SPONGES FROM THE SOUTH-WEST OF AFRICA: DESCRIPTION OF SPECIES.

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ABSTRACT

This paper deals with the faunistic study of 27 species of sponges collected off Namibia during different Spanish expeditions. Most of the species are described and some taxonomic aspects are also considered.

The name *P. lévii* is proposed for the southern African species *P. atlantica* Lévi, since this latter name has already been used for a North Atlantic species (Stephens 1917).

INTRODUCTION

The sponges dealt with in this paper were collected by a commercial trawler from the slope and continental shelf of Namibia. As the main objective of these expeditions was to study the Namibia's trawl fisheries, the samples were taken from soft bottoms, where trawlers were able to operate. Therefore, areas with rocky or hard bottoms, with a higher sponge diversity, were purposely avoided, and as a result just four stations produced sponges. It is, however, also possible that certain small, unconventionally-shaped specimens or encrusting forms were missed.

The species found have been re-described in order to illustrate possible species variability and to enable the aptness of the classifications to be verified. Four new species from this same area *(Isodictya chichatouzae, Pronax benguelensis, Microciona namibiensis* and *Gellius jorii)* have already been described (Uriz, 1984).

MATERIAL AND METHODS

The material was sampled by trawl gears operated from the trawler "Chicha-Touza". Effective trawling time lasted half an hour, and the coordinates given indicate the position at the beginning of each trawl.

Sampling Stations

Station VP-7. Valdivia Bank, 26011' S; 6019' E. Depth 234-242m. Hard bottom covered by extensions of *Pachastrella monilifera.*

Station BP-5. 22018' S; 1307' E. Depth 240m. Sandy and muddy bottom.

Station BP-55. 29045,8' S; 14037,3' E. Depth 467m. Greenish-grey mud.

Station BP-58. 29030.9' S; 14056,5' E. Depth 260-269m. Bottom of dead, hard corals.

Infralittoral zone off Walvis Bay. The rhizoids of the alga *Ecklonia maxima* were trawled off Walvis Bay. The good condition of the endobiont fauna indicated that it came from a nearby littoral zone.

RESULTS

Description of species

Order Astrophorida
Family Stellettiidae Carter 1875

Penares sphaera (Lendenfeld 1906)

Synonymy: *Papyrula sphaera* Lendenfeld 1906

Material examined: 1 specimen (B-27) growing on a *Lophohelia* skeleton. Station BP-58.

Description: Encrusting specimen. Surface glabrous but rough to the touch, with a reticulated pattern produced by the tangential arrangement of the cladomes of dichotriaenes. Oscula and ostia not evident. Consistency firm and the colour, in yellowish white.

Spicules (Fig. 1a)

Dichotriaenes: With a relatively short rhabdome, 380-580 μm x 70-94 μm in size, and deuterocladi longer than protocladi (300-450 μm x 18-32 μm and 100-150 μm x 24-33 μm, respectively).

Oxea: fusiform, curved, 850-1.580 μm x 12-52 μm in size.

Microxea: Very characteristic in shape. The ends of the larger ones are curved to the same side; the smallest ones are centrotylote. Size, 30-120 μm x 4-8 μm.

Skeletal arrangement: Main skeleton made up of irregularly arranged oxea and dichotriaenes with cladi tangential to the sponge surface and rhabdomes directed inwards. Microxea scattered in the choanosome and densely aggregated in the ectosomal layer.

Distribution. – Atlantic coast of South Africa (Lendenfeld, 1906; Lévi, 1964, 1967)

Remarks: The author agrees with Topsent (1894) that the presence of absence of asters is not sufficient to differenciate the two genera when the rest of the spicules are similar. For this reason the author regards the genus *Papyrula* Schmidt 1868 to be a synonym of *Penares.*

This species differs from *P. candidata* in the size of the megascleres and the shape of the microxea.

Family Pachastrellidae Carter 1875.

Pachastrella monilifera Schmidt 1868

Synonymy: *Pachastrella abyssi* Schmidt 1868.

Material examined: Some fragments (V-1, V-5, V-6 and V-8) of a large specimen some m2 in size, serving as a substrate for *P. atlantica*, many gasteropods and starfishes. Station VP-7.

Specimen with typical external features and spicules. Colour in spirit clean white, withviolet spots probably caused by the epibiont gasteropods.

Distribution. – a eurybathic and practically cosmopolitan species.

Order Spirophorida
Family Tetillidae Sollas 1886

Tetilla capilosa Lévi 1967

Material examined: 1 specimen (B-4). Station BP-55.

Description: Pseudospherical specimen, flattened at the base, covered by bundles of long spicules projecting tangentially from the upper sponge surface and obliquely from the rest of the surface, with an osculum 5mm in diameter, into which flow three excurrent canals, 2mm wide. No differenciated cortex. Surface incrusted with a considerable amount of mud. The colour, in spirit, greyish beige.

Spicules (Fig. 1b).

Characterized by large megascleres more than 6000 μm in length, generally broken on the microscope slides.

Protriaenes (occasionally prodiaenes): with straight cladi forming an acute angle. The rhabdome, at first uniform and straight, narrows slightly and becomes variably curved. Size: cladi, 150-260 μm x 7 - 12 μm; rhabdome, up to 3900 μm x 10-18 μm.

Anatriaenes: with a characteristic rhabdome narrowing suddenly at the base, widening again immediately, and then slowly tapering. Size: 6500 μm maximum in length, 18-20 μm in diameter at the base.

Oxea: Straight and highly asymmetrical, one end thick and rather blunt, the other thin and sharp. Size: 2500 μm x 45-65 μm.

Sigmaspires: Somewhat rough, maximum diameter 11-17 μm.

Skeletal arrangement: Skeleton radial or slightly spiral. The oxea, anatriaenes and protriaenes produce pronounced external hispidation. Sigmaspires scattered and extraordinarily abundant.

Distribution. – Atlantic coast of South Africa (Levi 1967).

Order Hadromerida
Family Suberitidae Schmidt 1870

Pseudosuberites hyalinus (Ridley & Dendy 1887)

Synonymy: *Hymeniacidom (?) hyalina* Ridley & Dendy 1887.

Material examined: 1 specimen (B-41) incrusted with calcareous debris. Oscula not evident. Ectosome differentiated and partially detachable with its own skeleton. The colour, in spirit, is dirty white.

Spicules (Fig. 2a)

Tylostyles: rather fusiform, with a distinct head, measuring 210-630 μm x 8-26 μm; it is not possible to divide them into two size categories.

Skeletal arrangement: Main skeleton consisting of irregular bundles of spicules supporting the ectosome. Ectosomal skeleton made up of tangentially arranged tylostyles.

Distribution. – North Atlantic, Southwest Atlantic, Antarctic, and Mediterranean Sea.

Pseudosuberites sp.

Material examined: 1 specimen (B-2) growing on a polychaete tube. Station BP-58.

This specimen shows a skeletal arrangement typical of the genus *Pseudosuberites*, its spicules being more related in shape to those of the family *Polymastiidae* (small tylostyles and large strongyloxea, fig.2b). More specimens would be needed in order to describe the species properly.

Prosuberites epiphytum lLamarck 1816)

Synonymy: *Alcyonium epephytum* Lamarck 1816. *Suberites sulphurea* Gray, Topsent 1889

Material examined: 1 specimen (B-36) on an *Alcyonium.* Station BP-58.

Description: Small crust, 2 cm across and 1.5 mm thick, easily detachable from the substrate. Aquiferous openings not apparent and ectosome undifferenciated. Firm consistency and hispid surface. The colour, in spirit, is yellowish beige.

