17 Styles II/Rhabdostyles: 130–250 × 3.5–7 Strongyles: 168–190 × 3.5–7	Mediterranean Sea, Celtic Sea
Hymerhabdia kobluki van Soest, 2017	Microlobate encrusting	Dull yellow to beige	Microhispid, no oscules are visible	Firm	Styles I: 632–1176 × 12–36 Styles II: 498–570 × 24–31 Styles III: 264–387 × 9–18 Oxeas: 264–424 × 9–(14.9)–19	Guyana Shelf, Bonaire, Colombian Caribbean
Hymerhabdia oxeata (Dendy, 1924)	Encrusting	Dark brown	Hispid	–	Oxeas: 270 × 12 Styles: 289–1037 × 12.7–34	New Zealand
Hymerhabdia oxytrunca Topsent, 1904	Encrusting	Brown, grey	Hispid	–	Styles I: 350–610 × 8–20 Styles II: 260–550 × 7–18 Rhabdostyles I: 180–350 × 6–7.5 Rhabdostyles II: 170–290 × 7–7.5 Oxeas: 480–670 × 13–15	Mediterranean Sea, Azores, Canaries
Hymerhabdia pori Tsurnamal, 1969	Encrusting	Orange/red or yellow/orange	Hispid or papillate	Soft	Styles I: 755–1550 × 13–20 Styles II: 224–600 × 13–17 Strongyles: 207–1080 × 17–22 Strongyles/Toxostrongyles: 196–380 × 6.7–11	Mediterranean Sea
Hymerhabdia reichi Tsurnamal, 1969	Encrusting	Orange/red or yellow/orange	Hispid/pointed papillate	–	Styles: 400–720 × 4.4–10 Strongyles: 280–520 × 6–9 Oxeas I: 400–600 × 3.5–11 Oxeas II: 100–130 × 2.2–4.4	Mediterranean Sea

Table 3 (continued). Morphological characters and distribution of the species of *Hymerhabdia* Topsent, 1892 of all the world. The distribution refers to that present in the World Porifera Database (van Soest *et al.* 2020).

Species	Shape	Colour	Surface	Consistency	Spicules (µm)	Distribution
Hymerhabdia topsenti Lévi, 1952	Encrusting	Red	Hispid	–	Styles I: 1600 × 12–13 Styles II: 350–500 × 15–30 Styles III: 20–350 × 4–12 Oxeas: 160–320 × 8–18	Atlantic Ocean
Hymerhabdia typica Topsent, 1892	Encrusting	–	Hispid	–	Styles and Tylostyles: 650–800 × 10 Rhabdostyles: 80–120 × 8–10	Mediterranean Sea, Celtic Sea, Azores, Canaries

Order Axinellida Lévi, 1953
Family Axinellidae Carter, 1875
Genus *Axinella* Schmidt, 1862

Axinella cylindrica Bertolino, Costa & Pansini sp. nov.
urn:lsid:zoobank.org:act:21616DF2-8C48-428E-8631-C6A2553E214C
Figs 3–4; Table 4

Etymology

The new species is named after the body shape.

Type material

Holotype

CHILE – **Puerto Cisnes** • Seno Magdalena B; 44.650167° S, 72.89085° W; depth 20 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a rocky cliff by scuba diving; CILE 1; MSGN 61493.

Paratypes

CHILE – **Puerto Cisnes** • 1 specimen; Seno Magdalena D; 44.614863° S, 72.958312° W; depth 18 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a rocky bottom by scuba diving; CILE 37; DISTAV • 1 specimen; Seno Magdalena E; 44.613885° S, 72.941490° W; depth 15 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a rocky cliff by scuba diving; CILE 23; DISTAV • 1 specimen; Seno Magdalena D; 56.616666° S, 72.716666° W; depth 20 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a rocky wall by scuba diving; CILE 81; DISTAV.

Description

Habitus. All of the specimens have a regular cylindrical shape (5–7 cm high, ca 1 cm in diameter) (Fig. 3A). Surface lightly hispid, consistence firm. Colour in life bright yellow (Fig. 3A).

Skeleton. Skeleton formed by network of thin ascending plurispicular fibres forming quadrangular meshes with abundant spongin (Fig. 3B). Choanosome differentiated in axial compressed region (Fig. 3D) and extra-axial plumoreticulate part (Fig. 3C–D). Ectosome formed by erect spicule brushes, hispidating sponge surface, supported by terminal part of choanosomal ascending fibres (Fig. 3C–D).

Spicules. Megascleres: Styles smooth, straight or slightly curved, with regular, round heads (Fig. 4A), 700–(832.5)–960 µm long and 20–(25.2)–32.5 µm thick in holotype. Rhabdostyles smooth with pronounced basal bend (Fig. 4B), 240–(296.5)–435 µm long and 15–(17)–20 µm thick in holotype. Oxeas smooth, more or less folded, 197.5–(346)–425 µm long and 12.5–(18.7)–22.5 µm thick in holotype. The thinnest ones are almost straight or slightly flexuous (Fig. 4C). Measurements of spicule of all collected specimens (holotype and paratypes) are reported in Table 4.

Habitat

This species lives on a rocky cliff covered by coralline algae, at a depth between 15 and 20 m.

Remarks

We have recorded two new species of the genus *Axinella* and have therefore chosen to make a single discussion after their description.

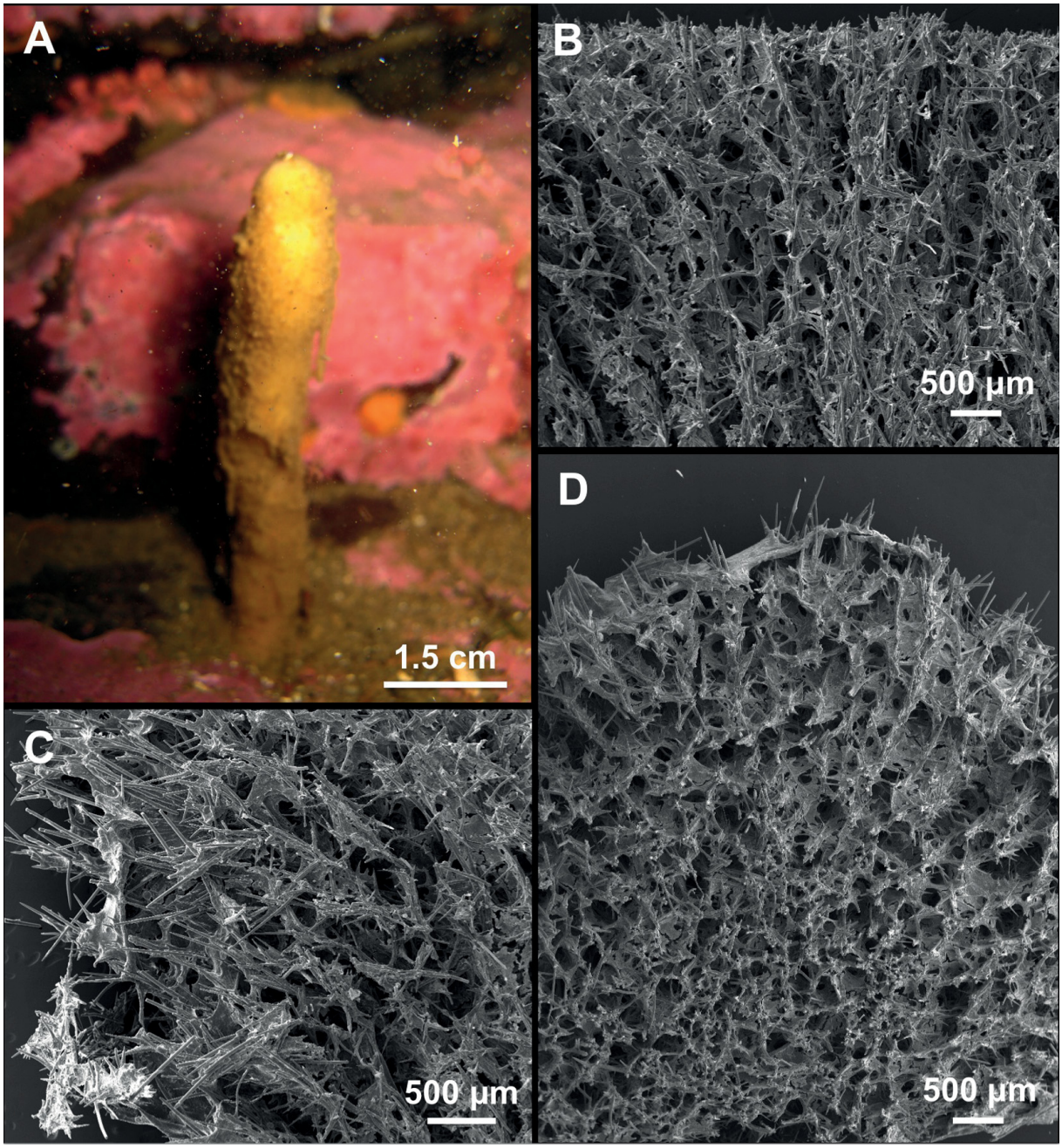

Fig. 3. *Axinella cylindrica* Bertolino, Costa & Pansini sp. nov., holotype (CILE 1; MSGN 61493). **A**. The holotype in life. **B**. Skeleton formed by a network of thin ascending plurispicular fibres. **C**. Extra-axial pumoreticulate skeleton. **D**. Skeleton differentiated in two regions, axial compressed reticulated and extra-axial plumoreticulate.

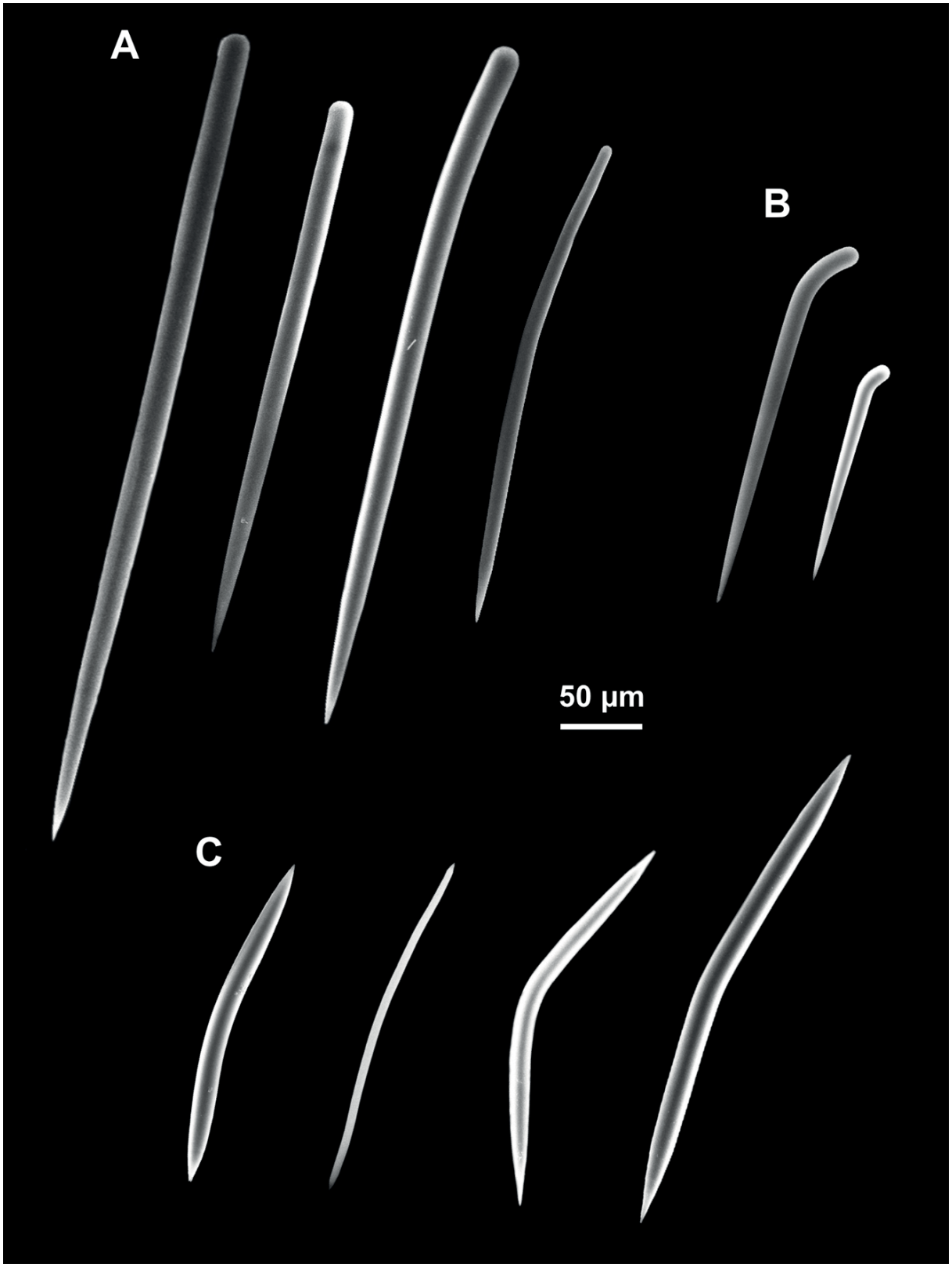

Fig. 4. Spicules of *Axinella cylindrica* Bertolino, Costa & Pansini sp. nov., holotype (CILE 1; MSGN 61493). **A**. Smooth styles. **B**. Rhabdostyles. **C**. Oxeas.

Table 4. Comparison of spicule dimensions (in µm) among specimens of *Axinella cylindrica* Bertolino, Costa & Pansini sp. nov.

Specimens	Styles	Rhabdostyles	Oxeas
CILE 1 Holotype (MSGN 61493)	700–(832.5)–960 × 20–(25.2)–32.5	240–(296.5)–435 × 15–(17)–20	197.5–(346)–425 × 12.5–(18.7)–22.5
CILE 23	513–(686.6)–1005 × 21–(26.2)–29	238–(323.5)–451 × 13–(19)–26	283–(399.5)–492 × 16–(20)–29
CILE 37	360–(614.7)–930 × 2.5–(20)–30	117.5–(253.4)–390 × 12.5–(17.9)–22.5	182.5–(345.3)–425 × 5–(17.9)–22.5
CILE 81	204–(620.6)–887 × 8–(13.6)–23	194–(274.4)–418 × 5–(14.3)–21	224–(393.2)–612 × 10–(17.4)–26

Axinella coronata Bertolino, Costa & Pansini sp. nov.
urn:lsid:zoobank.org:act:29550A2F-F048-40D5-B473-906EB62DC478
Figs 5–6; Table 5

Etymology

The new species is named after the crown of thin styles surrounding single tylostyles.

