REVUE SUISSE DE ZOOLOGIE 104 (2): 379-467; juin 1997

Shallow waters Demosponges of the Galápagos Islands

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Shallow waters Demosponges of the Galápagos Islands. - Descriptions and illustrations are presented for 45 sponge species from shallow waters of the Galápagos Islands, obtained from collections made by the South East Pacific Biological Oceanographic Programme (SEPBOP) 1966 and W.D. Hope in 1978 deposited in the National Museum of Natural History, Washington. Twenty two previously known species are described, most new record for this area, one a new combination: *Higginsia papillosa* Thiele, transfered to *Halicnemia*. Twenty three species of the genera *Plakina*, *Plakortis*, *Penares*, *Stelletta*, *Dercitus*, *Corallistes*, *Cinachyrella*, *Chondrilla*, *Sigmosceptrella*, *Polymastia*, *Quasillina*, *Tethya*, *Phakellia*, *Halicnemia*, *Spongosorites*, *Aulospongus*, *Lissodendoryx*, *Oceanapia*, and *Cacospongia*, are new to science.
Definitions of genera and families are briefly discussed. Comparisons made with many type specimens of species from the NE, Central and SE Pacific areas.

Key-words: Demosponges - Galápagos - Fauna - Systematics.

INTRODUCTION

Knowledge of the shallow water sponge fauna of the Galápagos Islands (Table 1) is limited to a few records made by DE LAUBENFELS (1939) based on material collected during a 1938 cruise of President Franklin D. Roosevelt in the tropical East Pacific, and on material collected during the Hancock Pacific Expedition on the M.S. Velero III; DESQUEYROUX-FAÚNDEZ & VAN SOEST (1996), who described *Tedania (Tedania) galapagensis* and recorded two other species, and TOPSENT (1895) who reported *Chondrosia reniformis* Nardo, 1847 from the Galápagos Islands.

Deep-water sponges were collected by the U.S. Fish Commission Steamer "Albatross" during 1891 and described by WILSON (1904).

Thus, with about 30 species known prior to the present study this area remains one of the least known areas of world for sponges.

Manuscript accepted 18.11.1996.

TABLE 1

Galápagos species previously recorded. Information from literature.

Topsent, 1895	Wilson, 1904	De Laubenfels, 1939	Desqueyroux-Faúndez & van Soest, 1996
Chondrosia reniformis Nardo, 1847	*Euplectella* sp.	*Haliclona enamela* De Laubenfels, 1930	*Iophon lamella* Wilson, 1904
	Regradella delicata Wilson, 1904	*Haliclona permollis* (Bowerbank, 1866)	*Myxilla (M.) mexicensis* Dickinson, 1945
	Hexactinella ventilabrum Carter, 1885	*Adocia simulans* (Johnston, 1842)	*Tedania (T.) galapagensis* Desqueyroux-Faúndez & van Soest, 1996
	H. labyrinthica Wilson, 1904	*Callyspongia vaginalis* (Lamarck, 1814)	
	H. tubulosa Schulze, 1887	*Merramium roosevelti* (De Laubenfels, 1939	
	Sclerothamnopsis compressa Wilson, 1904	*Tedania nigrescens* (Schmidt, 1862)	
	Penares foliaformis Wilson, 1904	*Higginsia papillosa* Thiele, 1905	
	Thenea fenestrata Schmidt, 1875	*Cliona celata* Grant, 1826	
	Poecillastra cribraria Wilson, 1904	*Geodia paupera* Bowerbank, 1873	
	P. tricornis Wilson, 1904		
	Polymastia maeandria Wilson, 1904		
	Auletta dendrophora Wilson, 1904		
	Iophon lamella Wilson, 1904		
	I. lamella indivisus Wilson, 1904		
	I. indentatus Wilson, 1904		
	Tylodesma alba Wilson, 1904		
	T. vestibularis Wilson, 1904		
	Oceanapia bacillifera Wilson, 1904		
	Petrosia variabilis crassa Wilson, 1904		
	P.similis densissima Wilson, 1904		

MATERIAL AND METHODS

Specimens were collected at the Galápagos Islands, including Albemarle Isl. (I. Isabela), Indefatigable Isl. (I. Santa Cruz), Gardner Isl., (I. Española), James Isl. (I. Santiago), Bindloe Isl. (I. Marchena), Nameless Isl. (I. Sin Nombre), and Seymour Isl. (I. Seymour).

The holotypes of this collection are deposited in the USNM. Several paratypes, as well as schizo-holotypes of new species (fragments and microscopic slides of type material), are deposited in ZMA and in the MHNG. Representative specimens and/or fragments of known species are deposited in each of the three museum collections.

Specimen data are indicated with each species description under "Material", in the following order:

Specimens or fragments deposited at USNM with their registration number, SEPBOP "Anton Bruun" Cruise number, locality, geographical coordinates, date (day, month, year), depth in m, type of substrate, fragments and microscopical slides deposited at ZMA and MHNG with their registration number.

Type material of studied species and related genera was borrowed from different museums for comparisons. Data are indicated.

Abbreviations cited in text are:

BMNH:	Natural History Museum, London
MHNG:	Muséum d'histoire naturelle, Genève
MNHN:	Muséum national d'histoire naturelle, Paris
LMJG:	Landes Museum Jubileum, Graz
USC:	University of Southern California
SEPBOP:	South Eastern Pacific Biological Oceanographic Program
USNM/NMNH:	National Museum of Natural History, Washington
ZMA:	Zoölogisch Museum Amsterdam
ZMB:	Museum für Naturkunde der Humboldt Universität, Berlin

Skeletal slides and dissociated spicule mounts were prepared following RÜTZLER (1978). The SEM study was made at MHNG, using a Zeiss Digital Scan Microscope DSM-940, with accelerating voltage of 20 kV and magnification up to 10000 times. Spicule measurements are given as minimum - *mean* - maximum, N = 25.

SYSTEMATICS

Order HOMOSCLEROPHORIDA
Plakinidae Schulze, 1880
Genus *Plakina* Schulze, 1880
Plakina fragilis n. sp.
Plakina microlobata n. sp.
Plakina pacifica n. sp.
Genus *Plakortis* Schulze, 1880
Plakortis galapagensis n. sp.

Order ASTROPHORIDA
Ancorinidae Schmidt, 1870
Genus *Penares* Gray, 1867
Penares saccharis (De Laubenfels, 1930)
Penares apicospinatus n. sp.
Penares scabiosus n. sp.
Genus *Stelletta* Schmidt, 1862
Stelletta eduardoi n. sp.
Pachastrellidae Carter, 1875
Genus *Dercitus* Gray, 1867
Dercitus reptans n. sp.
Genus *Poecillastra* Sollas, 1888
Poecillastra cribraria Wilson, 1904
Genus *Vulcanella* Sollas, 1886
Vulcanella tricornis (Wilson, 1904)
Geodiidae Gray, 1867
Genus *Geodia* Lamarck, 1815
Geodia media Bowerbank, 1873
Genus *Erylus* Gray, 1867
Erylus cf. *oxyaster* von Lendenfeld, 1910
Order LITHISTIDA
Corallistidae Sollas, 1888
Genus *Corallistes* Schmidt, 1870
Corallistes isabela n. sp.
Order: SPIROPHORIDA
Tetillidae Sollas, 1886
Genus *Cinachyrella* Wilson, 1925
Cinachyrella globulosa n. sp.
Order: HADROMERIDA
Clionidae Gray, 1867
Genus *Cliona* Grant, 1826
Cliona chilensis Thiele, 1905
Chondrillidae Schmidt, 1862
Genus *Chondrilla* Schmidt, 1862
Chondrilla verrucosa n. sp.
Genus *Chondrosia* Nardo, 1842
Chondrosia cf. *chucalla* de Laubenfels, 1954
Latrunculiidae Topsent, 1922
Genus *Sigmosceptrella* Dendy, 1922
Sigmosceptrella hospitalis n. sp.
Polymastiidae Gray, 1867
Genus *Polymastia* Bowerbank, 1863
Polymastia villosa n. sp.

Genus Quasillina Norman, 1868
Quasillina translucida n. sp.
Tethyidae Gray, 1867
Genus *Tethya* Lamarck, 1814
Tethya sarai n. sp.
Order HALICHONDRIDA
Axinellidae Carter, 1875
Genus *Auletta* Schmidt, 1870
Auletta dendrophora Wilson, 1904
Genus *Phakellia* Bowerbank, 1863
Phakellia hooperi n. sp.
Desmoxyidae Hallmann, 1917
Genus *Halicnemia* Bowerbank, 1864
Halicnemia diazae n. sp.
Halichondriidae
Genus *Hymeniacidon* Bowerbank, 1861
Hymeniacidon sinapium De Laubenfels, 1930
Genus *Spongosorites* Topsent, 1896
Spongosorites smithae n. sp.
Genus *Topsentia* Berg, 1899
Topsentia aff. *ophiraphidites* (De Laubenfels, 1934)
Order POECILOSCLERIDA
Suborder MICROCIONINA
Iophonidae Burton, 1929
Iophon lamella Wilson, 1904
Genus *Acarnus* Gray, 1867
Acarnus peruanus van Soest, Hooper & Hiemstra, 1991
Microcionidae Carter, 1875
Genus *Antho* Gray, 1867
Subgenus *Plocamia* Schmidt, 1870
Antho (Plocamia) lithophoenix (De Laubenfels, 1927)
Raspailiidae Hentschel, 1923
Genus *Aulospongus* Norman, 1878
Aulospongus galapagensis n. sp.
Suborder MYXILLINA
Myxillidae Topsent, 1928
Genus *Myxilla* Schmidt, 1862
Subgenus *Myxilla* Schmidt, 1862
Myxilla mexicensis Dickinson, 1945
Tedaniidae Ridley & Dendy, 1886
Genus *Tedania* Gray, 1867
Subgenus Tedania Gray, 1867
Tedania (Tedania) galapagensis Desqueyroux-Faúndez & van Soest, 1996

Anchinoidae Topsent, 1928
Genus *Phorbas* Duchassaing & Michelotti, 1868
Phorbas californiana (De Laubenfels, 1932)
Coelosphaeridae Hentschel, 1923
Genus *Lissodendoryx* Topsent, 1892
Lissodendoryx albemarlensis n. sp.
Suborder MYCALINA
Guitarridae Burton, 1929
Genus *Guitarra* Carter, 1874
Guitarra abbotti Lee, 1987
Mycalidae Lundbeck, 1905
Genus *Mycale* Gray, 1867
Subgenus *Carmia* Gray, 1867
Mycale (Carmia) cecilia De Laubenfels, 1936
Order HAPLOSCLERIDA
*Chalinidae
Phlocodictyidae Carter, 1882
Genus *Oceanapia* Norman, 1869
Oceanapia microtoxa n. sp.
Order DICTYOCERATIDA
Irciniidae Gray, 1867
Genus *Ircinia* Nardo, 1833
Ircinia sp.
Genus *Cacospongia* Schmidt, 1862
Cacospongia similis Thiele, 1905
Cacospongia incognita n. sp.
Order DENDROCERATIDA
Dysideidae Gray, 1867
Genus *Spongionella* Bowerbank, 1862
Spongionella repens (Thiele, 1905)
Order VERONGIDA
Aplysinidae Carter, 1875
Genus *Aplysina* Nardo, 1834
Aplysina azteca Gomez & Bakus, 1992

*We mention here the occurrence of several species of *Haliclona* (Haplosclerida, Chalinidae) in our samples, but these are not included in the descriptions below because the state of preservation of this material was insufficient for making recognizable descriptions.

DESCRIPTIONS

Order HOMOSCLEROPHORIDA
Plakinidae Schulze, 1880

Plakina Schulze, 1880

Type species: *Plakina monolopha* Schulze, 1880 by subsequent designation (SOLLAS, 1888).

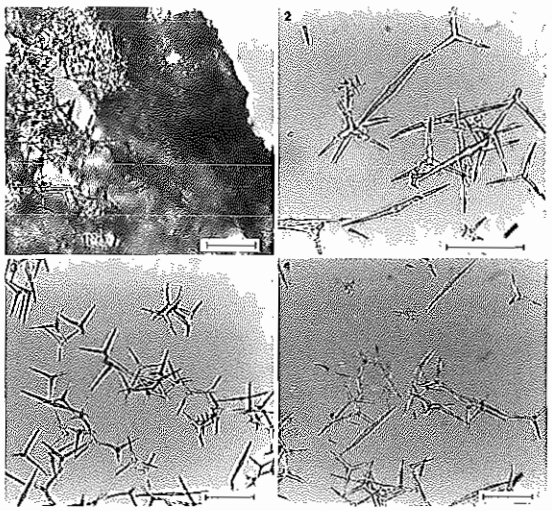
Definition (from DIAZ & VAN SOEST, 1994): thinly to massively encrusting Plakinidae with a spiculation of diods, triods and calthrops, and with lophocalthrops with one, two, three or four lophate rays. The lophocalthrops are concentrated at the sponge surface. Eurypylous choanocyte chambers usually with a radial arrangement of chambers around a central excurrent canal.

Plakina fragilis n. sp. (Figs 1-4)

Material: Holotype USNM 43168 SEPBOP "Anton Bruun" 18B-794A James Isl., 00°12'S 90°50'W, 23-09-1966, intertidal. Microscopical slides and fragments ZMA POR. 11190, MHNG 21531.

DESCRIPTION:

Thin crust of 0.3 mm in thickness and about 5 mm^2 in lateral expansion. Surface: no apparent oscules or larger openings; microscopically there is a regular distribution of inhalant and exhalant pits. Consistency fragile, cheesy.



FIGS 1-4

Plakina fragilis n. sp. 1. Holotype, encrusting specimen. Stat. 18B 794A James Isl., longitudinal view of surface skeleton, trilophate spicules on surface. 2, 3, 4. General view of spicules: diods, triods calthropses and trilophose calthrops or lophocalthrops. Scales: figs 1-4= 50 µm.

SKELETON:

Ectosomal: not differentiated clearly from the choanosome, but trilophate spicules are concentrated at the surface.

Choanosomal: regularly alveolar with alveolae of 40-60 µm in diameter, covered by calthrops and diods.

Spicules: diods, triods, calthrops and trilophose calthrops.

Diods: irregular, curved, markedly thicker in the middle, 66 - *83.4* - 96 µm by 4.5 - *5.45* - 7.0 µm.

Triods: rare, occasionally Y-shaped, cladome 42 - *50.0* - 61 µm, longest ray 24 - *29.2* - 36 µm by 3.0 - *3.25* - 4.0 µm.

Calthrops: very frequently (40 %) with one ray reduced to a short knob, often (30%) with a second ray also reduced to a knob, cladome 29 - *43.8* - 56 µm, longest ray 18 - *25.7* - 33 µm by 2.5 - *3.1* - 4.0 µm.

Trilophose calthrops: with each lophate ray trifurcate, a good proportion with the fourth non-lophate ray bifurcate, occasionally the divided rays show also incipient lophate development, thus verging towards being "tetralophate", cladome 18 - *21.2* - 25 µm, non-lophate ray 12 - *13.5* -15 by 2.0 - *3.0* - 4.0 µm.

Etymology: the name refers to its consistency.

Remarks: the present species belongs to the world-wide species complex referred to *Plakina trilopha* Schulze, 1880, but clearly consisting of several distinct sibling species. Other species included in this complex are *P. corticioides* Vacelet, Vasseur & Lévi, 1976, and *P. tetralopha* Hoshino & Tanita, 1989. The differences between allopatric species in this cosmopolitan species complex are very small and subtle (cf. Table 2). The Galápagos *P. fragilis* n. sp. differs from the Mediterranean *P. trilopha* in the more robust spicules and the relative more common calthrops (rare in *P. trilopha*), but especially in the high frequency of the doubly reduced calthrops (which it shares only with *P. trilopha* sensu VACELET, VASSEUR & LÉVI 1976 from Madagascar). It is uncertain whether the Galápagos specimen and the specimen reported as *P. trilopha* from Chile (23°S) by DESQUEYROUX (1972) belong to the same species; the cladome of the trilophose calthrops is clearly larger (27-37 µm) in Chilean material, which is shared with Subantarctic and Antarctic specimens of *P. trilopha* (sensu KOLTUN 1964; BOURY-ESNAULT & VAN BEVEREN 1982), none of which are strictly conspecific with the Mediterranean population of *P. trilopha* (MURICY *et al.*, in press).

Plakina microlobata n. sp. (Figs 5-10)

Material: Holotype USNM 40632 SEPBOP "Anton Bruun" 18B-794A James Isl., 00°12'S 90°50'W, 23-09-1966, intertidal. Microscopical slides and fragments, MHNG 18980.

Paratype: ZMA.POR. 11207, SEPBOP "Anton Bruun" 16-66139 Albemarle Isl., N coast, 00°15'55"S 91°26'41"W, 25-05-1966, 0-3 m.

DESCRIPTION:

Thinly encrusting on rock (holotype, together with *Erylus* cf. *oxyaster* and serpulids), 10-20 mm^2 in lateral expansion, 1-3 mm in thickness. Smooth surface, strongly undulating, micro-lobate and pitted regularly (visible to the naked eye).

TABLE 2

Spicule sizes reported for *Plakina trilopha* Schulze, compared to Plakina fragilis n. sp., information from literature, various localities and ZMA and MHNG material. Measurements (in µm) refer to length and width (diods), to cladome and length and width of rays (triods, calthropses and lophose calthrops).

Author/collect.	Locality	Diods	Triods	Calthrops	Lophocaltrops
P. trilopha	Mediterranean	present	present	present	present
Topsent, 1895	Mediterranean	present	present	present	rays 15-25
Koltun, 1964	Antarctica	70-147 x 3-5	clad. 25-57	clad.25-57	clad. 25-44
Bergquist, 1968	New Zealand	62-72 x 5-5.5	clad. 48-58	rays 24-29 x 4-6	clad. 20-28
Thomas, 1970	India	63-105 x 2-6	rays 29 x 4	rays 29 x 4	clad. 21-25
Boury-Esnault, 1973	Brazil	present	present	clad. 53	clad. 22
Vacelet *et al.*, 1976	Madagascar	80-100 x 2.5-4	absent	rays 20-25	rays 7.5-10
Boury-Esnault & van Beveren, 1982	Kerguelen	81-127 x 2.5-5	rays 31-52	rays 31-52	clad. 26-39
Pulitzer-Finali, 1983	Mediterranean	80	?	rays 30	clad. 16-21
Lévi & Lévi, 1989	Philippines	80-100 x 5	rays 25-40 x 2-4	clad. 25 rays 15 7-10	
Diaz & van Soest, 1994	Mediterranean	78-103 x 2-3	rays 36 x 2.5	rays 30 x 1.5	clad. 18
ZMA POR 10331 ZMA POR 10332					
P. fragilis n. sp. ZMA POR 11190 MHNG 21531	Galápagos	66-96 x 5-7	clad. 42-61 rays 29.2 x 3.25	clad. 29-56 rays 25.7 x 3.1	clad. 18-25 rays 13.5 x 3.0

Consistency: firm, cheesy.

Colour: whitish beige in alcohol.

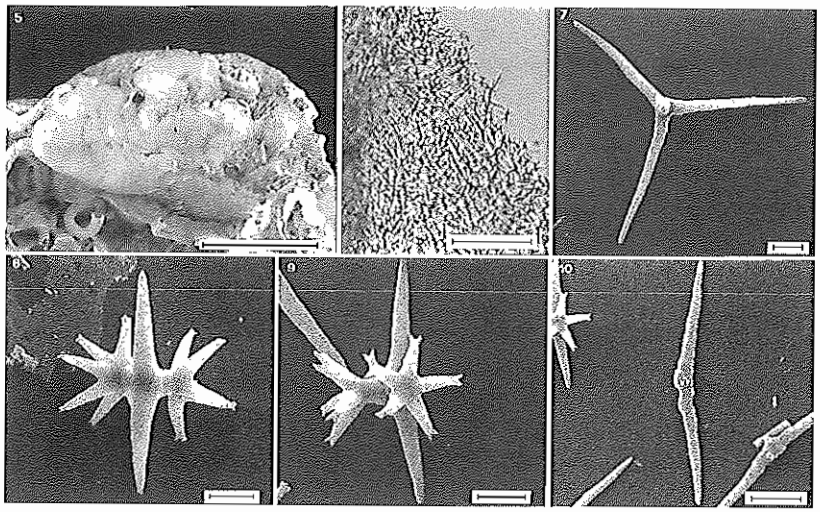
SKELETON:

Ectosomal: not clearly differentiated from the choanosome. Inhalant pits rounded, 120-150 µm in diameter, exhalant pits elongate, irregular, 350-400 µm by 100 µm.

Choanosomal: markedly alveolar, with individual alveolae and inhalant and exhalant pits clearly visible in thick sections. Alveolae (which are presumably the choanocyte chambers surrounded by a coat of spicules) are 50 µm in diameter, perfectly round.

Spicules: diods, triods, calthrops and dilophose calthrops.

Diods, common, occasionally provided with an incipient middle ray which may be vestigially lophate, small, of rather uniform size, 45 - *60.5* - 72 µm by 1.5 - *2.75* - 4.0 µm.



FIGS 5-10

Plakina microlobata n. sp. 5. Holotype, thinly encrusting specimen. Stat. 18B 794A James Isl. 6. Skeletal structure, longitudinal view. 7. Calthrops with normal rays. 8, 9. Dilophose calthrops with 2 lophate rays and bifurcate non lophate ray. 10. Diods with incipient middle ray. Scales: fig. 5 = 10 mm; fig. 6 = 50 µm; figs 7-9 = 5 µm; fig. 10 = 10 µm.

Triods, rare, often Y-shaped, cladome 33 - *38.6* - 51 µm, longest ray 21.0 - *24.0* - 28 µm by 2.0 - *2.25* - 3.0 µm.

Calthrops, the majority with one of the rays reduced to a stub, cladome 24 - *32.5* - 40 µm, longest ray 15 - *20.3* - 26 by 1.5 - *2.05* - 2.5 µm.

Dilophose calthrops, mostly with two lophate rays, occasionally one of the non-lophate rays is bifurcate, cladome 16 - *21.5* - 27 µm, longest ray 9 - *11.2* - 13 µm by 1.0 - *1.75* - 2.5 µm.

Etymology: the name refers to characters of the surface.

Remarks: Plakina species with dilophotriaenes (Table 3) have been reported from the Mediterranean (*Plakina dilopha* Schulze, 1880; TOPSENT 1895), from the Caribbean (*Plakina elisa* (De Laubenfels 1936) as *Plakoosa*; (refered to *P. dilopha* by TOPSENT (1937)), and from Ascension (DIAZ & VAN SOEST 1994 as *Plakina* cf. *dilopha*). The new species differs from the Mediterranean *P. dilopha* in spicule sizes (shorter diods, shorter-rayed triods) and diversity of lophotriaenes (absence of monolophotriaenes in the present specimens). SCHULZE (1880) mentions the rarity of calthropses, TOPSENT (1895) the rarity of diods, while in the specimens at hand, both are common. In contrast, the triods are rare. The new species differs from *P. elisa*, in possessing common calthrops (not found in *elisa*); moreover, specimens conforming to *P. elisa* from Curaçao have a large proportion of the diods and triods provided with

several sharp spines. Of the compared specimens (cf. Table 3) the material from Ascension is closest to the present species, differing in the more robust spicules and the rarity of calthropses.

The fact that this species was collected from the same locality as the preceeding one requires some comment on their discrimination. Apart from the obvious difference in the presence of trilophose calthrops in *P. fragilis* that are absent in *P. microlobata*, the length and thickness of both diods and calthrops are subtly but clearly smaller in the present species. The diods of *P. microlobata* are invariably irregularly roughened or spined in the middle whereas those of *P. fragilis* are smooth.

A species possibly related to the present one is *Plakina bioxea* Green & Bakus, 1994 from deep water off Santa Maria Basin, California. The spicule types mentioned by these authors match those of our new species, be it that diods reach a larger size

TABLE 3

Spicule sizes reported for *Plakina dilopha* Schulze and *Plakina elisa* De Laubenfels, compared to *Plakina microlobata* n. sp., information from literature and ZMA and MHNG material. Measurements (in µm) refer to length and width (diods), to cladome (triods calthrops and lophocalthrops) and length and width of rays (triods, calthrops and lophocalthrops).

Author/collect.	Locality	Diods	Triods	Calthrops	Lophocalthrops
P. dilopha	Mediterranean	70-90	rays 25-30	rays 25-30	rays 25-30
P. cf. *dilopha* Diaz & van Soest, 1994 ZMA POR 10330 ZMA POR 10333	Ascension	80-90 x 3	rays 15-26	Absent?	rays 13 x 2
P. elisa	Panama (Car.)	present	rays 25 x 2	Absent?	rays 12 x 1
Diaz & van Soest, 1994 ZMA POR 8429 ZMA POR 10229	Curaçao	80 x 4	rays 18-23 x 4	rays 18-24 x 4	rays 16 x 3
P. bioxea	California	78-179 x 3-8	?	rays 29-39 x 4.5 13-19 x 4-5	?
P. microlobata n. sp. ZMA POR 11207 MHNG 18980	Galápagos	60.5 x 2	clad. 38.6 rays 24 x 2.2	clad. 24-40 rays 20.3 x 2.0	clad. 16-27 rays 11 x 1.7

and have 2-8 central spines. A major difference, however, is the alleged presence of long oxeas 300-1120 µm long, arranged in thick bundles of 50 spicules diameter. It is conceivable that these are not proper to the species, as spicule bundles are not known in Plakinidae so far.

Plakina pacifica n.sp. (Figs 11-16)

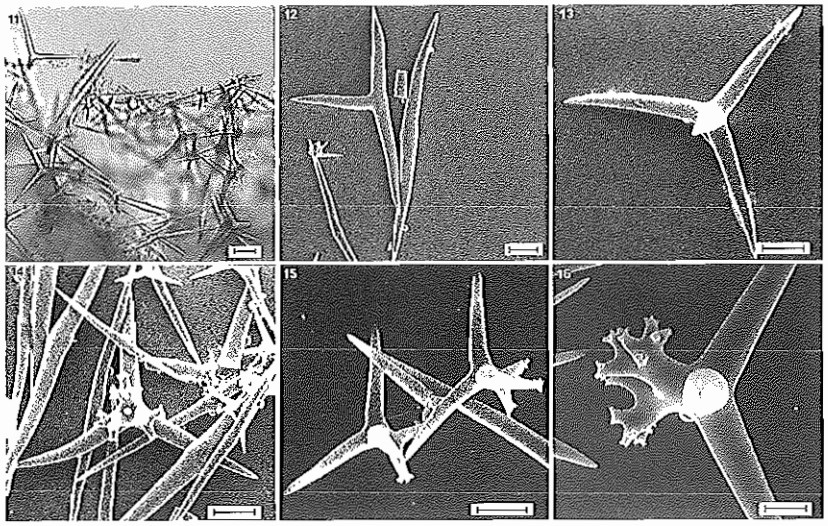
Material: Holotype USNM 41440 SEPBOP "Anton Bruun" 16-66139 Albemarle Isl., N coast, 00°15'S 91°26'W, 25-05-1966, 0-3 m. Microscopical slides and fragments ZMA POR. 11208, MHNG 18982.

DESCRIPTION:

Three small, thin crusts of 5-8 mm^2 and 0.5-1.0 mm in thickness. Surface somewhat undulating, microlobate, optically smooth but with microscopical pits (which are characteristic for the genus).

Consistency: cheesy.

Colour: beige, in alcohol.



FIGS 11-16

Plakina pacifica n. sp. Holotype, Stat. 16-66139 Albemarle Isl. 11. Ectosomal skeleton with larger lophotriaenes outward. 12. Asymmetrical triods, Y shaped and diods. 13, 14. Calthrops with three knobbed rays and an incipient lophate ray. 15, 16. Transitional monolophose calthrops with knobbed and lophate ray divided in two or three cladi. Scales: fig. 11 = 50 µm ; figs 12-14 = 20 µm ; fig. 15, 16 = 10 µm.