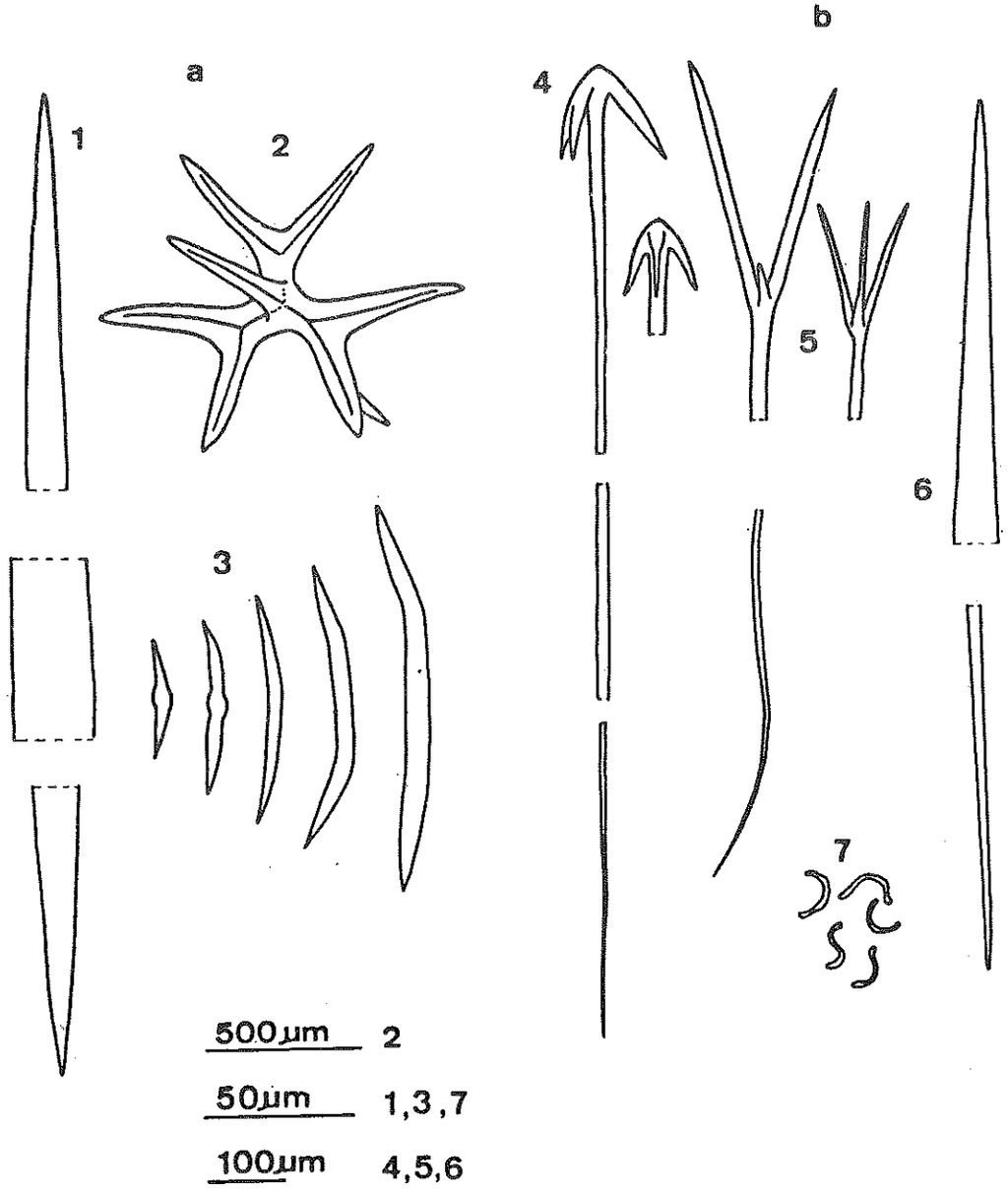

Fig. 1 – a) *Penares sphaera:* (1) oxeote, (2) dichotriaene, (3) microxea. b) *Tetilla capillosa:* (4) anatriaenes, (5) protriaenes, (6) asymmetric ends of an oxeote (7) sigmaspires.

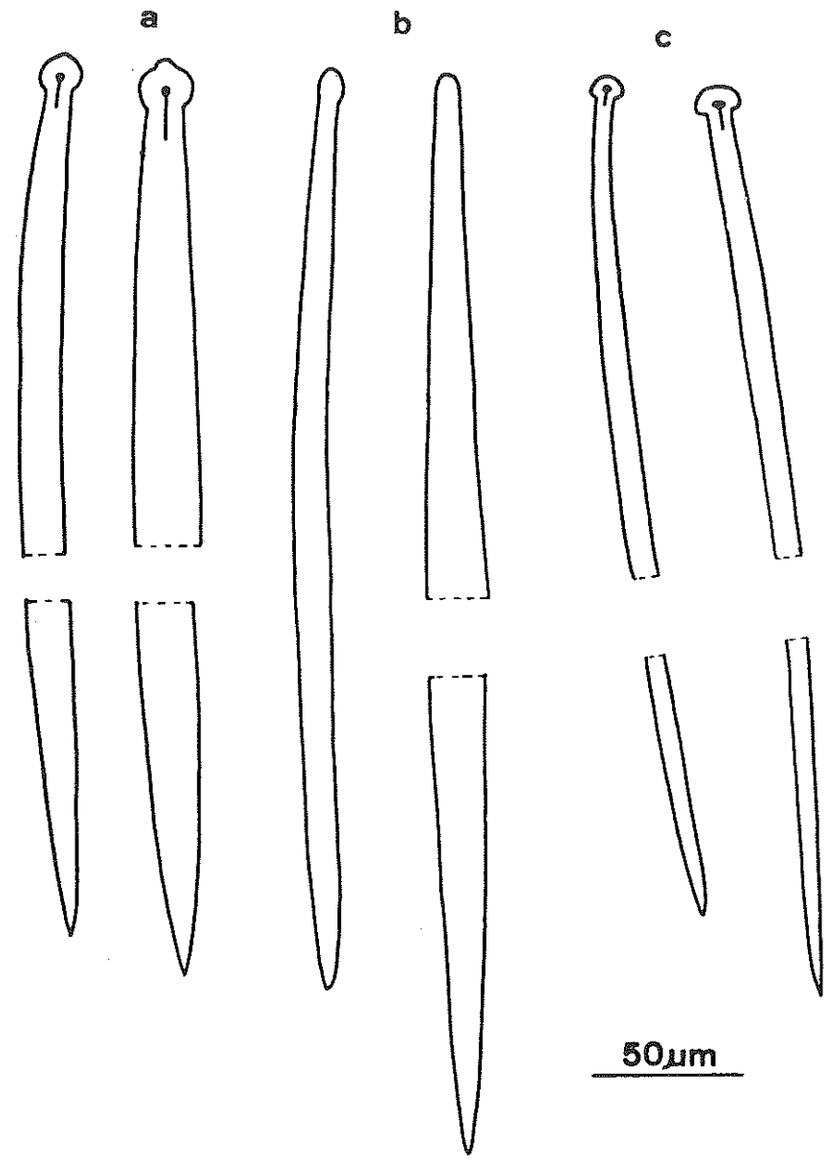

Fig. 2 – a) *Pseudosuberites hyalinus:* tylostyles. b) *Pseudosuberites sp.:* tylostyle and strongyloxeote. c) *Prosuberites epiphytum:* tylostyles.

Spicules (Fig. 2c).

Tylostyles: With a pronounced head slightly flattened at the top, and either a straight or a curved shaft with no differentiated neck. Separable into two size categories, 100-170 μm x 2-5 μm and 350-440 μm x 7-10 μm.

Skeletal arrangement: Skeleton consisting of short, plumose bundles of tylostyles whose ends project through the sponge surface, causing external hispidation.

Distribution. – North Atlantic and Mediterranean Sea (very common), Gulf of Mexico and Eastern coast of Australia.

Remarks: The markedly characteristic spicule shape of *P. epiphytum* made it possible to identify this specimen from Namibia, despite the skeleton made up of short columns, typical of the genus *Laxosuberites*. Nevertheless, Topsent (1900) described this type of skeletal arrangement for thick specimens of *P. epiphytum*. This feature, as Topsent himself pointed out, calls into question whether inclusion of Lamark's species in the genus *Prosuberites* is correct.

Ficulina ficus (Linné 1767)

Synonymy: *Alcyonium ficus* Linne 1767

(For complete synonymy see Topsent, 1900)

Material examined: 1 specimen (B-62) carried on the back of *Exodromidia spinosa* (Macpherson, Instituto de Investigaciones Pesqueras, Barcelona, pers. comm). Station BP-5.

This orange-coloured, massive, flattened specimen has spicules similar to those of North Atlantic and Mediterranean specimens.

Distribution. – North Atlantic (to Senegal), Mediterranean Sea, North Pacific, and Bering Sea.

Order Poecilosclerida

Family Mycalidae Lundbeck 1905

Mycale massa (Schmidt 1862) ***oceanica*** Topsent 1924

Material examined: 1 specimen (B-25) wrapped around a tube of a polychaete, along with bryozoa, colonial ascidiacea, and other sponges. Station BP-58.

Description: Massive specimen, 5 x 3 x 2 cm in size. The surface is uniformy hispid, velvety to the touch, incrusted with mud. Consistency compact but brittle. Thick, detachable ectosome trailing some spicule bundles from the main skeleton. The colour, in spirit, is yellowish brown.

Spicules (Fig. 3c)

Subtylostyles: Fusiform, with a slightly swollen base and a straight or slightly curved shaft tapering to a blunt point; some transformed into asymmetrical oxea with a blunt point. Size: 520-810 μm x 18-24 μm.

Anisochelae I: Very large (95-120 μm in length and 15 μm in shaft diameter) arranged in rosettes in the ectosome.

Anisochelae II: Scattered in the choanosome and in the ectosome, measuring 34-48 μm in length; a few irregular or malformed.

Anisochelae III: Characterized by their small size, 18-25 μm in length, and the spur-shaped inferior palette.

Sigmata: Typically shaped, separable into two size categories, 28-45 μm and 13-18μm.

Rhaphides: Generally scattered, occasionally arranged in trichodragmata, linear, 55-80 μm in length.

Skeletal arrangement: Main skeleton made up of an irregular network of spicular bundles perpendicular to the sponge surface in the outer layer, plus scattered single spicules. Peripheral bundles protruding through the ectosome, causing external hispidation.

Ectosomal skeleton comprising a tangential layer of scattered single or irregularly arranged bundles of subtylostyles.

Microscleres generally scattered, but the largest anisochelae form rosettes in the ectosome.

Distribution. – The species inhabit the North Atlantic Ocean and the Mediterranean Sea. The variety *oceanica* had previously been recorded from White Cape and the Azorean Archipelago (Topsent 1924).

Remarks: The Namibian specimen conforms perfectly to the variety *oceanica*, which differs from the typical species in the narrower base of the subtylostyles and larger size of the anisochelae. This specimen has, along with the subtylostyles, a number of oxea as a result of the progressive narrowing of the base of the subtylostyles. This feature approaches it to the Antarctic species *Mycale acerata* Kirkpatrick 1907.

Paresperella atlantica Stephens 1917.

Material examined: 2 specimens (V-2a and V 2b) encrusting on the sponge *Pachastrella monilifera*. Station VP-7.

Description: Small crusts, 1.5 cm and 2 cm across, respectively, with no apparent oscula. Surface smooth and glabrous. Ectosome partially detachable from the choanosome. The colour, in spirit, is pinkish.