Type material

Holotype

CHILE – **Puerto Cisnes** • Seno Magdalena B; 44.650167° S, 72.89085° W; depth 20 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a rocky cliff by scuba diving; CILE 22; MSGN 61494.

Paratypes

CHILE – **Puerto Cisnes** • 1 specimen; Seno Magdalena E (Punta Tabla); 44.613885° S, 72.94149° W; depth 22 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a rocky cliff by scuba diving; CILE 9; DISTAV • 1 specimen; Seno Magdalena C; 44.631113° S, 72.929130° W; depth 25 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a rocky wall by scuba diving; CILE 15; DISTAV.

Description

Habitus. Fan shaped sponge, 2 cm high, very thin (2 mm maximum), with short basal stem. Surface very hispid with tufts of macroscleres coming out from surface (Fig. 5A–B). Consistency hard but friable. Colour in life bright yellow (Fig. 5A–B).

Skeleton. Plumose, formed by multi-spicular primary tracts, radiating from axis towards surface (Fig. 5C–D), ending in single tylostyle surrounded by crown of thin styles that projects slightly through sponge surface (Fig. 5E–F).

Spicules. Megascleres: Tylostyles slightly curved (Fig. 6A), 1300–(1962)–2200 µm long and 10–(17.42)–25 µm thick. Long, smooth and thin styles, with shaft slightly thickened in distal third (Fig. 6B), 1200–(1500)–1800 µm long and 2.5–(3.3)–5 µm thick. Styles to tylostyles or subtylostyles more or less bent near head as true rhabdostyles (Fig. 6C), 460–(505)–590 µm long and 10–(15.62)–20 µm thick. Thin and sinuous styles, with round heads and slightly rounded points (Fig. 6D), 460–(556.5)–600 µm long and 2.5–(3.5)–5 µm thick.

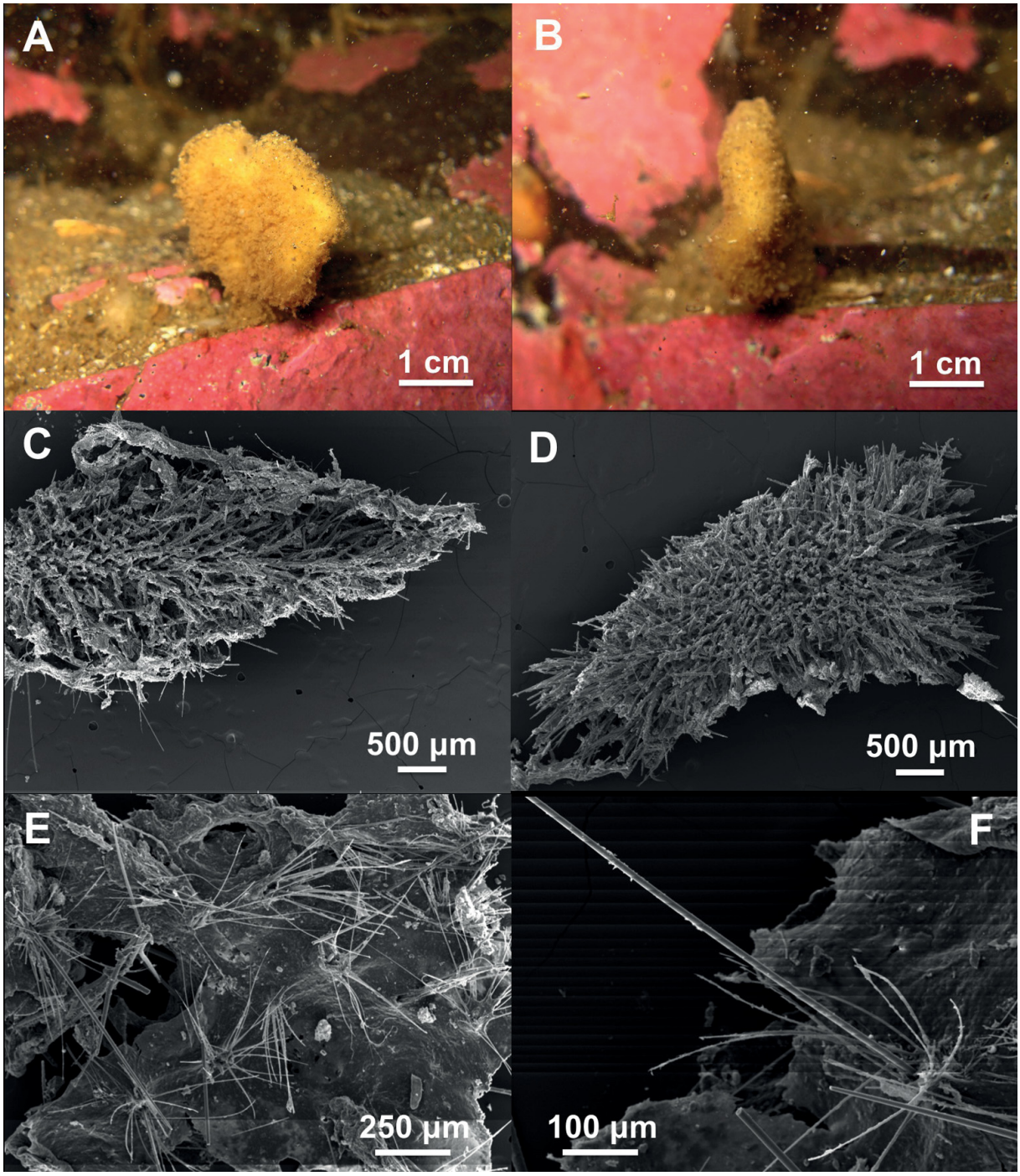

Fig. 5. *Axinella coronata* Bertolino, Costa & Pansini sp. nov., holotype (CILE 22; MSGN 61494). **A**–**B**. The holotype in life. **C**. Plumose multispicular skeleton. **D**. Cross section of the skeleton. **E**. Ectosome. **F**. Magnification of a single tylostyle, surrounded by a crown of thin styles.

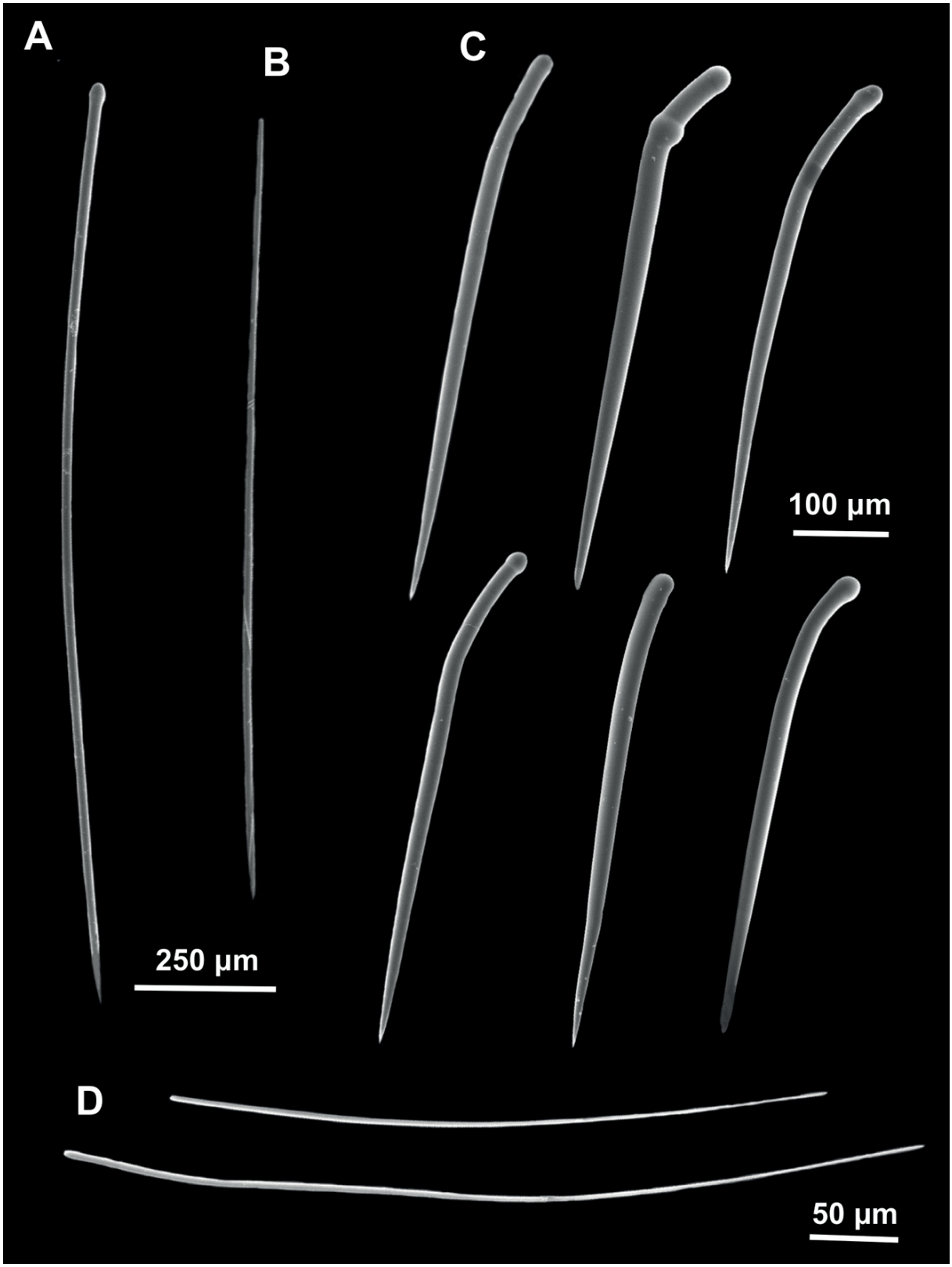

Fig. 6. Spicules of *Axinella coronata* Bertolino, Costa & Pansini sp. nov., holotype (CILE 22; MSGN 61494). **A**. Tylostyles. **B**. Styles. **C**. Styles bend near the head similar to rhabdostyles. **D**. Thin and sinuous styles.

Table 5 (continued on the next two pages). Morphological characters and distribution of the two new species and the other species of *Axinella* Schmidt, 1862 recorded in the Southern Hemisphere. The distribution refers to that present in the World Porifera Database (van Soest *et al.* 2020).

Species	Shape	Colour	Surface	Consistency	Spicules (µm)	Distribution
Axinella cylindrica Bertolino, Costa & Pansini sp. nov.	Regular cylindrical shape, 7 cm high	Bright yellow	Lightly hispid	Firm	Styles: 700–(832.5)–960 × 20–(25.2)–32.5 Rhabdosrtyles: 240–(296.5)–435 × 15–(17)–20 Oxeas: 197.5–(346)–425 × 12.5–(18.7)–22.5 (Holotype measure)	Chilean Fjords
Axinella coronata Bertolino, Costa & Pansini sp. nov.	Fan shaped, 2 cm high	Bright yellow	Very hispid	Hard but friable	Tylostyles: 1300–(1962)–2200 × 10–(17.42)–25 Styles: 460–(505)–590 × 10–(15.62)–20 Thin sinuous styles: 460–(556.5)–600 × 2.5–(3.5)–5	Chilean Fjords
Axinella antarctica (Koltun, 1964)	Globular, slightly elongated, 5.5 cm high	Brown	–	–	Oxeas: 500–1300 × 21–50 µm Straight or sinuous styles: 980–2400 × 30–52	Antarctica, New Zealand
Axinella aruensis (Hentschel, 1912)	Ramified, 17 cm high	Orange	–	–	Oxeas: 336–440 × 13–21 Styles: 336–440 × 13–21	East African coral coast, Banda Sea, Southeast Papua New Guinea, North, Northwest Australian coast
Axinella australiensis Bergquist, 1970	Ramified	Light red	Hispid	–	Oxeas: 140–400 × 9–16 Styles: 120–130 × 1.5–16	New Zealand
Axinella brondstedi Bergquist, 1970	Erect, irregularly lump-shaped	Light yellowish	Hispid	–	Oxeas: 400 × 6 Styles and sinuous strongyles: 400–900 × 28	New Zealand
Axinella corrugata (George & Wilson, 1919)	Lamellated, corrugated	Bright orange, red	Hispid	Firm	Styles sometimes modified to oxeas Styles I: (stout) 400–700 × 10–12 Styles II: (slender) 400–500 × 3–8	Gulf of Mexico, Caribbean Sea, Southern Atlantic Sea (Brazil)
Axinella crassa (Carter, 1885)	Sub-stipitate, flabellate	Wax yellow	–	Firm, resilient	Oxeas: 1524 × 10.4	Southeast Australia
Axinella crinita Thiele, 1905	Arborescent, very ramified	Brown	–	Soft	Styles I: 600–750 × 20–25 Styles II: 200–250 × 10–15 Subtylostyles: 400–500 × 2	Chilean coasts

Table 5 (continued). Morphological characters and distribution of the two new species and the other species of *Axinella* Schmidt, 1862 recorded in the Southern Hemisphere. The distribution refers to that present in the World Porifera Database (van Soest *et al.* 2020).

Species	Shape	Colour	Surface	Consistency	Spicules (µm)	Distribution
Axinella elegans (Dendy, 1924)	Cylindrical stalk base, dichotomising above in two places, 4.2 cm high	White after preservation	–	Flexible and elastic	Styles I: 550 × 15 Styles II: 270 × 12 Oxeas: 270 × 12	New Zealand
Axinella globula Brøndsted, 1924	Hemispherical shape	Grey	Very hispid	–	Styles: 250–400 × up to 22	New Zealand
Axinella kirki Dendy, 1897	Massive hemispherical with short conical proces	Yellowish/ grey	Rugose	–	Oxeas Styles Strongyles up to 1000 × 9	South Australia
Axinella lesueuri Topsent, 1932	Arborescent	–	–	–	Styles I: 90–110 × 5.5–7.5 Styles II: 160–180 × 4–5 Oxeas: 160–180 × 4–5	Australia
Axinella lifouensis Lévi & Lévi, 1983	Fan-shaped with cylindrical stalk base	–	Hispid	–	Styles I: 2300–2500 × 25–35 Styles II: 400–750 × 12–25 Oxeas: 300–1100 × 20–25	New Caledonia
Axinella loribellae Alvarez & Hooper, 2009	Fan-shaped, thin lamellae, 1–5 mm thick, single or bifurcate, 3 cm high and 4 cm wide	Burnt orange alive, brown in alcohol	Smooth, velvety, marked irregularly with ribs	Flexible, easy to tear, rubbery	Styles: 196.3–(274.6±47.7)–352.9 × 8.33–(13.5±2.7)–18.3 Sinuous strongyles: 103.6–(190.1±74)–396.3 × 6.01–(10.3±1.9)–13.09 Oxeas: 148.5–(226.8±63.6)–440.2 × 4.8–(8.7±2.1)–12.9	Northern Australia between Darwin Harbour and the Wessel Is.
Axinella meloniformis Carter, 1885	Globular	Yellow, red, orange	Corrugated	Firm	Oxeas: 635 × 17	Southeast Australia (Port Phillip Heads Marine National Park)
Axinella natalensis (Kirkpatrick, 1903)	Cup-shaped	Pale yellow	–	–	Styles: 450–1200 × 12–13 Oxeas: 300 × 12	Southeast Africa (Natal)

Table 5 (continued). Morphological characters and distribution of the two new species and the other species of *Axinella* Schmidt, 1862 recorded in the Southern Hemisphere. The distribution refers to that present in the World Porifera Database (van Soest *et al.* 2020).

