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Family Chalinidae Gray, 1867

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Chalinidae Gray (Demospongiae, Haplosclerida), including synonyms Renieridae Ridley, Gelliidae Ridley, Haliclonidae de Laubenfels and Adociidae de Laubenfels, belongs to the suborder Haplosclerina together with Callyspongiidae de Laubenfels and Niphatidae Van Soest. Chalinidae have a world-wide distribution with possibly hundreds of extant species living in all parts of the oceans. Twenty-seven nominal genera have been described, but only four genera are presently considered valid: *Chalinula, Cladocroce, Dendroxea* and *Haliclona*, the latter containing the subgenera *Gellius, Halichoclona, Haliclona, Reniera, Rhizoniera* and *Soestella*. Chalinidae differ from other haplosclerid families by the possession of a unispicular tangential ectosomal skeleton and a choanosomal skeleton with unispicular secondary lines. Characters in common with other marine haplosclerid families are smooth, diactinal megascleres and microscleres, if present, in the form of sigmas, toxas, raphides and microxeas. Some species exhibit extremely high variability in morphological characters, inhibiting their reliable identification by the non-specialist, whilst others are remarkably constant in their features.
Keywords: Porifera; Demospongiae; Haplosclerida; Haplosclerina; Chalinidae; *Chalinula*; *Cladocroce*; *Dendroxea*; *Haliclona (Gellius)*; *Haliclona (Halichoclona)*; *Haliclona (Haliclona)*; *Haliclona (Reniera)*; *Haliclona (Rhizoniera)*; *Haliclona (Soestella)*.

DEFINITION, DIAGNOSIS, SCOPE

Synonymy

Chalinidae Gray, 1867a: 511. Renierinae Schmidt, 1870: 39. Gelliadae Gray, 1872a: 449. Renieridae Ridley, 1884a: 406. Gelliidae Ridley, 1884a. Gelliinae Ridley & Dendy, 1887: 37. Haliclonidae de Laubenfels, 1932: 111. Adociidae de Laubenfels, 1936a: 65.

Definition

Haplosclerina with a delicate reticulated choanosomal skeleton of uni-, pauci- or multispicular primary lines, which are regularly connected by unispicular secondary lines. Ectosomal skeleton, if present, a regularly hexagonal, unispicular, tangential reticulation.

Diagnosis

Thickly encrusting, cushion-shaped, ramose or tubular growth forms, cushion-shaped sponges commonly with oscular chimneys or mounds. Consistency soft to rather firm, also spongy. Colour purple, violet, pink, brown, blue or green, occasionally white. Megascleres smooth oxeas or strongyles, microscleres, if present, sigmas, toxas, raphides or microxeas.

Scope

Twenty-seven nominal genera have been described, four of which are considered valid: *Chalinula, Cladocroce, Dendroxea* and *Haliclona* (with the subgenera *Haliclona, Reniera, Halichoclona, Soestella, Gellius*, and *Rhizoniera*).

