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Family Petrosiidae Van Soest, 1980

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Petrosiidae Van Soest (Demospongiae, Haplosclerida) contains four valid genera and two subgenera. Species are widely distributed in shallow and deeper warm-temperate to cold waters. Genera share a reticulated tangential ectosomal layer of spicules, or surface crust and are differentiated by their choanosomal skeletal structure, varying from isotropic-confused to isotropic-lamellate, and their types and size classes of spicules.
Keywords: Porifera; Demospongiae; Haplosclerida; Petrosiidae; *Acanthostrongylophora; Neopetrosia; Petrosia (Petrosia); Petrosia (Strongylophora)*; *Xestospongia*.

DEFINITION, DIAGNOSIS, SCOPE

Synonymy

Petrosiidae Van Soest, 1980: 66.

Definition (from Van Soest, 1980)

Haplosclerida with an ectosomal skeleton consisting of an isotropic reticulation of single spicules or spicule tracts and a choanosomal skeleton verging towards an isotropic reticulation of spicule tracts, in which primary and secondary tracts are indistinct.

Diagnosis (emended from Van Soest, 1980; Hooper & Wiedenmayer, 1994)

Massive, volcano or vase-shaped, bulbous and less commonly, encrusting-branching sponges. Sponge texture characteristically stony and brittle due the high silica content of the mineral skeleton, about 58% relative to spongin content of the skeleton (Desqueyroux-Faúndez, 1987). Surface smooth, covered by a smooth, strong crust or variably hispid. Specialised ectosomal skeleton consisting of an isotropic tangential reticulation of free spicules or spicule tracts, forming the mineral crust. Choanosomal skeleton is a more-or-less regular isotropic network of multispicular tracts where primary and secondary fibres are indistinct. Spongin not visible, spicules bound together with the minimal amount of spongin. Multispicular tracts are regularly distributed to form, rounded meshes parallel to the surface, that can be ill defined or masked by the abundant free spicules. Megascleres: oxeas to strongylotes. Microscleres if present, smaller oxeas. In one subgenus *(Strongylophora)*, smaller, sausage-shaped strongyles exist. Spicule types and size classes are very variable within different genera, ranging from only one type of spicule in only one size class, smaller than 200 µm long *(Neopetrosia)* or larger than 200 µm long *(Xestospongia)*, up to two types of spicules with five size classes *(Strongylophora)*. Spicule morphologies and sizes are considered important taxonomic characters among different genera, since they are fixed and stable for each genus (Table 1). Oviparous reproduction is known for only one genus *(Xestospongia)*, which is gonochoric and has synchronous spawning (e.g., Fromont, 1988), but larvae are unknown (Bergquist, 1980a).

Scope

Nine nominal genera and hundreds of species are known worldwide, of which only four genera and two subgenera are considered valid here: *Acanthostrongylophora*, *Neopetrosia*, *Petrosia* (*Petrosia*), *Petrosia* (*Strongylophora*) and *Xestospongia*. *Densa* and *Quepanetsal* are included in synonymy with *Xestospongia*, with question, as are *Tedaniella* and *Chalinorhaphis* included in *Petrosia*. Species are distributed in shallow and deeper tropical, warm-temperate to cold waters, with depth range 4–280 m.

History and biology

The family was erected by Van Soest, 1980 to include Haplosclerida with an ectosomal skeleton consisting of an isotropic reticulation of single spicules or spicules tracts and a choanosomal skeleton verging towards an isotropic reticulation of spicule tracts, in which primary and secondary tracts are indistinct. Van Soest (1980) split the genera previously grouped in Nepheliospongiidae Clarke, 1900 by Wiedenmayer (1977a) into two new families: Petrosiidae and Oceanapiidae. Van Soest (1980) suggested that it was uncertain whether Recent genera such as *Petrosia* and *Xestospongia* were closely allied with the fossil genus *Nepheliospongia*, as implicitly indicated by their inclusion in a single family Nepheliospongiidae. Wiedenmayer (1977a) defined Nepheliospongiidae principally by the strong development of megascleres in relation to spongin, hence with hard or friable consistency, the presence of a skeletal accretive structure with ascending and radially diverging skeletal tracts, and the tendency to have a tangential ectosomal network or peripheral crust. At the same time, Wiedenmayer (1977a) associated a fossil group Heliospongiidae Finks, 1960 with Nepheliospongiidae, which in his opinion shared the same characters of spiculation, skeletal architecture and aquiferous system, with living Nepheliospongiidae. Wiedenmayer (1977a) included in this family: *Petrosia*, *Xestospongia*, *Cribrochalina*, *Hemigellius*, *Vagocia*, *Calyx*, *Rhizochalina*, *Oceanapia*, *Biminia* and *Siphonodictyon*.

Bergquist & Warne (1980: 35) accepted, but modified, the diagnosis of Nepheliospongiidae Clarke given by Wiedenmayer (1977a). They included only two genera having a mineral skeleton predominant over the soft tissues, and a greater development of a spiculose ectosomal layer. In one genus (*Petrosia*) this is represented

Table 1. Spicule forms and dimensions for genera and subgenera of Petrosiidae (from the literature) (measurements in µm, represented as minimum–mean– and maximum dimensions).

Genus	Type of spicules	Spicules size (µm)
Acanthostrongylophora Hooper, 1984a	strongyles	105–154–174 × 5–8–12
	thin oxeas	98–139–173 × 1–2–4
	small strongyles	contamination
Neopetrosia de Laubenfels, 1949b	small oxeas	120 × 3
Petrosia Vosmaer, 1887	oxeas to oxeotes (1)	182–212–237 × 10–13–14
	strongylotes (2)	40–80–136 × 7–10
	strongylotes (3)	30–45–85 × 2–3
Strongylophora Dendy, 1905	centrangulate oxeas	28 × 2
	strongylotes	260 × 20
	small strongyles	260 × 6
Xestospongia de Laubenfels, 1930	oxeas to strongylote-oxeote	254–308–400 × 16–21–30

by a marked crust or non-detachable peripheral crust of spicules, and in others it is visible in the form of a strongly hispid (e.g., *Xestospongia*) or a shaggy (e.g., *Acanthostrongylophora*) surface.

Van Soest's (1980) concept of Petrosiidae concerned sponges which often exhibit a tangential surface crust of free spicules – a character considered as an apomorphy for the family. *Oceanapia* and *Calyx* were excluded from Petrosiidae. The genera *Cribrochalina*, *Hemigellius*, *Vagocia*, *Rhizochalina*, *Biminia* and *Siphonodictyon* were considered as Nepheliospongiidae by Wiedenmayer (1977a) but are actually treated in Niphatidae or Phloeodictyidae. Van Soest (1980) described only three genera in Petrosiidae, all from the West Indies: *Xestospongia*, *Petrosia* and *Strongylophora*.

In the opinion of Bergquist *et al*. (1986) recent improvements in biochemical technology has provided pivotal information on sponge phylogeny, in particular, sterol patterns as markers for resolving taxonomic problems at the intrageneric level, e.g., within *Xestospongia*, *Petrosia* and *Phakellia*. Fromont *et al*. (1994), studying structural parameters of sterols, compared sterol percentage of molecular weights, type of sterol nucleus and position of alkylation, with previous chemotaxonomic studies in order to determine if these studies showed groups of sponges with similar characters. They concluded that grouping species and genera was not possible, although a sterol-set ('fingerprint') was characteristic for particular species. Similar results were obtained by Van Soest & Braekman (1999) for *Petrosia* species and *Cribrochalina vasculum*; both possessing hydroxylated acetylenes as good markers; *Xestospongia testudinaria* and *X. muta* shared brominated acetylenes also representing a good marker. In the family Niphatidae, *Amphimedon compressa*, *A. viridis* and *A. erina* contained alkylpiperidines which they share with *Callyspongia* species. Nevertheless, one of the major difficulties to be overcome before any confidence can be applied universally to chemotaxonomic methods is the confident taxonomic identification of studied samples and of all the different sterols found in each sponge.