Species	Shape	Colour	Surface	Consistency	Spicules (µm)	Distribution
Axinella pilifera Carter, 1885	Lobate	Orange, brown	–	Soft	Oxeas I: 275 × 7–8.4 Oxeas II: 330 × 8	Southeast Australia (Port Phillip Heads Marine National Park)
Axinella plumosa (Lévi & Lévi, 1983)	Plumose with peduncle	Light grey	–	–	Oxeas I: 80–150 × 8–12 Oxeas II: 250–400 × 8–12	New Caledonia
Axinella profunda Ridley & Dendy, 1886	Stipitate, branching dichotomously in one plane	Yellowish grey	Hispid	–	Oxeas: 84–550 × 20–37	North and South Pacific Abyssal Province
Axinella richardsoni Bergquist, 1970	Long growing, concave lamella, lobate	Dull orange	Hispid	Firm, compressible	Styles: 232–392 × 12–20 Oxeas: 208–435 × 6.9–20	New Zealand
Axinella sinoxea Alvarez & Hooper, 2009	Single or multiple fans, 4–6 mm thick, 8–14 cm long and up to 30 cm wide, on common stalk; erect, uniplanar with digitate to irregular margins or bifurcate tips	Orange, pale yellow or beige with light pink tinge alive; brown-grey in alcohol	Smooth but slightly rough to touch	Soft, floppy, flexible, slightly, compressible	Thick Styles: 159–245 × 7–17 Thin Styles: 97–201 × 2–6 Raphids: 192.9–(227.2±14.9)–249.6 × 0.8–(2±0.6)–3	Common in the vicinity of East Point Sponge Gardens, Darwin Harbour, deep water in Western Australia
Axinella symbiotica Whitelegge, 1907	More or less flabellate, with a series of irregular terminal branches, 18 cm height	Yellowish grey	Rather brittle, harsh to the touch	Slightly compressible	Styles: 200–250 × 10–15 Curved styles/Strongyles: 250–300 × 15–20 Oxeas: (very scarce and may not belong to the sponge)	New South Wales, Australia
Axinella torquata Brøndsted, 1924	Lump shape	Corrugate	Slightly hispid	–	Styles: 170–520 × up to 12 Oxeas: 325–570 × up to 14	New Zealand
Axinella villosa Carter, 1885	Digitiform	–	Hispid	–	Oxeas: 330 × 10.6	Southeast Australia (Port Phillip Heads Marine National Park)

Habitat

Recorded on rocky cliffs and walls covered by coralline algae, at a depth between 20 and 25 m.

Remarks

The attribution of *A. cylindrica* sp. nov. and *A. coronata* sp. nov. to the genus *Axinella* Schmidt, 1862 is based on the skeleton architecture characterised by a choanosomal skeleton differentiated in the axial (compressed or vaguely reticulated) and extra-axial (plumoreticulated) regions. The only species of this genus present on the Chilean coast is *A. crinita* Thiele, 1905. This species differs from the two newly described species in external shape (very ramified with cylindrical branches (Desqueyroux 1972)), absence of rhabdostyles (present in *A. cylindrica* sp. nov.) and presence of long thin styles with curved head (absent in *A. coronata* sp. nov.). In Table 5, the other geographically close species of *Axinella* and other species recorded in the Southern Hemisphere are reported. All of these species differ from *A. cylindrica* sp. nov. and *A. coronata* sp. nov. in the external morphology, and the type and size of spicules. Moreover *A. cylindrica* sp. nov. differs from all the other species in the presence of rhabdostyles (Table 5).

Order Biemnida Morrow, 2013
Family Biemnidae Hentschel, 1923
Genus *Biemna* Gray, 1867

Biemna aurantiaca Bertolino, Costa & Pansini sp. nov.
urn:lsid:zoobank.org:act:DD1D8BC5-DCF9-4294-9FA4-80FFD911417C
Figs 7–8; Table 6

Etymology

The new species is named after its orange colour.

Type material

Holotype

CHILE – **Puerto Cisnes** • Seno Magdalena G; 44.763254° S, 72.891581° W; depth 15 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a rocky slope by scuba diving; CILE 20; MSGN 61497.

Paratype

CHILE – **Puerto Cisnes** • 1 specimen; same collection data as for holotype; CILE 6; DISTAV.

Description

Habitus. Cushion-shaped sponge, almost spherical, 3.5 cm in diameter and ca 2 cm thick. Canal system visible, converging towards round flush oscula. Surface slightly hispid, colour in life bright orange (Fig. 7A–B). Consistency soft and friable.

Skeleton. Plumoreticulate choanosome (Fig. 7C) with spongin fibres cored by bundles of spicules typical of Biemnidae. Sponge surface appears slightly hispid due to single protruding spicules (Fig. 7C).

Spicules. Megascleres: Smooth sinuous styles, with regular, round heads (Fig. 8A), 700–(842.5)–920 µm long and 2.5–(4.8)–7.5 µm thick. Tylostyles sometimes slightly bent near head (Fig. 8B), 120–(269.25)–380 µm long and 5–(12.9)–20 µm thick. Microscleres: two categories of raphids; I, long and thin raphids, curved or slightly sinuous, 105–(129.5)–200 µm long, with microspined extremities (Fig. 8C); II, short and thick raphidioid microxeas with small scattered spines (Fig. 8D), 27.5–(35.6)–40 × 2 µm long. C-shaped sigmas with microspined extremities, divided into two size categories: sigmas I, 130–(160.8)–170 µm long and × 5–(5.7)–7.5 µm thick (Fig. 8E); sigmas II, 12.5–(13.12)–17.5 µm long (Fig. 8F).

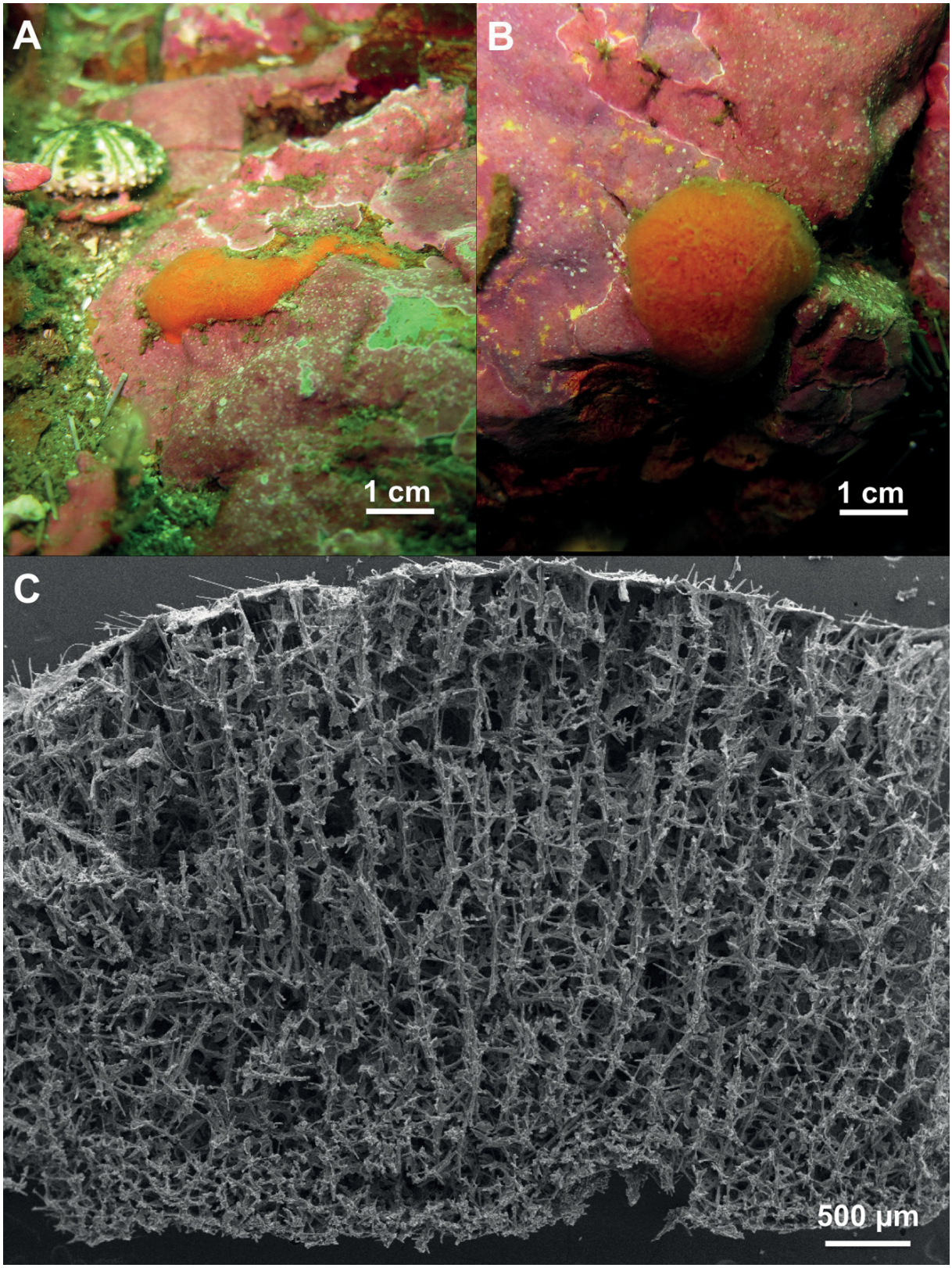

Fig. 7. *Biemna aurantiaca* Bertolino, Costa & Pansini sp. nov., holotype (CILE 20; MSGN 61497). **A–B**. The holotype in life. **C**. Plumoreticulate skeleton.

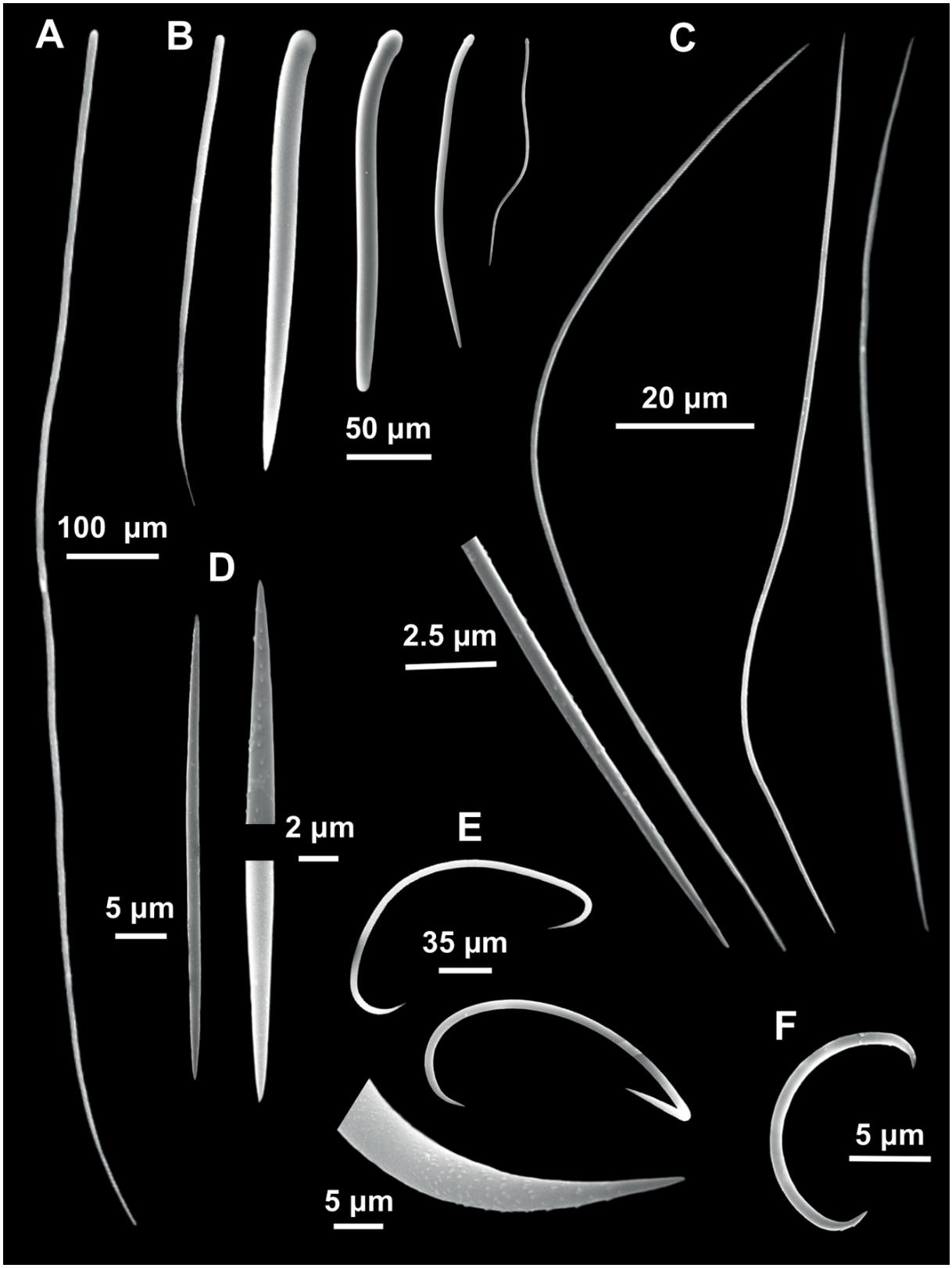

Fig. 8. Spicules of *Biemna aurantiaca* Bertolino, Costa & Pansini sp. nov., holotype (CILE 20; MSGN 61497). **A**. Sinuous styles. **B**. Tylostyles. **C**. Raphids I. **D**. Raphids II. **E**. Sigma I. **F**. Sigma II.

Habitat

Species lives at a depth of 20 m on a vertical wall.