SKELETON:

Ectosomal: strengthened by a crust of larger lophose calthrops, with the lophate ray directed outward.

Choanosomal: uniformly distributed predominantly tetractine spicules; alveolate structure obscured. At the base of the sponge there are extensive lacunae, with a basal crust of small lophose calthrops.

Spicules: diods, triods, calthrops and two categories of monolophose calthrops.

Diods: very common, sometimes with incipient third ray protruding from the

middle at right angles, with large size variation (possibly in two discrete categories): 67 - *160.7* - 184 µm by 4.0 - *8.8* - 12 µm.

Triods: relatively rare, many asymmetrical or Y-shaped, cladome 61 - *92.5* - 131 µm, longest ray 47 - *58.2* - 77 µm by 4.0 - *5.6* - 9.0 µm.

Calthrops: common, occasionally with an incipient lophate ray, occasionally with 5 rays, with large size variation (possibly in two size categories) cladome 64 - *80* - 118 µm, longest ray 30 - *50.2* - 82 µm by 4.0 - *7.6* - 13 µm.

Monolophose calthrops, clearly in two sizes which are also partly localized (cf. above), with lophate ray divided in two or three cladi which proliferate in the larger spicules, 1) cladome 26 - *29.1* - 32 µm, longest ray 13 - *15.2* - 19 µm by 1.0 - *1.7* - 3.0 µm, 2) cladome 46 - *74.1* - 103 µm, longest ray 19 - *45.1* - 60 by 4 - *7.6* - 12 µm.

Etymology: named after its origin, the Pacific Ocean.

Remarks: the new species belongs to the *P. monolopha* species complex distributed over most areas of the world. Although it is certain that all specimens reported under the name *Plakina monolopha* Schulze from such disjunct localities as the Mediterranean, the Caribbean, the Indian Ocean, Hawaii and Antarctica belong to the same species, it is likely that they form a complex of closely related species sharing the lophose calthrops with a single lophate ray. Among these, the new species stands out in possessing two distinct non-overlapping size categories of lophose calthrops, the larger of which is concentrated at the surface. Literature data on *P. monolopha* spicules sizes and categories are presented in Table 4, and from these it can be deduced that the new species has clearly larger diods than most recorded specimens, and that also the size of the calthrops is comparatively large.

Plakortis Schulze, 1880

Type species: *Plakortis simplex* Schulze, 1880 by subsequent designation (SOLLAS 1888).

Definition (from DIAZ & VAN SOEST 1994): thinly to massively encrusting Plakinidae with a spiculation of small (50-200 µm) diods and with triods in varying abundance. Deformed calthrops and diod-derived "microscleres" (5-20 µm) are found occasionally distributed regularly in the sponge body.

Plakortis galapagensis n.sp. (Figs 17-20)

Material: Holotype USNM 41443 SEPBOP "Anton Bruun" 16-66139 Albemarle Isl., N coast, 00°15'S 91°26' W, 25-05-1966, 0-3 m. Microscopical slides and fragments ZMA POR11209, MHNG 18994.

DESCRIPTION:

A fragment of a massive encrustation, 5 mm in thickness. Surface smooth, with a few openings.

Consistency: soft.

Colour: beige in alcohol.

TABLE 4

Spicule sizes reported for *Plakina monolopha* Schulze compared to *Plakina pacifica* n. sp., information from literature and ZMA and MHNG material. Measurements (in µm) refer to length and width (diods), to cladome (triods calthrops and lophocalthrops) and to length and width of rays (triods, calthrops and lophocalthrops.

Author/collect.	Locality	Diods	Triods	Calthrops	Lophocalthrops
P. monolopha	Mediterranean	70-90	rays 25-30	rays 25-30	rays 25-30
Thiele, 1898	Japan	80	20	absent	rays 10-15
Arndt, 1927	Curaçao (Car.)	75-90 x 3	rays 33 x 3	absent	rays 16
De Laubenfels, 1951	Hawaii	36 x 4	rays 20-24 x 3-4	rays 20-24 x 3-4	rays 12 x 3
Koltun, 1964	Antarctica	70-140 x 3-5	rays 20-52	rays 20-52	rays 10-20
Bergquist, 1968	New Zealand	72-96 x 4	rays 20-28 x 4	rays 20-28 x 4	rays 11-13 x 2
Thomas, 1970	India	63-109 x 2-6	rays 21-42 x 2-5	rays 21-42 x 2-5	rays 16
Pulitzer-Finali, 1983	Mediterranean	94	rays 32	rays 32	clad. 27-40
Hoshino & Tanita, 1989	Japan	85-120 x 4-6	rays 20-24 x 3-4	rays 20-24 x 3-4	clad. 20
Diaz & van Soest, 1994	Ireland	80-90 x 3-5	rays 30 x 3	rays 21 x 3	clad. 23
ZMA POR 4424					
P. pacifica n.sp.	Galápagos	67-184	clad. 61-131	clad. 64-118	clad. 29.1
ZMA POR 11208 MHNG 18982		x 4-12	rays 47-77 x 5.6	rays 50.2 x 7.6	rays 15.2 x 1.7 clad. 74.1 rays 45.1 x 7.6

SKELETON:

Ectosomal: crust of tangential diods.

Choanosomal: alveolar structure well developed, alveolae 40-50 µm in diameter. Several embryos in advanced state of development are present, the largest of which measured 260 by 180 µm.

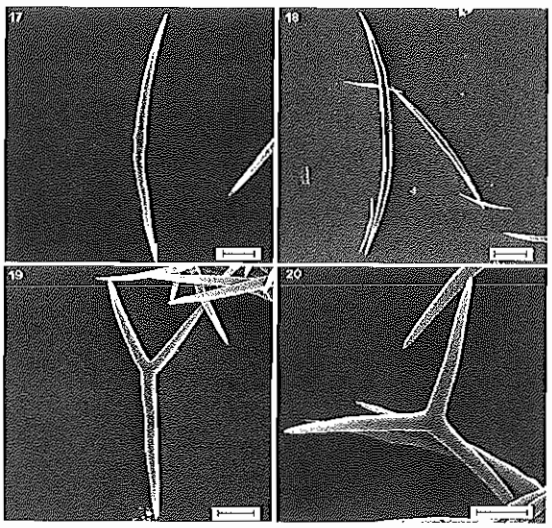
Spicules: diods and triods.

Diods: strongly, but irregularly curved, very variable in size, and at least two distinct size classes are recognizable (although intermediate sizes are also present in low quantities: 1) 126 - *142.3* - 165 µm by 4.0 - *6.1* - 8.0 µm, 2) 27 - *65.7* - 92 µm by 1.5 - *3.1* - 4.0 µm.

Triods: predominantly equal-angled, cladome 27 - *45.7* - 65 µm, longest ray 17 - *28.5* - 36 µm by 1.5 - *3.05* - 4.0 µm.

Etymology: named after its origin.

Remarks: this species belongs to the *Plakortis simplex* complex occurring in most areas of the world. This complex was recently discussed by DIAZ & VAN SOEST (1994), who concluded that subtle differences exist among allopatric populations



FIGS 17-20

Plakortis galapagensis n. sp. Holotype, Stat. 16-66139, Albemarle Isl. 17, 18. Different sizes of strongly curved diods. 19, 20. Y shaped and equal angled triods. Scales: fig. 17 = 20 µm; figs 18-20 = 10 µm.

answering generally to the description of *Plakortis simplex* and the likehood that most or all of these regional populations represent distinct sibling species. The present material differs from the Mediterranean populations clearly in the upper size of the diods. The apparent size categories of diods in the present material is a unique but dubious character separating this species from all other *Plakortis* (Table 5). It is unclear, whether species recorded with similar size ranges (*P. zyggompha* (De Laubenfels, 1934), *P. copiosa* Pulitzer-Finali, 1993, *P. kenyensis* Pulitzer-Finali, 1993, *P. quasiamphiaster* Díaz & van Soest, 1994) do in fact have two distinct size categories. Table 5 includes skeletal measurements of *Plakortis* species with large size diods: *P. angulospiculatus* (Carter, 1879), *P. erythraena* Lévi, 1958, *P. halichondrioides* (Wilson, 1902), *P. lita* De Laubenfels, 1954, *P. nigra* Lévi, 1953, *P. simplex* Schulze, 1880.

Order ASTROPHORIDA
Ancorinidae Schmidt, 1870

Penares Gray, 1867

Type species: *Stelletta helleri* Schmidt, 1864 by monotypy.

Definition (emended from TOPSENT 1894): Ancorinidae with a spiculation of microrhabds abundantly distributed in the cortex and in the external part of choanosome.

TABLE 5

Spicule size categories separating *Plakortis galapagensis* n. sp. from other species of *Plakortis* reported with similar size ranges of diods and triods: *P. zyggompha* (De Laubenfels), *P. copiosa* and *P. kenyensis* Pulitzer-Finali, *P. quasiamphiaster* Diaz & van Soest, *P. angulospiculatus* (Carter), *P. erythraena* Lévi. Information from literature and ZMA and MHNG material. Measurements (in µm) refer to length and width (diods), to cladome and to length and width of rays (triods), to average size and number of spines (amphiaster-like).

Author/collect.	Locality	Diods	Triods ray-length	Amphiaster-like
Plakortis zyggompha	Puerto Rico	50-140 x 2-5	25-50 x 2-3	——
P. copiosa	E. Africa	55-110	18-37 x 4-4.5	——
P. kenyensis	E. Africa	80-260 x 2-7	30-60	——
P. quasiamphiaster	Caraibe	66-136 x 4-6	14-47 x 3-5	27-75 x 3-6 spines 2-15
P. angulospiculatus BMNH 1850:5:8:35-37	Jamaica	60-120 x 3	none	——
P. erythraena	Red Sea	10-90 x 1-2	20-25 x 1-2	
P. halichondrioides	Virgin Isl.	130-200 x 3-5	rare	——
P. lita	Caroline Isl.	20-80 x 2-3	rare	5-8 x <1
P. nigra	Red Sea	20-90	——	——
P. simplex NMNH 8433, 9433	Mediterranean Atlantic?	60-150 x 3-6	25-50 x 3-6	——
P. galapagensis n. sp. ZMA POR 11209 MHNG 18994	Galápagos	126-165 x 4-8 27-92 x 1.5-4	clad. 27-65 rays 17-36 x 1.5-4	——

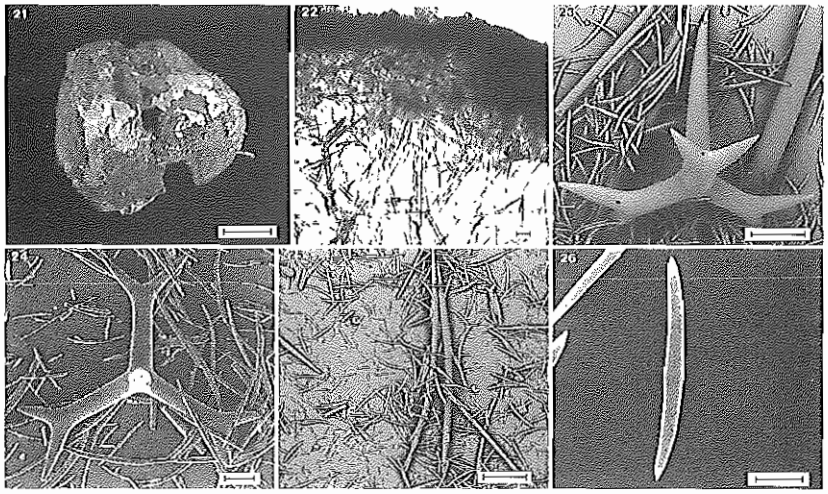
Penares saccharis (De Laubenfels, 1930) (Figs 21-26)

Papyrula saccharis De Laubenfels, 1930: 26, 1932: 37, fig. 16.

Material: USNM 37916 Gardner Isl., N of Hood Isl., 10-02-1978, coll. W.D. Hope, 22 m, on rocks. Microscopical slides and fragments ZMA POR. 11210, MHNG 18981.

DESCRIPTION:

Two hemispherical fragments, 50 x 40 x 20 and 40 x 20 x 20 mm, heavily encrusted by filamentous and calcareous algae.



FIGS 21-26

Penares saccharis (De Laubenfels). Gardner Isl. 21. Hemispherical fragment of specimen. 22. Ectosomal crust of small oxeas and microrhabds, carried by dichotriaenes. 23, 24. Dichotriaenes and small oxeas. 25. Oxeas and small oxeas. 26. Microrhabds. Scales: fig. 21 = 10 mm; figs 22, 24 = 50 µm; figs 23, = 100 µm; fig. 25 = 200 µm; fig. 26 = 10 µm.

Surface: rough to touch, no apparent oscules.

Consistency: firm. Interior cavernous.

Colour: pale green in formalin; mottled red brown in alcohol; interior lighter brown.

SKELETON:

Ectosomal: a crust of microxeas and microrhabds, carried by dichotriaenes.

Choanosomal: subectosomal palisade of dichotriaenes, irregularly arranged. Interiorly there is an irregular arrangement of oxeas.

Spicules: dichotriaenes, oxeas, small oxeas and microrhabds.

MEGASCLERES:

Dichotriaenes, clads: 150 by 28 µm, rhabd 300 by 30 µm.

Oxeas: 467-*641*-900 by 12-28 µm.

Small oxeas: 66-*140*-170 by 3-8 µm.

MICROSCLERES:

Microrhabds 22-*35*-50 by 2-3 µm. No asters.

Distribution: Galápagos Islands; California.

Remarks: we compared the present specimen with the holotype of *Papyrula saccharis* De Laubenfels, 1930 (USNM 21476), from Lower California and found

them well-matched. The cladi of the dichotriaenes are somewhat longer in the type (many measure up to 200 µm), and the small oxeas are not so sharply separated into two categories as in the Galapagos material, although their overall range of measurements is similar. Both specimens lack oxyasters.

Penares apicospinatus n.sp. (Figs 27-33)

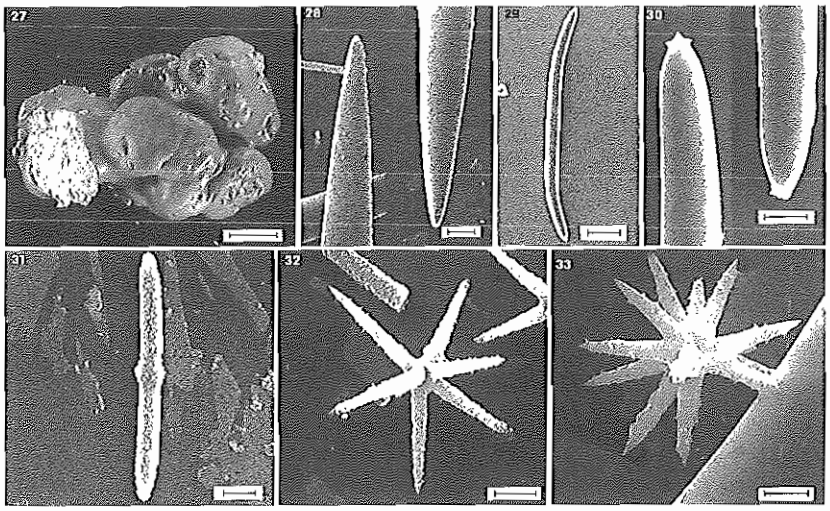
Material studied: Holotype USNM 40754 SEPBOP "Anton Bruun" 18B-794E, James Isl., 00°12'S 90°52'W, 24-09-09-1966, 34 m, volcanic rock dredge. Microscopical slides and fragments ZMA POR 11211, MHNG 18991.

DESCRIPTION:

The holotype specimen consists of six big fragments and some smaller broken-off pieces. Largest fragment is a mass of lobes, 16 cm long, 9 cm high and 10 cm wide, attached to volcanic rock, the other fragments are individual elongate lobes, approximately 7 cm long and 4 cm high and wide, similar to those of the big mass. Each lobe has one or two oscules of 2 mm in diameter, with slightly raised rims. Surface smooth, dull.

Consistency: compressible, firm, rough to the touch. The surface is an easily damaged crust.

Colour: warm chocolate brown on top, somewhat lighter along the sides. The interior is also a lighter orange-brown, and has a clearly radiate structure.



FIGS 27-33

Penares apicospinatus n. sp. Stat. 18B-794E James Isl. 27. Holotype, lobate specimen. 28. Apices of an oxea. 29. Small, curved oxea. 30. Microspined apices of the same. 31. Rugose, small centrotylote microrhabd. 32. Larger oxyaster with low number of rays. 33. Small oxyaster with higher number of rays. Scales: fig. 27 = 40 mm; fig. 28 = 10 µm; fig. 29 = 20 µm; figs 30-32 = 5 µm; fig. 33 = 2 mm.

SKELETON:

Ectosomal: a distinct cortex consisting of a massive deposit of microrhabds and small oxeas carried by the cladomes of the subectosomal triaenes. The cortex has a thickness of 300-400 µm. Pore areas are regularly distributed over the surface; they have a diameter of 50-70 µm and are 40-60 µm apart.

Choanosomal: the cortex is carried by the cladomes of orthotriaenes, which are radially arranged in discrete tracts, in which they are mixed with oxeas. Towards the interior these tracts consist exclusively of oxeas. Diameter of the tracts ca. 150 µm, lying at distances of 150 µm apart. Between the tracts larger canals and large numbers of asters are found, mixed with fewer microrhabds and small oxeas.

Spicules: orthotriaenes, oxeas, small oxeas, microrhabds and oxyasters.

MEGASCLERES:

Orthotriaenes: concentrated subectosomally, clads almost straight (plagiotriaene-like), occasionally reduced: cladome 301 - *553.5* - 694 µm, clads 184 - *324.0* - 412 µm by 32 - *44.8* - 68 µm, rhabd 712 - *1122.0* - 1650 µm by 32 - *50.5* - 56 µm.

Oxeas: curved, gradually tapering, with sharp points: 1426 - *2496.3* - 3130 µm by 21 - *38.8* - 48 µm.

Small oxeas: smooth, curved, doubly angulated, with microspined apices occasionally modified to styles, of variable size, possibly in two size categories: 68 - *127.3* - 169 µm by 4.0 - *6.5* - 9.0 µm.

MICROSCLERES:

Microrhabds: centrotylote, finely rugose, in two size categories: 67 - *91* - 120 by 2 - *5* - 6 µm, and 19 - *27*- 42 µm by 1 - *2* - 4 µm.

Oxyasters: in two distinct size categories, the larger with a barely developed centre and a lower number of rays, the smaller with a more distinct centre and a higher number of rays. Larger: 17 - *26.5* - 37 µm diameter, ray number 6 - *7* - 8. Smaller: 6 - *9.1* - 13 µm in diameter, ray number 8 - *10* - 12.

Etymology: named for the microspined apices of small oxeas.

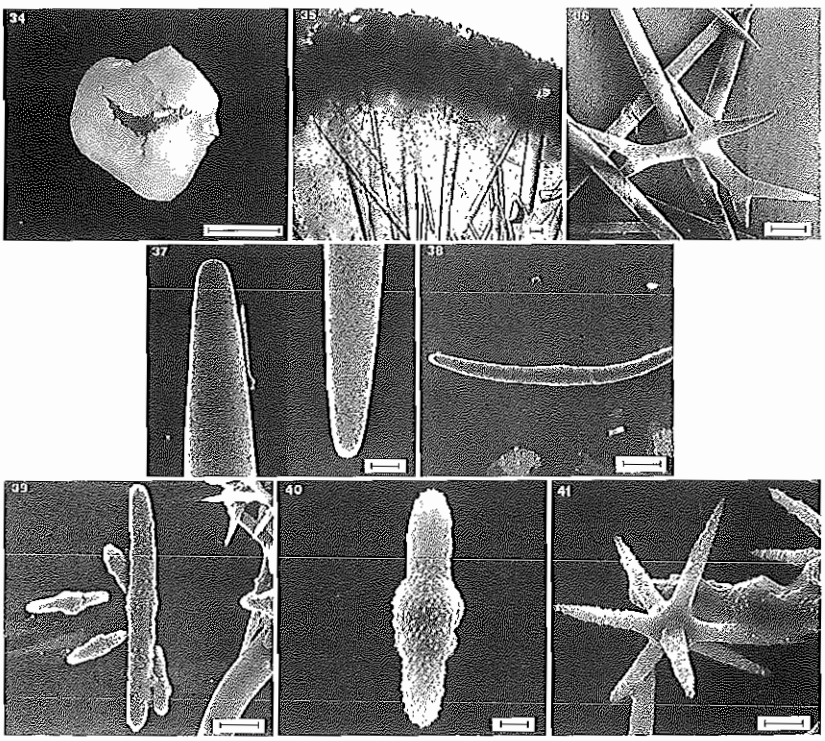
Remarks: the only *Penares* species described from the area is *P. foliaformis* Wilson, 1904; this has much more robust triaenes (140 µm in thickness), with predominantly dichotriaene morphology, bigger and thicker microrhabds. The oxyasters are in a single category with more than 12 rays (7-23).

Penares saccharis (De Laubenfels, 1930) (cf. above) also possesses dichotriaenes, but has no asters .

A further species of *Penares*, *P. scabiosus* n. sp., described below is close to *P. foliaformis*, and dissimilar to the present species in having dichotriaenes and very numerous small (15 µm) centrotylote microrhabds.

Penares scabiosus n. sp. (Figs 34-41)

Material studied: Holotype USNM 43172 SEPBOP "Anton Bruun" 18b-791c, off Seymour Isl., N of Indefatigable Isl. , 00°26'S 090°20'W, 21-09-1966, 95 m, volcanic rocks. Microscopical slides and fragments ZMA POR. 11212, MHNG 18995.



FIGS 34-41

Penares scabiosus n. sp. 34. Holotype specimen, Stat. 18B-791C off Seymour Isl. 35. Perpendicular view of the skeleton, ectosomal crust of small oxeas and microrhabds carried by the dichotriaene cladomes. 36. Dichotriaene. 37. Large oxea apices. 38. Small oxea. 39. Centrotylote microspined microrhabds, categories 1-2. 40. Centrotylote microspined microrhabd, categorie 3. 41. Oxyaster with 7 visible rays. Scales: fig. 34 = 10 mm; fig. 35 = 50 µm; fig. 36 = 100 µm; fig. 37, 39 = 10 µm; fig. 38 = 20 µm; fig. 40 = 2 µm; fig. 41 = 5 µm.

DESCRIPTION:

An optically smooth mass, rough to the touch. No apparent oscules. Size: 20 x 25 x 25 mm.

Consistency: firm, crumbly internally.

Colour: pinkish grey in alcohol, interior beige.

SKELETON:

Ectosomal: A crust of small oxeas and microrhabds, 100-200 µm thick, carried by the cladomes of thick subectosomal dichotriaenes. Crust pierced by regularly spaced inhalant openings, 60-200 µm in diameter. Microrhabds overlying the microxeas and filling the insterstices.

Choanosomal: the subectosomal skeleton consists of single dichotriaenes, spaced 250-400 µm apart; between them a dense mass of asters is found. Interiorly, a mass of irregularly intercrossing oxeas with scattered asters is found.

Spicules: dichotriaenes, large oxeas, small oxeas, microrhabds, oxyasters.

MEGASCLERES:

Dichotriaenes: cladome 900 µm, clads 450 µm length by 80 µm in diameter, rhabds 620-1100 µm length and 40-90 µm in diameter.

Oxeas: 2760-3200 µm by 40-80 µm.

Small oxeas, smooth: 44- *75* -106 µm by 4- *6* -10 µm.

MICROSCLERES:

Microrhabds, entirely microspined centrotylote: three sizes averaging 60-43, 21-23 and 15 µm. The smallest category is very numerous.

Oxyasters: 20-38 µm (6-10 rays).

Etymology: the name refers to the rough surface.

Remarks: Penares scabiosus is close to *P. foliaformis* Wilson, 1904, also from the Galápagos, in general characteristics and spicule sizes (Table 6). We were able to compare the present material with the holotype of Wilson (USNM 8291), and found the following differences: the dichotriaenes of *P. foliaformis* have clearly thicker rhabds (140 µm) and the microrhabds have a smaller size range, with the smallest most numerous category of 15 µm lacking in *P. foliaformis*; the oxyasters of *P. foliaformis* are clearly smaller (7-23 µm) and have more numerous rays (12 or more). Habits of the two are also different. The new species differs from *P. apicospinatus* n. sp. and *P. saccharis* De Laubenfels in having robust dichotriaenes and a very small category of microrhabds. *P. saccharis* lacks oxyasters.

TABLE 6

Spicule sizes of *Penares foliaformis* Wilson from Galápagos, compared to *P. saccharis* (De Laubenfels) and to *P. scabiosus* n. sp. Information from literature and ZMA and MHNG material. Measurements (in µm) refer to cladome (dichotriaenes), to length and width (rhabdome of dichotriaenes, oxeas, small oxeas and microrhabds), and to diameter (oxyasters).

Author/collect.	Locality	Dichotriaenes	Oxeas	Small	Microrhabd.	Oxyast.
Penares foliaformis USNM 8291	Galápagos	rhabd. 900 x 140	2300 x 70	——	——	——
P. saccharis De Laubenfels, 1932	California	clad. 120-210 rhabd. 320-435 x 20-30	780 x 22	——	35-145 x 1-3	——
P. scabiosus n.sp. ZMA POR 11212 MHNG 18995	Galápagos	clad. 900 rhabd. 620-1100 x 40-90	2760-3200 x 40-80	44-106 x 4-10	43-23-15	20-38

Stelletta Schmidt, 1862

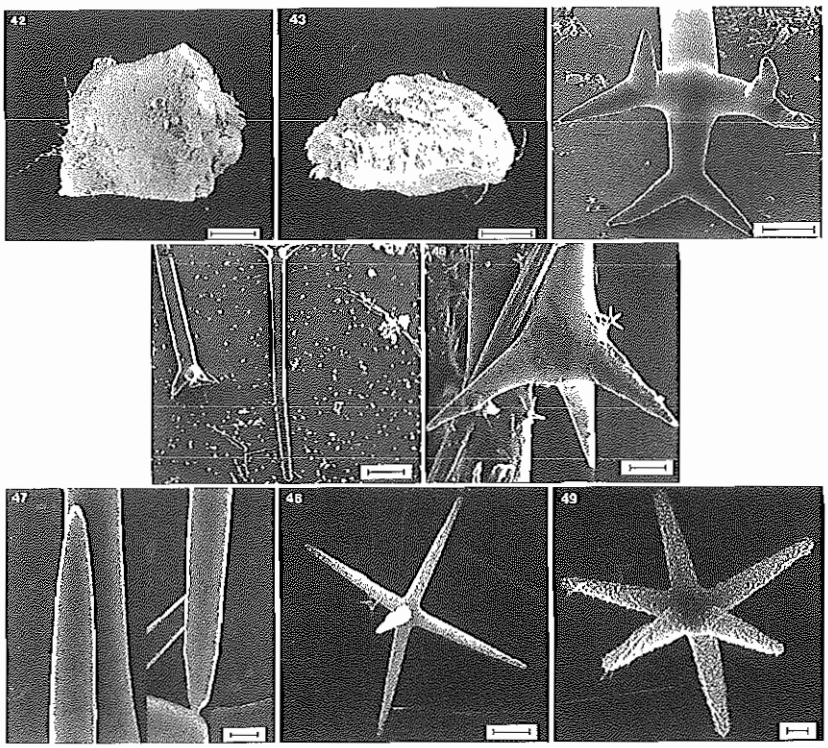
Type species: *Stelletta grubii* Schmidt, 1862 by subsequent designation. (BURTON & RAO 1932).

