Zootaxa 5087 (2): 201–252
https://www.mapress.com/zt/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.5087.2.1
http://zoobank.org/urn:lsid:zoobank.org:pub:4B472D23-386F-497F-A6DA-8867C081D6D8

Diving into the unknown: fourteen new species of haplosclerid sponges (Demospongiae: Haplosclerida) revealed along the Peruvian coast (Southeastern Pacific)

ANDRÉ BISPO[1, 4,*], PHILIPPE WILLENZ [2, 3, 5] & EDUARDO HAJDU[1, 6]
[1]*Museu Nacional, Departamento de Invertebrados, Universidade Federal do Rio de Janeiro, Quinta da Boa Vista, s/n, CEP 20940-040, Rio de Janeiro, RJ, Brazil*
[2]*Royal Belgian Institute of Natural Sciences, Taxonomy and Phylogeny, Rue Vautier 29, B–1000, Bruxelles, Belgium*
[3]*Université Libre de Bruxelles, Laboratoire de Biologie Marine, Avenue F.D. Roosevelt, 50, B–1050 Bruxelles, Belgium*
[4] *https://orcid.org/0000-0003-4025-6839; afelipebispo@gmail.com*
[5] *https://orcid.org/0000-0003-4127-9346; philippe.willenz@naturalsciences.be*
[6] *https://orcid.org/0000-0002-8760-9403; eduardo.hajdu@gmail.com*
[*]*Corresponding author*

Table of contents

Accepted by D. Erpenbeck: 7 Dec. 2021; published: 6 Jan. 2022

Abstract

The Peruvian coast is certainly one of the poorest studied areas in the world for marine sponges biodiversity, with only 20 species registered so far from over 2,400 km coastline. In spite of its great species richness worldwide, there is not a single record of Haplosclerida in Peru. Accordingly, in this study we aimed to describe the species belonging to this order present in the relatively recent collections undertaken along the Peruvian coast by two of us (PhW, EH). Here, we describe fourteen new species, provisionally endemic to the Peruvian coast. This finding represents a major addition to the knowledge of the biodiversity of sponges along the Peruvian coast, increasing the list of species known to occur in this area by about 68%. This is also the largest single proposal of new Haplosclerida in over 37 years of sponge taxonomy worldwide. *Niphates* is for the first time recorded in the Southeastern Pacific, and an identification key to the Haplosclerida from the Peruvian coast is provided. Regarding the distribution of the described species, most of them—except for *Chalinula chelysa* **sp. nov.**—have a narrow geographic range, which might indicate their rarity or that the haplosclerid fauna in Peru is still poorly known.

Key words: Porifera, Eastern Pacific, marine sponges, biodiversity, *Haliclona*, *Chalinula*

Introduction

The Peruvian coast is the venue for a complex arrangement of different oceanographic phenomena. Its northern portion, down to 5° S, corresponds to the southernmost limit of the Tropical East Pacific province (Guayaquil Ecoregion) (Spalding *et al.* 2007), constantly influenced by tropical warm waters (Sullivan Sealey & Bustamante 1999). The central and southern portions of Peru coastal waters, in turn, mark the northernmost ecoregions of the Warm Temperate Southeastern Pacific province, with Central Peru and Humboldtian Ecoregions (Spalding *et al.* 2007). Both latter ecoregions are highly influenced by the temperate Humboldt (Peru) Current—that moves northward—associated with a complex system of upwellings, where water temperatures range from 13 to 18 °C (Tarazona *et al.* 2003; Hooker *et al.* 2013).

The normal oceanographic conditions of the Warm Temperate Southeastern Pacific province are cyclically perturbed during El Niño Southern Oscillation (ENSO), which in its warm phase weakens the Humboldt Current, thus allowing the incursion of tropical waters down to north Chile (Tarazona & Arntz 2001; Hooker *et al.* 2013). Such a complex coastal oceanography is the main driver of patterns of diversity and distribution of marine organisms along the Peruvian coast.

In spite of being a very complex area in oceanographic terms, the Peruvian coast is still very poorly studied regarding its marine biodiversity. There are only 20 species of sponges currently registered for shallow waters in the Peruvian coast (Aguirre *et al.* 2011; Azevedo *et al.* 2015; Hajdu *et al.* 2015; Cóndor-Luján *et al.* 2019, 2021; Arroyo *et al.* 2020; Recinos *et al.* 2020), which is certainly among the poorest known in the world for sponge biodiversity (van Soest *et al.* 2012). The recent increase in the rate of description of new sponge species from this area after taxonomic treatment in the scope of projects *Esponjas de Peru* (ESPER, DGD, Belgium) and *Capacitação para Pesquisa em Taxonomia, Filogenia e Biogeografia de Poríferos da América do Sul* (EsponjAS, CNPq, Brazil) reinforce this scenario of lack of knowledge, also indicating that real species diversity is much higher.

Within the entire Phylum Porifera, the order Haplosclerida is the third most diverse, with over 1,000 accepted species (van Soest *et al.* 2021). This order is of difficult taxonomy, given its high biodiversity and low number of morphological characters available to taxonomists. Several molecular phylogenies showed the families and genera within Haplosclerida to be poly- or paraphyletic, highlighting the homoplastic nature of the morphological features used to classify these sponges, and thus urging a thorough integrative revision of its classification (Redmond *et al.* 2007, 2011, 2013; Leal *et al.* 2017). While this is still in progress, the current classificatory scheme (van Soest *et al.* 2021) is still necessary, so that new species can be inserted in the system.

Few haplosclerids have been described from the entire Eastern Pacific, especially from the Warm-Temperate Southeastern Pacific (WTSP), Juan Fernandez and Desventuradas and Tropical East Pacific (TEP) provinces. The main taxonomic studies dealing, though not exclusively, with haplosclerids from this area include Thiele (1905), de Laubenfels (1932), Dickinson (1945), Ristau (1978), Desqueyroux-Faúndez & van Soest (1997), Cruz-Barraza & Carballo (2008), Hajdu *et al.* (2013) and Sim-Smith *et al.* (2021). Within the framework of projects ESPER (DGD, Belgium) and EsponjAS (CNPq, Brazil), we obtained a large number of haplosclerids from the Peruvian coast, an area where not a single species of this order had been registered up to now. Accordingly, it is the aim of this study to describe the Peruvian Haplosclerida gathered through both inventory efforts listed above, which includes 14 species belonging to four genera and three families.

Material and methods

The material studied here was collected by SCUBA diving or wading at low tides in 25 of the 90 localities (Azevedo *et al.* 2015) that were sampled in 2007 and 2008 along the Peruvian coast (Table 1, Figure 1). They include both tropical and subtropical sectors, mostly in the shallow subtidal down to 15 m depth, but also in intertidal areas of mangroves. Specimens were photographed in situ before collection, fixed and preserved in ethanol (90% and 70%, respectively). Specimens were deposited in the sponge collection of the Universidad Peruana Cayetano Heredia (UPCH), the Royal Belgian Institute of Natural Sciences, the Museum d’Histoire Naturelle de Genève (MHNG) and Museu Nacional of the Universidade Federal do Rio de Janeiro (MNRJ).

TABLE 1. List of collection localities along the Peruvian coast.

#	Locality	Region	Geographic Coordinates	Ecoregion
01	Punta Capones, Mangroves of Tumbes	Tumbes	03°24’05.30”S–80°18’18.00”W	Guayaquil
02	Northern Point of Isla Chalaquera, Mangroves of Tumbes	Tumbes	03°25’31.80”S–80°16’37.20”W	Guayaquil
03	Cancas	Tumbes	03°55’14.10”S–80°56’46.80”W	Guayaquil
04	Baja de La Antena, Punta Sal	Tumbes	03°57’15.6”S–80°57’57.8”W	Guayaquil
05	Fondadero Balneario, Punta Sal	Tumbes	03°58’04.1”S–80°58’09.30”W	Guayaquil
06	La Cabrillera, Isla Foca	Piura	05°12’09.30”S–81°12’39.90”W	Guayaquil
07	Peña Negra (off Matacaballo), Bahía de Sechura	Piura	05°36’52.80”S–80°50’28.20”W	Guayaquil
08	Bayovar (Puerto Rico), Bahía de Sechura	Piura	05°46’49.70”S–81°04’04.70”W	Guayaquil
09	Islote Santo Domingo, Islas Lobos de Afuera	Lambayeque	06°55’09.8”’S–80°44’09.4”W	Central Peru
10	Bajo El Chile, Islas Lobos de Afuera	Lambayeque	06°55’18.0”S–80°43’13.6”W	Central Peru
11	Puerto Chicama, Islas Macabi	La Libertad	07°48’31.7”S–79°29’50.6”W	Central Peru
12	Near Playa Tina, Tortugas	Ancash	09°22’02.50”S–78°25’31.00”W	Central Peru
13	Isla Tortuga	Ancash	09°22’37.56”S–78°26’20.40”W	Central Peru
14	Islote, Bahía de Paracas	Ica	13°49’38.71”S–76°18’07.41”W	Humboldtian
15	Laguna Grande	Ica	14°09’11.88”S–76°15’51.3”W	Humboldtian
16	Isla Independencia / La Vieja	Ica	14°17’23.10”S–76°10’28.40”W	Humboldtian
17	Unnamed Locality #1, Isla Santa Rosa	Ica	14°19’11.30”S–76°09’30.10”W	Humboldtian
18	Unnamed Locality #2, Isla Santa Rosa	Ica	14°19’10.2”S–76°09’52.40”W	Humboldtian
19	Unnamed Inlet to the North of Quilca	Arequipa	16°42’06.10”S–72°26’54.0”W	Humboldtian
20	Bahía Ancupita, Matarani	Arequipa	16°50’13.30”S–72°17’28.30”W	Humboldtian
21	Punta Hornillos, Matarani	Arequipa	16°52’49.80”S–72°17’18.24”W	Humboldtian
22	Isla Blanca, Matarani	Arequipa	17°00’31.50”S–72°07’19.90”W	Humboldtian
23	Playa Catarindo, Mollendo	Arequipa	17°01’08.93”S–72°02’03.25”W	Humboldtian
24	Mocho Tres Hermanos, Ilo	Moquegua	17°39’13.40”S–71°21’33.10”W	Humboldtian
25	Punta Coles, Ilo	Moquegua	17°42’00.0”S–71°22’51.2”W	Humboldtian

Dissociated spicules mounts and skeletal ground sections (embedding in epoxy resin) were made according to usual procedures for Demospongiae described in Hajdu *et al.* (2011) and Aguirre *et al.* (2011), respectively. For some specimens, fragments were stained in toto for 1 min in a saturated solution of acid fuchsine in absolute ethanol before embedding in epoxy, in order to enhance the visibility of living tissues. Spicule measurements were made from Scanning Electron Microscopy (SEM) or, alternatively, Light Microscopy (LM) pictures using the public domain image analysis program ImageJ (Schneider *et al.* 2012) for each type of spicule. Measurements are expressed in micrometres as minimum–mean–maximum for length x width, followed by the n in parentheses. Light microscopy photographs were taken at the Royal Belgian Institute of Natural Sciences (RBINS) with a Leica DFC 450C camera mounted on a Leica DM 5500B microscope, using the Leica Application Suite (LAS v. 4.8) for image stacking. The SEM was performed in a FEI/Philips XL30 ESEM TMP Microscope at RBINS.

FIGURE 1. Map of the Peruvian coast, showing the collection localities (white dots) for the species described in this study. Numbers in the map refer to those in Table 1.

Results

Systematics

Class Demospongiae Sollas, 1885

Order Haplosclerida Topsent, 1928

Family Chalinidae Gray, 1867

Genus *Chalinula* Schmidt, 1868

Definition. Choanosomal skeleton with secondary lines one or more spicules long. The skeleton might also be more isotropic, however it always has a few discernible primary and secondary lines. No ectosomal skeleton. Spongin scarce to abundant (modified from de Weerdt 2002).

Remarks. The definition of *Chalinula* is based on the number of spicules in the secondary lines of the choanosomal skeleton. Nevertheless, the skeletal architecture in the species of this genus is remarkably variable, as well as the amount of spongin (de Weerdt 2000).

For instance, the type species *C. renieroides* Schmidt, 1868 might bear secondary lines 1–4 spicules long, though in type material they have predominantly 1–2 spicules (de Weerdt 2000). In turn, *C. zeae* de Weerdt, 2000 also has secondary lines 1–2 spicules long. On the other hand, variability in the skeleton of *C. molitba* (de Laubenfels, 1949) is extreme, a species that can develop (1) isotropic reticulation of spongin fibres cored by oxeas, (2) anisotropic reticulation with secondary lines 1–3 spicules long and intermediate amounts of spongin, (3) isotropic and unispicular reticulation of oxeas with scarce spongin (de Weerdt 2000). The presence of several intermediate forms between these distinct skeletal arrangements of *C. molitba* preclude their designation as different species (de Weerdt 2000). Thus, in order to cover the variability in skeletal features, including the number of spicules in secondary lines and amount of spongin, we made a small amendment on the definition of *Chalinula*.

Chalinula chelysa sp. nov.

(Figure 2, Table 2, Table 3)

Holotype. MNRJ 11272 (Vouchers: RBINS-IG 32239-POR 11272, MHNG 85274)—near Playa Tina, Tortugas, Ancash Region (09º22'02.50" S, 78º25'31.00" W), 8 m, coll. Ph. Willenz & Y. Hooker (23/IX/2007). **Paratypes**. MNRJ 12075 (Vouchers: RBINS-IG 32240-POR 12075, MHNG 85517)—Mocho Tres Hermanos, Ilo, Moquega Region (17º39'13.40" S, 71º21'33.10" W), depth 15 m, coll. Y. Hooker, Ph. Willenz & M. Rios (08/XI/2008); MNRJ 12080 (Vouchers: RBINS-IG 32240-POR 12080, MHNG 85522)—Mocho Tres Hermanos, Ilo, Moquega Region (17º39'13.40" S, 71º21'33.10" W), depth 14 m, coll. Y. Hooker, Ph. Willenz & M. Rios (08/XI/2008); MNRJ 12145 (Vouchers: RBINS-IG 32240-POR 12145, MHNG 85588)—Bahía Ancupita, Matarani, Arequipa Region (16º50'13.30" S, 72º17'28.30" W), depth ca. 9 m, coll. Y. Hooker & U. Zanabria (27/XI/2008); MNRJ 12837 (Vouchers: RBINS-IG 32240-POR 12837, MHNG 85670)—Unnamed Locality #1, Isla Santa Rosa, Reserva Nacional de Paracas, Ica Region (14º19'11.30" S, 76º09'30.10" W), depth ca. 1 m, coll. Y. Hooker, Ph. Willenz & F. Azevedo (10/XII/2008).

Comparative material. *Acervochalina variabilis* Thiele, 1905: ZMB POR 3331 – syntype (slides), Juan Fernandez Archipelago, Chile.

Diagnosis. The only *Chalinula* in the Eastern Pacific with the combination of encrusting to cushion-shaped habit, light-yellow colour alive, anisotropic to isotropic skeleton with only few discernible primary and secondary lines, oxeas 73–169 µm, scarce spongin that never encloses the spicule tracts, and oscula mostly flat on the surface.

Description (Fig. 2A, B). Thinly encrusting, only a few centimetres wide (MNRJ 11272, 12075 and 12145), or more cushion-shaped, with occasional irregular lobate projections (MNRJ 12080, 12837). Surface smooth, punctate. Oscula, 1–2 mm wide, circular, mostly scattered, occasionally aligned on the top of short irregular ridges, flush with the surface or on the top of little bumps. Consistency soft. Colour in life beige to light-yellow.

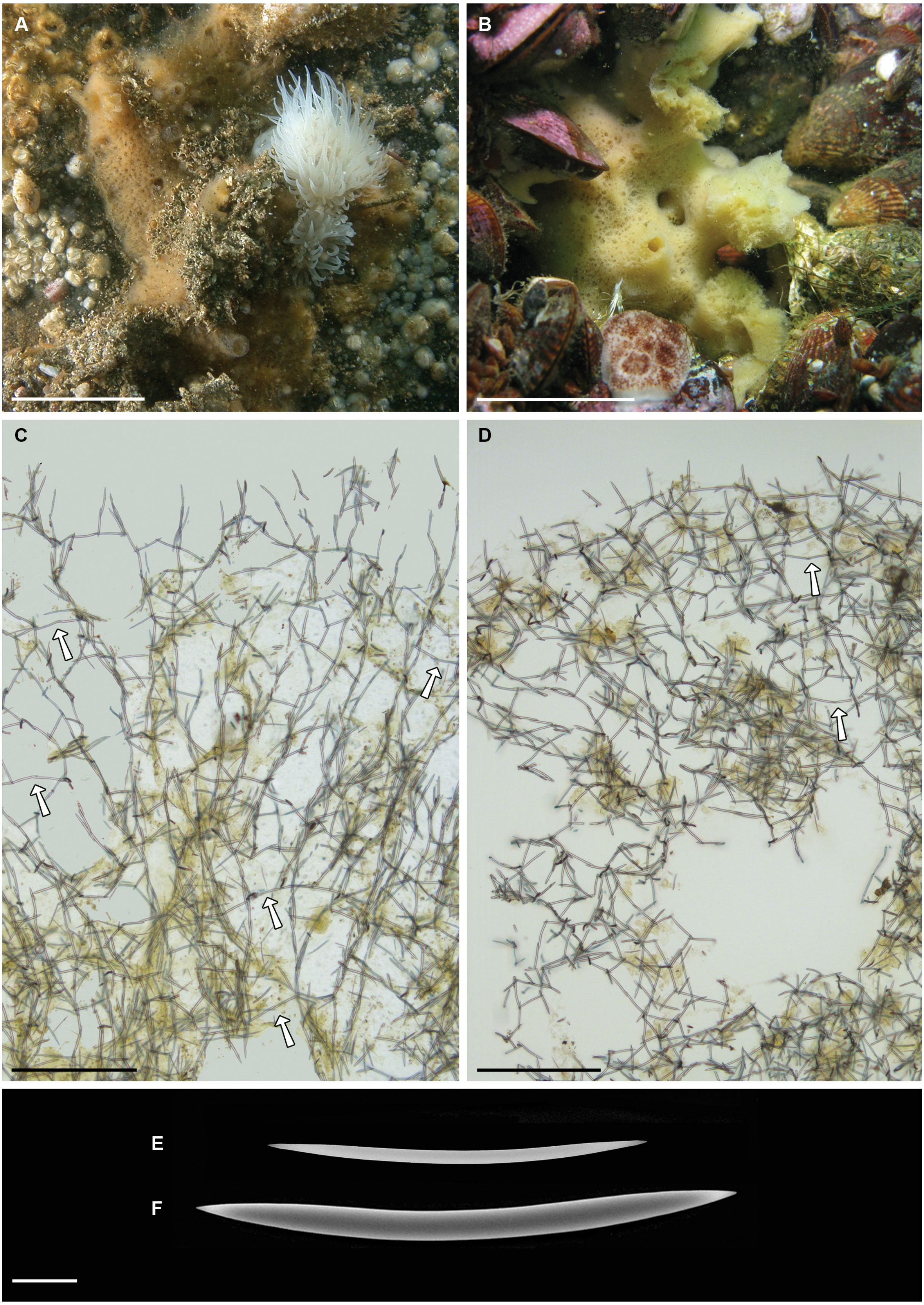

FIGURE 2. ***Chalinula chelysa* sp. nov.** A, holotype alive (MNRJ 11272); B, paratype alive (MNRJ 12080); C, skeletal architecture in transverse ground section (from MNRJ 11272, holotype); D, skeletal architecture in transverse ground section (from MNRJ 12075, paratype); E–F, oxeas in SEM (MNRJ 12075, paratype). Scale bars: A–B, 2 cm; C, 500 µm; D, 500 µm; E–F, 20 µm. White arrows indicate secondary lines with two or more spicules long.

Skeleton (Fig. 2C, D). No specialized ectosomal skeleton. Choanosome a relatively regular anisotropic reticulation, with ascending, somewhat sinuously, primary uni-, to paucispicular tracts, 1–3 spicules thick, mostly orthogonally connected by unispicular secondary tracts, and 1–2 spicules long; overall construction quite loose, with large lacunae, up to 0.8 mm in diameter, and few younger spicules scattered all around. There is a tendency of the skeleton to become isotropic in some areas. Spongin, if any, very scarce, nodal.

Spicules (Fig. 2E, F). Oxeas, fusiform, straight, or more frequently subtly bent at centre, long acerate points, 73–*129*–169 x 1.0–*5*.5–9.0 µm (Table 2).

TABLE 2. Spicules measurements for *Chalinula chelysa* **sp. nov.** All values in µm, expressed as follows: minimum–*mean*–maximum length x width.

Specimen	**Oxeas**
MNRJ 11272 (Holotype)	98–*129*–147 x 2.3–*6.8*–8.3 (n=20 x 20)
MNRJ 12075 (Paratype)	101–*136*–159.2–2.0–*6.5*–9.4 (n=30 x 30)
MNRJ 12080 (Paratype)	85–*139*–169 x 2.0–*5.5–9.0* (n=35 x 20)
MNRJ 12145 (Paratype)	73–*115*–149.2 x 1.0–*4.5*–8.6 (n=50 x 50)
MNRJ 12837 (Paratype)	108–*132*–156 x 2.7–*5.3*–8.0 (n=38 x 38)

Ecology. Specimens were found on shallow, 7–15 m deep, rocky substrates (MNRJ 11272, 12145, and 12837), or epibiotic over mytillids (MNRJ 12075, 12080); MNRJ 11272 occurred in a rich association with barnacles, brachiopods, ophiuroids, anemones, crabs, polychaetes, molluscs and other sponges. The water temperature during collections varied from 11 to 18° C.

Distribution (Fig. 3A). Known from Bahía Tortuga (Ancash Region), Isla La Vieja and Isla Santa Rosa (Ica Region), Matarani (Arequipa Region), Ilo (Moquegua Region), in Peru.

Etymology. The species name, "*chelysa"* is used as a noun in apposition, derived from the Gr. *chelys* (= En. turtle, Sp. *tortuga*), referring to the type locality (near Playa Tina, Tortugas).

Remarks. In Chalinidae, the presence of an anisotropic skeleton with uni- to paucispicular primary lines is shared by *Chalinula*, *Haliclona* (*Haliclona*), *H.* (*Soestella*) and *H.* (*Rhizoniera*) (de Weerdt 2002). Nevertheless, only in *Chalinula* secondary lines can be more than one spicule long. *Chalinula chelysa* **sp. nov.** exhibits a skeleton varying from anisotropic to subanisotropic, with secondary lines one or two spicules long, thus falling in *Chalinula*'s side of the spectrum and justifying our generic assignment.

There are only four species of *Chalinula* previously registered along the Eastern Pacific: *C. ecbasis* (de Laubenfels, 1930), from California (USA); *C. ignobilis* (Thiele, 1905), from Punta Arenas (Chile); *C.* cf. *molitba*, from Galápagos (Ecuador); *C. nematifera* (de Laubenfels, 1954), from Isla Isabel and Cabo Pulmo (Mexico); and *C. variabilis* (Thiele, 1905), from Punta Arenas and Juan Fernandez Archipelago (Chile).

The new species is distinct from *C. ecbasis, C. ignobilis* and *C. variabilis* based on shape, colour and skeleton features (Table 3). *Chalinula ecbasis* is a digitate or ramose species, up to 10 cm high, with a wide variability in colour (brown, tan, purple, or lavender in life), and has a stout reticulation of spongin fibres, cored by 4–7 spicules in both primary and secondary lines (de Laubenfels 1932; Lee *et al.* 2007), unlike typical *Chalinula* spp. In turn, *C. ignobilis* has a thickly encrusting habit, pinkish brown colour alive with yellowish coloured base and abundant spongin enclosing the spicule tracts (Thiele 1905; Hajdu *et al.* 2013). On the other hand, *C. variabilis* is ovate to finger-shaped, reaching up to 6 cm in length, pale brown to greyish purple colour, with an irregular and dense reticulation of spongin fibres cored by oxeas up to 115 µm long (Thiele 1905). We could examine a slide of one of the syntypes of *C. variabilis* (ZMB POR 3331, from Juan Fernandez Archipelago), confirming its distinct skeletal organization in comparison with the new species.

In spite of sharing a similar shape, *C. chelysa* **sp. nov.** is quite unlike the species described as *C.* cf. *molitba* from Galápagos (Sim-Smith *et al.* 2021). The latter has a lilac colour alive and a mainly isotropic reticulation of spongin fibres cored by oxeas that are slightly smaller (103–*113*–129 µm) than in *C. chelysa* **sp. nov** (73–*129*–169µm).

Chalinula nematifera is an Indo-Pacific sponge that has recently been introduced in the Tropical Eastern Pacific (de Laubenfels 1954; Cruz-Barraza & Carballo 2008; Ávila & Carballo 2009). *Chalinula chelysa* **sp. nov.** and *C. nematifera* are conspicuously distinct both in ecological and morphological terms. The latter is a coral-killing species so far found exclusively in coralline areas, mostly overgrowing live corals (Ávila & Carballo 2009; Rossi *et al.* 2015). Such ecological preference is not present in *C. chelysa* **sp. nov.** In addition, *C. nematifera* has a vibrant purple colour also showing white threads standing out at the surface (de Laubenfels 1954; Cruz-Barraza & Carballo 2008; Rossi *et al.* 2015), contrasting with the off light-yellow colour without any threads at the surface of the new species. Their skeletons are also distinct, with a more regular anisotropic reticulation of spongin fibres in *C. nematifera* (Cruz-Barraza & Carballo 2008) *vs.* a more irregular anisotropic to subanisotropic reticulation of spicules with scarce spongin in *C. chelysa* **sp. nov.**

It is important to highlight that when Sim-Smith *et al.* (2021) questioned the presence of *C. nematifera* in the Eastern Pacific, they inadvertently missed the description provided in Cruz-Barraza & Carballo (2008). These latter authors sustained the identity of their specimens as *C. nematifera* based on similar dimensions of oxeas, similar skeletal features, presence of mucous and presence of the characteristic white threads in the surface of some specimens. Therefore, until further taxonomic revision, the record of this species in the Tropical Eastern Pacific is to be considered valid.