History and biology

The taxonomic history of Chalinidae is long and complicated, and only the main developments can be dealt with here. The name Chalinidae was proposed by Gray in 1867 for a group of highly unrelated sponges of the order Keratospongia ('horny sponges') with a 'skeleton formed of regular, reticulated, anastomosing, horny fibres, which have one or more series of regular small siliceous spicules in the central lines'. Gray (1867a) assigned nine genera to the family, including *Isodictya, Acanthella, Clathria*, and *Astrospongia*, but only the first mentioned genus, *Chalina* Bowerbank (which is a junior synonym of *Haliclona* Grant, 1836), is a 'true' chalinid as presently understood. That Gray's definition was far too wide is also obvious from the work of Lendenfeld (1887c) who took the liberty to add many more genera to the family, most of which are incompatible with the currently accepted concept of Chalinidae. Three more families were later proposed by different authors, all three comprising a wide range of genera, of which the type genera are closely related to *Haliclona*. Renieridae Schmidt (1870), was established without a clear definition, for *Reniera* (subgenus of *Haliclona*), *Amorphina, Pellina, Eumastia* (all Halichondriidae), *Foliolina* (Phloeodictyidae), *Tedania* (Tedaniidae), *Schmidtia* (Petrosiidae), *Plicatella* (Microcionidae), and *Auletta* (Axinellidae). Gelliadae was erected by Gray (1872a) as part of the order Hamispongia ('Sponge horny or fleshy, strengthened with fusiform or needle-like spicules, interspersed with anchorate or bihamate spicules.'), for sponges with 'defensive spicules filiform' (*Gellius* (subgenus of *Haliclona*), *Biemna* (Desmacellidae), *Asychis* (*Gellius*, subgenus of *Haliclona*) and *Oceanapia* (Phloeodictyidae)) and sponges with 'defensive spicules clavate at the end' *(Dymnus (Damo))*. In 1936 de Laubenfels erected the family Adociidae, as part of the order Poecilosclerida for sponges with a 'special dermal skeleton' and included, apart from the type genus *Adocia* (*Haliclona*, subgenus of *Haliclona*), such widely divergent genera like *Melophlus* (Ancorinidae), *Menanetia* (Halichondriidae), and *Protoschmidtia* (Chalinidae, *incertae sedis*). Topsent (1928c) included the first three families, as subfamilies of the family Haploscleridae, in a newly created order Haplosclerida. Although he accepted various kinds of choanosomal skeletal architectures, he made the 'Haploscleridae' [name corrected to Haliclonidae by de Laubenfels, 1932, which is a junior synonym of Chalinidae] much more comprehensible by allowing only diactinal spicules as megascleres ('mostly oxeas, sometimes strongyles' [translated]), only sigmas, toxas, microxeas

and raphides as microscleres, and excluding sponges with echinating spicules. He used the subfamily Gelliinae for sponges with microscleres, the Renierinae for sponges with spicule-reinforced skeletons, and the Chalininae for sponges with spongin-reinforced skeletons. Since the addition of the family Adociidae by de Laubenfels (1936a) for sponges with a special dermal skeleton, two general trends can be observed (cf. Van Soest, 1980 for a detailed review): one of spongologists following the line of Topsent (e.g., Lévi, 1973; Griessinger, 1971), the other following de Laubenfels (e.g., Hechtel, 1965; Bergquist & Warne, 1980). Van Soest (1980) made clear that neither of these classifications were based on characters reflecting phylogenetic relationships. He redefined the family Haliclonidae with emphasis on the choanosomal skeletal architecture ('… choanosomal skeleton consisting of uni- or paucispicular primary (ascending) tracts or fibres, interconnected by single spicules at right angles …'), and included both genera without a dermal skeleton and without microscleres, like *Haliclona*, with a dermal skeleton and without microscleres, like *Adocia*, with microscleres and a dermal skeleton, like *Sigmadocia*, and other microsclere bearing genera like *Gellius, Orina* and *Toxadocia*. Van Soest's new concept of the family was followed by De Weerdt (1986) who, after a taxonomic revision and phylogenetic analysis of North East Atlantic Chalinidae, went a step further by abandoning most of the nominal genera and recognizing only eight monophyletic 'species groups' (De Weerdt, 1989). Recently, De Weerdt (2000) published a monograph of Caribbean Chalinidae, in which the species groups have been given proper names, based on study of all the available type species of the nominal genera. Chalinidae occur in all seas, from polar regions to the tropics. Although they can be found at all depths, they are most common in shallower parts of both tropical reef environments and colder, subtidal habitats. They may form substantial components of mangrove communities. Chalinid sponges usually do not reach large sizes, but under certain conditions, like mangrove habitats, they may form proliferations of more than 1 m long. The reproduction is so far known to be exclusively viviparous, with ciliated larvae of $140 \times 470\,\mu m$ (cf. Wapstra & Van Soest, 1987). Like other haplosclerids, some species produce toxic chemical compounds, like cyclic alkylpiperidines (Van Soest & Braekman, 1999) and amino alcohols (Devijver *et al*., 2000).