Definition (emended from TOPSENT 1894): Ancorinidae with two or three types of asters, distributed on both, surface and choanosome or only present in the chanosome. Cortex well developed.

Stelletta eduardoi n. sp. (Figs 42-49)

Material: Holotype USNM 43166 SEPBOP "Anton Bruun" 18B-794E, N coast James Isl., 00°12'S 90°51'W, 34 m, volcanic rocks. Microscopical slides and fragments ZMA POR. 11213, MHNG 18962.

Paratype: SEPBOP "Anton Bruun" 16-66139 , W coast Albemarle Isl., 00°15'S 91°26'W, 0-3 m. Microscopical slides and fragments ZMA POR. 11214, MHNG 21044.



FIGS 42-49

Stelletta eduardoi n. sp. Stat. 18B-794E N coast of James Isl. 42. Fragment of holotype specimen. 43. Transversal section of the same. 44. Terminal part of a dichotriaene. 45. Two dichotriaenes and several oxeas and oxyasters. 46. Plagiotriaene. 47. Oxea. 48, 49. Microspined oxyaster and strongylaster-oxyaster. Scales: figs 42, 43= 10 mm; fig. 44 = 100 µm; fig. 45 = 200 µm; fig. 46 = 20 µm; figs 47, 48 = 5 µm; fig. 49 = 2 µm

TABLE 7

Spicule sizes reported for *Stelleta clarella* De Laubenfels, from California, compared to *S. eduardoi* n. sp. Information from literature and ZMA and MHNG material. Measurements (in µm) refer to cladome (triaenes) to length and width (rhabds of triaenes, oxeas) and to diameter and number of rays (euasters).

Author/collect.	Locality	1. Dichotriaenes 2. Plagiotriaenes 3. Anastriaenes * Ortho to dichotriaenes	Oxeas	Euasters
Stelletta clarella	California	——		
		2. rhabd. 2000-3000 x 20-100	3500 x 50	9-15
		3. rhabd. 100-2000 9-15	1400 x 15	——
Bakus & Green, 1987	California	1. rhabd. 550-1880 x 22-33 2. rhabd. 220-3960 x 2.40 ——	1118-3119 x 17-52 50-850 x 2-7	5.10.18
Green & Bakus, 1994	California	* clad. 171-357 rhabd. 300-700 x 39-91	450 x 10	10-13
S. eduardoi n. sp. ZMA POR 11213 MHNG 18962	Galápagos	1. clad. 450-550 rhabd. 1800-3000 x 50-100 2. clad. 200 rhabd. 1800 x 70	2000-3300 x 90	16-32 3-6 rays strong. 8-14 8-10 rays

DESCRIPTION:

Three massive-globular specimens. No apparent oscules. Size: 25-30 x 20 x 5-10 mm.

Consistency: prickly to the touch, compressible to hard.

Colour: beige in alcohol. In cross sections a clear division between a darker coloured cortex and a lighter coloured choanosome is visible.

SKELETON:

Ectosomal: a thin crust of asters carried by subectosomal dichotriaenes.

Choanosomal: radiate architecture with dichotriaenes and oxeas intermingled.

Spicules: dichotriaenes, plagiotriaenes, anatriaenes (only one observed), oxeas and euasters.

MEGASCLERES:

Dichotriaenes, cladome 450-550 µm, rhabdome 1800-3000 µm by 50-100 µm.

Plagiotriaenes, cladome 200 µm, rhabdome 1800 µm by 70 µm.

Oxeas 2000-3300 µm by 90 µm; a single broken anatriaene was observed in one specimen.

MICROSCLERES:

Euasters in two sizes: microspined oxyasters 16- *22* -32 µm, with 3-6 rays, and microspined strongylasters/oxyasters 8- *12* - 14 µm, with 8-10 rays.

Etymology: named after Eduardo Hajdu, Sao Paulo University, Brazil in recognition of his important work on Demosponges.

Remarks: the present specimens were compared with De Laubenfels' holotype of *Stelletta clarella* De Laubenfels, 1930, USNM 21488, from California and with descriptions from other authors (BAKUS & GREEN 1987; GREEN & BAKUS 1994) (Table 7) and several differences were found: the anatriaenes in the type specimen - although also uncommon - are more numerous than the single - possibly foreign - one in the Galápagos material, and in all Californian specimens the euasters are not readily divisible in two categories. *S. clarella* has a special category of malformed ectosomal chiasters forming the surface armour, absent in the new species.

Pachastrellidae Carter, 1875

Dercitus Gray, 1867

Type species: *Hymeniacidon bucklandi* Bowerbank, 1866 by monotypy.

Definition (from SOLLAS 1888): Pachastrellidae in which microscleres are spined microrhabds; toxiform microxeas may be present.

Remark: The concept of *Dercitus* employed here is wider than that of MALDONADO (1993), who restricted the use of the genus to the type species on account of the toxiform microxeas found in it. For *Dercitus*-like species lacking such microscleres he revived the genus *Stoeba*. In our opinion this is an unnecessary restriction and we propose to use *Dercitus* in a wider sense to include all those encrusting pachastrellids with spined microrhabds as microscleres.

Dercitus reptans n.sp. (Figs 50-52)

Material: Holotype USNM 43170 SEPBOP "Anton Bruun" 16-66139, Albemarle Isl., N coast 00°15'S 91°26 W, 25-05-1966, 0-3 m. Microscopical slides and fragments MHNG 18963.

Paratype: ZMA POR. 11215, three fragments, same data as the holotype.

DESCRIPTION:

Three specimens and a few fragments, in the form of long (up to 26 mm) thin (2-4 mm in diameter) creeping, stolon-like branches, here and there encrusting the substrate.

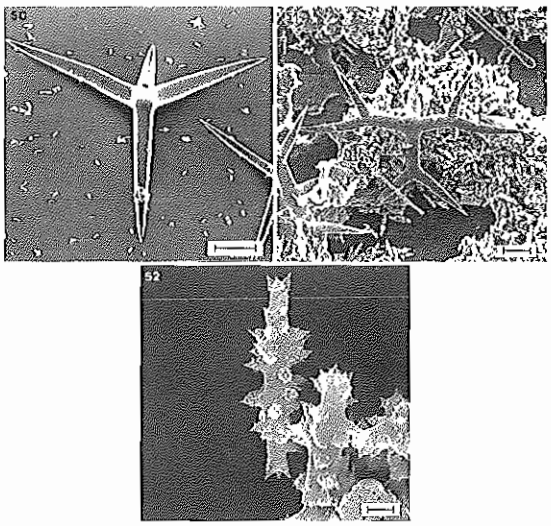
Surface: micronulose, rough. No apparent oscules.

Consistency: hard, easily damaged.

Colour: whitish pink in alcohol.

SKELETON:

Ectosomal: thin cover of acanthorhabds, pierced at irregular distances by the rays of large calthrops.



FIGS 50-52

Dercitus reptans n. sp. Stat. 16-66139 Albemarle Isl. 50. Holotype specimen, calthrops with variable length of rays. 51. Short shafted dichotriaene. 52. Acanthomicrorhabds, irregularly spined. Scales: fig. 50 = 100 µm; fig. 51 = 20 µm; fig. 52 = 2 µm.

Choanosomal: calthrops and dichotriaenes arranged without any organization. Interior cavernous, with very little organic matter.

Spicules: calthrops, dichotriaenes, microrhabds.

Calthrops, large, variable length, cladome up to 670 µm, rays 344-*484*-648 µm by 16-*27*-50 µm.

Short-shafted dichotriaenes, cladome 156-*164*-170 µm, rays 90 by 8-9 µm.

Acanthomicrorhabds, 15-*47*-74 µm by 2-8 µm, irregularly spined.

Etymology: the name refers to its habit.

Remarks: DE LAUBENFELS (1930, 1932) described *Dercitus syrmatitus* from California. We compared the type specimen (USNM 21438), from California, with our material and found them to be quite dissimilar. *D. syrmatitus* is agglutinating a mass of sand and its spicule dimensions are about half to one third of those of *D. reptans* n.sp. (calthrops have cladomes of average 220 µm, rays are 140-150 by 11-15 µm), no dichotriaenes are found in *D. syrmatitus*.

Poecillastra Sollas, 1888

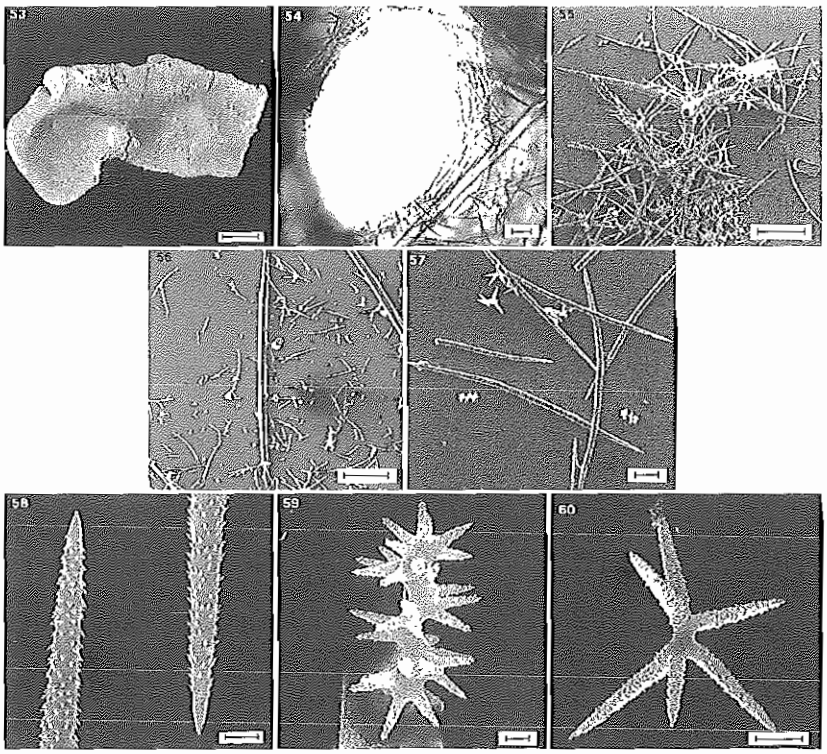
Type species: *Normania crassa* Bowerbank, 1869 by monotypy.

Definition (emended from SOLLAS 1888): Pachastrellidae with plate-like form, with two different surfaces, upper oscular and inferior poriferous. Megascleres oxeas and triaenes, normally orthotriaenes and orthodichotriaenes. Microscleres streptasters and microxeas.

Poecillastra cribraria Wilson, 1904 (Figs 53-60)

Poecillastra cribraria Wilson, 1904: 105, pl. 14, figs 9-12, pl. 15, figs 1-4, pl. 6, figs. 1, 3.

Material: SEPBOP "Anton Bruun" 18B-791C, off Seymour Isl., N of Indefatigable Isl. 00°26'S 90°20'W, 21-09-1966, 95 m. Microscopical slides and fragments ZMA POR. 11216, MHNG 20598.



FIGS 53-60

Poecillastra cribraria Wilson. Stat. 18B-791C, off Seymour Isl. 53. Fragment of specimen. 54. Choanosomal section. 55. One of the rare triaenes, microxeas. 56. Oxeas and microspined microxeas. 57. Microspined microxeas, spirasters and plesiasters. 58. Apices of microxea. 59, 60. Spiraster and plesiaster. Scales: fig. 53 = 10 mm; fig. 54 = 50 µm; fig. 55 = 100 µm; fig. 56 = 200 µm; fig. 57 = 20 µm; figs 58, 59 = 2 µm; fig. 60 = 5 µm.

DESCRIPTION:

A fragment of a lamellar, linguiform plate, 56 x 26 x 4 mm with differentiated surfaces, one with a translucent membrane and small pores (2-3 mm) which likely represents the oscules. Laterally there is a fringe of fine spicules. The other surface is irregular, undulated, slightly concave, with the same membrane but no pores visible.

Surface: slightly rough, aquiferous canals are visible, ramifying under the surface.

Consistency: firm.

Colour: light brown in alcohol.

SKELETON:

Ectosomal: a crust of spirasters and tangentially arranged microxeas carried by the subectosomal triaenes, leaving regularly spaced pore fields of 50-120 µm in diameter.

Choanosomal: uniformly alveolate, with meshes covered by oxeas and spirasters.

Spicules: triaenes, oxeas, microxeas, spirasters, plesiasters.

MEGASCLERES:

Rare orthotriaenes, cladome 500-*579*-664 µm, rhabdome 100-200 µm by 13-*18*-26 µm.

Oxeas 448-*1554*-2000 (in the type up to 2500 µm) by 18-*22*-35 µm.

MICROSCLERES:

Microspined microxeas 112-*136*-171 µm by 2-*3*-5 µm.

Spirasters 10-*12*-13 µm.

Plesiasters 13-*18*-26 µm.

Distribution: Galápagos Islands.

Remarks: the identification was checked against Wilson's holotype of *Poecillastra cribraria*, USNM 8295, from Galápagos and very few discrepancies were found. Triaenes are rare in both specimens.

Vulcanella Sollas, 1886

Type species: *Sphinctrella horrida* Schmidt, 1870 by subsequent designation (DE LAUBENFELS 1936).

Synonyms: *Sphinctrella* Schmidt, 1870 (preoccupied)
Sphincterella De Laubenfel, 1936.

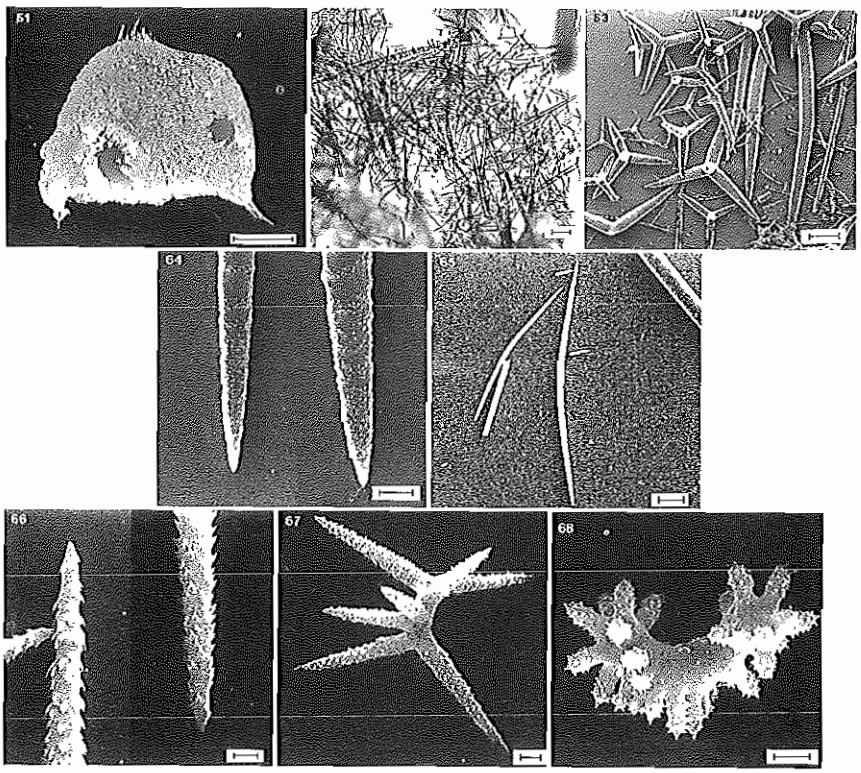
Definition (emended from SOLLAS 1886): Pachastrellidae encrusting or massive with pores generally dispersed and only few, highly specialized oscules, opening to a large cloaca. Spicules: calthrops of different sizes, oxeas, rugose or microspined microxeas and asters

Remarks: The genus *Vulcanella* is revived here to replace the preoccupied *Sphinctrella* Schmidt, 1870. DE LAUBENFELS (1936) erected *Sphincterella* for this group, but overlooked that *Vulcanella* Sollas was available as a replacement name. The fact that *Sphinctrella* was preoccupied did not prevent authors from persisting in its use for sponges, and neither *Vulcanella* nor *Sphincterella* gained acceptance so far.

Vulcanella tricornis (Wilson, 1904) (Fig. 61-68)

Poecillastra tricornis Wilson, 1904: 101, pl. 13, figs 12-14, pl. 14, fig. 8.

Material: SEPBOP "Anton Bruun" 18B-791C, off Seymour Isl., N of Indefatigable Isl. 00°26'S 90°20'W, 21-09-1966, 95 m, volcanic rocks. Microscopical slides and fragments, ZMA POR. 11217, MHNG 18983.



FIGS 61-68

Vulcanella tricornis (Wilson). Stat. 18B-791C off Seymour Isl. 61. Oval specimen bearing two porocalices. 62. Choanosomal skeleton, annulated oxea and microxea. 63. View of calthrops and oxeas, microxeas and annulated oxeas. 64. Apices of annulated oxea. 65. View of the microspined microxea. 66. Apices of microspined microxea. 67. Spiraster. 68. Plesiaster. Scales: fig. 61 = 10 mm; fig. 62 = 50 µm; fig. 63 = 100 µm; fig. 64 = 5 µm; fig. 65.= 20 µm; figs 66-68 = 2 µm.

DESCRIPTION:

Oval to round sponge, 27 x 30 x 10 mm, with the surface bearing three porocalices of 4-5 mm in diameter, surrounded by fringes of long oxeas, approximately 7000 µm long.

Surface: optically smooth but rough to the touch.

Consistency: hard.

Colour: light brown in alcohol.

SKELETON:

Ectosomal: a crust of microscleres

Choanosomal: a confused reticulation of smaller annulated oxeas and microxeas. Many aquiferous spaces.

Spicules: calthrops, oxeas, smaller annulated oxea, microxeas, spirasters, plesiasters.

MEGASCLERES:

Calthrops: cladome up to 1000 µm, cladi 440-860 µm, rhabd 30-*55*-100 µm
Oxeas of the porocalices: up to 7000 µm by 18 µm.
Choanosomal large oxeas 2500-3500 µm by 170-180 µm.
Small annulated oxeas, annules microspined: 205-*298*-450 µm by 8 µm

MICROSCLERES:

Microxeas, optically smooth but microspined: 64-*85*-128 µm by 3 µm.
Spirasters 9-*10*-14 µm.
Plesiasters 10-*13*-16 µm.

Distribution: Galápagos Islands.

Remarks: the holotype *V. tricornis* (Wilson, 1904), from Galápagos, has larger calthrops (cladome up to 1400 µm), but in all other aspects it closely resembles our specimen (Table 8).

TABLE 8

Spicule sizes reported for *Vulcanella tricornis* (Wilson), holotype. Information from literature and ZMA and MHNG material. Measurements (in µm) refer to length and width (cladi and rhabds, oxeas from porocalices and choanosoma, annulated oxeas, microxeas, spirasters and plesiasters) and number of rays (plesiasters, spirasters).

Author/collect.	Locality	Calthrops.	Oxeas porocal.	Oxeas choanosome	Annulated oxeas	Microxea	Spirast. *Plesiast.
Vulcanella tricornis Holotype	Galápagos	700 -1000	25000	2500-5000 x 85-135	400-500 x 8-16	120	20 x 2-3 24-26 x 8 *20 x 7
ZMA POR 11217	Galápagos	1000	7000 x 18	2500-3500	205-450	64-128	9-14
MHNG 18983		440-860 x 30-100		x 170-180	x 8	x 3	*10-16

Geodiidae Gray, 1867

Geodia Lamarck, 1815

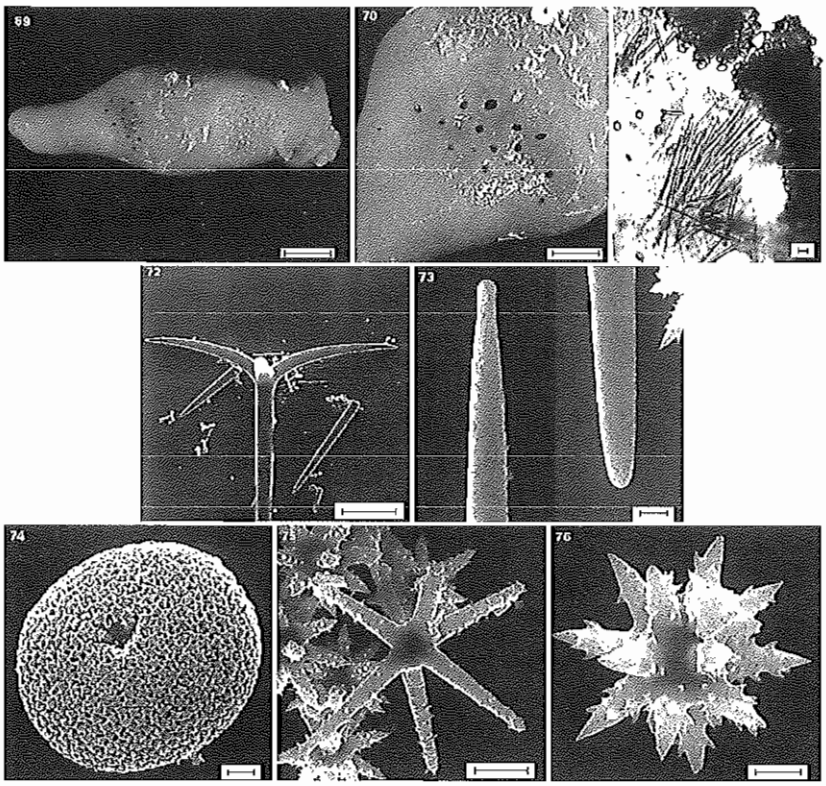
Type species: *Geodia gibberosa* Lamarck, 1815 by monotypy.

Definition (emended from VON LENDENFELD 1910): Geodiidae with aquiferous system afferent and efferent independently, with well developed and large subectosomal spaces. Megascleres triaenes. Microscleres sterrasters and euasters of different types.

Geodia media Bowerbank, 1873 (Figs 69-76)

Geodia media Bowerbank, 1873: 13, pl II, figs. 24-29; von Lendenfeld, 1910: 194, pl. 16, figs. 1-21, pl. 17, figs. 1-22.
Synops(?) *media*, Sollas, 1888: 266.

Material: USNM 35786 SEPBOP "Anton Bruun" 18B-794A, James Isl., Sullivan Bay, shore and tidepool, 00°12'S 90°50'W, 23-09-1966, microscopical slides and fragments ZMA POR. 11218, 11219, MHNG 21045, 21047; 18B-795D, E. of Albemarle Isl., 00°37'S 90°51'W, 78 m, microscopical slides and fragments ZMA POR. 11220, MHNG 18965; 16-6695, N coast Indefatigable Isl., 00°45'S 090°20'W, 17-05-1966, 0-1m, microscopical slides and fragments ZMA POR. 11221, MHNG 21046; Indefatigable Isl., 00°45'S 090°20'W, 17-05-1966, 2-3 m, microscopical slides and fragments: MHNG 21048; 16 HA 106 Seymour Isl., 00°26' S 090°17'W, 15-05-1966 0-5 m, microscopical slides and fragments MHNG 20606; 16-66110; Indefatigable Isl., 00°44'S 090°17'W, 19-05-1966.



FIGS 69-76

Geodia media Bowerbank, Stat. 18B-794A James Isl. 69. Specimen with two flattened pore sieves. 70. Enlarged view of one of the pore sieve. 71. Ectosomal crust of sterrasters and subectosomal oxeas and sterrasters. 72. Plagiotriaene. 73. Apices of oxea. 74. Ectosomal sterraster. 75. Oxyaster with 8 rays. 76. Oxyspheraster with 10-11 rays. Scales: figs 69, 70 = 10 mm; fig. 71 = 50 µm; fig. 72 = 100 µm; figs 73, 76 = 2 µm; fig. 74 = 10 µm; fig. 75 = 5 µm;

DESCRIPTION:

One specimen massive elongated and several fragments. Size 13-37 x 10-15 x 5-18 mm.

Surface smooth, without visible surface membrane. Two flattened pore sieves visible in the specimen and in the largest fragments. Pores inconspicuous, 0.5 mm in diameter.

Consistency hard, brittle.

Colour: yellowish to cream-white in alcohol.

SKELETON:

Ectosomal: a crust of sterrasters.

Choanosomal: subectosomal orthotriaenes carry the crust of sterrasters. Towards the interior oxeas predominate.

Spicules: plagiotriaenes, anatriaenes, oxeas, small oxeas, ectosomal sterrasters, oxyasters, oxyspherasters.

MEGASCLERES:

Plagiotriaenes, cladome 160-*284*-520 µm, rhabd 500- *925*-1080 µm 17-40 µm, cladi 120-*184*-303 µm.

Anatriaenes, scarce, and mostly broken, rhabd 600 µm, cladome 30 µm, cladi 10-20 µm.

Oxeas 800-*1048*-1350 µm by 10-*16*-20 µm.

Small oxeas 86-*122*-148 by 4 µm.

MICROSCLERES:

Ectosomal sterrasters, oval, 50-*63*-74 by 60 µm, a second category of immature (?) sterrasters measures 19-*42*-64 µm.

Oxyasters 12-*18*-24 µm, with 8 rays.

Oxyspherasters 6-*8*-13 µm, with 10-11 rays.

Distribution: Galápagos Islands; Pacific coasts of Mexico and Panama (VON LENDENFELD 1910)

Remarks: the identification is based on the redescription of this species by VON LENDENFELD (1910) (who examined Bowerbank's type). In general, there is a good correspondence in categories and sizes of the various spicule types, but in our specimens the thickness of the megascleres is at the lower range compared to the material described by VON LENDENFELD (e.g. the thickness of the plagiotriaene shaft is 30-80 µm in Lendenfeld's material against 17-40 in our material).

Erylus Gray, 1867

Type species: *Stelletta mammillaris* Schmidt, 1862 by monotypy.

Definition (from VON LENDENFELD 1910): Geodiidae with uniporal afferent and efferent surfaces or larger oscules. Triaenes short-shafted ortho- or plagiotrianes; no ana- or protriaenes. Sterrasters usually flattened into aspidasters.

Erylus cf. **oxyaster** von Lendenfeld, 1910 (Figs 77-79)

?Erylus oxyaster Lendenfeld, 1910: 268, pl. 3, figs 29-35, pl. 4, figs 1-43.

Material: SEPBOP "Anton Bruun" 18B-794A, James Isl., 00°12'S 90°50'W, 23-09-1966, intertidal; 18B-795, E of Albemarle Isl., 00°37'S 90°51'W, 1966, 78 m. Microscopical slides and fragments ZMA POR. 11222, MHNG 18966.

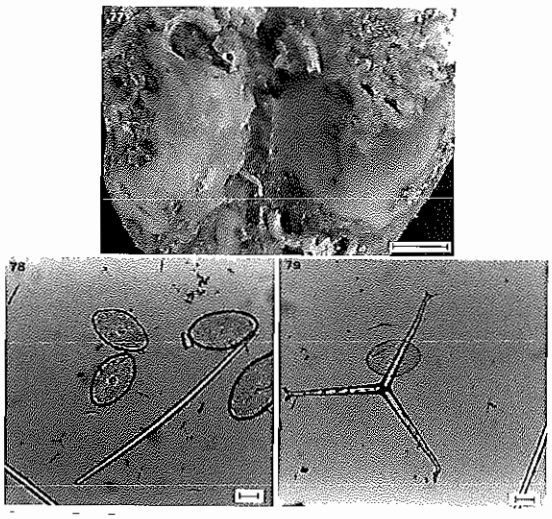
DESCRIPTION:

Encrusting on stone, slightly elongate, up to 30 x 10 x 5 mm.

Surface: smooth, no oscules visible.

Consistency: hard.

Colour: white, with brown spots, in alcohol.



FIGS 77-79

Erylus cf *oxyaster* von Lendenfeld. Stat. 18B-794A, James Isl. 77. Encrusting specimen. 78. Strongyloxeas, aspidasters and microrhabds. 79. Dichotriaene, axe of an oxea, aspidaster, microrhabds and diactine oxyaster. Scales: fig. 77 = 10 mm; figs 78, 79 = 50 µm.