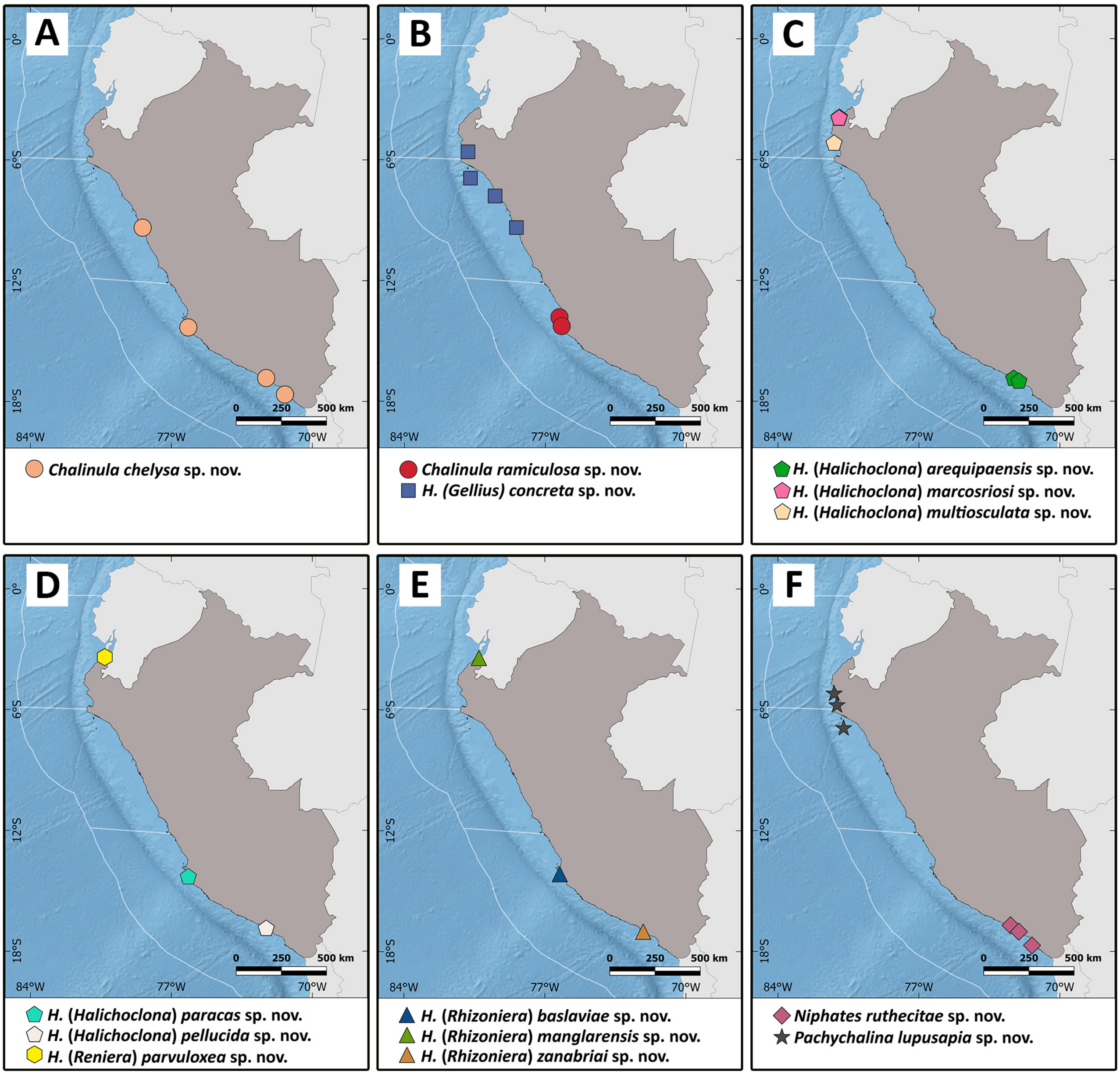

FIGURE 3. Map showing the geographic distribution of Peruvian haplosclerids. A, distribution of *Chalinula chelysa* **sp. nov.**; B, distribution of *Chalinula ramiculosa* **sp. nov.** and *Haliclona* (*G.*) *concreta* **sp nov.**; C, distribution of *H.* (*Halich.*) *arequipaensis* **sp. nov.**, *H.* (*Halich.*) *multiosculata* **sp. nov.** and *H.* (*Halich.*) *marcoriosi* **sp. nov.**; D, distribution of *H.* (*Halich.*) *paracas* **sp. nov.**, *H.* (*Halich.*) *pellucida* **sp. nov.** and (*Reniera*) *parvuloxea* **sp. nov.**; E, distribution of *H.* (*Rhizoniera*) **spp. nov.**; F, distribution of *Niphates ruthecitae* **sp. nov.** and *Pachychalina lupusapia* **sp. nov.**

TABLE 3. Comparative data on external morphology, anatomy, spicule length x width, and known distribution for *Chalinula* spp., *Haliclona* spp. *Niphates* spp. and *Pachychalina* spp. occurring along the Eastern Pacific and in transitional areas between the Pacific and Atlantic (Beagle Channel and Strait of Magellan). (Ecto. = ectosome; Choano. = choanosome). Sources: Wilson (1904); Thiele (1905); de Laubenfels (1926, 1930, 1932); Dickinson (1945); Sarà (1978); Desqueyroux-Faúndez (1990); Desqueyroux-Faúndez & van Soest (1997); Gómez *et al.* (2002); Cruz-Barraza & Carballo (2006, 2008); van Soest (2017); Gastaldi *et al.* (2018); Sim-Smith *et al.* (2021); present study.

Species	External morphology	Anatomy	Distribution
***Chalinula chelysa* sp. nov.**	Thinly encrusting to cushion-shaped, with irregular lobate projections; oscula circular, 1–2 mm wide, flat on the surface or on top of bumps; consistency soft; surface smooth, punctate; colour in life beige to light–yellow.	**Ecto.**—not specialized. **Choano.**—regular anisotropic reticulation, with sinuous primary tracts, 1–3 spicules, connected by unispicular secondary tracts, 1–2 spicules long, in parts isotropic. **Spongin** scarce. **Oxeas**, long acerate points, 73–*129*–169 x 1.0–*5.5*–9.0 µm.	Peru
Chalinula ecbasis (de Laubenfels, 1930)	Ramose or digitate, up to 10 cm high x ca. 1 cm diameter; oscula few, apical, 2 to 5 mm wide; consistency spongy; surface hirsute; colour in life purple or drab.	**Ecto.**—not specialized. **Choano.**—fibrous reticulation with polygonal meshes, ca. 75 µm diameter, free spicules scattered, primary and secondary fibres 10–20 µm diameter, 4–7 spicules thick. **Oxeas**, 100 x 5 µm.	California
Chalinula ignobilis (Thiele, 1905)	Encrusting, 100 x 25 x 25 mm; oscula 1–2 mm wide, irregularly distributed on small conules; surface slightly hispid; colour in life pinkish–brown on top and yellow at the base.	**Ecto.—**not described. **Choano.—**multispicular spongin fibres, up to 5 spicules thick, secondary tracts two spicules long. **Spongin** abundant, totally enveloping spicules. **Oxeas**, 125 x 7 µm.	Chile (Strait of Magellan)
Chalinula* cf. *molitba sensu Sim-Smith *et al.* (2021)	Thinly encrusting, up to 10 mm thick, with short cylindrical or volcaniform projections up to 5 mm high; oscula apical, ca. 4 mm wide, with a whitish margin; consistency very soft, compressible, easily torn; surface smooth; colour in life lilac.	**Ecto.—**not specialized. **Choano.**—isotropic reticulation, spicules encased by spongin, most secondary tracts unispicular, few 2–3 spicules long, some free spicules. **Spongin** abundant. **Oxeas**, 103–*113*–129 x 5–*7*–9 µm.	Ecuador (Galápagos Islands)
Chalinula nematifera (de Laubenfels, 1954) sensu Cruz-Barraza & Carballo (2008)	Thinly encrusting to cushion-shaped, 1–4 mm thick, with volcaniform elevations 0.5–1.5 mm high; oscula 2.5–7.0 mm wide, abundant, oval or circular, apical; consistency soft, compressible, with mucus; surface smooth, but soft and shaggy to the touch, with pale threads in some specimens; colour in life violet.	**Ecto.**—not specialized. **Choano.—**regular anisotropic reticulation, primary lines uni– to bispicular, 13–25 µm diameter, secondary lines 1–2 spicules long, 5–15 µm diameter, forming triangular or squared polygonal meshes, 100–200 µm wide. **Oxeas**, sharp points, 88–*99*–113 x 2.5–*4.4*–5.0 µm.	Indo-Pacific, Central Pacific and Eastern Pacific

......*continued on the next page*

TABLE 3. (Continued)

Species	External morphology	Anatomy	Distribution
***Chalinula ramiculosa* sp. nov.**	Irregularly massive or a dense mass of short branches, often birfucated or anastomosed, up to 150 mm diameter x 50 mm thick; oscula circular, 0.8–4.0 mm wide, slightly elevated or on short volcaniform projections; surface smooth, with subectosomal strands; colour in life beige to pinkish beige.	**Ecto.**—not specialized, but with abundant tangential loose oxeas. **Choano.**—confused, unispicular, isotropic reticulation, with only few loose primary tracts and few secondary lines two spicules long. **Spongin** very scarce, nodal. **Oxeas**, acerate, 81–*123*–150 x 1.3–*5.5*–9.0 µm.	Peru
Chalinula variabilis (Thiele, 1905)	Egg–shaped, finger–shaped or club–shaped; oscula 1–3 mm diameter; consistency elastic and soft; surface rough; colour in life pale brownish or grayish purple.	**Ecto.**—not described. **Choano.**—reticulation of spongin fibres, more organized close to the surface, denser and irregular towards the interior, fibres are thicker and cored by more spicules close to the surface than in the interior. **Spongin** abundant. **Oxeas**, sharp points, 90–100 x ca. 1 µm (I) and 115 x 8 (II).	Chile (Strait of Magellan; Juan Fernandez and Desventuradas Islands)
Haliclona* (*Flagellia*) *edaphus de Laubenfels, 1930 sensu van Soest (2017)	Encrusting, plate-like mass, 400 x 300 x 200 mm; oscula ca. 1 mm wide; consistency firm to hard; surface smooth; colour whitish in life and in ethanol.	**Ecto.—**single spicules tangentially arranged; **Choano.—**dense, confused reticulation. **Oxeas**, curved, cigar–shaped, sharp points, 272–342 x 12–17 µm. **Flagellosigmas**, elliptical, with large difference in length of long and short endings, long endings 76–105 µm, short endings 64–72 µm, width 53–81 µm, thickness 1.5–3.5 µm. **Normal sigmas**, robust, symmetrical, apices sharply curved, 37–81 x 2.5–4.0 µm.	USA (California)
Haliclona* (*Flagellia*) *microtoxa (Desqueyroux–Faúndez & van Soest, 1997) **comb. nov.**	Cushion-shaped or turnip-shaped, up to 110 x 90 x 70 mm; oscular chimneys, 6–10 mm diameter, thin walled; consistency firm, friable; surface smooth, detachable; colour light orange–brown in ethanol.	**Ecto.—**regular tangential reticulation, with loose subdermal network of paucispicular tracts, 2–3 spicules thick, creating meshes 300–500 µm in diameter. **Choano.**—longitudinal and irregular multispicular tracts, 10 or more spicules, with an isotropic unispicular reticulation in between. **Spongin** scarce. **Oxeas**, abrupt points, 279–*407*–549 x 8–*14*–16 µm. **Flagellosigma**, 70–*96*–122 µm. **Normal sigmas**, C–shaped, in two categories, 32–*44*–61 µm and 11–*19*–29 µm. **Toxas**, sharp–angled, recurved apices, two–size categories, 45–*52*–70 µm and 6–10 µm.	Ecuador (Galápagos Islands)

......*continued on the next page*

TABLE 3. (Continued)

Species	External morphology	Anatomy	Distribution
Haliclona* (*Gellius*) *borzattii (Sarà, 1978)	Cylindrical, conical, 3 cm basal diameter, 3 cm high; oscules not visible; pores 0.25 mm diam; consistency hard, friable; surface smooth, with a cortex strongly attached to choanosome; colour, when dry, grey	**Ecto.—**cortical, tangential, very dense reticulation forming trigonal meshes, uni- or paucispicular. **Choano.—**confused layer of irregularly distributed oxeas in uni- or paucispicular tracts, also bearing sandgrains and large canals, 1–3 mm diameter, . **Spongin** scarce or absent. **Oxeas**, slightly bent, , 180–200 x 6–10 µm. **Sigmas**, C or S-shaped, 32–26 µm.	Argentina (Beagle Channel)
***Haliclona* (*Gellius*) *concreta* sp. nov.**	Encrusting, up to 7 mm thick; oscula circular to oval, 1–6 mm wide, flush with the surface or on top of small elevations or tubular projections, 6–8 mm high; consistency hard; surface smooth; colour in life greyish lilac.	**Ecto.**—not specialized. **Choano.**—confused, isotropic, denser towards inner parts. **Spongin** scarce. **Oxeas**, acerate points, some modified to styles, 190–*257*–324 x 2.9–*10.9*–15.2 µm. **Toxas**, variable curvature, with recurved apices, 19–*41*–73 x 0.2–*1.4*–2.9 µm. **Sigmas**, C–shaped, few with straight shaft, 5.4–*7.6*–9.2 x 0.4–*0.7*–1.0 µm.	Peru
Haliclona* (*Gellius*) *laubenfelsi van Soest & Hooper, 2020 sensu van Soest, Kaiser and van Syoc (2011), as *H.* (*G.*) *violacea* (de Laubenfels, 1950)	Encrusting, with small lobes, most bearing a terminal oscule, 35 x 20 x 10 mm; consistency soft, limp; colour light pinkish brown in ethanol.	**Ecto. and Choano.—**unispicular and irregular. **Spongin**, scarce. **Oxeas**, slightly curved, sharp points, 93–119 x 3.0–4.5 µm. **Toxas**, thin, variably curved, 34–63 x 0.5 µm.	Indo–Pacific, Central and Eastern Pacific
Haliclona* (*Gellius*) *perforata (Wilson, 1904)	Flattened plate–like mass, 5–10 mm thick, or amorphous mass, ca. 40 mm in diameter, pierced by spaces, creating anastomosing lobes; oscula small, scattered over upper and outer surfaces; consistency firm and cartilaginous; upper surface rough, with small projections, ca. 1 mm high; colour ashy gray.	**Ecto.**—a reticulation of spiculo–fibres, with single spicules and tufts of spicules projecting. **Choano.**—confused, irregular reticulation of spiculo–fibres, abundant free spicules in between. **Spongin** in small amounts in fibres. **Oxeas**, sharp points, sometimes blunt, 150–320 x 2–20 µm. **Sigmas** abundant, 18 x 2 µm.	Pacific side of Panama
Haliclona* (*Gellius*) *textapatina (de Laubenfels, 1926)	Shallow bowl, lamellate, 10 mm thick; oscula 1 mm wide; consistency delicate, brittle; surface smooth; colour in life pale dirty yellow.	**Ecto.**—rounded reticulation. **Choano.** –confused isodictyal reticulation, with rounded meshes. **Spongin** scarce. **Oxeas**, 450 x 20 µm. **Sigmas**, 50–80 µm.	USA (California)

......continued on the next page

TABLE 3. (Continued)

Species	External morphology	Anatomy	Distribution
Haliclona (***Halichoclona***) ***arequipaensis*** **sp. nov.**	Thickly encrusting, up to 5 mm thick, may form erect, lamellate or crest-like projections; oscula 1–2 mm wide, apical on abundant volcaniform bumps 1 mm high; surface smooth; consistency resilient, flexible; colour in life dull pink.	**Ecto.**—tangential, dense, slightly confused, isotropic. **Choano.**—dense, uni– to multispicular isotropic reticulation, with 2–10 oxeas by knot, choanosomal spaces up to 900 µm in diameter. Few loose, paucispicular, tracts parallel to the surface. **Spongin** scarce, nodal. **Oxeas**, acerate points, 108–198 x 2.2–12.6 µm.	Peru
Haliclona (***Halichoclona***) ***conica*** (Thiele, 1905)	Rounded cone, encrusting, 23 mm high x 15 mm thick; oscula apical, 3 mm diameter, surface easily peeled off; colour in ethanol light grey.	**Ecto.**—irregular network of large meshes, free spicules abundant. **Choano.**—6 spicules by knot. **Oxeas**, 165 x 10 µm	Chile (Admiralty Sound, Strait of Magellan)
Haliclona (***Halichoclona***) ***gellindra*** (de Laubenfels, 1932)	Thinly encrusting, up to 4 mm thick; oscula 1 mm wide, with a raised rim; consistency fragile; surface smooth, punctate; colour in life pale lavender.	**Ecto.**—tangential crust of oxeas. **Choano.**—regular isodictyal reticulation. **Oxeas,** 110–170 × 3–10.	USA (California)
Haliclona (***Halichoclona***) ***marcoriosi*** **sp. nov.**	Repent–ramose, with abundant tubular anisodiametric projections, 10–50 mm high x 4–14 mm wide, occasional blind fistules; oscula, circular to oval, 1–9 mm wide, lateral or apical on tubes, surround by a thin membrane; surface smooth, even, punctate; consistency firm, but brittle and fragile; colour in life pink with whitish and yellowish areas.	**Ecto.**—dense, confused, isotropic. **Choano.**—unispicular, isotropic reticulation, more regular than ectosome, though dense, creating trigonal meshes, with many spicules in confusion, some ill–defined paucispicular tracts also present, without clear orientation, choanosomal spaces, 221–866 µm. **Spongin** scarce, nodal. **Oxeas**, acerate, 97–*137*–164 x 1.6–*5.7*–9.0 µm.	Peru
Haliclona (***Halichoclona***) ***multiosculata*** **sp. nov.**	Encrusting, up to 6 mm; oscula abundant, circular, ca. 1–4 mm wide, frequently aligned in rows on ridges; consistency firm; surface rough; colour in life light pink.	**Ecto.**—dense, isotropic reticulation, with some discernible trigonal to squared meshes. **Choano.**—of the same structure of the ectosome, but denser. **Spongin** scarce, nodal. **Oxeas**, hastate points, 87–*116*–135 x 1.9–*6.2*–8.7 µm.	Peru
Haliclona (***Halichoclona***) ***paracas*** **sp. nov.**	Thinly encrusting, 1–3 mm thick, with small volcaniform projections, 1.0–1.6 mm high; oscula apical, circular, 0.8–1.2 mm wide; consistency firm, but compressible; surface smooth, punctate; colour in life beige.	**Ecto.**—dense, isotropic reticulation, uni- to paucispicular, with some discernible trigonal to squared meshes. **Choano.—**of the same structure as the ectosome, with choanosomal spaces 600–1500 µm wide. **Oxeas**, acerate, 157–*187*–211 x 5.1–*10.*2–12.8 µm.	Peru

......continued on the next page

TABLE 3. (Continued)

Species	External morphology	Anatomy	Distribution
***Haliclona* (*Halichoclona*) *pellucida* sp. nov.**	Thickly encrusting to cushion-shaped, ca. 7 mm thick, up to 20 x 7 cm wide; oscula circular, 1–3 mm wide, slightly elevated or on top of small volcaniform projections up to 5 mm high; consistency firm, barely compressible; surface smooth, slightly punctate, translucent; colour in life white.	**Ecto.**—dense, isotropic, with few paucispicular tracts. **Choano.**—dense, confused, isotropic, with few paucispicular tracts perpendicular to the surface, in parts more regular, isodictyal, forming trigonal or squared meshes; choanosomal spaces 284–756 µm wide. **Spongin** nodal. **Oxeas** hastate, 129–*161*–184 x 3.0–*7.5*–12.0 µm.	Peru
Haliclona* (*Halichoclona*) *thielei van Soest & Hooper, 2020 sensu Thiele (1905) as *Reniera foraminosa*	Thinly encrusting, 2–3 mm thick; oscula abundant on short cones; surface punctate; colour in life light blue green, grey, violet–grey.	**Ecto.**—not described. **Choano.**—dense, irregular reticulation with primary tracts in subectsome and deeper in the choanosome. **Spongin** scarce in "typical form", more abundant in basal segment of tracts in the additional "form". **Oxeas**, 125–150 × 10 µm.	Chile
Haliclona* (*Haliclona*) *clairae Sim-Smith, Hickman Jr. & Kelly, 2021	Thinly encrusting, 3 mm thick, with long fistular projectios; oscules up to 2 mm wide, on top of fistules; consistency very soft, compressible, easily torn; colour in life lilac, with cream and tan patches	**Ecto.** - tangential, isotropic. **Choano.**—anisotropic, multispicular primary tracts and unispicular secondary tracts. **Spongin** nodal. **Oxeas** 111–120–139 × 4–7–9 µm.	Ecuador (Galápagos Islands)
Haliclona* (*Haliclona*) *ambrosia Dickinson, 1945	Ramose, 3 mm thick; oscula up to 4 mm wide; consistency woody; surface smooth; colour when preserved drab.	**Ecto.—**tangential, not further described. **Choano.—**not described. **Oxeas** in two categories, (I) 240 × 14 µm, (II) 130 × 3 µm.	USA (California), Mexico (Gulf of California)
Haliclona* (*Haliclona*) *macropora (Thiele, 1905)	Encrusting, 5 mm thick; oscula rare, 2–4 mm wide; surface conulose; colour in ethanol grey yellow.	**Ecto.**—not described. **Choano.**—dense, regular, with multispicular primary tracts up to 6 spicules. **Spongin** scarce, nodal. **Oxeas**, sharp points, 104–*118*–124 x 4–*5.2*–8 µm.	Chile (Juan Fernández and Desventuradas Islands)
Haliclona* (*Haliclona*) *sonorensis Cruz–Barraza & Carballo, 2006	Encrusting; 2–5 mm thick; oscula, circular or oval, 0.5–1 mm wide, on top of volcaniform elevations, 0.9–1.5 mm high; consistency soft, compressible, fragile; surface even, smooth; colour in life pinkish violet.	**Ecto.**—regular, isotropic, unispicular, with trigonal, quadrangular or polygonal meshes. **Choano.**—regular, ladder-like, with uni- to paucispicular primary tracts, unispicular secondary tracts, in parts confused and isotropic. **Spongin** nodal. **Oxeas**, acerate, some blunt, 100–*127*–145 × 5–*8.4*–10 µm.	Mexico (Gulf of California)

......*continued on the next page*

TABLE 3. (Continued)

Species	External morphology	Anatomy	Distribution
Haliclona* (*Haliclona*) *spinosella (Thiele, 1905)	Tubular, 5–6 cm high x 2 cm diameter; consistency soft; surface verrucose; colour in life dirty yellow–brown.	**Ecto.**—not described. **Choano.**—loose, irregular reticulation of paucispicular tracts. **Spongin** uniting the tracts. **Oxeas**, short points, ca. 150–170 x 7–8 µm.	Chile (Strait of Magellan)
Haliclona* (*Haliclona*) *verrucosa (Thiele, 1905)	Encrusting, 40–60 mm diameter, 5 mm thick, attached to substrate by narrow bridges; oscula up to 1 mm wide; surface microhispid with verrucose projections up to 1 cm high; colour in life blue–grey.	**Ecto.**—not described. **Choano.**—anisotropic reticulation of irregular primary tracts connected by perpendicular spicules. **Spongin** scarce, but abundant at base. **Oxeas**, ca. 150–165 x 6–7.	Chile (Strait of Magellan)
Haliclona* (*Reniera*) *algicola (Thiele, 1905)	Encrusting, up to 5 mm thick; oscula abundant, ca. 1 mm wide, some apical on tubes ca. 3 mm high; colour in life light grey.	**Ecto.**—not described. **Choano.**—dense, irregular reticulation, tracts absent. **Spongin** abundant. **Oxeas**, 193–208 x 4–12 µm	Chile
Haliclona* (*Reniera*) *caduca Hajdu *et al.*, 2013	Massive, with volcaniform, globular or conical projections; oscula apical, 2–3 mm wide; consistency very soft, fragile; surface smooth; colour in life white to pink.	**Ecto.**—irregular, tangential, unispicular isodictyal to subisodictyal reticulation, few tangential paucispicular tracts. **Choano.** –unispicular, isodictyal to subisodictyal reticulation; **Spongin** scarce, nodal. **Oxeas** fusiform, strongyloid, mucronated, conical or sharp points, 85–*101*–113 x 5–*7.9*–10 µm.	Chile
Haliclona* (*Reniera*) *delicata (Sarà, 1978)	Encrusting; consistency soft, delicate; colour in life pink.	**Ecto.**—not specialized. **Choano.**—regular uni- to bispicular reticulation, with trigonal or quadrangular meshes. **Spongin** scarce, nodal. **Oxeas**, bent centrally, long pointed, 100–120 x 6–7 µm.	Argentina (Beagle Channel)
Haliclona* (*Reniera*) *oberi Sim-Smith, Hickman Jr & Kelly, 2021	Thinly encrusting, 3 mm thick, oscula abundant, 3 mm, wide; consistency very soft, easily torn; surface semi–translucent, punctate; colour in life light orange.	**Ecto.**—tangential, unispicular, isotropic. **Choano.**—unispicular, isotropic, few paucispicular tracts. **Spongin** moderately abundant, nodal. **Oxeas**, sharp points, 118–*135*–154 × 7–*9*–12 µm.	Ecuador (Galápagos Islands)
***Haliclona* (*Reniera*) *parvuloxea* sp. nov.**	Encrusting, with abundant, short, cylindrical or irregular, frequently bifurcate, lobate or fistular projections; oscula circular, apical, 0.4–1.3 mm wide; consistency soft; surface smooth; colour in life yellow.	**Ecto.**—isodictyal to isotropic, unispicular. **Choano.**—isotropic, unispicular, in some parts tend to be more regular, isodictyal; skeleton heavily pigmented. **Spongin** scarce, nodal. **Oxeas**, short acerate points, 62–*80*–91 x 1.0–*2.5*–4.0 µm.	Peru

......continued on the next page

TABLE 3. (Continued)

Species	External morphology	Anatomy	Distribution
Haliclona* (*Reniera*) *sordida (Thiele, 1905)	Encrusting, 5–7 mm thick; oscula commonly in groups of four, 0.5 mm diameter; consistency friable; surface smooth to microspined or verrucose; colour in life dirty grey–brown.	**Ecto.**—not described. **Choano.**—irregular, mostly unispicular, few loose ascending tracts up to 5 spicules thick. **Spongin** nodal. **Oxeas**, long points, 136–184 x 6–12 µm.	Chile (Straig of Magellan)
Haliclona* (*Reniera*) *topsenti (Thiele, 1905)	Cushion–shaped, up to 5 mm thick; oscula 2.0–2.5 mm wide, on top of small verrucose projections; consistency resilient; surface microhispid; colour in life blue–violet on top, yellow at base.	**Skeleton** not described. **Oxeas**, long points, up to 150 µm.	Chile (Strait of Magellan)
Haliclona* (*Rhizoniera*) *anceps (Thiele, 1905)	Encrusting, 6 cm long, few conules 12 mm high; oscula on top of conules, 3 mm wide; colour in life yellowish grey.	**Ecto.**—not described. **Choano.**—not dense, irregular meshes, 1–2 oxeas thick, intermingled to multispicular longitudinal tracts, 6–10 thick. **Oxeas**, tornote–like, 150 x 7 µm.	Chile (Juan Fernández and Desventuradas Islands)
***Haliclona* (*Rhizoniera*) *baslaviae* sp. nov**	Thickly encrusting, up to 3 cm wide; consistency soft; oscula circular, 1 mm wide; surface smooth; colour in life purplish blue.	**Ecto.**—not specialized. **Choano.**—irregular, anisotropic, with loose uni- to bispicular primary tracts connected by unispicular secondary tracts, with many scattered spicules. **Spongin** not visible. **Oxeas**, long acerate points, 93–164 x 3.1–6.1 µm.	Peru
Haliclona* (*Rhizoniera*) *enamela de Laubenfels, 1930	Thinly encrusting, 1–2 mm thick; oscula with raised collars, 1.0–1.5 mm; consistency spongy; surface smooth to verrucose; colour in life drab.	**Ecto.**—not specialized. **Choano.**—fibrous reticulation, mutispicular primary tracts 6–8 spicules thick, uni- to paucispicular secondary tracts 1–2 spicules thick, free spicules present. **Spongin** abundant, enclosing the spicules. **Oxeas** 120 × 4 µm.	USA (California)
***Haliclona* (*Rhizoniera*) *manglarensis* sp. nov.**	Encrusting, with lobate projections frequently bifurcate, up to 3 cm high; oscula circular, 2–5 mm wide, apical, lateral or basal on projections; consistency soft and brittle; surface rough; colour in life olive.	**Ecto.**—not specialized. **Choano.**—confused, isotropic, unispicular, more anisotropic close to the surface, with ill-defined uni- to bispicular primary lines connected by unispicular secondary lines, free spicules abundant. **Spongin** not visible. **Oxeas**, long acerate points, 92–*120*–140 x 1.0–*3.8*–6.0 µm.	Peru

......continued on the next page

TABLE 3. (Continued)