Remarks

We have recorded three new species of the genus *Biemna* and have therefore decided to make combined remarks after their description.

Biemna erecta Bertolino, Costa & Pansini sp. nov.
urn:lsid:zoobank.org:act:F0A045BB-EE04-4239-94C8-C3025A29B450
Figs 9–10; Table 6

Etymology

The new species is named after its growth form.

Type material

Holotype

CHILE – **Puerto Cisnes** • Seno Magdalena D; 44.614863° S, 72.958312° W; depth 20 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a vertical wall by scuba diving; CILE 74; MSGN 61496.

Description

Habitus. Fan-shaped lamellar sponge, about 3 mm thick and 3.5 cm long, with basal peduncle. Surface very hispid caused by megascleres protruding from surface. Colour in life pale yellow, tending to orange (Fig. 9A–B). Consistency soft, compressible and friable in dry state.

Skeleton. Plumose skeleton formed by dense fibres of spicules whose extremities protrude through surface of sponge, resulting in hispid appearance (Fig. 9C). Choanosome differentiated into two regions composed of axial compressed and extra-axial plumose fibres (Fig. 9D–E). Basal peduncle formed by ascending central fibres with radial spicules (Fig. 9F).

Spicules. Megascleres: Styles smooth and sinuous, with regular round heads (Fig. 10A), 1810.5–(2033.3)–2295 μm long and 15–(17.5)–20 μm thick; tylostyles/subtylostyles slightly curved near the head (Fig. 10B), 350–(607.5)–960 μm long and 10–(18.75)–30 μm thick. Microscleres: Two categories of raphids; I, sinuous and thin raphids (Fig. 10C), 87.5–(115)–167.5 μm long; II, short and thick raphids, with small scattered spines, similar to raphidioid microxeas, 23.4–(36.55)–42.5 μm long and 2 μm thick (Fig. 10D). C-shaped sigmas with microspined extremities clearly divided into two size categories: sigmas I, (Fig. 10E), 140–(159.5)–180 μm long and 5–(5.7)–7.5 μm thick; and sigmas II, (Fig. 10F), only 10–(14.5)–17.5 μm long.

Habitat

Species lives on a vertical wall at a depth of 20 m.

Remarks

We have recorded three new species of the genus *Biemna* and have therefore decided to make combined remarks after their description.

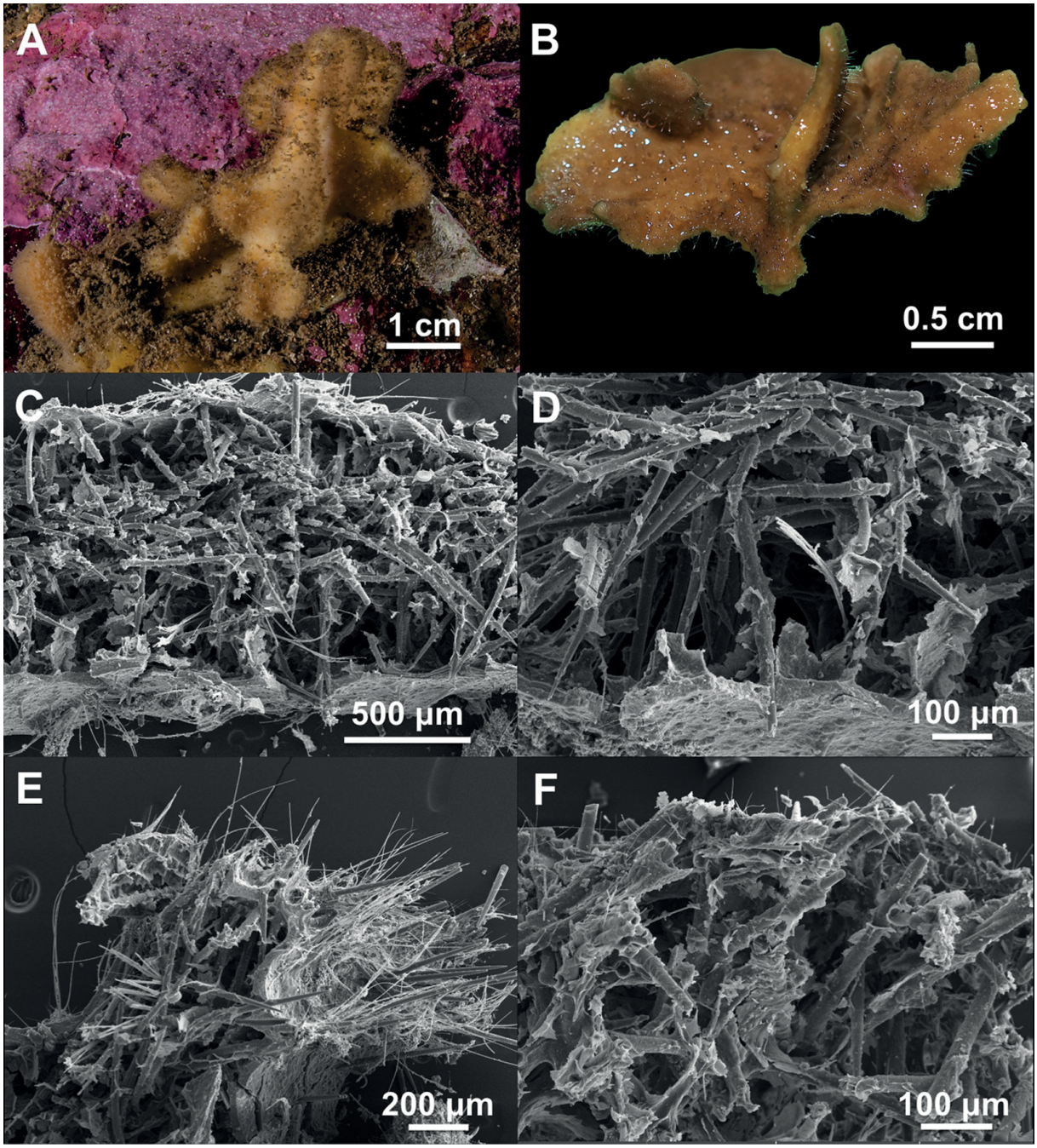

Fig. 9. *Biemna erecta* Bertolino, Costa & Pansini sp. nov., holotype (CILE 74; MSGN 61496). **A–B**. The holotype in life. **C**. Plumose skeleton. **D–E**. Choanosome. **F**. Basal peduncle skeleton.

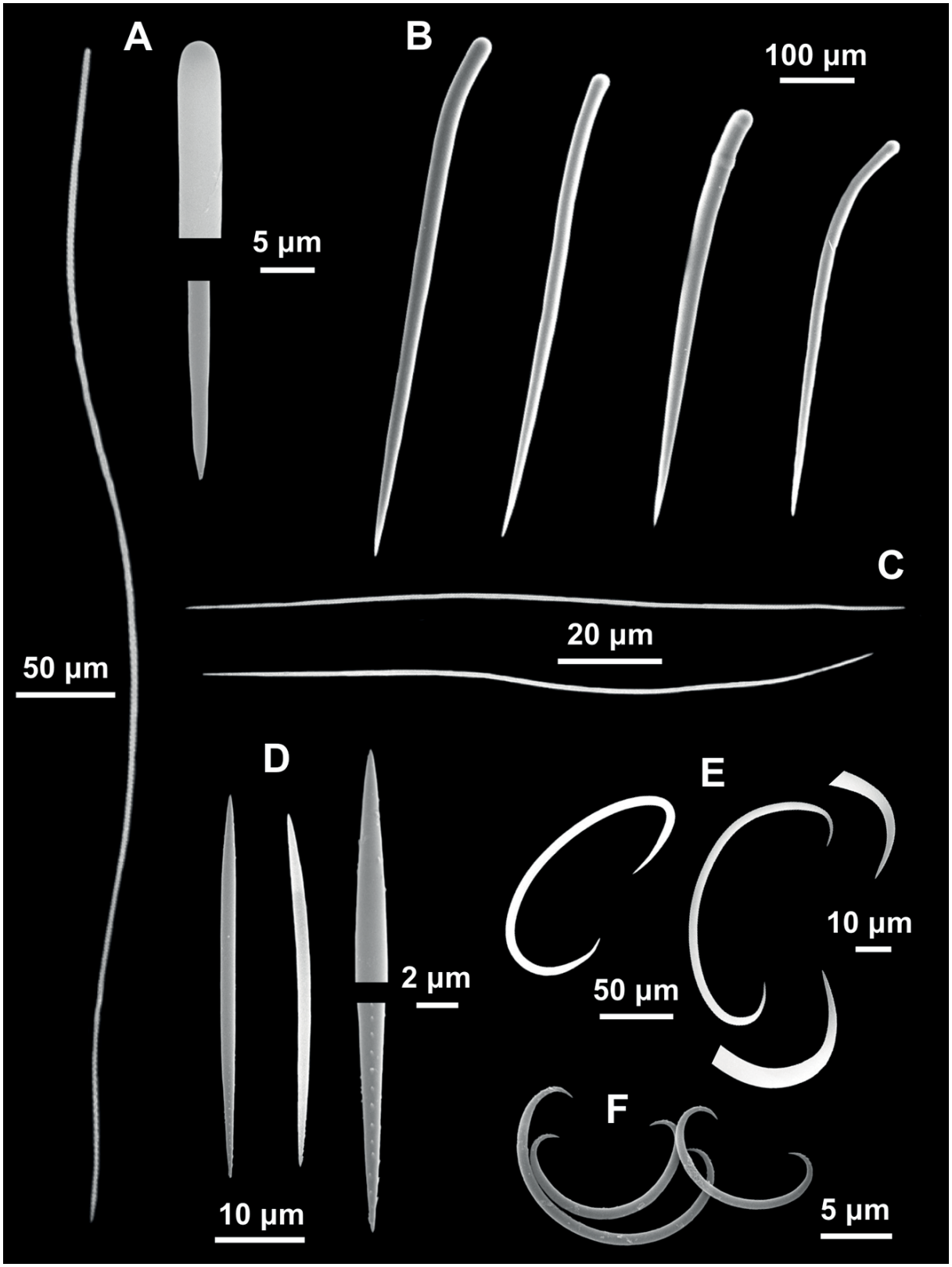

Fig. 10. Spicules of *Biemna erecta* Bertolino, Costa & Pansini sp. nov., holotype (CILE 74; MSGN 61496). **A**. Styles. **B**. Tylostyles/subtylostyles. **C**. Raphids I. **D**. Raphids II. **E**. Sigma I. **F**. Sigma II.

Biemna typica Bertolino, Costa & Pansini sp. nov.
urn:lsid:zoobank.org:act:00C6E35C-E9FE-4F3D-A752-1A91D11BAC1C
Figs 11–12; Table 6

Etymology

The new species is named after its spicule complement typical of the genus.

Type material

Holotype

CHILE – **Puerto Cisnes** • Seno Magdalena G; 44.763254° S, 72.891581° W; depth 15 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a rocky slope by scuba diving; CILE 28; MSGN 61495.

Description

Habitus. Massive, cushion shaped sponge, rather regular, ca 2 cm long and 2 cm thick, with very hispid surface. Colour in life bright red, remaining unchanged out of the water. Sponge compressible and friable (Fig. 11A).

Skeleton. Structure typical of Biemnidae, plumose and with variable development of spongin fibres (Fig. 11B). Choanosome plumoreticulate, with spongin fibres covered by bundles of spicules (styles) and oxeote spicules that – protruding through sponge surface – make it hispid. Ectosomal skeleton composed of brushes of megascleres (Fig. 11C–D).

Spicules. Megascleres: Styles I smooth, straight, slightly sinuous and thin, with regular, round heads (Fig. 12A), 1275–(1450.8)–1632 µm long and 5.2–(6.5)–7.8 µm thick; styles II smooth, curved and very thin (Fig. 12B), 293.6–(340.3)–365.22 µm long and 2–(2.25)–2.5 µm thick; styles III straight, curved or doubly bent, sometimes modified to rhabdostyles (Fig. 12C), 220–(409.7)–640 µm long and 10.4–(13.76)–20.8 µm thick. Microscleres: two raphid categories; raphids I, straight or sinuous (Fig. 12D), 87.5–(115)–167.5 µm long; raphids II, short and thick, similar to raphidioid microxeas with one microspined tip (Fig. 12E), 23.4–(36.55)–42.5 µm long. C-shaped sigmas with microspined extremities clearly divided into two size categories: sigmas I, (Fig. 12F),145.5–(136.7)–152 µm long and 2.6 µm thick; sigmas II, (Fig. 12G), 12.5–(19.8)–22.5 µm long.

Habitat

Species lives on a rocky slope covered by coralline algae, at a depth between 15 and 20 m.

Remarks

The three new species, *Biemna aurantiaca* sp. nov., *B. erecta* sp. nov. and *B. typica* sp. nov., differ from each other primarily in their external morphology and colour (see descriptions above and Table 6). Regarding megascleres, *B. aurantiaca* sp. nov. has smaller styles and tylostyles than *B. erecta* sp. nov., while *B. typica* sp. nov. has only three categories of styles, with no tylostyles. Furthermore, the microscleres differ in size between the three new species which are, therefore, clearly distinguishable from each other. From the cold waters of the Southern Hemisphere, twelve species of the genus *Biemna* are known (Table 6). Two of these have been reported on the Chilean coast: *B. chilensis* Thiele, 1905 and *B. lutea* Bertolino, Costa & Pansini, 2019. The new species described in the present study differ from these two species in the presence of more categories of styles and different forms of spicules. Additionally, only one category of raphids is present in *B. chilensis* (see Table 6). *Biemna typica* sp. nov. differs from all other *Biemna* listed in Table 6 in the presence of only one category of styles. *Biemna erecta* sp. nov. and *B. aurantiaca* sp. nov. have spicule complements similar to *B. rhabderemioides*

Bergquist, 1961 and *B. rhabdostyla* Uriz, 1988, but the latter two species possess much smaller styles and subtylostyles (Table 6).

In conclusion, the three species described here (*Biemna aurantiaca* sp. nov., *B. erecta* sp. nov and *B. typica* sp. nov.) differ from each other in the size and shape of the spicules, and should be considered as new species.