Spicules (Fig. 3a)

Subtylostyles: Straight or slightly curved, measuring 320-400 μm x 6-10 μm. Thickness somewhat irregular along the shaft, with a slight

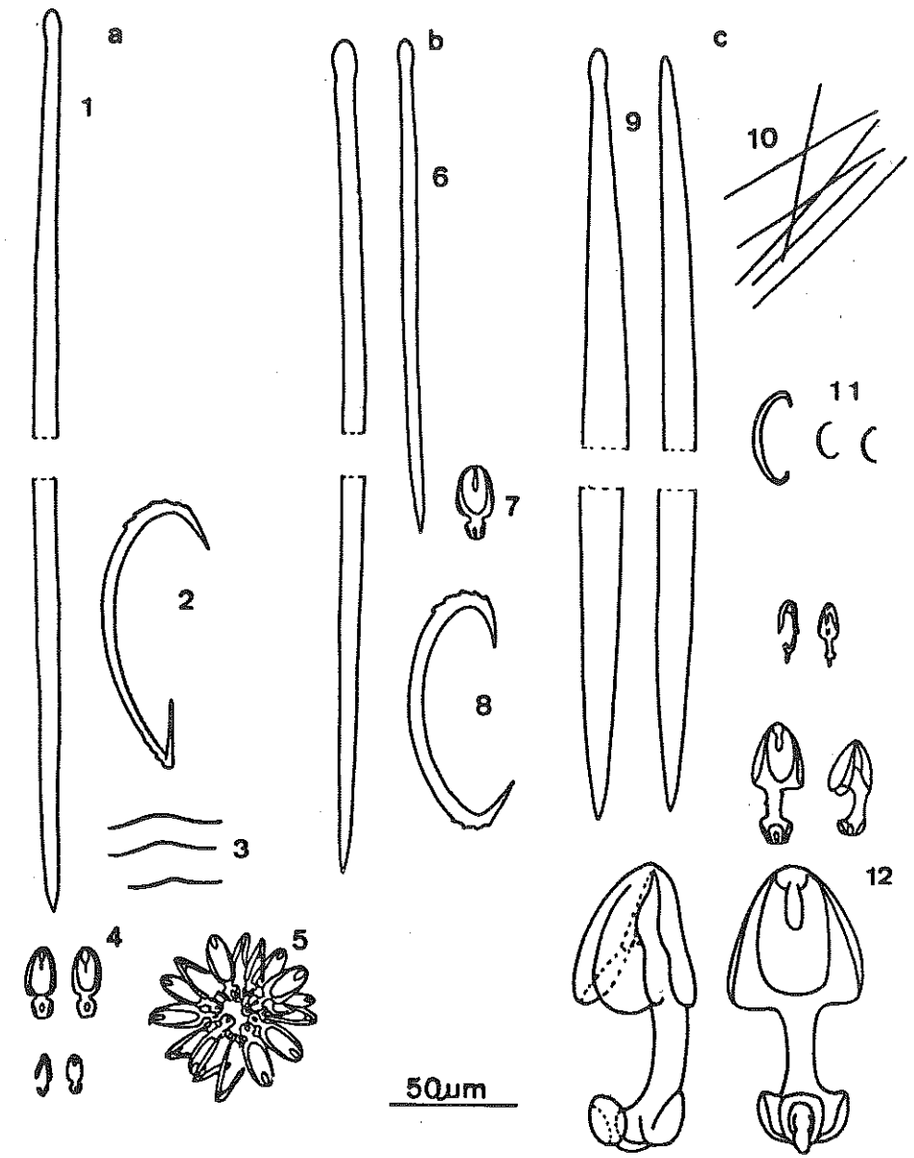

Fig. 3 – a) *Paresperella atlantica:* (1) subtylostyle, (2) sigma, (3) toxa, (4) anisochelae of two categories, (5) big anisochelae arranged in rosettes. b) *Paresperella levii:* (6) subtylostyles of two categories, (7) anisochela, (8) sigma. c) *Mycale massa oceanica:* (9) subtylostyle and strongyloxeote, (10) raphides, (11) sigmata of two sizes, (12) isochelae of three sizes.

constriction just under the base. Two size categories not distinguishable.

Anisochelae I: With a long upper palette making up 2/3 of the spicule length, very short shaft and general contour rounded. Size: 22-30 μm in length.

Anisochelae II: Similar in shape, but smaller and less abundant than anisochelae I, 11-15 μm in length.

Sigmata: Open C or S-shaped, measuring 70-110 μm. Often presenting one normally curved end, with the other sharply bent and twisted around by 90°. Minute serration present on the outside edge of both pointed ends.

Toxa: Linear, gently curved, 45-50 μm in length (only three such spicules found).

Skeletal arrangement: Skeleton consisting of an irregular network of subtylostyle bundles along with scattered spicules, either in the choanosome or in the ectosome. Sigmata more abundant in the ectosomal layer, where the anisochelae I are arranged in rosettes. The three toxa were found in the choanosome.

Distribution: – North Atlantic, coast of Ireland (Stephens 1917)

Remarks: These specimens conform very closely to the species found by Stephens (1917) on the Irish coast. The size and shape of their spicules more closely resemble those of this North Atlantic species than those of any described from the Indian Ocean or from the South Atlantic.

The apparently unusual distribution of this species (1 recorded from the North Atlantic, 2 recorded from the South Atlantic) does not seem to the author to be any reason to consider the South Atlantic specimens to be a new species. There are already many species of this genus *(P. serratohamata, P. curvisigma, P. repens)* that are not markedly differenciated.

Paresperella lévii n. nom.

Synonymy: *P. atlantica* Lévi 1963 (not *P. atlantica* Stephens 1917)

Material examined: 2 specimens growing among the rhizoids of *Ecklonia maxima*. Infralittoral zone of Walvis Bay.

Description: Encrusting specimens, 3 mm thick and 2.5 cm and 1.45 cm across, respectively, easily detachable from the substrate. Ectosome and oscula not apparent. Consistency brittle. The colour, in spirit, is pale orange.

Spicules (Fig. 3b)

The spicules closely match those of the South African specimens (Lévi 1963).

Subtylostyles: With a poorly developed head

Separable into two size categories, 300-410 μm x 9-12 μm and 165-220 μm x 4-6 μm.

Anisochelae: 23-19 μm in length.

Sigmata: With a thick shaft, measuring 85-100 μm 4-6 μm.

Skeletal arrangement: Typical of the genus *Paresperella* (see the description for *P. atlantica*).

Distribution: Atlantic coast of South Africa (Levi 1963).

Remarks: The main difference between this and the other *Paresperella* species without toxa is, as Levi (1963) pointed out, the differentiation of the subtylostyles into two size categories. The species was called *P. atlantica* by Levi, but this name had been used before (Stephens 1917) to designate a North Atlantic species and so the author proposes a new name, *P. levii*, for the South African species.

Family Hamacanthidae Gray 1872

Hamacantha esperioides (Ridley & Dendy 1886)

Synonymy; *Vomerula esperioides* Ridley & Dendy 1886

Material examined: Numerous specimens, of which only three (B-I, B-II and B-42) were numbered, on different hard substrates. Station BP-58.

Description: Thickly encrusting, often massive sponges, in which case they are amorphous, lobate or tubular, with frequent anastomoses; the largest specimen reaching 20 cm in height and 15 cm in width. Consistency somewhat flexible. Cavernous choanosome with wide aquiferous canals. Surface rough to the touch, but not hispid. The spiculous, apparent ectosome is supported and separated from the choanosome by spicule bundles. Ectosome perforated by numerous inhalant openings (50-60 μm in diameter) densely clustered in cribriform areas. Subectosomal lacunae also frequent. The colour, in spirit, yellowish white.

Spicules (Fig. 4a)

Styles: Fusiform, straight, or slightly curved, with blunt points, measuring 580-630 μm x 12-17 μm (diameter at the widest point). According to Lévi (1963), they may be called styloxea.

Diancistra I: Slightly curved or straight, measuring 160-173 μm x 10-12 μm (diameter at the mid-point of the shaft).

Diancistra II: With a curved and sometimes angular shaft, measuring 28-32 μm in length, less abundant than the diancistra I.

Sigmata: C-shaped, measuring 22-33 μm x 1,5-2 μm.

Skeletal arrangement: Main skeleton consisting of a network of style bundles (90-160 μm

in diameter). Ectosomal skeleton is a prolongation of the main skeleton with tangential spicule bundles, thinner than in the choanosome. Spicule bundles are echinated by the diancistra I spicules.

Distribution.– South Atlantic: Rio de la Plata. South africa: Agulhas Bank (Ridley & Dendy 1887), southern coast (Levi 1963).

Family *Esperiopsidae* Hentschel 1923

Desmacidon ramosa Ridley & Dendy 1886

Material examined: 1 specimen (B-23) wrapped around a colony of polychaete tubes. Station BP-58.

Description: Branching, worm-shaped specimen 20 cm long and 2 cm wide. Consistency firm and compact, rather leathery. Surface clean, very rough to the touch and minutely hispid. Cortex-like ectosome 0.3-1.5 mm thick. Cribriform pore areas described by Ridley & Dendy (1887) were not conspicuous because of the contracted condition of this specimen; nevertheless, it exhibited small concavities (250 μm across) distributed in a regular pattern that surely correspond to these pore areas. The oscula are also scattered along the branches, on the top of conical protuberances. The colour, in spirit, is yellowish beige, excepting the protuberances, which are brown.

Spicules (Fig. 4b)

Oxea: Straight, fusiform, tapering to robust, blunt points (especially blunt in the thick spicules) 300-520 μm x 14-30 μm in size. There is a negative correlation between thickness and length.

Isochelae: Arcuate and tridentate, with the central tooth shorter than the two lateral teeth, 14-18 μm in length.

Skeletal arrangement: Main skeleton made up of branched spicule fibers with an either longitudinal or divergent orientation, ending in dense spicule bundles perpendicular to the sponge surface. Some single oxea and isochelae are scattered.

Distribution. – South Africa: Cape of Good Hope (Ridley & Dendy 1887), Atlantic coast (Levi 1963).

Remarks: This species was tentatively classed in the genus *Desmacidon* because of its peculiar skeletal arrangement (Ridley & Dendy 1887), very different from *D. fruticosa*. Only the broad definition of this genus given by Bowerbank (1864) makes it possible to maintain *D. ramosa* in it.

Family Myxillidae Topsent 1928

Myxilla rosacea Lieberkuhn 1859)

Synonymy: *Halichondria rosacea* Lieberkuhn 1859)

Material examined: 2 specimens (B-32 and B-34) on a tube of polychaete. Station BP-58.

Description: Typical encrusting specimens, white coloured, in spirit.

Spicules (Fig. 5a)

The spicules are similar to those of boreal specimens.

Ectosomal tornota: Asymmetrical with spiny ends, 160-180 μm x 6 - 8 μm

Acanthostyles: With few spines along the shaft, 210-260 μm x 9 - 14 μm in size.

Sigmata: C and S-shaped, measuring 16-28 μm x 1-2,5 μm.