SKELETON:

Ectosomal: a crust of aspidasters, 2-3 layers thick, with microrhabds arranged tangentially in the interstices between the aspidasters.

Choanosomal: subectosomal dichotrianes carry the crust of aspidasters. Interiorly strongyloxeas are confusedly arranged.

Spicules: dichotriaenes, strongyloxeas, microrhabds, aspidasters, oxyasters of two sizes.

MEGASCLERES:

Dichotriaenes, cladome 420-*820*-1000 µm, rhabd 700 µm by 80 µm , cladi 500 µm by 60 µm.

Strongyloxeas 410-*600*-1000 µm by 12-*20*-25 µm.

MICROSCLERES:

Microspined microrhabds, centrotylote: 66-*80*-98 µm by 4-8 µm.
Aspidasters oval, thin: 61-*95*-189 by 74-*95*-139 µm, thickness 16 µm.
Big oxyasters, diactine to tetractine, 29-*35*-60 µm, with 2-4 rays.
Small oxyasters 13-*22*-25 µm, with 12 rays.

Distribution: Galápagos Islands

Remarks: the present identification is made with hesitation, because we noted considerable differences between VON LENDENFELD's description and our specimens were found: von Lendenfeld recorded normally shaped oxeas of 1800-2900 by 60-85 µm (against our strongyloxeas of 400-1000 by 12-25 µm) and aspidaster size 208-243 by 125-150 µm (against our 61-189 by 74-139 µm). Nevertheless, it is probable that the specimens are conspecific because the other spicule types are in the same size range and the overall spicule geometries are similar. Of all the Pacific *Erylus* species described so far, *E. oxyaster* is obviously closest and its type locality is also Galápagos.

Order LITHISTIDA
Corallistidae Sollas, 1888

Corallistes Schmidt, 1870

Type species: *Corallistes typus* Schmidt, 1870 by subsequent designation (De Laubenfels, 1936).

Definition: (from SOLLAS 1888) Corallistidae in which the ectosomal megasclere is a dichotriaene and the microscleres are spirasters. The pores are simple.

Corallistes isabela n.sp. (Figs 80-86)

Material: Holotype USNM 43167 SEPBOP "Anton Bruun" 18B-795, E of Albemarle Isl., 00°37'S 90°51'W, -1966, 78 m. Microscopical slides and fragments, ZMA POR. 11237, MHNG 20605.

DESCRIPTION:

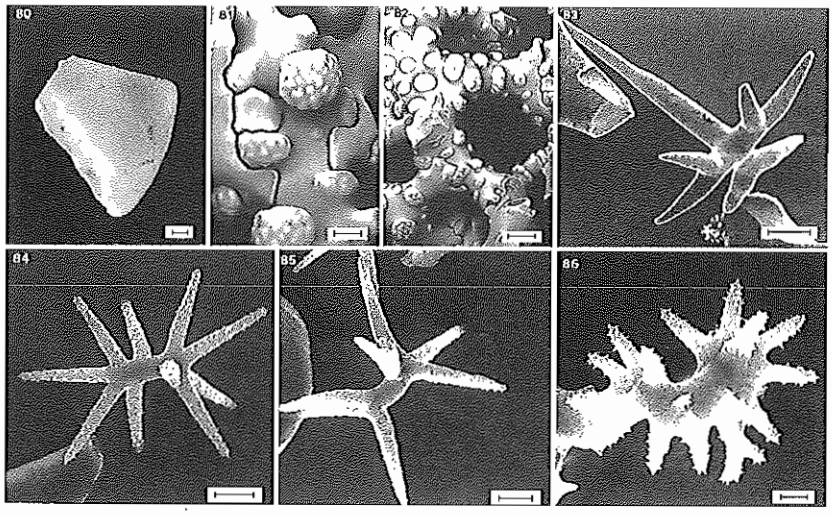
A small fragment of a flattened cup or plate (similar to *C. typus*), with rounded margin, with differentiated surfaces, upper surface without visible apertures, the lower with small oscules of 1 mm in diameter. A clearly visible cortical region in cross section.

Consistency: hard, granular.

Colour: light brown to cream in alcohol.

SKELETON:

Ectosomal: crust of dichotriaenes arranged with the cladomes outwards and rhabdomes perpendicular to the surface. Alternating smaller and larger dichotriaenes. Bundles of oxeotes penetrate the surface. Microscleres are abundant at the surface as well as between the rhabds of the dichotriaenes.



FIGS 80-86

Corallistes isabela n. sp. Stat. 18B-795 E. of Albemarle Isl. 80. Fragment of the holotype, a flattened cup. 81, 82. Knobbed desmas. 83. Large dichotriaenes. 84, 85. Amphiasters, 86. Spiraster. Scales: fig. 80 = 10 mm; figs 81, 83 = 20 µm; fig. 82 = 50 µm; figs 84, 85 = 5 µm; fig. 86 = 2 µm.

Choanosomal: the usual tight reticulation of knobbed desmas, with bundles of oxeotes spaced out regularly. In between desmas abundant microscleres are found.

Spicules: Dichotriaenes in two sizes, desmas, oxeotes, amphiasters, spirasters.

MEGASCLERES:

Large dichotriaenes , cladome 329-540 µm, cladi 282 µm, rhabd 14-40 µm.

Small dichotriaenes, cladome averaging 120 µm, cladi 60-70 µm, rhabdome 229-269 by 23 µm.

Desmas 526-959 by 129-327 µm.

Oxeotes, long, mostly broken off, thus no definite length can be given, but certainly over 1000 by 1-5 µm.

MICROSCLERES:

Short-shafted, thick-rayed amphiasters averaging 42 µm.

Short singly-arched spirasters averaging 23 µm.

Etymology: After its origin: Albemarle or Isabela Island.

Remarks: C. isabela n. sp. and Atlantic *C. typus* Schmidt 1870 are similar in general morphology: small cups with rounded margins. Two principal differences exist between them: sizes of dichotriaenes and amphiasters (Table 9). *C. isabela* n. sp. has two sizes of dichotriaenes. Cladome of the larger category of dichotriaenes is twice as big as that of *C. typus*. Rhabdome of the smaller category is also longer than those of *C. typus*. *C. isabela* n. sp. also has larger amphiasters than *C. typus*.

TABLE 9

Spicule sizes reported for *Corallistes isabela* n. sp. compared to *Corallistes typus* Schmidt. Information from literature and ZMA and MHNG material. Measurements refer to cladome, to length and width (desmas, rhabds, oxeotes) and to diameter (amphiasters, spirasters).

Author/coll.	Locality	Desmas	Dichotriaenes 1. large 2. small	Oxeotes	*Amphiasters **Spirasters
Corallistes typus	Florida	——	——	——	——
Sollas, 1888	Pernambuco	Tuberculate	rhabd. 238-320 x 32	701 x 4	**20-24
van Soest & Stentoft, 1988	Caraïbe	300-360 x 15-24	clad. 90-300 rhabd. 130-380 x 15-24	700-1260 x 4-8	**14-26
C. isabela n. sp. ZMA POR 11237 MHNG 20599	Galápagos	Knobbe-like 526-959 x 129-327	1. clad. 329-540 rhabd. 14-40 2. 120 229-269 x 23	over 1000 x 1-5	* 42 **23

Order SPIROPHORIDA

Tetillidae

Genus **Cinachyrella** Wilson, 1925

Type species: *Tetilla hirsuta* Dendy, 1889 by subsequent designation (RÜTZLER 1987).

Definition (from RÜTZLER 1987): Tetillidae with porocalices , without cortex.

Cinachyrella globulosa n. sp. (Figs 87-92)

Material: Holotype USNM 43164 SEPBOP "Anton Bruun" 18B-794E, James Isl., 00°12'S 90°52'W, 24-09-1966, 34 m, rock dredge. Microscopical slides and fragments ZMA POR 11223, MHNG 20597.

DESCRIPTION:

Fragment of a globular sponge with prominent porocalyces.

Surface: hispid, arenaceous.

Consistency: firm.

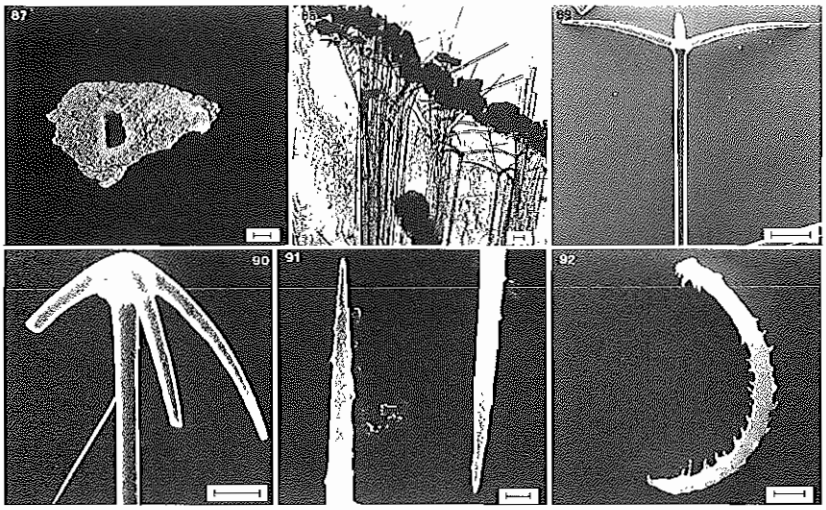
Colour: grayish white in alcohol.

SKELETON: predominantly radiate.

Spicules: orthotriaenes, plagiotriaenes, anatriaenes, oxeas, microxeas, sigma-spires.

MEGASCLERES:

Orthotriaenes, cladome 246-*305*-386 µm, rhabds 920-*1125*-1700 by 20 µm; cladi 140-*208*-300 µm.



FIGS 87-92

Cinachyrella globulosa n. sp. Stat. 18B-794E James Isl. 87. Holotype. View of prominent porocalyx in fragment of globular specimen. 88. Skeletal cross section, choanosomal and surface view. 89. Cladome of an orthotriaene. 90. Anatriaene. 91 Microspined apices of microxea. 92. Sigmaspire. Scales: fig. 87 = 10 mm; fig. 88 = 50 µm; fig. 89 = 100 µm; fig. 90 = 20 µm; fig. 91 = 1 µm ; fig. 92 = 2 µm.

Plagiotriaenes, cladome 140-200 µm, rhabds 2000-3000 by 10-15 µm, cladi 140-200 µm.

Anatriaenes: cladome 90-100 µm, rhabds 2520-*2687*-2900 by 10 µm, cladi 100 µm .

Oxeas: 1840-*2896*-4480 µm by 20 µm.

MICROSCLERES:

Microxeas 57-*80*-120 µm by 0.5-1.0 µm .

Sigmaspires: 10-*12*-16 µm.

Etymology: the name refers to its morphology.

Remarks: through the high proportion of plagio- and orthotriaenes the species is similar to Caribbean *Cinachyrella arenosa* (VAN SOEST & STENTOFT 1988 as *Cinachyra*), but this species has trichodragmata in addition to the microxeas and sigmaspires.

Order HADROMERIDA Topsent, 1900
Clionidae Gray, 1867

Genus **Cliona** Grant, 1826

Type species *Cliona celata* Grant, 1826 by monotypy.

Definition (emended from TOPSENT 1900): Excavating Clionidae of which the spiculation includes tylostyles, microxeas and spirasters. Either of these microsclere categories may be absent.

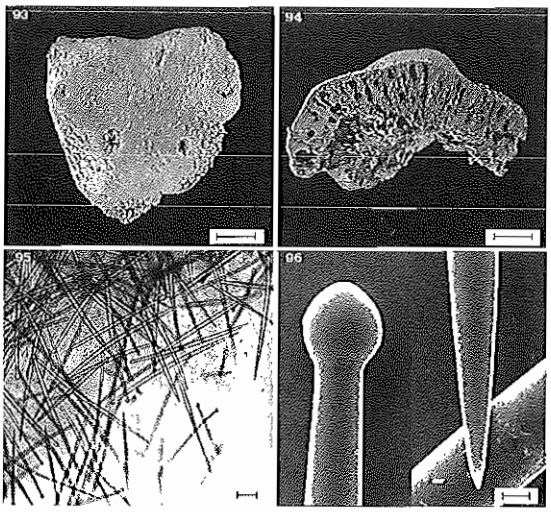
Cliona chilensis Thiele, 1905 (Figs 93-96)

Cliona chilensis Thiele, 1905: 409, figs 28, 29, 36a-c;
Pseudosuberites melanos De Laubenfels *in* DESQUEYROUX 1972: 15, figs 35-37, 130, 131;
Pseudosuberites pseudos Dickinson, 1945: 38, pl. 70, fig. 140, pl. 71, fig. 141, 142, pl. 72, fig. 143;

Material: USNM 37951 Punta Vicente Roca, stat. 8 00°5'S 090°W; coll. W.D. Hope, 1978, 18 m, microscopical slides and fragments ZMA POR. 11224, MHNG 21050; ZMA POR. 11225, MHNG 18821; 18B-794E, N coast James Isl., 00°12'S 090°52'W, 24-09-1966,.34 m, rock dredge, microscopical slides and fragments ZMA POR. 11226, MHNG 21049; 18B 795 D, E of Albemarle Isl., 00°37'S 90°51'W, 78 m.

DESCRIPTION:

Massive, globular sponges with surface covered by the characteristic inhalant *Cliona* papillas. Material fragmented with largest fragment 100 x 100 x 40 mm, papillas approximately 4 mm in diameter. Oscules on low prominences, isolated, about 3 mm in diameter, lying 3-5 cm apart. In cross section inhalant and exhalant canals dominate the choanosomal structure.



FIGS 93-96

Cliona chilensis Thiele. Stat. 18B-794E James Isl. 93. View of the massive specimen. 94. Cross section of the same. 95. General view spicules of the tylostyle palisade. 96, head and apex of a tylostyle. Scales: figs 93, 94 = 10 mm; fig. 95 = 50 µm; fig. 96 = 5 µm.

Consistency: firm, cartilaginous.

Colour: yellow orange, dark brown in alcohol.

SKELETON:

Ectosomal: dense palisade of tylostyles with points outward.

Choanosomal: directly under the palisade the skeleton is thoroughly confused with tylostyles arranged criss-cross. Further down into the choanosome the tylostyles are arranged along the regularly spaced aquiferous canals. Pigment granules are abundant.

Spicules: tylostyles 213-*280*-356 by 8-10-14 µm.

Distribution: Galápagos Islands; South East Pacific coast, from Lower California to Chiloé (Chile).

Remarks: comparisons with the holotype and paratype (here designated) of *C. chilensis* Thiele, ZMB 2233, ZMB 2235, from Calbuco, Chile, and with the holotype of *Pseudosuberites pseudos* Dickinson, 1945, (AHF 21) from Gulf of California revealed that all are conspecific. This *Cliona* species assumes the gamma-form also known from *C. celata* and *C. viridis* in the Eastern Atlantic. A difference with *C. celata* is the arrangement of the oscules in isolated mounds versus the arrangement in rows in *C. celata*. From *C. viridis* the present species differs in lacking microscleres. THIELE (1905) reports some spirasters, but we have not observed these in his type material.

Chondrillidae Gray, 1872

Chondrilla Schmidt, 1862

Type species: *Chondrilla nucula* Schmidt, 1862 by subsequent designation (DE LAUBENFELS 1936).

Definition (emended from WIEDENMAYER 1977): Chondrillidae with a strong cortex reinforced by cuasters of oxyspheraster type.

Chondrilla verrucosa n. sp. (Figs 97-102)

Material: Holotype USNM 37918 Albemarle Isl., coll. Rofen, 17-05-1966, microscopical slides and fragments ZMA POR 11227, MHNG 20616.

Paratype: ZMA POR. 11228, SEPBOP "Anton Bruun" stat. 16-66139, Albemarle Isl., N coast, 00°15'S 91°26'W, 25-05-1966, 0-3 m, microscopical slides and fragments, MHNG 21051.

DESCRIPTION:

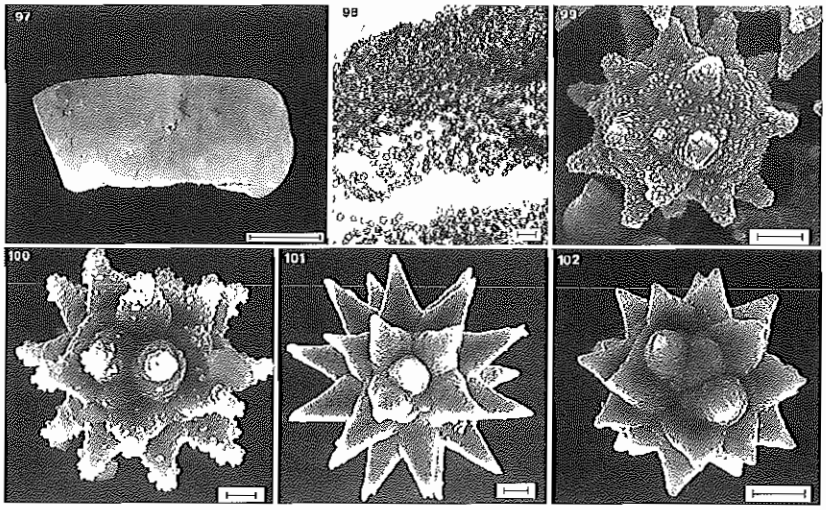
Thickly encrusting, rounded edges, smooth surface, no visible oscules. Size of holotype 2 x 1.5 x 0.5 cm, of paratype 4 x 1.5 x 0.7 cm.

Consistency: rubbery, tough.

Colour: brownish grey, somewhat mottled.

SKELETON:

Ectosomal: a clearly distinguishable cortex of about 160-180 µm in thickness separated from the choanosome by a series of subcortical cavities.



FIGS 97-102

Chondrilla verrucosa n. sp. Stat. 16-66139 Albemarle Isl. 97. Fragment of holotype specimen. 98. Surface crust of spherasters. 99, 100. Spherasters with warted surface and rounded rays. 101, 102 spherasters with pointed rays. Scales:fig. 97 = 50 mm; fig. 98 = 50 µm; figs 99, 100 = 5 µm; fig. 101 = 2 µm; fig. 102 = 5 µm.

Choanosomal: the spherasters form a dense surface crust and surround internal aquiferous spaces. Relatively high proportion of spicules.

SPICULES:

Spherasters only, mostly exhibiting a characteristic warty surface, in a wide size range, possibly separable into two categories:

Strongylospherasters scarcely found in the spicule slides, but numerous in the SEM slides, 21-*26*-30 µm in diameter.

Spherasters with pointed rays 22-*27*-32 µm in diameter.

Etymology: the name refers to the warty spherasters.

Remarks: this is the first record of the genus *Chondrilla* from the South East Pacific. The warty spherasters are the main distinction from other *Chondrilla* species; this feature is not easily recognized in light microscopy, so it may turn out to be a feature found in other *Chondrilla* species, too. The new species may be close to *Chondrilla acanthaster* De Laubenfels, 1954 from the Palau Islands, but its asters are described as being clearly spined and they are clearly smaller (only 17-22 µm). We compared our specimens with type specimens of *Chondrilla nucula* Schmidt, 1862 (LMJG 15108, from Quarnero. Schizotypes: BMNH 1867:7:26:1, BMNH 1867:7: 26:30 and BMNH 1867:3:11:97) and found that this species is clearly distinguishable from *C. verrucosa* n. sp. principally by two differences: the spherasters with warty

surface and pointed rays, the existence of two categories, oxyspherasters and strongylospherasters in *C. verrucosa* n. sp. and only one smooth category in *C. nucula*; the second difference is the thinness of the cortex: 160-180 µm in *C. verrucosa* and 1500-2000 µm, in *C. nucula*.

Chondrosia Nardo, 1842

Type species: *Chondrosia reniformis* Nardo, 1847 by monotypy.

Definition: Chondrillidae without spicules.

Chondrosia cf. **chucalla** De Laubenfels, 1954

Chondrosia reniformis sensu Topsent, 1895: 517 (in part: Galápagos material)
Chondrosia chucalla De Laubenfels, 1954: 254, text. fig. 178; HOOPER & WIEDENMAYER 1994: 126.

Material: ZMA POR. 11229, Galapagos Isl., Indefatigable Isl., 0.6 m, 17-05-1966 coll. R. Rofen.

DESCRIPTION:

Thickly encrusting, on the base of a hydroid colony, size 15 x 15 x 10 mm.
Surface: smooth.
Colour: dark grey in alcohol.
Consistency: rubbery, slippery.

SKELETON:

Absent; a distinct darker coloured cortical region of 450-500 µm in thickness is developed.

Distribution: Galápagos Islands; Australia, W(?) and Central Pacific Ocean (HOOPER & WIEDENMAYER 1994); Palau, Hawaii (DE LAUBENFELS 1954).

Remarks: the specific identification of *Chondrosia* species on casual light microscopical examination of unstained histological section is not really possible. The name assigned to our specimen is based on the fact that the description of *C. chucalla* does not conflict with the characters described above, and that it is entirely possible that its distribution extends across the Pacific.

Latrunculiidae Topsent, 1922

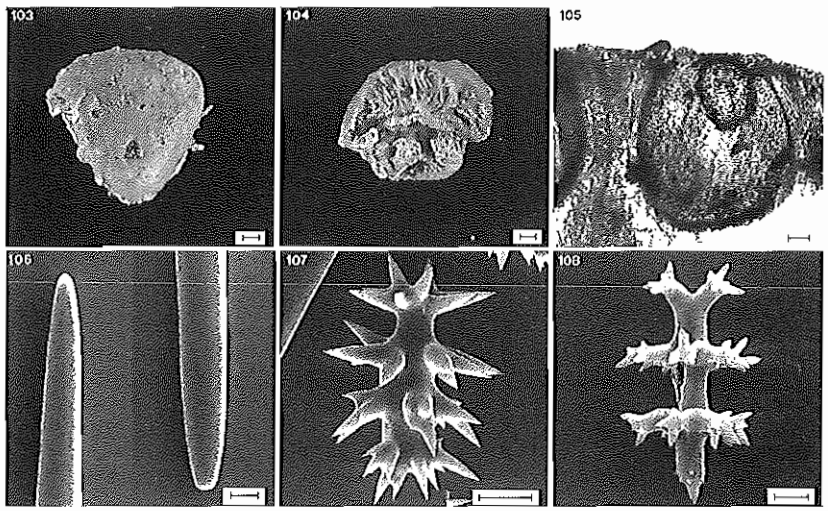
Sigmosceptrella Dendy, 1922

Type species: *Spirastrella fibrosa* Dendy, 1897 by subsequent designation (DENDY 1922).

Definition (provisionally deduced from KELLY-BORGES & VACELET 1995): ?Latrunculiidae encrusting to massive. Megascleres styles or oxeas. Microscleres spinorhabds, with 3-4 whorls of spines, derived from sigmiform rhabds.

Sigmosceptrella hospitalis n.sp. (Figs 103-108)

Material studied: Holotype USNM 40756 SEPBOP "Anton Bruun" 18B-794E, James Isl., 00°12'S 90°52'W, 24-09-1966, 34 m, rock dredge. Microscopical slides and fragments ZMA POR. 11230, MHNG 21019.



FIGS 103-108

Sigmosceptrella hospitalis n. sp. Stat. 18B-794 James Isl. 103. Holotype specimen. 104. Cross section of the same. 105. Surface holes containing microcrustacea, ectosomal crust of microscleres and oxea bouquets. 106. Apices of oxea. 107. Spinorhabd. 108. Sigmorhabd. Scales:figs 103, 104 = 10 mm; fig. 105 = 50 µm; figs 106, 108 = 5 µm; fig. 107 = 10 µm.

DESCRIPTION:

Thickly encrusting to massive, growing on a substrate of serpulid tubes.

Surface: smooth, covered with 1-2 mm sized holes containing microcrustaceans. No apparent oscules.

Consistency: hard.

Colour: reddish brown in alcohol.

SKELETON:

Ectosomal: a crust of microscleres carried by bouquets of oxeas. The rounded shallow holes in which the microcrustacea are housed are covered by a crust of microscleres.

Choanosomal: internal structure radiate, fibrous. Radiating tracts of megascleres, are 100-250 µm in diameter, distances between them 80-100 µm. Microscleres are scattered between the tracts.

Spicules: oxeas, spinorhabds.

Oxeas: 336-*398*-526 µm by 8-*10*-12 µm.

Spinorhabds: microscleres with anisomorph rhabd (one end pointed the other blunt and spined) with sharply spined rays, 32-*39*-45 µm; "sigmodiscorhabd" growth stages present, 16-*25*-29 µm.

Etymology: the name refers to the association with the microcrustaceans.

Remarks: the young forms of the spinorhabds make it clear this species belongs to the revived genus *Sigmosceptrella*, differentiated from *Latrunculia* proper in having a sigmoid initial stage in the microscleres. This feature is shared by species of the revived genera *Diacarnus*, but these have their rays approximately of equal length while those of *Sigmosceptrella* are longer in the inner whorls than in the terminal whorls (KELLY-BORGES & VACELET 1995). No *Sigmosceptrella* species have been described from the East Pacific so far.

Polymastiidae Gray, 1867

Genus **Polymastia** Bowerbank, 1863

Type species: *Halichondria mammillaris* Johnston, 1842 by original designation.

Definition (emended from BOURY-ESNAULT *et al.* 1994): encrusting or spherical Polymastiidae with papillae and a cortex with a palisade of small tylostyles. Choanosomal skeleton of radial bundles of large tylostyles and free spicules. Spicules: tylostyles, styles or strongyloxeas. No microscleres.

Polymastia villosa n.sp. (Figs 109-112)

Material: Holotype USNM 41438 SEPBOP "Anton Bruun" 18B-795, E of Albemarle Isl., 00°37'S 90°51'W, 78 m, -1966, microscopical slides and fragments ZMA POR. 11231, MHNG 21020.

DESCRIPTION:

Globular hairy sponge with a single central papilla, attached to serpulid tubes. Size 28 x 32 x 28 mm. The papilla is smooth, conical, 8 mm long with an enlarged base of 7 mm in diameter and a pointed apex of 2 mm in diameter.

Surface: resembles, through protruding spicules, the pelt of a furred mammal. Mud and other foreign material is found captured between the spicules.

Consistency: firm, hard.

Colour: gray brown in alcohol.

SKELETON of the main body: in cross section five areas are visible: the outer pelt of protruding megascleres, points outward, sticking out 1400 µm from the surface; the surface palisade of small tylostyles, thickness 200 µm; a tangential layer of intermediate tylostyles, thickness 400 µm; an area free of spicules, thickness 250 µm; and a zone of confusedly reticulated packages of small tylostyles, thickness 400 µm. Through all this perpendicular tracts of large tylostyles, 200-350 µm in diameter, lying 400 µm apart, traverse from the centre of the body.

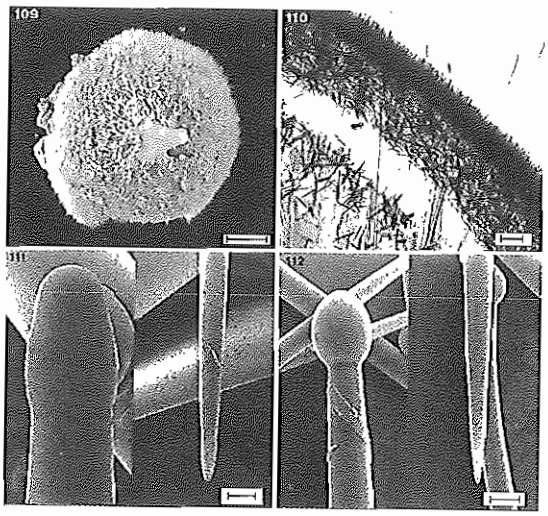
Spicules: tylostyles.