KEY TO GENERA

(1) At the basis of the sponge there is a densely reticulated mass of spicula, choanosomal skeleton consisting of almost plumose, branching spicular tracts, which thin out towards the surface ..... ***Dendroxea***
No densely reticulated mass of spicules at the basis of the sponge, choanosomal skeleton a rather delicate, iso- or anisotropic, ladder-like reticulation or consisting of multispicular fibre tracts with a rather dense subisotropic reticulation in between 2

(2) Secondary lines of the choanosomal skeleton more than one spicule long ..... ***Chalinula***
Secondary lines of the choanosomal skeleton one spicule long 3

(3) Skeleton consisting of multispicular fibre tracts with a rather dense subisotropic reticulation in between ..... ***Cladocroce***
Skeleton iso-, subiso- or anisotropic, but without multispicular fibre tracts throughout the sponge ..... ***Haliclona***

CHALINULA SCHMIDT, 1868

Synonymy

Chalinula Schmidt, 1868: 7. *Acervochalina* Ridley, 1884a: 398. *Phylosiphonia* Lendenfeld, 1887c: 796. *Chalinodendron* Lendenfeld, 1887c: 819. *Nara* de Laubenfels, 1954: 76. *Katiba* de Laubenfels, 1954: 186.

Type species

Chalinula renieroides Schmidt, 1868 (by subsequent designation; de Laubenfels, 1936a: 47).

Definition

Choanosomal skeleton with secondary lines more than one spicule length. No ectosomal skeleton.

Diagnosis

Thinly encrusting, cushion-shaped or irregularly digitate growth forms. Consistency spongy, elastic, or very soft and limp. Colour brown or purplish. Oxeas short, ranging from vestigial to cigar-shaped; a high variation in form and size may occur within the same species. Spongin usually abundant, with high variation within one species. No microscleres.

Previous review

De Weerdt, 2000.

Description of type species

Chalinula renieroides Schmidt, 1868 (Fig. 1).

Synonymy. *Chalinula renieroides* Schmidt, 1868: 7. *Chalinula fertilis* Keller, 1879: 318, pls. 18–20. *Acervochalina fertilis;* De Weerdt & Van Soest, 1986: 27, figs 19, 20. Taxonomic decision for synonymy: De Weerdt, 2000.

Material examined. Holotype (slide): MNHN D.T 748 – two microscopic slides made by Topsent from Schmidt's specimen, labeled '*Chalinula renieroides* O. Schmidt, Type, Muséum, Exp. sc.de l'Algériè'.

Description. Thin crusts to laterally spreading cushions of equal thickness (up to 0.5 cm), with numerous, regularly distributed oscula, flush with the surface and on slightly raised mounds, 0.8–1.5 mm in diameter (Fig. 1A). Surface even, slightly hispid. Consistency soft, somewhat resilient, compressible. Colour light brown. Choanosomal skeleton (Fig. 1B) a regular reticulation of unispicular (occasionally paucispicular) primary lines which are, at unequal distances but regularly, connected by secondary lines of one spicule thick and two-four spicules in length. Most meshes between the lines are rectangular, 133–195 μm in diameter. Spongin moderate, completely enveloping the skeletal lines. Spicules (Fig. 1C) short, straight or only very slightly curved oxeas