Spatuliferous isanchorae: 15-44 μm in length.

Distribution.– North Atlantic, Mediterranean Sea (very common) and Arctic.

Myxilla simplex Baer 1905

Material examined: 1 specimen (B-14) wrapped around small tubes of polychaetes and some fragments of Hydriodea. Station BP-58.

Description: Crust 1 x 2 cm across and 3 mm thick. Surface glabrous to the naked eye, but minutely hispid through a binocular microscope. Distinct and partially detachable ectosome. Oscula and ostia not visible. Consistency brittle. The colour, in spirit, whitish beige.

Spicules (Fig. 5b)

Ectosomal tornota: Straight and fusiform, 145-170 μm x 6-7 μm in size.

Acanthostyles: Slightly curved, 100-225 μm x 7-12 μm in size. Smaller ones with thicker spines.

Sigmata: Separable into two size categories, 32-40 μm x 2-3 μm and 8-12 μm x 1,5 μm.

Isanchorae: 25-32 μm in length.

Skeletal arrangement: Main skeleton consisting of a subisodictyal network of acanthostyles with one or two spicules per side. Ectosomal skeleton composed of tangential tornota. Scattered sigmata and isanchorae.

Distribution.– Indian Ocean (Zanzibar).

Atlantic coast of South Africa (Stephens 1915; Levi 1963, 1969)

Remarks: The spicules of this specimen are stronger than those of the littoral specimens described by Levi (1963).

Crellomyxilla chilensis (Thiele 1905)

Synonymy: *Maxilla chilensis* Thiele 1905
Ectyomyxilla chilensis (Thiele) Levi 1963

Material examined: 1 specimen (B-38) on *Gellius jorii*. Station BP-58.

Description: Small crust 0.5cm across.

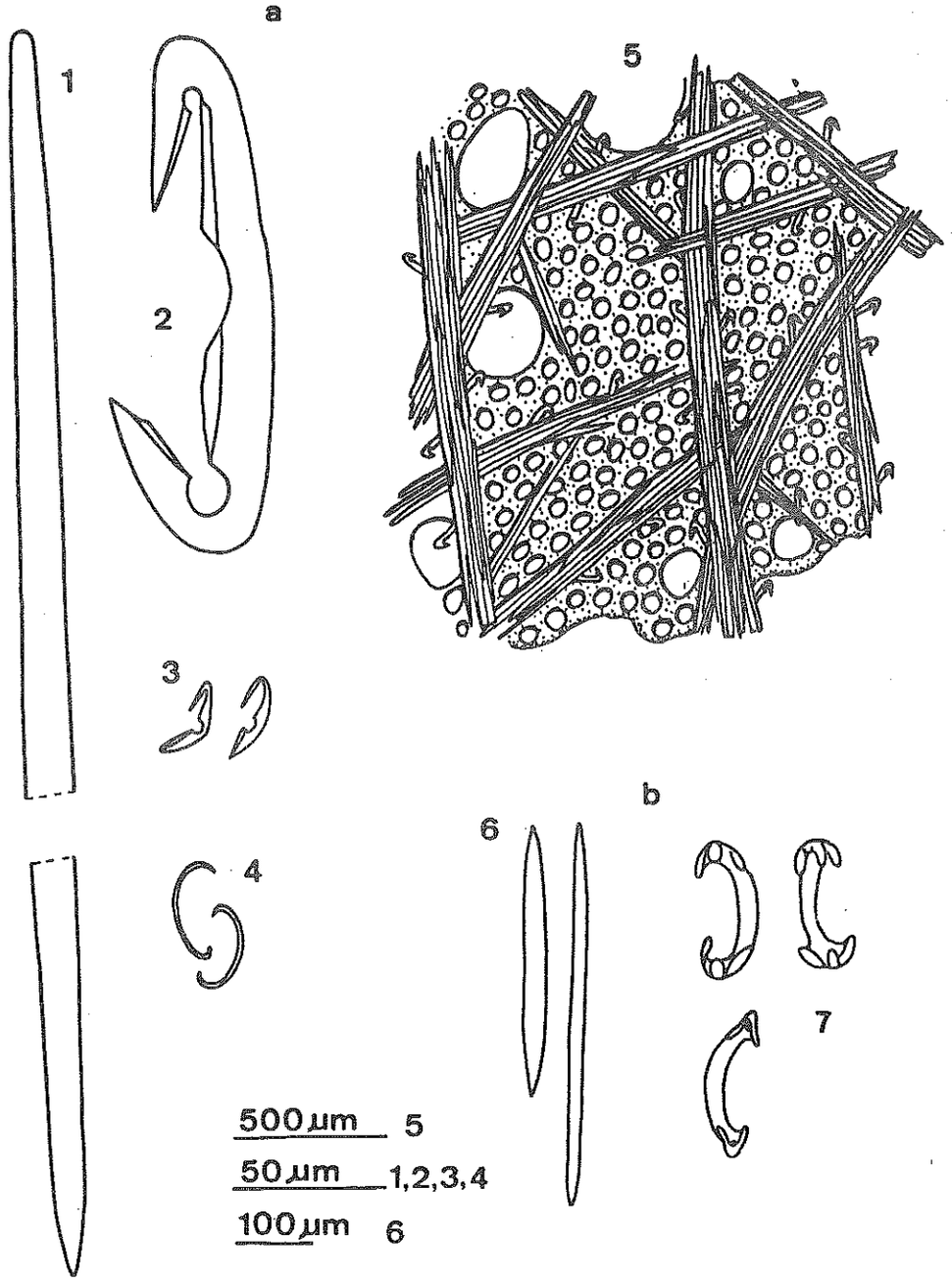

Fig. 4 – a) *Hamacantha esperioides:* (1) style. (2) diancister I, (3) diancister II, (4) sigmas, (5) ectosomal cribiporal area showing the spicule bundles echinated by the diancister I. b) *Desmacidon ramosa:* (6) oxea, (7) arcuate isochelae.

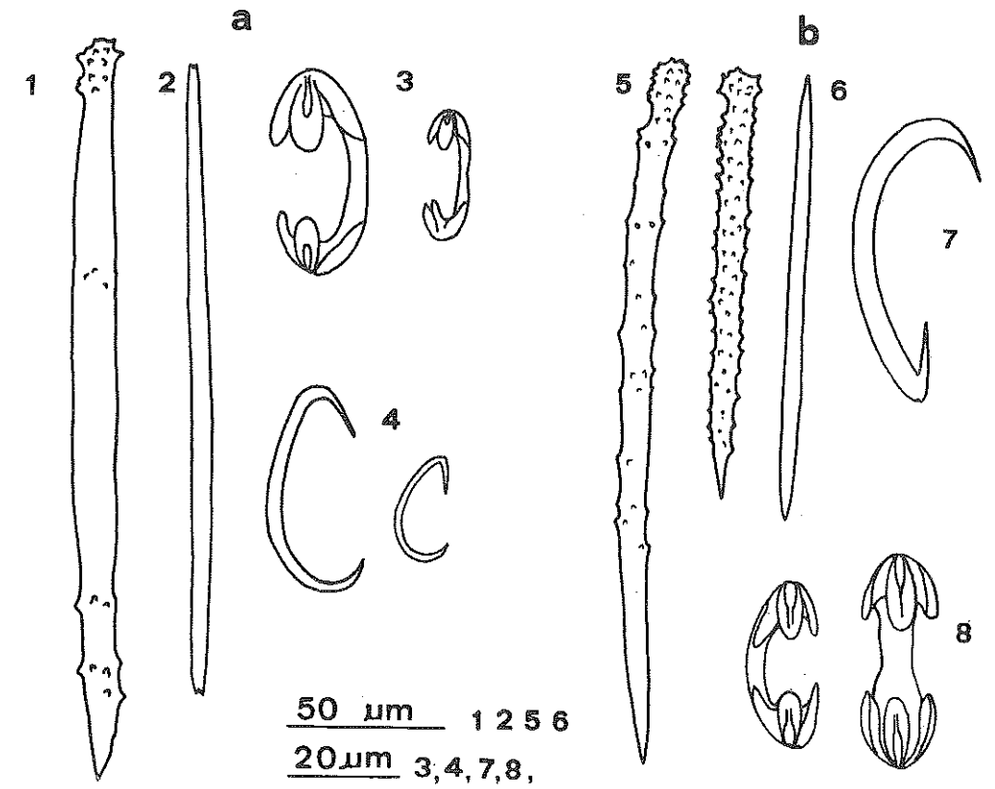

Fig. 5 – a) *Myxilla rosacea:* (1) acanthostyle, (2) tornotes with spiny ends, (3) spatuliferous isanchorae, (4) sigmata . b) *Myxilla simplex:* (5) acanthostyles, (6) tornote, (7) sigma, (8) isanchorae.

Surface smooth and glabrous. Neither oscula nor ostia distinct. Ectosome detachable from the choanosome with its own skeleton. The colour, in spirit, is whitish.

Spicules (Fig. 6a)

Main acanthostyles: Straight or slightly curved, with a poorly distinguishable head and spines all along the shaft. Size: 190-295 μm x 7-11 μm.

Ectosomal acanthostyles: Slightly curved bearing spines all along the shaft, measuring 100-180 μm x 4-7 μm.

Tornota: Straight, with short and occasionally lanceolate points, measuring 200-250 μm x 5-6 μm.

Sigmata: Asymmetrical, with one broadly curved end and the other end abruptly bent, chordal length, 25-45 μm.

Isochelae: Arcuate, separable into two size categories, 19-30 μm and 12-15 μm in length.

Skeletal arrangement: Main skeleton formed by a subisodictyal network of acanthostyles with one or two spicules making up the sides. Ectosomal skeleton consisting of a dense layer of tangential acanthostyles supported by bunches of tornota. Scattered isochelae and sigmata.

Distribution.– Widely distributed in the southern hemisphere: Antarctic, Kerguelen Island, Falkland Island, New Zealand, Chile, and Brazil.