Distribution

Species are distributed in shallow and deeper warm-temperate to cold waters (e.g., Galapagos, Sri Lanka, Falkland Islands, Straits of Magellan, Subantarctic), at depths between 4–280 m. More than a hundred nominal species of Petrosiidae have been recorded (Van Soest, pers. comm.) from the West Indies, East Pacific, Galapagos Islands; Chile-Peru, Magellan, Antarctica and the Subantarctic; Australia and New Zealand; Indonesia; Molucca Sea; Pacific, Indo-Pacific and Indian Ocean; Mediterranean-Atlantic, Red Sea, Mediterranean, Boreal, N, and E Atlantic; W and S Africa.

KEY TO GENERA AND SUBGENERA

(1) Ectosomal skeleton clearly different from choanosomal skeleton, very dense, tangential unispicular network, finely hispid, with rounded, regular or isodictyal, or irregular, subrectangular meshes. Choanosomal spicule tracts compact, differentiated or not in primary and connecting tracts. With or without microscleres 2

Ectosomal skeleton undifferentiated from choanosomal skeleton, consisting of a very dense disordered network of free spicules, with a single type of spicule of a single size class larger than 200 µm long. Choanosomal skeleton consisting of short longitudinal, undivided, pauci- to multispicular tracts connected by few oxeas, causing irregular meshes .... ***Xestospongia***

(2) Ectosomal skeleton finely hispid, consisting of a tangential network with rounded regular meshes and free spicules. Choanosomal spicule tracts compact, not differentiated into primary or connecting tracts. Megascleres are oxeas, ranging from oxeote to strongylote of at least three size classes, large 180–400 × 10–14 µm, medium 40–130 × 5–10 µm, and small curved strongyles 30–100 × 2–3 µm .... ***Petrosia (Petrosia)*** … 3

Ectosomal skeleton a finely hispid, tangential network with isodictyal meshes of single spicules and free spicules at the nodal points. A second subectosomal tangential network is present. Choanosomal skeleton with irregular paucispicular tracts differentiated into short connecting and longer longitudinal tracts. Megascleres oxeas in a single size class smaller than 200 µm long ..... ***Neopetrosia***

(3) Ectosomal skeleton finely shaggy, with a tangential network of multispicular tracts of strongyles and free oxeas, with ovoid to subrectangular meshes. Choanosomal spicule skeleton compact, differentiated into multispicular longitudinal tracts and interconnecting confused tracts of single strongyles. Spicules: strongyles and thin oxeas of similar length (100–120 µm up 170 µm, but of different diameter: 5–12 and 2–4 µm, respectively). Microscleres absent .... ***Acanthostrongylophora***

Ectosomal skeleton a dense, granular, tangential network of single strongyles forming a subrectangular mesh, with free strongyles grouped at the nodes of the network. Abundant abruptly curved microxeas. Choanosomal spicule tracts slightly differentiated with stout longitudinal tracts and connecting short, irregular tracts of strongyles and free strongyles .... ***Petrosia (Strongylophora)***

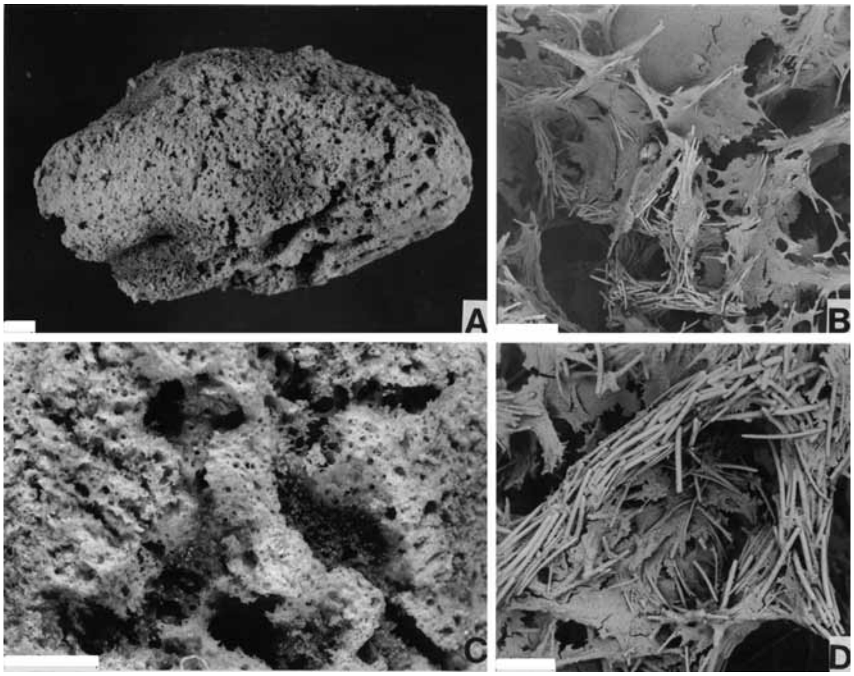

Fig. 1. *Acanthostrongyla* Hooper, 1984a. A–D, type species, *A. ashmorica* Hooper, 1984a. A, C, holotype NMV F51374 (NTM Z1495), view of the specimen, normal and enlarged view (scale 1 cm). B, ectosomal layer (scale 200 μm). D, choanosomal skeleton forming a network of multispicular, longitudinal tracts with irregular, abundant ovoid meshes (scale 100 μm).

ACANTHOSTRONGYLOPHORA HOOPER, 1984

Synonymy

Acanthostrongylophora Hooper, 1984a: 58; Hooper & Wiedenmayer, 1994: 328.

Type species

Acanthostrongylophora ashmorica Hooper, 1984a (by monotypy).

Definition

Petrosiidae with a shaggy surface produced by the ends of primary fibres and an irregular subrectangular loose reticulation of strongyles and thin oxeas.

Diagnosis (emended from Hooper, 1984a)

Petrosiidae with a lamellate-isotropic heavily meshed reticulation of spicule tracts cored by thick strongyles and fewer thin oxeas. Ectosome with an irregular subrectangular loose reticulation of megascleres, interrupted by the terminal part of longitudinal tracts. Surface membrane thin and fragile with irregular pores. Choanosome cavernous, crumb-of-bread texture. Spongin scarce. Spicules strongyles and thin oxeas.

Distribution

Northwestern Australia.

Previous reviews

Hooper & Wiedenmayer, 1994: 328.

Description of type species

Acanthostrongylophora ashmorica Hooper, 1984a.

Synonymy. *Acanthostrongyla ashmorica* Hooper, 1984a: 58, figs 4, 5.

Material examined. Holotype: NMV 51374 (fragment NTM Z1495) – N of Barracouta Shoals, near Ashmore Reef, Sahul Shelf, Western Australia. Schizoholotypes: ZMA POR5294 (fragment), MHNG-INVE 26690 (slides).

Description. Massive sponge, erect, firm, friable (Fig. 1A, C). Surface uneven, shaggy, with large grooves. Few oscules, large and flush with the surface, irregularly scattered. Texture firm to stony, barely compressible, strongly brittle. Surface, light, fragile, covered by a surface membrane with rounded pores, partly conserved between the fine oxea 'tufts' issuing from terminal parts of the primary longitudinal fibres (Fig. 1B). Ectosomal skeleton a tangential irregular subrectangular network of loose strongyles, with free oxeas and light spongin. Choanosomal skeleton (Fig. 1D), partially cavernous, forming a network of multispicular, longitudinal tracts with irregular, abundant ovoid meshes, halichondroid in places. Connecting tracts confused, formed by single strongyles and oxeas cemented by scarce spongin. Megascleres: strongyles, slightly bent, 105–153–174 μm long, 5–8–12 μm wide, and fine, thin oxeas, slightly bent, 123–138–173 μm long, 2–4 μm wide.

Remarks. Hooper (1984a) described *Acanthostrongylophora* with spiny microscleres (acanthose microstrongyles), whereas subsequently Hooper *(in litteris)* considered these microscleres as contaminants, resembling microrhabds of *Theonella*. Hooper (1984a) considered *Acanthostrongylophora* to be closely related to *Strongylophora*, differing only in having acanthose microstrongyles (which thus potentially negates the genus given that these are now known to be contaminants, and they were not found subsequently in our analysis of the type material). However, from our observations of the holotype we conclude that the two genera differ by the possession of a shaggy uneven surface in *Acanthostrongylophora*

Table 2. Comparison of spicule forms and dimensions between *Acanthostrongylophora* and *Strongylophora* (measurements in μm taken from type material, represented as minimum–mean– and maximum dimensions).