Species	External morphology	Anatomy	Distribution
***Haliclona* (*Rhizoniera*) *zanabriai* sp. nov.**	Thickly encrusting, 5–9 mm thick, with short lobate projections or small ridges; oscula circular, most flat on surface, 1–2 mm wide; consistency soft, compressible; surface punctate; colour in life light brown.	**Ecto.**—not specialized. **Choano.**—anisotropic, with ascending regular primary uni– to paucispicular tracts 1–5 spicules thick, connected by unispicular secondary tracts, with large lacunae of up to 300 µm in diameter, free spicules scattered. **Spongin** scarce. **Oxeas**, acerate points, 79–*123*–163 x 1.0–*5.1*–9.0 µm.	Peru
Haliclona* (*Soestella*) *auletta (Thiele, 1905)	Single axis, 8 cm long, wherefrom several tubes originate, frequently anastomosed to each other, specimen up to 5 cm high; oscula apical, 2–4 mm diameter; surface detachable, conulose, pores grouped, elongated, 60–70 µm diameter; colour in life yellowish grey.	**Ecto.**—not described. **Choano.**—irregular reticulation, ill–defined longitudinal tracts, 2–5 spicules thick, spicules more abundant at places. **Spongin** scarce. **Oxeas**, 150 x 11µm.	Chile
Haliclona* (*Soestella*) *caerulea (Hechtel, 1965) sensu Cruz–Barraza & Carballo, 2008	Cushion–shaped to massive lobate, 20–150 mm high; oscula at the top of lobules, circular or oval, 1.3–5.0 mm diameter; consistency lightly compressible, brittle; surface even, smooth or lightly rough, with fistules 2–10 mm high; colour in life light blue to beige or white.	**Ecto.**—regular, tangential, unispicular, isotropic reticulation. **Choano.**—lightly confused, pauci– to multispicular primary lines 4–8 spicules thick, connected by secondary unispicular lines or single spicules. **Oxeas**, sharp points, some blunt, 83–177–210 x 2.5–5.9–11.3. **Sigmas**, C–shaped, 18–22–30 µm.	Tropical Western Atlantic, Central Pacific and Tropical Eastern Pacific
Haliclona* (*Soestella*) *chilensis (Thiele, 1905)	Numerous irregular hollow projections, 5–6 mm wide, up to 4 cm long; oscula apical, 1 mm diameter; surface smooth; colour in life whitish–grey.	**Ecto.**—not described. **Choano.**—loose, numerous radial canals fill most of the walls of the projections, irregular network with ill–defined or stout spicule tracts. **Spongin** scarce. **Oxeas**, blunt ends, 165 x 10 µm.	Chile
Haliclona* (*Soestella*) *inepta (Thiele, 1905)	10–15 mm high, 4–10 mm diameter at base; oscula 1 mm diameter surrounded by membranous chimney; whitish in preserved state.	**Ecto.**—not specialized. **Choano.**—compact, irregular, ill–defined longitudinal spicule tracts, 1–3 spicules thick. **Spongin** scarce. **Oxeas**, sharp points, 180–200 x 8 µm.	Chile (Strait of Magellan)
Haliclona* (*Soestella*) *roslynae Sim-Smith, Hickman Jr. & Kelly, 2021	Thickly encrusting, up to 10 mm thick; oscula on short cylinders, up to 5 mm wide; consistency very soft, friable; surface punctate; colour in life pink, with tinges of yellow and purple.	**Ecto.—**loose. **Choano.**—loose, subanisotropic, with rounded meshes, ill–defined paucispicular primary tracts and unispicular secondary tracts in places. **Spongin** nodal. **Oxeas** 93–*107*–117 × 5–*6*–7 µm.	Ecuador (Galápagos Islands)

......*continued on the next page*

TABLE 3. (Continued)

Species	External morphology	Anatomy	Distribution
Haliclona* (*Soestella*) *spuma Sim-Smith, Hickman Jr. & Kelly, 2021	Thinly to thickly encrusting, cavernous, 5–20 mm thick; oscula up to 3 mm wide, on top of slightly raised or volcaniform mounds; consistency very soft, friable; colour in life white to cream.	**Ecto.**—loose, many spaces. **Choano.**—loose, subanisotropic, with rounded meshes delimiting choanosomal spaces, irregular multispicular primary tracts and ill–defined pauci- to multispicular secondary tracts. **Spongin** scarce. **Oxeas** 136–*164*–192 × 5–*8*–13 µm.	Ecuador (Galápagos Islands)
Haliclona agglutinata Desqueyroux–Faúndez, 1990	Massive, 100–300 mm thick; oscula 2–3 mm; consistency firm, friable; surface irregular, slightly hispid; colour in life off-white with pinkish patches.	**Ecto.**—not specialized. **Choano.** dense, isodictyal, unispicular, with discontinuous paucispicular primary tracts. **Spongin** not visible. **Oxeas** 102–140 × 1.5–5.0 µm.	Chile (Easter Island)
Haliclona nitens Desqueyroux–Faúndez, 1990	Lamellar, massive, 15 mm thick; oscula 3–4 mm wide with raised collars; consistency very soft, brittle; surface smooth; colour tan in ethanol.	**Ecto.**—well–defined, isodictyal. **Choano.**—isodictyal to subisodictyal, no tracts. **Spongin** nodal. **Oxeas** in two categories, 100–106 × 1.6–2.0 µm (I), 102–118 × 3–4 µm (II).	Chile (Easter Island)
Haliclona rapanui (Desqueyroux–Faúndez, 1990)	Encrusting, 19 mm thick; oscula 2–3 mm wide; consistency firm, crumbly; surface smooth, hispid; colour in ethanol whitish.	**Ecto.**—not specialized. **Choano.**—dense, isotropic, confused, some discontinuous multispicular primary tracts, spicules pierce surface. **Oxeas** in two categories, some modified to styles and strongyles, 157–*170*–180 x 6–*7*–8 µm (I), 128–*148*–163 x 6–*8*–8 µm (II).	Chile (Easter Island)
Haliclona rugosa (Thiele, 1905)	Hemispherical; surface irregular, conules (?) forming a surface network, smooth, punctate; colour in life brownish.	**Ecto.**—not described. **Choano.**—ascending, large, irregular, spicule tracts. **Spongin** scarce. **Oxeas** long ends, ca. 150 x 7 µm.	Chile (Strait of Magellan)
Haliclona siphonella (Thiele, 1905)	Sak–like, 25 mm high x 10 mm diameter; oscula apical, 2 mm diameter; consistency soft; surface smooth; colour in life white to yellow.	**Skeleton** not described. **Strongyles**, 212–252 x 12–20 µm.	Chile
Haliclona texta (Sarà, 1978)	Erect, ramified cylindrical branches, up to 5 mm diameter, with swellings along; oscula scattered on the branches, elliptical, up to 2 mm diameter; consistency elastic; surface slightly hispid; colour when dry and in ethanol brownish yellow	**Ecto.**—of the same structure as the choanosome, forming meshes about 300 µm in diameter, some tracts in the nodes of the reticulation project towards the surface. **Choano.**—an isotropic network of uni- to multispicular fibres, 1–10 spicules, 20–60 µm thick. **Oxeas**, short and roust, 80–130 x 2–10 µm.	Argentina (Beagle Channel)

......continued on the next page

TABLE 3. (Continued)

Species	External morphology	Anatomy	Distribution
Haliclona translucida Desqueyroux–Faúndez, 1990	Thinly encrusting, 1–5 mm thick; oscula abundant, 1.5–2.0 mm wide; consistency very soft, fragile; surface finely hispid, translucent; colour in life white to yellowish.	**Ecto.**—tangential. **Choano.**—isotropic to isodictyal, with trigonal to rectangular meshes, no spicule tracts. **Spongin** scarce, nodal. **Oxeas** usually modified to strongyles, 94–*105*–116 × 6–7 µm.	Chile (Easter Island)
Haliclona turquoisia (de Laubenfels, 1954) sensu Gómez *et al.* (2002)	Encrusting to semi–encrusting, 0.5–1.7 mm thick, or ramose, 2.8–7.0 mm thick, may grow out to patches up 40 cm diameter, small branching digitations may be present; oscula even or on top of elevations, 0.4–5.0 mm wide; consistency soft, lightly elastic, fragile; surface punctate, smooth, sligthtly shaggy in places; colour in life green to bluish-green.	**Ecto.**—unispicular, isotropic. **Choano.**—isotropic reticulation of uni– multispicular primary and secondary lines, subectosomal spaces 25–900 µm in diameter. **Spogin** scarce, nodal. **Oxeas**, sharp to blunt points, 63–93–120 x 2.5–4.0–6.3 µm.	Central Pacific, Mexican Pacific
Niphates lunisimilis (de Laubenfels, 1930)	Massive, subspherical, 2 x 3 x 5 cm; oscula craterlike, with raised collars, ca. 4 mm wide; consistency toughly spongy, fragile; surface smooth; colour in life pale drab.	**Ecto.**—not specialized. **Choano.—**isodictyal groundwork, crossed by an anisotropic reticulation of multispicular spongin fibres 75 µm diameter. **Spongin** enclosing spicules. **Oxeas**, 110–125 x 8–10 µm.	USA (California)
***Niphates ruthecitae* sp. nov.**	Cushion-shaped, with irregular lobate or thick lamellate projections; oscula circular, 1–2 mm wide, flat on the surface or on top of small volcaniform elevations; consistency spongy; surface optically rough, smooth to the touch; colour in life light brown to light pink.	**Ecto.**—irregular reticulation of pauci– to multispicular tracts, 13–60 µm thick, creating irregular to circular meshes 70–370 µm wide. **Choano.** –regular, quadrangular reticulation of longitudinal multispicular primary tracts 50–225 µm thick, connected by uni- to paucispicular secondary tracts 30–75 µm thick, creating squared to rectangular meshes 85–1000 µm wide. **Spongin** abundant. **Oxeas**, long acerate points, 54–*96*–128 x 1.7–*6.0*–9.9 µm.	Peru
***Pachychalina lupusapia* sp. nov.**	Thickly encrusting, with abundant cylindrical or volcaniform projections, 0.5–1.0 cm high or digitiform lobes, 2.5–3.0 cm high; oscula apical, circular, 0.5–3.0 mm wide; consistency compressible, slightly resilient; surface punctate, convergent subectosomal channels at the marginal areas; colour in life gray, with a hint of purple or violet.	**Ecto.**—not specialized. **Choano.**—anisotropic to isotropic, with pauci- to multispicular primary tracts up to 55 µm thick, connected by short secondary uni- to paucispicular tracts inserted in variable angle. **Spongin** scarce. **Oxeas**, long acerate points, 90–*137*–166 x 1.6–*5.9*–9.0 µm.	Peru
Pachychalina tenera (Thiele, 1905)	Round, 10 mm high; oscule ca. 0.7 mm wide; consistency soft; surface finely verrucose, colour in life whitish	**Ecto.**—not described. **Choano.**—loose stout ascending primary tracts and slender transverse secondary tracts. **Spongin** not visible. **Oxeas**, long points, 130 x 6–7 µm.	Chile (Strait of Magellan) and Argentina

***Chalinula ramiculosa* sp. nov.**

(Figure 4, Table 3, Table 4)

Holotype. MNRJ 12889 (Vouchers: RBINS-IG 32240-POR 12889, MHNG 85722)—Islote, Atenas, Reserva Nacional de Paracas, Ica Region (13°49'38.71" S—76°18'07.41" W), depth 3 m, coll. Y. Hooker, Ph. Willenz & N. Mostajo Berropsi (13/XII/2008). **Paratypes.** MNRJ 12820 (Vouchers: RBINS-IG 32240-POR 12820, MHNG 85652)—Isla Independencia (Isla La Vieja) (14º16'08.20" S, 76º11'25.00" W), depth 7.0 m, coll. Y. Hooker, Ph. Willenz & F. Azevedo (09/XII/2008); MNRJ 12887 (Vouchers: RBINS-IG 32240-POR 12887, MHNG 85720), MNRJ 12888 (Vouchers: RBINS-IG 32240-POR 12888, MHNG 85721), MNRJ 12890 (Vouchers: RBINS-IG 32240-POR 12890, MHNG 85723), MNRJ 12892 (Vouchers: RBINS-IG 32240-POR 12892, MHNG 85725)—Islote, Atenas, Reserva Nacional de Paracas, Ica Region (13°49'38.71" S, 76°18'07.41" W), depth 1.6–3.3 m, coll. Y. Hooker, Ph. Willenz & N. Mostajo Berropsi (13/XII/2008). **Additional material deposited in collections.** MNRJ 12891(Vouchers: RBINS-IG 32240-POR 12891, MHNG 85724)—Islote, Atenas, Reserva Nacional de Paracas, Ica Region (13°49'38.71" S, 76°18'07.41" W), depth 2.9 m, coll. Y. Hooker, Ph. Willenz & N. Mostajo Berropsi, (13/XII/2008).

Diagnosis. Only *Chalinula* in the Eastern Pacific with the combination of a massive habit and a dense mass of short, bifurcating and anastomosing branches, colour alive beige to pinkish beige, and an isotropic, unispicular skeleton of oxeas 93–157 µm long.

Description (Fig. 4A, B). Massive, irregularly outlined (MNRJ 12820), or a dense mass of short, irregular, often bifurcating or anastomosing branches widening apically (MNRJ 12887, 12888, 12889, 12892). Specimens reached 15 cm in largest diameter, and 5 cm in thickness. Surface smooth, albeit somewhat irregular, with tangential, longitudinal subectosomal strands, and a slight reticulation, both visible upon zooming in on underwater *in situ* images. Oscula, 0.8–4.0 mm diam., common, circular, mostly located at the base of branches, slightly elevated on short volcaniform projections. Consistency soft, compressible. Colour in life beige to pinkish-beige, darkening to purplish-brown after exposure to the air.

Skeleton (Fig. 4C, D). No specialized ectosomal skeleton, but loose, even abundant tangential oxeas may be spread at the surface (holotype). Choanosomal architecture a confused unispicular, isotropic reticulation, with only seldom recognizable loose primary tracts, and even fewer connecting lines, two spicules long. Spongin very scarce, only at the nodes of the reticulation.

Spicules (Fig. 4E, F). Oxeas, fusiform, straight, or more frequently subtly bent at centre, sharp acerate points, 81–*123*–150 x 1.3–*5.5*–9.0 µm. (Table 4)

TABLE 4. Spicules measurements for *Chalinula ramiculosa* **sp. nov.** All values in µm, expressed as follows: minimum–*mean*–maximum length x width.

Specimen	Oxeas
MNRJ 12889 (Holotype)	81–*120*–150 x 2.0–*5.1*–9.0 (n=40 x 20)
MNRJ 12820 (Paratype)	84–*123*–144 x 1.7–*5.1*–8.1 (n=40 x 20)
MNRJ 12892 (Paratype)	88–*123*–153 x 2.0–*4.8*–8.0 (n=40 x 20)
MNRJ 12887	94–*126*–149 x 1.3–*6.3*–8.1 (n=40 x 40)

Ecology. Attached to rock, or epibiontic on bivalves or *Codium*-like algae in the very shallow subtidal (3–7 m depth, MNRJ 12892). The mass of sponge and algae branches houses ophiuroids and crabs, and can be markedly overlaid by fine sediment. Water temperature during collection was 13°C for MNRJ 12820 and 16°C for 12892.

Distribution (Fig. 3B). Only known from Paracas and Isla La Vieja (Ica Region), in Peru.

Etymology. The epithet "*ramiculosa*" is used as a noun in apposition derived from the diminutive form of the L. *ramus*, pl. *rami* (L. *ramusculus* = small branch + L. -*osus* = in abundance), and refers to the presence of short and abundant branches in this species.

Remarks. The main pattern observed in *C. ramiculosa* **sp nov.** skeleton is a unispicular, isotropic reticulation, almost without primary and secondary lines. However, there are some areas where an anisotropic reticulation is apparent, with secondary lines more than one spicule long, bringing the new species close to *Chalinula*. As already pointed before in the Remarks section for *Chalinula*, such a variation in the skeleton is present in several species of this genus.

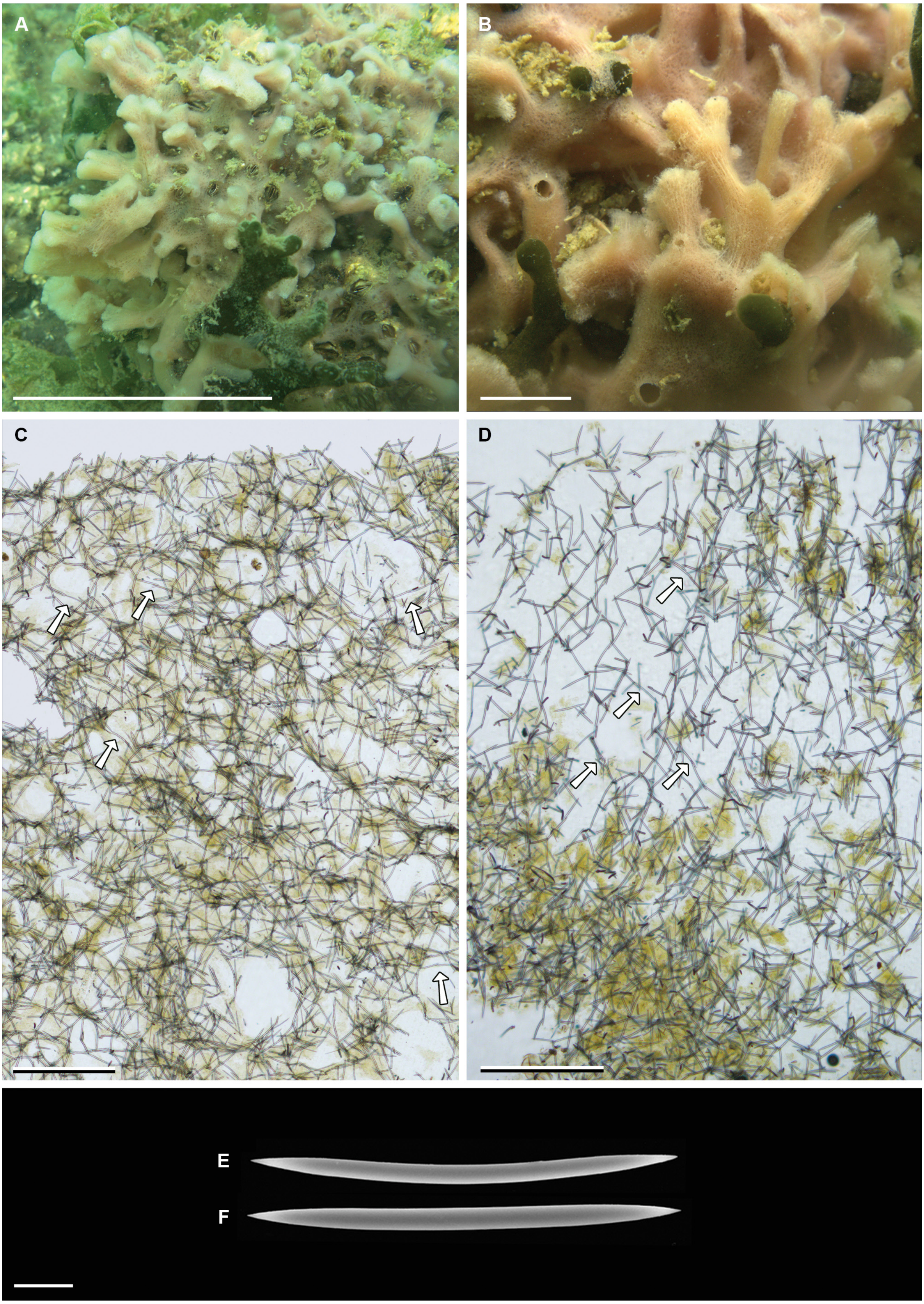

FIGURE 4. ***Chalinula ramiculosa*** **sp. nov.** A, paratype alive (MNRJ 12892); B, holotype alive (MNRJ 12889); C, skeletal architecture in transverse ground section (MNRJ 12820, paratype); D, skeletal architecture in transverse ground section (MNRJ 12889, holotype); E–F, oxeas (MNRJ 12889, holotype). Scale bars: A, 5 cm; B, 1 cm; C–D, 500 µm; E–F, 20 µm. White arrows indicate secondary lines with two or more spicules long.

The only additional *Chalinula* in the Peruvian coast is *C. chelysa* **sp. nov.** However, the massive shape and the presence of abundant, small, irregular-anastomosed branches in *C. ramiculosa* **sp. nov.** set both species apart (Table 3). Another Eastern Pacific Chalinidae resembling somehow the habit of *C. ramiculosa* **sp. nov.** is *H.* (*Rh.*) *enamela* de Laubenfels, 1930. Even so, both are readily distinguished based on the mainly isotropic and unispicular skeleton with scarce spongin of the new species, in contrast to the stout reticulation of multispicular primary lines cored by 6–8 spicules, and rich in spongin. Remaining Eastern Pacific Chalinidae are all easily distinguished on the basis of tabulated comparative data shown in Table 3.

Haliclona Grant, 1841

Definition. Chalinidae with secondary lines unispicular and one spicule long (modified from de Weerdt 2002).

Remarks. We included "one spicule long" in the definition of *Haliclona* to contrast with the "one or more spicules long" of *Chalinula*, as this is the only feature distinguishing both genera.

Haliclona (*Gellius*) Gray, 1867

Definition. Chalinidae with a choanosomal skeleton consisting of a rather confused, subhalichondroid reticulation of pauci- to multispicular primary lines, irregularly connected by unispicular secondary lines. Ectosomal skeleton, if present, either a regular, tangential, unispicular, isotropic reticulation, or consisting of irregularly strewn, tangentially orientated spicules (de Weerdt 2002).

Haliclona (*Gellius*) *concreta* sp. nov.

(Figure 5, Table 3, Table 5)

Holotype. MNRJ 11274 (Vouchers: RBINS-IG 32239-POR 11274, MHNG 85276)—Isla Tortuga, Casma, Ancash Region (09°22'37.56" S, 78°26'20.40" W), depth 6 m, Ph. Willenz & Y. Hooker (23/IX/2007). **Paratypes.** MNRJ 11262 (Vouchers: RBINS-IG 32239-POR 11262, MHNG 85265)—Isla Tortuga, Casma, Ancash Region (09°22'37.56" S, 78°26'20.40" W), depth 6 m, coll. E. Hajdu (23/IX/2007); MNRJ 13647 (Vouchers: RBINS-IG 32241-POR 13647, MHNG 85886)—Peña Negras, off Matacaballos, Bahía de Sechura, Piura Region (05°36'52.80" S, 80°50'28.20" W), depth 8 m, coll. Y. Hooker (05/XII/2009). **Additional material deposited in collections.** MNRJ 11318 (Vouchers: RBINS-IG 32239-POR 11318, MHNG 85319)—Puerto Chicama, Islas Macabi, La Libertad Region (07°48'31.7" S, 79°29'50.6" W), depth 5 m, coll. Ph. Willenz & Y. Hooker (30/IX/2007); MNRJ 11362 (Vouchers: RBINS-IG 32239-POR 11362, MHNG 85360)—Bajo El Chile, Islas Lobos de Afuera, Lambayeque Region (06°55'18.0" S, 80°43'13.6" W), depth 8 m, coll. E. Hajdu (05/X/2007).

Diagnosis. The only *Haliclona* in the Eastern Pacific with a combination of lilac-grey colour alive, oxeas up to 324 µm long, and sigmas and toxas as microscleres, in a single category each.

Description (Fig. 5A, B). Encrusting sponge, up to 7 mm thick, up to 20 cm wide. Surface optically smooth, commonly covered by small patches of turf. Oscula, circular to oval, 1–6 mm wide, flush with the surface, or at the top of small elevations or tubular projections, 6–8 mm high. Consistency hard, firm, just slightly compressible. Colour alive greyish lilac.

Skeleton (Fig. 5C, D). No specialized ectosomal skeleton. Choanosome a confused isotropic reticulation, becoming denser towards its inner parts. Spongin scarce.

Spicules (Fig. 5E–J). Oxeas mostly slightly curved, sharp acerate points, some modified to styles, 190–*257*–324 x 2.9–*10.9*–15.2 µm (Fig. 5I, J). Toxas, rare, in a single category with a rather variable degree of shaft curvature, with recurved apices, 19–*41*–73 x 0.2–*1.4*–2.9 µm (Fig. 5E, F)**.** Sigmas, variable in abundance, in a single category, C-shaped, few with straight shaft, 5.4–*7.6*–9.2 x 0.4–*0.7*–1.0 µm (Fig. 5G, H)**.** Complete measurements are given in Table 5.

Ecology. Occurring on rocky substrate in the shallow subtidal, from 4.5–7.5 m deep. Water temperature during collection of MNRJ 11262 and 11274 was 13° C.

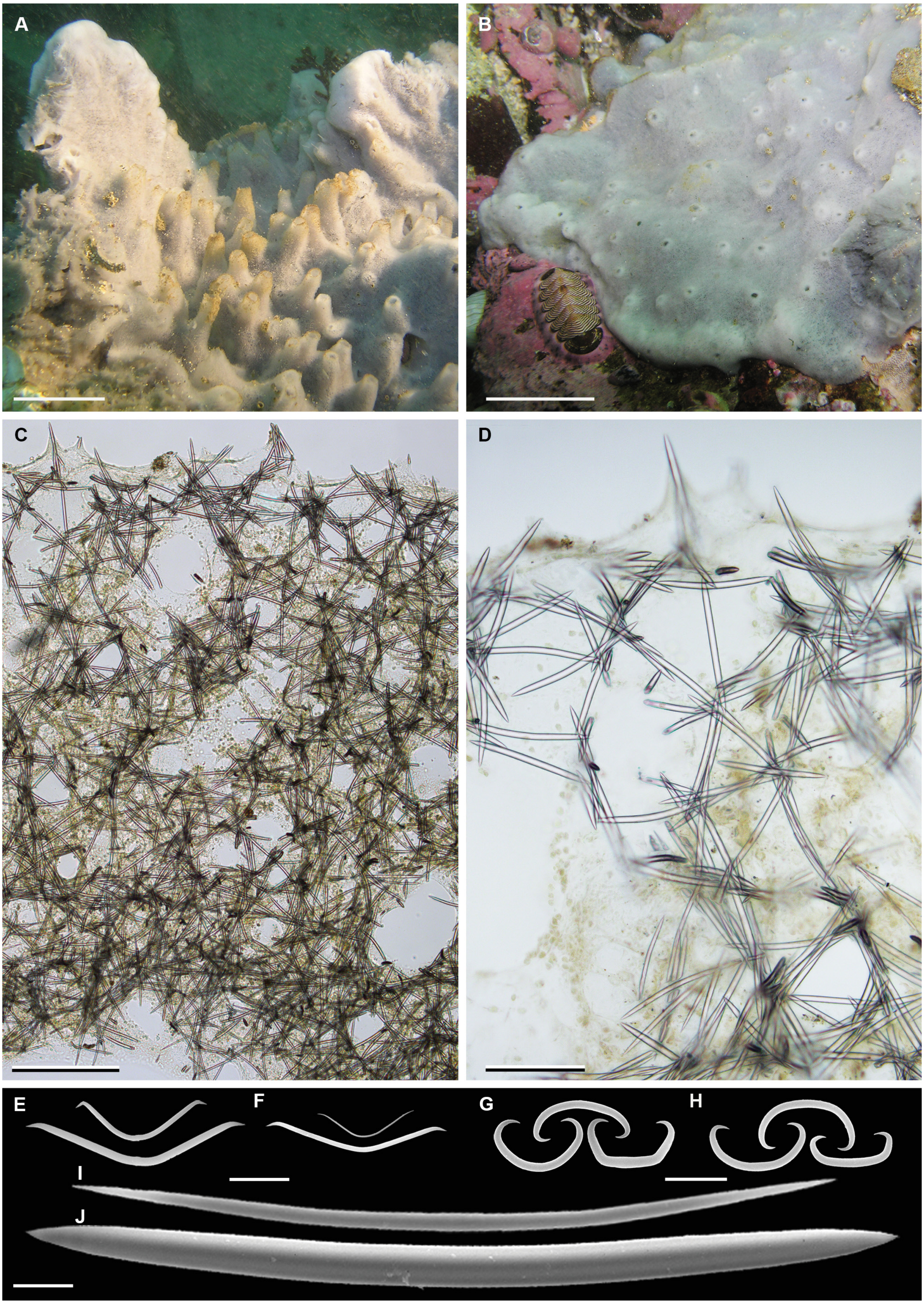

FIGURE 5. ***Haliclona*** **(*Gellius*)** ***concreta*** **sp. nov.** A–B, holotype alive (MNRJ 11274); C, skeletal architecture in transverse ground section (from MNRJ 11274, holotype); D, detail of C; E–F, toxas (from MNRJ 11274 and MNRJ 13647, respectively); G–H, sigmas (from MNRJ 11274 and MNRJ 13647, respectively); I–J, oxeas (MNRJ 11274). Scale bars: A–B, 2 cm; C, 500 µm; D, 200 µm; E–F, I–J, 20 µm; G–H, 5 µm.

TABLE 5. Spicules measurements for *Haliclona* (*Gellius*) *concreta* **sp. nov.** All values in µm, expressed as follows: minimum–*mean*–maximum length x width.

Specimen	Oxeas	Sigmas	Toxas
MNRJ 11274 (Holotype)	203–*256*–294 x 5.0–*10.6*–15.0 (n=40 x 20)	5.4–*7.6*–8.6 x 0.7–*0.8*–1.0 (n=12 x 12)	27–*53*–73 x 0.6–*1.7*–2.9 (n=8 x 8)
MNRJ 11262 (Paratype)	262–*294*–324 x 8.9–*12.7*–15.1 (n=30 x 30)	6.0–*7.4*–8.6 x 0.4–*0.6*–0.8 (n=19 x 19)	19–*42*–60 x 0.8–*1.8*–2.5 (n=24 x 24)
MNRJ 13647 (Paratype)	190–*222*–246 x 2.9–*9.4*–11.9 (n=30 x 30)	6.4–*7.8*–9.2 x 0.5–*0.7*–0.9 (n=30 x 30)	23–*34*–60 x 0.2–*0.6*–1.8 (n=19 x 19)

Distribution (Fig. 3B). Only known from Bahía de Sechura (Piura Region), Islas Macabi (La Libertad Region), Islas Lobos de Afuera (Lambayeque Region) and Isla Tortuga (Ancash Region), in Peru.