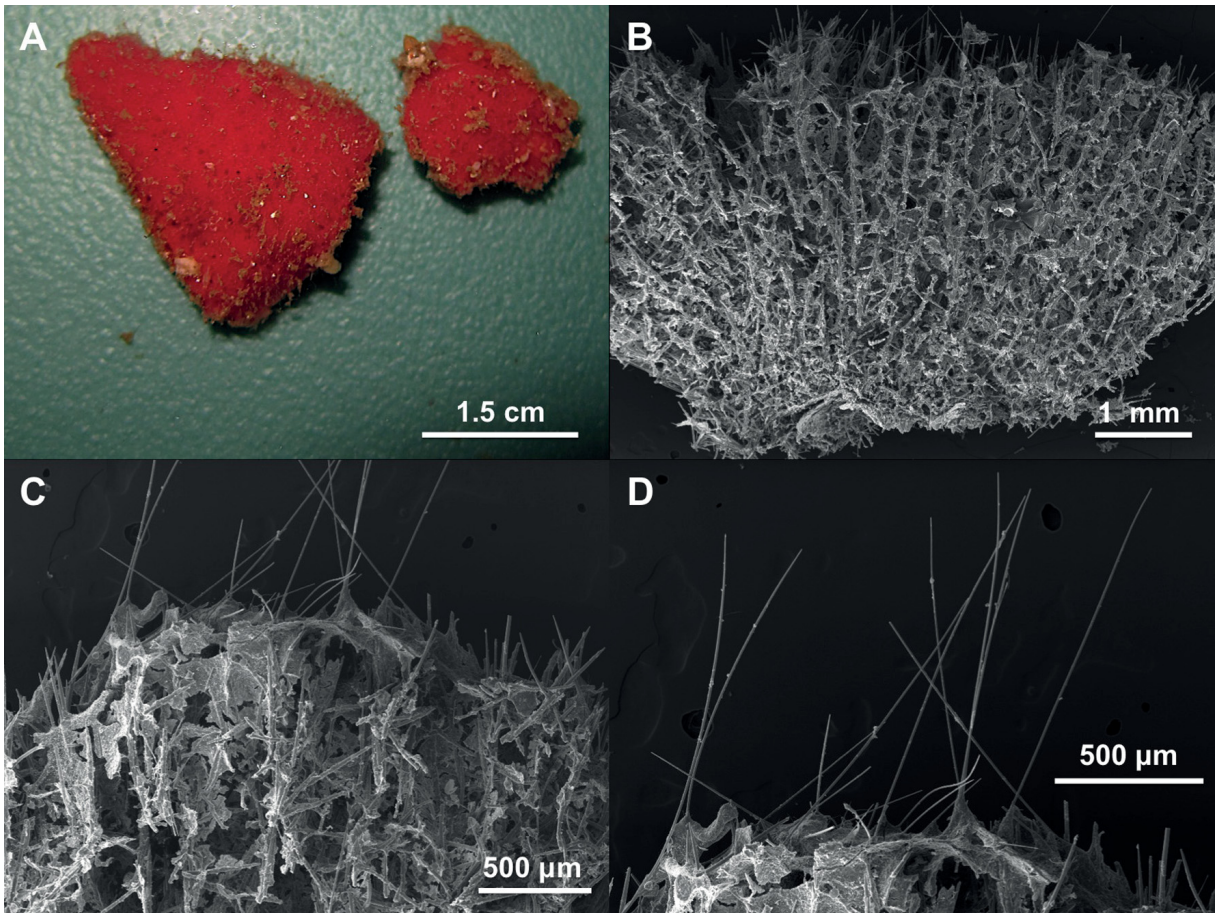

Fig. 11. *Biemna typica* Bertolino, Costa & Pansini sp. nov., holotype (CILE 28; MSGN 61495). **A**. The holotype in life. **B**. Plumose skeleton. **C–D**. Ectosomal skeleton.

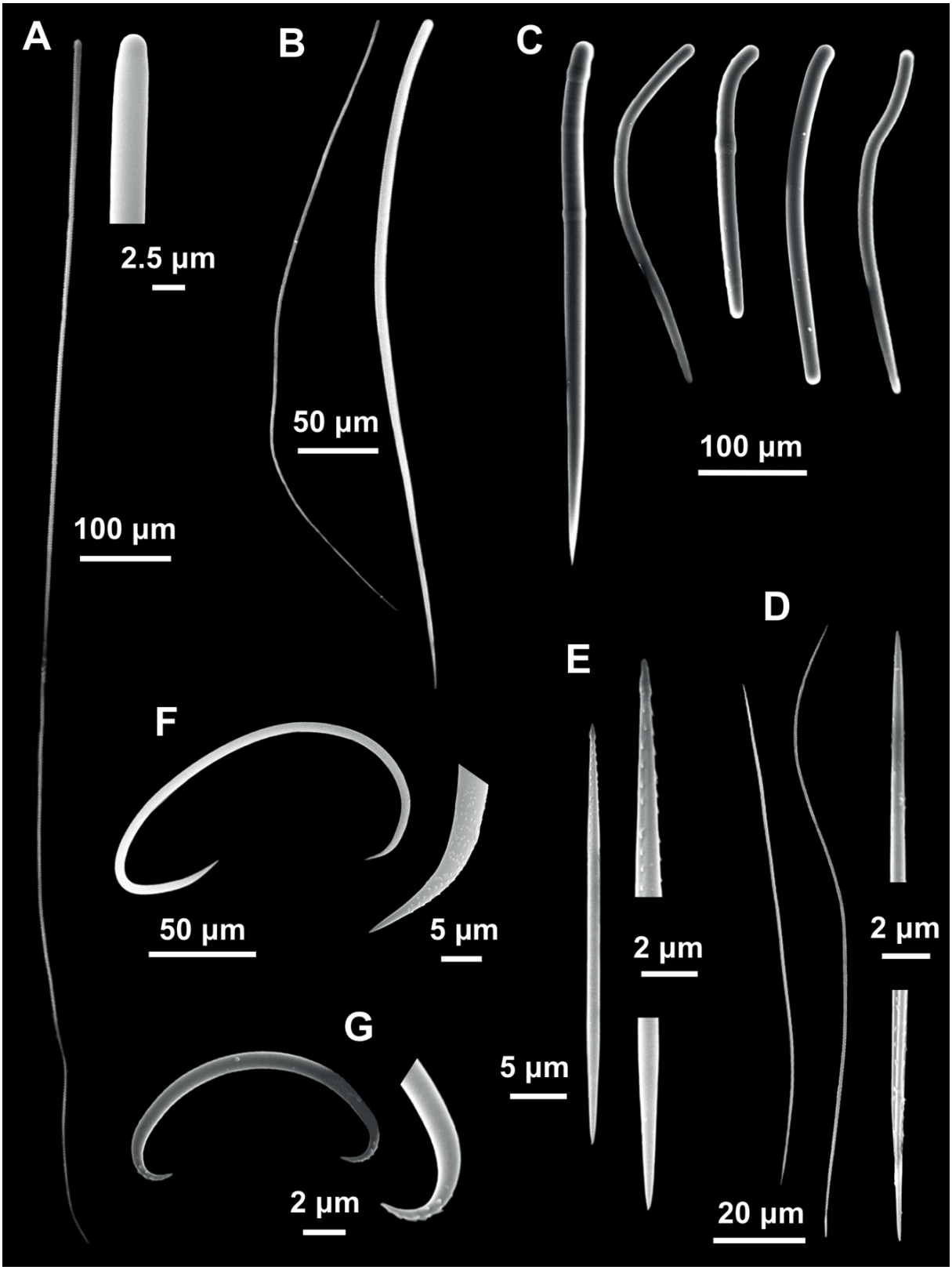

Fig. 12. Spicules of *Biemna typica* Bertolino, Costa & Pansini sp. nov., holotype (CILE 28; MSGN 61495). **A**. Styles I. **B**. Styles II. **C**. Styles III, sometimes modified to rhabdostyles. **D**. Raphids I. **E**. Raphids II. **F**. Sigmas I. **G**. Sigmas II.

Table 6 (continued on the next two pages). Morphological characters and distribution of the species of *Biemna* Gray, 1867 recorded in the Southern Hemisphere. The distribution refers to that present in the World Porifera Database (van Soest *et al.* 2020).

Species	Shape	Colour	Surface	Consistency	Spicules (µm)	Distribution
Biemna aurantiaca Bertolino, Costa & Pansini sp. nov.	Cushion-shaped, almost spherical	Orange tending to red	Lightly hispid	Friable	Styles: 700–(842.5)–920 × 2.5–(4.8)–7.5 Tylostyles: 120–(269.25)–380 × 5–(12.9)–20 Raphids I: 105–(129.5)–200 Raphids II: 27.5–(35.6)–40 × 2 Sigma I: 130–(160.8)–170 × 5–(5.7)–7.5 Sigma II: 12.5–(13.12)–17.5	Chile
Biemna erecta Bertolino, Costa & Pansini sp. nov.	Fan-shaped, lamellar with basal peduncle	Pale yellow tending to orange	Very hispid	Soft, compressible and friable	Styles: 1810.5–(2033.3)–2295 × 15–(17.5)–20 Tylostyles/Subtylostyles: 350–(607.5)–960 × 10–(18.75)–30 Raphids I: 87.5–(115)–167.5 Raphids II: 23.4–(36.55)–42.5 Sigma I: 140–(159.5)–180 × 5–(5.7)–7.5 Sigma II: 10–(14.5)–17.5	Chile
Biemna typica Bertolino, Costa & Pansini sp. nov.	Massive cushion-shaped	Bright red	Very hispid	Friable and compressible	Styles I: 1275–(1450.8)–1632 × 5.2–(6.5)–7.8 Styles II: 293.6–(340.3)–365.22 × 2–(2.25)–2.5 Styles III: 220–(409.7)–640 × 10.4–(13.76)–20.8 Raphids I: 87.5–(115)–167.5 Raphids II: 23.4–(36.55)–42.5 Sigma I: 145.5–(136.7)–152 × 2.6 Sigma II: 12.5–(19.8)–22.5	Chile
Biemna anisotoxa Lévi, 1963	Massive	Yellow	Cavernous	Friable	Styles: 300–350 × 6–10 Raphids: 115–130 × 1 Microxeas: 55–68 × 2 Sigma I: 35–40 Sigma II: 18–22 Sigma III: 10 Microstyles: 35–60 × 1	South Africa, Southwest Madagascar

Table 6 (continued). Morphological characters and distribution of the species of *Biemna* Gray, 1867 recorded in the Southern Hemisphere. The distribution refers to that present in the World Porifera Database (van Soest *et al*. 2020).

Species	Shape	Colour	Surface	Consistency	Spicules (µm)	Distribution
Biemna chilensis Thiele, 1905	Lamellate to digitate; flabellate-digitate; spherical	Yellow	Conulose	Friable	Styles: 664–1016 × 25–29 Raphids: 360 –424 Sigma I: 46–55 Sigma II: 18	Chile, Falklands/Malvinas, East Antarctic Wilkes Land, Kerguelen Islands
Biemna flabellata Bergquist, 1970	Erect, lamellate	Dull yellow	Hispid	Firm	Styles: 266–496 × 10–30 Microxeas I: 90–140 Microxeas II: 28–50 Sigma I: 27–40 Sigma II: 9–14	New Zealand
Biemna lutea Bertolino, Costa & Pansini 2019	Massive sponge, rather irregular, about 5 cm long and 3 cm thick	Dull yellow	Conulose, very hispid	Soft due to the flaky texture	Styles: 530–(627.5)–660 × 5–(18.5)–32.5 Raphids: 112.5–(130.6)–142.5 × 1 Microxeas: 35–(37)–40 × 1 Sigma I: 140–(159.5)–180 × 5–(5.7)–7.5 Sigma II: 10–(14.5)–17.5	Chile
Biemna macrorhaphis Hentschel, 1914	Almost spherical, up to 1 cm in size	Yellowish grey	Conulose	Soft and easy to tear	Styles: 664–1016 × 25–29 Raphids: 360–424 × 1	East Antarctica
Biemna novaezealandiae Dendy, 1924	Crust rather thin	White	–	–	Styles: 1070 × 32 Raphids: 120 Microxeas: I 96 × 3 Microxeas: II 20 Sigma I: 56–140 Sigma II: 20	New Zealand
Biemna pedonculata Lévi, 1963	Massive peduncolate claviform	Yellowish grey	Hispid	–	Styles: 350–550 × 30–50 Raphids: 100–130 Sigma I: 80–95 × 8–9 Sigma II: 18–20 Sigma III: 9–10	South Africa

Table 6 (continued). Morphological characters and distribution of the species of *Biemna* Gray, 1867 recorded in the Southern Hemisphere. The distribution refers to that present in the World Porifera Database (van Soest *et al*. 2020).

Species	Shape	Colour	Surface	Consistency	Spicules (µm)	Distribution
Biemna polyphylla Lévi, 1963	Erect	Yellowish grey	Corrugate porous	–	Styles: 450–550 × 35–45 Raphids: 100–110 × 1 Raphidoid microxeas: 35–55 Sigma I: 130–160 × 6–9 Sigma II: 18–20 Sigma III: 9–10	South Africa
Biemna rhabderemioides Bergquist, 1961	Encrusting to massive	Bright yellow	Hispid, conulose	Firm	Styles: 420–470 × 10–16 Subtylostyles: 420–480 × 10–16 Raphids: 90 Microxeas: 50 × 3 Sigma I: 42–45 Sigma II: 12–14	South Africa
Biemna rhabdostyla Uriz, 1988	Thickly encrusting	Dirty brown after preservation	Glabrous, with some conules terminating in spicule brushes	Fragile	Styles: 800–1210 × 13–27 Rhabdostyles: 130–215 × 8–11 Raphids: 123–160 Microxeas: 40–54 × 1.5 Sigma I: 53–112 × 3–4.5 Sigma II: 30–45 × 2–4 Sigma III: 13–22 × 1.5	South Africa
Biemna rufescens Bergquist & Fromont, 1988	Encrusting to massive with prominent ocular fistules	Purple, yellow	Quite smooth and finely hispid	Soft and compressible	Styles: 350–480 × 5–11.5 Microxeas I: 90–130 Microxeas II: 45–73 Sigma I: 30–50 Sigma II: 20–32 Sigma III: 13–20	New Zealand
Biemna strongylota Rios & Cristobo, 2006	Erect sponges, supported by stalk 5 to 10 mm long and 1.5 to 2 mm in diameter at the base	White in ethanol	Hispid, rough to the touch	–	Strongyles: 400–(553) 640 × 19–(26.5) 30 Raphids: 130–(179) 238 Microxeas: 58–(72) 86 Sigma I: 35–(82) 100 × 2 Sigma II: 10–(16) 22 × 1	Antarctica

Order Scopalinida Morrow & Cárdenas, 2015
Family Scopalinidae Morrow, Picton, Erpenbeck, Boury-Esnault, Maggs & Allcock, 2012
Genus *Scopalina* Schmidt, 1862

Scopalina cribrosa Bertolino, Costa & Pansini sp. nov.
urn:lsid:zoobank.org:act:2C1EE9CB-2950-4449-AD77-D32D9A781E9C
Fig. 13; Table 7

Etymology

The new species is named after the cribrose surface of the sponge.