Genus	Megascleres	'Microscleres'
Acanthostrongylophora Hooper, 1984a		
Strongyles	66–115–174 × 5–8–12	Absent
Thin oxeas	123–138–173 × 2–4	
Small strongyles contamination	16–18–23 ×1.5–3–4	
Strongylophora Dendy, 1905		
Strongyles	156–208–238 × 12–14–20	
Strongylotes	143–200–230 × 4–7–8	
Small strongyles	20–34–53 × 4–7–8	
Microxea-like spicules		21–26–30 × 2–3

(in *Strongylophora* this is uneven but uniformly granular), by its breadcrumb texture (hard in *Strongylophora*), although the texture of both genera is similar (easily breakable), and the main difference between the two genera being the type of spicules and skeletal morphology (see Table 2).

Thus, despite the recognition that acanthose microscleres are contaminants (Hooper, pers. comm.), we suggest that these additional characters detailed above differentiate *Acanthostrongylophora* from *Strongylophora*, with the former a valid genus. Another species of *Acanthostrongylophora* is known from Indonesia, where it is common (Van Soest, pers. comm.), but remains unpublished, and we await the description of this taxon that may clarify the taxonomic position of *Acanthostrongylophora*.

Distribution

Currently monotypic, known only from the type locality near Ashmore Reef, Western Australia, 80–91 m depth, with a possible second species from Indonesia (Van Soest, pers. comm.).

NEOPETROSIA DE LAUBENFELS, 1949

Synonymy

Neopetrosia de Laubenfels, 1949b: 10; Bergquist, 1965 (in part): 149, 150, 151.

Type species

Haliclona longleyi de Laubenfels, 1932 (by original designation).

Definition

Petrosiidae with finely hispid surface produced by fine brushes of oxeas issued from subectosomal tracts, and a compact choanosomal network combining rounded meshes with a superimposed anisotropic reticulation. Megascleres oxeas less than 200 μm long.

Diagnosis

Compact sponges (Fig. 2A), with an ectosomal unispicular isodictyal layer and free-brushes of oxeas, producing a finely hispid, smooth, 'velvet-like' surface (Fig. 2B). Ectosomal skeleton a tangential isodictyal network with one size of spicule (Fig. 2C), spongin and spicule brushes only at nodal points, free spicules abundant. Consistency hard, stony, spongin always scarce. Subdermal region with short spicular tracts, limited by a second surface skeleton layer, 'peripheral condensation' (Fig. 2D, arrow), or a 'paper-thin area about 1 mm below the surface' (see de Laubenfels, 1953b: 18). Choanosomal skeleton a compact network of irregular paucispicular tracts with rounded meshes, irregular in size. Megascleres: oxeas, less than 200 μm long.

Distribution

Central West Atlantic, Indo-West Pacific.

Previous reviews

Duchassaing, 1850: 26; Green, 1977: 88; Wiedenmayer, 1977b: 113, pl. 14, figs 1–5, text-fig. 128 (as '*Xestospongia subtriangularis*' (Duchassaing), synonymy from Van Soest, 1980: 72).

Description of type species

Haliclona longleyi de Laubenfels, 1932.

Synonymy. *Haliclona longleyi* de Laubenfels, 1932: 54; 1936a: 44, pl. 7, fig. 1, pl. 8, fig. 2. *Neopetrosia longleyi* de Laubenfels, 1949b:10.

Material examined. Lectotype (here designated): USNM 22475 – near Bird Key, Florida Keys, Dry Tortugas, Gulf of Mexico. Schizolectotypes: BMNH 1936.4.8.42 (slide, from de Laubenfels' specimen).

Description. Ramose 30–40 cm high, anastomosing branches 2–5 cm in diameter, erect, with finger-like flattened round lobes (Fig. 2A), fixed to the substratum by a narrow basal portion. Several oscula scattered on one face of the branches, 3–8 mm in diameter, sometimes surrounded by a collar. Surface smooth, extremely porous, rough, minutely hispid. No special surface skeleton. Texture very hard, compact, aquiferous system without large spaces. Colour alive is yellow green on those surfaces which are most exposed to light, and dark olive green on shaded surfaces. Ectosomal skeleton a tangential isodictyal dense surface network composed of one spicule length, with spongin present only at the nodes. Surface hispidation is produced by fine spicule brushes issuing from the nodes of meshes. Abundant free spicules are present. Subectosomal region appears as a compact irregular network of short spicular tracts. About 1 mm below the surface there is a second layer of the same appearance as the surface, described as a 'paper-thin area about 1 mm below the surface' (de Laubenfels, 1953b: 18). In longitudinal sections this layer is very net-like, easily observed (Fig. 2D). Choanosomal network confused with irregular meshes formed by irregular multi- to paucispicular fibres, 3–20 spicule-rows, ("often more than 20", de Laubenfels, 1932), coated by a fine spongin sheath. No interconnecting tracts, but 1–3 spicules are joined by scarce spongin between tracts. Divergent free ends of longitudinal tracts form the ectosomal skeleton (Fig. 2D). Megascleres: are bent oxeas, 104–120–144 μm long, 2–3–4 μm wide, usually of only one size class.

Distribution

Dry Tortugas, Florida, near Bird Key Reef, 1 m depth (de Laubenfels, 1932), Western Bahamas (de Laubenfels, 1949b);

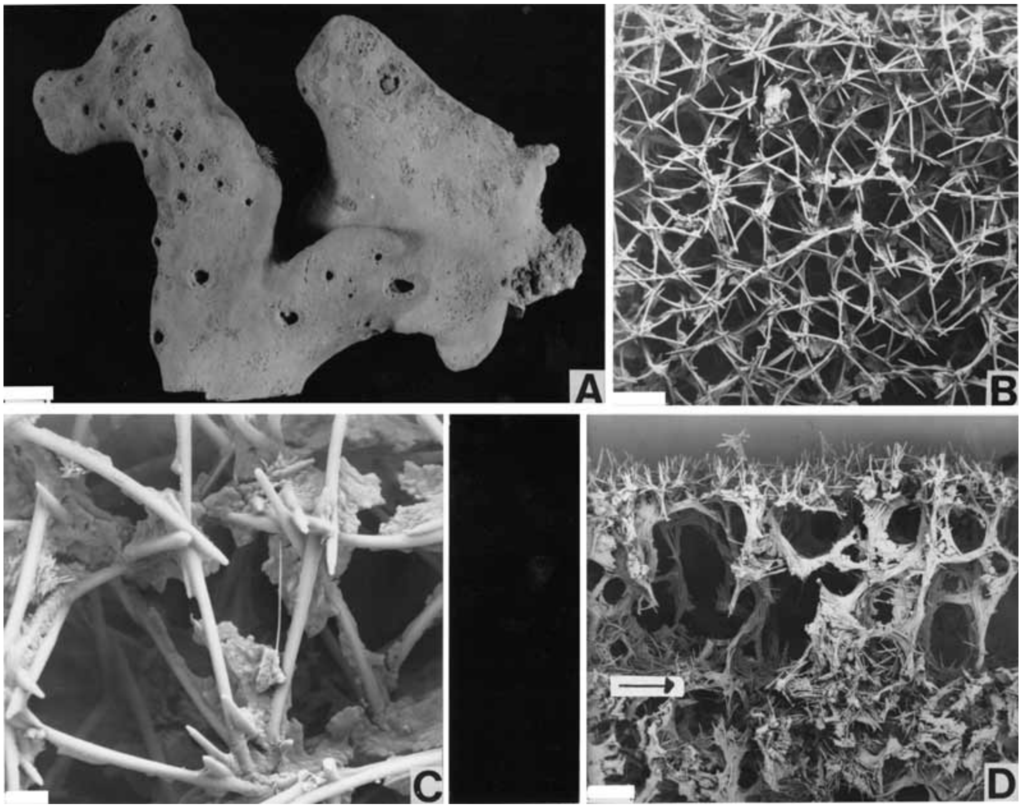

Fig. 2. *Neopetrosia* de Laubenfels, 1949b. A–D, type species, *Neopetrosia longleyi* de Laubenfels, 1949b. A, lectotype USNM 22475 (scale 1 cm). B, ectosomal skeleton, dense and tangential isodictyal surface network of one spicule length (scale 100 μm). C, fine hispid spicule brush issued from nodal points of mesh (scale 20 μm). D, longitudinal section through the surface. Subectosomal region appears as a compact irregular network of short spicule tracts, with a fine 'paper-thin area' (arrow) about 1 mm below the surface (de Laubenfels, 1953b) is clearly visible (scale 200 μm).