Ectosomal tylostyles of the palisade 123-*159*-209 by 4-5 µm.

Tylostyles of the subectosomal tangential layer 353-*503*-672 by 8-*11*-16 µm.

Tylostyles of the choanosomal packages 400 by 10 µm.

Tylostyles of the choanosomal tracts (including the protruding tylostyles): 1540-*1659*-3000 by 20-30 µm.



FIGS 109-112

Polymastia villosa n. sp. Stat. 18B-795 Albemarle Isl. 109. Holotype specimen, prominently hairy and with a single papilla. 110. Cross section of the surface, with surface palisade of small tylostyle, a free of spicule area, a confusely reticulated packages of small tylostyles, and the perpendicular tracts of large tylostyles. 111. Choanosomal subtylostyles. 112. View of the palisade tylostyles. Scales: fig. 109 = 10 mm; fig. 110 = 50 µm; fig. 111, 112 = 5 µm.

Etymology: the name refers to the hairy surface.

Remarks: the new species differs from the sympatric *Polymastia maeandria* Wilson, 1904, (holotype specimen USNM 8292), in the possession of a single papilla (many papillae in *P. maeandria*), and the hairy surface, (*P. maeandria* has a smooth surface). The largest tylostyles are much longer than those of *P. maeandria*. The new species is closest to *P. pachymastia* De Laubenfels, 1932, from California. De Laubenfels' description of this species is very inadequate, but we reexamined the type specimen USNM 22062, and found that spicule sizes and shapes are similar to those of our new species. However, the following differences were found: *P. pachymastia* forms flattened cushions with numerous blunt papillae (against the single conical papilla and globular growth form in *P. villosa*), and the smaller categories of tylostyles have less pronounced heads than those of *P. villosa*. *P. pachymastia* shows considerable similarities with *Sphaerotylus schoenus* (Sollas, 1882) from northern European waters. We have also examined the holotype (here designated) ZMB 3267, of *Polymastia isidis* Thiele, 1905, from Chile, which is distinct from our new species in the size of the largest tylostyles, which reach only 850 x 15 µm. That species was also reported from Kerguelen (BOURY-ESNAULT & VAN BEVEREN 1982) with larger tylostyles (up to 1600 µm) and with several papillae; this may turn out to be a separate species. *P. invaginata* Kirkpatrick (1908) from Antarctic and Sub-Antarctic

waters (cf. photos in BOURY-ESNAULT & VAN BEVEREN 1982) has a shape similar to our new species, including the single central papilla, but it has a smooth surface.

Quasillina Norman, 1869

Type species: *Euplectella brevis* Bowerbank, 1861 by subsequent designation (VOSMAER 1885).

Definition (emended from TOPSENT 1900): massive Polymastiidae with or without stalk. Apical oscule. A cortex may be present. The only choanosomal skeleton consists of a subectosomal system of longitudinal and circumferential tracts. Megascleres styles to subtylostyles and strongyloxeas in two to three sizes.

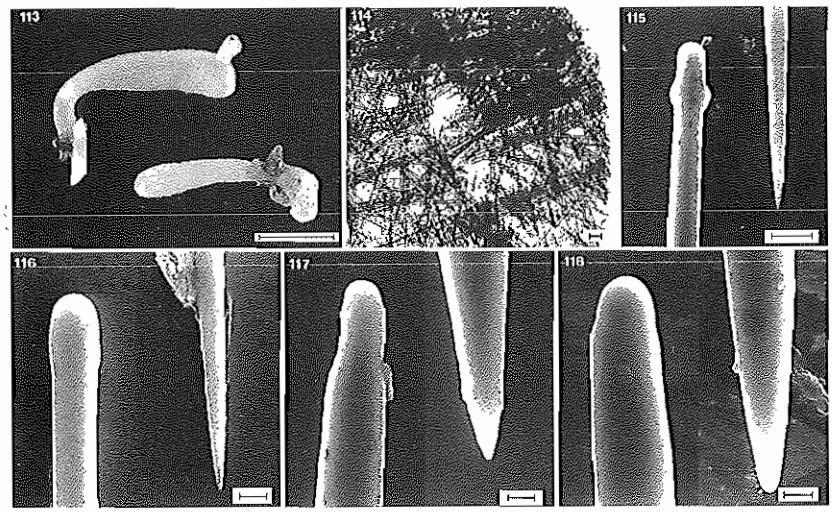
Quasillina translucida n. sp. (Figs 113-118)

Material: Holotype USNM 43163 SEPBOP "Anton Bruun" 18B-795, E of Albemarle Isl., 00°37'S 90°51'W, -1966, 78 m, attached to coarse sediment grains and small pebbles. Microscopical slides and fragments, MHNG 21021.

Paratypes: ZMA POR. 11232, 3 specimens and a fragment, same data as the holotype.

DESCRIPTION:

Elongate bladder-like fistules of 10-20 mm length, 4-8 mm in greatest width. The holotype has a small side-fistule near the apex. The specimens are all firmly



FIGS 113-118

Quasillina translucida n. sp. Stat. 18B-795 E. of Albemarle Isl. 113. Holotype and paratype with a small side-fistule near the apex. 114. Strongly developed system of longitudinal tracts. 115, 116. Small ectosomal style to subtylostyle, sharply pointed. 117. Strongyloxea of the longitudinal tracts. 118. Strongyloxea of the circumferential tracts. Scales: fig. 113 = 10 mm; fig. 114 = 50 µm; fig. 115 = 5 µm; figs 116-118 = 2 µm.

attached to small pebbles, with a basal part that is narrower than the upper part but not forming a stalk. No oscule apparent, but suspected to be apical, and closed in preservation. Hollow, transparent, with a system of subdermal intercrossing longitudinal and perpendicular tracts clearly visible to the naked eye if held against the light.

Surface: optically smooth but microscopically hispid, rough to the touch.

Consistency: somewhat fragile, easily torn.

Colour: pale white in alcohol.

SKELETON:

Only an ectosomal and subectosomal skeleton is developed.

Ectosomal: a diffuse palisade of erect small styles to subtylostyles and tylostyles, rather spaced out and not forming a continuous surface crust. At the apex the small styles are crowded together to form a canopy covering and closing off a presumed terminal opening.

Subectosomal: the body is upheld by a strongly developed system of longitudinal tracts 60-120 µm in diameter, consisting of 5-20 huge strongyloxeas. The longitudinal tracts number 15-20 around the circumference of a specimen, they are occasionally anastomosing and lie at distances of 250-400 µm. Perpendicular to these there are thinner but more numerous circumferential tracts 50-80 µm in diameter consisting of intermediate sized strongyloxeas; many are single and oriented randomly.

Spicules: strongyloxeas in two sizes, styles to subtylostyles, tylostyles.

Long strongyloxeas of the longitudinal tracts, thin with a very narrow blunt end, 760-*1000*-1200 by 10-12 µm.

Short strongyloxeas of the circumferal tracts, relatively thick in the middle, likewise with very narrow blunt end, 400-*546*-650 by10-14 µm.

Small ectosomal styles, occasionally subtylostyles to tylostyles with a swollen or clearly developed tyle, uniformly thin over most of their length, but with an elongated sharply pointed end, the latter part frequently curved, 127-*160*-200 by 1-3 µm.

Etymology: the name refers to the transparent ectosome that allows to see the internal structure.

Remarks: this is the first record of the genus *Quasillina* from tropical latitudes. The new species is similar to Boreo-Arctic *Quasillina brevis* (Bowerbank, 1861) in most respects (cf. descriptions in e.g. VOSMAER 1885; DENDY 1888; TOPSENT 1900; KOLTUN 1966). However, specimens of that species are more definitely stalked, with a clear separation between a thin stalk and a wide main body. Also, no distinction is apparent between the sizes of strongyloxeas of the longitudinal and the circumferal tracts, although the overall size range is similar in both species.

Tethyidae Gray, 1867

Tethya Lamarck, 1815

Type species: *Tethya lyncurium* Linnaeus, 1767 by subsequent designation (SOLLAS 1888).

Definition: Spherical Tethyidae, never stalked, but may have basal rootlets. Cortex well developed, radiate skeleton of strongyloxeas, megasters (small spherasters and/or oxyspherasters) and micrasters (small and large euasters and oxyasters) found in ecto- and choanosome.

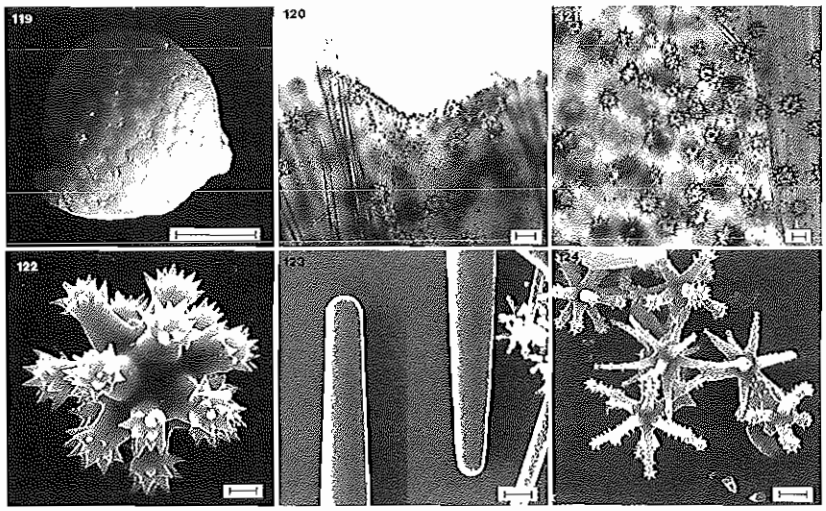
Tethya sarai n.sp. (Figs 119-124)

Material: Holotype USNM 37915, Bindloe Isl., Punta Espejo, intertidal, coll. W.D. Hope, 02-1978, microscopical slides and fragments, MHNG 21024

Paratypes: USNM 37921, Albemarle Isl., among mangrove, Estero Flores, coll. W.D. Hope, 1978; Indefatigable Isl., outer reef next to Turtle Bay, coll. R. Rofen, 17-05-1966, 0.5-1 m (25 specimens), microscopical slides and fragments ZMA POR. 11233, MHNG 18978; SEPBOP "Anton Bruun" 16-6610, Indefatigable Isl, 00°44'S 090°17'W, 19-05-1966. (5 specimens), microscopical slides and fragments ZMA POR. 11234, MHNG 21025; ZMA POR. 11235, MHNG 21023; 16-6696, Indefatigable Isl., 00°45'S 90°20'W, 0-1 m (1 specimen), microscopical slides and fragments ZMA POR. 11236, MHNG 21022; 18B-795D, Albemarle Isl., E coast, 00°34'S 90°56'W, 24-09-1966, intertidal (10 specimens), microscopical slides and fragments MHNG 21026.

DESCRIPTION:

Globular, relatively smooth, with low warts. Size up to 25 mm in diameter. No visible oscules. In cross section the thick cortical layer is clearly visible against the more yellowish interior.



FIGS 119-124

Tethya sarai n. sp. Stat. 18B-795D E of Albemarle Isl. 119. Holotype, globular specimen with low warts. 120. Thin, one layer crust of micrasters (tylasters). 121. Dense layer of spherasters with large sized asters of the outermost part, choanosomal megascleres tracts and spherasters. 122. Strongylasters with numerous arms. 123. Strongyloxea apices. 124. Oxyspherasters and tylasters. Scales: fig. 119 = 10 mm; figs 120-121 = 50 µm; fig. 122 = 2 µm; fig. 123 = 10 µm; fig. 124 = 5 µm.

Consistency: hard to compressible, somewhat variable among specimens.
Colour: cream in alcohol.

SKELETON:

In cross section the following zones may be distinguished: a thin one layer crust of microasters (tylasters), a very thick (2-4 mm) very dense layer of spherasters, with the outermost parts containing on the average larger-sized asters than the innermost parts, but a clear separation into two zones is not found; there are frequent, but irregular aquiferous spaces in this zone. The cortex is set rather sharply apart from the choanosome, where microster-like strongylasters or tylasters dominate; some spherasters are also scattered here. The choanosomal megasclere tracts form massive columns in the interior but fan out through the cortical layer of spherasters; diameter of the tracts near the surface 100-200 µm.

SPICULES:

Strongyloxeas, strongylasters/tylasters, microasters/tylasters, oxyspherasters.

MEGASCLERES:

Strongyloxeas 920-*1224*-1500 by 20-*25*-30 µm.

MICROSCLERES:

Strongylasters/tylasters of the centre: 23 µm (up to 20 rays).
Microasters/tylasters: 8-*10*-15 (10-12 rays).
Oxyspherasters in two size categories: 12-*16*-20 and 38-*67*-90 µm.

Ecology: in shallow water, among mangroves.
Etymology: named after Prof. Michele Sarà of the Genoa University in recognition of his exhaustive studies on the systematics of the genus *Tethya*.

Remarks: we have compared *Tethya sarai* n sp. with *T. deformis* Thiele, 1898, (MHNG 985932, specimen from Easter Island (I. Pascua)), species represented at Enochima and at Easter Island and with the holotype (ZMB 3269) of *T. papillosa* Thiele, 1905, from Calbuco, Chile, considered a synonym of *T. deformis* by TOPSENT 1918. Morphologically the three species are similar: globular and covered by small and low surface warts and without visible oscules. Differences in the microscleres structure and sizes are visible only under SEM (Table 10), but clearly show our material is a new species.

Order HALICHONDRIDA

Axinellidae Carter, 1875

Genus **Auletta** Schmidt, 1870

Type species: *Auletta sycinularia* Schmidt, 1870 by monotypy.

Definition: (from ALVAREZ *et al.* in press) Axinellidae specialized, hollow tubular, branching or cylindrical growth forms, with terminal oscules. Ectosome without specialized skeleton, but extra-axial choanosomal spicules may be piercing the surface, singly or in brushes. Choanosomal skeleton, with a basal condensed layer

TABLE 10

Spicule sizes reported for *Tethya deformis* Thiele, Japan and Easter Island and *Tethya papillosa* (Thiele), Chile, compared to *T. sarai* n. sp. Information from literature and ZMA and MHNG material. Measurements refer to length and wide (strongyloxeas) and to length and number of rays (strongylasters and micrasters).

Author/coll.	Locality	Strongyloxeas	Strongylasters	Microsters
Tethya deformis	Enoshima	1300-1850 x 33	50	12
Desqueyroux-Faúndez, 1990	Easter Island	1405-1386 x 13-17	54	13.5
T. papillosa	Chile	1500 x 10-25	55-60	10-15
T. sarai n. sp. ZMA POR 11233 to 11236 MHNG 21022 to 21026	Galápagos	1224 x 25	23 / 20 rays	8-15 10-12 rays

of sinuous strongyles and styles, lining the inner tube wall and radial plumoreticulate extra-axial tracts of long styles/rhabdostyles of two sizes, embedded perpendicular to the axial skeleton; extra-axial tracts ascending towards the surface in longitudinal bands, united by abundant fibre and collagenous spongin, inteconnected by occasional uni- or aspicular fibres.

Auletta dendrophora Wilson, 1904 (Figs 125, 126)

Auletta dendrophora Wilson, 1904: 158, pl. 19, figs.4, 5. 7, pl. 25, fig. 2.

Material: SEPBOP "Anton Bruun" 18B-791C, off Seymour Isl., N of Indefatigable Isl., 00°26'S 90°20'W, 21.09.1966, 95 m. Microscopical slides and fragments: ZMA POR. 11247, MHNG 21031.

DESCRIPTION:

Fragment of a tube, 18 mm high, 11 mm in diameter, with a continous lumen of 3 mm in diameter over its whole.

Consistency: firm to compressible.

Surface: Covered by the terminal part of the fibres that form brushes of spicules projecting on the surface as an hispid layer.

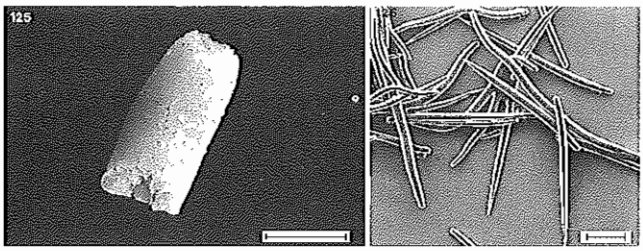
SKELETON:

Ectosomal: membranous, without specialized skeleton, pierced by the extra-axial spicules, then rough or goose-flesh appearance.

Choanosomal: internal wall of the tube formed by abundantly ramified longitudinal fibres of sinuous strongyles/oxeas.

Spicules: Styles and sinuous strongyles/oxeas.

Styles 1: 492-*671*-850 by 16-*20*-24 μm; styles 2: 131-*246*-336 by 8-*10*-16 μm.



FIGS 125-126

Auletta dendrophora Wilson. Stat. 18B-791C Off Seymour Isl. 125. Fragment of tube. 126. Sinuous strongylo/oxeas and styles. Scales: fig. 125 = 25 mm; fig. 126.= 100 µm.

Sinuous strongyles/oxeas: 221-*417*-722 by 8-*13*-25 µm.

Ecology: depth 95 m.

Distribution: Galápagos Islands.

Remarks: we have compared our material with the holotype, USNM 8298 of *Auletta dendrophora* Wilson, from Galápagos.

Both our material and Wilson's are from the same depth. Morphology and spicule sizes closely match those of Wilson's specimen.

Phakellia Bowerbank, 1863

Type species: *Halichondria ventilabrum* Johnston, 1842 by original designation.

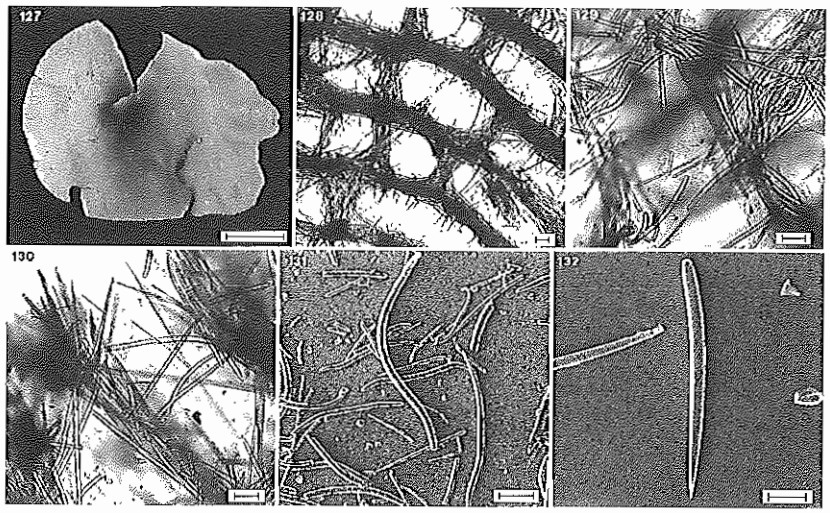
Definition (from ALVAREZ *et al.*, in press): compressed flabellate or cup-like forms predominate. Surface smooth or microconulose. Oscules often surrounded by stellate subectosomal drainage canals. Ectosomal skeleton membranous without spiculation, usually fleshy, often with extra-axial spicules protruding through the surface. Choanosomal axial skeleton as a dense mass of interwoven sinuous strongyles and styles or only strongyles, organized into multispicular-ascending and paucispicular transverse tracts, forming a compressed reticulation at the axis. Fibrous and collagenous spongin are sparse. Extra-axial skeleton of sparse plumose bundles or individual styles or oxeas, perpendicular to the axis, with or without transversely connecting megascleres. Microscleres absent.

Phakellia hooperi n.sp. (Figs. 127-132)

Material: Holotype USNM 39747 SEPBOP "Anton Bruun" 18B-791C, off Seymour Isl., N coast Indefatigable Isl. 00°26'S 90°20'W, 21.09.1969, 95 m. Microscopical slides and fragments ZMA POR. 11248, MHNG 21032.

DESCRIPTION:

Cup-shaped, 110 mm wide by 80 mm high, thickness of wall 4 mm near the base, 2 mm near the rim. Basal attachment lacking, rims show a few indentations. No visible oscules; outer surface distinctly punctate.



FIGS 127-132

Phakellia hooperi n. sp. Stat. 18B-791C Off Seymour Isl. 127. Holotype, cup-shaped specimen. 128. Rectangular neat system of interconnecting tracts. 129. Enlarged view of tracts of sinuous strongyles. 130. Surface brushes of ectosomal styles. 131. Sinuous strongyles. 132. Short styles of the choanosomal tracts. Scales: fig. 127 = 10 mm; figs 128-130 = 50 µm; fig. 131 = 100 µm; fig. 132 = 20 µm.

Surface smooth, uniformly structured, slightly hispid to the touch. Irregularly distributed round depressions (2-3 mm in diameter) are found on both surfaces, presumably left by epibiont barnacles or zoanthids.

Consistency: firm.

Colour: brown in alcohol.

SKELETON:

A neat rectangular system of longitudinal (diameter 150 µm) and interconnecting tracts (350 by 100 µm width), consisting of spongin fibres cored by 4-8 spicules in cross section. The meshes are very regular, elongately rectangular, 1000 by 350 µm. The tracts are formed by sinuous strongyles, short styles are placed at right angles to the tracts of strongyles. The tracts end at the surface in a neat system of meshes and brushes of short styles, occasionally by a single very long style, which protrudes far beyond the surface membrane, which is otherwise not provided with spicules.

SPICULES:

Styles and sinuous strongyles.

Short styles, of the tracts, and surface brushes, strongly curved near the base (almost like rhabdostyles): 98-*244*-394 by 4-*8*-12 µm

Long ectosomal styles: 799-*1257*-2000 by 4-*11*-16 µm.

Sinuous strongyles, curved several times in opposite directions: 328-*462*-648 by 12-*15*-20µm.

Etymology: named after John Hooper, Queensland Museum, Brisbane, in recognition of his prolific and outstanding work on the taxonomy and classification of the Demosponges.

Remarks: WILSON (1904) described *Phakellia lamelligera* from the Galápagos Islands. We re-examined the holotype USNM 8314 and found it to be quite dissimilar. In fact, this species is not a *Phakellia* because it lacks sinuous strongyles. The spicules include curved styles and oxeas and abundant trichodragmata; we propose to reassign this species to *Axinella*. No other *Phakellia* species are known from the East Pacific.

Desmoxyidae Hallmann, 1917

Halicnemia Bowerbank, 1864

Type species: *Halicnemia patera* Bowerbank, 1864 by original designation.

Definition (from VAN SOEST 1987): Desmoxyidae encrusting, with a very hispid surface. Choanosomal skeleton: basal reticulation of longitudinal spicule tracts, consisting of styles and centrotylote smooth oxeas. Extra-axial styles or tylostyles are embedded and erect on this basal layer, protruding to and perpendicular to the surface. Specialized ectosomal acanthose, centrangulate or straight microxeas.

Halicnemia diazae n. sp. (Figs 133-138)

Material: Holotype: USNM 43165 SEPBOP "Anton Bruun" 18B-794A, James Isl., 00°12'S 90°50'W 23.09.1966, intertidal. Microscopical slides and fragments ZMA POR. 11249, MHNG 21033.

DESCRIPTION:

Massively encrusting, 5-10 mm thick, fragmented, largest fragment 30 by 10 mm.

Surface smooth, but slightly corrugated with subdermal grooves. No oscules apparent.

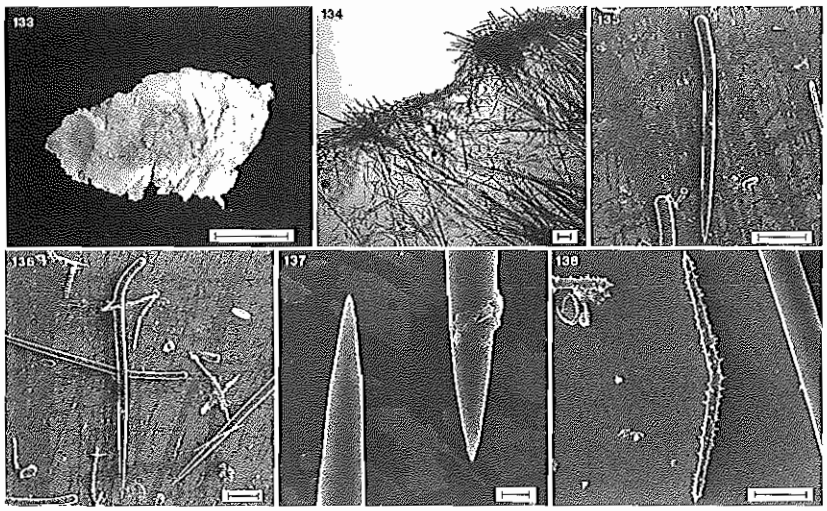
Consistency: compressible, crumbly.

Colour: whitish in alcohol.

SKELETON:

Ectosomal: a felted mass of mostly tangentially arranged acanthoxeas, carried by bouquets of oxeas.

Choanosomal: plumose-dendritic, consisting of thick tracts of long styles, erect on the substrate in bundles of two or three, surrounded by shorter rhabdostyles, ending at the surface in bouquets of oxeas. Tracts irregular, not visibly bound by any spongin. Acanthoxeas scattered throughout the choanosome.



FIGS 133-138

Halicnemia diazae n. sp. Stat. 18B-794A James Isl. 133. Fragment of the holotype. 134. Surface skeleton with felted mass of acanthoxeas and oxea bouquets. 135. Long choanosomal style. 136. Smooth rhabdostyle. 137. Oxea of the surface bouquets. 138. Acanthoxea. Scales: fig. 133 = 10 mm; figs 134-136 = 50 µm; fig. 137 = 5 µm; fig. 138 = 20 µm.

SPICULES:

Long styles, shorter (rhabdo-) styles, oxeas and acanthoxeas.

Long styles, smooth, most showing a smooth terminal tyle, mostly somewhat curved but not rhabdose, occasionally straight: 720-*800*-1300 by 8-*10*-28 µm.

Rhabdostyles: smooth curved strongly or occasionally almost straight (in the latter case not clearly differentiated from long styles) relatively thick, with a slight terminal or subterminal swelling, of quite wide ranging length: 280-770 by 10-23 µm.

Oxeas of the surface bouquets: smooth, straight, mostly centrotylote, often with mucronate apices: 375-520 µm by 5 µm.

Acanthoxeas: spined all over, with a sharp central angular bend: 65-115 by 2-5 µm.

Etymology: named after Maria Cristina Diaz in recognition of her valuable contributions to sponge systematics.

Remarks: so far the genus *Halicnemia* is not known from the tropical East Pacific; the nearest record is that of *Halicnemia patera* (Bowerbank) from British Columbia (AUSTIN 1985). However, it is likely that several sponges described from the area under *Higginsia* are in fact members of *Halicnemia*. In shape and spiculation our new species is close to *Higginsia papillosa* Thiele, 1905 originally reported from Southern Chile. We have re-examined Thiele's material (Holotype ZMB 3283), and

found clear differences in the shape of the shorter styles (not rhabdose in *H. papillosa*), and the sizes of the oxeas (up to 1 mm in *papillosa*) and acanthoxeas (100-170 µm in *papillosa*); the surface is papillated in *papillosa*. Thiele's species is here assigned to *Halicnemia* as it conforms to that genus (cf. VAN SOEST 1987) and not to *Higginsia* sensu HOOPER (1991). The species was subsequently recorded (without description) from Albemarle Island, Galápagos, by DE LAUBENFELS (1939). The identity of De Laubenfels' specimens remains to be determined; it may turn out to be our new species rather than Thiele's cold water species. A further similar species is the unnamed Desmoxyidae sp. A, described by GREEN & BAKUS (1994: 42) from California. In this species however, the main megascleres are tylostyles rather than styles and like *papillosa* the smaller ones are not rhabdose. The smaller styles are also much smaller (192-244 µm) than the smaller rhabdostyles of our new species. The oxeas may be up to 920 µm long, similar to *papillosa*. The yellow green *Higginsia* sp. sensu BAKUS & ABBOTT (1980) from intertidal California is also similar in form and spiculation, but no sizes and spicule shapes have been detailed by these authors.