Etymology. The specific epithet, "*concreta"* (from the L. *concretus* = hardened, stiff), is used as a noun in apposition and highlights the hard consistency of the new species.

Remarks. The isotropic, confused skeleton in combination with large-sized oxeas and toxas as microscleres warrants a confident assignment of this species to *Haliclona* (*Gellius*) sensu de Weerdt (2002). The single haplosclerid species in the Eastern Pacific with a similar spicular complement of oxeas, sigmas and toxas is *Oceanapia microtoxa* Desqueyroux-Faúndez & van Soest, 1997 from the Galápagos (Table 3). Nevertheless, this species has longer oxeas that could reach up to 549 µm, sigmas in three categories that are always larger in size in comparison to the new species, and toxas in two categories (Desqueyroux-Faúndez & van Soest 1997). These features set both species apart. In our opinion, *Oceanapia microtoxa* is better assigned to *Haliclona* (*Flagellia*) as its sigmas 1 bear the characteristic flagellosigma shape *sensu* van Soest (2017), the type material lacks the characteristic fistules of *Oceanapia*, and it has an irregular choanosomal skeleton with irregular multispicular tracts. The presence of these tracts in *H.* (*Flagellia*) *microtoxa* **comb. nov.** is shared with *Haliclona* (*Flagellia*) *indonesiae* van Soest, 2017, and both their choanosomal skeletons appear to be less regular than that of typical *Oceanapia* redescribed in detail by de Weerdt (1985)*,* such as *O. robusta* (Bowerbank, 1866) and *O. isodictyiformis* (Carter, 1882).

Haliclona (*Gellius*) *tenerrima* Burton, 1954 is another closely-related species, presenting a greyish colour, oxeas, sigmas and toxas of similar shape and within the same range (de Weerdt 2000). However, *H.* (*G.*) *concreta* **sp. nov.** has a hard consistency, and a more confused isotropic skeleton in opposition to the soft and fragile consistency, and a loosely organized skeleton of paucispicular primary lines irregularly connected by secondary lines in *H.* (*G.*) *tenerrima*. Furthermore, *H.* (*G.*) *concreta* **sp. nov.** is a conspicuous species, that sometimes can expand up to 20 cm laterally, reach up to 7 mm in thickness, and bear oscula of 1–6 mm wide, whilst *H.* (*G.*) *tenerrima* is a cryptic species, less than 1 cm in diameter, only up to 2 mm thick, and without visible oscula, at least when preserved (de Weerdt 2002). In addition, *H.* (*G.*) *tenerrima* is a tropical Western Atlantic species, making conspecificity very unlikely.

The other three *Haliclona* (*Gellius*) spp. known to occur in the Eastern Pacific are *H.* (*G.*) *laubenfelsi* van Soest & Hooper, 2020, from Hawaii and Clipperton Island; *H.* (*G.*) *perforata* (Wilson, 1904) from Panama; and *H.* (*G.*) *textapatina* (de Laubenfels, 1926) from off Santa Cruz, California (Table 3). *Haliclona* (*G.*) *concreta* **sp. nov.** is easily distinguished from *H.* (*G.*) *laubenfelsi* by dimensions of the oxeas, that are 190–324 µm long in the former, whereas *H.* (*G.*) *laubenfelsi* has small oxeas 93–140 µm long (van Soest *et al.* 2011). *Haliclona* (*G.*) *concreta* **sp. nov.** is set apart from *H.* (*G.*) *perforata* and *H.* (*G.*) *textapatina* due to its smaller sigmas (5.4–9.2 x 0.4–1.0 µm), and presence of toxas, in opposition to *H.* (*G.*) *perforata* and *H.* (*G.*) *textapatina* larger sigmas (18 x 2 µm and 50–80 x 2–4 µm, respectively), and absence of toxas (Wilson 1904; de Laubenfels 1926).

Haliclona (*Halichoclona*) de Laubenfels, 1932

Definition. Chalinidae with a choanosomal skeleton consisting of a subisotropic, somewhat confused reticulation, commonly intercepted by many choanosomal spaces. Ectosomal skeleton of the same structure as the choanosome, usually very loosely overlaying the choanosome, from which it may be separated by extensive subectosomal spaces. Spongin absent or very scarce, at the nodes of the spicules. Megascleres usually acerate or hastate oxeas. Microscleres, if present, microxeas or sigmas. Sponges commonly relatively crisp and brittle, only slightly compressible (de Weerdt 2002).

***Haliclona* (*Halichoclona*) *arequipaensis* sp. nov.**

(Figure 6, Table 3)

Holotype. MNRJ 12140 (Vouchers: RBINS-IG 32240-POR 12140, MHNG 85947)—Playa Catarindo, Mollendo, Arequipa Region (17°01'08.93" S, 72°02'03.25" W), depth 4–5 m, coll. Y. Hooker, U. Zanabria & Ph. Willenz (26/XI/2008). **Paratype.** MNRJ 12147 (Vouchers: RBINS-IG 32240-POR 12147, MHNG 85589)—Punta Hornillos, Matarani, Arequipa Region (16°52'49.80" S, 72°17'18.24" W), depth 15 m, coll. Y. Hooker, U. Zanabria & Ph. Willenz (28/XI/2008).

Diagnosis. The only *Haliclona* in the Eastern Pacific with the combination of thickly encrusting habit, reaching up to 30 cm in diameter, eventually with erect, lamellate or crest-like projections, dull pink colour alive, dense isotropic reticulation with few paucispicular tracts in the choanosome, and oxeas reaching up to 108–198 µm in length.

Description (Fig. 6A, B). Thickly crustose, up to 5 mm thick, over 30 cm in largest diameter (MNRJ 12140), forming erect, lamellate or crest-like projections (MNRJ 12147, expanding distally, terminally serrated) up to 60 mm high x 20 mm wide x 5 mm thick. Surface regularly smooth to the naked eye, minutely reticulated upon closer inspection. Oscula, 1–2 mm in diameter, spread all over the sponge surface, apical on abundant, 1 mm high volcaniform bumps. Consistency resilient, flexible. Colour in life dull pink.

Skeleton (Fig. 6C, D). Ectosome a dense, slightly confused, tangential isotropic reticulation. Choanosome a dense, uni- to multispicular isotropic reticulation, with 2–10 oxeas by knot, pierced here and there by subectosomal and choanosomal spaces, up to 900 µm in diameter. Tracts nearly totally absent, the few seen were loose, paucispicular, parallel to the surface, albeit deep in the choanosome. Spongin scarce, only observed at the nodes of the reticulation.

Spicules (Fig. 6E–G). Oxeas, fusiform, straight, or more frequently subtly bent at centre, sharp acerate points, holotype: 123–*161.3*–198 x 2.4–*7.1*–12.6 µm (n = 40 x 40); paratype: 108–*147.2*–178 x 2.2–*7.3*–11.9 µm (n = 40 x 40).

Ecology. Specimens collected from erect rocky substrate; co-occurring with limpets, shrimps, anemones, additional sponges (including *Niphates ruthecitae* **sp. nov.**, see below), and large seastars. Several crabs (hermit crabs and others) were observed on the surface of *H.* (*Halich.*) *arequipaensis* **sp. nov.** The paratype carried a thin brown (turf?) mat in parts of its surface. Recorded depth was 4 to 15 meters. Water temperature during collections was 15–16°C.

Distribution (Fig. 3C). Only known from areas close to Matarani and Mollendo (Arequipa Region), in Peru.

Etymology. The epithet "*arequipaensis"* refers to the Arequipa Region where both specimens were collected.

Remarks. There are five other *Haliclona* spp. along the Eastern Pacific that approach the most *H.* (*Halich.*) *arequipaensis* **sp. nov.** regarding their shape and/or skeletal architecture: *H. agglutinata* Desqueyroux-Faúndez, 1990, from Easter Island; *H.* (*Halich.*) *algicola*, from Chile; *H.* (*Halicl.*) *dianae* Sim-Smith, Hickman Jr. & Kelly, 2021 from Galápagos; *H.* (*Halich.*) *gellindra* (de Laubenfels, 1932), from California; *H.* (*Halich.*) *paracas* **sp. nov.**, from Peru; *H. rapanui* (Desqueyroux-Faúndez, 1990), from Easter Island; and *Haliclona* (*Halich.*) *thielei* van Soest & Hooper, 2020, from Chile (Table 3).

The encrusting shape, punctate surface, confused subisotropic skeleton, oxeas 105–122 µm long, and pale lavender colour in life (de Laubenfels 1932; de Weerdt 2002) make *H.* (*Halich.*) *gellindra* the most similar to the new species. Though its few and irregular oscula bearing raised collars about 1 mm high make conspecificty with *H.* (*Halich.*) *arequipaensis* **sp. nov.** unlikely. Additionally, *H.* (*Halich.*) *gellindra* is only known from the California coast (de Laubenfels 1932) and the Gulf of California (Dickinson 1945), separated from the Peruvian coast by the warmer waters of the Tropical Eastern Pacific.

H. (*Halich.*) *arequipaensis* **sp. nov.** is readily distinguished from *H. agglutinata* due to the latter's massive shape, reaching 10–28 cm in thickness (Desqueyroux-Faúndez 1990), in contrast to a thickly encrusting shape, 5 mm thick, in *H.* (*Halich.*) *arequipaensis* **sp. nov.** Divergence in colour and dimensions of the oxeas only marginally overlapping ensure *H.* (*Halich.*) *arequipaensis* **sp. nov.** and *H.* (*Halich.*) *algicola* as distinct species. The latter has a light grey colour alive and oxeas of 193–230 x 4–12 µm (Thiele 1905; Hajdu *et al.* 2013), contrasting with the dull pink colour in life and oxeas ranging between 108–198 x 2–13 µm in *H.* (*Halich.*) *arequipaensis* **sp. nov.** *Haliclona* (*Halicl.*) *dianae* is reddish pink in colour with a regular anisotropic reticulation of uni- to paucispicular primary lines (Sim-Smith *et al.* 2021), such an arrangement is distinct from the dense, slightly confused and isotropic reticulation present in the new species. In its turn, *H. rapanui* has a thickly encrusting habit, 19 mm thick,

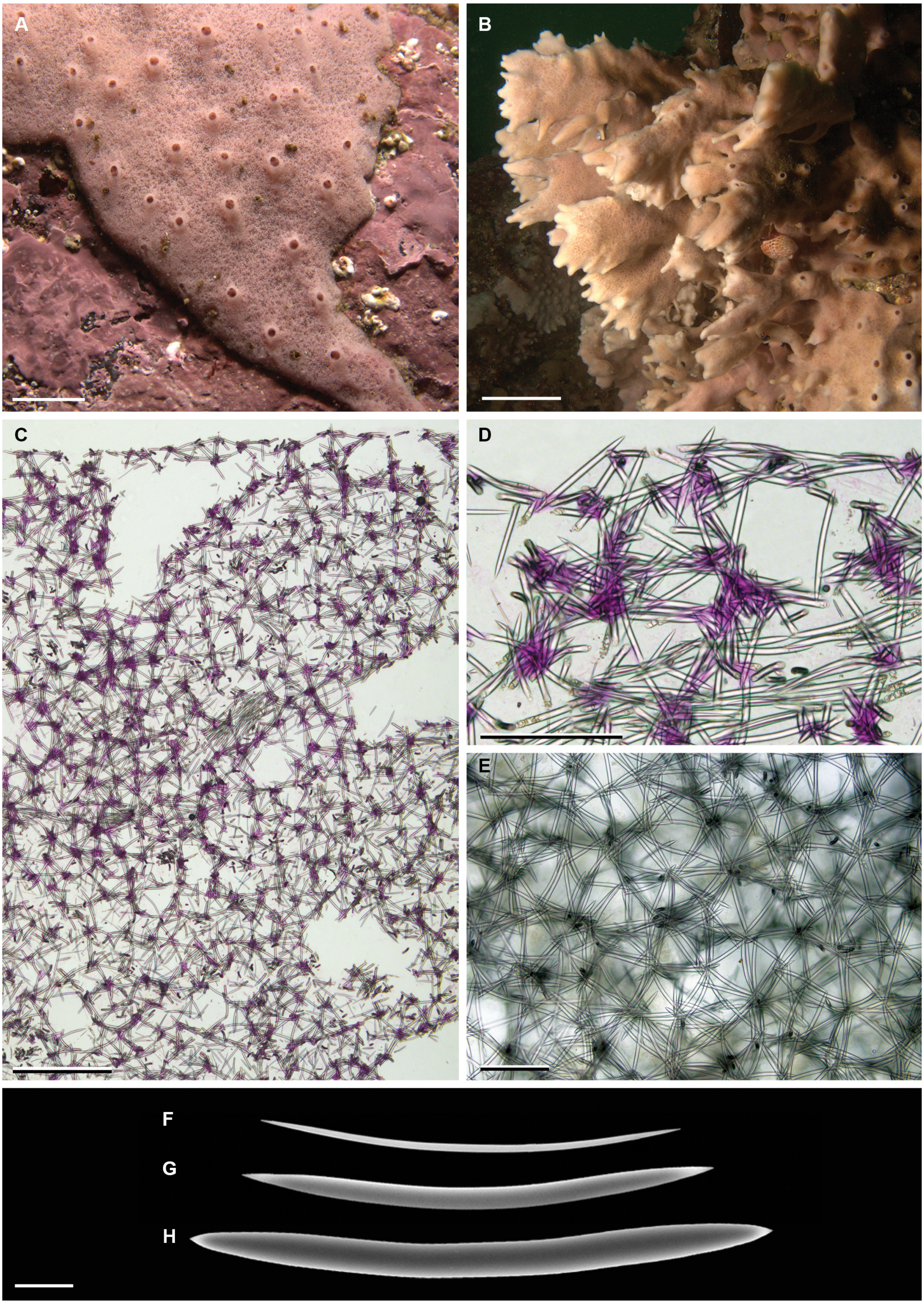

FIGURE 6. ***Haliclona (Halichoclona) arequipaensis* sp. nov.** A, holotype alive (MNRJ 12140); B, paratype alive (MNRJ 12147); C–D, skeletal architecture in transverse ground section (MNRJ 12140, holotype); E, ectosomal skeleton architecture in tangential ground section (MNRJ 12147, paratype); F–H, oxeas (MNRJ 12147, paratype). Scale bars: A, 1 cm; B, 2 cm; C, 500 µm; D–E, 200 µm; F–H, 20 µm.

hispid surface, and lacks an ectosome (Desqueyroux-Faúndez 1990), whilst *H. (Halich.) arequipaensis* **sp. nov.** has 5 mm in thickness, a smooth surface, and a tangential ectosome. Comparison with *H.* (*Halich.*) *paracas* **sp. nov.** is provided below in the remarks section of the latter species.

Haliclona (*Halich.*) *thielei* is an intertidal species from the Caleta Tumbes area in Chile (Hajdu *et al.* 2013). The original description of this species was based on several fragments in a same jar that Thiele (1905) doubtfully considered as part of an interspecific variability in two forms: one has a dense and irregular skeleton (from now on called " Spicule reinforced form") and the other with a regular skeleton of oxeas and abundant spongin.(from now on called " Spongin reinforced form). Nevertheless, these differences regarding the skeletal architecture and oxeas' dimensions in both forms indicate the presence of, at least, two species in the type material of *H.* (*Halich.*) *thielei*. Thus, a taxonomic revision of this species is necessary. Notwithstanding, the " Spicule reinforced form" of *H.* (*Halich.*) *thielei* is similar to *H.* (*Halich.*) *arequipaensis* **sp. nov.**, though both are distinct based on the following features: *H.* (*Halich.*) *thielei* " Spicule reinforced form" has blue-green or violet-grey colour alive, more organized skeleton close to the surface, with discernible paucispicular tracts (similar to *Rhizoniera* subgenus architecture), and shorter oxeas of 140–150 µm. In turn, *H.* (*Halich.*) *arequipaensis* **sp. nov.** has dull pink colour alive, an isotropic skeleton, with loose paucispicular tracts parallel to the surface in the deeper choanosome, and oxeas occurring in a larger size range, 108–198 µm.

***Haliclona* (*Halichoclona*) *marcoriosi* sp. nov.**

(Figure 7, Table 3, Table 6)

Holotype. MNRJ 13069 (Vouchers: RBINS-IG 32241-POR 13069, MHNG 85857)—Cancas, Tumbes Region (03°55'14.10" S, 80°56'46.80" W), depth 15.2 m, coll. Y. Hooker & Ph. Willenz (30/XI/2009). **Paratypes.** MNRJ 12975 (Vouchers: RBINS-IG 32241-POR 12975, MHNG 85764)—Punta Sal, Fondadero Balneario, Tumbes Region (03°58'04.1" S, 80°58'09.30" W), depth 9.7 m, coll. Y. Hooker, C. Segani & Ph. Willenz (21/XI/2009); MNRJ 13001 (Vouchers: RBINS-IG 32241-POR 13001, MHNG 85789)—Baja de La Antena, Punta Sal, Tumbes Region (03°57'15.60" S, 80°57'57.80" W), depth. 15–17 m, coll. Y. Hooker (22/XI/2009). **Additional material deposited in collections.** MNRJ 11470 (Vouchers: RBINS-IG 32239-POR 11470, MHNG 85466)—Baja de La Antena, Punta Sal, Tumbes Region (03°57'15.60" S, 80°57'57.80" W), depth 12 m, coll. Y. Hooker, M. Rios & Ph. Willenz (16/X/2007).

Diagnosis. The only *Haliclona* in the Eastern Pacific combining a repent-ramose habit, with several anisodiametric tubes, up to 5 cm high, frequently anastomosing, pinkish beige to pink colour alive, isotropic reticulation with few paucispicular tracts, and oxeas 97–157 µm long.

Description (Fig. 7A, B). Sponge mainly repent-ramose, irregular, with abundant tubular (MNRJ 11470, 13001 and 13069) or lobate (MNRJ 12975) projections of varied sections (from nearly circular to variously elliptic, 10–50 mm high), mostly not isodiametric (4–14 mm wide), bearing oscula on their sides, or more frequently apically, which are usually surrounded by a thin membrane (2–7 mm high). Occasional blind fistules/thorns present, especially close to the oscula. Surface smooth, even, punctate. Oscula circular to oval, 1–9 mm wide. Consistency firm, but brittle and fragile. Colour alive predominantly pink, but whitish and yellowish parts also occur, fading away in ethanol to an off-white to beige overall colouration.

Skeleton (Fig. 7C–E). Ectosome a dense and confused isotropic skeleton. Choanosome a unispicular isotropic reticulation more regular than the ectosome, though still dense, creating triangular meshes, but also with many spicules in confusion, and presence of spaces (221–866 µm in diameter); some poorly defined paucispicular tracts also observed, but without a clear orientation. Spongin scarce, barely observable at the nodes of the reticulation.

Spicules (Fig. 7F, G). Oxeas, acerate, most slightly curved, some straight, 97–*137*–164 x 1.6–*5.7*–9.0 µm (Table 6).

Ecology. Found on rocky substrate, growing alone or interwoven with other benthic invertebrates, such as calcareous bryozoans (MNRJ 13001) or octocorals (MNRJ 11470). Depth ranging from 9.7 to 17 m. Water temperature during collection of MNRJ 13069 was 23° C.

Distribution (Fig. 3C). Only known from Cancas and Punta Sal (Tumbes, Region), in Peru.

Etymology. The epithet "*marcoriosi"* honours Marco Samuel Rios Morales, who joined the diving team with great enthusiasm and efficiency, at different occasions all along the ESPER Project (2007–2009).

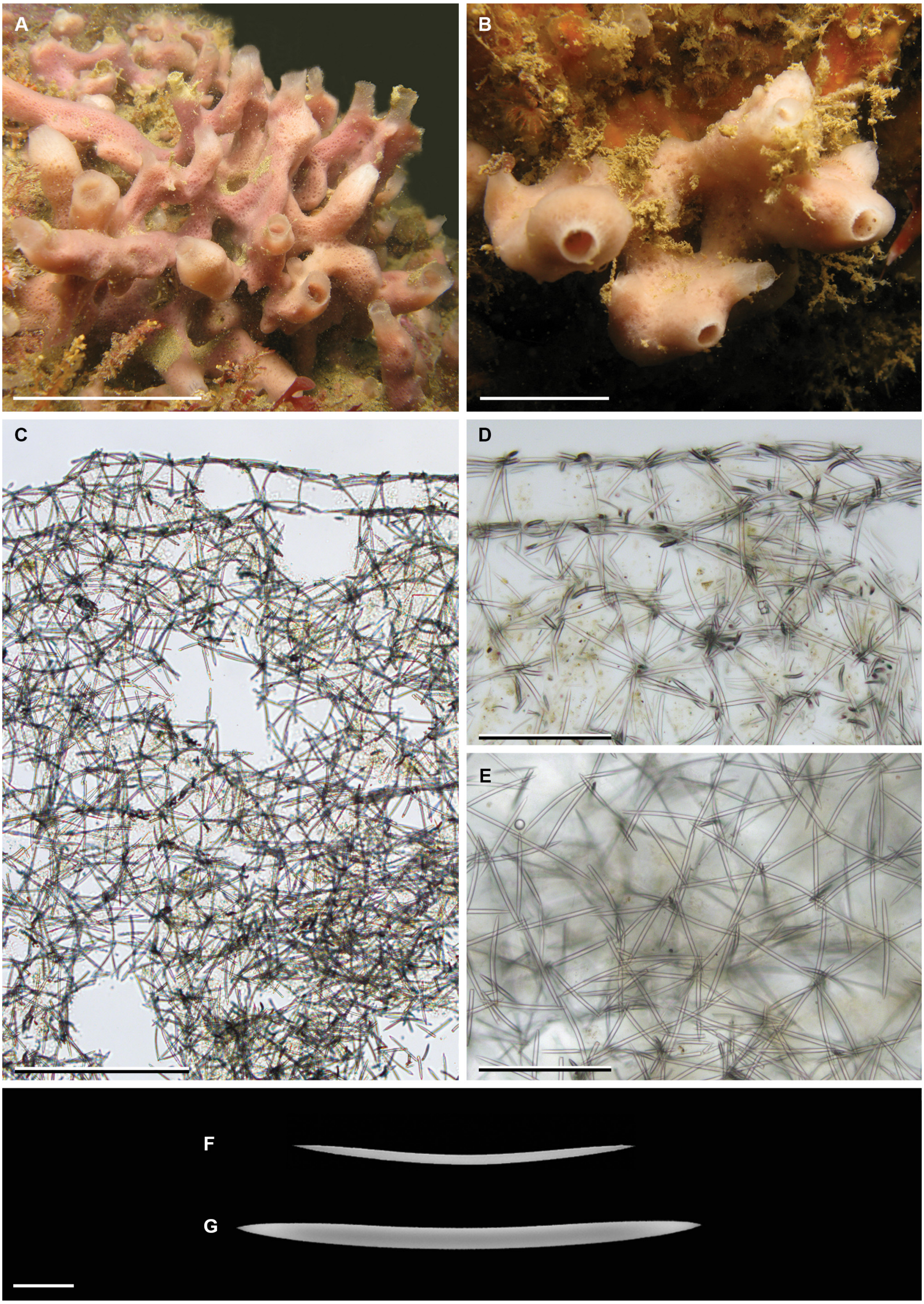

FIGURE 7. ***Haliclona (Halichoclona) marcoriosi*** **sp. nov.** A, holotype alive (MNRJ 13069); B, paratype alive (MNRJ 12975); C–D, skeletal architecture in transverse ground section (MNRJ 13069, holotype); E, ectosomal skeleton architecture in tangential ground section (MNRJ 13069, holotype); F–G, oxeas (MNRJ 13069, holotype). Scale bars: A, 5 cm; B, 1 cm; C, 500 µm; D–E, 200 µm; F–G, 20 µm.

TABLE 6. Spicules measurements for *Haliclona* (*Halichoclona*) *marcoriosi* **sp. nov.** All values in µm, expressed as follows: minimum–*mean*–maximum length x width.

Specimen	Oxeas
MNRJ 12975 (Holotype)	97–*139*–160 x 1.8–*5.9*–8.0 (n=44 x 44)
MNRJ 13001 (Paratype)	103–*134*–157 x 3.1–*5.9*–7.6 (n=41 x 41)
MNRJ 13069 (Paratype)	98–*133*–157 x 1.6–*5.0*–9.0 (n=47 x 47)
MNRJ 11470	120–*144*–164 x 3.4–*6.3*–8.0 (n=42 x 42)

Remarks. *Haliclona* (*Halichoclona*) *marcoriosi* **sp. nov.** is quite distinct from its congeners in the Eastern Pacific (Table 3). Those that approach the new species in colour are *H. agglutinata*, from Easter Island; *H.* (*Re.*) *caduca* Hajdu *et al.*, 2013, from Los Lagos Region in Chile; *H.* (*Halicl.*) *clairae* Sim-Smith, Hickman Jr. & Kelly, 2021, from Galápagos; and *H.* (*S.*) *roslynae* Sim-Smith, Hickman Jr. & Kelly, 2021, also from Galápagos. Nevertheless, the new species differs from *H. agglutinata* regarding the latter's massive shape and predominant off-white colour (Desqueyroux-Faúndez 1990). *Haliclona* (*Halich.*) *marcoriosi* **sp. nov.** is distinguished from *H.* (*Re.*) *caduca* given the latter's much more delicate, unispicular skeleton, and much smaller oxeas (85–113 µm) (Hajdu *et al.* 2013). The very soft consistency, the thickly encrusting shape and the smaller oxeas (93–117 µm) of *H.* (*S.*) *roslynae* (Sim-Smith *et al.* 2021) set this species and *H.* (*Halich.*) *marcoriosi* **sp. nov.** apart. On the other hand, *H.* (*Halicl.*) *clairae* resemble very much the new species not only in colour, but also given its punctate surface and presence of tubular projections. However, both species can be set apart by the thinly encrusting (3 mm thick) shape, very soft consistency, small oscula (up to 2 mm in diameter), and anisotropic reticulation of multispicular primary lines, regularly connected by unispicular secondary lines bounded by abundant nodal spongin as seen in *H.* (*Halicl.*) *clairae* (Sim-Smith *et al.* 2021).

Another species that approaches *H.* (*Halich.*) *marcoriosi* **sp. nov.** due to its ramose habit is *H.* (*Halicl.*) *ambrosia* (Dickinson, 1945), known from the San Marco Island at the Gulf of California. However, *H.* (*Halicl.*) *ambrosia* does not develop tubular projections, and has oxeas in two categories (oxeas I, 240 x 14; oxeas II, 130 x 3 µm long) (Dickinson 1945).

Other species known to have a similar tubular habit are *H.* (*S.*) *auletta* (Thiele, 1905), *H.* (*S.*) *chilensis* (Thiele, 1905) and *H.* (*Halicl.*) *spinosella* (Thiele, 1905). The first two are from the Los Lagos Region in Chile and the latter from the Strait of Magellan area. In spite of *H.* (*S.*) *auletta*'s and *H.* (*S.*) *chilensis*' tubular habit, the tubes in *H.* (*S.*) *auletta* are particularly distinct as they arise from a basal mat (Thiele 1905). Notwithstanding, both species are distinguished from the new species based on their loose and discontinuous skeleton with ill-defined paucispicular tracts close to the surface, in addition to short-pointed conical oxeas in *H.* (*S.*) *auletta* and blunt-pointed oxeas in *H.* (*S.*) *chilensis* (Thiele 1905). In turn, *H.* (*Halicl.*) *spinosella* is another tubular species, but with a surface much more irregular and verrucose (Thiele 1905) than observed in *H.* (*Halich.*) *marcoriosi* **sp. nov.**

Haliclona (*Halichoclona*) *multiosculata* sp. nov.

(Figure 8, Table 3)

Holotype. MNRJ 13682 (Vouchers: RBINS-IG 32241-POR 12080, MHNG 85920)—La Cabrillera, Isla Foca, Piura Region (05°12'09.30" S, 81°12'39.90" W), depth 15 m, coll. Y. Hooker, M. Rios & Ph. Willenz (11/XII/2009).