Eastern North America (de Laubenfels, 1953b); West of Big Marco Pass, Gulf of Mexico (de Laubenfels, 1953a); West Indian region (de Laubenfels, 1954); La Blanquilla, Veracruz, Gulf of Mexico (Green, 1977).

Remarks. De Laubenfels (1932) observed that his new species was for a long time regarded as being '*Haliclona* ("*Thalysias*') *subtriangularis* Duchassaing & Michelotti", but in his opinion '*H. longleyi* differed from *H.* ('*T.*') *subtriangularis* in having smaller spicules, (the latter being 140 μm in length by 7 μm in diameter), and its colour (green instead of yellow in life, and white instead of drab, when dry, respectively). In *H. longleyi* we also observed a different pattern of tracts, with the choanosomal mesh in *H. subtriangularis* more variable (from 80–200 μm) than in *H. longleyi*. De Laubenfels (1932) remarked that it was more certain Schmidt's (1870: 44) *Schmidtia aulopora* and *H. subtriangularis* were synonyms, than *H. longleyi*.

In Bergquist's (1965) opinion *Neopetrosia* was "incompletely defined" and not different from *Xestospongia*, as defined by de Laubenfels (1950a: 49) and by herself (1965: 151). This is in part supported by the fact that both genera, *Neopetrosia* and *Xestospongia*, are defined as having only a single size class of oxeas. Bergquist (1965) suggested emending "the definition of *Xestospongia* to include sponges with a distinct reticulate skeleton but where the accumulation of spicules may be so great as to obscure this in parts or in all of the sponge, except the subdermal region". Wiedenmayer (1977b: 113) considered characters of *Neopetrosia* as integrating with those of *Xestospongia*, and suggested the former was a junior synonym of the latter, in accordance with Bergquist's (1965) position. Conversely, Van Soest (1980 and *in litteris*) considered *Neopetrosia* to be a valid genus that could include some species which up until now have been placed in *Xestospongia* (e.g., *X. subtriangularis*, *X. exigua* and *X. pacifica*) containing oxeas smaller than 200 μm (atypical for *Xestospongia*).

The choanosomal skeleton of *Neopetrosia* is differently organised from that of *Xestospongia*, with the latter a reticulate coarse arrangement with large meshes lacking any pattern, versus a more compact structure in *Neopetrosia*. *Neopetrosia* also differs from *Xestospongia* in the type of ectosomal network (isodictyal, with one spicule length side-by-side, and spicule brushes at the nodal points), and the possession of a second subectosomal spiculation (Fig. 2D). When comparing the ectosomal skeletons of *Neopetrosia* and *Xestospongia* we observe in both genera an ectosomal layer produced in the same way, but in *Neopetrosia* this consists of a simple tangential unispicular isodictyal network of small spicules, instead of the dense ectosomal brushes of large spicules present in *Xestospongia*. The description of the type species of *Neopetrosia* by de Laubenfels (1949b) did not mention all the characters present in *Neopetrosia longleyi*, but later (de Laubenfels, 1954: 83), in describing *Neopetrosia pandora*, modified its description and mentioning the presence of a typical 500 μm thick, special dark subdermal layer that we also observed in *N. longleyi* (Fig. 2D). We cannot say what the value of this structure is, which is produced by the choanosomal skeleton, consisting of longitudinal fibres of about 500 μm long. This structure is visible as a secondary surface layer overlaying the primary layer, and is similar to the structure observed in other genera of Haplosclerida (e.g., *Callyspongia (Euplacella)*), or a peripheral condensation at the

Table 3. Comparison of morphology, spicule geometry and spicule sizes between *Neopetrosia* and *Xestospongia* (measurements in µm taken from type material, represented as minimum–mean– and maximum dimensions).

Genus	Morphology	Choanosomal Skeleton	Spicules
Neopetrosia de Laubenfels, 1949b	Ramose, lobulate, consistency stiff, surface finely hispid, single isodictyal network of small spicules	Irregular multi-paucispicular tracts, rounded meshes	Oxeas 104–120–144× 2–3–4
Xestospongia de Laubenfels, 1932	Lamellar, massive, surface strongly hispid with abundant brushes of larger spicules	Dense, short discontinuous tracts(6–10 sps)	Oxeas 205–450× 8–30

surface. With regard to the size of its spicules (less than 200 µm long) and the recognizable anisotropic pattern of its skeleton (with a relatively small mesh size), *Neopetrosia* is here considered a valid genus. In Van Soest's opinion *(in litteris)* at least *H. longleyi*, *H. subtriangularis* and *X. exigua* are members, as well as many of the similar 'hard' *Reniera*/ *Haliclona* species described in the literature (e.g., *X. pacifica*).

Neopetrosia has also been compared with *Petrosia* based on their similar external morphology and consistency in the dry state. They differ especially in their ectosomal skeleton and the size categories of their spicules.

PETROSIA VOSMAER, 1885

Synonymy

Refer to subgenera.

Type species

Rayneria dura Nardo, 1833 (by monotypy).

Definition

Petrosiidae with an ectosomal triangular or polygonal reticulation of spicule tracts or single spicules, usually echinated at the nodes or along the tracts by a smaller category of spicules. Choanosomal skeleton basically a lamellate-isotropic reticulation of spicule tracts, and an interstitial unispicular reticulation. Megascleres with distinct size categories of strongyles or oxeas, often with a special category of ectosomal microxeas.

Diagnosis

Petrosiidae with a tangential specialised ectosomal unispicular network (subgenus *Petrosia*) or a very dense irregular tangential ectosomal reticulation of free strongyles of different sizes, mostly large microxeas (subgenus *Strongylophora*). Choanosomal skeleton a dense network of thickly crowded spicule tracts producing rounded meshes. A dense interstitial reticulation of free spicules gives the sponge a stony texture. Megascleres include oxeas and strongyles or only strongyles. Microscleres present or absent, when present are centrangulate microxeas.

Distribution

Mediterranean; Central Atlantic, North, central and South Pacific Oceans; Indian Ocean.

Previous reviews

Refer to subgenera.

Remarks

Prior to the creation of the family Petrosiidae (Van Soest, 1980) *Petrosia* was associated with different genera and often assigned to Renieridae Schmidt, 1870 (=Chalinidae). Topsent (1928c) considered differences between micro- and megascleres, observed in some genera of Haplosclerida, e.g., *Strongylophora* and *Petrosia*, as invalid, and his concept of *P. dura* includes specimens exhibiting microstrongyles and microxeas in the ectosomal skeleton. For the same reason, *Strongylophora sensu* Topsent (1928c) should fall into synonymy with *Petrosia*.

The history of the genus is convoluted. De Laubenfels (1936a) considered *Petrosia* as a genus exhibiting the most complicated spiculation of megascleres of the Adociidae (=Chalinidae), in which he also included species originally described as *Petrosia* that he later transferred to *Xestospongia* (viz., *X. exigua*, *X. testudinaria* and *X. muta*). Lévi (1973) remarked on the predominance of silica over spongin as the principal characteristic of Renieridae (including *Petrosia*), and associated genera such as *Reniera*, *Petrosia*, *Pachychalina* and *Gellius*, with genera displaying the characters of Phloeodictyidae (e.g., *Oceanapia*, *Calyx*, *Pellina*).

Van Soest (1980) considered that *Petrosia* and *Strongylophora* were distinct from these other 'Renieridae' owing to their possession of small strongyles. More recently, however (Van Soest, pers. comm.), he suggests that this may not be the case, and furthermore, the presence or absence of 'microxeas' may have a poor taxonomic value at the supra-specific level. Supporting evidence to differentiate *Strongylophora* from *Petrosia* also came from their different chemical profiles published within the marine natural products chemistry literature, with *Petrosia* reported to have hydroxylated acetylenes and *Strongylophora* strongylophorines. More recently, Van Soest (pers. comm.) identified a 'typical' *Strongylophora* (i.e., with all the spicule types found in the type species), having acetylenes very similar to those in many *Petrosia*. Morphological differences between the type species of both these genera were found mainly in their different spicule morphologies and size classes, but these differences, in the opinion of Van Soest (*in litteris*), are just two or three size classes which are commonly found in *Petrosia* species: large oxeas (oxeote or strongylote) of the main skeleton, small oxeas or strongylotes of the surface and an intermediate class often found, but not always present. When only strongyles are present in other Petrosiidae there is always a category of 'juvenile' thinner oxea spicules, but in typical *Strongylophora* the strongyles and oxeas have similar dimensions and can be matched easily, and thus the latter clearly do not represent 'juvenile' spicules. In the type species of *Strongylophora, S. durissima*, and in several other species the smallest spicules are sharply pointed oxeas, abruptly curved at the middle. In Van Soest's opinion (*in litteris*), if a difference between *Petrosia* and *Strongylophora* exists, it is perhaps found in this spicule type. Thus we relegate *Petrosia* and *Strongylophora* to subgenera of a single genus taxon, with *Petrosia* being the senior most available name.