Higginsia higginissima Dickinson, 1945 from California conforms to our concept of *Higginsia* with smooth oxeas as main megascleres.

The present material may be taken as further evidence for a close relationship between *Higginsia* and *Halicnemia* and between the halichondrid family Desmoxyidae and the Poecilosclerid families Raspailiidae and Rhabderemiidae. The similarity of the angulated acanthoxeas of both genera is here supported by a grade in skeletal architecture halfway between a strictly *Eurypon*-like architecture in *Halicnemia patera* and a strictly reticulate architecture in *Higginsia coralloides*. The new species has long styles surrounded by shorter styles, a feature also observed in *H. patera*, the plumose spicule bundles also observed in some *Higginsia* and surface bouquets of special oxeas reminiscent of a Raspailiid surface structure. The oxeas are centrotylote, a shape also found in *Halicnemia patera*. Future revision of these genera may well result in a union of the families Desmoxyidae and Raspailiidae.

Halichondriidae Vosmaer, 1887

Hymeniacidon Bowerbank, 1861.

Type species: *Hymeniacidon caruncula* Bowerbank, 1859 by subsequent designation (BOWERBANK 1864).

Definition: encrusting to fistulate Halichondriidae which have lost their oxeote spicules, retaining styles and stylotes. Choanosomal skeleton varies from halichondroid to disorganised with ascending spicules tracts. Ectosomal tangential skeleton is thin, membraneous, detachable, containing only styles or stylotes, less developed than in *Halichondria*. Most species with a characteristic fleshy consistency.

Hymeniacidon sinapium De Laubenfels, 1930

Hymeniacidon sinapium De Laubenfels, 1930: 26; DE LAUBENFELS 1932: 57, fig. 29; SIM & BAKUS 1986: 14.

Leucophloeus actites Ristau, 1978: 578, figs. 2d,3b,5c-d.

Material: USNM 37950, Nameless Isl., Stn 26A, coll. W.D. Hope, 01-02-1978, intertidal. Microscopical slides and fragments ZMA POR. 11250, MHNG 21034.

DESCRIPTION:

Thinly encrusting to low cushions, on barnacles, thickness 2-5 mm, lateral size up to 20 x 30 mm.

Surface: smooth, no apparent oscules.

Consistency: soft, easily torn.

Colour: orange in formalin and alcohol.

SKELETON: ectosomal tangential skeleton of intercrossing styles, easily detachable, because there are extensive subdermal lacunae. Choanosome largely confused, with large open spaces, with some vague tracts randomly oriented, carrying the surface skeleton. Many single spicules strewn in confusion. Spongin content low.

SPICULES:

Styles only, curved but otherwise perfectly shaped with long pointed ends and equidiametrical for most of the shaft length up to and including the blunt apex, in a large but continuous length variation, 148-*237*-312 by 4 µm.

Distribution: Galápagos Islands; Southern California.

Remarks: the descriptions of DE LAUBENFELS (1930, 1932) fit the present material precisely, (we have examined the holotype, USNM 37922, of *H. sinapium* De Laubenfels, 1930, from California), so the identification is made with confidence. The possibility that one of the species described by THIELE (1905), *H. rubiginosa* and *H. fernandezi* are conspecific with *H. sinapium* cannot be excluded since spicule measurements for these two species are: 325 by 7 µm and 300-340 by 7-10 µm.

Spongosorites Topsent, 1896

Type species: *Spongosorites placenta* Topsent, 1896 by original designation.

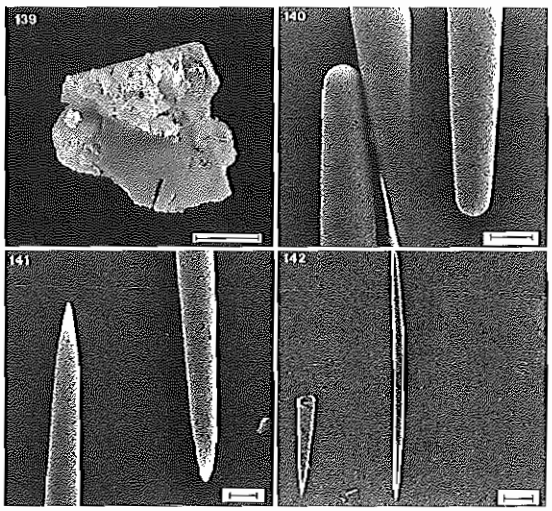
Definition (from VAN SOEST *et al.* 1990): Halichondriidae with a smooth, flaky crust of paratangentially arranged, relatively thin spicules and a choanosomal utterly confused skeleton, traversed by spongin-enforced tracts running more or less parallel to the surface. Most species show an aerophobic colour change from yellow to greyish brown or black.

Spongosorites smithae n.sp. (Figs 139-142)

Holotype: USNM 39721 SEPBOP "Anton Bruun" 18B-791C, off Seymour Island, N coast Indefatigable Isl., 00°26'S 90°20'W, 21-09-1966, 95 m.; SEPBOP "Anton Bruun" 18B-794E, James Isl. 00°12'S 90°52'W, 24.09.1966, 34 m. Microscopical slides and fragments ZMA POR. 11251, 21035, MHNG 21940, 21941.

DESCRIPTION:

Fragmented, the largest fragment of which is 30 x 30 x 10 cm, a flattened massive crust with a smooth surface and easily detachable crust of about 0.5 mm in thickness. It is partly encrusted by a *Haliclona* and no oscules are apparent.



FIGS 139-142

Spongosorites smithae n. sp. Stat. 18B-791C off Seymour Isl. 139. Fragment of the holotype, a massive crust. 140. Oxea with stylote modified apices. 141, 142. Oxeas 1 and 2. Scales: fig. 139 = 10 mm; fig. 140 = 10 µm; fig. 141 = 5 µm; fig. 142 = 20 µm.

Consistency: cheesy-compact. Several extensive galleries and holes are visible where the specimen has been cut-off.

Colour: a warm orange-brown in alcohol, interior somewhat lighter coloured.

SKELETON: at the surface there is a crust of irregularly crowded spicules, with a high proportion of the smallest size categories, thickness between 0.3 and 0.5 mm. Underneath there is an irregular system of spicule tracts intercrossing and anastomosing leaving irregular spaces in which loose, single spicules occur.

SPICULES:

Oxeas only, although some stylote modifications occur, mostly curved, occasionally angulated, rather abruptly pointed, in a great size range divisible in four size categories:

oxea I, 323-*364*-450 by 12-14-16 µm; oxea II, 220-*261*-300 by 10-12 µm; oxea III, 115-*160*-213 by 4-5-7 µm and oxea IV, 80-100 by 2 µm

Etymology: named after Kate P. Smith, assistant curator of the sponge collections of the National Museum of Natural History (Smithsonian Institution), Washington in recognition of her important activities behind the scenes.

Remarks: this is the first record of the genus from the East Pacific, although other species may hide under different generic names such as *Topsentia*. The (bio-) geographically closest record of a *Spongosorites* is that of the black-coloured *S. porites* De Laubenfels, 1949 from Onotoa in the Gilbert Islands (01°S 175°E) (DE

LAUBENFELS 1954). The black-colour undoubtedly is the result of a post-mortem colour change (POMPONI *et al.* 1991). We examined the holotype of that species (from the Yap Archipelago near the Philippines), USNM 22732, and found it to be quite different in skeletal architecture and spicule thickness. The surface crust in *S. porites* is much thinner, leaving distinct pore-fields, and the oxeas are only 4-5 µm in thickness in the larger spicules. There are three size classes of oxeas and their length is similar to that of the new species.

DENDY (1905) described three species of *Spongosorites* from Indian waters, but re-examination of his material is necessary to check whether these answer to the revised definition of *Spongosorites* given by VAN SOEST *et al.* 1990.

The new species is similar to some Caribbean *Spongosorites* (DIAZ *et al.* 1993), differing from them primarily in the differentiation of four size classes rather than the usual three (*S. arenatus*, *S. ruetzleri*, *S. siliquaria*) or two (*S. placenta*, *S. suberitoides*). The longest oxeas are also short compared to those of the other species excepting *S. suberitoides*.

Topsentia Berg, 1899

Type species: *Anisoxya glabra* Topsent, 1898 by monotypy.

Definition (from VAN SOEST *et al.* 1990): Halichondriidae with an ectosomal crust of compact, smaller ectosomal paratangential oxeas that form a brittle and rough microhispid surface. They may lose their ectosomal crust instead of which they have an utterly confused peripheral skeleton. Choanosomal skeleton a confused arrangement of spicules. Megascleres: oxeas of different sizes, twisted, bent spicules may be present. No microscleres.

Topsentia aff. **ophiraphidites** (De Laubenfels, 1934) (Figs 143-146)

Viles ophiraphidites De Laubenfels, 1934: 13.

Topsentia ophiraphidites; DIAZ *et al.* 1993: 290, figs 6, 12 (with further synonyms).

Material: USNM 43171 SEPBOP "Anton Bruun" 18B-794A, James Isl., 00°12'S 90°50'W, 23-09-1966, intertidal. Microscopical slides and fragments ZMA POR. 11252, MHNG 20771.

DESCRIPTION:

Fragments of a small massively encrusting sponge. Largest fragment 15 x 5 x 5 mm. Surface rough, uneven, microscopically hispid. No apparent oscules.

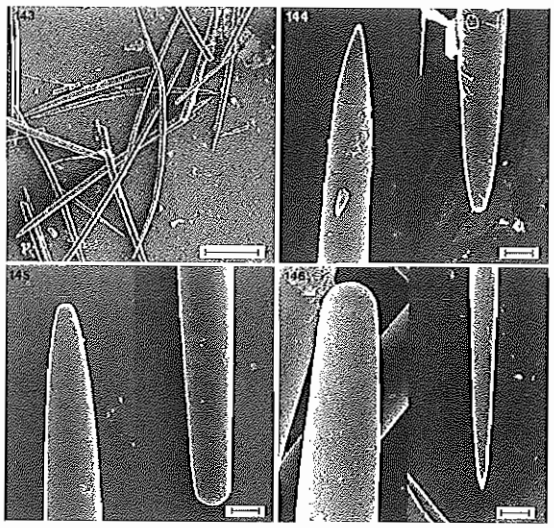
Consistency: firm to hard, brittle, fragile, crumbly.

Colour: brownish in alcohol.

SKELETON:

High spicule content; confused architecture, with vague spicule tracts and many single randomly oriented spicules. Near the surface, spicules tend to be arranged criss-cross forming a vague crust. Little or no spongin, not collagenous.

Spicules: curved oxeas, strongyloxeas and stylotes, in a great size range but difficult to divide into categories; representative sizes are: curved oxeas, 680-*803*-



FIGS 143-146

Topsentia aff. *ophiraphidites* (De Laubenfels). Stat 18B-794A James Isl. 143. Sinuous and straight oxeas. 144. Oxea. 145. Strongyloxea. 146. Stylote. Scales: fig. 143 = 200 µm; figs 144-146 = 10 µm.

1000 by 20 µm; straight oxeas, 599-*684*-795 by 8-*12*-16 µm; strongyloxeas, 467-*666*-820 by 8-*13*-16 µm; stylotes, 361-*637*-804 by 8-*14*-16 µm

Distribution: Galápagos Islands; if conspecific with *Viles ophiraphidites*, then amphi-American (Puerto Rico, Bahamas, S. Caribbean, Brazil).

Remarks: although it is unlikely, from a biogeographical and ecological point of view, that the intertidal Galápagos specimens and the deep-reef and fore-reef specimens from the Caribbean are conspecific, we cannot find morphological differences between these specimens. The diagnostic characters for *ophiraphidites* are admittedly vague and general, and the Galápagos specimen is small and fragmented, but the spicule sizes and form, including a proportion of sinuously curved smaller spicules, are similar to the extent that conspecificity has to be assumed for the time being.

It is not impossible that Californian records of *Oxeostilon burtoni* sensu DICKINSON (1945) (not: DE LAUBENFELS 1934) and *O. fernaldi* Sim & Bakus, 1986, are conspecific with the present material. If that would be demonstrated (on the basis of better material than now available), and if a specific difference with Caribbean *ophiraphidites* would be found in the future, then *fernaldi* would be available as a name for this species.

Order POECILOSCLERIDA

Suborder MICROCIONINA

Iophonidae Burton, 1929

Iophon Gray, 1867

Type species: *Halichondria scandens* Bowerbank, 1866, by subsequent designation (DENDY 1924)

Definition (from DESQUEYROUX-FAÚNDEZ & VAN SOEST 1996): Iophonidae with ectosomal skeleton of tylotes with spined heads and choanosomal isodictyal reticulation of smooth or spined styles, which may or may not be echinated by acanthostyles. Microscleres bipocilla and palmate isochelae.

Iophon lamella Wilson, 1904

Iophon lamella Wilson, 1904: 146, pl. 20, figs 3, 7-9, 12, 13, pl. 24, figs 2-4; DESQUEYROUX-FAÚNDEZ & VAN SOEST 1996: 15, figs 13-18, with synonyms.

Material: ZMA POR. 10977, MNHG 18808, Seymour Island, 95 m.

DESCRIPTION:

Small, irregularly lamellate fragments. Surface differentiated: one undulated and punctate and an opposite side with grooves, covered by a thin, easily removed membrane.

SKELETON:

Ectosomal: a palisade of scattered tylotes

Choanosomal: tight-meshed isotropical reticulation of spined styles and tylotes. Microscleres abundant.

SPICULES:

Megascleres: acanthostyles1, heavily spined, smooth tylotes with swollen spined apices.

Microscleres: spurred anisochelae 1 and 2, bipocilla strongly curved and one trilobate extremity.

Distribution: Galápagos Islands, West coast of Central America (Dickinson, 1945), Pacific coast of Southern California, Baja California.

Acarnus Gray, 1867

Type species: *Acarnus innominatus* Gray, 1867 by monotypy.

Definition (from VAN SOEST *et al.* 1991): massive, branching or encrusting Iophonidae, with ectosomal skeleton of scattered tylotes with spined heads, choanosomal skeleton consisting of an isodictyal, isotropic or anisotropic reticulation of styles and cladotylotes, arranged singly or in tracts of several spicules, which may or may not be echinated by acanthostyles and/or cladotylotes. Thinly, encrusting specimens with hymedesmioid skeleton, i. e. with styles or cladotylotes erected on the substrate. Cladotylotes in two categories, exceptionally in three or a single one. Microscleres up to three categories of toxas and chelae.

Acarnus peruanus van Soest, Hooper & Hiemstra, 1991 (Figs 147-154)

Acarnus peruanus van Soest, Hooper & Hiemstra, 1991: 70, text-fig. 5, pl. 1, fig. 5.

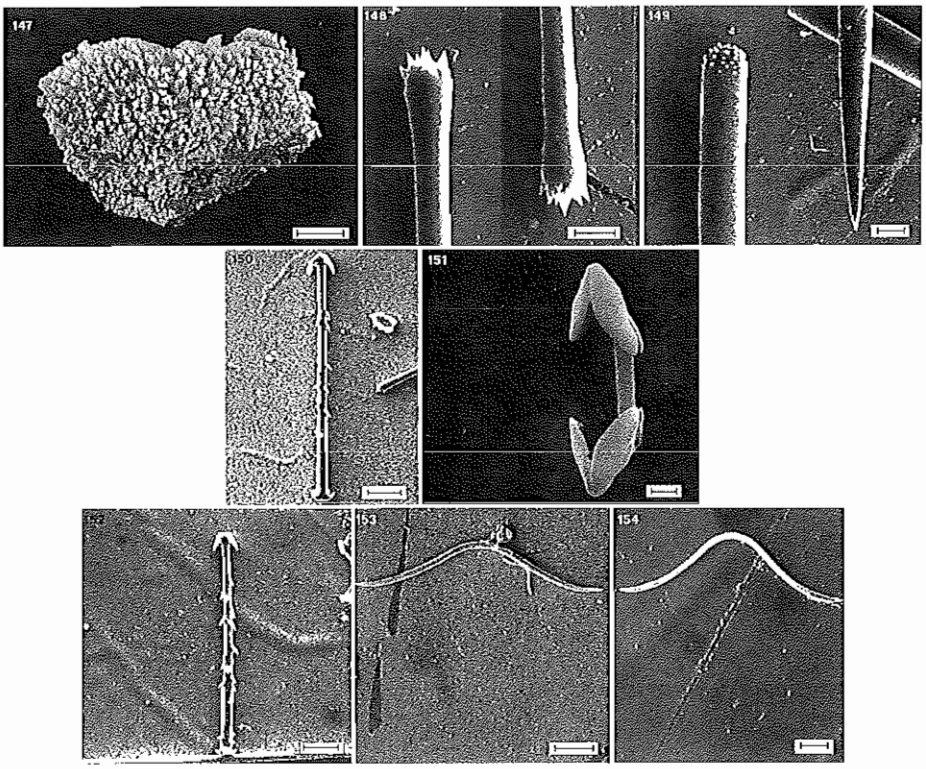
Material: USNM 43178 Albemarle Isl., Togus Cove, stat. 9, 02.1978, coll. W. D. Hope, 9 m. Microscopical slides and fragments ZMA POR. 11238, MHNG 21027.

DESCRIPTION:

Massive sponge, with rugose-conulose corrugated surface. No apparent oscules. Size of largest fragment 70 x 50 x 40 mm, partly encrusted by a black zoanthid.

Consistency: firm

Colour in formalin described as orange, in alcohol is pale beige.



FIGS 147-154

Acarnus peruanus van Soest, Hooper & Hiemstra. Albemarle Isl., Togus Cove, Stat. 9. 147. View of the studied specimen. 148. Ectosomal tylote microspined apices. 149. Choanosomal styles with microspined heads. 150, 152. Cladotylotes 1 and 2. 151. Palmate isochelae. 153. Toxas 1 and 3, 154. Toxa 2. Scales: fig. 147 = 10 mm; figs 148, 154 = 5 µm; fig. 149 = 10 µm; figs 150,153= 20 µm; fig. 151 = 10 µm; fig. 152 = 2 µm.

SKELETON:

Ectosomal: loose, irregular reticulation of styles arranged in bundles of two or three. Very little spongin. Nodes and individual styles echinated by acanthostyles and small cladotylotes.

SPICULES:

Ectosomal tylotes, choanosomal smooth styles, cladotylotes of two sizes, palmate isochelas and toxas.

MEGASCLERES: Tylotes with microspined heads: 172-*192*-262 by 3-4 μm;

Styles smooth but with microspined heads: 258-*393*-444 by 8-*10*-14 μm.

Cladotylotes 1 with spined shaft: 54-*73*-99 by 2 μm; cladotylotes 2: 102-*112*-122 by 3-*5*-6 μm.

MICROSCLERES: Palmate isochelae: 9-*13*-15 μm.

Toxas, thin, deeply curved, 33-*45*-53 μm;

Toxas thicker and longer with shallow curve: 70- *89*-123 μm

Distribution: Galápagos Islands; Peru.

Remarks: two discrepancies between the type specimen from Peru and the Galápagos specimen, are apparent: the length of the choanosomal styles (Peru: 244-371 μm) and the length of the thicker toxas (Peru: 188-211 μm). These differences are considered minor and not significantly different to discriminate between the two population at specific level.

Microcionidae Carter, 1875

Antho Gray, 1867.

Type species: *Myxilla involvens* Schmidt, 1864 by monotypy.

Definition (from HOOPER 1996): Microcionidae with ectosomal skeleton of auxiliary styles, choanosomal skeleton a basal or axial renieroid reticulation of acanthostyles, acanthostrongyles or "dumbell" spicules, with a secondary dendritic, plumose, plumoreticulate or echinating skeleton of smooth choanosomal styles arising from fibres (erect forms) or ascending upward from basal spongin (encrusting forms). Echinating acanthostyles present or absent. Microscleres include palmate isochelae, including modified forms (cleistochelae, pseudoarcuate), modified sigmoid isochelae (croca) and smooth or spined toxas of several forms.

Subgenus **Plocamia** Schmidt, 1870

Type species: *Plocamia gymnazusa* Schmidt, 1870 by subsequent designation (BURTON 1935).

Definition (from HOOPER 1996): with basal renieroid skeleton, composed predominantly of (acantho)strongyles or less commonly strongyles. Echinating acanthostyles overlap the main skeleton.

Antho (Plocamia) lithophoenix (De Laubenfels, 1927) (Figs 155-164)

Plocamia lithophoenix De Laubenfels, 1927: 263
Isociona lithophoenix; De Laubenfels, 1932: 99
[?Not: *Antho lithophoenix*; Sim & Bakus, 1986]

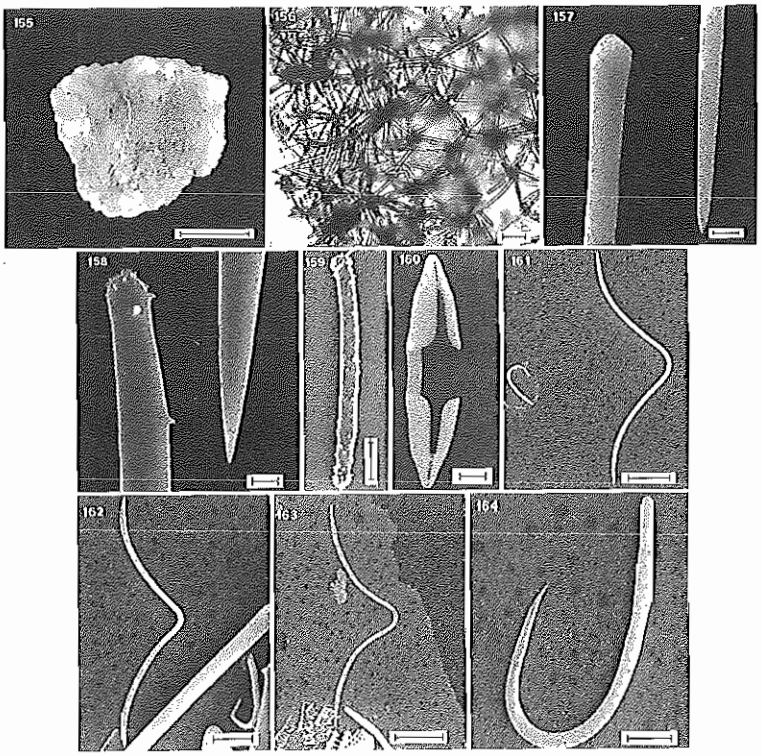
Material: USNM 37920, Gardner Isl., stat. 23, coll. W. D. Hope, 02. 1978, 22 m; microscopical slides and fragments, ZMA POR. 11239 , ZMA POR. 11240, MHNG 21028,; SEPBOP "Anton Bruun" 18B-794E, James Isl., 00°12'S 90°52'W, 24.09.1966, 34m, rock dredge. Microscopical slides and fragments, MHNG 21029, 20612.

DESCRIPTION:

Thinly to thickly encrusting, several mm in thickness, fragmented, fragments 26 x 16 x 6, 28 x 18 x 3, 8 x 7 x 2, 17 x 7 x 2, 12 x 9 x 1 mm.

Surface punctate, smooth or minutely conulose to corrugated. No obvious oscules. Consistency firm, fragile, crumbly.

Colour: pale reddish or yellow-beige in alcohol (presumably red in life).



FIGS 155-164

Antho (Plocamia) lithophoenix (De Laubenfels). Stat. 18 B-794E, Gardner Isl. 155. Fragment of specimen. 156. Choanosomal skeleton, isotropical reticulation of acanthostrongyles. 157. Ectosomal sutylostyles of the tangential skeleton. 158. Subectosomal styles, microspined apex. 159. Choanosomal acanthostrongyles with heavily spined apices. 160. Palmate isochelae. 161. Toxa 1, large and croca. 162. Toxa 2. 163. Toxa 3, small. 164. Croca. Scales: fig. 155 = 25 mm; fig. 156 = 50 µm; figs 157, 160, 164 = 2 µm; figs 158, 162, 163 = 5 µm; fig. 159 = 20 µm; fig. 161 = 10 µm.

Ectosomal skeleton: bundles of partly erect, partly tangential subtylostyles. Individual subectosomal styles protrude beyond the surface.

Choanosomal skeleton: isotropic reticulation of acanthostrongyles, echinated at the nodes by acanthostyles. The reticulation is quadrangular in cross section, triangular in tangential section, with sides consisting of one or two spicules. Meshes approximately 100 µm in size. A subectosomal area is free of choanosomal acanthostrongyles, but is crossed by long smooth styles standing erect on the choanosomal reticulation and piercing the ectosome.

SPICULES:

Ectosomal subtylostyles, subectosomal smooth styles, acanthostrongyles, acanthostyles, palmate isochelae, crocas and toxas.

MEGASCLERES:

Ectosomal subtylostyles, microspined at the head, in a wide size range, but not separable in two functional size categories: 120-320 by 1-3 µm.

Subectosomal styles, long, thick, smooth excepting the heads which are microspined: 280-320 by 14-20 µm.

Acanthostrongyles, entirely spined, but more heavily towards the apices: 82-*110*-125 by 6-*8*-10 µm.

Acanthostyles, entirely spined, but lightly so except at the head: 102-*130*-190 by 6-*7*-12 µm.

MICROSCLERES:

Palmate isochelae, 13-*16*-19 µm.

Toxas, gently curved, large size variation, divisible in three overlapping size categories, the largest of which has faintly but unmistakably roughened/spined ends: 220 by 3-4 (not in James Isl. specimen), 75-120 and 15-30 µm.

Crocas, (J-shaped or sigmoid isochelae), abundantly present in the Gardner Island specimen, were rare in the other specimen, size 8-10 µm.

Distribution: Galápagos Islands; California

Remarks: the description of the holotype of *Plocamia lithophoenix*, De Laubenfels, 1927, from California, differs in two aspects from the present material, the size range of the toxas, given as 23-110 µm and the crocas which were not reported. However, inspection of a slide of the holotype USNM 21460, revealed that a few of the toxas may reach 170 µm, clearly nearer the largest size found here. Given the large variability of the toxas, and the fact that we found the larger toxas only in one of the two specimens, this difference is not significant. Moreover, the roughened ends of the toxas were also found in the type slide of DE LAUBENFELS. Crocas [characteristic for the genus *Jia* De Laubenfels, 1930 which was synonymized with *Antho* by VAN SOEST & STONE (1986)] were also found in the type of *lithophoenix* after some searching. They are apparently variable in abundance, and were overlooked by DE LAUBENFELS (or considered contamination).

Antho species from neighbouring areas are: *A. inconspicua* (Desqueyroux, 1972), *A. karykina* (De Laubenfels, 1927), *A. igzo* (De Laubenfels, 1932), *A. karyoka*

(Dickinson, 1945), *A. illgi* (Bakus, 1966), *A. jia* (De Laubenfels, 1930) and *A. "manaarensis"* sensu LAMBE 1894. All these species differ distinctly from *A. (P.) lithophoenix*.

Raspailiidae Hentschel, 1923

Aulospongus Norman, 1878

Type species: *Halyphysema tubulatus* Bowerbank, 1873 by original designation.

Definition (from HOOPER 1991): Raspailiidae cup-shaped, lobate and cylindrical growth forms, composed of fused, shaggy fibre bundles. Choanosomal axial skeleton not condensed, composed of long plumose, partially fused spongin fibres cored by smooth rhabdostyles, diverging in the periphery, ectosome without any specialized spicules or skeletal structure, echinating acanthostyles have smooth rhabdose bases, with spined points, or sometimes they are entirely spined; rhaphide microscleres present or absent.

Aulospongus galapagensis n.sp. (Figs 165-168)

Material: Holotype USNM43173 SEPBOP "Anton Bruun" 18B-795, E of Albemarle Isl., 00°37'S 90°51'W, -1966, 78 m. Microscopical slides and fragments, ZMA POR. 11241, MHNG 20614.