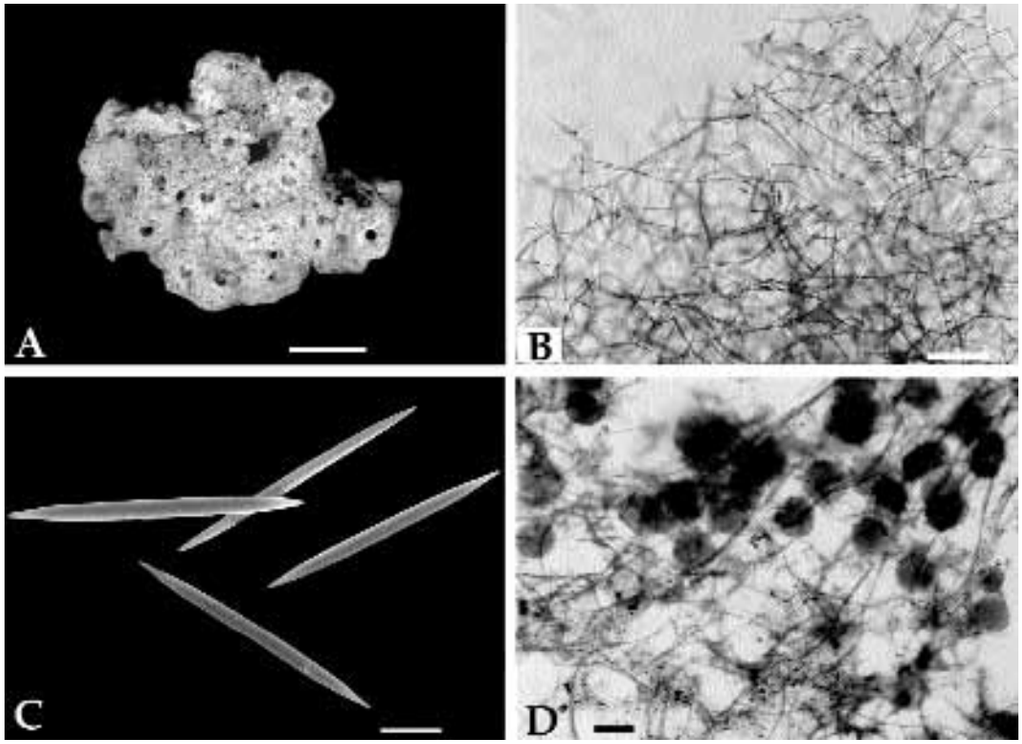

Fig. 1. *Chalinula renieroides* Schmidt, 1868. A, habit of preserved specimen, ZMA Por. 3043 (scale 0.5 cm). B, perpendicular section of choanosome, Topsent's slide of *Chalinula renieroides,* MNHN DT. 748 (scale 200 μm). C, SEM photo of spicules made from ZMA Por. 3043 (scale 20 μm). D, perpendicular section of choanosome, Topsent's slide of *Chalinula fertilis* Keller, 1879, MNHN DT. 2279 (scale 250 μm).

with a pronounced fusiform shape and sharp points, 81–*93.9*–105 × 3.6–*5.1*–6.6 μm. Frequently the sponges produce many embryos (Fig. 1D). Distribution and ecology. Mediterranean, Azores, Caribbean. Growing on and under stones in shallow sandy bottom.

Remarks. The genus *Acervochalina* Ridley (1884a: 398) was erected (by original designation) for North Atlantic *Chalina limbata* (Bowerbank, 1866: 373). This species was first described by Montagu (1818: 111, pl. XV figs 2, 3) as *Spongia limbata* (Fig. 2A), then by Johnston (1842: 168, pl. XIX figs 3–5) under the same name (Fig. 2B–D). Bowerbank (1866) transferred it to *Chalina* (Fig. 2E). The earliest available material of *Spongia limbata* is that of Johnston in the BMNH collection. BMNH 47.9.7.88 ('Hab?') consists of two sponges, one of which is the specimen of Johnston, 1842, pl. XIX fig. 5 (Fig. 2D). It is a firm, cushion-shaped sponge attached to an alga, with a very fibrous structure, and hispid surface. The skeleton is a reticulation of primary and secondary spongin fibres (Fig. 2J), the first 18–76 μm thick, cored by 4–20 spicules. The secondary fibres are 1–6 spicules long and 3–7 spicules thick. The diameter of the meshes is 170–400 μm. The oxeas are vestigial, fusiform, 52.8–*65.1*–74.4 × 1–*1.5*–2.2 μm. This specimen, as well as Johnston's other BMNH material of the species (BMNH 47.9.7.89 ('Hab?'), 47.9.7.91 ('Britain'), and 47.9.7.92 ('Devonshire')) conforms to Montagu's description and figures. Bowerbank's material of *Chalina limbata* is in the BMNH represented by, among others, BMNH 1877.5.21.2086 (Cornwall, figured specimens of Bowerbank, 1874, pl. LXVII figs 7–10) (Fig. 2E–F), 1877.5.21.2087 (Cornwall, figured specimen of Bowerbank, 1874, pl. LXVII fig. 11) and 1877.5.21.2088 (St. Andrews). No slides of these specimens were made, but their external appearance (all of them being small, fibrous cushions) leaves no doubt about their identity. For further synonymy of *Chalinula limbata* see De Weerdt, 1986 (as *Acervochalina*).

Phylosiphonia was erected by Lendenfeld (1887c: 796) for *Chalinula fertilis* Keller (1879), subsequently designated as type species by Burton (1934a: 531). For the conspecifity of *Chalinula fertilis* and *C. renieroides* see De Weerdt, 2000.