Remarks: The genus *Crellomyxilla* Dendy 1924 is typified by a dense ectosomal skeleton composed of acanthostyles or acanthoxea and a myxilla like main skeleton. It is clearly distinguishable from the genus *Ectoyomyxilla* Lundbeck, in which both types of acanthostyles form part of the main skeleton only. The author agrees with Boury-Esnault & Van Beveren (1982) in maintaining the two genera separate.

Plocamiancora denticulata Topsent 1927

Material examined: 2 specimens (B-17 and B-18) on a *Lophohelia skeleton and a bivalve* value, respectively. Station BP-58.

Description: Small crusts, easily detachable from the substrate. Surface uneven and very hispid. Ectosome and aquiferous openings not apparent. The colour, in spirit, dark brown.

Spicules (Fig. 6b)

Ectosomal tornota: Straight, asymmetrical, with one end somewhat broader than the other. Size: 220-230 μm x 2.5-4 μm (specimen B-18) and 250-290 μm x 4 - 5 μm (specimen B-17).

Acanthostrongyles: Very stout, curved, with spines all along the shaft, without widened heads. Size: 135-200 μm x 12-20 μm (specimen B-18) and 170-220 μm x 18-20 μm (specimen B-17).

Acanthostyles: Conical, with short spines decreasing in number towards the completely smooth point. Smaller ones are frequently spinier. Size: 360-610 μm x 15-35 μm (specimen B-18) and 310-660 μm x 21-40 μm (specimen B-17).

Isanchorae: Pluridentate, with a curved shaft, and five to nine teeth. They were separable in specimen B-18 into two categories, 63-70 μm in length with five teeth and 30-42 um in length with seven teeth. All sizes between 35 μm and 55 μm in length were present in specimen B-17, the number of teeth varying between five and nine.

Skeletal arrangement: Main skeleton made up of a basal isodictyal network of acanthostrongyles, in the nodes of which are inserted acanthostyles perpendicularly, reaching through the ectosome, causing external hispidation of the sponge. Ectosomal skeleton composed of tornota scattered or in bundles, and numerous isanchorae.

Distribution.– North Atlantic: Azores and Marocco, at more than 1500 um in depth (Topsent 1928). The species seemingly exhibits an Atlantic distribution, confined to colder waters.

Remarks: These specimens conform closely to *P. denticulata* Topsent, differing only in the thicker acanthostrongyles and in lacking the two categories of acanthostyles. It might be thought that they are young specimens of the genus *Ectyonancora*, described by Lévi (1963) as including massive sponges with the same types of spicules as *Plocamiancora*. Nevertheless, they differ markedly from the closest species of this genus in respect of spicule size.

Iophon proximum (Ridley 1881)

Synonymy: *Alebion proximum* (Ridley 1881)

Material examined: 3 specimens (B-3, B-35 and B-43) and numerous fragments. Station BP-58.

Description: Massive, irregularly shaped with an anfractuous, uneven and hispid surface. Consistency soft and breakable. Ectosome apparent but not detachable from the choanosome. Oscula, 1,5-2mm in diameter, clustered in poorly delimited areas. The colour, in spirit, dark brown.

Spicules (Fig. 7a)

Acanthostyles: Straight or somewhat curved, with spines all along the shaft, more apparent at both ends, which end in a short point. Size: 300-350 μm x 14-18 μm.

Acanthotylota: Fusiform, nearly straight, with spine-bearing ends and some irregularity along the shaft. Size: 220-285 μm x 7-9. 5 μm.

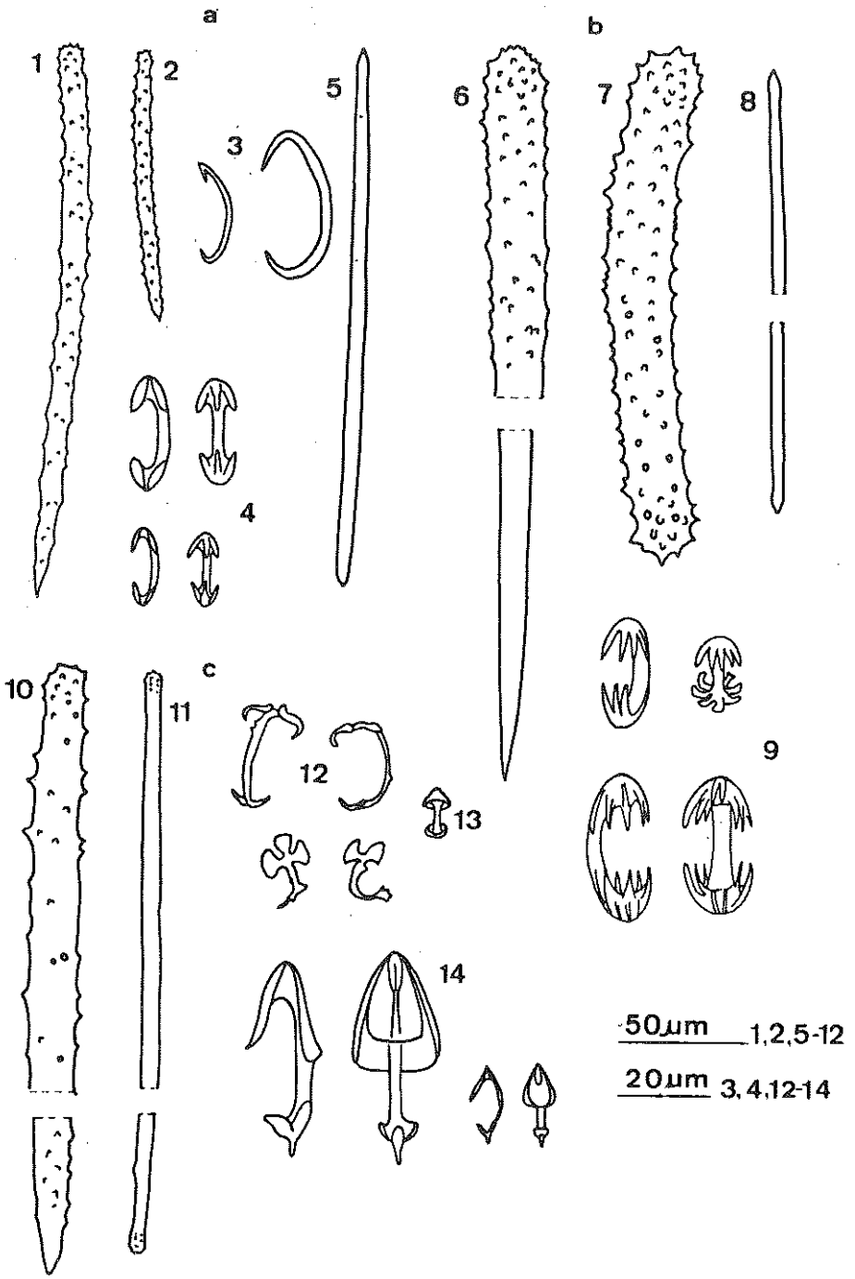

Fig. 6 – a) *Crellomyxilla chilensis:* (1) main acanthostyle, (2) ectosomal acanthostyle, (3) sigmata, (4) arcuate isochelae of two sizes, (5) tornote. b) *Plocamiancora denticulata:* (6) acanthostyle, (7) acanthostrongyle, (8) ectosomal tornote, (9) pluridentate isanchorae. c) *Iophon chelifer:* (10) acanthostyle, (11) acanthotylote, (12) clover-shaped and unconventional bipocilli, (13) classical bipocilli, (14) anisochelae of two sizes.

Broader ends in specimen B-35.

Anisochelae: With a sting-shaped prolongation of the lower palette, 18-28 μm in length. Separable, though not distinctly, into two size categories (11-15 μm and 20-28 μm).

Bipocilli: Typically shaped, abundant, 10-14 um in length.

Skeletal arrangement: Main skeleton consisting of a myxilla like network of acanthostyles with one or two spicules per side. Ectosomal skeleton composed of tangential acanthotylota either scattered or grouped in bundles. Large anisochelae arranged in rosettes, preferentially in the choanosome. Small anisochelae and bipocilli scattered singly.

Distribution.– Antarctic, sub-Antarctic region, Chile, Galapagos Island. South Africa (Stephens 1915, Burton 1936, Lévi 1963).

Remarks: This species shows great variation in spicule-size. The Namibian specimens have stout spicules similar to those of Antarctic specimens (Koltun 1964).

Some authors consider this species synonymous with *I. chelifer*. Moreover, the features cited by Boury-Esnault & Van Beveren (1982) to distinguish these two species are readily apparent in the Namibian specimens.

Iophon chelifer Ridley & Dendy 1886

Material examined: 1 specimen (B-33) covering some branches of *Hydroida*. Station BP-58.

Description: Crust 1 cm across. Surface uneven, hispid, and incrusted with mud. Ectosome only detachable in certain areas. Oscula inconspicuous. The colour, in spirit, brown (lighter than in the specimens of *I. proximum)*.

Spicules (Fig. 6c)

Acanthostyles: Slightly curved, the base narrower than maximum shaft diameter, blunt points, and few spines except at the base and point. Size: 260-320 μm x 15-20 μm.

Acanthotylota: Straight, with spine-bearing asymmetrical ends, 205-270 μm x 6-8 μm; some are polytylota.

Anisochelae: With a sting-shaped prolongation of the lower palette, separable into two size categories of 24-33 μm and 11-15 μm in length.

Bipocilli I: Small, exhibiting the typical calotte shape, 10-12 μm in length.

Bipocilli II: Irregular or clover-shaped, some bearing spines on the shaft, 14-18 μm in length, very abundant.

Skeletal arrangement: Main skeleton made up of a myxilla like network of acanthostyles with three or four spicules per side. Ectosomal skeleton composed of tangential and irregularly placed acanthotylota.

Anisochelae and bipocilli scattered throughout the sponge.

Distribution.– Sub-Antarctic region and Vancouver. South Africa: Cape of Good Hope (Ridley & Dendy 1887).

Remarks: In this specimen the clover-shaped bipocilli are smaller than those in specimens from Kerguelen (Boury-Esnault & Van Beveren 1982). Moreover there are other bipocilli with spiny shafts.