Diagnosis. Only *Haliclona* in the Eastern Pacific with the combination of encrusting habit, with abundant oscula usually aligned in rows on ridges, rough surface, firm consistency and light pink colour alive, isotropic skeleton of oxeas 87–135 µm in length.

Description (Fig. 8A, B). Encrusting, up to ca. 6 mm thick, covering large areas up to 15 x 20 cm. Surface rough. Oscula abundant, circular, ca. 1–4 mm wide, frequently aligned in rows on ridges. Consistency firm. Colour in life light pink.

Skeleton (Fig. 8C, D). Ectosome a dense isotropic reticulation, with some discernible triangular to squared meshes, slightly confused. Choanosome of the same structure as the ectosome, but denser. Spongin scarce, only found at the nodes of the reticulation.

Spicules (Fig. 8E, F). Oxeas, slender, subtly bent at centre, sharp hastate points, 87–*116*–135 x 1.9–*6.2*–8.7 µm (n = 45 x 45).

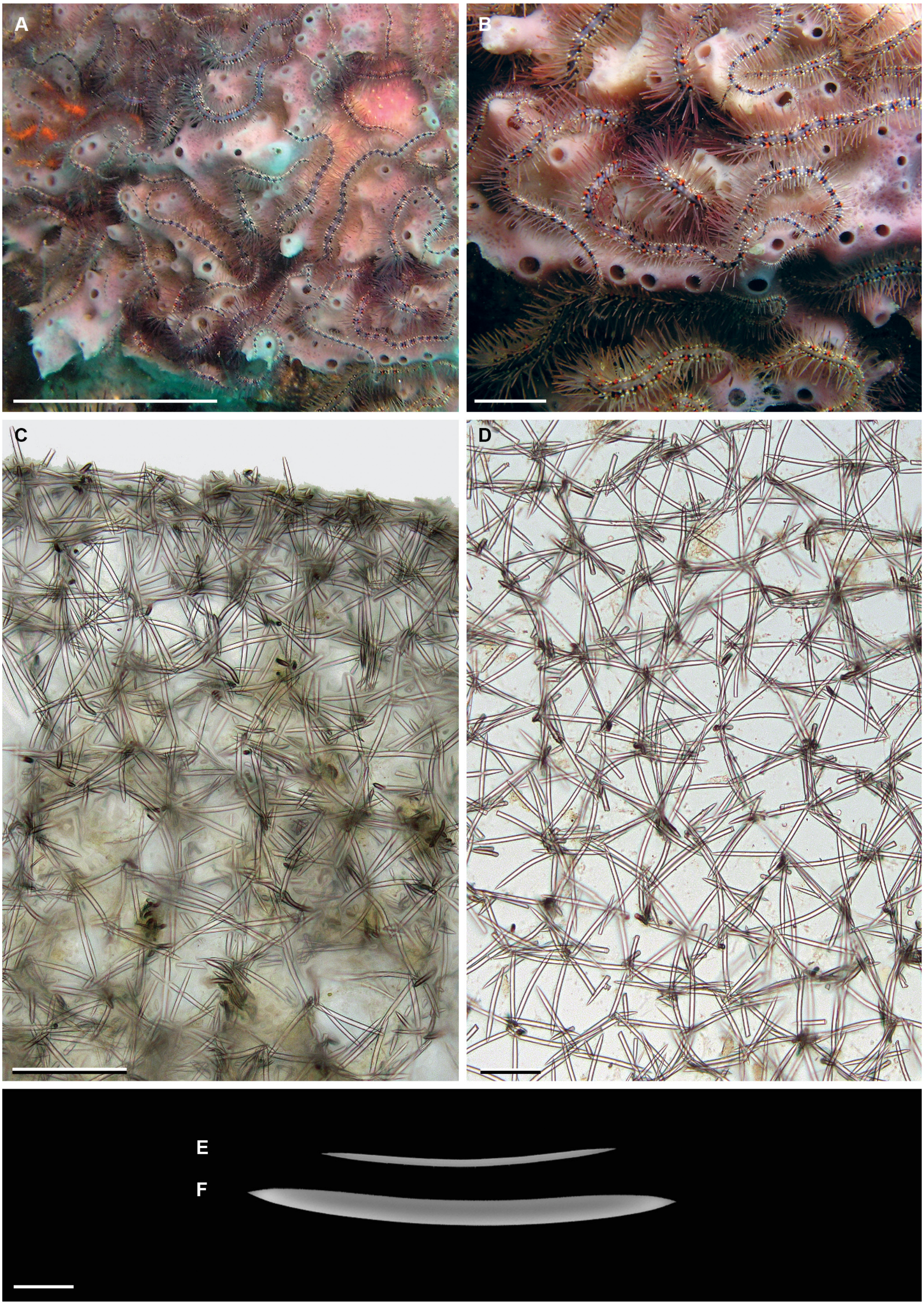

FIGURE 8. ***Haliclona (Halichoclona) multiosculata*** **sp. nov. (MNRJ 13682, holotype).** A–B, holotype alive; C, skeletal architecture in transverse ground section; D, ectosomal skeleton architecture in tangential ground section; E–F, oxeas in SEM. Scale bars: A, 5 cm; B, 1 cm; C, 200 µm; D, 100 µm; E–F, 20 µm.

Ecology. Found on rocky substrate around 15 m depth, associated with many ophiuroids. Water temperature during collection was 21° C.

Distribution (Fig. 3C). Only known from its type locality, Isla Foca (Piura Region, Peru).

Etymology. The epithet "*multiosculata"* is used as a noun in apposition that refers to the abundance of oscula in the new species (L. *multi* = much).

Remarks. There are no clear relatives of *H.* (*Halich.*) *multiosculata* **sp. nov.** in the Eastern Pacific (Table 3). *Haliclona agglutinata* is most similar to the new species with a choanosomal skeleton of comparable architecture, oxeas within a similar size range (102–140 µm), and colour alive off-white with pinkish areas (Desqueyroux-Faúndez & van Soest 1997). Nevertheless, the new species is encrusting, much thinner than *H. agglutinata*, has oscula commonly aligned on ridges, and skeleton without paucispicular tracts.

Other Eastern Pacific *Haliclona* spp. that might be related to the new species regarding its skeleton architecture and/or shape are *H.* (*Halich.*) *conica* (Thiele, 1905), *H.* (*Halich.*) *gellindra*, *H. (Re.*) *sordida* (Thiele, 1905), and *H.* (*Halich.*) *thielei*. However, the new species differs from *H.* (*Halich.*) *conica* for the latter's conical habit (15 mm thick) and longer oxeas (165 x 10 µm) (Thiele 1905). In addition, *H.* (*Halich.*) *gellindra* can also be distinguished by its fragile consistency, fewer and smaller oscula, and occurrence restricted to the Temperate Northeastern Pacific, along California and the coast of the Gulf of California (de Laubenfels 1932; Dickinson 1945). *H.* (*Re.*) *sordida* considerably approaches the new species by its encrusting habit (5–7 mm thick), smooth to irregular surface, and grouped oscula. However, *H.* (*Re.*) *sordida*'s smaller oscula (0.5 mm wide), its skeletal architecture with loose ascending tracts, and longer oxeas (200 x 9 µm) differentiate the two species (Thiele 1905; Hajdu *et al.* 2013). Finally, *H.* (*Halich.*) *thielei* also has an encrusting shape, but it has distinct colour alive (blue, grey or violet-grey), and never has oscula aligned on ridges (Thiele 1905; Hajdu *et al.* 2013).

***Haliclona* (*Halichoclona*) *paracas* sp. nov.**

(Figure 9, Table 3)

Holotype. MNRJ 12841 (Vouchers: RBINS-IG 32240-POR 12841, MHNG 85674)—Unnamed Locality #2, Isla Santa Rosa, Reserva Nacional de Paracas, Ica Region (14°19'10.2" S, 76°09'52.4" W), depth 8 m, coll. Y. Hooker, F. Azevedo & Ph. Willenz (10/XII/2008).

Comparative material. *Reniera algicola* Thiele, 1905: ZMB POR 3320—syntype (slides), Talcahuano, Chile.

Diagnosis. The only *Haliclona* in the Eastern Pacific with a combination of thinly encrusting habit, beige colour alive, abundant oscula about 1 mm wide, punctate surface, and an isotropic and dense reticulation of oxeas 157–211 µm long, without spicule tracts.

Description (Fig. 9A, B). Thinly encrusting, ca. 1–3 mm thick, occupying an area of ca. 6.0 x 3.5 cm. Surface smooth, punctate, with small volcaniform projections, 1.0–1.6 mm high, topped by an oscule. Oscula common, circular, 0.8–1.2 mm wide. Consistency firm, but compressible. Colour alive beige, colour in ethanol yellowish cream.

Skeleton (Fig. 9C–E). Ectosomal skeleton a dense, uni- to paucispicular, isotropic reticulation, slightly confused, but with some discernible triangular to squared meshes (Fig. 9E). Choanosome of the same structure as the ectosome, albeit there are some subectosomal and choanosomal spaces, 600–1500 µm (Fig. 9C, D). Spongin scarce, only observed at the nodes of the reticulation.

Spicules (Fig. 9F, G). Oxeas, slightly curved, acerate, 157–*187*–211 x 5.1–*10.2*–12.8 µm (n = 30 x 30).

Ecology. Found on rocks at 8 m depth, together with other sponges and sea anemones. Water temperature during collections was 14° C.

Distribution (Fig. 3D). Only known from its type locality, Isla Santa Rosa (Ica Region), in Peru.

Etymology. The epithet "*paracas"* is used as a noun in apposition referring to the Marine Protected Area of Paracas, where Isla Santa Rosa (type locality) is located.

Remarks. The isotropic reticulation of the new species could fit both in *H.* (*Reniera*) or *H.* (*Halichoclona*). However, we decided for the assignment to *H.* (*Halichoclona*) based on the presence of a dense and confused reticulation in areas of the choanosome, in addition to the presence of choanosomal and subectosomal spaces. In addition, the ectosomal skeleton is supposed to be very regular and unispicular in *H.* (*Reniera*) (de Weerdt 2002), which diverge from the dense, uni- to paucispicular and slightly confused ectosome in *H.* (*Halich.*) *paracas* **sp. nov.**

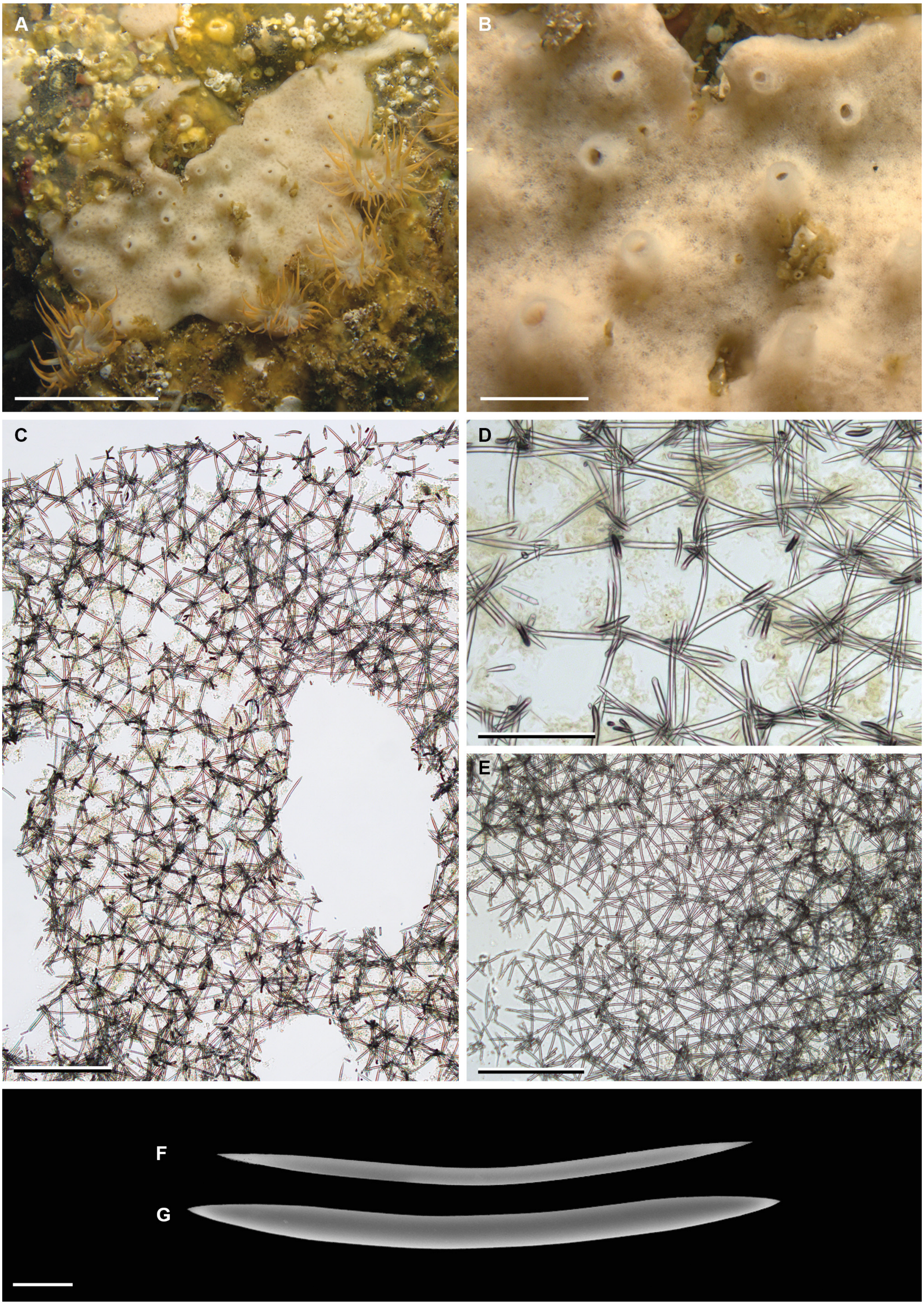

FIGURE 9. ***Haliclona (Halichoclona) paracas*** **sp. nov. (MRNJ 12841, holotype).** A–B, holotype alive; C, skeletal architecture in transverse ground section; D, detail of C; E, ectosomal skeletal architecture in tangential ground section; F–G, oxeas in SEM. Scale bars: A, 5 cm; B, 2 cm; C, 500 µm; D, 200 µm; E, 500 µm; F–G, 20 µm.

Eastern Pacific *Haliclona* spp. with encrusting shape and/or colour similar to the new species include 13 species (Table 3). Those that can be readily set apart from the new species based on their smaller oxeas are *H.* (*Re.*) *topsenti* (Thiele, 1905) (up to 150 µm), *H.* (*Halicl.*) *macropora* (Thiele, 1905) (104–124 µm), *H.* (*Halicl.*) *sonorensis* Cruz-Barraza & Carballo, 2006 (100–145 µm), *H.* (*Re.*) *oberi* Sim-Smith, Hickman Jr. & Kelly, 2021 (118–154 µm), *H.* (*Rh.*) *anceps* (up to 150 um) *H.* (*Rh.*) *enamela* (up to 120 µm), *H.* (*S.*) *roslynae* (93–117 µm), *H.* (*Halich.*) *thielei* (125–150 µm) and *H. translucida* Desqueyroux-Faúndez, 1990 (94–116 µm).

The new species and *H.* (*Re.*) *algicola* share similarly sized and shaped oxeas. Nevertheless, the light grey colour of the latter alive and the brownish colour when fixed, somewhat diverges from the beige colour in life and yellowish cream in ethanol observed in the new species. We examined an original slide of *H.* (*Re.*) *algicola* syntype (ZMB POR 3320), where we did not observe very abundant spongin in the reticulation. Contrastingly, we could observe a much more irregular and much looser reticulation in *H.* (*Re.*) *algicola* than in the new species. We believe the distinct colour in life and these small skeletal differences set both species apart. The reticulation in *H.* (*Re.*) *algicola* looks less regular than that commonly found in *H.* (*Reniera*). Nevertheless, the examined slides are insufficient to review its subgeneric assignment.

The new species differs from *H.* (*Re.*) *sordida* based on the latter's verrucose surface, grey-brown colour and presence of ascending paucispicular tracts in the choanosome (Thiele 1905). *Haliclona* (*Halich.*) *gellindra* differs by its pale-lavender colour, in addition to rare and irregular oscula (de Laubenfels 1932). In its turn, *H.* (*S.*) *spuma* has a subanisotropic reticulation of multispicular primary lines and pauci- to multispicular secondary lines and is thicker, 5–20 mm, than the new species (Sim-Smith *et al.* 2021).

***Haliclona* (*Halichoclona*) *pellucida* sp. nov.**

(Figure 10, Table 3)

Holotype. MNRJ 12149 (Vouchers: RBINS-IG 32240-POR 12149, MHNG 85591)—Punta Hornillos, Matarani, Arequipa Region (16°52'49.80" S, 72°17'18.24" W), depth 11 m, coll. Y. Hooker, U. Zanabria & Ph. Willenz (28/XI/2008).

Diagnosis. The only *Haliclona* in the Eastern Pacific with a combination of thickly encrusting to cushion-shaped habit, white colour alive with translucent smooth surface, isotropic, slightly confused to isodictyal choanosomal reticulation of oxeas 129–184 µm in length.

Description (Fig. 10A, B). Thickly encrusting to cushion-shaped, ca. 7 mm thick, spreading laterally to cover an area larger than 20 x 7 cm. Surface smooth, but uneven, just slightly punctate, translucent. Oscula common, circular, 1–3 mm wide, just slightly elevated or at the top of small volcaniform projections, up to 5 mm high. Consistency firm, nearly incompressible Colour alive is white, with a translucent surface that gives to the sponge an icy aspect.

Skeleton (Fig. 10C–E). Ectosomal skeleton a dense isotropic reticulation, with some ill-defined paucispicular tracts without a clear orientation. Choanosomal skeleton a dense and confused isotropic reticulation with occasional ill-defined paucispicular (1–4 spicules) tracts perpendicular to the surface. In some parts, the skeleton becomes a regular isodictyal reticulation, of uni- to bispicular triangular to squared meshes, Choanosomal spaces are common, especially closer to the surface, 284–756 µm wide. Spongin at the nodes of the reticulation.

Spicules (Fig. 10F–H). Oxeas, hastate, mostly curved, 129–*161*–184 µm x 3.0–*7.5*–12 µm (n = 40 x 20).

Ecology. Found on rocky substrate, underneath an overhang at about 11 m depth, co-occurring with shrimps and other sponges. Water temperature during collection was 15°C.

Etymology. The epithet "*pellucida*" refers to the vitreous aspect of this sponge (L. *pellucidus* = clear, transparent).

Distribution (Fig. 3D). Only known from its type locality, Matarani (Arequipa Region), in Peru.

Remarks. The new species has a mainly dense, isotropic skeleton, with choanosomal spaces and firm consistency, matching the *H.* (*Halichoclona*) definition. Even though, its skeleton turns into a more regular isodictyal reticulation in parts, resembling that of *H.* (*Reniera*). However, the also dense and confused ectosomal skeleton markedly deviates from the very regular and unispicular ectosome of typical *H.* (*Reniera*) as *H.* (*Re.*) *aquaeductus* (Schmidt, 1862), *H.* (*Re.*) *cinerea* (Grant, 1826) and *H.* (*Re.*) *implexiformis* (Hechtel, 1965). Thus, the new species is best classified in *H.* (*Halichoclona*).

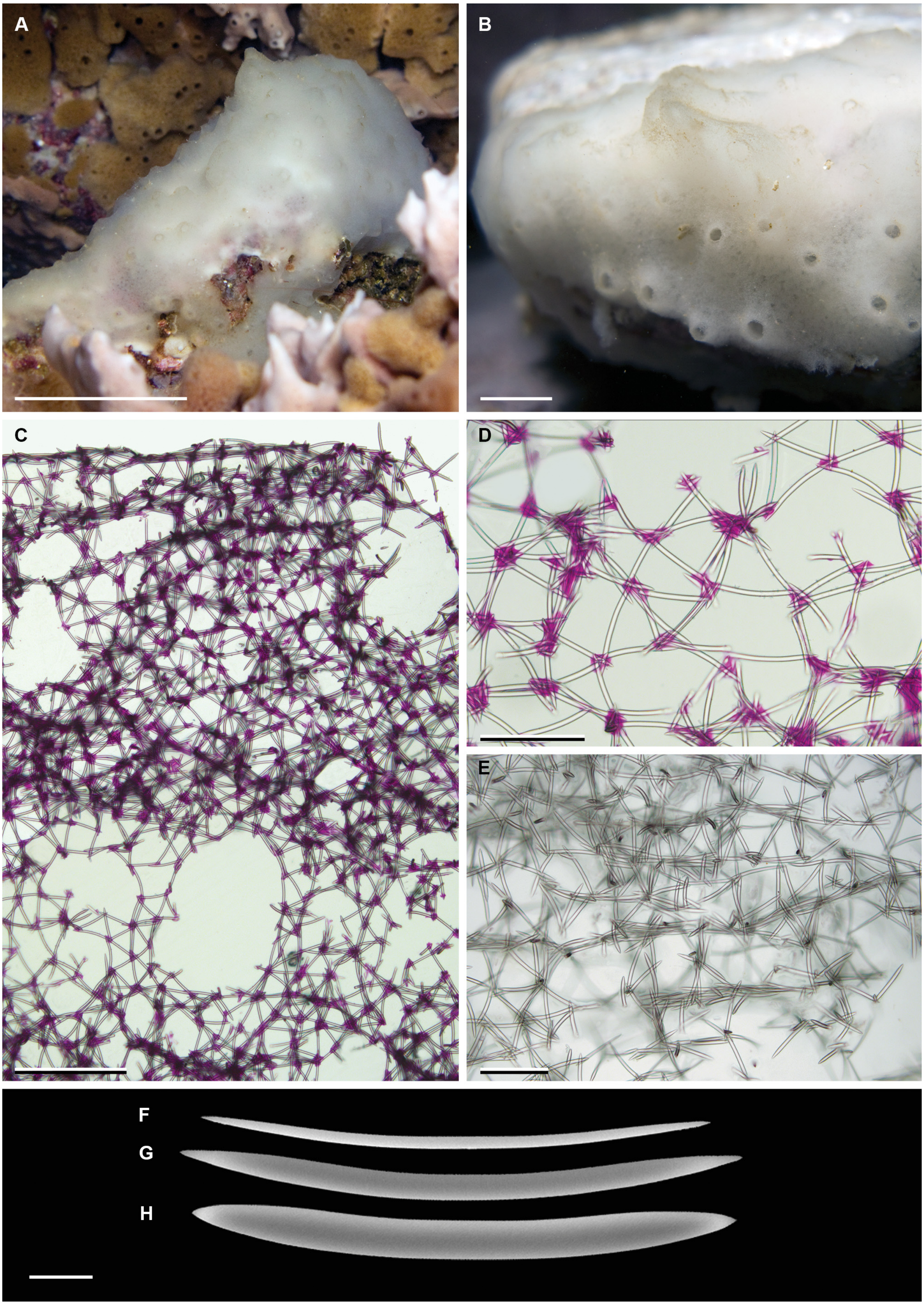

FIGURE 10. ***Haliclona (Halichoclona) pellucida*** **sp. nov. (MNRJ 12149, holotype).** A–B, holotype alive; C, skeletal architecture in transverse ground section stained with acid fuchsine; D, detail of C; E, ectosomal skeleton architecture in tangential ground section; F–H, oxeas. Scale bars: A, 5 cm; B, 1 cm; C, 500 µm; D–E, 200 µm; F–H, 20 µm.

Two species that are similar to *H.* (*Halich.) pellucida* **sp. nov.** in shape and colour are the Easter Island endemics *H. rapanui* and *H. translucida* (Table 3). The former is close to the new species in face of its thickly encrusting habit (up to 19 mm thick), oscula 2–3 mm wide and similar sized oxeas. However, the two species are easily distinguished based on their hispid surface, presence of ascending multispicular tracts in the choanosome, and oxeas usually modified to styles or strongyles in *H. rapanui* (Desqueyroux-Faúndez 1990). *Haliclona translucida* is also similar to the new species, given its white to yellow colour alive, thickly encrusting habit, oscula 1.5–2.0 mm wide, and an isodictyal to isotropic reticulation with triangular or squared meshes and no spicule tracts (Desqueyroux-Faúndez 1990). However, the latter can be differentiated from *H.* (*Halich.*) *pellucida* **sp. nov.** based on their non-overlapping oxeas' dimensions, 94–116 µm long in the Easter Island species (Desqueyroux-Faúndez 1990), and 129–184 µm in the new one.

Haliclona (*Halich.*) *pellucida* **sp. nov.** is similarly close to *H.* (*Halich.*) *arequipaensis* **sp. nov.**, *H.* (*Halich.*) *paracas* **sp. nov.**, *H.* (*Re.*) *algicola*, and *H.* (*S.*) *spuma* given their habit (overall similar shape, and somewhat similar colouration). However, *H.* (*Halich.*) *pellucida* **sp. nov.** has a distinct translucent aspect on the surface, without the same punctate aspect present in these species (Thiele 1905; Sim-Smith *et al.* 2021; present study). In addition, *H.* (*S.*) *spuma* has a subanisotropic reticulation with primary multispicular lines, whereas the new species has an isotropic to isodictyal reticulation (Sim-Smith *et al.* 2021). Finally, *H.* (*Re.*) *algicola* also has longer oxeas (193–208 µm, (Hajdu *et al.* 2013), than those of *H.* (*Halich.*) *pellucida* **sp. nov.** (129–186 µm long).

The firm consistency of *H.* (*Halich.*) *pellucida* **sp. nov.** warrants comparison with two other white-coloured Eastern Pacific haplosclerids, namely *Xestospongia dubia* (Ristau, 1978) and *Neopetrosia vanilla* (de Laubenfels, 1930). Both are white, encrusting, hard, and with a very dense isotropic reticulation, that in *X. dubia* is reinforced with multispicular tracts. These features make them distinct from the new species (de Laubenfels 1930; Ristau 1978; Lee *et al.* 2007). In fact, the generic assignment of *X. dubia* is not clear, with oxeas smaller than expected for *Xestospongia*, but approaching *Neopetrosia*. The similarities between *X. dubia* and *N. vanilla* suggests their synonymy should be evaluated.

Haliclona (*Reniera*) Schmidt, 1862

Definition. Chalinidae with a choanosomal skeleton consisting of a delicate, regular, unispicular, isotropic reticulation. Ectosomal skeleton, if present, also a tangential, unispicular, isotropic, very regular and continuous reticulation. Spongin always present at the nodes of the reticulation, but never abundant. Oxeas frequently blunt-pointed or strongylote. Microscleres, if present, toxas and sigmas. Sponges commonly soft and fragile (de Weerdt 2002).

Haliclona (*Reniera*) *parvuloxea* sp. nov.

(Figure 11, Table 3)

Holotype. MNRJ 13044 (Vouchers: RBINS-IG 32241-POR 13044, MHNG 85832)—Punta Capones, Mangroves of Tumbes, Tumbes Region (03°24'05.30" S, 80°18' 18.00" W), intertidal, coll. Y. Hooker, Ph. Willenz & K.M. Pretell Monzón (27/XI/2009).

Diagnosis. The only *Haliclona* in the Eastern Pacific with a combination of encrusting habit, presence of blind fistules, lobate projections frequently bifurcating, with an apical oscula, colour alive yellow; isotropic to isodictyal unispicular skeleton, and oxeas 62–91µm in length.

Description (Fig. 11A, B). Encrusting, with abundant, short, up to 5 mm high, cylindrical or irregular, frequently bifurcate, lobate projections; several blind fistules present; often with small, circular, apical oscula, 0.4–1.3 mm in diameter. Surface smooth, shiny out of water. Consistency soft. Colour in life yellow.

Skeleton (Fig. 11C–E). Ectosome an isodictyal to isotropic, unispicular reticulation. Choanosome an isotropic, unispicular reticulation, more regular in some parts, isodictyal; in others somewhat disorganized. Mesohyl heavily pigmented, rendering a brownish colour that even hampers skeleton observation. Spongin scarce, at the nodes of the reticulation when present.

Spicules (Fig. 11F, G). Oxeas, slender, subtly bent at centre, short acerate points, dimensions 62–*80*–91 x 1.0–*2.5*–4.0 µm (n = 40 x 20).