Chalinorhaphis Lendenfeld, 1887, with type species *Chalinorhaphis armata* Lendenfeld, 1887: 821, pl. XXVIII fig. 1 (by subsequent designation, de Laubenfels, 1936a), is considered here as a probable synonym of *Petrosia* based on the reported size of its oxeas (450 × 30 μm and the form of its skeletal meshes. It is described as being irregularly massive, with hard texture, 10 × 3 cm, with its skeleton a reticulation of spiculofibres (70 μm diameter) forming large meshes (1000 μm diameter). However, this synonymy is tentative as the genus is poorly known only from its type locality (Port Jackson, NSW) (Hooper & Wiedenmayer, 1994).

We recognize in the genus *Petrosia* the possession of a lamellate skeleton with regular isodiametric meshes, where the primary and secondary fibres are present but indistinguishable, and the presence of spicules typical of the family (oxeas or strongyles), as the typical diagnostic characters of the genus *Petrosia*. Aside from these singular traits we cannot ignore its affinity with genera displaying similar ectosomal skeletons, of varying degrees of development. For example, the extremely dense tangential ectosomal skeleton of *Petrosia* is reminiscent of the crust-like ectosomal skeleton of *Cribrochalina* (Niphatidae), *Sclerochalina* (=*Siphonochalina*) and *Callyspongia (Euplacella)* (Callyspongiidae). Wiedenmayer (1977b) also associated *Cribrochalina* [in part] with *Petrosia* and *Xestospongia*, assigning them all to the family Nepheliospongiidae. In Van Soest's (1980) opinion the structure of *Cribrochalina* (with strong primary fibres, rich in spongin and radially distributed to form a crust), is very different from the isotropical mesh of *Petrosia* and the skeletal structure of *Xestospongia*.

There is still some debate about the affinities of the type species of *Petrosia, Reniera dura* (Nardo) with other nominal taxa, and we suggest that this issue cannot be resolved through morphometric data alone. As an example, some authors considered the type species to be a synonym of *P. ficiformis* (Poiret, 1789a [1980]) (e.g., Rützler, 1965: 39; Wiedenmayer, 1977b: 113; Desqueyroux-Faúndez, 1987: 187), and the micrometries of both species (Table 3) illustrate the difficulty in separating these species based on morphometrics alone. Balsamo Crivelli (1863) described four species of *Schmidtia* (*S. ficiformis, S. fungiformis, S. clavata* and *S. dura*), which according to Schmidt (1864: 42) comprised only two taxa (*S. dura* and *S. clavata*). Vosmaer (1885b) also suggested that *S. aulopora* and *S. muta* (=*Xestospongia*), described later by Schmidt (1870: 44, 45), might also belong to *S. dura*. This potential synonymy cannot be resolved at present. Topsent (1892a: 68; 1904) described *P. clavata* from the Azores, emphasising the possession of 'kidney shaped' spicules in these populations contrasting to the possession of 'short strongyles' in *P. dura*, with the implication that such geometric differences in spicule morphologies may be pivotal to their specific identities. Similarly, the number, position and size of oscules in species of *Petrosia* vary significantly and might provide an additional character to differentiate species of *Petrosia*. Ultimately, however, future revisions of *Petrosia* must use characters other than those described above, which are widely open to subjective interpretation (e.g., chemical and molecular data), to more precisely define species and reconstruct the phylogeny of *Petrosia*.

We also include in the synonymy of *Petrosia*, the genus *Pharetronema* Sollas, 1879b: 404 (type species *Pharetronema zingiberis* Sollas, 1879b: 404, pl. XXX, figs 1–15 from Jamaica). A part of the type specimen, which was deposited in the Bristol Museum, is kept in the Natural History Museum, as a dry specimen accompanied by two slides (BMNH 1909.8.15.1). The material consists of two pieces of branches, each 2 cm long and 1.5 cm diameter, surface smooth, but undulated, no apparent oscules. The original specimen is a much larger hand-shaped form with seven branches. The skeleton consists of a reticulation of thick spicule bundles, making elongated meshes. At the surface there are ectosomal spicule brushes composed of smaller spicules than those of the subectosomal and choanosomal bundles. Megascleres oxeas in at least two size categories, 250–280 × 10 μm and 30–40 × 2 μm. The structure and spiculation of this sponge conform to the genus *Petrosia*, and the species may be identical to the species described by Wiedenmayer (1977b: 123) as *Cribrochalina dura* (Wilson, 1902). Thus, *Pharetronema* is a synonym of *Petrosia*, and because it is a senior name, it has to be suppressed under ICZN Article 23.9 as an unused name (not used after 1899) in favour of *Petrosia* which has been used more than 25 times by 10 different authors in the past 50 years.

SUBGENUS *PETROSIA* VOSMAER, 1885

Synonymy

[*Schmidtia*] Balsamo Crivelli, 1863 (preocc.). [*Pharetronema*] Sollas, 1879b: 404 (*nomen oblitum*). *Petrosia* Vosmaer, 1885b: 338. ? *Tedaniella* Czerniavsky, 1879: 376 (uncertain affinity). ? *Chalinorhaphis* Lendenfeld, 1887: 821.

Type species

Reniera ? dura (Nardo, 1833) (by monotypy).

Definition

Petrosia with spicule complement including two or three size categories of oxeas or strongyles, in which the smallest is concentrated at the surface.

Diagnosis (emended from Van Soest, 1980 and De Weerdt, 1985)

Petrosia with a tangential specialised ectosomal unispicular network, and a very dense lamellate-isotropic choanosomal skeletal network of thickly crowded spicule tracts producing rounded meshes, forming layers parallel to the surface. A dense interstitial reticulation of free spicules gives the sponge a stony texture. Megascleres at least two distinct size categories of oxeote or strongylote spicules. Microscleres absent.

Distribution

Mediterranean; Central Atlantic, North, central and South Pacific Oceans.

Previous reviews

Topsent, 1892a: 68; 1904: 240; Dendy, 1905 (in part): 144; Bergquist & Warne, 1980: 35; Van Soest, 1980: 74; Desqueyroux-Faúndez, 1987: 181; De Weerdt, 1985: 82; Fromont, 1991: 87.

Table 4. Comparisons between various specimens of *P. dura* (Nardo) and *P. ficiformis* (Poiret) (measurements in μm, taken from the literature or our *own observations, represented as minimum–maximum, or minimum–mean and maximum dimensions).

Species, material	Locality (Growth form)	Oxeas	Oxeote/ Strongylote	Affinities
R. dura				
Schmidt, 1862	Sebenico (massive-lobate)	not recorded	not recorded	*P. ficiformis* lectotype
*BMNH 1867.7.26.18	Lesina, Adriatic (massive-lobate)	30–58 × 2–3	182–237 × 10–14	
*LMJG 15330/169	Lissa, Lesina (massive-lobate)	38–58–96 × 2–3 67–79–112 × 5–6 40–136 × 6–10	107–162–180 × 6–8–12 150–175–400 × 10	
P. ficiformis				
Topsent, 1933	Indian Ocean ? (massive-branched)	250–280 × 15 *280–310 × 20–22	microxeas sausage-shaped	probably *Strongylophora*
Rützler, 1965	Rovinj (massive 2–160 cm^2)	25–260/4–12	not recorded	*P. ficiformis*
Pulitzer-Finali, 1977	Bay of Naples (habit not recorded)	45–230/6.7	absent	*P. ficiformis*
Sarà, 1972	Mediterranean (massive, branched-lobate)	not recorded	not recorded	*P. ficiformis*
Desqueyroux-Faúndez, 1987	Ambon (massive-lobate tubes: 21 × 7.5–10 cm)	not recorded	74–140 × 3.2 218–286 × 6.4	*Petrosia*/ *Strongylophora* sp.
De Weerdt & Van Soest, 1986	SE North Atlantic (ramose-repent, massive-flabelliform, 6 ×3.5 × 5 cm)	small oxeas 45 × 1 50 × 3.5 65 × 5	middle-sized oxeas 120–200 × 1.5–2.5 140 × 7.5 large-sized oxeas 240 × 10–15	*P. ficiformis*

Description of type species

Petrosia dura (Nardo, 1833) (Fig. 3).