Type material

Holotype

CHILE – **Puerto Cisnes** • Jacaf Canal N; 44.271194° S, 73.209222° W; depth 20 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a rocky slope by scuba diving; CILE 32; MSGN 61498.

Description

Habitus. Encrusting sponge 5 mm thick and 10 cm long (Fig. 13A). Surface slightly conulose with visible oscula, ostia and canal network. Slightly hispid. Colour in life reddish orange (Fig. 13A). Consistency soft.

Skeleton. Choanosomal skeleton consisting of bundles of thin styles entirely enclosed in spongin. Dendritic fibres rising up from basal spongin plate. Low spicular density.

Spicules. Megascleres: Smooth styles, bent near the head, ending with tip not pointed but almost rounded (Fig. 13B–C), 520–(1616.15)–2091 μm long and 2.5–(23.25)–32.5 μm thick.

Habitat

Species lives at a depth of 20 m, on a rocky slope covered by coralline algae.

Remarks

From five species of the *Scopalina* genus known in the Southern Hemisphere (Table 7), only *Scopalina bunkeri* Goodwin, Jones, Neely & Brickle, 2011 has been recorded from Chilean coast by Bertolino *et al.* (2019). The new species differs from *S. bunkeri* in having a very spiky surface and by the presence of smaller styles (Table 7). *Scopalina cribrosa* sp. nov. differs from *S. australiensis* (Pulitzer-Finali, 1982) from Eastern Australia in its external morphology, having an erect habit, large body and spicule size, but much smaller styles (Table 7). *Scopalina cribrosa* sp. nov. differs from *S. erubescens* Goodwin, Jones, Neely & Brickle, 2011 from the Falklands / Malvinas in its pale pink colour, a conulose surface, and styles that are four times shorter than those of *S. erubescens* (Table 7). *Scopalina cribrosa* sp. nov. differs from *S. hapalia* (Hooper, Cook, Hobbs & Kennedy, 1997) from Australia both in the colour and the presence of strongyles, which are lacking in the new species. Finally, regarding species of the Southern Hemisphere, *S. cribrosa* sp. nov. differs from *S. incrustans* (Lendenfeld, 1887) from Australia by its larger styles. The nine species of *Scopalina* reported from the Northern Hemisphere differ from *S. cribrosa* in the size of spicules, and often in their shape (Table 7). We, therefore, propose that *Scopalina cribrosa* sp. nov. should be considered as a species new to science.

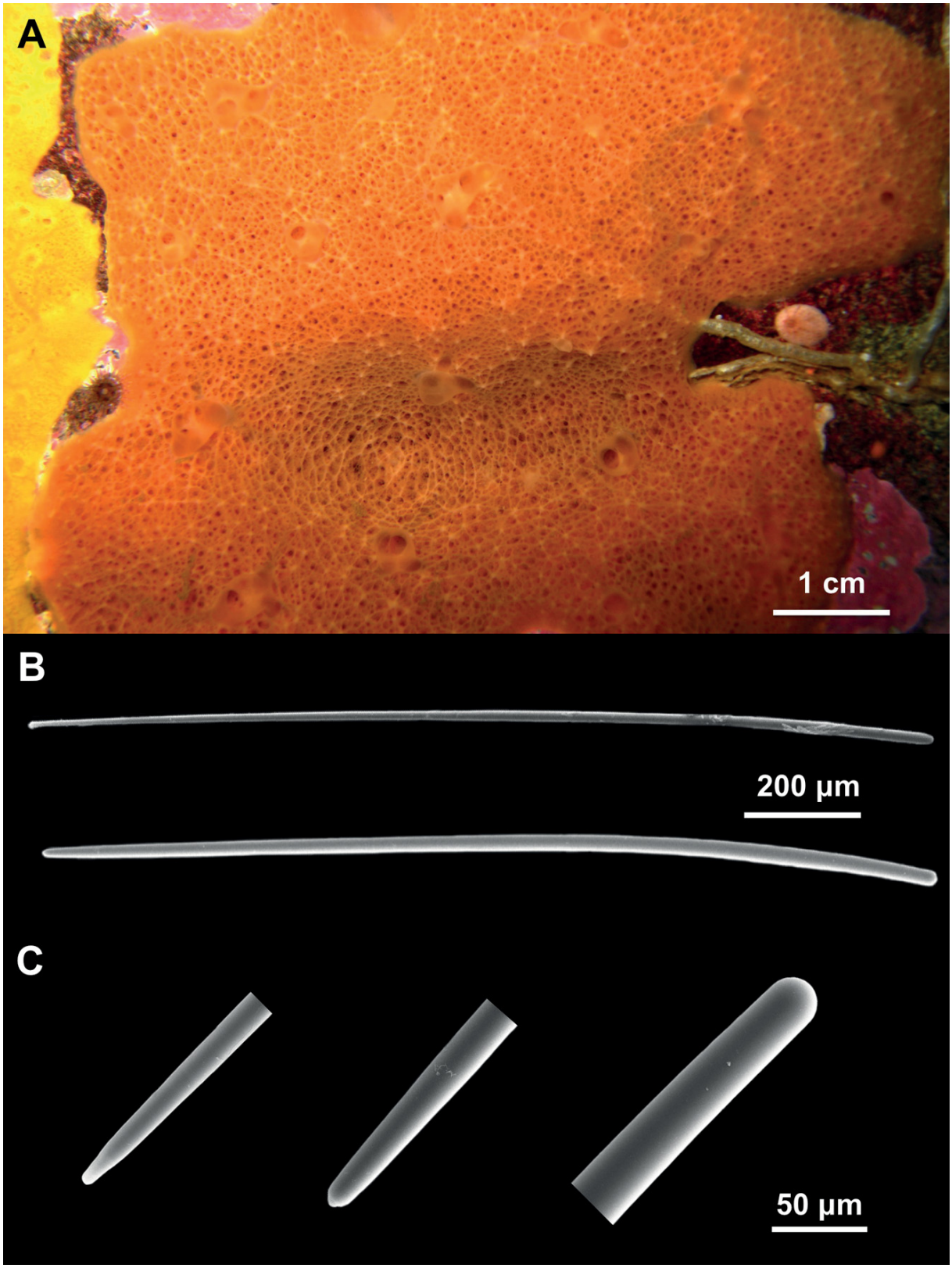

Fig. 13. *Scopalina cribrosa* Bertolino, Costa & Pansini sp. nov., holotype (CILE 32; MSGN 61498). **A**. The holotype in life. **B**. Styles. **C**. Magnification of the style ends.

Table 7 (continued on the next page). Morphological characters and distribution of the species of *Scopalina* Schmidt, 1862. The distribution refers to that present in the World Porifera Database (van Soest *et al.* 2020).

Species	Shape	Colour	Surface	Consistency	Spicules (µm)	Distribution
Scopalina cribrosa Bertolino, Costa & Pansini sp. nov.	Encrusting	Reddish orange	Slightly hispid	Soft	Styles: 520–(1616.15)–2091 × 2.5–(23.25)–32.5	Chile
Scopalina agoga (de Laubenfels, 1954)	Subspherical, 4 cm high and 5–6 cm lateral dimension	Rose, red verging slightly towards purple	–	Spongy	Oxeas: 280–300 × 2–10	Palu, Caroline Islands
Scopalina australiensis (Pulitzer-Finali, 1982)	Growing erect, 25 × 20 × 12 mm; cushion shaped, 45 × 25 mm wide, 20 mm thick	Orange in life, light orange/brown after preservation	–	Softly elastic, resilient	Styles: 430–600 × 4–9.5/11	Eastern Australia
Scopalina azurea Bibiloni, 1993	Encrusting, 2 × 2 cm in diameter	Blue in alcohol	Irregular	Soft	Styles: 430–739 × 6–8	Mediterranean Sea
Scopalina blanensis Blanquer & Uriz, 2008	Encrusting, 2 × 3 × 0.4 cm	Salmon to pale orange in life, cream in alcohol	Conulose	Fleshy, extremely soft in life, easily torn	Styles: 380–(600)–800 × 2.3–(5.3)–9	Mediterranean Sea
Scopalina bunkeri Goodwin, Jones, Neely & Brickle, 2011	Thin encrusting	Rusty orange	Spiky	–	Styles: 694–1741	Falklands/Malvinas, Chile
Scopalina canariensis Blanquer & Uriz, 2008	Thick encrusting, 0.5 to 1 cm thick, 4 × 3 cm	Bright orange in life, beige in alcohol	Smooth, strongly conulose	Fleshy	Styles: 160–(199)–399 × 1.9–2.5	Canarian Islands
Scopalina ceutensis Blanquer & Uriz, 2008	Thickly encrusting, 1.5 mm thickness	Bright yellow-orange in life, beige in alcohol	Smooth and conulose	Compressible and fleshy	Styles: 480–(537)–603 × 3.4–(5)–6.8	Alboran Sea
Scopalina erubescens Goodwin, Jones, Neely & Brickle, 2011	Thick crust	Pale pink	Conulose	–	Styles: 331–(395)–459 × 9.4–(13)–15.6	Falklands/Malvinas
Scopalina hapalia (Hooper, Cook, Hobbs & Kennedy, 1997)	Thickly encrusting, massive bulbous, stoloniferous or elongate ridges	Bright orange to dark orange alive, pale orange-brown in ethanol	Sharply pointed	Soft, membranous, easily torn, fragile	Styles: 375–(583.5)–1130 × 3–(8.1)–15 Stongyles: 182–(231.3)–275 × 1–(2.1)–2.5	Australia

Table 7 (continued). Morphological characters and distribution of the species of *Scopalina* Schmidt, 1862. The distribution refers to that present in the World Porifera Database (van Soest *et al*. 2020).

Species	Shape	Colour	Surface	Consistency	Spicules (µm)	Distribution
Scopalina hispida (Hechtel, 1965)	Encrusting, 1–3 mm thick	Light orange, pale beige in alcohol	Uneven and hispid	Soft, limy, delicate	Styles: 493–1193 × 5–12	Caribbean Sea, Venezuelan coasts, Bermuda
Scopalina incrustans (Lendenfeld, 1887)	Encrusting, 4 mm thick	–	Conulose	–	Styles: 600 × 10	Australia
Scopalina lophyropoda Schmidt, 1862	Encrusting	Red, brown	Hispid	–	Styles: 560–1000 × 4–10 by Topsent. 1934	Mediterranean Sea, Alboran Sea, Azores, Cape Verde
Scopalina rubra (Vacelet & Vasseur, 1971)	Encrusting	Red	–	Friable	Styles: 330–550 × 10–15	Western and Northern Madagascar
Scopalina ruetzleri (Wiedenmayer, 1977)	Massive semi-encrusting, lobate	Bright orange to pinkish orange	Conulose	Soft, delicate, compressible, easily torn	Styles: 400–500 × 5.5–8	Bermuda, Caribbean Sea, Brazilian coasts

Order Suberitida Chombard & Boury-Esnault, 1999
Family Suberitidae Schmidt, 1870
Genus *Rhizaxinella* Keller, 1880

Rhizaxinella strongylata Bertolino, Costa & Pansini sp. nov.
urn:lsid:zoobank.org:act:78052288-83C4-4D9F-91DE-6275C19187CE
Fig. 14

Etymology

The new species is so named for the presence of strongyloid styles in the spicules.

Type material

Holotype

CHILE – **Puerto Cisnes** • Seno Magdalena D; 44.614863° S, 72.958312° W; depth 25 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a vertical wall by scuba diving; CILE 65; MSGN 61499.

Description

Habitus. Small erect sponge, 5 cm high, with thin stalk (5 mm in diameter) which divides into two branches with peariform extremities (Fig. 14A). Two round oscula visible. Surface hispid. Colour in life bright yellow (Fig. 14A). Consistency strong but compressible.

Skeleton. Stalk characterized by axial compact skeleton that diverges into thinner secondary axes in branches. Close to surface ectosomal skeleton composed of brushes of spicules.

Spicules. Megascleres: Smooth, slightly curved, long tylostyles (Fig. 14B), 841.5–(1466.3)–2320.5 µm long and 17.5–(21.75)–30 µm thick. Shorter, straight or curved, often fusiform tylostyles, with different heads (Fig. 14C), 175–(230.25)–320 µm long and 10–(14.1)–17.5 µm thick. Smooth strongyloid styles, more or less curved (Fig. 14D), 200–(274.55)–340 µm long and 10–(18.75)–25 µm thick.

Habitat

Species lives at a depth between 20 and 25 m on a vertical wall.

Remarks

Only one species of this genus has been reported from the channels and fjords of southern Chile: *Rhizaxinella spiralis* (Ridley & Dendy, 1886). The new species *R. strongylata* sp. nov. described here differs from *R. spiralis* in external morphology, shape and size of styles/tylostyles, and in the presence of strongyloid spicules. In fact, *R. spiralis* has a stipitate cylindrical shape and two categories of tylostyles/styles that measure 1000 × 13 µm and 400 µm (width not reported in original description).