Family Hymedesmiidae Topsent 1928

Hymedesmia aurantiaca Lévi 1963

Material examined: 2 specimens (B-13 and B-16) on a gasteropod and a brachiopod, respectively. Station BP-58.

Description: Small crusts less than 2 cm across. Even, slightly hispid surface. Ectosome relatively thick, difficult to separate from the choanosome. The colour, in spirit, pale orange.

Spicules (Fig. 7b)

Ectosomal tornota: Straight and fusiform, slightly curved at the basal portion, measuring 240-310 μm x 5-7 μm.

Main acanthostyles: Somewhat conical, slightly curved near the base, with no distinctly visible heads. Spines decreasing in number from the head to the point, which is completly smooth. Size: 250-350 μm x 11-15 μm.

Accessory acanthostyles: Straight, conical, with a more or less conspicuous head, bearing spines along the full shaft, the spines oriented towards the spicule base. Size: 80-115 μm x 6-9 μm.

Isochelae: Very arcuate, with short teeth, measuring 23-35 μm in length and 3-5 μm in shaft diameter.

Skeletal arrangement: Hymedesmioid skeleton composed of tangential tornota, scattered or arranged in bundles, in addition to abundant isochelae. Ectosomal pore areas characterized by a higher density of isochelae to the detriment of the tornota.

Distribution.– Southern coast of South Africa (Levi 1963).

Remarks: There are several species of the genus *Hymedesmia* whose spicules are related to those in the Namibian specimens, which have been classed under Lévi's species on the basis of the relatively thick, orange ectosome and spicule size. The difference in depth (18m for Lévi's specimen and 260-269 m for those from Namibia

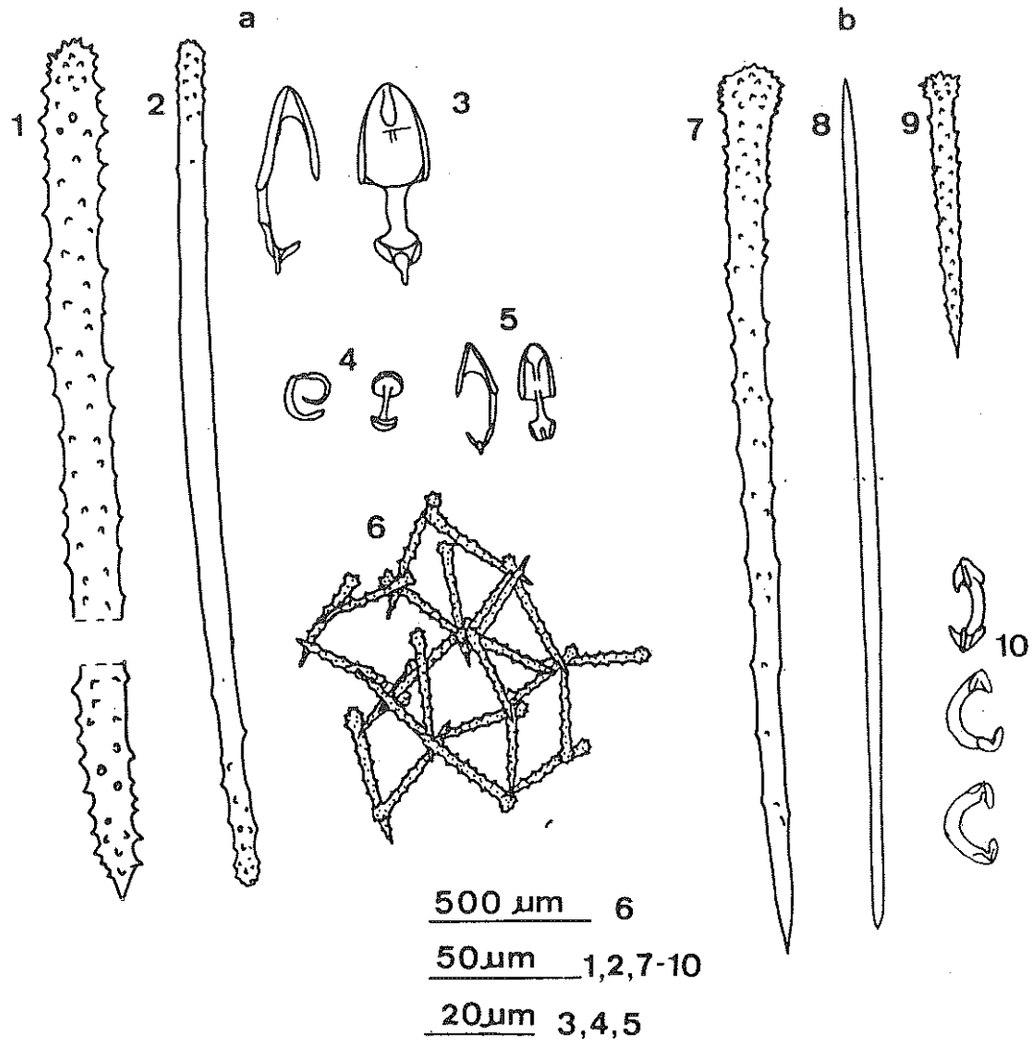

Fig. 7 – a) *Iophon proximum:* (1) acanthostyle, (2) acanthotylote, (3) big anisochelae, (4) bipocilli, (5) small anisochelae, (6) main skeletal arrangement, b)*Hymedesmia aurantiaca:* (7) main acanthostyle, (8) ectosomal tornote, (9) accessory acanthostyle, (10) arcuate isochelae.

is not so strange bearing in mind the cold temperature of the surface water in this region.

Family Clathriidae Hentschel 1923

Microciona cf. ***spinarcus*** Carter & Hope 1889

Material examined: 1 specimen (B-6) on a polychaete tube. Station BP-58.

Description: Hispid, encrusting specimen, with neither vents nor ectosome differentiated. The colour, in spirit, is light brown.

Spicules (fig. 8a)

Main acanthostyles: Slightly curved, with a spine-bearing head and some scattered spines along the shaft, measuring 230-320 μm x 10-15 μm.

Accessory acanthostyles: Conical, straight, with spines along the full length, measuring 80-150 μm x 6- 10 μm.

Ectosomal subtylostyles: Straight, with some rudimentary spines at the base, measuring 220-270 μm x 2-5 μm.

Toxa: With spines on the ends, curvature quite pronounced, measuring 80-300 μm x 3-4 μm

Palmate isochaela: Infrequent, only two found, 9 and 10 μm long.

Skeletal arrangement: Main skeleton consisting of short, plumose columns of main acanthostyles echinated by the accessory acanthostyles. Ectosomal skeleton comprising a layer of tangential, irregularly located subtylostyles. Scattered microscleres.

Distribution.– Common species in the North Atlantic Ocean. The Mediterranean species *M. assimilis* is probably synonymous.

Remarks: The spicules of this specimen led the author to include it in this North Atlantic species but with some reservations, since only two isochelae could be found in it. Lévi (1960) stated that these spicules were sometimes scarce.

Microciona sp.

Material examined: 1 specimen (B-26) on a valve of *Terebratulina*. Station BP-58.

This small encrusting specimen does not allow the author to classify it. Its spicules, typical of *Clathriidae*, are represented in fig. 8b. The skeletal arrangement can be classed between that of *Leptoclathria* and *Microciona.*

Order Haplosclerida

Family Haliclonidae Laubenfels 1932

Haliclona topsenti (Thiele 1905)

Synonymy: *Reniera topsenti* Thiele 1905

Material examined: 2 specimens (B-21 and B-22) among the rhizoids of *Ecklonia maxima*. Infralittoral zone of Walvis Bay.

Description: Encrusting .5 cm thick specimen. Slightly hispid surface. Consistency brittle and crumbly. Ectosome not detachable from the choanosome. The colour, in spirit, is whitish on the bottom half and brownish violet on top.

Spicules (Fig. 9a)

Oxea: Straight or slightly curved, relatively thick, 110-135 μm x 5-10 μm, some transformed into styles.

Skeletal arrangement: Skeleton consisting of an irregular network with paucispicular sides. Spongine limited to the junctions between spicules. No differentiated ectosomal skeleton.

Distribution:- Antarctic, sub-Antarctic region, Chile, and Argentina.

Haliclona cf. delicata (Sará 1978)

Synonymy: *Reniera delicata* Sara 1978

Material examined: 1 specimen (B-20) among the rhizoids of *Ecklonia maxima*, together with *Haliclona topsenti*. Infralittoral zone of Walvis Bay.

Description: Cushion-shaped specimen, 2 cm in diameter. Slightly hispid surface. Consistency brittle. Oscula not apparent and ectosome not detachable. The colour, in spirit, is pinkish white.

Spicules (Fig. 9b)

Oxea: Slightly curved and regular in size, measuring 100-117 μm x 6-7 μm.

Skeletal arrangment: Regular network with unispicular sides and spongine at the nodes. No differentiated ectosomal skeleton.

Distribution: sub-Antarctic region: Tierra del Fuego.

Remarks: This specimens differs from *H. topsenti*, with which it lives in its more delicate appearance and in spicule size. It seems to be conspecific with Sara's species, and more properly a *Haliclona* because of the lack of a differentiated ectosomal skeleton.

Family Gelliidae Ridley & Dendy 1887

Gellius flagellifer Ridley & Dendy 1887

Synonymy: (?) *Gellius vagabundus* Schmidt 1870

Material examined: 1 specimen (B-19). Station BP-58.

Description: Massive, hard yet friable specimen. Surface rough to the touch but not hispid. Ectosome evident, with a tangential skeleton. Aquiferous openings not distinct. The colour, in spirit, yellowish beige.

Spicules (fig. 9d).