Synonymy. *Rayneria dura* Nardo, 1833: col. 519; *Reniera ? dura*; Schmidt, 1862: 76, pl. 7 fig. 13, 13a–e. *Schmidtia dura*; Balsamo Crivelli, 1863: 293; pl. 5 figs 1–3. *Petrosia dura*; Vosmaer, 1885b: 338. Non *Cribrochalina dura sensu* Wiedenmayer, 1977b: 123.

Material examined. Lectotype (here designated): LMJG 15330 (dry) – Lissa, Lesina. Other material. LMJG 15627 (dry) – Sebenico. BMNH 1867.7.26.18 (dry) – Lesina, Adriatic. BMNH 1867.3.11.48 (slide), 1877.5.21.321 (dry) – Adriatic (Bowerbank collection, 'fragments from Schmidt').

Description. Massive sponge, irregularly globular, with a large base that produces several fused lobes of 35–40 mm in diameter and up to 80 mm high. Aquiferous system with a terminal deep aquiferous cavity connected with a unique volcano-shaped osculum at the end of the lobes. Numerous oscules in the internal wall of the aquiferous cavity. Surface smooth, fine, compact, covered by a fine ectosomal layer, hispid to the touch. Texture hard, firm. Ectosomal skeleton a fine layer of free spicules, about 1 mm deep, producing a tangential compact network with isodiametrical meshes. Choanosomal skeleton a regular system of multispicular compact tracts or fibres with isodiametrical meshes without differences between primary and secondary fibres. Free spicules abundant. Spongin not visible. Megascleres (Table 3) oxeas, strongyloid, oxeote or strongylote in three sizes, the larger ones oxeote to strongylote, 182–212–400 μm long, 10–13–14 μm wide; the medium-sized ones oxeas, 40–80–136 μm long, 5–7–10 μm wide; the small ones oxeas, 30–58–96 μm long, 2–3 μm wide. Within the last category of oxeas we also observed some bent strongyles of the same size.

Remarks. Refer to genus.

Distribution

Naples, Rovinj, Adriatic, SE North Atlantic; Ambon, Indonesia; Abrolhos Islands, Western Australia.

SUBGENUS *STRONGYLOPHORA* DENDY, 1905

Synonymy

Strongylophora Dendy, 1905: 141, pl. 9 fig. 1; Wilson, 1925: 391.

Type species

Strongylophora durissima Dendy, 1905: 141 (by monotypy).

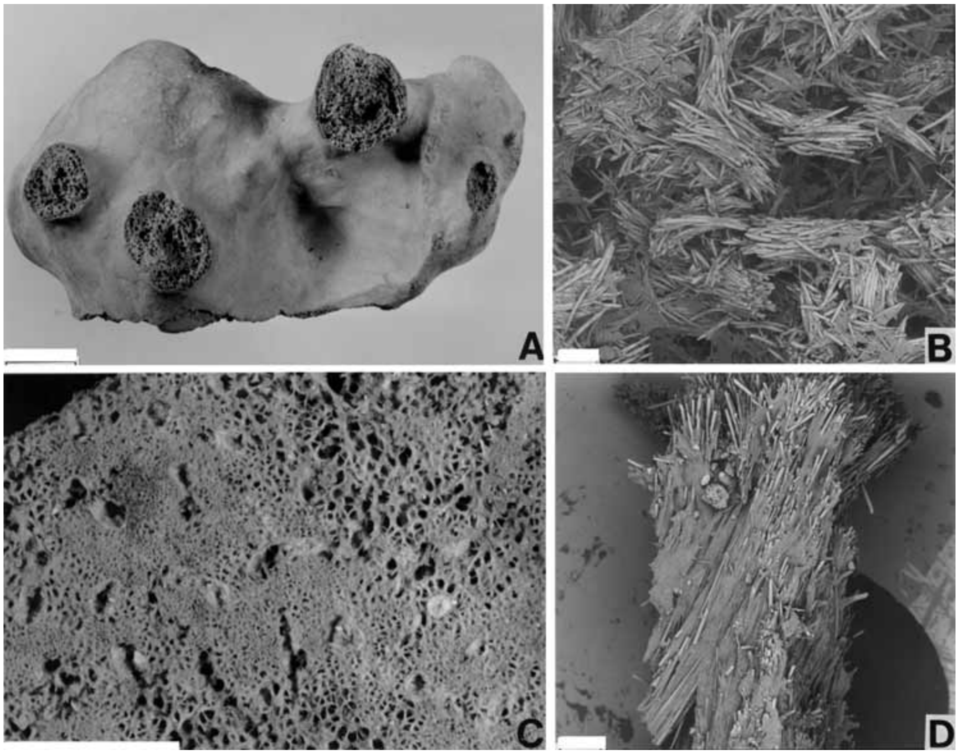

Fig. 3. *Petrosia* (*Petrosia*) Vosmaer, 1885b. A, lectotype LMJG 15330/169. B, *Alcyonium ficiformis* Lamarck, Lamarck collection BMNH 1954.2.20.80, enlarged view of the surface (scale 200 μm). C, lectotype, surface, tangential view (scale 1 cm). D, Schmidt's specimen LMJG 15330/169, compact choanosomal fibres (scale 500 μm).

Definition

Petrosia with three to five categories of oxeas or strongyles, including centrangulate microxeas.

Diagnosis (emended from Dendy, 1905)

Petrosia with a very dense irregular tangential ectosomal reticulation of free strongyles and oxeas of different sizes echinated by small centrangulate microxeas. Large strongyles are grouped and radiate from the nodes. Small bundles of short strongyles (sometimes sausage-shaped) are also present at the nodes, giving the surface its granular appearance. Choanosomal skeleton a dense network of strongyles which are partly assembled to form strong tracts with no visible spongin. An interstitial network of connecting tracts of strongyles and free strongyles gives the sponge a stony texture.

Distribution

Shallow waters of warm-temperate and tropical seas. Indian Ocean (Sri Lanka), and Indo-west Pacific, from Western Australia to Vanuatu (Hooper & Wiedenmayer, 1994; Hooper, pers. comm., unpublished data).

Previous reviews

Topsent, 1917; 1928c; de Laubenfels, 1934: 19; 1936a: 70; 1950a: 64; Van Soest, 1980: 78; Wilson, 1925: 323.

Description of type species

Strongylophora durissima Dendy, 1905 (Fig. 4).

Synonymy. Dendy, 1905: 141, pl. 9, fig. 1; Wilson, 1925: 393.

Material examined. Lectotype (here designated): BMNH 1907.2.1.37 – Ceylon, Indian Ocean, Herdman Collection (RN 156). Other material. Specimens of *Strongylophora durissima*: BMNH 1926.9.3.54 (dry)- South Africa, Gilchrist Collection (RN 271). BMNH 1926.9.3.23 (dry) – South Africa, Gilchrist Collection (RN 88). BMNH 1926.9.3.84 (dry) – South Africa, Gilchrist Collection (RN 15). BMNH 1926.9.3.85 – South Africa, Gilchrist Collection (RN 267). BMNH 1904.12.1.32–44 (several dry specimens) – South Africa, Gilchrist Collection.