DESCRIPTION:

Small branch fragment, 15 mm long, 50 mm diameter, with hispid surface due to single long styles protruding far out from the surface.

Consistency: stiff.

Colour: beige in alcohol.

SKELETON:

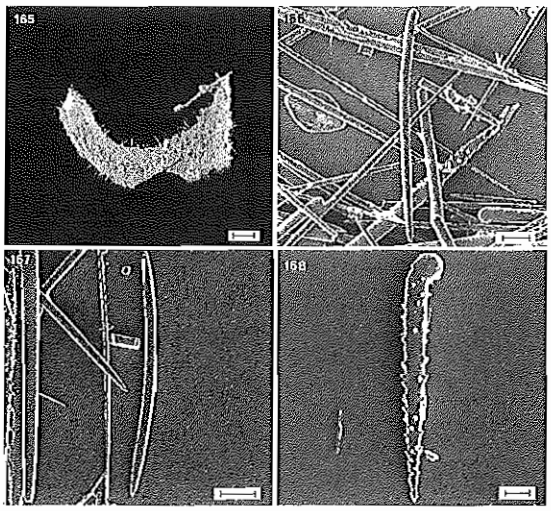
Typical raspailiid surface bouquets, with a central longer style,surrounded by small oxeas and styles. The skeleton of the interior of the branch is a central solid column of aligned long styles, and this column is profusely echinated by acanthorhabdostyles and smooth tylostyles. There is no reticulation.

SPICULES:

Long styles, small styles, oxeas, acanthorhabdostyles and smooth curved tylostyles.

Long styles of the surface bouquets 1300-1700 by 20-45, often strongylostyle modifications; spicules of the central column predominantly styles, probably of the same category as those of the surface but in a larger range of size and form, strongylostylote, strongylote and even occasionally oxeote modifications occur, 400-1700 by 20-45 µm.

Small styles and oxeas of the surface bouquets are essentially the same spicule type, but the styles have one end blunt, and are technically strongyloxeas, both types are united under the name anisoxeas by HOOPER (1991), size 450-550 by 8-15 µm.



FIGS 165-168

Aulospongus galapagensis n. sp. Stat. 18B-795. E. of Albemarle Isl. 165. Holotype, a small branch fragment. 166. General view of spicules, with style and acanthorhabdostyle. 167. Oxea of the surface bouquets and strongyloxea. 168. Echinating acanthorhabdostyle. Scales: fig. 165 = 20 mm; figs166, 167 = 50 µm; fig. 168 = 20 µm.

Echinating acanthorhabdostyles spined only in the lower half, although occasionally there are some spines in the upper half and on the tyle, spines curved towards the rounded end, 170-320 by 15-30 µm;

Echinating smooth tylostyles, curved, probably the same spicule category as the acanthorhabdostyles, 250-280 by 8-10 µm.

Etymology: named after the type locality.

Remarks: the present material is very close to Californian *Aulospongus hyle* (De Laubenfels, 1930 as *Hemectyon*). Points of difference are the shape (frondose in *hyle*), and the apparent lack of ectosomal long styles causing a smooth surface instead of the strongly hispid surface of our new species. Spicule sizes and categories are similar in both, and conspecificity is not entirely impossible.

Another East Pacific species with similar spicules is *Aulospongus cerebella* (Dickinson, 1945 as *Heterectya*); however this is a massively encrusting sponge without special surface bouquets. A possible third species of *Aulospongus* close to our new species is Dickinson's *Hemectyon hymani*. The spiculation includes "raphides" of 150 by 2 µm, which may be equivalent to the anisoxeas of the surface bouquets. If that is the case, then the size of these is clearly different from those of the new species. The apparent close relationship in spicule categories and sizes found between *A. galapagensis* n. sp. and *A. hyle* forms a strong support for HOOPER'S (1991) decision to unite the genera *Aulospongus* and *Hemectyonilla*, as both would have had to be assigned to these different "genera" on the basis of their skeletal architecture.

Suborder MYXILLINA

Myxillidae Topsent, 1928

Myxilla Schmidt, 1862

Type species: *Halichondria rosacea* Lieberkühn, 1859 by subsequent designation (RIDLEY & DENDY 1887).

Definition (from DESQUEYROUX FAÚNDEZ & VAN SOEST 1996): Myxillidae with ectosomal spicules variably mucronate, strongylotylote or tornote, frequently with one or a few prominent spines on the apices. Choanosomal spicules stylotes, with or without spination. Microscleres anchorate chelae spatulate and/or unguiferate and sigmas.

Subgenus **Myxilla** Schmidt, 1862

Myxilla (Myxilla) mexicensis Dickinson, 1945

Myxilla mexicensis Dickinson, 1945: 18, pl. 24, figs 47-48, pl. 25 figs 49-50; DESQUEYROUX-FAÚNDEZ & VAN SOEST 1996: 27, figs 39-53.

Material studied: USNM 37918-19, ZMA POR. 10978-79, MNHG 18958-61, from Kicker Rock, Albemarle Isl., James Isl., and Indefatigable Isl, 18-60 m.

DESCRIPTION:

Tubiforme sponge with the basal part slightly enlarged. Surface strongly tuberculate and irregular. Choanosome with large open spaces and canals. Pores irregularly scattered in surface depressions.

SKELETON:

Ectosomal: a perpendicular compact palisade of tylotornotes and free microscleres.

Choanosomal: a tight meshed isotropic reticulation of strongly spined styles, abundant microscleres specially sigmas.

SPICULES:

Megascleres: strongly spined styles, slightly bent, tylotornotes straight, regular diameter and swollen spined apices.

Microscleres: anchorate spatuliferous isochelas 1 and 2, morphologically identical.

Distribution: Galápagos Islands; Southern California.

Tedaniidae Ridley & Dendy, 1886

Tedania Gray, 1867

Type species: *Reniera digitata* Schmidt, 1862 by subsequent designation (KOLTUN 1959).

Definition (from DESQUEYROUX FAÚNDEZ & VAN SOEST 1996): Tedaniidae possessing morphologically distinct ectosomal and choanosomal megascleres. The type species has microspined tylotes as ectosomal spicules and smooth styles as

choanosomal spicules.

Subgenus **Tedania** Gray, 1867

Tedania (Tedania) galapagensis Desqueyroux-Faúndez & van Soest, 1996

Tedania (Tedania) galapagensis Desqueyroux-Faúndez & Van Soest, 1996: 53, figs 99-104.
Material: ZMA POR. 11264, MNHG 18975, Albemarle Isl., 78 m.

DESCRIPTION:

Fragil, very soft massive sponge, with smooth surface covered by a thin, non detachable membrane. Several small oscules. Aquiferous canals visible under the membrane.

SKELETON:

Ectosomal: palisade of tylote bundles, partially included in the membrane, abundant onychaetes.

Choanosomal: tight meshed reticulation of short longitudinal tracts of smooth styles connected by tylotes and abundant free onychaetes.

Spicules: styles, tylotes, onychaetes.

MEGASCLERES:

Styles, thin, smooth, slightly curved.

Smooth tylotes with oval microspined apices.

MICROSCLERES: onychaetes strongly spined.

Distribution: Galápagos Islands.

Anchinoidae Topsent, 1928

Genus **Phorbas** Duchassaing & Michelotti, 1864

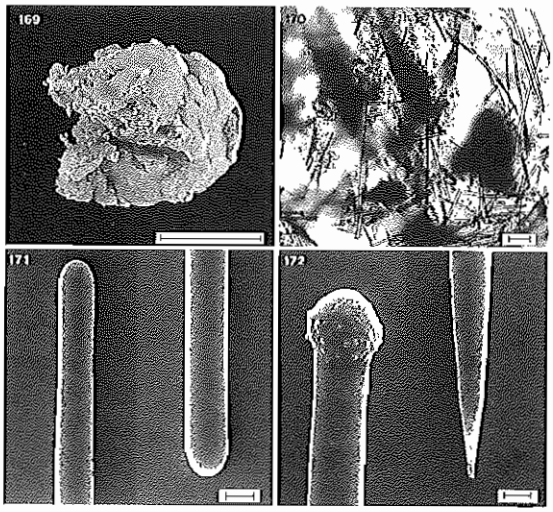
Type species: *Phorbas amaranthus* Duchassaing & Michelotti, 1864 by subsequent designation (DE LAUBENFELS 1936).

Definition (emended from VOULTSIADOU-KOUKOURA & VAN SOEST 1991): Anchinoidae in which the styles composing the choanosomal plumose or plumo-reticulate tracts, if present, are heavily spined acanthostyles. Occasionally the coring acanthostyles are completely replaced by the diactinal smooth spicules. Echinating styles are likewise, heavily spined. Microscleres arcuate isochelae and sigmata.

Phorbas californiana (De Laubenfels, 1932) (Figs 169 -172)

Myxilla versicolor californiana De Laubenfels, 1932: 81, fig. 46;
Podotuberculum hoffmani Bakus, 1966: 505, fig. 23, pl. II fig. c.

Material: USNM 43176 SEPBOP "Anton Bruun" 18B-794E, James Isl., 00°12'S 90°52'W, 24-09-1966, 34 m, encrusting on rock. Microscopical slides and fragments ZMA POR. 11242, MHNG 21030, 21944.



FIGS 169-172

Phorbas californiana (De Laubenfels). Stat. 18B-794 E James Isl. 169. Massively encrusting fragment. 170. Choanosomal network. 171. Anisotylote. 172. Style with acanthose head. Scales: fig. 169 = 20 mm; fig. 170 = 50 µm; figs 171, 172 = 5 µm.

DESCRIPTION:

Massively encrusting, about 10 mm thick, largest fragments 20 x 10 mm.

Surface: smooth but warty, presumably because pore-sieves were contracted in preservation. No obvious oscules. A thick ectosomal layer is easily detachable. Consistency: compressible, moderately firm.

Colour: Surface layer greyish brown in alcohol. Choanosome more reddish brown.

SKELETON:

Ectosomal: a closely arranged palisade of anisotylotes to anisostrongyles. Part of the them are paratangential and form a thick crust on the surface.

Choanosomal: distinctly developed plumose tracts lying at distances of 200-350 µm, here and there anastomosing, 50-70 µm in diameter, made up of anisostrongyles and styles, with progressively more styles towards the interior of the sponge. Tracts are loosely and not very abundantly echinated by styles.

Spicules: anisotylotes to anisostrongyles, styles; no microscleres.

Anisotylotes, occasionally true tylotes, occasionally aniso-strongyles, making up the surface palisade and filling up the peripheral parts of the choanosomal tracts, 202-*240*-310 by 3-6 µm.

Styles, curved, with acanthose heads, sometimes with a few spines along the upper part of the shaft, rarely entirely smooth, echinating and filling the choanosomal tracts, 243-*272*-304 by 6-10 µm.

Distribution: Galápagos Islands; California.

Remarks: the holotype of *Myxilla versicolor californiana* (USNM 21474), from California, was compared with the present material and it was similar in structure; spicule sizes were smaller than ours (anisotylotes 240 by 4-8, styles 250-265 by 8-12 µm), but were otherwise similar. Microscopic slides of the paratype of *Podotuberculum hoffmani* (BMNH 1964:12:1:4), from Eagle Point, San Juan Island, Washington, were also examined, and they as well as the description, match in all aspects, including the surface tubercles. No other *Phorbas* species have been reported from the East Pacific. The anisotylotes of our material often are nearly perfect tylotes, but invariably one head is slightly more extended than the other. In the absence of isochelae the present species approaches *Phorbas mercator* (Schmidt, 1868 as *Suberotelites*) from the Mediterranean; however, this has entirely spined short acanthostyles quite like other species of *Phorbas*. With VOULTSIADOU-KOUKOURA & VAN SOEST 1991, we consider the loss of chelae an unlikely synapomorphy for *Phorbas*-like sponges and consequently the genera *Suberotelites* and *Podotuberculum* are considered synonyms of *Phorbas*.

Coelosphaeridae Hentschel, 1923

Lissodendoryx Topsent, 1892

Type species: *Tedania leptoderma* Topsent, 1889 by subsequent designation (TOPSENT 1894).

Definition (from HOFMAN & VAN SOEST 1995): Coelosphaeridae with ectosomal skeleton of smooth tylotes tangentially or in spicule bundles. Choanosomal skeleton arranged in a renieroid reticulation of single spicules or paucispicular tracts: smooth or spined styles, occasionally oxeas, without echinating spicules. Microscleres include arcuate isochelae and sigmata.

Lissodendoryx albemarlensis n.sp. (Figs 173-178)

Lissodendoryx isodictyalis Dickinson, 1945: pl. 28, fig. 56, pl. 29 figs 57-58, pl. 30 figs 59-60.

Material: Holotype: USNM 43169 SEPBOP "Anton Bruun" 16-66142, Albemarle Isl., W coast, 00°14'S 091°26'W, 25-05-1966, depth not recorded. Microscopical slides and fragments ZMA POR. 11243, MHNG 20596.

DESCRIPTION:

Small cushion, fragmented, largest approximately 10 x 10 x 10 mm.

Surface coarsely punctate to almost clathrate. No discernable oscule, but many smaller apertures visible.

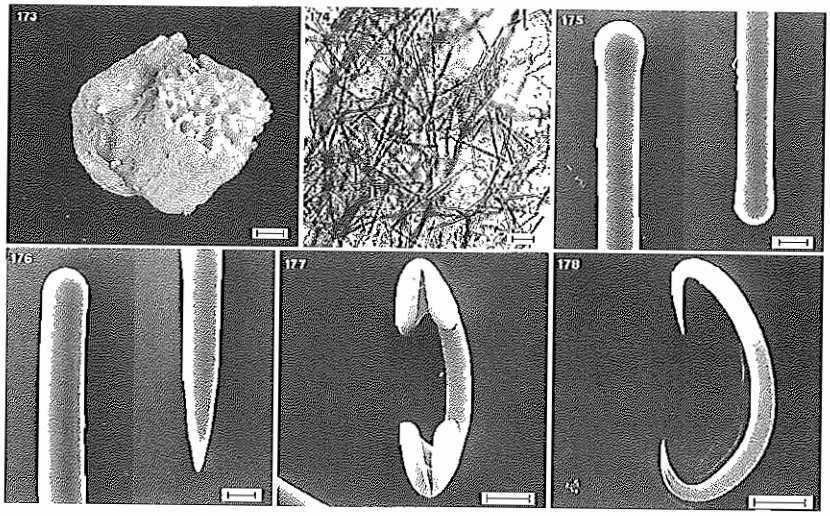
Consistency: rather firm, fragile, crumbly.

Colour: pale beige in alcohol.

Ectosomal skeleton: where present, it consists of tangential and paratangential bundles of tylotes.

Choanosomal skeleton: isotropic, but irregular, with squarish meshes enclosed by 1-5 styles per side. Microscleres abundant. Little spongin.

Spicules: tylotes, styles, arcuate isochelae and sigmas.



FIGS 173-178

Lissodendoryx albemarlensis n. sp. Stat. 16-66142 0°14'S 091°26'W. 173. Holotype, small cushion fragment. 174. Isotropic to irregular choanosomal network. 175. Apices of tylote. 176. Apices of short and fat style. 177. Arcuate isochelae. 178. Sigma. Scales: fig. 173 = 50 mm; fig. 174 = 50 µm; figs 175-178 = 5 µm..

MEGASCLERES:

Ectosomal tylotes, short and fat, with distinct tyles, entirely smooth, 107-*139*-170 by 5 µm.

Choanosomal styles, short and fat, slightly curved, often with slightly developed tyle, entirely smooth, 123-*157*-190 by 4-8 µm.

MICROSCLERES:

Arcuate isochelae, in a single very uniform size: 16-26 µm.

Sigmas likewise in a single very uniform size: 16-26 µm.

Distribution: Galápagos Islands; Southern California; possibly northward up to Vancouver Island.

Remarks: DICKINSON'S (1945) description of *L. isodictyalis* from Lower California shows no discrepancies with our material. *L. isodictyalis* (Carter, 1882) is a Caribbean sponge with two size categories of chelae and sigmas. All other records from the East Pacific of *Lissodendoryx* material similar to our specimen mention the occurrence of partly spined styles. In view of the variation of this feature (cf. VAN SOEST 1984 in *L. isodictyalis*) this fact alone is not a good specific character. A species similar to our material and from a nearby area is *L. noxiosa* De Laubenfels, 1930. We compared the holotype of this species (USNM 21467), from California, with our material and found them to be generally similar in architecture and spicule sizes, but there were two obvious differences: all styles in *L. noxiosa* had spines on

their heads (but see above remark), and there are two distinctly different chelae categories, 28-33 and about 15-18 µm; the latter are not mentioned in DE LAUBENFELS' descriptions. BAKUS (1966) synonymized DE LAUBENFELS' *L. noxiosa* with LAMBE's (1895) *Myxilla firma*, and he may be right: Lambe records chelae in two size categories (52 and 13-19 µm). BAKUS' (1966) San Juan material appears close to the Californian material in spicule sizes.

Suborder MYCALINA

Guitarridae Burton, 1929

Genus **Guitarra** Carter, 1874

Type species: *Guitarra fimbriata* Carter, 1874 by monotypy.

Definition (emended from BERGQUIST & FROMONT 1988): Guitarridae with ectosomal brushes of megascleres and choanosomal reticulation. Megascleres are oxeas or stylote derivations. Microscleres include placochelae, biplacochelae, spined sigma-like microscleres, and peculiar microscleres with spines probably derived from palmate isochelae.

Guitarra abbotti Lee, 1987 (Figs 179-184)

Guitarra abbotti Lee, 1987: 465, figs 1-13.

Material: USNM 43175 SEPBOP ,"Anton Bruun" Stat. 18B-795, E of Albemarle Isl., 00°37'S 90°51'W, -1966, 78 m. Microscopical slides and fragments ZMA POR 11245, MHNG18822.

DESCRIPTION:

Elongated-globular sponge, size 40 x 15 x 10 mm. Surface irregularly crinkled, pierced by spicule brushes, but generally smooth. One larger (3 mm) and one smaller oscule, both somewhat sunken, on the upper side.

Consistency: compressible, soft, fragile.

Colour: in alcohol beige.

SKELETON:

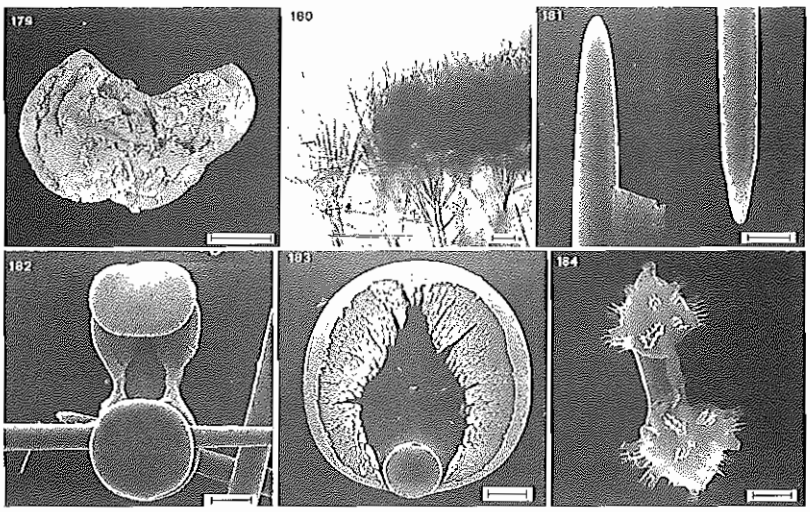
Ectosomal: Terminal part of choanosomal spicule tracts may penetrate the membrane and form a loose surface spicule network.

Choanosomal: rather confused, in places plumose, in other areas more alveolate, with thick spicule tracts, 50-70 µm in diameter, consisting of 10 or more spicules, criss-crossing in an ill-defined reticulum forming irregular meshes of 200 - 400 µm.

Spicules: oxeotes, placochelae, biplacochelae and spined isochelae.

MEGASCLERES:

Oxeotes, anisodiametrical, with one end often more elongate than the other, size, 350-455 by 5-10 µm; in the ectosomal bouquets smaller oxeotes of 200-250 by 3 µm occur.



FIGS 179-184

Guitarra abbotti Lee. Stat. 18B-795 E. of Albemarle Isl. 179. Fragment of a massive specimen. 180. Cross section with surface view, spicule tracts and ectosomal bouquets. 181. Oxeote apices. 182. Placochelae. 183. Biplacochelae. 184. Spined isochelae. Scales: fig. 179 = 50 mm; fig. 180 = 50 µm; figs 181, 183 = 5 µm; fig. 182 = 10 µm; fig. 184 = 2 µm.

MICROSCLERES:

Placochelae in two size categories: 55-75 by 25-30 µm and 30-35 by 12-15 µm.
Biplacochelae in only one size category: average 27 µm.
Spined isochelae average 12 µm.

Distribution: Galápagos Islands; Northern California.

Remarks: the present material is similar to *Guitarra abbotti* Lee, 1987, differing slightly in the size of the oxeas (250-396 µm in Lee's material) and the length of the large placochelae (64-100 µm in Lee's (1987) material). *G. abbotti* was originally described from nearby northern California (38°N 123°W). If our specimen is indeed conspecific, then we have to assume that *G. abbotti* is sympatric with *G. isabellae* Lee, 1987, described from Tagus Cove, Isabela Island (=Albemarle Isl.), Galápagos, at 82 m. The two species differ rather distinctly in the presence of sigmas and the absence of spined isochelae in *G. isabellae*. We have to accept these differences as valid species criteria until further research on variability of such characters has been completed.

Mycalidae Lundbeck, 1905

Mycale Gray, 1867

Type species: *Hymeniacidon lingua* Bowerbank, 1863 by subsequent designation (THIELE 1903).

Definition (from HAJDU & DESQUEYROUX-FAÚNDEZ 1994): Mycalidae with anisochelae.

Subgenus **Carmia** Gray, 1867

Type species: *Hymeniacidon macilenta* Bowerbank, 1866 by subsequent designation TOPSENT 1924.

Definition: (From BERGQUIST & FROMONT 1988) choanosomal skeleton of dendritic-plumose tracts of styles or subtylostyles, extending to the surface and sometimes expanded slightly into brushes. No special surface skeleton.

Microscleres are anisochelae, sigmas and toxas may be present.

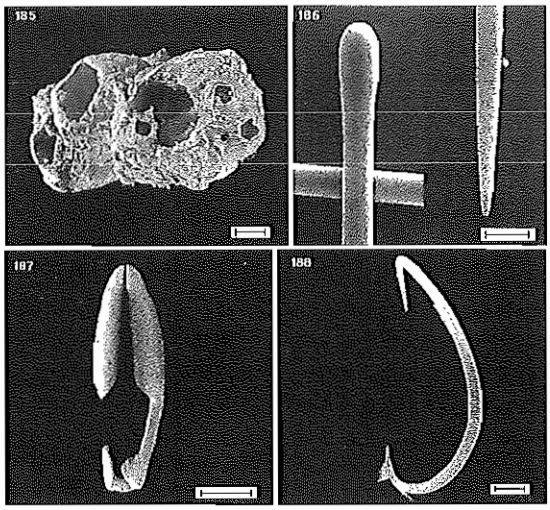
Mycale (Carmia) cecilia De Laubenfels, 1936 (Figs 185-188)

Mycale cecilia De Laubenfels, 1936b: 447, fig. 41
Mycale microsigmatosa Green & Gomez, 1986: 284, figs 37-40

Material: USNM 36614, Albemarle Isl., Kicker Rock, stat. 17, 02-1978, encrusting barnacles on a steep vertical slope, 23 m. Microscopical slides and fragments ZMA POR. 11246, MHNG 18988, 21946, 21954.

DESCRIPTION:

Thinly encrusting on giant barnacles, 2-5 mm in thickness, indefinite lateral expansion. Surface irregular, lumpy, in places conulose, but this is caused by



FIGS 185-188

Mycale (Carmia) cecilia De Laubenfels. Stat. 17. Kicker Rock. 185. Thinly encrusting specimen on giant barnacles. 186. Straight mycalostyles (subtylostyle). 187. Narrow anisochelae with long median alae. 188. Thin, twisted sigma. Scales: fig. 185 = 10 mm; figs 186-188 = 5 µm.

protruding hydroid stalks. Partly overgrown by a compound tunicate. Oscules few, small, up to 3 mm in diameter, slightly raised above the surface.

Consistency: soft, crumbly, easily damaged.

Colour: light beige in alcohol.

SKELETON:

Ectosomal: the organic dermis is carried by bouquets of diverging megascleres.

Choanosomal: plumose-dendritic skeleton, with well-defined spicule tracts diverging dichotomously towards the surface, rarely anastomosing, 100 µm in diameter (25 spicules across) at the base, thinning out to 30 µm (3-4 spicules across) just below the surface. Microscleres abundant in all parts of the sponge.

Spicules: subtylostyles, anisochelae, sigmas.

MEGASCLERES:

Subtylostyles ("mycalostyles") straight, with clearly developed neck, 166-*230*-260 x 2-4 µm.

MICROSCLERES:

Anisochelae, with characteristic narrow shape and long median alae: 10-*14*-20 µm, possibly dividable in two categories, but morphologically similar;

Sigmas, thin, twisted: 24-*30*-35 µm.

Distribution: Galápagos Islands; Pacific coasts of Mexico and Panama.

Remarks: In spiculation, the present material conforms closely to Caribbean *M. microsigmatosa* (cf. VAN SOEST 1984; Hajdu, pers. comm.) and to *M. microsigmatosa* Green & Gomez, 1986 from Pacific Mexico, with spicule sizes and form quite similar. DE LAUBENFELS (1936b) described *M. cecilia* from Pacific Panama as a separate species, but its description and the form of the figured spicules is strongly reminiscent of *M. microsigmatosa*, as well. The only difference is the alleged occurrence of two size categories of anisochelae, viz. 12-15 and 22-25 µm, of which De Laubenfels admits the existence of intermediates. Similar size ranges were found in our material, but a clear gap in the size frequency is absent. The *microsigmatosa* type of sponge occurs in many parts of the tropical oceans. However, the existence of two separate species on both sides of the isthmus of Panama, may be confirmed and accordingly we propose to retain the name *M. cecilia*.

Order HAPLOSCLERIDA

Phloeodictyidae Carter, 1882

Genus **Oceanapia** Norman, 1869

Type species: *Desmacidon robusta* Bowerbank, 1866 by subsequent designation (DE LAUBENFELS 1936).

Definition (emended from VAN SOEST 1980): Phloeodictyidae with a spongin-enforced tangential ectosomal crust and long aquiferous fistules reinforced by an irregular isotropically meshed reticulation of spicule tracts bound by spongin.

Choanosomal skeleton with multispicular tracts of spicules, and an isotropic skeleton of single spicules. Microscleres may include sigmas and/or toxas.