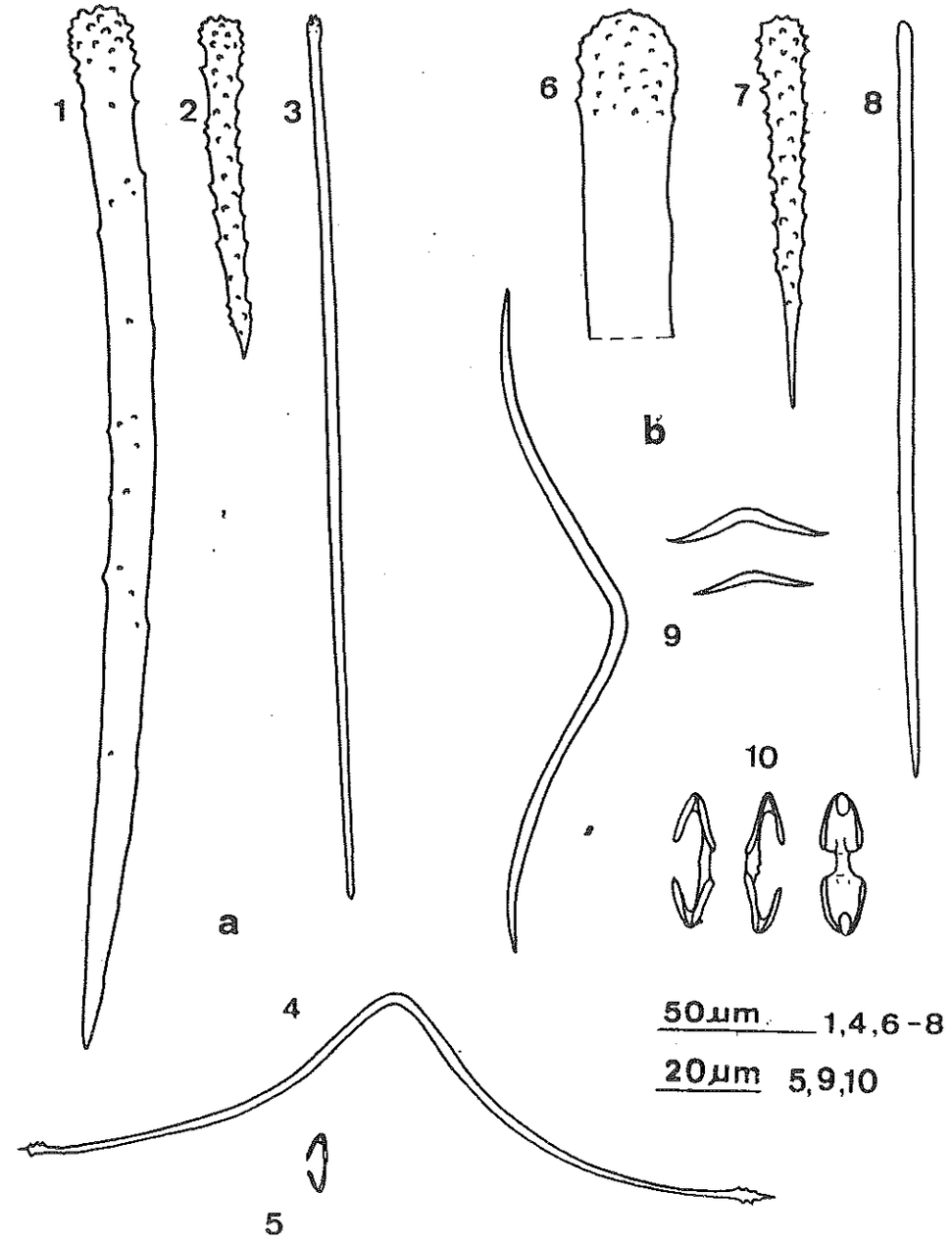

Fig. 8 – a) *Microciona cf. spinarcus:* (1) main acanthostyle, (2) accessory acanthostyle, (3) ectosomal subtylostyle, (4) toxon with spiny ends, (5) isochelae. b) *Microciona sp.:* (6) base of a main acanthostyle, (7) accessory acanthostyle, (8) ectosomal subtylostyle, (9) toxa of different sizes, (10) palmate isochelae.

Oxea: Robust, straight or slightly curved, measuring 450-570 μm x 16-28 μm.

Sigmata I: flagelliform, with one arm more inwardly curved than the other, very abundant. Size: 100-140 μm in diameter and 2-4 μm thick.

Sigmata II: C-shaped, 40-70 μm in diameter and 3-5 μm thick.

Skeletal arrangement: Main skeleton comprising a network of irregular units with unispicular sides, plus scattered spicules. Ectosomal skeleton made up of a tangential network similar to that of the choanosome. Scattered sigmata.

Distribution: Antarctic, sub-Antarctic region, New zealand, North Atlantic, and Mediterranean Sea. South Africa: Vema Seamount (Lévi 1969).

Remarks: This specimen closely resembles those from Kerguelen (Boury-Esnault and Van Beveren 1982) and those from South Africa described by Lévi (1969). Like those it posseses a unispicular network. However, Ridley & Dendy (1887) described the holotype as having a polyspicular reticulation (Fig. 9)).

Gellius glacialis Ridley & Dendy 1886

Material examined: 2 specimens (B-5a and B-5b). Station BP-58.

Description: Massive, elongate specimens, measuring 4.2 x 2.5 x 1.5 cm and 3.5 x 2.3 x 1.6 cm, respectively. Consistency hard and brittle, surface rough but not hispid, partially incrusted with mud. Ectosome apparent, but only detachable when covering subectosomal canals. Abundant oscula up to 3 mm in diameter. The colour, in spirit, is greyish beige.

Spicules (Fig. 9e)

Oxea: Straight or slightly curved, tapering to blunt points, measuring 400-610 μm x 25-30 μm.

Sigmata: C-shaped, uniformly curved or somewhat angular, measuring 60-72 μm in diameter and up to 5 μm thick.

Skeletal arrangement: Main skeleton consisting of a network with one to three spicules per side. Spongine present only at the nodes. Ectosomal skeleton comprising an isodictyal network with unispicular to paucispicular sides. sigmata abundant and spread throughout the sponge.

Distribution:- Antarctic, Falkland Island, New Zealand. South Africa: Agulhas Bank (Ridley & Dendy 1887).

Order Dictyoceratida
Family Dysideidae Gray 1867

Dysidea fragilis (Montagu 1818)

Synonymy: *Spongelia fragilis* Montagu 1818

Material examined: 1 specimen (B-28). Station BP-58.

Description: Ramose specimen with three branches measuring 7 cm, 4 cm and 2 cm in length and a maximum of 0.8 cm thick, partially anastomosed. Ectosome highly incrusted with calcareous debris and mud. The colour, in spirit, greyish beige.

Skeleton made up of typical fibres to a great extent filled with foreign debris.

Distribution: Cosmopolitan species.

Order Dendroceratida
Family Halisarcidae

Halisarca dujardini Johnston 1885

Material examined: 1 specimen (B-28) on a horny tube of polychaete. Station BP-58.

Description: Encrusting specimen with an even surface and indistinct oscula. Elongate flagellated chambers, 100-150 μm x 28-35 μm.

Distribution: North Atlantic, Mediterranean Sea, Antarctic and sub-Antarctic region.

DISCUSSION

This small collection of species from Namibia, consisting of 59 specimens belonging to 27 species is a contribution to the knowledge of the sponge fauna in this region. The only South Atlantic coasts of Africa studied before, and only partially (Borojevic, 1967; Burton, 1925, 1929, 1936; Kirkpatrick 1902-3; Lendenfeld 1906; Ridley & Dendy 1887; Sollas 1888; Stephens 1915 Levi 1963; 1967, 1969) were those of South Africa.

The order Poecilosclerida is the most highly represented, with twelve genera and fourteen species, followed by Haplosclerida (four species) and Hadromerida. Only the species *H. esperioides* and *I. proximum* appear to be abundant in the area sampled. Nevertheless, this species list represents only poorly the sponge fauna of Namibia which seems to exhibit, on the basis of samples collected later on a great diversity of species.

With regard to the taxonomy employed, the author wishes to point out that the two *Gellius* species described in this paper could be classified under the genus *Sigmadocia* Laubenfels, based on their dermal skeletons. It is not clear whether this genus should be placed in the family

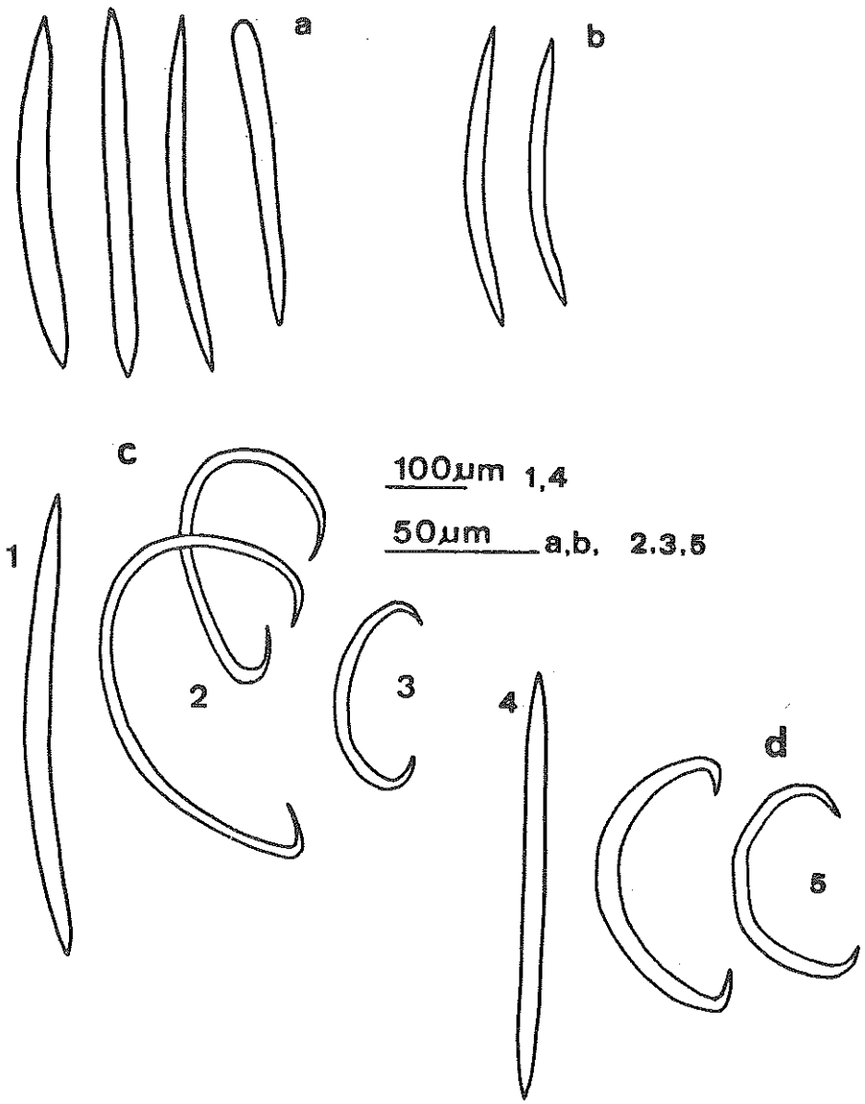

Fig. 9 – a) *Haliclona topsenti:* oxea and style. b) *Haliclona cf. delicata:* oxea. c) *Gellius flagellifer:* (1) oxeote, (2) flagelliform sigmata, (3) C-shaped sigma. d) *Gellius glacialis:* (4) oxeote, (5) sigmata.