Four other *Rhizaxinella* species are present in the Southern Hemisphere and so geographically closer to the new species. *Rhizaxinella australiensis* Hentschel, 1909 (North Patagonian Gulf, East Antarctic Wilkes Land, West Australia) is ramified with vertical branches; tylostyles are sinuous, straight or strongyloid and measure 500–1200 × 9–19 µm and 240–500 × 9–12 µm. *Rhizaxinella dichotoma* Lévi, 1993 (New Zealand, New Caledonia) is pedunculate with multiple branches, has principal tylostyles (725–1200 × 15–30 µm) and peripheral tylostyles (400–800 × 4–10 µm). *Rhizaxinella durissima* (Ridley & Dendy, 1886) (Southwest Australia) with pedunculate shape has straight styles/tylostyles (240 × 6.3 µm) and fusiform tylostyles (1500 × 15.7 µm). The species morphologically closest to the new species, based on the large spicules and the presence of strongyloid forms, appears to be *R. radiata* Hentschel, 1909 (West Australia) which has a pedunculate shape, straight styles (1100–2150 × 27–45 µm), styles/subtylostyles

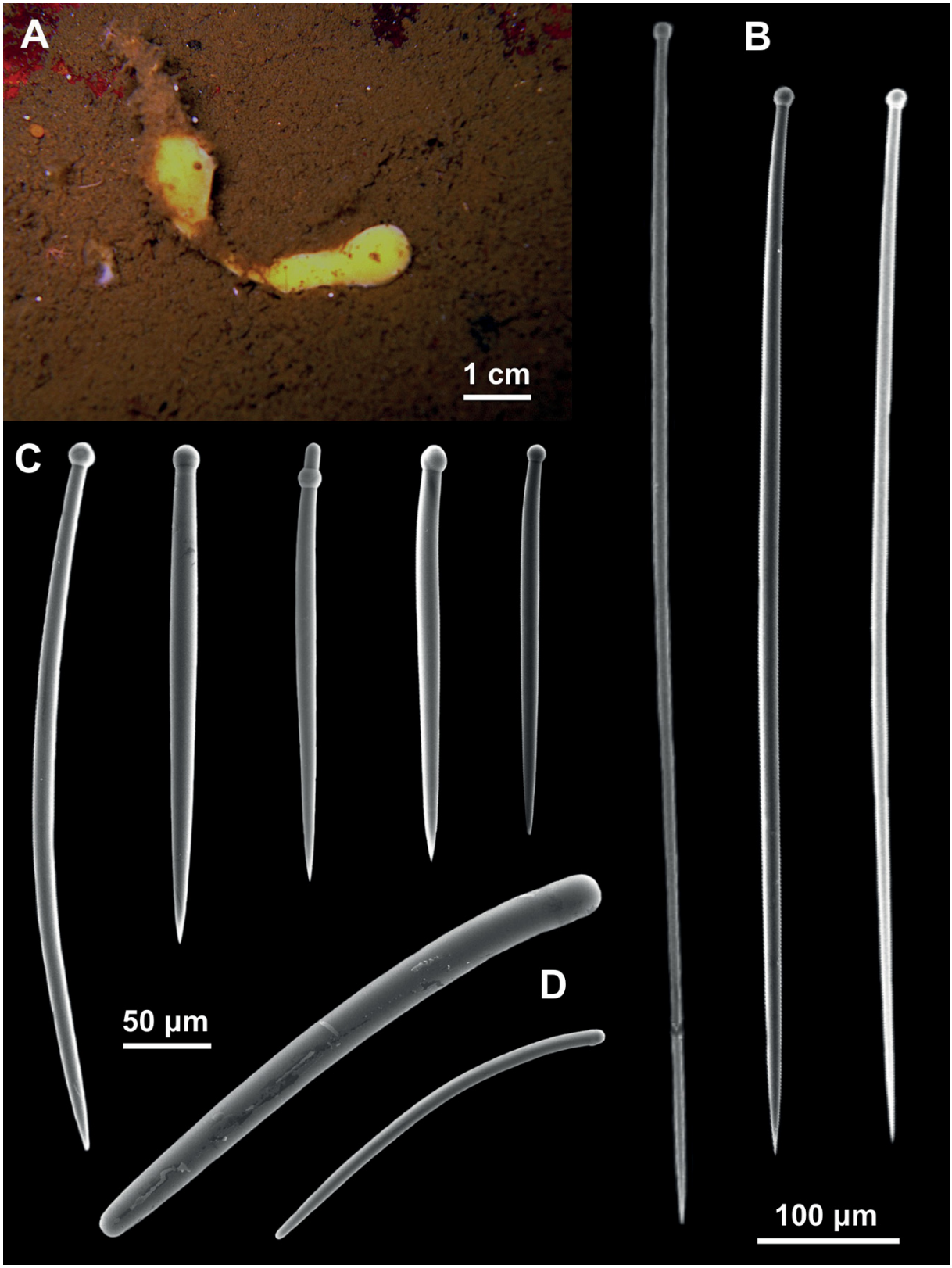

Fig. 14. *Rhizaxinella strongylata* Bertolino, Costa & Pansini sp. nov., holotype (CILE 65; MSGN 61499). **A**. The holotype in life. **B**. Tylostyles I. **C**. Tylostyles II. **D**. Strongyloid styles.

(250–800 × 10–17 µm) and strongyles (250–350 × 7–11.2 µm). Even allowing for the lesser importance of sponge shape and a degree of morphological variability within the genus, the present description of type and size of spicules of *R. strongylata* sp. nov. merits the establishment of a new species.

Subclass Keratosa Grant, 1861
Order Dendroceratida Minchin, 1900
Family Darwinellidae Merejkowsky, 1879

Genus ***Darwinella*** Müller, 1865

Type species

Darwinella muelleri (Schultze, 1865).

Emended diagnosis

In the *Darwinella*, the dendritic fibre skeleton is supplemented by fibrous spicules which can be diactinal, triactinal or polyactinal. There is no sand in the fibres but dispersed cellular elements can occur. The sponges are fleshy, encrusting, or massive to lobate; to which fibrous spicule with style shape may be added (emended from Müller 1865).

Remarks

The species of *Darwinella* may be confused with those belonging to the genus *Aplysilla* Schulze, 1878 because of the similarity in external shape; however, *Darwinella* is characterized by the presence of diactinal, triactinal or polyactinal fibrous spicules (Pronzato 1975). In the present study we described a new fibrous spicule type for the *Darwinella* genus.

Darwinella pronzatoi Bertolino, Costa & Pansini sp. nov.
urn:lsid:zoobank.org:act:FA17C8DB-1973-4E6F-9AB9-A025F68D38F5
Fig. 15

Etymology

The new species is named after Professor Roberto Pronzato (DISTAV – Università degli Studi di Genova) in recognition of his significant contributions to taxonomic studies on horny sponges.

Type material

Holotype

CHILE – **Puerto Cisnes** • Seno Magdalena C; 44.631113° S, 72.929130° W; depth 15 m; 5–10 Aug. 2016; Marco Bertolino leg.; on a rocky wall by scuba diving; CILE 100; MSGN 61500.

Description

Habitus. Encrusting sponge about 5 cm long and 1.5 cm thick, with regular conulose surface. Colour in life bright yellow (Fig. 15A). Live specimens soft, very fragile, showing numerous oscula with low rim (Fig. 15A). Ostia also visible on sponge surface (Fig. 15A)

Skeleton. Structure typical of *Darwinella* genus with ascending dendritic fibres supporting surface conules. Several dendritic fibres arise from common basal plate. Red dendritic fibres laminated, linear and sinuous, 14–(15)–16 mm long and 70–(80)–90 µm thick, with opaque core (Fig. 15B); axial core 10–(11)–12 µm thick.

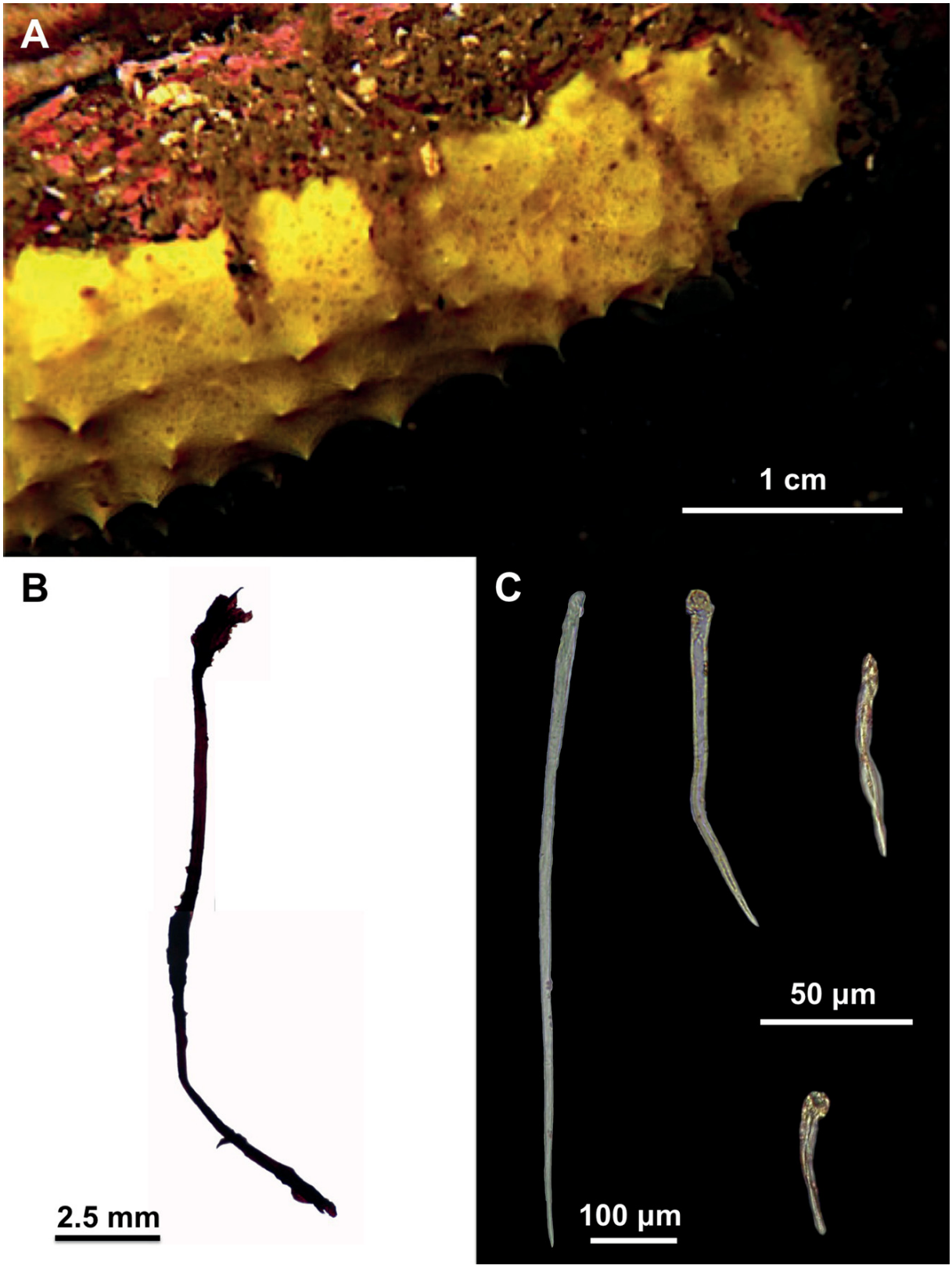

Fig. 15. *Darwinella pronzatoi* Bertolino, Costa & Pansini sp. nov., holotype (CILE 100; MSGN 61500). **A**. The holotype in life. **B**. Dendritic fibres. **C**. Horny styles

Spicules. Smooth, straight, slightly curved or sinuous horny styles, with visible axial core (Fig. 15C), 87.5–(436)–830 μm long and 9–(12.5)–16 μm thick; axial core 2.5–(8.3)–13 μm thick.

Habitat

Species lives at a depth of 15 m in a shady area on rocky wall.

Remarks

Up to now, there was no evidence of the presence of the genus *Darwinella* from the Chilean coasts. Thirteen species belonging to this genus have been described worldwide, eleven of which have multiradiate spicules and one species, *Darwinella tango* (Poiner & Taylor, 1990), has no spicules. Only two species are characterized by monaxonic spicules: *D. gardineri* Topsent, 1905, characterised by curved horny oxeas (1600–2000 × 20 μm), and *D. oxeata* Bergquist, 1961, having horny spined oxeas (530–2083 × 4.2–29.8 μm). Due to the presence of smooth, straight, slightly curved or sinuous horny styles, *D. pronzatoi* is clearly different from both these species, therefore it should be considered as a species new to science.

Discussion

With 23 identified species the present study notably increases the number of sponges reported from Chilean fjords to 139 (Table 8).

From a biogeographic standpoint, apart from the nine new species, one species, *Biemna lutea* Bertolino, Costa & Pansini, 2019, is recorded for the first time after its description in the same region; 12 species were already recorded from the Chilean coast; and one species, *Hymedesmia* (*Stylopus*) *lissostyla* described from New Zealand, is recorded for the first time in the Chilean sponge fauna (Table 2).

Taking into account the literature together with our data, the total number of sponge species known along the Chilean coasts, increases to 187 (Table 8).

The sponge fauna of the fjord region is strongly separated from that recorded in the other areas of the Chilean coasts. In fact, among the 139 species described for the fjords and the 73 listed for the Chilean coasts, only 25 are in common. This number clearly shows the peculiarity of the Southern Chilean coast and suggests the necessity of a further effort to achieve a satisfactory knowledge of the biodiversity of this area.

Table 8 (continued on the next five pages). List of sponge species hitherto recorded for the whole Chilean coast.

		Inside the fjords	Outside the fjords
Class	**Calcarea Bowerbank, 1864**		
Subclass	**Calcaronea Bibber, 1898**		
Order	**Leucosolenida Hartman, 1958**		
	Sycettusa chilensis Azevedo, Hajdu, Willenz & Klautau, 2009	+	+
	Vosmaeropsis sericata (Ridley, 1881)	+	
	Leucosolenia australis Brøndsted, 1931	+	
	Leucosolenia lucasi Dendy, 1891	+	
	Leucandra fernandensis (Breitfuss, 1898)		+
	Leucandra masatierrae (Breitfuss, 1898)		+
	Leucandra platei (Breitfuss, 1898)	+	
	Sycon huinayense Azevedo, Hajdu, Willenz & Klautau, 2009	+	
	Sycon incrustans Breitfuss, 1898	+	+
	Sycon proboscideum sensu Breitfuss, 1898	+	+
Subclass	**Calcinea Bibber, 1898**		
Order	**Clathrinida Hartman, 1958**		
	Clathrina antofagastensis Azevedo, Hajdu, Willenz & Klautau, 2009		+
	Clathrina fjordica Azevedo, Hajdu, Willenz & Klautau, 2009	+	
	Clathrina primordialis (Haeckel, 1872) ?	Doubt presence	
	Clathrina ramosa (Azevedo, Hajdu, Willenz & Klautau, 2009)	+	
	Leucettusa nuda (Azevedo, Hajdu, Willenz & Klautau, 2009)	+	+
	Ascaltis poterium (Haeckel, 1872)	+	
Class	**Demospongiae Sollas, 1885**		
Subclass	**Heteroscleromorpha Cárdenas, Pérez & Boury-Esnault, 2012**		
Order	**Agelasida Hartman, 1980**		
	Hymerhabdia imperfecta Bertolino, Costa & Pansini sp. nov.	+	
Order	**Axinellida Lévi, 1953**		
	Axinella antarctica (Koltun, 1964)	+	
	Axinella coronata Bertolino, Costa & Pansini sp. nov.	+	
	Axinella crinita Thiele, 1905	+	+
	Axinella cylindrica Bertolino, Costa & Pansini sp. nov.	+	
	Dragmacidon egregium (Ridley, 1881)	+	
	Phakellia sur Carvalho, Desqueyroux-Faúndez & Hajdu, 2007	+	
Order	**Bubarida Morrow & Cárdenas, 2015**		
	Bubaris murrayi Topsent, 1913	+	
	Bubaris vermiculata (Bowerbank, 1866) ?	Doubt presence	
	Acanthella danerii Costa, Bavestrello, Pansini & Bertolino, 2020	+	
	Eurypon miniaceum Thiele, 1905	+	
	Halicnemia papillosa (Thiele, 1905)	+	
Order	**Biemnida Morrow, 2013**		
	Biemna aurantiaca Bertolino, Costa & Pansini sp. nov.	+	
	Biemna chilensis Thiele, 1905	+	
	Biemna erecta Bertolino, Costa & Pansini sp. nov.	+	
	Biemna lutea Bertolino, Costa & Pansini, 2019	+	
	Biemna typica Bertolino, Costa & Pansini sp. nov.	+	
	Rhabderemia uruguaiensis van Soest & Hooper, 1993	+	

Table 8 (continued). List of sponge species hitherto recorded for the whole Chilean coast.