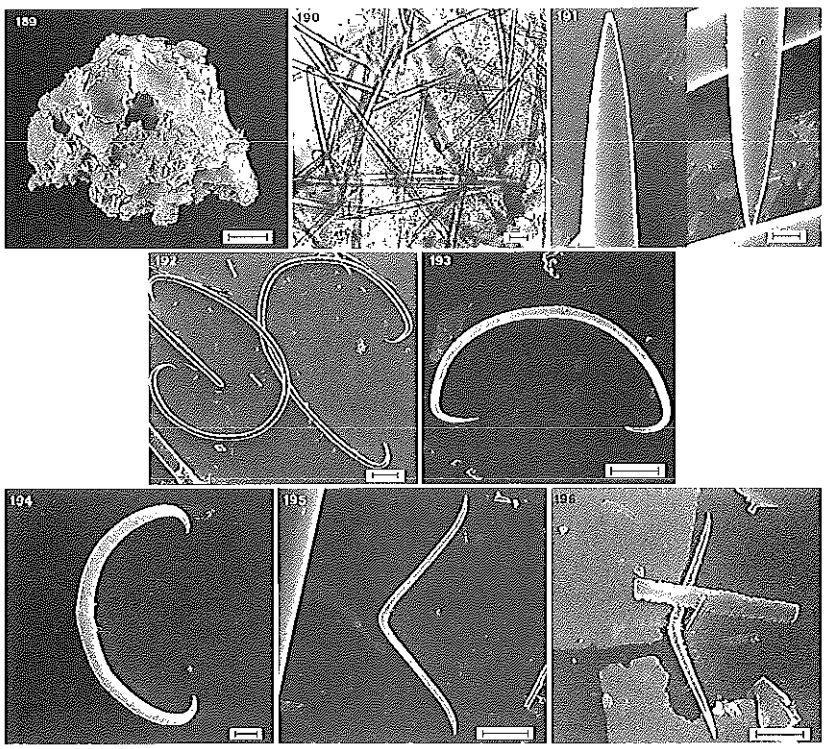
Oceanapia microtoxa n. sp. (Figs 189-196)

Material studied: Holotype USNM 39740 SEPBOP "Anton Bruun", stat. 18B-791C, off Seymour Isl., N coast Indefatigable Isl., 00°26'S 90°20'W, 21-09-1966, 95 m. Microscopical slides and fragments ZMA POR. 11253, MHNG 21052.

Paratype: ZMA POR. 11254 SEPBOP "Anton Bruun", Stat. 18B-795, E of Albemarle Isl., 00°37'S 90°51'W, 24-09-1966, 78 m, rock dredge. Microscopical slides and fragments, MHNG 20770.

DESCRIPTION:

Two big irregular cushion-shaped or turnip-shaped specimens of 110 x 70 x 70 mm and 90 x 90 x 60 mm, with smooth detachable surface crust. The upper surface



FIGS 189-196

Oceanapia microtoxa n. sp. stat 18B-791C off Seymour and Indefatigable Is. 189. Holotype, an irregular cushion shaped specimen, with oscular chimneys. 190. View of the irregular isotropic choanosomal network. 191. Long and straight oxea. 192. Sigma 1 with strongly recurved apices. 193, 194. Sigmas 2, 3 with C form, largely open and stronger than the other categories. 195, 196. Toxas, sharply angled and in two categories. Scales: fig. 189 = 10 mm; figs 190 = 50 µm; figs 191, 193, 195 = 10 µm; fig. 192 = 20 µm; figs 194, 196 = 2 µm.

has 3-10 raised oscular chimneys of unequal height, diameter 6-10 mm, with thin-walled frayed walls, presumably the remnants of low finger-like fistules, but these were not preserved.

Consistency: firm, friable. The interior is very crumbly, full of holes and wider canals. One of the specimens has enclosed and partly overgrown a specimen of *Spongosorites smithae* n. sp.

Colour: light orange-brown in alcohol.

SKELETON:

Ectosomal: an regular tangential unispicular network of intercrossing oxeas. Subdermally there is a loose network of paucispicular tracts (2-3 spicules thick) enclosing angular meshes of 300-500 µm in diameter.

Choanosomal skeleton of longitudinal multispicular tracts (10 or more spicules thick) following irregular courses. In between, single spicules form an irrregular isotropic network. Spongin scarce.

Spicules: Oxeas, sigmas and toxas.

MEGASCLERES:

Oxeas long and straight, with rather abrupt points, 279-*407*-549 by 8-*14*-16 µm.

MICROSCLERES:

Sigmas angulated, thin, three size categories: sigma 1, strongly recurved apices, 70-*96*-122 µm; sigma 2, C form, 32-*44*-61 µm; and sigma 3, C form and more open and stronger than the other categories, 11-*19*-29 µm.

Toxas sharp-angled with recurved apices, in two size categories, toxa 1:45-*52*-70 µm, very numerous; and toxa 2: 6-10 µm; very difficult to detect.

Etymology: the name refers to the very small toxa 2 microscleres.

Remarks: Although the fistules were not preserved, the damaged oscule walls and the typically *Oceanapia*-like skeletal structure make its membership of this genus probably. The spicules are those of the genus *Biminia*, which is now generally considered a junior synonym of *Oceanapia*. We do not think that the possession of sigmas and/or toxas is a character of a monophyletic group within the Phloeodictyidae, as there occur in all combinations in otherwise closely related species.

Other records of *Oceanapia*'s from this area are *Oceanapia bacillifera* Wilson, 1904 (Galápagos), *Rhizochalina pacifica* Dickinson, 1945 (California) and *Rhizochalina oleracea* Schmidt,1870 sensu SIM & BAKUS 1986 (California). None of these have microscleres. *O. bacillifera* has strongyles as megascleres and considerable spongin binding them together. SIM & BAKUS' record is a species with very small oxeas (only 70-110 µm), certainly not conspecific with the Caribbean *O. oleracea* requiring a new name. DICKINSON's species has oxeas of 1300 µm length and is very probably a Halichondrid or Axinellid.

Order DICTYOCERATIDA

Irciniidae Gray, 1867

Genus **Ircinia** Nardo, 1833

Type species: *Spongia fasciculata* Pallas, 1766 by subsequent designation (DE LAUBENFELS 1948).

Definition (emended from BERGQUIST 1980): Irciniidae with prominent surface conules, consistency tough. Primary fibres cored, and in complex fascicles. Secondary fibres simple. Mesohyl with collagenous filaments with terminal knobs.

Ircinia spec. (Figs 197-199)

Material studied: Indefatigable Isl., coll. R. Rofen, 17-05-1966, 0.40-0.60 m. Microscopical slides and fragments ZMA POR. 11255, MHNG 21036.

DESCRIPTION:

Two small fragments of less than 10 mm^3 each of an encrusting sponge. Surface finely conulose. No apparent oscules. Consistency: tough .

Colour: greyish brown in alcohol.

SKELETON:

Ectosome skeleton: a crust of sandgrains and spicule fragment coat.

Choanosome: an irregular system of fasciculate primary fibres of 120-140 µm, sparingly connected by secondary fibres of 40-60 µm. Both types of fibres have a similar central core of spicule fragments. Meshes 400-500 µm in size. The mesohyl is densely filled with a tight mass of thin filaments 1-3 µm in diameter, with terminal knobs of 4 µm.

Ecology: shallow water.

Remarks: in view of the scarcity and fragmentation of available material it is refrained from naming it. There are several reports of *Ircinia* species from the Eastern Pacific: *Ircinia clavata* Thiele, 1905, *Ircinia variabilis hirsuta* Thiele, 1905, *Ircinia "variabilis"* sensu DESQUEYROUX 1972, and *Ircinia fusca* sensu DICKINSON 1945. The

FIGS 197, 199

Ircinia sp. Indefatigable Isl. stat 26. 197. Cross view of surface skeleton. 198, 199. Choanosomal skeleton, fasciculate primary and secondary fibres with central core of spicule fragments. Scales: figs 197-199 = 50 µm.

present specimens differ from these in the possession of much thinner filaments. It is intermediate between *Ircinia* s.s. (thick filaments, fibres cored) and *Sarcotragus* (thin filaments, fibres uncored).

Genus **Cacospongia** Schmidt, 1862

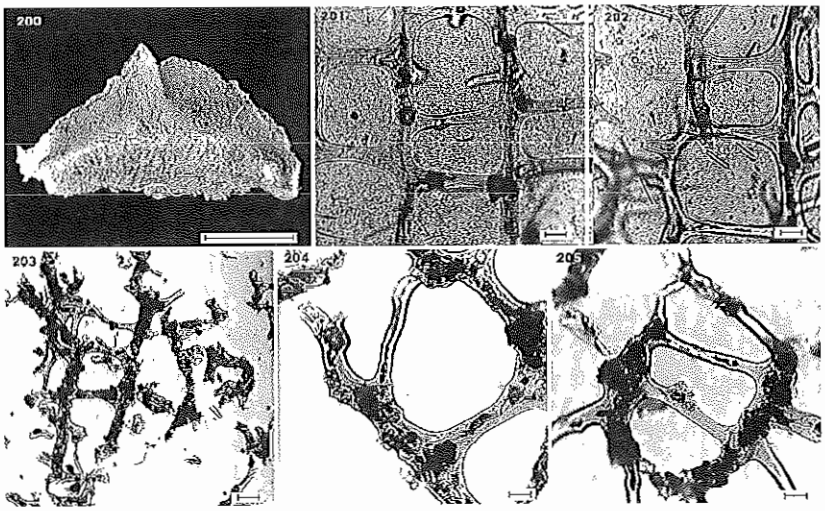
Type species: *Cacospongia mollior* Schmidt, 1862 by subsequent designation (DE LAUBENFELS 1936).

Definition (emended from BERGQUIST 1980): Surface finely and evenly conulose, resembling *Spongia*. Primary fibres simple, stratified and cored with detritus that can almost obscure the stratified nature of the spongin. Secondary fibres clear, regularly spaced forming an almost rectangular reticulation, with or without pith.

Cacospongia similis Thiele, 1905 (Figs 200-205)

Cacospongia similis Thiele, 1905: 481, fig. 108

Material: USNM 43174 Indefatigable Isl., approximately 5 miles west of Academy Bay, outer reef next to Turtle Bay, coll. R. Rofen, 17-05-1966, at low tide, on volcanic rocks, microscopical slides and fragments, ZMA POR. 11256, MHNG 21039; SEPBOP "Anton Bruun" stat. 16 HA106, N coast Indefatigable Isl., 00°26'S 090°17'W, 15-05-1966, 0-5 m depth, microscopical slides and fragments ZMA POR. 11258, MHNG 21037; stat. 16 66110, S coast Indefatigable Isl., 00°44'S 090°17' W, 19-05-1966, 0-5 m, microscopical slides and fragments ZMA POR. 11257, MHNG 21038.



FIGS 200-205

Cacospongia similis Thiele, 1905. 200. Specimen from Turtle Bay, Indefatigable Isl. 201, 202. Choanosomal skeleton, regular network of lightly cored primary fibres and uncored secondary fibres. 203-205, Holotype, ZMB 336, from Calbuco, Chile, choanosomal skeleton. Scales: fig. 200 = 10 mm; figs 201-205 = 50 µm.

DESCRIPTION:

Flattened encrusting cushions, fragmented, 1-1.5 cm thick, with indefinite lateral expansion, but largest fragment 4.5 x 2.5 cm. Surface: only slightly conulose, undulating. Oscules small, less than 1 mm in diameter.

Consistency: spongy but rather stiff.

Colour (in alcohol) purplish brown on top, light beige on the sides; some fragments are entirely beige.

SKELETON:

Ectosomal: organic, very slightly charged with broken spicules and other small foreign particles. Conules are formed by the ends of the primary fibres protruding slightly beyond the ectosome.

Choanosomal: a very regular ladder-like system of lightly cored primary fibres, 41-*50*-70 µm in diameter, and uncored secondary fibres of 30-*34*-40 µm in diameter; here and there tertiary fibres of 8-*19*-25 µm occur. All fibres are finely but distinctly striated and spongin is clear and lightly coloured. Meshes are rectangular 90-*200*-490 by x 66-*250*-353 µm.

Distribution: ?Juan-Fernandez Archipelago, Galápagos Islands.

Remarks: Thiele's species : ZMB 3336 holotype of *Cacospongia similis* from Chile, is the only *Cacospongia* sp. reported from the SE Pacific, but there are a few discrepancies with his specimen which make the present assignment uncertain: he reports primary fibres of 70-90 µm (our measurements: 41-*90*-148) and meshes of 300-500 µm (our measurements: 164-*235*-320), clearly exceeding the measurements of our specimens. On the other hand, variability is unknown and there are certainly similarities.

A species that needs comparison with the present material is DE LAUBENFELS (1932) *Spongia idia* from California (assigned to *Leiosella* by AUSTIN 1985). This has similar rectangular fibre reticulation, but its primary fibres are fasciculate and diameter of the individual fibres may reach 200 µm; it is likely that this is a closely related, but separate species of *Cacospongia*.

Cacospongia incognita n. sp. (Figs 206-209)

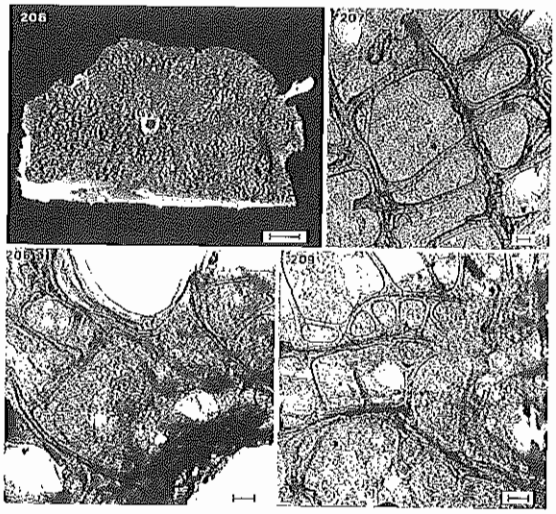
Material: Holotype USNM 40621 Nameless Isl., stat. 26, 22-02-1978, 30 m, rocks, coll. W.D. Hope. Microscopical slides and fragments ZMA POR. 11259, MHNG 21040.

DESCRIPTION:

Large cake-shaped mass, 100 x 62 x 50 mm, (length, large and high) with a finely but irregularly conulose surface. Oscules irregularly distributed, sunken into the sponge, but occasionally slightly elevated on low mounds, 2-5 mm in diameter. A larger hole appears to be occupied (and presumably excavated) by a small crab and a serpulid. Several barnacles encrust the upper surface.

Consistency: firm, compressible, tough.

Colour: upper surface black (both alive and in alcohol), the sides light brown; the interior are a creamy white in alcohol.



FIGS 206-209

Cacospongia incognita n. sp. Nameless Isl., stat. 26. 206. Fragment of the holotype. 207. Choanosomal regular network of spongin fibres, lightly cored by foreing spicules. 208. Upper surface (black region) 209. Subectosomal part, pierced by spaced ostia. Scales: fig. 206 = 10 mm; figs 207-209 = 50 μm.

SKELETON:

Ectosomal: thick organic membrane, heavily pigmented pierced by regularly spaced ostia, 40-50 μm in diameter.

Choanosomal: a regular ladder-like system of spongin fibres. Primary fibres slightly thicker than secondary fibres, distinctly laminated and lightly cored by foreign spicules, probably also by cells, because frequently part of the core appears black in transmitted light over some distance.

Occasionally two primary fibres lie close together and are interlinked by very short secondary fibres, but such fascicles rarely extend over the whole length of the primary fibre. Thickness 120-150 μm. Secondary fibres distinctly laminated, uncored, and connecting to the primary fibres mostly at right angles. Not infrequently they are more irregular and follow an erratic course. Thickness 50-100 μm. Meshes of the skeleton 100-600 by 60-200 μm. Choanocyte chambers rounded oval, 30-40 μm in diameter.

Etymology: the name refers to its appearance.

Remarks: the new species was first tentatively assigned to *Smenospongia* on account of its robust fibres, black exterior combined with a light interior, and occasional organic coring material. The specimen shows some similarity, with Caribbean *Smenospongia cerebriformis* (Duchassaing & Michelotti, 1864).

However, BERGQUIST (1980) defined *Smenospongia* as having uncored primary fibres. The genus *Cacospongia* has cored primary fibres and a rectangular skeleton, and thus fits the present species perfectly. It differs from the above *Cacospongia similis* clearly in the coarser fibres and meshes; the present species likewise needs to be compared with Californian *Cacospongia idia* (De Laubenfels).

Order DENDROCERATIDA

Dysideidae Gray, 1867

Genus **Spongionella** Bowerbank, 1862

Type species: *Spongionella pulchella* Sowerby, 1806 by monotypy.

Definition (from BERGQUIST 1980): Dysideidae with skeletal compact reticulation of uncored primary and secondary fibres in which concentric laminations and a pith component are always apparent though variable in extent. Skeletal arrangement regular. Primary fibres are extended into fine tapered projections and surface is finely conulose.

Spongionella repens (Thiele, 1905) (Figs 210-211)

Spongelia repens Thiele, 1905: 486, fig. 111.

Material studied: SEPBOP "Anton Bruun" 18B-795, E of Albemarle Isl., 00°37'S 90°51'W, 1966, 78 m, encrusting on shells. Microscopical slides and fragments ZMA POR. 11260, MHNG 21041.

DESCRIPTION:

Semiglobular cushion on a fragment of a *Pecten* shell. Size 20 x 15 x 10 mm.
Surface: hispid, conulose, somewhat macerated. No apparent oscules.
Consistency: softly, spongy.
Colour: greyish beige in alcohol.

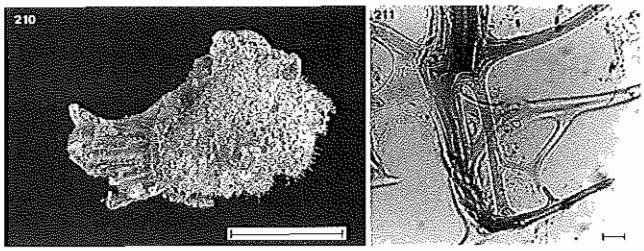
SKELETON:

Ectosomal: Absent.

Choanosomal: fibres laminated, amber-coloured, some of them filled with detritus. Primary fibres of 37-*68*-110 µm in diameter lie at distances of 98-*600*-1150 µm. In between and interconnecting the primary fibres is an irregular system of secondary fibres, 8-*22*-31 µm in diameter and tertiary fibres of clear spongin, 8-*12*-16 µm in diameter enclosing irregularly shaped and arranged meshes of 90 - 369 by 66 - 400 µm.

Distribution: ?Juan Fernandez, Galápagos Islands.

Remarks: the assignment of this material to Thiele's species is made somewhat hesitatingly because of the distance of the primary fibres (300 µm in Thiele's specimen) and the geographic separation (Juan Fernandez is in a distinctly colder region). Several details do match, including the habit and the size and arrangement of the secondary and tertiary fibres. It is assumed that primary fibre distance is variable.



FIGS 210-211

Spongionella repens (Thiele). Stat. 18B-795 E. of Albemarle Isl. 210. Semiglobular cushion on a *Pecten* shell. 211. Laminated amber colour primary and irregular network of secondary fibres. Scales: fig. 210 = 50 mm; fig. 211= 50 µm.

Order VERONGIDA

Aplysinidae Carter, 1875

Genus **Aplysina** Nardo, 1834

Type species: *Aplysina aerophoba* Schmidt, 1862 by subsequent designation (DE LAUBENFELS 1948).

Definition (from BERGQUIST 1980): marked aerophobic colour change from yellow or green to darker colours; with fibres of only one kind without foreign material and with a thick pith. Fibres form a regular reticulation with large hexagonal meshes. Without specialized surface arrangement.

Aplysina azteca Gómez & Bakus, 1992 (Figs 212-215)

Aplysina aztecus Gomez & Bakus, 1992: 179, pl. 3, 4.

Material studied: ZMA POR. 11263 Indefatigable Isl., 0.6-0.9 m, 17-05-1966, coll. R. Rofen.

DESCRIPTION:

Two fragments in the form of low cushions, 1 x 1 x 0.5 cm each; no oscules or other apertures.

Surface: rough, faintly conulose.

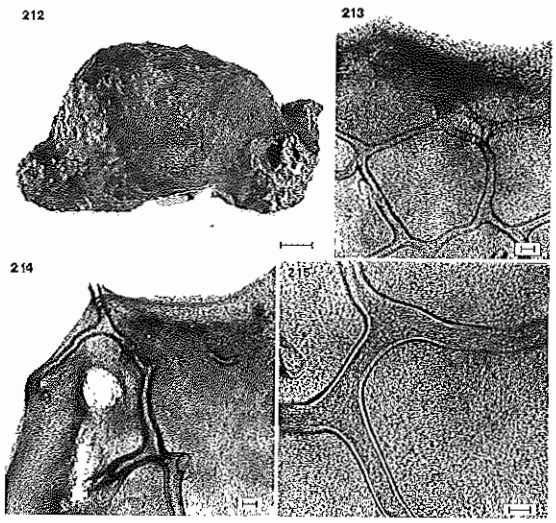
Colour: black outside, grey interiorly.

Consistency: firm.

SKELETON:

Ectosomal: organic, easily detachable, with a strong dark pigmentation.

Choanosomal: with a regular reticulation of only one category of fibre; without difference in diameter, between primary and secondary fibres, 41-82-164 µm. All fibres with a thick pith, 49-60 µm. A regular reticulation with large hexagonal meshes, 560-2000 µm. is clearly visible, distance between fibres, 410-597-820 µm.



FIGS 212-215

Aplysina azteca Gómez & Bakus. Stat. 16-6670 02°11'S 80°56'W. 212. Terminal part of the Galápagos specimen. 213. Choanosomal skeleton with strong dark pigmentation of the surface. 214. Undifferentiated pithed fibres, without foreign material. 215. Dark pigment, internal spaces. Scales: fig. 212 = 10 mm; figs 213-215 = 50 µm.

Distribution: Galápagos Islands; Baja California.

Remarks: our fragments resemble *A. azteca* from Baja California in its typically globose form and sizes of meshes of the fibre system.

BIOGEOGRAPHY

Table 11 summarizes the known distributions of the some 70 species recorded from the Galápagos Islands. More than half of the species are endemic (37 spp. = 56.1 %) , of which 23 (= 34.8 % of the total of species studied) are new. Of the remainder, 13 species are also represented in the South East Pacific coast (California, Peru, Mexico and/or Chile). Among them *Cliona chilensis* is unusual for its wide distribution along the East Pacific coast, from California to Chiloé at 42°S. The absence of the species South of Chiloé supports the conclusion of the existence of two areas of endemism along the Chilean coast (DESQUEYROUX-FAÚNDEZ & VAN SOEST 1996): A Northern one extending from California to Chiloé (42°S) and a Southern one, the Magellan region (43°-53°S). Two Galápagos species occur only in the Pacific coast of Mexico and Panama one of which is amphiamerican in distribution (present in Porto Rico, the Bahamas and Brazil). Finally, two species share a Caribbean distribution and three species are "cosmopolitan".

TABLE 11

Known distribution of species recorded at Galápagos islands, e = endemic; + = if represented in an additional area. Last column indicates tentative grouping of closest related species.

	Galápagos	E Pacific	Central Pacific	Other	Affinities
P. fragilis n.sp.	e	-	-		cosmotropical
P. microlobata n.sp.	e	-	-		amphi-american
P. pacifica n.sp.	e	-	-		cosmotrop/Antarc.
P. galapagensis n.sp.	e	-	-		cosmotropical
P. foliaformis	e	-	-		
P. saccharis	+	+	-		NE Pacific
P. apicospinatus n.sp.	e	-	-		?Indo-West Pacific
P. scabiosus n.sp.	e	-	-		?
S. eduardoi n.sp.	e	-	-		NE Pacific
D. reptans n.sp.	e	-	-		cosmotropical
P. cribraria	e	-	-		?cosmopolitan
V. tricornis	e	-	-		?cosmopolitan
G. media	+	Mexico Panama	-		amphi-american
G. paupera	+	-	-	British ls.	?
T. fenestrata	e	-	-		Arctic
T. echinata	e	-	-		Arctic
T. lamelliformis	e	-	-		Arctic
T. pyriformis	e	-	-		Arctic
E. cf. *oxyaster*	e	-	-		Indo-West Pacific
C. isabela n.sp.	e	-	-		NE Pacific
C. globulosa n.sp.	e	-	-		amphi-american
C. chilensis	+	+	-		N+S E Pacific
C. verrucosa n.sp.	e	-	-		cosmotropical
C. cf. *chucalla*	+	-	Hawaii	Australia	Indo-West Pacific
S. hospitalis n.sp.	e	-	-		Indo-West Pacific
P. maeandria	e	-	-		NE Pacific
P. villosa n.sp.	e	-	-		Antarctic
Q. translucida n.sp.	e	-	-		Arctic
T. sarai n.sp.	e	-	-		cosmotropical
A. dendrophora	e	-	-		amphi-american
P. hooperi n.sp.	e	-	-		amphi-american
P. lamelligera	e	-	-		amphi-american
H. diazae n.sp.	e	-	-		NE Pacific-Arctic
H. papillosa	+	+	-		SE Pacific
H. sinapium	+	-	-		NE Pacific
S. smithae n.sp.	e	-	-		amphi-american
T. aff. *ophiraphidites*	+	-	-	Porto Rico	amphi-american
			-	Caribbean	
I. lamella	+	+	-		NE Pacific
I. lamella-indivisa	e	-			NE Pacific
I. chelifer	+	-	-		Antarctic
I. chelifer ostiamagna	+	-	-	C. Good Hope	Antarctic
A. peruanus	+	+	-		Indo-West Pacific
A. (P.) lithophoenix	+	+	-		NE Pacific-Arctic
A. galapagensis n.sp.	e	-	-		NE Pacific

M. mexicensis	+	+	-		Arctic
T. galapagensis	e	-	-		cosmotropical
T. nigrescens	+	Mexico	-	Cospopolitan	cosmotropical
		C. America	-		
P. californiana	+	+	-		Arctic
M. roosvelti	+	-	-		amphi-american?
L. albemarlensis n.sp.	e	-	-		cosmotropical
G. abbotti	+	+	-		NE Pacific
M. (C.) cecilia	+	Mexico	+		amphi-american
		Panama	-		
H. enamela	+	California	-		NE Pacific
		Mexico	-		
H. permollis	+	Panama	-		NE Pacific
P. variabilis	+	-	Philippines	Antarctic	?
				Australia	
P. similis densissima	+	Chile	Philippines	Falkland	?
				Kerguelen	
				C. Good Hope	
O. microtoxa n.sp.	e	-	-		cosmotropical
O. bacillifera	+	-	-	Off Bahia	?
A. simulans	+	-	-	Cosmopolitan	NE Pacific
?C. vaginalis	+	-	-	Caribbean	amphi-american
I. spec.	e	-	-		?
C. similis	+	+	-		SE Pacific
C. incognita n.sp.	e	-	-		?SE Pacific
S. repens	+	+	-		Arctic
A. azteca	+	+	-		amphi-american
A. ecuatorensis n.sp.	e	-	-		amphi-american

Total: 66
Endemics: 37
new species: 23

Five genera are recorded for the first time from the East Pacific region: *Sigmosceptrella*, *Quasillina*, *Phakellia*, *Halicnemia* and *Spongosorites*.

Distributional data confirm our previous conclusion (DESQUEYROUX-FAÚNDEZ & VAN SOEST 1996), to assign the Galápagos fauna and that of the tropical and temperate American coast to the same area of endemism.

Quite a different pattern emerges when analysing the distributions of pairs of closest related species or groups of species (last column in table 11). The groupings used here are tentative and should be tested with rigid cladistic methodology. Whereas at species distribution level the major affinities are to the tropical and temperate East Pacific coast, in the broader species group approach we find most affinities with the Pacific North temperate and Arctic coasts indicating a possible non-Tethyan origin of this fauna. At this state of our knowledge it is difficult to explain the differences. In the former approach the result may be biased due to the large amount of non informative endemic species. In addition, the former approach may be useful for defining areas of endemism but cannot be used for analysing historical relationships between areas of endemism.

ACKNOWLEDGMENTS

We are greately indebted to the following persons for the loan of material:

C. Valentine (BMNH), G. J. Bakus ((USC), C. Lévi (MNHN), K. Rützler, K. P. Smith, J. Noorenburg (USNM) and D. Kühlmann (ZMB). J. Wüest, C. Ratton, I. Juriens (MHNG); J. Vermeulen and L. A. van der Laan (ZMA) provided technical assistance.

J. N. A. Hooper (QMB), E. Hajdu (USP) and D. Burckhardt (MHNG) provided constructive comments on previous manuscript drafts which is gratefully acknowledged.

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