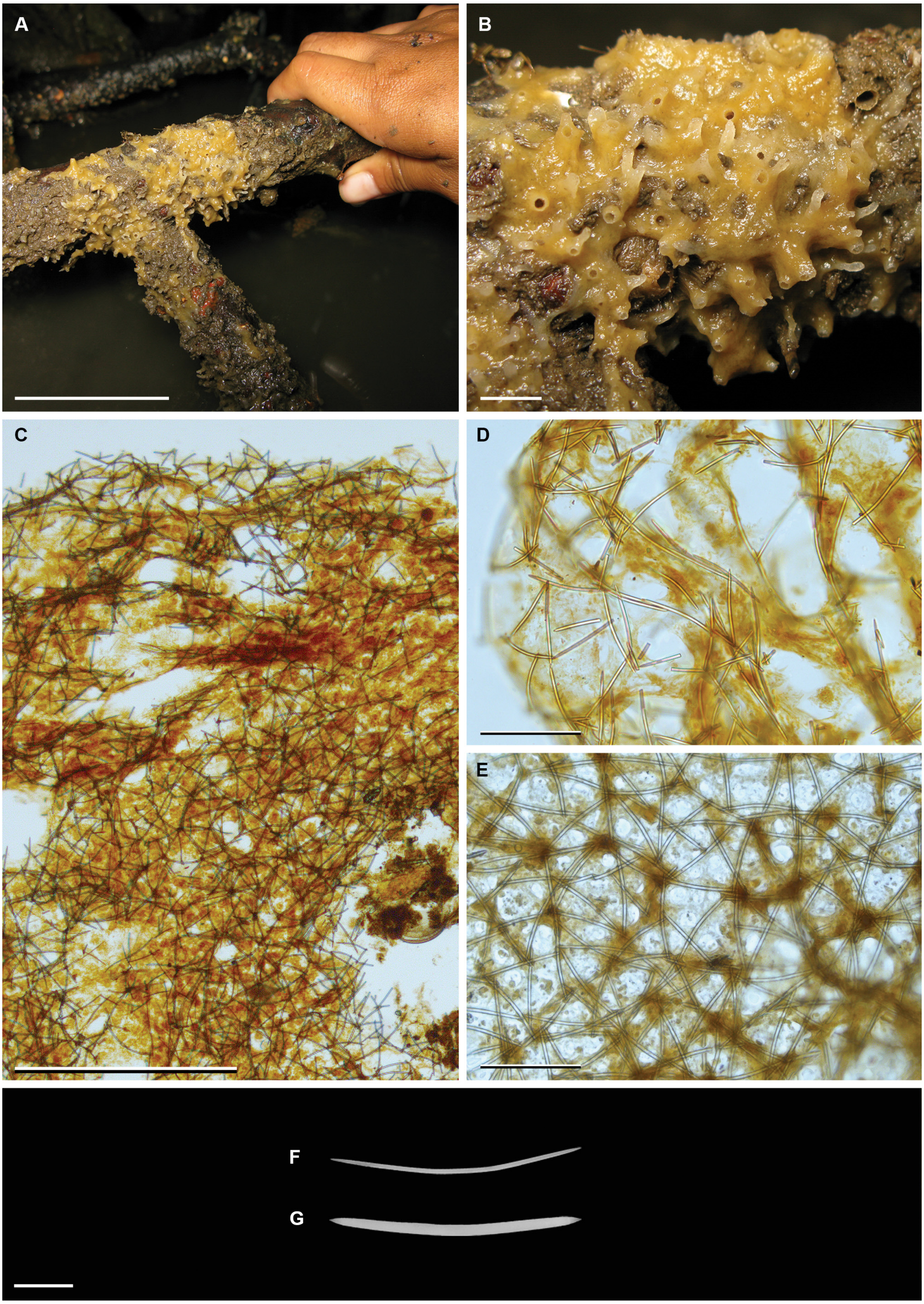

FIGURE 11. ***Haliclona (Reniera) parvuloxea*** **sp. nov. (MNRJ 13044, holotype).** A–B, holotype above water on a mangrove root; C, skeletal architecture in transverse ground section; D, detail of C (sponge surface to the left); E, ectosomal skeleton architecture in tangential ground section; F–G, oxeas. Scale bars:A, 5 cm; B, 2 cm; C, 200 µm; D–E, 100 µm; F–G, 20 µm.

Ecology. Intertidal, epibiotic over unidentified mangrove tree roots.

Distribution (Fig. 3D). Only known from its type locality, in the mangroves of Tumbes, in Peru.

Etymology. The epithet comes from the L. *parvulus* (= very little), in reference to the overall small dimensions of oxeas in this species, smaller than in other Peruvian haplosclerids.

Remarks. Little is known of the sponge biodiversity in mangroves along the Tropical Eastern Pacific (Cortés *et al.* 2009). Unsurprisingly, this is the only yellow *Haliclona*, with small oxeas, from mangrove habitats in the Tropical Eastern Pacific. Other congeners from the tropical sector of the Peruvian coast include *H.* (*Halich.*) *marcoriosi* **sp. nov.** and *H.* (*Halich.*) *multiosculata* **sp. nov.** (Table 3), albeit their dissimilarities in colour, shape, spicule dimensions and habitat differentiate these species from *H.* (*Re.*) *parvuloxea* **sp. nov.** Comparison with *H.* (*Rh.*) *manglarensis* **sp. nov,** also occurring in the Tumbes mangrove, is made in the Remarks section of that species.

Yellowish-coloured *Haliclona* spp. in the Eastern or Central Pacific are *H.* (*Rh.*) *anceps*, *H.* (*S.*) *auletta*, *H.* (*Halicl.*) *macropora*, *H.* (*Halich.*) *mokuoloea* (de Laubenfels, 1950), *H. siphonella* (Thiele, 1905), *H.* (*Halicl.*) *spinosella*, and *H. translucida* (Table 3). They all are readily distinguished from *H.* (*Re.*) *parvuloxea* **sp. nov.** due to the latter's small-sized oxeas, 62–91 µm long, in addition to several differences in the habit of these species (Thiele 1905; Hajdu *et al.* 2013).

***Haliclona* (*Rhizoniera*) Griessinger, 1971**

Definition. Chalinidae with an anisotropic, ladder-like choanosomal skeleton consisting of uni- to multispicular primary lines, connected by irregular unispicular secondary lines. Ectosomal skeleton usually absent; if present, consisting only of some vaguely strewn tangentially oriented oxeas. Spongin moderate to absent. Megascleres usually slender oxeas with acerated points. No microscleres (Muricy *et al.* 2015).

***Haliclona* (*Rhizoniera*) *baslaviae* sp. nov.**

(Figure 12, Table 3)

Holotype. MNRJ 12856 (Vouchers: RBINS-IG 32240-POR 12856, MHNG 85689)—Roquedal, Laguna Grande, Reserva Nacional de Paracas, Ica Region (14°09'11.88" S, 76°15'51.3" W), depth 3–9 m, coll. Y. Hooker, E. Hajdu & Ph. Willenz (12/XII/2008).

Diagnosis. The only *Haliclona* in the Eastern Pacific with a combination of smooth surface, rare oscula, blue colour alive, and an irregular anisotropic reticulation with loose uni- to paucispicular primary tracts.

Description (Fig. 12A). Small specimen, ca. 3 cm in largest diameter, thickly encrusting on an empty limpet shell. Surface smooth. Oscula rare, circular, 1 mm in diameter. Consistency soft. Colour purplish blue in life.

Skeleton (Fig. 12B). Ectosome not specialized. Choanosome an irregular anisotropic reticulation, loose uni- to paucispicular primary tracts connected by unispicular secondary tracts. Few pauci- to multispicular discontinuous tracts, perpendicular to the surface, deep in the choanosome. Choanosomal and subectosomal spaces present, 150–780 µm in diameter. Many free spicules around. Spongin not visible.

Spicules (Fig. 12C, D). Oxeas, slender, subtly bent at centre, long acerate points, dimensions 133–*151*–169 µm x 4.0–*5.3*–6.0 µm (n = 20 x 10).

Ecology. Shallow subtidal, markedly silted habitat. Water temperature during collection was 21°C.

Distribution (Fig. 3E). Only known from its type locality at Laguna Grande (Paracas), in Peru.

Etymology. The specific epithet honours Dr. Báslavi Cóndor-Luján who, as an undergraduate, participated in our fieldwork year after year, and followed up developing her career in sponge taxonomy.

Remarks. The anisotropic, ladder-like reticulation of the new species is similar to that found in *H.* (*Haliclona*) and *H.* (*Rhizoniera*). However, the reticulation in *H.* (*Haliclona*) is supposed to be very regular, with straight primary lines, while in the new species it is more irregular with spongin not observable. Thus, *H.* (*Rhizoniera*) remains as the best assignment for the new species, especially after the amendment of the subgeneric diagnosis by Muricy *et al.* (2015) to allow the inclusion of species with unispicular primary lines.

This is the only blue *Haliclona* found in Peru. Other congeners in the Eastern Pacific showing similar colour when alive are *H.* (*Halich.*) *gellindra*, *H.* (*Halich.*) *thielei*, *H.* (*Re.*) *topsenti*, and *H.* (*Halicl.*) *verrucosa* (Thiele, 1905) (Table 3). The new species can be promptly set apart from *H.* (*Halich.*) *gellindra* based on the presence of

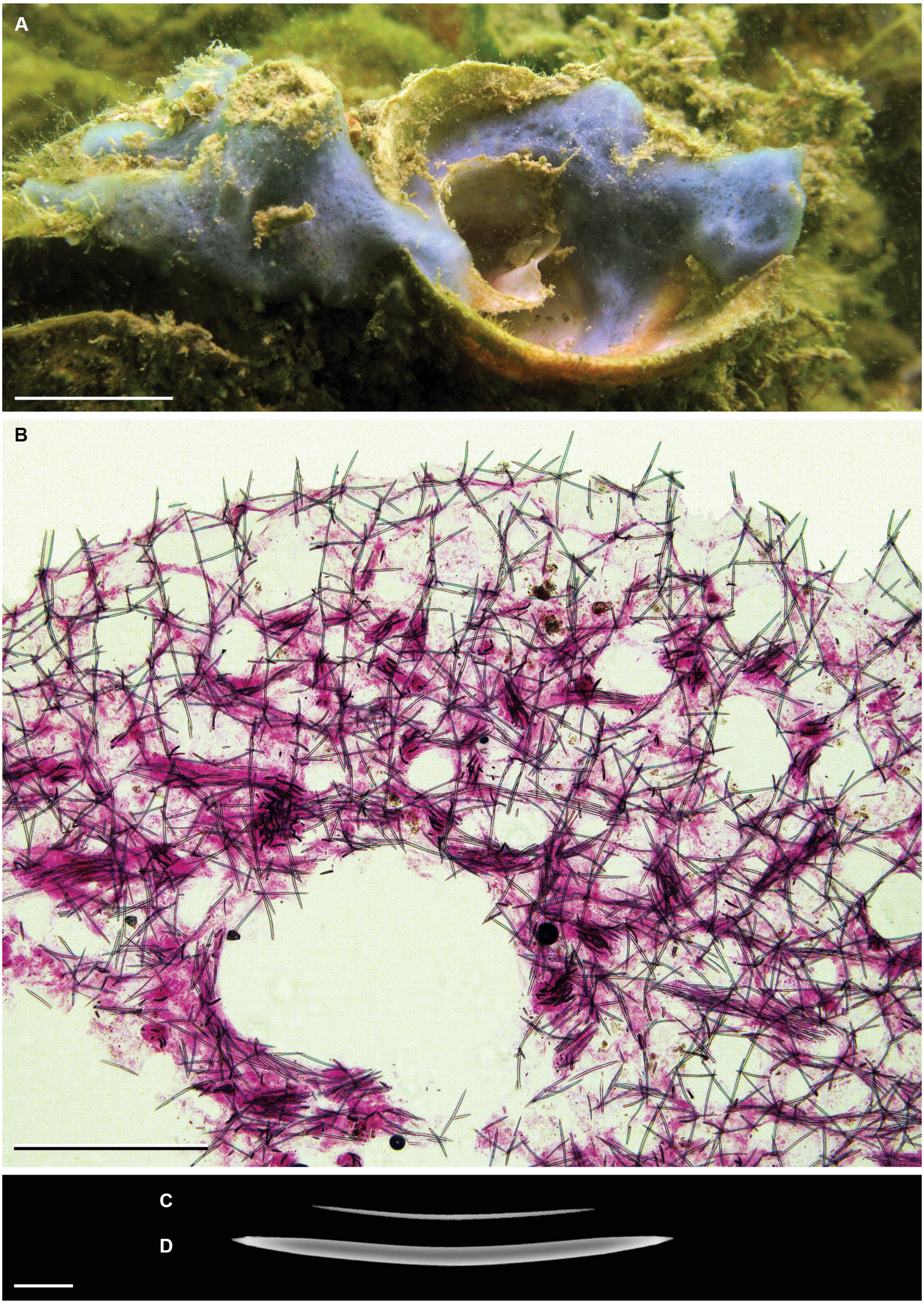

FIGURE 12. ***Haliclona (Rhizoniera) baslaviae* sp. nov. (MNRJ 12856, holotype).** A, holotype alive; B, skeletal architecture in transverse ground section; C–D, oxeas. Scale bars: A, 1 cm; B, 500 µm; C–D, 20 µm.

a tangential ectosome and a dense, confused, subisotropic choanosomal skeleton (de Laubenfels 1932; de Weerdt 2002). The "spicule reinforced form" of *H.* (*Halich.*) *thielei* has an encrusting habit, 2–3 mm thick, and blue green or violet-grey colour, similarly to *H.* (*Rh.*) *baslaviae* **sp. nov.** Even so, both forms of *H.* (*Halich.*) *thielei* are distinct from *H.* (*Rh.*) *baslaviae* **sp. nov.** The "spicule reinforced form" has a dense and irregular skeleton, and abundant oscula; while the "spongin reinforced form" has a skeleton with abundant nodal spongin, and oscula on top of conical projections up to 3 mm high (Thiele 1905). Both patterns contrast to what is observed in *H.* (*Rh.*) *baslaviae* **sp. nov.**, that has a mainly unispicular anisotropic architecture, without visible spongin, and seemingly only one, flat oscule. These features clearly set both species apart.

Haliclona (*Re.*) *topsenti* and *H.* (*Halicl.*) *verrucosa* are only known from the Magellanic Province and share a similar encrusting habit, though distinguished based on skeleton architecture and aspects of the oscula/surface. The former has oscula mostly on top of verrucose projections, and a dense and irregular skeleton, with occasional paucispicular tracts close to the surface (Thiele 1905). *Haliclona* (*Halicl.*) *verrucosa* also has oscula on top of verrucose projections, in addition to small and irregular blind verrucose projections on its surface, and abundant spongin in basal parts of the skeleton (Thiele 1905). The new species is thus distinct from all other blue(ish) *Haliclona* spp. known from the Eastern Pacific.

***Haliclona* (*Rhizoniera*) *manglarensis* sp. nov.**

(Figure 13, Table 3)

Holotype. MNRJ 13052 (Vouchers: RBINS-IG 32240-POR 13052, MHNG 85840)—Northern Point of Isla Chalaquera, Mangroves of Tumbes, Tumbes Region (03°25'31.80" S, 80°16'37.20" W), intertidal, coll. Y. Hooker, Ph. Willenz & K.M.P Monzón (27/XI/2009).

Diagnosis. The only *Haliclona* in the Eastern Pacific with a combination of encrusting habit, abundant lobate projections up to 3 cm high, rough surface, olive green to yellow colour alive; skeleton mostly a unispicular, isotropic reticulation, more ladder-like close to the surface.

Description (Fig. 13A, B). Encrusting with abundant lobate projections, up to 3 cm high, cylindrical or irregular, frequently bifurcate. Oscula circular, 2–5 mm diam., apical, lateral or basal on the lobate projections. Surface rough, velvety out of water. Consistency soft and bristly. Colour in life olive, becoming lighter and yellowish, towards the lobes' apices.

Skeleton (Fig. 13C). Ectosome unspecialized. Choanosome a confused, unispicular, isotropic reticulation in the deeper parts, becoming more anisotropic close to the surface, with ill-defined uni- to bispicular primary lines irregularly connected by unispicular secondary lines. Abundant small spicules (likely juveniles), scattered all around. Mesohyl moderately pigmented, brownish. Spongin not visible.

Spicules (Fig. 13D, E). Oxeas, slender, subtly bent at centre, long acerate points, 92–*120*–140 µm x 1.0–*3.8*–6.0 µm (n = 40 x 20).

Ecology. Intertidal, epibiotic over unidentified mangrove tree roots.

Distribution (Fig. 3E). This far only known from its type locality in the Mangroves of Tumbes area (Tumbes Region), in Peru.

Etymology. The specific epithet, "*manglarensis"*, refers to the mangrove ecosystem where the species occurs.

Remarks. *Haliclona* (*Rhizoniera*) *manglarensis* **sp. nov.** has a unispicular and isotropic reticulation in the deeper parts of the choanosome, becoming more regularly anisotropic close to the surface, with uni- to bispicular primary lines. Such an arrangement is not promptly assigned to any of the subgenera of *Haliclona*, being actually somewhat similar to *H.* (*Soestella*), *H.* (*Reniera*) and *H.* (*Rhizoniera*). The new species share with *H.* (*Soestella*) only the presence of ill-defined primary lines, but lacks the characteristic rounded meshes of this subgenus. In turn, the new species could also resemble *Haliclona* (*Reniera*) regarding the shared presence of unipiscular isotropic skeleton, however in *H.* (*Reniera*) the reticulation is very regular, the skeleton entirely isotropic, while the new species has a dual reticulation, irregular and isotropic in the inner parts, and anisotropic in the surface, being thus not much alike *H.* (*Reniera*). Lastly, *H.* (*Rhizoniera*) spp. commonly have a regular anisotropic, ladder-like skeleton of ascending pauci- to multispicular lines, usually lacking a specialized ectosome, and scarce spongin. This subgenus is the most similar to what is observed in the new species, except for the presence of a more isotropic skeleton in the inner parts of the choanosome and the presence of uni- to bispicular primary lines. Nevertheless, Muricy *et al.* (2015)

FIGURE 13. ***Haliclona (Rhizoniera) manglarensis*** **sp. nov. (MNRJ 13052, holotype).** A–B, holotype above water on a mangrove root; C, skeletal architecture in transverse ground section; D–E, oxeas. Scale bars: A, 5 cm; B, 1 cm; C, 500 µm; D, 100 µm; E–F, 20 µm.

amended the definition of *H.* (*Rhizoniera*) to include species with unispicular primary lines. Concurrently, the species *H.* (*Rh.*) *fugidia* Muricy *et al.*, 2015 also has a skeleton similar to that in *H.* (*Rh.*) *manglarensis* **sp. nov.**, isotropic inside and anisotropic close to the surface with uni- to paucispicular primary lines. Thus, the best assignment of the new species is *H.* (*Rhizoniera*).

Haliclona (Rh.) *manglarensis* **sp. nov.** has no close relatives along the Eastern Pacific (Table 3). The only other *Haliclona* co-occurring in the Tumbes mangroves, epibiotic on mangrove roots, is *H.* (*Re.*) *parvuloxea* **sp. nov.** (see above). The latter has a predominantly isotropic, unispicular architecture typical of its subgenus, thinly encrusting shape without lobate projections, smooth surface, and yellow colour alive. All these characters render it markedly distinct from *H.* (*Rh.*) *manglarensis* **sp. nov.**

The mangroves of Tumbes have a tropical fauna (Hooker *et al.* 2013), and the only tropical *Haliclona* spp. occurring along the Eastern Pacific are *H.* (*Halicl.*) *ambrosia*, *H.* (*S.*) *caerulea* (Hechtel, 1965), *H.* (*Rh.*) *enamela*, *H.* (*G.*) *laubenfelsi*, *H.* (*Re.*) *oberi*, *H.* (*G.*) *perforata*, *H.* (*S.*) *roslynae*, *H.* (*Halicl.*) *sonorensis, H.* (*S.*) *spuma*, and *H. turquoisia* (de Laubenfels, 1954). The ramose habit and longer oxeas (130–240 µm long) in *H.* (*Halicl.*) *ambrosia* set it apart from the new species (Dickinson 1945). *Haliclona* (*S.*) *caerulea* and *H.* (*G.*) *perforata* are easily distinguished based on the presence of sigmas as microscleres (Hechtel 1965; de Weerdt 2000). The record of *H.* (*Rh.*) *enamela* for Clipperton Atoll (de Laubenfels 1939) was reviewed in van Soest *et al.* (2011), who assigned it to *H.* (*G.*) *laubenfelsi*, and there is little doubt that this should be also applied to the Galápagos record also mentioned by de Laubenfels (1939). Still, the presence of toxas readily sets *H.* (*G.*) *laubenfelsi* apart from the new species. The bluish-green colour of *H turquoisia*, in conjunction with its regular, isotropic to isodictyal skeleton reinforced by multispicular tracts (Gómez *et al.* 2002), also characterizes it as very dissimilar to the new species. *Haliclona* (*S.*) *roslynae* can be distinguished by its translucent light pink colour alive, in addition to the presence of rounded meshes in the choanosome (Sim-Smith *et al.* 2021). In its turn, *H.* (*Halicl.*) *sonorensis* is very distinct. It is encrusting, with only scarce oscula, and a pinkish-violet colour alive. Besides, it has a regular iso- to anisotropic skeleton with abundant nodal spongin (Cruz-Barraza & Carballo 2006). Lastly, *H.* (*S.*) *spuma* is also distinguished based on its white colour alive, lack of prominent lobate projections, and presence of multispicular primary lines in the choanosome (Sim-Smith *et al.* 2021).

***Haliclona* (*Rhizoniera*) *zanabriai* sp. nov.**

(Figure 14, Table 3)

Holotype. MNRJ 12155 (Vouchers: RBINS-IG 32240-POR 12155, MHNG 85598) Isla Blanca, Matarani, Arequipa Region (17º00'31.50" S, 72º07'19.90" W—Matarani, Arequipa), depth between 4.5–20 m, coll. Y. Hooker & U. Zanabria (28/XI/2008).

Diagnosis. The only *Haliclona* in the Eastern Pacific with a combination of cushion-shaped habit, short lobate projections or small ridges, punctate and flat surface, colour alive light-brown, an anisotropic skeleton with uni- to paucispicular primary tracts, and oxeas 79–163 µm in length.

Description (Fig. 14A, B). Thickly encrusting specimen, 5–9 mm thick, with short lobate projections or small ridges, irregularly sprawling, attaining largest diameters of over 30 cm. Surface somewhat punctate. Oscula abundant, circular, 1–2 mm in diameter, mostly flush with the surface. Consistency soft, compressible. Colour in life light brown.

Skeleton (Fig. 14C, D). No specialized ectosomal skeleton. Choanosome an anisotropic reticulation with ascending, somewhat regular, primary uni- to paucispicular tracts (1–5 spicules thick), connected by mostly unispicular secondary tracts in varied angles of attachment; overall construction quite loose. Large lacunae present, up to 300 µm in diam., and a few, likely younger spicules, scattered all around. Spongin scarce, at the nodes of the reticulation.

Oxeas (Fig. 14E–G). Oxeas, fusiform, straight, or more frequently subtly bent at centre, long acerate points, 79–*123*–163 µm x 1.0–*5.1*–9.0 µm (n = 40 x 20).

Ecology. Occur on shallow rocky substrate in the subtidal zone, partly epibiont on large barnacles, and associated with red algae, shrimps, a blenny, and a dense mat of short polyps (likely *Hydractinia* sp.). Though the depth during collection was not recorded, the maximum depth reached on this dive was 20 m.

Distribution (Fig. 3E). Only known from its type locality at Isla Blanca (Matarani, Arequipa Region), in Peru.

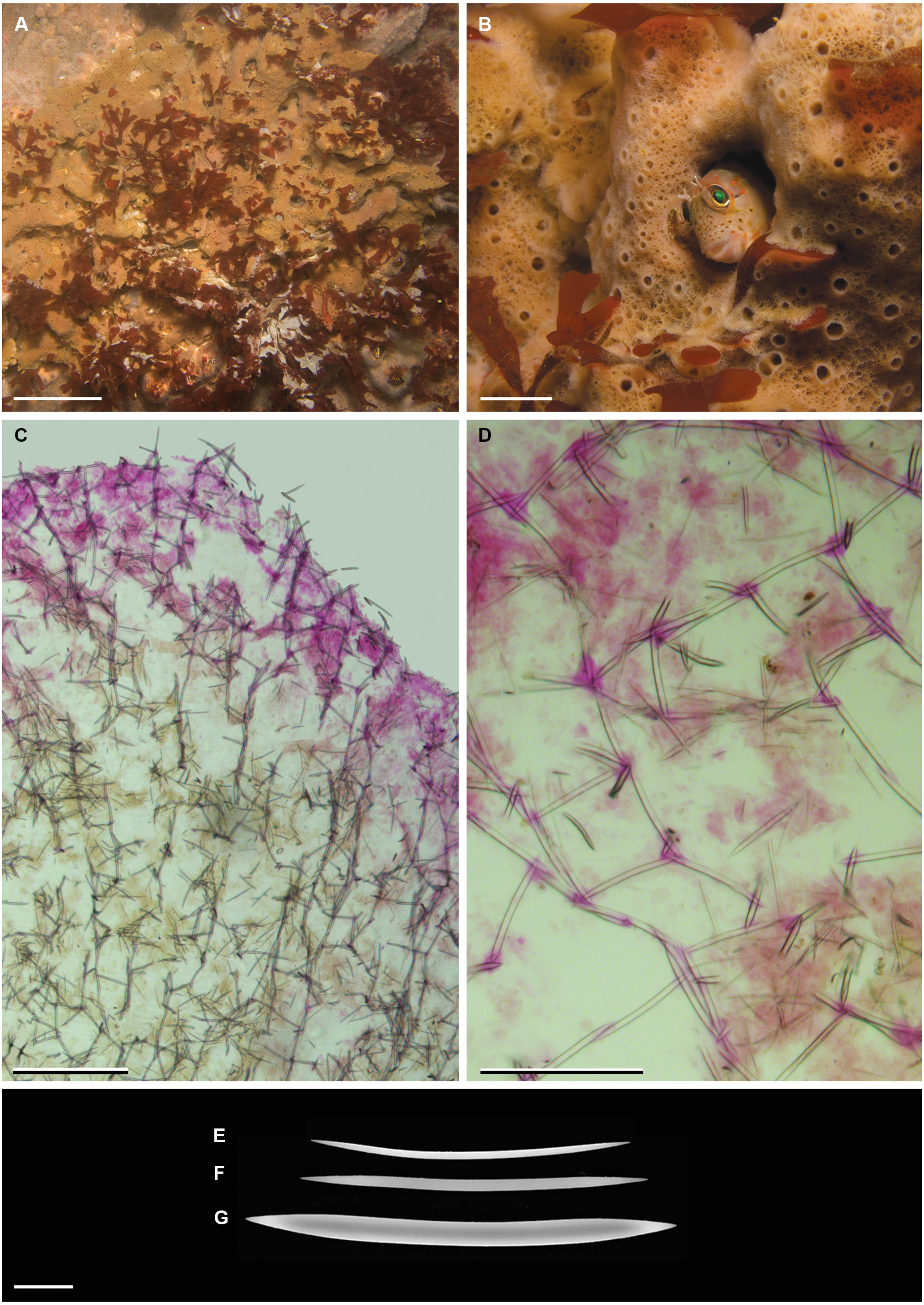

FIGURE 14. ***Haliclona (Rhizoniera) zanabriai*** **sp. nov. (MNRJ 12155).** A–B, holotype alive; C, skeletal architecture in transverse ground section stained with acid fuchsine; D, detail of C; E–G, oxeas. Scale bars: A, 10 cm; B, 1 cm; C, 500 µm; D, 200 µm; E–G, 20 µm.

Etymology. We dedicate this species to Ulrich Zanabria for his efficient buddy diving assistance during our stay in Matarani, which involved several deeper dives.