		Inside the fjords	Outside the fjords
Order	**Clionaida Morrow & Cárdenas, 2015**		
	Cliona chilensis Thiele, 1905	+	
	Clionaopsis platei (Thiele, 1905)	+	+
	Cliothosa hancocki (Topsent, 1888) ?	Doubt presence	
	Spheciospongia vesparium (Lamarck, 1815) ?	Doubt presence	
Order	**Desmacellida Morrow & Cárdenas, 2015**		
	Desmacella vestibularis (Wilson, 1904)		+
Order	**Haplosclerida Topsent, 1928**		
	Callyspongia fusifera (Thiele, 1905)	+	+
	Siphonochalina fortis Ridley, 1881	+	
	Chalinula variabilis (Thiele, 1905)	+	
	Haliclona (*Halichoclona*) *conica* (Thiele, 1905)	+	
	Haliclona (*Reniera*) *caduca* Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	+	
	Haliclona (*Reniera*) *delicata* (Sarà, 1978)	+	
	Haliclona (*Reniera*) *infundibularis* (Ridley & Dendy, 1887)	+	
	Haliclona (*Reniera*) *topsenti* (Thiele, 1905)	+	
	Haliclona (*Rhizoniera*) *anceps* (Thiele, 1905)		+
	Haliclona (*Soestella*) *auletta* (Thiele, 1905)	+	
	Haliclona (*Soestella*) *chilensis* (Thiele, 1905)	+	+
	Haliclona algicola (Thiele, 1905)	+	
	Haliclona bilamellata Burton, 1932	+	
	Haliclona ignobilis (Thiele, 1905)	+	+
	Haliclona inepta (Thiele, 1905)	+	
	Haliclona macropora (Thiele, 1905)	+	+
	Haliclona nodosa (Thiele, 1905)	+	
	Haliclona rugosa (Thiele, 1905)	+	
	Haliclona siphonella (Thiele, 1905)	+	
	Haliclona sordida (Thiele, 1905)	+	
	Haliclona spinosella (Thiele, 1905)	+	
	Haliclona thielei van Soest & Hooper, 2020		+
	Haliclona verrucosa (Thiele, 1905)	+	
	Haliclona virens (Topsent, 1908)	+	
	Amphimedon decurtata (Sarà, 1978)	+	
	Amphimedon maresi (Sarà, 1978)	+	
	Amphimedon reticulosa (Thiele, 1905)	+	
	Dasychalina magellanica (Thiele, 1905)	+	
	Dasychalina validissima (Thiele, 1905)	+	
	Pachychalina tenera Thiele, 1905	+	

Table 8 (continued). List of sponge species hitherto recorded for the whole Chilean coast. * = new record for Chile.

		Inside the fjords	Outside the fjords
	Oceanapia guaiteca Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	+	
	Oceanapia spinisphaera Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	+	
Order	**Poecilosclerida Topsent, 1928**		
	Iophon proximum (Ridley, 1881)	+	+
	Iophon radiatum Topsent, 1901		+
	Iophon timidum Desqueyroux-Faúndez & van Soest, 1996	+	
	Iophon tubiforme Desqueyroux-Faúndez & van Soest, 1996	+	
	Iophon unicorne Topsent, 1907	+	
	Forcepia (*Leptolabis*) *irritans* (Thiele, 1905)		+
	Lissodendoryx (*Ectyodoryx*) *ballena* Fernandez, Cárdenas, Bravo, Lôbo-Hajdu, Willenz & Hajdu, 2016	+	
	Lissodendoryx (*Ectyodoryx*) *coloanensis* Fernandez, Cárdenas, Bravo, Lôbo-Hajdu, Willenz & Hajdu, 2016	+	
	Lissodendoryx (*Ectyodoryx*) *corrugata* Fernandez, Cárdenas, Bravo, Lôbo-Hajdu, Willenz & Hajdu, 2016	+	
	Lissodendoryx (*Ectyodoryx*) *diegoramirezensis* Fernandez, Cárdenas, Bravo, Lôbo-Hajdu, Willenz & Hajdu, 2016	+	
	Lissodendoryx (*Ectyodoryx*) *patagonica* (Ridley & Dendy, 1886)	+	
	Batzella mollis Thiele, 1905		+
	Strongylacidon platei (Thiele, 1905)		+
	Abyssocladia diegoramirezensis Lopes, Bravo & Hajdu, 2011		+
	Abyssocladia umbellata Lopes, Bravo & Hajdu, 2011		+
	Asbestopluma (*Asbestopluma*) *bitrichela* Lopes, Bravo & Hajdu, 2011	+	+
	Asbestopluma (*Asbestopluma*) *magnifica* Lopes, Bravo & Hajdu, 2011	+	
	Asbestopluma (*Helophloeina*) *delicata* Lopes, Bravo & Hajdu, 2011	+	
	Chondrocladia (*Chondrocladia*) *schlatteri* Lopes, Bravo & Hajdu, 2011		+
	Chondrocladia (*Meliiderma*) *latrunculioides* Lopes, Bravo & Hajdu, 2011		+
	Lycopodina microstrongyla (Lopes, Bravo & Hajdu, 2011)		+
	Crambe amarilla Esteves, Lôbo-Hajdu & Hajdu, 2007	+	
	Crambe chilensis Esteves, Lôbo-Hajdu & Hajdu, 2007	+	
	Crambe maldonadoi Esteves, Lôbo-Hajdu & Hajdu, 2007	+	
	Amphilectus americanus (Ridley & Dendy, 1887)	+	
	Amphilectus fucorum (Esper, 1794)?	Doubt presence	
	Amphilectus rugosus (Thiele, 1905)	+	
	Hamigera cleistochela Bertolino, Costa & Pansini, 2019	+	
	Hymedesmia (*Stylopus*) *lissostyla* (Bergquist & Fromont, 1988) *	+	
	Phorbas areolatus (Thiele, 1905)	+	
	Isodictya delicata (Thiele, 1905)	+	+
	Latrunculia (*Latrunculia*) *basalis* Kirkpatrick, 1908	+	

Table 8 (continued). List of sponge species hitherto recorded for the whole Chilean coast.

	Inside the fjords	Outside the fjords
Latrunculia (*Latrunculia*) *ciruela* Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	+	
Latrunculia (*Latrunculia*) *copihuensis* Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	+	
Latrunculia (*Latrunculia*) *yepayek* Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	+	
Latrunculia (*Latrunculia*) *verenae* Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	+	
Antho (*Acarnia*) *inconspicua* (Desqueyroux, 1972)		+
Clathria (*Clathria*) *discreta* (Thiele, 1905)	+	+
Clathria (*Clathria*) *lipochela* Burton, 1932	+	
Clathria (*Clathria*) *microxa* Desqueyroux, 1972	+	
Clathria (*Clathria*) *papillosa* Thiele, 1905	+	
Clathria (*Cornulotrocha*) *polita* (Ridley, 1881)	+	+
Clathria (*Cornulotrocha*) *rosetafiordica* Hajdu, Desqueyroux-Faúndez & Willenz, 2006	+	
Clathria (*Microciona*) *antarctica* (Topsent, 1917)		+
Clathria (*Microciona*) *mytilifila* Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	+	
Clathria (*Thalysias*) *amabilis* (Thiele, 1905)	+	
Clathria (*Thalysias*) *membranacea* (Thiele, 1905)		+
Mycale (*Aegogropila*) *magellanica* (Ridley, 1881)	+	
Mycale (*Carmia*) *gaussiana* Hentschel, 1914		+
Mycale (*Mycale*) *doellojuradoi* Burton, 1940		+
Mycale (*Mycale*) *thielei* Hajdu & Desqueyroux-Faúndez, 1994	+	
Mycale (*Mycale*) *tridens* Hentschel, 1914	+	
Mycale (*Oxymycale*) *acerata* Kirkpatrick, 1907 ?	Doubt presence	
Hymenancora laevis (Thiele, 1905)	+	+
Hymenancora tenuissima (Thiele, 1905)	+	
Myxilla (*Burtonanchora*) *araucana* Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	+	
Myxilla (*Ectyomyxilla*) *chilensis* Thiele, 1905	+	+
Myxilla (*Ectyomyxilla*) *massa* Ridley & Dendy, 1887	+	
Myxilla (*Myxilla*) *mollis* Ridley & Dendy, 1886	+	
Stelodoryx cribrigera (Ridley & Dendy, 1886)	+	
Neopodospongia tupecomareni Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	+	
Tedania (*Tedaniopsis*) *charcoti* Topsent, 1907	+	
Tedania (*Tedaniopsis*) *mucosa* Thiele, 1905	+	+
Tedania (*Tedaniopsis*) *tenuicapitata* Ridley, 1881	+	
Trachytedania patagonica Ridley & Dendy, 1886	+	
Trachytedania spinata Ridley, 1881	+	

Table 8 (continued). List of sponge species hitherto recorded for the whole Chilean coast.

		Inside the fjords	Outside the fjords
Order	**Polymastiida Morrow & Cárdenas, 2015**		
	Polymastia invaginata Kirkpatrick, 1907	+	
	Polymastia isidis Thiele, 1905	+	
	Scopalina bunkeri Goodwin, Jones, Neely & Brickle, 2011	+	
	Scopalina cribrosa Bertolino, Costa & Pansini sp. nov.	+	
Order	**Suberitida Chombard & Boury-Esnault, 1999**		
	Halichondria (*Halichondria*) *prostrata* Thiele, 1905		+
	Hymeniacidon calva (Ridley, 1881)	+	+
	Hymeniacidon corticata (Thiele, 1905)	+	+
	Hymeniacidon fernandezi Thiele, 1905		+
	Hymeniacidon longistylus Desqueyroux, 1972	+	
	Hymeniacidon rubiginosa Thiele, 1905		+
	Johannesia reticulosa (Thiele, 1905)		+
	Plicatellopsis expansa (Thiele, 1905)		+
	Plicatellopsis flabellata Burton, 1932	+	
	Protosuberites epiphytoides (Thiele, 1905)		+
	Pseudosuberites digitatus (Thiele, 1905)	+	+
	Pseudosuberites hyalinus (Ridley & Dendy, 1887)	+	+
	Pseudosuberites sulcatus (Thiele, 1905)	+	+
	Rhizaxinella strongylata Bertolino, Costa & Pansini sp. nov.	+	
	Suberites cranium Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	+	
	Suberites puncturatus Thiele, 1905		+
	Suberites ruber Thiele, 1905	+	+
Order	**Tethyda Morrow & Cárdenas, 2015**		
	Tethya melinka Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	+	
	Tethya papillosa (Thiele, 1905)		+
	Timea authia de Laubenfels, 1930		+
Order	**Tetractinellida Marshall, 1876**		
	Stelletta clarella de Laubenfels, 1930	+	
	Stelletta phrissens Sollas, 1886	+	
	Geodia magellani (Sollas, 1886)	+	
Subclass	**Keratosa Grant, 1861**		
Order	**Dendroceratida Minchin, 1900**		
	Aplysilla lendenfeldi Thiele, 1905		+
	Darwinella pronzatoi Bertolino, Costa & Pansini sp. nov.	+	
	Spongionella regularis (Ridley, 1881)	+	
	Spongionella repens (Thiele, 1905)		+
Order	**Dictyoceratida Minchin, 1900**		
	Dysidea chilensis (Thiele, 1905)	+	

Table 8 (continued). List of sponge species hitherto recorded for the whole Chilean coast.

		Inside the fjords	Outside the fjords
	Ircinia clavata (Thiele, 1905)		+
	Ircinia paupera (Thiele, 1905)		+
	Ircinia variabilis (Schmidt, 1862) ?	Doubt presence	
	Spongia (*Spongia*) *cerebralis* Thiele, 1905		+
	Spongia (*Spongia*) *magellanica* Thiele, 1905	+	+
	Hyrtios arenosus (Thiele, 1905)		+
	Hyrtios sororia (Thiele, 1905)		+
	Scalarispongia similis (Thiele, 1905)		+
Subclass	**Verongimorpha Erpenbeck, Sutcliffe, Cook, Dietzel, Maldonado, van Soest, Hooper & Wörheide, 2012**		
Order	**Chondrillida Redmond, Morrow, Thacker, Díaz, Boury-Esnault, Cárdenas, Hajdu, Lôbo-Hajdu, Picton, Pomponi, Kayal & Collins, 2013**		
	Halisarca desqueyrouxae Willenz, Ereskovsky & Lavrov, 2016	+	
	Halisarca magellanica Topsent, 1901	+	
Class	**Hexactinellida Schmidt, 1870**		
Subclass	**Amphidiscophora Schulze, 1886**		
Order	**Amphidiscosida Schrammen, 1924**		
	Hyalonema (*Corynonema*) *grandancora* Lendenfeld, 1915		+
	Hyalonema (*Prionema*) *poculum* Schulze, 1886		+
	Pheronema nasckaniense Tabachnick, 1990		+
	Schulzeviella gigas (Schulze, 1886)		+
Subclass	**Hexasterophora Schulze, 1886**		
Order	**Lyssacinosida Zittel, 1877**		
	Pseudoplectella dentatum Tabachnick, 1990		+
	Regadrella phoenix Schmidt, 1880		+
	Staurocalyptus roeperi (Schulze, 1886)	+	
	Caulophacus (*Caulophacus*) *chilensis* Reiswig & Araya, 2014		+
	Lanugonychia flabellum Lendenfeld, 1915		+
	Aphorme horrida Schulze, 1899		+
	Hyalascus stellatus (Schulze, 1886)	+	
	Rossella antarctica Carter, 1872	+	
	Rossella racovitzae Topsent, 1901		+
	Scyphidium chilense Ijima, 1927	+	
Subclass	**Hexasterophora Schulze, 1886**		
Order	**Sceptrulophora Mehl, 1992**		
	Pararete farreopsis (Carter, 1877)		+
Class	**Homoscleromorpha Bergquist, 1978**		
Order	**Homosclerophorida Bergquist, 1978**		
	Plakina trilopha Schulze, 1880 ?	Doubt presence	
Total	**187 species + 8 doubt presence**	**139**	**73**

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