Description. Sponge massive, irregularly depressed or cake-like, subcylindrical and slightly ramose (Fig. 4A). Surface very uneven and wrinkled, with grooves and ridges, minutely and uniformly granular. Sponge relatively cavernous (Fig. 4B) with few large oscules irregularly scattered, representing the opening of wide aquiferous canals. Numerous ostia are scattered in between the mesh of the ectosomal skeleton. Texture hard, stony, brittle. Ectosomal skeletal network (Fig. 4C) clearly differentiated from the choanosomal skeleton in the form of a tangential network of large and abundant free strongyles and loose tracts of strongyles or single strongyles forming the sides of irregularly triangular or quadrangular meshes. At the angular points ('corners') of the strongyle-tracts are groups of very short strongyles which form surface nodes that produce the granular-aspect of the surface. Abundant smaller spicules, resembling large microxeas, are also present in the meshes. Choanosomal skeleton very dense, compact

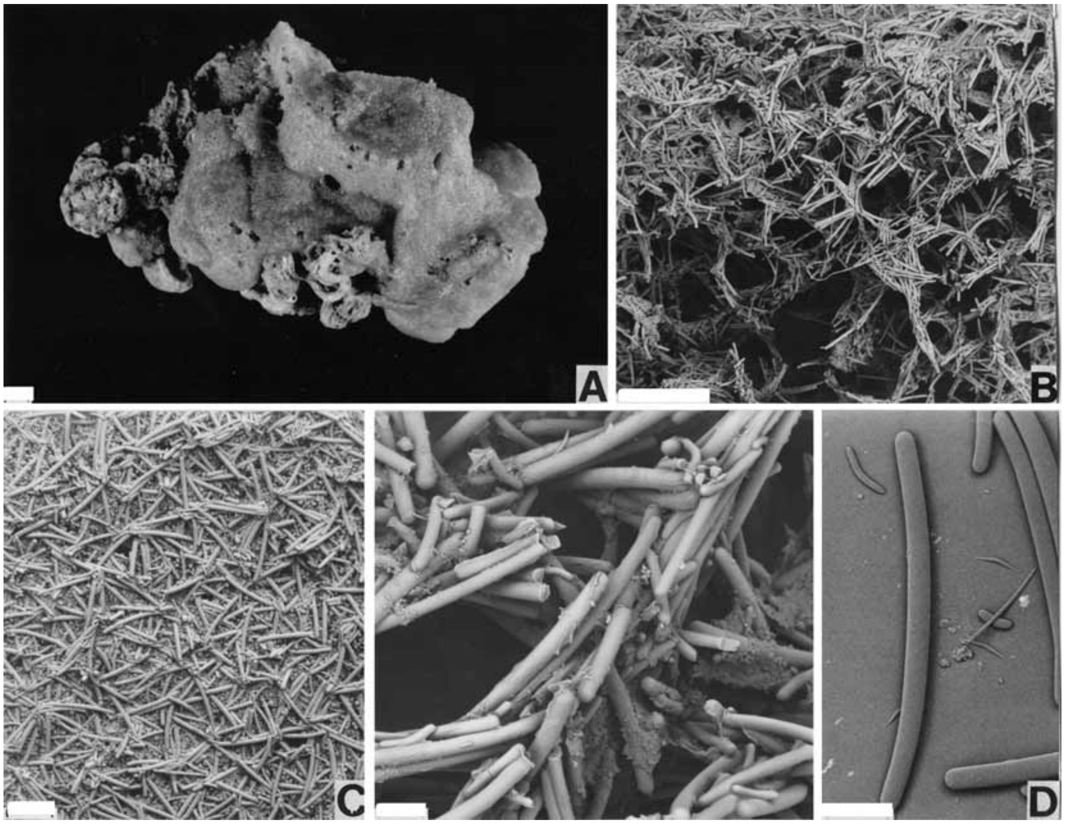

Fig. 4. *Petrosia* (*Strongylophora*) Dendy, 1905. A–D, type species, *Strongylophora durissima* Dendy, 1905. A, holotype BMNH 1907.2.1.37 (scale 1 cm). B, longitudinal section through the surface, on top (scale 500 μm). C, ectosomal tangential network of large and abundant free strongyles and loose strongyle-tracts or single strongyles forming the sides of irregularly triangular or quadrangular meshes (scale 200 μm). D, choanosomal tracts and view of spicules, long and small strongyles, oxeas and microxeas (scale 50 μm).

sub-rectangular network (Fig. 4D) with small meshes produced by stout spicular tracts of closely packed strongyla and free spicules. Toward the surface are stout multispicular longitudinal tracts formed by radiating bundles of single strongyles, closely packed, without visible spongin. Numerous free strongyles and microxea-like spicules are present between the tracts. Megascleres (Fig. 4D) included larger strongyles, stout, regularly bent or centrangulate, with rounded ends, 156–208–238 μm long, 12–14–20 μm wide; slender strongylotes, 143–200–230 μm long, 4–7–8 μm wide, and oxeotes, 164–193–205 μm long, 4 μm wide; and a second category of strongyles occurs in the ectosomal skeleton (some sausage-shaped, not considered to be microscleres; Dendy, 1905), 20–34–53 μm long, 4–7–8 μm wide; and smaller microxea-like spicules, centrangulate, 28 μm long, 2 μm wide (Dendy, 1905), 21–26–30 μm long, 2–3 μm wide (re-examination of type material). These microxea-like spicules are especially abundant in the dermal membrane, but less common in the choanosomal skeleton.

Remarks. *Strongylophora* is a remarkable subgenus, in spite of its doubtful taxonomic position due to its ubiquitous possession of microxeas (considered as microscleres by Dendy, 1905, but perhaps representing only ‘juvenile’ spicules – see remarks for genus *Petrosia*). Topsent (1917) compared *Strongylophora* with his genus *Microxina*, with resemblance between their respective skeletal structures and the presence of microxeas in both. In addition, both genera shared a ‘fibrous skeleton’, which in Topsent’s (1917) opinion was reason enough to include them in Axinellidae. Later (Topsent, 1928c) reconsidered his opinion of the microxeas in *Strongylophora* and suggested that they did not represent real microscleres but were reduced and modified megascleres. Consequently, *Strongylophora sensu* Topsent is a synonym of *Petrosia*.

De Laubenfels’ (1934: 19, 1936a: 70, 1950a: 64) concept of *Strongylophora* included strongylote megascleres, oxeas, rhaphides and microrhabds or sigmas as microscleres, approaching closely the concept of *Sigmadocia* (=*Haliclona*) (e.g., *S. amphioxa* de Laubenfels, 1950a from Bermuda exhibits a typical Chalinidae skeleton; *S. amphioxa* and *S. rampa* de Laubenfels, 1934 with large strongyles and oxeas, were transferred to *Adocia* and *Xestospongia*, respectively, by Van Soest, 1980). Only a few species of *Strongylophora* have been described to date although a thorough revision of *Petrosia* species is required to distribute species based on possession of strongylote oxeas and smaller sausage-shaped strongyles to subgenus *Strongylophora*. This is the case for *Petrosia strongylata* Thiele (1900: 938), which was transferred to *Strongylophora* (Van Soest, 1980: 78) and *P. ushitsuensis* Tanita, 1963 (transferred here to *Strongylophora*). There are undoubtedly many more putative species of *Petrosia* that require re-evaluation. Pulitzer-Finali (1996) included *Strongylophora corticata* Wilson, 1925 in his genus *Tabulocalyx* Pulitzer-Finali, 1993 (Phloeodictyidae), which is clearly a *Strongylophora* since it contains small sausage-shaped strongyles. The choanosomal network of *Strongylophora* exhibits a very strong, compact skeletal structure, typical of the Petrosiidae type of skeleton, especially near the surface where roundish surface meshes are evident and the ectosomal skeleton structure appears as