Adociidae, as per Bergquist & Warne (1980), in the Haliclonidae *sensu* Van Soest (1980); in the Renieridae *sensu* Lévi, (1973) or in the Gelliidae as provisionally defined by Boury-Esnault & Van Beveren (1982). For this reason, and since a review of all these families is needed the author has provisionally maintained the old name, particularly as the species described are readily recognizable under the generic name *Gellius*.

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REFERENCES

Baer, L. (1905). Silicispongien von Sansibar, Kapstadt und Papete. *Arch. f. Naturgesch.*, 72:1-32.

Bergquist, P.R. & Warne, K.P. (1980). The marine fauna of New Zealand: Porifera, Demospongiae, Part 3 (Haplosclerida and Nepheliospongida). Wellington. *Coll. Repr. N.Z. oceanogr. Inst.* 87:1-43.

Borojevic, R. (1967). Spongiaires d'Afrique du Sud. (2) Calcarea. *Trans. R.Soc.S. Afr.*, 37:183-226.

Boury- Esnault, N. & Van Beveren, M. (1982). Les Demosponges du plateau continental de Kerguelen-Heard. *CNFRA* 52:5-175.

Bowerbank J.S. (1864). *A Monograph of the Bit-British Spongiadae*. I. Ray Society, London,: 1-290.

Burton,M. (1925). Description of South African Sponges collected by the South African Marine Survey. Part I. Myxospongida and Astrotetraxonida. *Fish. Mar. Biol. Survey, Cape Town*,4:1-29.

Burton,M. (1929). Description of South African Sponges collected by the South African Marine Survey. Part II. The Lithistida with a critical survey of the desmas forming sponges. *Fish Mar. Biol. Survey, Cape Town*. 7:1-12.

Burton,M. (1936). Notes on sponges from S. Africa, with description of a new species. *Ann. Mag. nat. Hist.*, 17:141-147.

Carter,H.J. (1875). Notes introductory to the study and classification of the Spongida. *Ann. Mag. nat. Hist.* 16(4):1-40, 126-145, 177-200.

Carter,H.J. & Hoper,R. (1889). On a new British species of Microciona Bow. in which the ends of the tricurvate are spiniferous. *Ann. Mag. nat. Hist.* 6 (3): 99-106.

Dendy, A. (1924). Porifera. Part 1. Non-Antarctic Sponges. *Br. Antarct. Terra Nova Exped. 1910-1913.* Zoology, 6(3): 269-392).

Gray,J.E. (1867). Notes on the arrangement of sponges, with descriptions of some new genera. *Proc. zool. Soc. London,* 402-558.

Hentschel, E. (1923). Erste Unterabteilung der Metazoa Parazoa. Porifera = Schwaemme. In Kuekenthal,W. and Krumbach, T. (eds.). *Handbuch der Zoologie*. Berling & Leipzig, Walter de Gruyter und Co. Vol. 1, Protozoa, Porifera, Coeleterata, Mesozoa,: 207-418.

Johnston, G. (1842). *A History of British Sponges and Lithophytes*. London,:1- 264.

Kirkpatrick,R. (1902-3). Description of South African sponges. Parts I, II, III. *Mar. Invest. S.Afr. Dept. Agric.*, 1:219-232.

Kirkpatrick,R. (1907). Preliminary report on the Monaxonellida of the National Antarctic Expedition. *Ann. Mag. nat. Hist.* 7 (20): 271-291.

Koltun,W. M. (1964). Sponges of the Antarctic. I Tetraxonia and Cornacuspongida. *Biol. Rep.Soviet. Antarct. Exped. (1955-1958)*, 2:6-114.

Lamarck, J.B.P. de M. (1816). *Histoire naturelle des animaux sans vertebres* Paris, 2, :1-568.

Laubenfels, M.W. de (1932). The marine and fresh water sponges of California. *Proc. U.S. Nat. Hist. Museum*, 81(4) :1-140.

Lendenfeld, R. (1906). Die Tetraxonia. *Wiss. Ergebn. dt. Tiefsee Exped. "Valdivia" 1902-1940*, 11-59-374.

Lévi,C. (1960). Les Démosponges des côtes de France. I. Les *Clathriidae. Cah. Biol. mar.*, 1:47-87.

Lévi, C. (1963). Spongiaires d'Afrique du Sud. (1) Poecilosclérides. *Trans. R. Soc. S. Afr.*, 1:1-72.

Lévi,C. (1964). Spongiaires des zones bathyale, abyssale et hadale. *Galathea Rep.*, 7:63-112.

Lévi, C. (1967). Spongiaires d'Afrique du Sud. (3) Tétractinellides. *Trans. R. Soc. S. Afr.*, 37: 227-256.

Lévi, C. (1969). Spongiaires du Vema Seamount (Atlantique Sud). *Bull. Mus. natn. Hist. nat.*, Paris Série 2, 41(4):952-973

Lévi,C. (1973). Systématique de la classe des Demospongiaria (Démosponges). In *Traité de Zoologie. III Spongiaires.* Ed. P.P. Grassé 577-631 Paris:Masson.

Linné,C. (1767). *Systema Naturae*, Holmiae, 1 (2): 533-1327.

Lundbeck, W. (1905). Desmacidonidae (Pars). Porifera, Part II. *Danish Ingolf-Expedition*, 6 (2): 1 - 219.

Montagu, G. (1818). An essay on sponges, with description of all the species that have been discovered on the coast of Great Britain. *Mem. Werner Soc.*, 2:67- 122.

Ridley, S O. (1881). Account of the Zoological Collections made during the Survey of H M S. "Alert" in the Straits of Magellan and on the Coast of Patagonia. Spongida. *Proc. zool. Soc.* Lond :107 141.

Ridley, S O. & Dendy A A. (1886). Prelimiary report on the Monaxonida collected by H M S. "Challenger". *Ann. Mag. nat. Hist.*, 5 (18):325 - 351, 470 - 493.

Ridley, S O. & Dendy A. (1887). Monaxonida. *Rep. scient. Results Voy. Challenger* 1873-6, Zool. 20: 1- 275.

Sará, M. (1978). Demospongie di acque superficiali della Terra del Fucco. *Boll. Musei. Ist. Biol. Univ. Genova*, 46: 7-117.

Schmidt, O. (1862). *Die Spongien des adriatischen Meeres* 1-88. Leipzig.

Schmidt O. (1868). *Die Spongien der Kuste von Algier* (Drittes Supplement) 1 - 44 Leipzig.

Schmidt, O. (1870) *Grundzuge einer Spongienfauna des Atlantischen Gebietes.* 1- 88 Leipzig.

Sollas, W J. (1866). Preliminary account of the Tetractinellid Sponges dredged by H. M S. "Challenger" 1872-1876. Part I. The Choristida. *Sci. Proc. roy. Dublin Soc.*, 5:177- 199.

Sollas, W J. (1888). Tetractinellida. *Rep. scient. Results Voy. Challenger 1873-6*, Zool. 25: 1- 458.

Stephens, J. (1915). Atlantic sponges collected by the Scottish National Antarctic Expedition. *Trans. R. Soc. Edinb.*, 1 (2): 423-467.

Stephens, J. (1917). Report on the sponges collected off the coast of Ireland by the dredging expeditions of the Royal Irish Academy and the Royal Dublin Society. *Proc. R. Ir. Acad.*, 34, Sec.B: 1- 16.

Thiele, J. (1905). Die Kiesel- und Hornschwämme der Sammlung Plate. *Zool. Jahrb.*, Suppl.6: 407- 496.

Topsent, E. (1889). Quelques Spongiaires du banc de Campeche, *Mém Soc. Zool. France*, 2: 30-52.

Topsent, E. (1894). Etude monographique des Spongiaires de France. I Tetractinellida. *Archs Zool. exp. gen.*, 3 série 2: 259-400.

Topsent, E. (1900). Etude monographique des Spongiaries de France. III Monaxonida (Hadromerina). *Archs Zool. exp. gen.*, 3 série, 8.: 1-331.

Topsent, E. (1924). Révision des Mycale de l'Europe occidentale. *Ann. Inst. Océanogr.*, 1 (3): 77- 118.

Topsent, E. (1927). Diagnoses d'éponges nouvelles recueillies par le Prince Albert I de Monaco. *Bull. Inst. Océan. Monaco*, 502: 1-19.

Topsent, E. (1928). Spongiaires de l'Atlantique et de la Méditerranée provenant des croisières du Prince Albert I de Monaco. *Résult, Camp. Sci.*, 74: 1-376.

Uriz,M.J. (1984). Descripcion de nuveas esponjas de las costas de Namibia (SW de Africa). Res. Exp. Cient. 12: 107- 116.

Van Soest, R W M. (1980). Marine sponges from Curacao and other Caribbean localities Part II. Haplosclerida. *Stud. Fauna Curaçao Caribb. Isl.*, 62 (191): 1 - 173.