Remarks. *Haliclona* (*Rh.*) *zanabriai* **sp. nov.** is better assigned to *H. (Rhizoniera)* given its anisotropic skeleton, somewhat regular, with scarce spongin, and long-pointed oxeas (de Weerdt 2002). Several *Haliclona* spp. along the Eastern Pacific share with the new species the presence of uni- to multispicular primary lines with scarce spongin, demanding the comparisons provided below (Table 3). The Californian *H.* (*Rh.*) *enamela* has a brown colour, smooth to verrucose surface, and anatomy including a dense reticulation with primary lines 6–8 spicules thick (de Laubenfels 1932). In contrast, *H.* (*Rh.*) *zanabriai* **sp. nov.** has a flat surface without verrucose projections, and a much less dense skeleton, with primary lines only 1–5 spicules thick. Both species appear thus easily distinguishable.

The remaining eastern Pacific *Haliclona* spp. with uni- to multispicular primary lines are the Chilean *H.* (*Rh.*) *anceps*, *H.* (*S.*) *auletta*, *H.* (*S.*) *chilensis*, *H.* (*S.*) *inepta* (Thiele, 1905), *H.* (*Halicl.*) *macropora*, *H. rugosa* (Thiele, 1905), *H.* (*Re.*) *sordida*, *H.* (*Halich.*) *thielei*, and *H.* (*Halicl.*) *verrucosa*. The new species is promptly set apart from *H.* (*S.*) *inepta* and *H.* (*Re.*) *sordida* (both from the Magellanic Province) given its non-overlapping smaller oxeas (79–163 µm long in *H.* (*Rh.*) *zanabriai* **sp. nov.** *vs.* 180–200 µm in *H.* (*S.*) *inepta* and ca. 200 µm in *H.* (*Re.*) *sordida*) (Thiele 1905; Hajdu *et al.* 2013). In turn, *H.* (*S.*) *auletta* and *H.* (*S.*) *chilensis* (also from the Magellanic Province) have a distinct tubular shape, and conulose surface in the former (Thiele, 1905), so that conspecificity with *H.* (*Rh.*) *zanabriai* **sp. nov.** is rather unlikely.

Other Magellanic species that also resemble the new species are *H. rugosa* and *H.* (*Halicl.*) *verrucosa*. Their suggestive names derive from their particular habit with an irregular surface that might bear swellings in *H. rugosa*, or prominent verrucose projections in *H.* (*Halicl.*) *verrucosa*. In addition, *H. rugosa* has a hemispherical shape, blue-grey colour alive, and oxeas 150 µm long; while *H.* (*Halicl.*) *verrucosa* has oxeas 150–165 um long, joined in basal areas by abundant spongin (Thiele 1905). Therefore, their conspecificity with *H.* (*Rh.*) *zanabriai* **sp. nov.** is also unlikely.

The taxonomic problem of *H.* (*Halich.*) *thielei* was treated in the Remarks section of *H.* (*Halich.*) *arequipaensis* **sp. nov.** Still, none of the 'forms' of *H.* (*Halich.*) *thielei* are conspecific with *H* (*Rh.*) *zanabriai* **sp. nov.**, as the "spicule reinforced" one has a dense, irregular skeleton, and blue-green or grey-violet colour; and the "spongin reinforced", a much more regular skeleton, and apical oscula on conical elevations up to 3 mm high (Thiele 1905).

Haliclona (*Rh.*) *anceps* and *H.* (*Halicl.*) *macropora*, from the Juan Fernandez Archipelago, approach the habit of *H.* (*Rh.*) *zanabriai* **sp. nov.**, all sharing the presence of pauci- to multispicular tracts in the skeleton too. However, *H.* (*Rh.*) *anceps* is a grey-yellowish sponge, with irregular meshes in the choanosomal reticulation, bearing short pauci- to multispicular tracts beneath the surface, some of which may pierce the ectosome. Roughly speaking, this doesn't match the new species' brown colour and choanosomal architecture with deep, more regular longitudinal tracts, overlaid by spicules in confusion (Thiele 1905). In spite of the punctate surface and skeletal architecture much alike the new species in *H.* (*Halicl.*) *macropora*, it has projecting spicule tracts that produce conules on the surface (Thiele 1905), a feature not observed in *H.* (*Rh.*) *zanabriai* **sp. nov.** In addition, *H.* (*Rh.*) *zanabriai* **sp. nov.** has abundant oscula, while these are rare in *H.* (*Halicl.*) *macropora*, with only two reported in its type material (Thiele 1905).

Family Niphatidae van Soest, 1980

Niphates Duchassaing & Michelotti 1864

Definition. Niphatidae with a paratangential ectosomal reticulation of fibres or tracts, obscured by the conulose surface produced by the ends of primary longitudinal fibres (Desqueyroux-Faúndez & Valentine 2002).

Niphates ruthecitae sp. nov.

(Figure 15, Table 3, Table 7)

Holotype. MNRJ 12159 (Vouchers: RBINS-IG 32240-POR 12159, MHNG 85602)—Unnamed Inlet to the North of Quilca, Arequipa Region (16°42'06.10" S, 72°26'54.00" W), depth ca. 5 m, coll. Y. Hooker, M. Vilchez &

Ph. Willenz (01/XII/2008). **Paratypes.** MNRJ 12066 (Vouchers RBINS-IG 32240-POR 12066, MHNG 85508)—Punta Coles, Ilo, Moquegua Region (17°42'00.0" S, 71°22'51.2" W), depth 8.4 m, coll. Y. Hooker, Ph. Willenz & M. Rios (06/XI/2006); MNRJ 12141 (Vouchers: RBINS-IG 32240-POR 12141, MHNG 85584)—Playa Catarindo, Mollendo, Arequipa Region (17°01'08.93" S, 72°02'03.25" W), depth 4 m, coll. Y. Hooker & U. Zanabria (26/XI/2008). **Additional material deposited in collections.** MNRJ 12139 (Vouchers: RBINS-IG 32240-POR 12139, MHNG 85582)—Playa Catarindo, Mollendo, Arequipa Region (17°01'08.93" S, 72°02'03.25" W), depth 4 to 5 m, coll. Y. Hooker and U. Zanabria (26/XI/2019)

Diagnosis. The only *Niphates* in the Indo-Pacific combining a cushion-shape with lobate or thick lamellate projections, reticulated surface, light brown to light pink colour alive, a very regular skeleton of multispicular primary tracts connected by uni- to paucispicular secondary ones, oxeas 54–128 µm long, and no microscleres.

Description (Fig. 15A, B). Specimens can be large, over 30 cm in diameter, cushion-shaped, with irregular lobate or thick lamellate projections. Surface optically rough, but smoother to the touch. Oscula abundant, circular, 1–2 mm wide, randomly distributed, either flush with the surface, or on top of very low volcaniform elevations. Consistency spongy. Colour in life light brown to light pink.

Skeleton (Fig. 15C–E). Ectosome an irregular reticulation of pauci- to multispicular tracts (13–60 µm thick), creating irregular to circular meshes (70–370 µm wide). Choanosome a reticulation of longitudinal multispicular primary tracts (50–225 µm thick), orthogonally connected, fairly regularly, by uni- to paucispicular secondary tracts (30–75 µm thick), creating squared to rectangular meshes (85–1100 µm wide). Spongin is abundant, enveloping both categories of tracts, and free spicules are abundantly scattered throughout the choanosome.

Spicules (Fig. 15F, G). Oxeas, fusiform, straight, or more frequently subtly bent at centre, long acerate points, dimensions 54–*96*–128 x 1.7–*6.0*–9.9 µm (Table 7).

TABLE 7. Spicules measurements for *Niphates ruthecitae* **sp. nov.** All values in µm, expressed as follows: minimum–*mean*–maximum length x width.

Specimen	Oxeas
MNRJ 12159 (Holotype)	62–*89*–116 x 2.0–*5.0*–7.5 (n=40 x 40)
MNRJ 12066 (Paratype)	61–*104*–129 x 1.9–*6.6*–9.9 (n=33 x 33)
MNRJ 12141 (Paratype)	54–*97*–120 x 1.7–*6.4*–9.3 (n=43 x 43)

Ecology. Specimens collected from flat or vertical rocky substrate in the shallow subtidal (5 m), co-occurring with abundant sea urchins. Water temperature during collection of MNRJ 12141 was 16 °C.

Distribution (Fig. 3F). Only known from Arequipa and Moquegua Regions, in Peru.

Etymology. This species is dedicated to our late colleague and great friend Ruth Desqueyroux-Faúndez, for her important role in sponge taxonomy, devoting herself to identifying and describing new species, with a special care for the SE Pacific and for the Haplosclerida in particular.

Remarks. This is the only known *Niphates* in the entire Southeastern Pacific. Its single congener in the Eastern Pacific is *Niphates lunisimilis* (de Laubenfels, 1930) from California (Table 3). The latter shares with *N. ruthecitae* **sp. nov.** a somewhat similar shape (massive to subspherical in *N. lunisimilis*), oscula with raised edges, and drab colour (it may be light brown to light pink in *Niphates ruthecitae* **sp. nov.**). They, nevertheless, are very distinct in terms of skeletal architecture, as *N. lunisimilis* has a fragile, isodictyal skeleton superimposed by a reticulation of multispicular spongin fibres (de Laubenfels 1932). Other *Niphates* spp. are all from the Western and Central Pacific, rendering conspecificity unlikely on purely biogeographical terms.

Pachychalina Schmidt, 1868

Definition. Niphatidae with a paratangential ectosomal reticulation of fibres or tracts obscured by the irregularly, conulose to spiny surface, pierced by abundant aquiferous orifices (Desqueyroux-Faúndez & Valentine 2002).

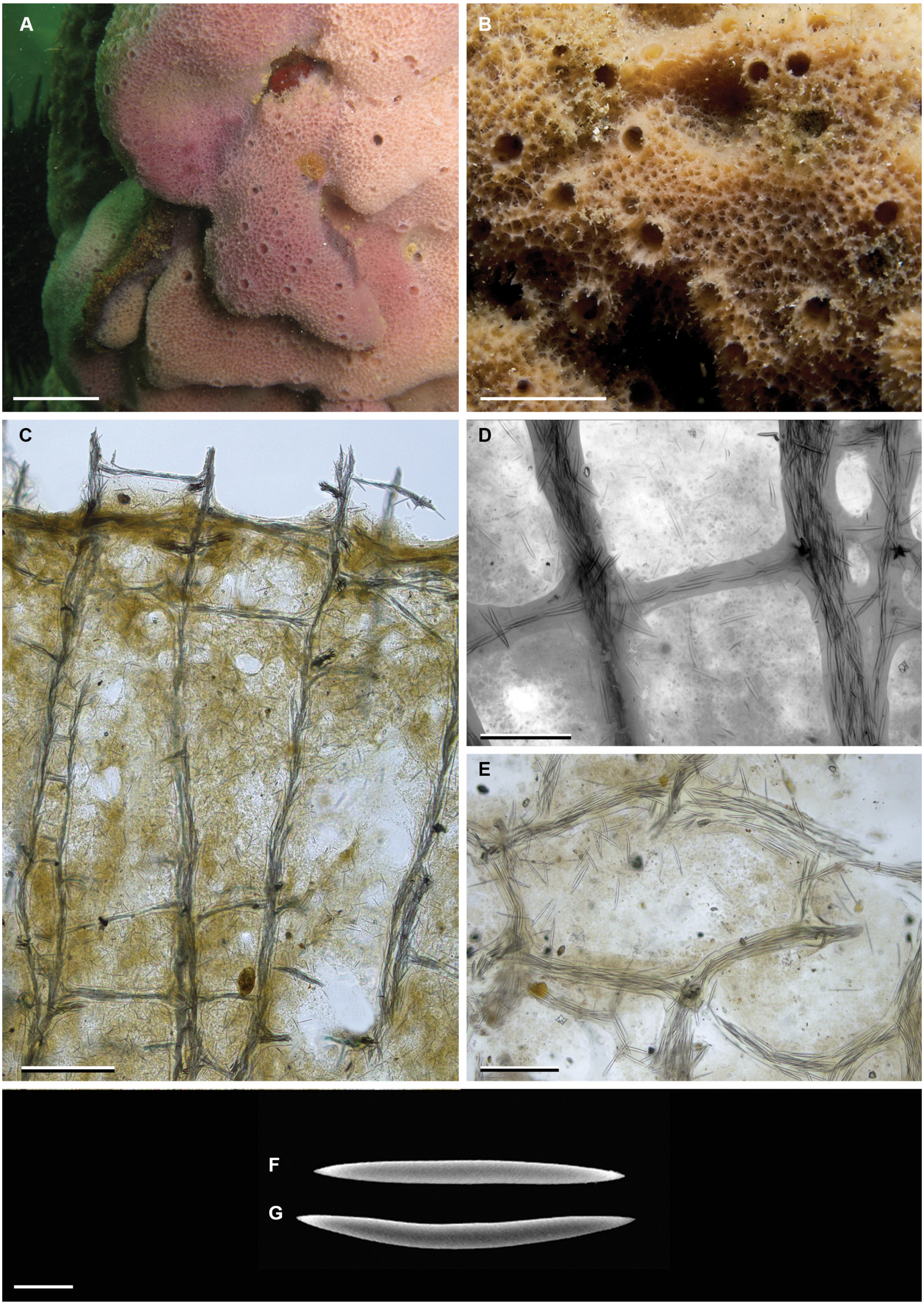

FIGURE 15. ***Niphates ruthecitae* sp. nov.** A, holotype alive (MNRJ 12159); B, paratype alive (MNRJ 12141); C–D, skeletal architecture in transverse ground section (MNRJ 12159, holotype); E, ectosomal skeleton architecture in tangential ground section (MNRJ 12159, holotype); F–G, oxeas. Scale bars: A, 2 cm; B, 1 cm; C, 500 µm; D–E, 200 µm; F–G, 20 µm.

Pachychalina lupusapia **sp. nov.**

(Figure 16, Table 3, Table 8)

Holotype. MNRJ 11357 (Vouchers: RBINS-IG 32239-POR 11357, MHNG 85356)—Islote Santo Domingo, Islas Lobos de Afuera, Lambayeque Region (06°55’09.80”’S, 80°44’09.40” W), depth 15 m, coll. Ph. Willenz & Y. Hooker (05/X/2007). **Paratypes.** MNRJ 13676 (Vouchers: RBINS-IG 32241-POR 13676, MHNG 85914)—Puerto Rico, Bayóvar, Bahia Sechura, Piura Region (05°46’49.70” S, 81°04’04.70” W), depth 10 m, coll. Y. Hooker, M. Rios & Ph. Willenz (09/XII/2009); MNRJ 13687 (Vouchers: RBINS-IG 32241-POR 13687, MHNG 85925)—La Cabrillera, Isla Foca, Piura Region (05°12’09.30” S, 81°12’39.90” W), depth 15 m, coll. Y. Hooker, M. Rios & Ph. Willenz (11/XII/2009). **Additional topotypical material deposited in collections.** MNRJ 11349 (Vouchers: RBINS-IG 32239-POR 11349, MHNG 85348)—Islote Santo Domingo, Islas Lobos de Afuera, Lambayeque Region (06°55’09.80”’S, 80°44’09.40” W), depth 14 m, coll. E. Hajdu (05/X/2007).

Comparative material. *Pachychalina tenera* Thiele, 1905: ZMB POR 3329—syntype (slides), Punta Arenas, Chile.

Diagnosis. The only *Pachychalina* in the Eastern Pacific with a thickly encrusting habit and attaining large dimensions, with abundant lobes bearing apical oscula, surface punctate, light grey colour alive with purple or violet tinges; choanosome with pauci- to multispicular primary tracts (up to 55 µm thick), connected by secondary uni- to paucispicular tracts; oxeas 90–164 µm in length.

Description (Fig. 16A, B). Thickly encrusting, 3–8 mm thick, occupying areas as large as 1 m, nearly flat, or bearing abundant, commonly short, cylindrical or volcaniform (0.5–1.0 cm high), seldom long, digitiform lobes (2.5–3.0 cm high). Oscula, 0.5–3.0 mm in diameter, circular, usually apical on lobes. Surface punctate. At places, mainly at margins, convergent subectosomal canals are seen in *in situ* images, but it is not clear they converge towards oscula. Consistency easily compressible, but slightly resilient. Colour in life light grey, with a hint of purple or violet.

Skeleton (Fig. 16C–E). No specialized ectosomal skeleton, only a few tangential oxeas strewn randomly amidst the orthogonal terminations of the main choanosomal tracts. Choanosomal architecture anisotropic at parts, or seemingly isotropic, with pauci- to multispicular primary longitudinal tracts (up to 55 µm thick), connected by short secondary uni- to paucispicular tracts inserted at various angles to the former. Spicule density decreases towards the periphery. Spongin is scarce.

Spicules (Fig. 16F, G). Oxeas, slender, mostly subtly bent at centre, long, acerate points, dimensions 90–*137*–166 x 1.6–*5.9*–9.0 µm (Table 8).

TABLE 8. Spicules measurements for *Pachychalina lupusapia* **sp. nov.** All values in µm, expressed as follows: minimum–*mean*–maximum length x width.

Specimen	Oxeas
MNRJ 11357 (Holotype)	122–*142*–166 x 3.4–*6.0*–8.2 (n=30 x 30)
MNRJ 13676 (Paratype)	110–*135*–156 x 3.1–*5.9*–7.4 (n=30 x 30)
MNRJ 13687 (Paratype)	90–*133*–148 x 1.6–*6.0*–9.0 (n=20 x 20)

Ecology. Specimens seen in nearly plane, often vertical, rocky walls, at 15 m depth. They were associated to sea urchins (cf. *Paracentrotus*), ophiuroids, chitons, tunicates, blennies, algae, and large barnacles. Water temperature during collection of the holotype was 16 °C.

Distribution (Fig. 3F). Known only from Bahía de Sechura (Piura Region) and Islas Lobos de Afuera (Lambayeque Region), in Peru.

Etymology. The epithet *“lupusapia*” is used as a noun in apposition derived from the L. *lupus* (= wolf) and Gr. *apios* (= far away), making reference to the type locality *Islas Lobos de Afuera*.

Remarks. There are only two species of *Pachychalina* reported from the Eastern Pacific: *P. acapulcensis* Wilson, 1904, from Mexico, and *P. tenera* Thiele, 1905 from southern Chile and Argentina (Table 3). *Pachychalina acapulcensis* is described as an erect lamella, bearing several lobes, a conulose surface, and oxeas 60–100 x 2–5 µm (Wilson 1904). Such features are enough to distinguish it from *P. lupusapia* **sp. nov.** *Pachychalina. acapulcensis* has a skeleton that is very similar to species of *Callyspongia* (*Cladochalina*), such as *C.* (*Cl.*) *fibrosa*, i.e., with stout spiculofibres encased by spongin and a complex reticulation of smaller fibres. In fact, several species previously

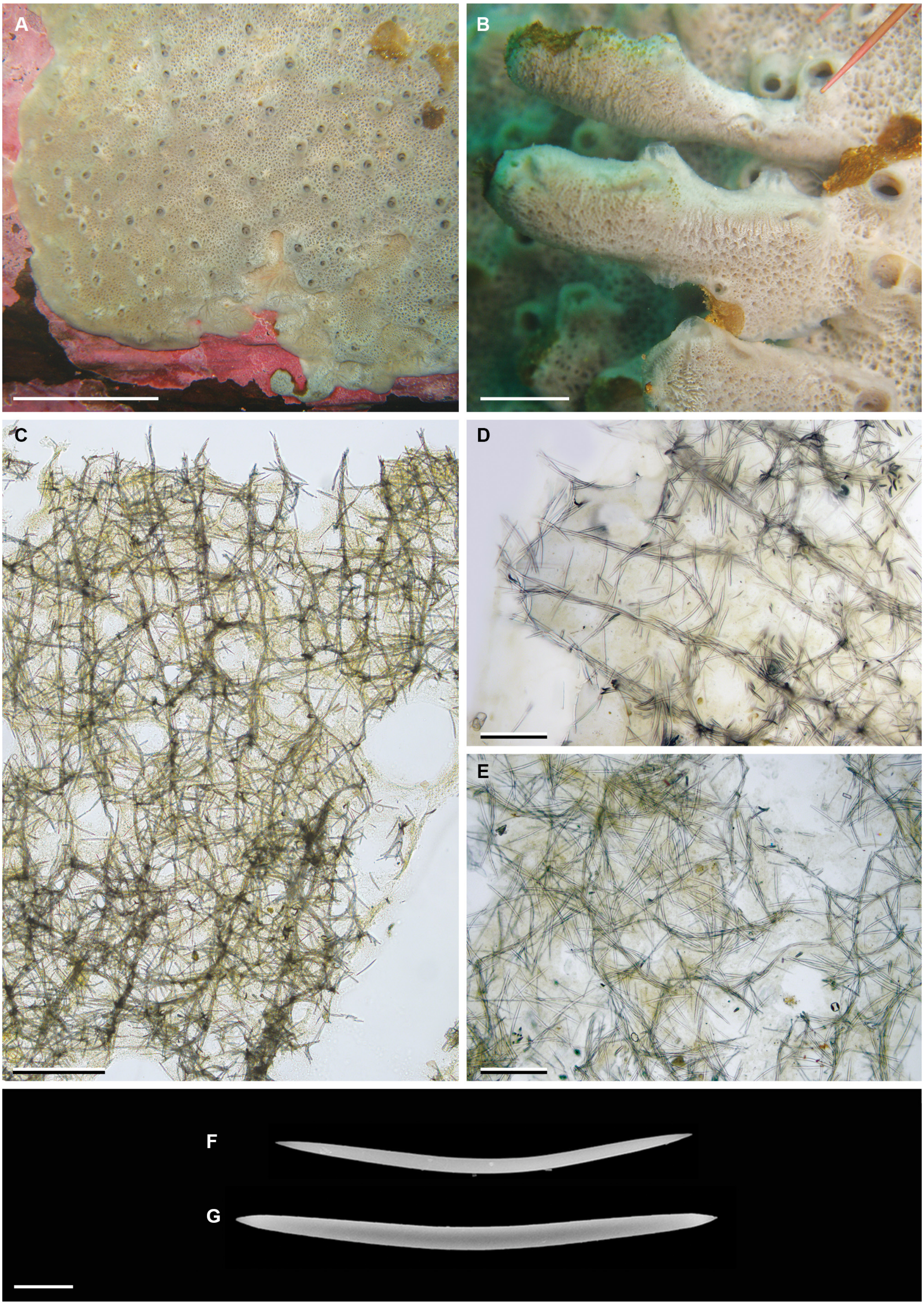

FIGURE 16. ***Pachychalina lupusapia* sp. nov. (MNRJ 11357, holotype).** A–B, holotype alive; C, skeletal architecture in transverse ground section; D, detail of C (sponge surface to the left); E, ectosomal skeleton architecture in tangential ground section; F–G oxeas. Scale bars: A, 5 cm; B, 1 cm; C, 500 µm; D–E, 200 µm; F–G, 20 µm.

described under *Pachychalina* in the Indo-Pacific have been transferred to *Callyspongia* (*Cladochalina*) (Desqueyroux-Faúndez 1984; de Voogd 2004). We propose the transfer of *P. acapulcensis* to the Callyspongiida, classified as *Callyspongia* (*Cladochalina*) *acapulcensis* **comb. nov.**

The only other *Pachychalina* in the Eastern Pacific is *P. tenera* from the Magellanic area. The holotype is encrusting, up to 10 mm thick, soft and delicate in consistency (Thiele 1905). We examined a slide of the skeleton of the syntype (ZMB POR 3329), that has an anisotropic architecture, with both primary and secondary multispicular tracts stouter than those of *P. lupusapia* **sp. nov.** In addition, secondary tracts in *P. lupusapia* **sp. nov.** are much shorter and more slender than in *P. tenera*, creating a tighter skeleton that is also more disorganized. *Pachychalina tenera* was also recorded for the Patagonian coast of Argentina (Gastaldi *et al.* 2018), where it was found as encrustations bearing digitiform or volcaniform projections, extremely soft but resilient in consistency, violet coloured alive, and with a similar skeletal architecture to the holotype of *P. tenera*. Thus, both Chilean and Argentinean populations of *P. tenera* are clearly distinct from *P. lupusapia* **sp. nov.**

Although classified in another genus, *H.* (*S.*) *spuma* is also similar to the new species based on the shared presence of multispicular tracts in the choanosome and punctate surface. Nevertheless, the primary tracts in *H.* (*S.*) *spuma* are subanisotropic, with ill-defined primary tracts, cavernous choanosome, and white to cream colour alive (Sim-Smith *et al.* 2021). While *P. lupusapia* **sp. nov.** has an anisotropic reticulation, with well-defined primary tracts, choanosome not cavernous and a light purplish grey colour alive. In addition, the surface looks more heavily punctate in *P. lupusapia* **sp. nov.**

Identification key to Peruvian haplosclerids

1a	Microscleres are sigmas and toxas	*Haliclona* (*Gellius*) *concreta* **sp. nov.**
1b	Microscleres absent	2
2a	Oxeas do not exceed 95 µm, yellow colour alive	*Haliclona* (*Reniera*) *parvuloxea* **sp. nov.**
2b	Oxeas exceed 105 µm, other colours	3
3a	Presence of multispicular primary tracts	4
3b	Absence of multispicular primary tracts	5
4a	Choanosomal skeleton very regular, with abundant spongin enveloping the spicule tracts	*Niphates ruthecitae* **sp. nov.**
4b	Choanosomal skeleton not very regular, with scarce spongin, never enveloping the spicule tracts	*Pachychalina lupusapia* **sp. nov.**
5a	Ectosomal skeleton specialized, a dense, uni- to paucispicular, isotropic reticulation	6
5b	Ectosomal skeleton unspecialized, absent	10
6a	Pink(ish) colour alive	7
6b	Other colours alive	9
7a	Repent-ramose habit	*Haliclona* (*Halichoclona*) *marcoriosi* **sp. nov**.
7b	Encrusting habit	8
8a	Oscula aligned in rows on ridges, and oxeas 108–198 µm	*Haliclona* (*Halichoclona*) *multiosculata* **sp. nov.**
8b	Oscula not aligned in rows on ridges, and oxeas 87–135 µm	*Haliclona* (*Halichoclona*) *arequipaensis* **sp. nov.**
9a	White colour alive, with translucent surface, and hastate oxeas	*Haliclona* (*Halichoclona*) *pellucida* **sp. nov.**
9b	Beige colour alive, no translucent surface, and acerate oxeas	*Haliclona* (*Halichoclona*) *paracas* **sp. nov.**
10a	Secondary lines only one spicules long	11
10b	Secondary lines one and more than one spicules long	13
11a	Without projections, purplish blue colour alive	*Haliclona* (*Rhizoniera*) *baslaviae* **sp. nov.**
11b	Lobate projections, other colours	12
12a	Oscula apical, lateral or basal on the projections; olive-green to yellow colour alive	*Haliclona* (*Rhizoniera*) *manglarensis* **sp. nov.**
12b	Oscula mostly flush with the surface; light-brown colour alive.	*Haliclona* (*Rhizoniera*) *zanabriai* **sp. nov.**
13a	Branches present, short, distal, bifurcating and anastomosing, beige to pinkish beige colour alive	*Chalinula ramiculosa* **sp. nov.**
13b	Branches absent, beige to light yellow colour alive	*Chalinula chelysa* **sp. nov.**

Discussion

In spite of recent progress regarding the inventory of shallow-water Calcarea (Azevedo *et al.* 2015; Cóndor-Luján *et al.* 2019) and Demospongiae (Aguirre *et al.* 2011; Hajdu *et al.* 2015; Recinos *et al.* 2020), the sponge diversity along the Peruvian coast is still very poorly known. The very small number of species described or registered for waters shallower than 200 m deep summarizes this lack of information. Not surprisingly, previously to the present work, no haplosclerids were described from the Peruvian coast. Thus, the fourteen new species herein described represent a major addition to the knowledge of the Southeastern Pacific sponge fauna (including Magellanic, Warm-Temperate Southeastern Pacific—WTSP and Tropical East Pacific—TEP Provinces), increasing the number of shallow-water sponges from Peru to 32 (>68%). It is also important to highlight the first report of *Niphates* from Southeastern Pacific waters. *Haliclona* is the richest genus of Haplosclerida in Peru (10 species), repeating a worldwide trend with *Haliclona* being the most species-rich genus in the entire Phylum Porifera, with almost 440 accepted species (van Soest *et al.* 2021).