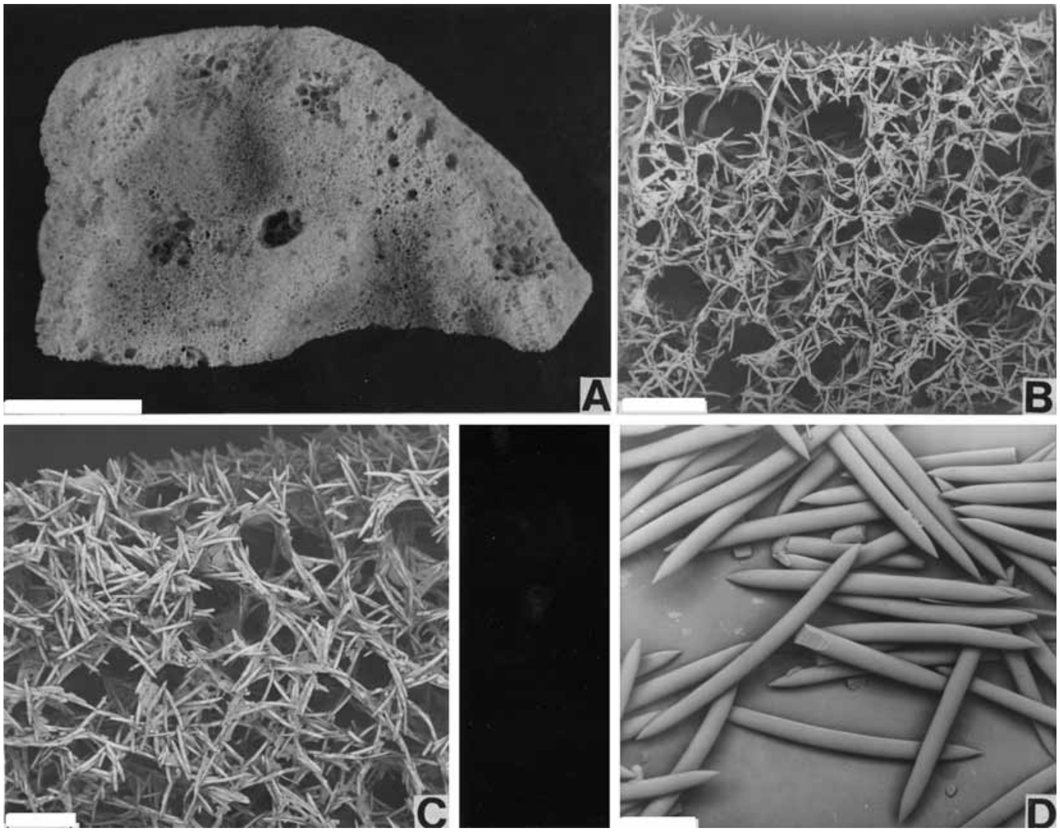

Fig. 5. *Xestospongia* de Laubenfels, 1932. A–D, type species, *Haliclona diprosopia* de Laubenfels, 1930. A, holotype USNM 21509, lamellar subspherical specimen (scale 1 cm). B, longitudinal section through the surface, showing ectosomal tangential disordered network of abundant spicule brushes (scale 1 mm). C, choanosomal skeleton, showing a highly dense network of short longitudinal undivided irregularly parallel tracts, pauci- to multispicular (scale 500 μm). D, oxeas (scale 100 μm).

a single tangential layer, which is clearly different from the choanosomal skeleton.

Ridley & Dendy (1887: 13) mentioned *Reniera crateriformis* Carter, 1882b as possessing sausage-shaped spicules although Carter's original description did not mention these. Hooper & Wiedenmayer (1994) included *R. crateriformis* in synonymy with *Xestospongia testudinaria* but confirmation of this synonymy is impossible since the BMNH holotype was not found.

XESTOSPONGIA DE LAUBENFELS, 1932

Synonymy

Xestospongia de Laubenfels, 1932: 115, fig. 69; 1936a: 46. ? *Densa* de Laubenfels, 1934: 14. ? *Quepanetsal* de Laubenfels, 1954: 180, fig. 119.

Type species

Haliclona diprosopia de Laubenfels, 1930 (by original designation).

Definition

Petrosiidae with an ectosomal skeleton consisting only of an isotropic reticulation of single spicules or spicule tracts.

Diagnosis

Petrosiidae lacking a special ectosomal skeleton, but a tangential disorganised network of free spicules which originate from the terminal ends of choanosomal tracts. Choanosomal skeleton a dense network of short longitudinal undivided pauci- to multispicular tracts of 6–10 spicules, connected by few oxeas. Roundish to polygonal large-spaced meshes delimited by unordered spicules. Free spicules are not present, but spicule brushes formed by the ends of connecting spicules are visible on the internal part of the mesh walls. Megascleres: oxeas with some strongylote and stylote forms, in a single size class, slightly bent, variable in size but not assigned to more than one class, larger than 200 μm long. Microscleres absent.

Distribution

West Indies, Cape Verde Islands, Boreal Pacific, Mediterranean, Atlantic, Boreal E Atlantic, West Africa, Australia and Antarctica (Van Soest, pers. comm.).

Previous reviews

De Laubenfels, 1936a: 46; 1950a: 49; 1954: 80; Bergquist, 1965: 149; Van Soest, 1980: 66; Bergquist & Warne, 1980: 36; Desqueyroux-Faúndez, 1987: 194; Fromont, 1991: 79; Hooper & Wiedenmayer, 1994: 329.

Description of type species

Haliclona diprosopia de Laubenfels, 1930 (Fig. 5).

Synonymy. *Haliclona diprosopia* de Laubenfels, 1930: 28; 1932: 115; Wiedenmayer, 1977b: 112.

Material examined. Holotype: USNM 21509 – California, Monterey Bay, coll. Rickets, 1929. Other material. BMNH 1929.8.22.59, 59a (dry specimen and slide) – Monterey Bay, California (label "Haliclona diprosopata de Laubenfels, MS, 1932").

Description. Lamellar subspherical, massive sponge (Fig. 5A). Aquiferous system represented by numerous oscula, 3 mm in diameter, scattered on one face of the lamellae, connected with shallow subdermal cavities with numerous ramifications. The non-oscular side is pierced by numerous ostia, at least 10 μm in diameter (de Laubenfels, 1932). Compact sponge without large aquiferous spaces. Surface smooth, rough, regularly and strongly hispid. Texture, hard, friable. Ectosomal skeleton a tangential disordered network of abundant spicule brushes formed by the ectosomal ends of choanosomal longitudinal tracts producing a strongly hispid surface (Fig. 5B). Choanosomal skeleton a highly dense network (Fig. 5C) of short longitudinal undivided, irregularly parallel tracts, pauci- to multispicular (6–10 spicules). Longitudinal tracts are not continuous and there are a variable number of short longitudinally interconnecting tracts parallel to the principal tracts, contributing to the high density of the skeleton. Primary tracts are interconnected by only a few oxeas or bundles of spicules (4–6), with scarce or no visible spongin, forming round to polygonal meshes, with no free spicules but obscured by ends of connecting oxeas and spicules from the longitudinal tracts of the choanosomal skeleton. Megascleres (Fig. 5D) oxeas with some strongylote and stylote forms, slightly bent and with ends of the same diameter. Spicules in only one size category showing variability only in thickness, and thus they are probably growth stages, 254–352–450 and 205–296–387 μm long, 16–23–30 and 8–10–12 μm wide.

Remarks. Slides prepared from the BMNH specimen do not correspond to the skeleton described by de Laubenfels (1932). Bergquist (1965) already remarked on this discrepancy, which primarily concerns measurements of the choanosomal reticulation and well-identified mesh differentiation which were not mentioned by de Laubenfels (1932). Bergquist (1965: 150) also remarked on the practical difficulties in differentiating *Xestospongia* from *Neopetrosia* based only on the generic diagnosis, whereas we conclude, from examination of respective type material that differences in choanosomal skeletal structure, and especially spicule micrometries, exist between both genera that are sufficient to distinguish them at the generic level, supporting their continued recognition as distinct taxa (see remarks for *Neopetrosia*). Like this latter genus *Xestospongia* has only a single size class of oxeas, although both may be distinguished by the relatively larger size of oxeas in *Xestospongia*, larger than 200 μm long.

Zea (1987) included *Densa araminta* de Laubenfels, 1934 (type species of *Densa* de Laubenfels, 1934, by original designation), in the synonymy of *Xestospongia proxima* (Duchassaing & Michelotti, 1864). In this work, we tentatively designated the genus *Densa* as subjective junior synonym of *Xestospongia*. Van Soest (*in litteris*) studied a fragment of *Quepanetsal madidus* de Laubenfels, 1954, from the west Central Pacific, a species associated with Halichondriidae by de Laubenfels. In the opinion of Van Soest this genus is definitely a haplosclerid and probably a *Xestospongia*. The alleged roughened rounded ends of the oxeas are just telescoped endings, common to some other Petrosiidae species. The strongyles are the dominant and mature spicule, the oxeas being obvious growth stages (same length and only slightly thinner than the oxeas). In this work, we also tentatively consider *Quepanetsal* as subjective junior synonym of *Xestospongia*.