The decision to recognize a higher taxon is essentially subjective, as no unambiguous rule exists determining each Linnean rank's level of universality. In other words, authors are free to decide where a higher taxon ends and the next one starts. As currently understood (van Soest 1980; de Weerdt 1986, 1989, 2002), *Haliclona* includes several taxa formerly proposed as genera. These are kept at the subgeneric level, for the once widespread belief that they were polyphyletic, now soundly confirmed in molecular studies (Redmond *et al.* 2007, 2011, 2013; Thacker *et al.* 2013). However, *Haliclona* has also repeatedly proven polyphyletic in these same studies (Redmond *et al.* 2007, 2011, 2013; Thacker *et al.* 2013). Accordingly, whenever a change of paradigm is attainable and a new classification can be proposed, it is likely that species now assigned to *Haliclona* will be spread in new or resurrected genera, similarly to what occurred for *Clathrina*-like calcareous sponges, now split in five different genera (Klautau *et al.* 2013). It appears that the skeletal architecture in *Haliclona*-like sponges has also been convergently developed. As suggested by Hajdu & van Soest (1996), not much evolutionary creativity is likely possible in the skeletal architecture of *Haliclona*-like sponges, given the limited diversity of the building blocks (simple diactinal spicules, spongin) observed in these sponges.

Eight out of the fourteen new species herein described are known from a single locality, whilst only *Chalinula chelysa* **sp. nov.** has a wide distributional range along the Warm-Temperate Southeastern Pacific sector of the Peruvian coast (9°–17° S). This large proportion of species with extremely narrow distributions might indicate their rarity, consequently generating conservation concerns, or that the haplosclerid fauna in Peru is still poorly known. Thus, only a more comprehensive sampling of sponges along the Eastern Pacific will provide a better delineation of species distribution and abundance.

The high number of Peruvian haplosclerid endemics is also remarkable. It, nevertheless, might merely reflect the meagre knowledge of sponge biodiversity in adjacent areas of WTSP and TEP, such as the central and northern coasts of Chile (Hajdu *et al.* 2013), Ecuador (Jaramillo *et al.* 2021), Colombia (Lizarazo *et al.* 2020), Panama (Maldonado *et al.* 2001), Costa Rica (Cortés *et al.* 2009) and Mexico (Carballo *et al.* 2014). The record of a single haplosclerid species (*Callyspongia* cf. *californica*) along Ecuador (Calabro *et al.* 2018; Jaramillo *et al.* 2021), and the two previously known haplosclerids from the WTSP, namely *H.* (*Re.*) *algicola* and *H.* (*Halich.*) *thielei*, are illustrative of this scanty knowledge. Recently, six new species of haplosclerids, all of them endemic, were reported for the Galápagos Archipelago, where sponge endemicity is around 65% (Sim-Smith *et al.* 2021). In time, we expect that at least some of the species with tropical affinity described here will be found further north as sampling and taxonomic study advance towards Ecuador, Colombia and Costa Rica.

Given the current knowledge on sponge biodiversity in the Southeastern Pacific, distribution of haplosclerids seems to closely match Province boundaries, with only three widespread species. *Haliclona* (*G.*) *concreta* **sp. nov.** and *P. lupusapia* **sp nov.** occur in a widely acknowledged biogeographical transition zone at ca. 4–6º S between TEP and WTSP in the Peruvian coast (Ramirez *et al.* 2003; Tarazona *et al.* 2003; Hooker 2009; Hooker *et al.* 2013; Ibanez-Erquiaga *et al.* 2018), whilst *H.* (*Re.*) *algicola* occurs along the Chilean coast at the WTSP down to the Magellanic Province (Thiele 1905; Desqueyroux 1976). In contrast, not a single species of calcareous sponges was shared between Provinces (Azevedo *et al.* 2015; Cóndor-Luján *et al.* 2019), except for the likely non-native *Clathrina aurea* (Cóndor-Luján *et al.* 2021). This suggests that the observed endemicity of the majority of the haplosclerids studied here may be real, and not an artefact of sub-ideal sampling. However, central and northern Chile are still poorly described regarding their sponge biodiversity and it is still premature to draw any conclusions regarding the distribution patterns of Haplosclerida in the Southeastern Pacific, especially given the evidence in contrary coming from other demosponges and benthic invertebrates (Schrödl 1999; Häussermann 2006; de Paula *et al.* 2012; Schrödl & Hooker 2014).

For example, the sponge *Cliona chilensis* Thiele, 1905 was found from the Magellanic region up to Antofagasta (23° S), and was observed to be genetically indistinguishable along this large area (de Paula *et al.* 2012). Similarly, distributional data for sea anemones and sea slugs show a relevant overlap of species between the WTSP and the Magellanic Province, not supporting the presence of a faunal break between these provinces (Schrödl 1999; Häussermann 2006). Even so, they still sustain a high level of endemicity (WTSP: 47% for sea anemones, 39% for sea slugs; Magellanic Province: 57% for sea anemones, 31% for sea slugs), creating a distinct faunal composition (Schrödl 1999; Häussermann 2006). The World Porifera Database lists only seven species of sponges for the Humboldtian Marine Ecoregion, seven for the Central Chile and 14 for the Araucanian, so the possibility cannot be discarded that some of the new Peruvian species described here will eventually show up in Chile. We also expect that additional Magellanic species will be found further north, thanks to the Humboldt Current, as already demonstrated in the cases of *C. chilensis*, sea anemones and sea slugs.

The extent of sponge species exchange between Provinces in the Southeastern Pacific is still to be investigated. However, preliminary observations during faunistic inventories (Hajdu *et al.* 2013) at 23–33° S highlight that sponges assemblages in these latitudes are not very similar to those along the fjord area. A large collection of Haplosclerida from southern South America (Chilean Fjords, Magellan Strait, Argentinian Patagonia) is currently being studied, and will surely help to draw a more comprehensive picture of the diversity and distribution of this group in this meeting area for the biotas of the Pacific and the Atlantic.

Acknowledgments

We thank Y. Hooker (UPCH) for leading our expedition in the field and for crucial assistance in collecting samples and taking a large part of the underwater photographs. Thanks go also to G. Lôbo-Hajdu (UERJ, Brazil), F. Azevedo (UFRJ, Brazil), B. Cóndor Luján (UCSUR, Peru), N. Mostajo Berropsi (FSU-JENA, Germany), M.S. Rios Morales, C. Segami and U. Zanabria for diving assistance. The patient collaboration of Julien Cillis while operating the SEM at RBINS was invaluable. We express our gratitude to P. Martin (RBINS) for giving us access to the Leica DM 5500B light microscope under his care. Dr. C. Lüter (ZMB, Germany) is thanked for providing access to the original type slides of Thiele (1905). Two anonymous reviewers are thanked for their valuable suggestions to improve the manuscript. The ESPER Project granted to RBINS was funded by the Belgian Directorate-General for Development Cooperation (DGD), within the framework of the CEBioS programme (Belgian Global Taxonomy Initiative NFP), RBINS. PhW was supported by travel grants #18834 from the FNRS (Fonds National de la Recherche Scientifique) and #23038.001427/2014-15 (CAPES/CIMAR) to conduct part of this study at MNRJ and UFRJ. EH is thankful to RBINS for partially subsidizing his visits to Brussels where this study has been jointly conducted with PhW in 2010, 2012, 2014, 2017, 2018 and 2019, and also to CAPES/CIMAR (Marine Sciences Program—grant 23038.001427/2014-15), CNPq (PROSUL - 490425/2007-0, Universal grants - 476558/2012-3 and 425839/2016-8, and Productivity Fellowship), and FAPERJ (Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro: Scientist from our State - 102.365/2009, 102.292/2013 and 202.624/2019). AB acknowledges CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) for granting him a doctoral scholarship.

References

Aguirre, L.K., Hooker, Y., Willenz, Ph. & Hajdu, E. (2011) A new *Clathria* (Demospongiae, Microcionidae) from Peru occurring on rocky substrates as well as epibiontic on *Eucidaris thouarsii* sea urchins. *Zootaxa*, 3085 (1), 41–54.
https://doi.org/10.11646/zootaxa.3085.1.3

Arroyo, Y., Hajdu, E., Willenz, Ph. & Cóndor-Luján, B. (2020) First record of *Ciocalypta* Bowerbank, 1862 (Demospongiae, Suberitida, Halichondriidae) in the Eastern Pacific, with description of a new species from Peru. *Zootaxa*, 4853 (3), 429–441.
https://doi.org/10.11646/zootaxa.4853.3.6

Ávila, E. & Carballo, J.L. (2009) A preliminary assessment of the invasiveness of the Indo-Pacific sponge *Chalinula nematifera* on coral communities from the tropical Eastern Pacific. *Biological Invasions*, 11 (2), 257–264.
https://doi.org/10.1007/s10530-008-9230-5

Azevedo, F., Cóndor-Luján, B., Willenz, Ph., Hajdu, E., Hooker, Y. & Klautau, M. (2015) Integrative taxonomy of calcareous sponges (subclass Calcinea) from the Peruvian coast: morphology, molecules, and biogeography. *Zoological Journal of the Linnean Society*, 173 (4), 787–817.
https://doi.org/10.1111/zoj.12213

Calabro, K., Chalén, B.E., Genta-Jouve, G., Jaramillo, K.B., Domínguez, C., de la Cruz, M., Cautain, B., Reyes, F., Thomas, O.P. & Rodríguez, J. (2018) Callyspongidic acids: amphiphilic diacids from the Tropical Eastern Pacific Sponge *Callyspongia* cf. *californica*. *Journal of Natural Products*, 81 (10), 2301–2305.
https://doi.org/10.1021/acs.jnatprod.8b00683

Carballo, J.L., Gómez, P. & Cruz-Barraza, J.A. (2014) Biodiversidad de Porifera en México. *Revista Mexicana de Biodiversidad*, 85 (Supplement), S143–S153.
https://doi.org/10.7550/rmb.32074

Cóndor-Luján, B., Azevedo, F., Hajdu, E., Hooker, Y., Willenz, Ph. & Klautau, M. (2019) Tropical Eastern Pacific Amphoriscidae Dendy, 1892 (Porifera: Calcarea: Calcaronea: Leucosolenida) from the Peruvian coast. *Marine Biodiversity*, 49 (4), 1813–1830.
https://doi.org/10.1007/s12526-019-00946-y

Cóndor-Luján, B., Leocorny, P., Padua, A., Azevedo, F., Seixas, V.C., Hooker, Y., Hajdu, E., Willenz, Ph., Pérez, T. & Klautau, M. (2021) Evolutionary history of the calcareous sponge *Clathrina aurea*: genetic connectivity in the Western Atlantic and intriguing occurrence in the Eastern Pacific. *Marine Biology*, 168 (8), 127.
https://doi.org/10.1007/s00227-021-03934-8

Cortés, J., van Der Hal, N. & van Soest, R.W.M. (2009) Sponges. *In*: Wehrtmann, I. S. & Cortés, J. (Eds.), *Marine Biodiversity of Costa Rica, Central America*. Springer Netherlands, Dordrecht, pp. 137–142.
https://doi.org/10.1007/978-1-4020-8278-8_9

Cruz-Barraza, J.A. & Carballo, J.L. (2006) A new species of *Haliclona* (Demospongiae: Haplosclerida) living in association with *Geodia media* Bowerbank (Mexican Pacific coast). *Zootaxa*, 1343, 43–54.

Cruz-Barraza, J.A. & Carballo, J.L. (2008) Taxonomy of sponges (Porifera) associated with corals from the Mexican Pacific Ocean. *Zoological Studies*, 47 (6), 741–758.

de Laubenfels, M.W. (1926) New sponges from California. *Annals and Magazine of Natural History*, 17 (9), 567-573.

de Laubenfels, M.W. (1930) The Sponges of California. (Abstracts of dissertations for the degree of doctor of philosophy). *Stanford University Bulletin*, 5 (98), 24–29.

de Laubenfels, M.W. (1932) The marine and fresh-water sponges of California. *Proceedings of the United States National Museum*, 81 (2927), 1–140.
https://doi.org/10.5479/si.00963801.81-2927.1

de Laubenfels, M.W. (1939) Sponges collected on the Presidential cruise of 1938. *Smithsonian Miscellaneous Collections*, 98 (15), 1–7.

de Laubenfels, M.W. (1954) The Sponges of the West-Central Pacific. *Oregon State Monographs. Studies in Zoology*, 7, 1–306.

de Paula, T.S., Zilberberg, C., Hajdu, E. & Lôbo-Hajdu, G. (2012) Morphology and molecules on opposite sides of the diversity gradient: Four cryptic species of the *Cliona celata* (Porifera, Demospongiae) complex in South America revealed by mitochondrial and nuclear markers. *Molecular Phylogenetics and Evolution*, 62 (1), 529–541.
https://doi.org/10.1016/j.ympev.2011.11.001

de Voogd, N.J. (2004) *Callyspongia* (*Euplacella*) *biru* spec. nov. (Porifera: Demospongiae: Haplosclerida) from Indonesia. *Zoologische Mededelingen*, 78 (28), 477–483.

de Weerdt, W.H. (1985) A systematic revision of the North Eastern Atlantic shallow-water Haplosclerida (Porifera, Demospongiae), Part I: Introduction, Oceanapiidae and Petrosiidae. *Beaufortia*, 35 (5), 61–91.

de Weerdt, W.H. (1986) A systematic revision of the North-Eastern Atlantic shallow-water Haplosclerida (Porifera, Demospongiae) Part II: Chalinidae. *Beaufortia*, 36 (6), 81–165.

de Weerdt, W.H. (1989) Phylogeny and vicariance biogeography of North Atlantic Chalinidae (Haplosclerida, Demospongiae). *Beaufortia*, 39 (3), 55–88.

de Weerdt, W.H. (2000) A monograph of the shallow-water Chalinidae (Porifera, Haplosclerida) of the Caribbean. *Beaufortia*, 50 (1), 1–67.

de Weerdt, W.H. (2002) Family Chalinidae Gray, 1867. *In*: Hooper, J.N.A. & van Soest, R.W.M. (Eds.), *Systema Porifera: A Guide to the Classification of Sponges*. Springer US, Boston, Massachusetts, pp. 852–873.
https://doi.org/10.1007/978-1-4615-0747-5_91

Desqueyroux-Faundez, R. (1984) Description de la faune des Haplosclerida de la Nouvelle-Caledonie I. Niphatidae-Callyspongiidae. *Revue suisse de Zoologie*, 91 (3), 765–827.

Desqueyroux-Faúndez, R. (1990) Sponges (Demospongiae) from Easter Island (Isla de Pascua) (South Pacific Ocean). *Revue suisse de Zoologie*, 97 (2), 373–410.

Desqueyroux-Faúndez, R. & Valentine, C. (2002) Family Niphatidae van Soest, 1980. *In*: Hooper, J.N.A. & van Soest, R.W.M. (Eds.), *Systema Porifera: A Guide to the Classification of Sponges*. Springer US, Boston, Massachusetts, pp. 874–889.
https://doi.org/10.1007/978-1-4615-0747-5_92

Desqueyroux-Faúndez, R. & van Soest, R.W.M. (1997) Shallow water Demosponges of the Galápagos Islands. *Revue suisse de Zoologie*, 104 (2), 379–467.

Desqueyroux, R. (1976) Démosponges signalées pour la Région des Canaux du Chili. *Cahiers de Biologie Marine*, 17 (1), 93–109.

Dickinson, M.G. (1945) Sponges of the Gulf of California. *In*: *Reports on the collections obtained by Alan Hancock Pacific Expeditions of Velero III off the coast of Mexico, Central America, South America, and Galapagos Islands in 1932, in 1933, in 1934, in 1937, in 1939, and 1940*. The University of Southern California Press, Los Angeles, California, pp. 1–55.

Gastaldi, M., de Paula, T.S., Narvarte, M.A., Lôbo-Hajdu, G. & Hajdu, E. (2018) Marine sponges (Porifera) from the Bahía San Antonio (North Patagonian Gulfs, Argentina), with additions to the phylogeography of the widely distributed *Cliona* aff. *celata* and *Hymeniacidon perlevis*, and the description of two new species. *Marine Biology Research*, 14 (7), 682–716. https://doi.org/10.1080/17451000.2018.1506136

Gómez, P., Carballo, J.L., Vázquez, L.E. & Cruz, J.A. (2002) New records for the sponge fauna (Porifera: Demospongiae) of the Pacific coast of Mexico (eastern Pacific Ocean). *Proceedings of the Biological Society of Washington*, 115 (1), 223–237.

Hajdu, E., Desqueyroux-Faúndez, R., Carvalho, M. de S., Lôbo-Hajdu, G. & Willenz, Ph. (2013) Twelve new Demospongiae (Porifera) from Chilean fjords, with remarks upon sponge-derived biogeographic compartments in the SE Pacific. *Zootaxa*, 3744 (1), 1–64. https://doi.org/10.11646/zootaxa.3744.1.1

Hajdu, E., Hooker, Y. & Willenz, Ph. (2015) New *Hamacantha* from Peru and resurrection of *Zygherpe* as subgenus (Demospongiae, Poecilosclerida, Hamacanthidae). *Zootaxa*, 3926 (1), 87–99. https://doi.org/10.11646/zootaxa.3926.1.3

Hajdu, E., Peixinho, S. & Fernandez, J.C.C. (2011) Esponjas marinhas da Bahia: guia de campo e laboratoìrio. Museu Nacional, Rio de Janeiro, 276 pp.

Hajdu, E. & van Soest, R.W.M. (1996) Choosing among Poriferan morphological characters within the cladistic paradigm. *Bulletin de l'Institut royal des Sciences naturelles de Belgique. Biologie.*, 66 (Supplement), 81–88.

Häussermann, V. (2006) Biodiversity of Chilean sea anemones (Cnidaria: Anthozoa): distribution patterns and zoogeographic implications, including new records for the fjord region. *Investigaciones marinas*, 34 (2), 23–35. https://doi.org/10.4067/S0717-71782006000200003

Hechtel, G.J. (1965) A systematic study of the Demospongiae of Port Royal, Jamaica. *Bulletin of the Peabody Museum of Natural History*, 20, 1–103.

Hooker, Y. (2009) Nuevos registros de peces costeros tropicales para el Perú. *Revista Peruana de Biología*, 16, 33–41.

Hooker, Y., Prieto-Rios, E. & Solís-Marín, F.A. (2013) Echinoderms of Peru. *In*: Alvarado, J. & Solis-Marin, F. (Eds.), *Echinoderm Research and Diversity in Latin America*. Springer, Berlin, Heidelberg, pp. 277–299. https://doi.org/10.1007/978-3-642-20051-9

Ibanez-Erquiaga, B., Pacheco, A.S., Rivadeneira, M.M. & Tejada, C.L. (2018) Biogeographical zonation of rocky intertidal communities along the coast of Peru (3.5–13.5° S Southeast Pacific). *PLoS ONE*, 13 (11), e0208244. https://doi.org/10.1371/journal.pone.0208244

Jaramillo, K.B., Cóndor-Luján, B., Longakit, B., Rodriguez, J., Thomas, O.P., McCormack, G. & Hajdu, E. (2021) New records of Demospongiae (Porifera) from Reserva Marina El Pelado (Santa Elena, Ecuador), with description of *Tedania* (*Tedania*) *ecuadoriensis* sp. nov. *ZooKeys*, 1011, 101–120. https://doi.org/10.3897/zookeys.1011.54485

Klautau, M., Azevedo, F., Cóndor-Luján, B., Rapp, H.T., Collins, A. & Russo, C.A.M. (2013) A molecular phylogeny for the Order Clathrinida rekindles and refines Haeckel's taxonomic proposal for Calcareous sponges. *Integrative and Comparative Biology*, 53 (3), 447–461. https://doi.org/10.1093/icb/ict039

Leal, C. V., Moraes, F.C., Fróes, A.M., Soares, A.C., de Oliveira, L.S., Moreira, A.P.B., Thompson, F.L. & Hajdu, E. (2017) Integrative taxonomy of Amazon Reefs' *Arenosclera* spp.: A New Clade in the Haplosclerida (Demospongiae). *Frontiers in Marine Science*, 4, 14. https://doi.org/10.3389/fmars.2017.00291

Lee, W.L., Elvin, D.W. & Reiswig, H.M. (2007) *The Sponges of California: A Guide and Key to the Marine Sponges of California*. Monterey Bay Sanctuary Foundation, Monterey, CA, 265 pp.

Lizarazo, N., Zea, S., Chasqui, L. & Rincón-Díaz, N. (2020) Biodiversidad de esponjas en arrecifes rocosos del Chocó norte, Pacífico colombiano. *Boletín de Investigaciones Marinas y Costeras*, 49 (2), 79–130. https://doi.org/10.25268/bimc.invemar.2020.49.2.889

Maldonado, M., Carmona, M.C., van Soest, R.W.M. & Pomponi, S.A. (2001) First record of the sponge genera *Crambe* and *Discorhabdella* for the eastern Pacific, with description of three new species. *Journal of Natural History*, 35 (9), 1261–1276.

Muricy, G., Esteves, E.L., Monteiro, L.C., Rodrigues, B.R. & Albano, R.M. (2015) A new species of *Haliclona* (Demospongiae: Haplosclerida: Chalinidae) from Southeastern Brazil and the first record of *Haliclona vansoesti* from the Brazilian coast. *Zootaxa*, 3925 (4), 536–550. https://doi.org/10.11646/zootaxa.3925.4.3

Ramirez, R., Paredes, C. & Arenas, J. (2003) Moluscos del Perú. *Revista de Biologia Tropical*, 51 (Supplement 3), 225–284.

Recinos, R., Pinheiro, U., Willenz, Ph. & Hajdu, E. (2020) Three new Raspailiidae Hentschel, 1923 (Axinellida, Demospongiae) from Peru. *Zootaxa*, 4778 (3), 521–545. https://doi.org/10.11646/zootaxa.4778.3.5

Redmond, N.E., Morrow, C.C., Thacker, R.W., Diaz, M.C., Boury-Esnault, N., Cardenas, P., Hajdu, E., Lôbo-Hajdu, G., Picton, B.E., Pomponi, S.A., Kayal, E. & Collins, A.G. (2013) Phylogeny and systematics of Demospongiae in light of new small-subunit ribosomal DNA (18S) sequences. *Integrative and Comparative Biology*, 53 (3), 388–415. https://doi.org/10.1093/icb/ict078

Redmond, N.E., Raleigh, J., van Soest, R.W.M., Kelly, M., Travers, S.A.A., Bradshaw, B., Vartia, S., Stephens, K.M. & McCormack, G.P. (2011) Phylogenetic relationships of the marine Haplosclerida (Phylum Porifera) employing ribosomal

(28S rRNA) and mitochondrial (cox1, nad1) gene sequence data. *PLoS ONE*, 6 (9), e24344. https://doi.org/10.1371/journal.pone.0024344

Redmond, N.E., van Soest, R.W.M., Kelly, M., Raleigh, J., Travers, S.A.A. & McCormack, G.P. (2007) Reassessment of the classification of the Order Haplosclerida (Class Demospongiae, Phylum Porifera) using 18S rRNA gene sequence data. *Molecular Phylogenetics and Evolution*, 43 (1), 344–352. https://doi.org/10.1016/j.ympev.2006.10.021

Ristau, D.A. (1978) Six new species of shallow-water marine demosponges from California. *Proceedings of the Biological Society of Washington*, 91 (3), 569–589.

Rossi, G., Montori, S., Cerrano, C. & Calcinai, B. (2015) The coral killing sponge *Chalinula nematifera* (Porifera: Haplosclerida) along the eastern coast of Sulawesi Island (Indonesia). *Italian Journal of Zoology*, 82 (1), 143–148. https://doi.org/10.1080/11250003.2014.994046

Sarà, M. (1978) Demospongiae di acque superficiali della Terra del Fuoco (Spedizioni AMF Mares—GRSTS e SAI). *Bolletino dei Musei e degli Istituti Biologici dell'Università di Genova*, 46, 7–117.

Schneider, C.A., Rasband, W.S. & Eliceiri, K.W. (2012) NIH Image to ImageJ: 25 years of image analysis. *Nature Methods*, 9 (7), 671–675. https://doi.org/10.1038/nmeth.2089

Schrödl, M. (1999) Zoogeographic relationships of Magellan Nudibranchia (Mollusca: Opisthobranchia) with particular reference to species from adjacent regions. *Scientia Marina*, 63 (S1), 409–416. https://doi.org/10.3989/scimar.1999.63s1409

Schrödl, M. & Hooker, Y. (2014) Sea slugs of Peru: Peruvian-Chilean faunal elements. *Spixiana*, 37 (1), 45–59.

Sim-Smith, C., Hickman Jr, C. & Kelly, M. (2021) New shallow-water sponges (Porifera) from the Galápagos Islands. *Zootaxa*, 5012 (1), 1–71. https://doi.org/10.11646/zootaxa.5012.1.1

Spalding, M.D., Fox, H.E., Allen, G.R., Davidson, N., Ferdaña, Z.A., Finlayson, M., Halpern, B.S., Jorge, M.A., Lombana, A., Lourie, S.A., Martin, K.D., McManus, E., Molnar, J., Recchia, C.A. & Robertson, J. (2007) Marine ecoregions of the world: A bioregionalization of coastal and shelf areas. *BioScience*, 57 (7), 573–583. https://doi.org/10.1641/B570707

Sullivan Sealey, K. & Bustamante, G. (1999) *Setting geographic priorities for marine conservation in Latin America and the Caribbean*. The Nature Conservancy, Arlington, Virginia, 125 pp.

Tarazona, J. & Arntz, W. (2001) The Peruvian Coastal Upwelling System. *In*: Seeliger, U. & Kjerfve, B. (Eds.), *Coastal Marine Ecosystems of Latin America. Ecological Studies (Analysis and Synthesis)*. Springer, Berlin and Heidelberg, pp. 229–244. https://doi.org/10.1007/978-3-662-04482-7_17

Tarazona, J., Gutiérrez, D., Paredes, C. & Indacochea, A. (2003) Overview and challenges of Marine Biodiversity Research in Peru. *Gayana, Concepción*, 67 (2), 206–231. https://doi.org/10.4067/S0717-65382003000200009

Thacker, R.W., Hill, A.L., Hill, M.S., Redmond, N.E., Collins, A.G., Morrow, C.C., Spicer, L., Carmack, C.A., Zappe, M.E., Pohlmann, D., Hall, C., Diaz, M.C. & Bangalore, P.V. (2013) Nearly complete 28S rRNA gene sequences confirm new hypotheses of sponge evolution. *Integrative and Comparative Biology*, 53 (3), 373–387. https://doi.org/10.1093/icb/ict071

Thiele, J. (1905) Die Kiesel- und Hornschwämme der Sammlung Plate. *Zoologische Jahrbücher*, Supplement 6 (Fauna Chilensis III), 407–496.

van Soest, R.W.M. (1980) Marine sponges from Curaçao and other Caribbean localities Part II. Haplosclerida. *Studies on the Fauna of Curaçao and Other Caribbean Islands*, 62 (1), 1–173.

van Soest, R.W.M. (2017) *Flagellia*, a new subgenus of *Haliclona* (Porifera, Haplosclerida). *European Journal of Taxonomy*, 351, 1–48. https://doi.org/10.5852/ejt.2017.351

van Soest, R.W.M., Boury-Esnault, N., Hooper, J.N.A., Rützler, K., de Voogd, N.J., Alvarez, B., Hajdu, E., Pisera, A.B., Manconi, R., Schönberg, C., Klautau, M., Kelly, M., Vacelet, J., Dohrmann, M., Díaz, M.C., Cárdenas, P., Carballo, J.L., Ríos, P., Downey, R. & Morrow, C.C. (2021) World Porifera Database. Available from: http://www.marinespecies.org/porifera (accessed 30 March 2021)

van Soest, R.W.M., Boury-Esnault, N., Vacelet, J., Dohrmann, M., Erpenbeck, D., De Voogd, N.J., Santodomingo, N., Vanhoorne, B., Kelly, M. & Hooper, J.N.A. (2012) Global diversity of sponges (Porifera). *PLoS ONE*, 7 (4), e35105. https://doi.org/10.1371/journal.pone.0035105

van Soest, R.W.M., Kaiser, K.L. & van Syoc, R. (2011) Sponges from Clipperton Island, East Pacific. *Zootaxa*, 46 (2839), 1–46.

Wilson, H.V. (1904) Reports on an Exploration off the West Coasts of Mexico, Central and South America, and off the Galapagos Islands, in charge of Alexander Agassiz, by the U.S. Fish Commission Steamer "Albatross" during 1891, Lieut. Commander Z.L. Tanner, U.S.S., commandin. *Memoirs of the Museum of Comparative Zoology at Harvard College*, 30 (1), 1–164.