Chalinodendron was erected by Lendenfeld (1887c: 819) for *Chalina gracilenta* Bowerbank (1866), subsequently designated as type species by Burton (1934a: 530). This species is a junior synonym of *Spongia limbata* Montagu (1818). Both the holotype of *Chalina gracilenta* (BMNH 1877.5.21.2089, Torquay, figured specimen of Bowerbank, 1874, pl. LXVII fig. 4, designated as the type by Bowerbank on p. 171 of the same volume) (Fig. 2G–I), and the other specimen of Bowerbank (BMNH 1877.5.21.2090, Scarborough) are cushion-shaped with circular oscula, with a very spongy and fibrous structure. Because of the fragility of this material no slides were made, but the BMNH holds specimens identified by Norman as *Chalina gracilenta* (BMNH 1910.1.1.382, North Devon; 1910.1.1.384, Cumbra), which were studied instead. The skeleton of BMNH 10.1.1.383 (Fig. 2K) is a reticulation of spongin fibres, 9.5–38 μm thick, cored by 2–20 spicules. The secondary fibres are 3–5 spicules in length and 1–5 spicules thick. The meshes between the fibres are 114–460 μm in diameter. The oxeas are vestigial, 60–100.8 × 1–4.3 μm. There is no doubt about the conspecifity of Bowerbank's *Chalina gracilenta* with Montagu's *Spongia limbata* and therefore about the synonymy of *Chalinodendron* with *Chalinula*.

Nara was erected by de Laubenfels (1954: 76, fig. 46; by original designation) for *Nara nematifera* de Laubenfels, 1954. The holotype, USNM 22980 (Ebon Lagoon, Marshall) is a thinly

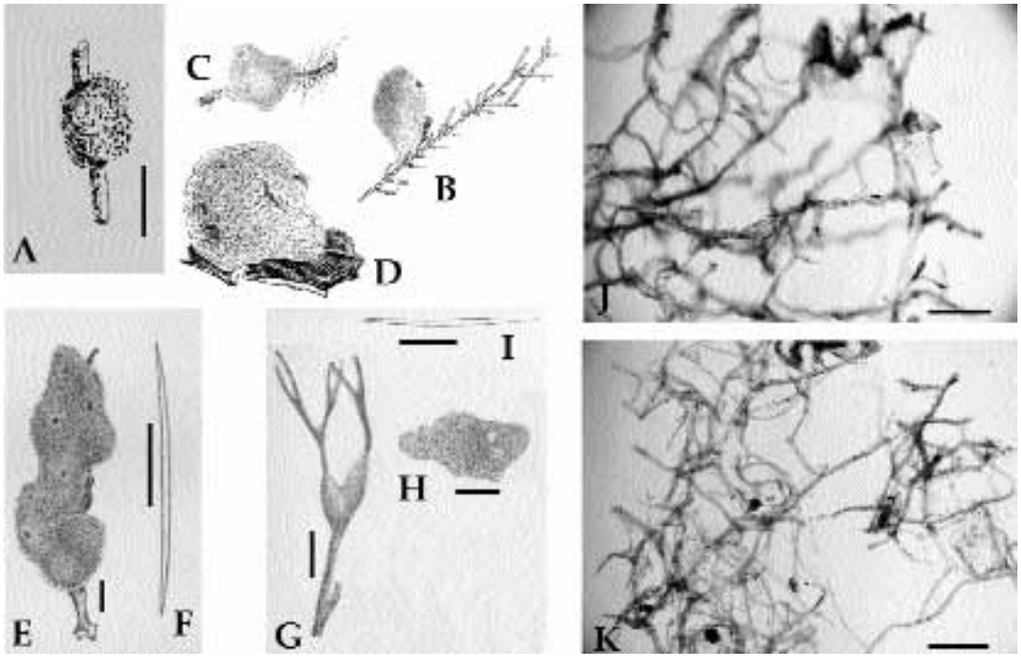

Fig. 2. *Chalinula limbata* (Montagu, 1818 as *Spongia*). A, habit, reproduced from Montagu, 1818 (scale 1 cm). B–D, habit, reproduced from Johnston (1842, as *Spongia*). E, habit, reproduced from Bowerbank (1874, as *Chalina*) (scale 0.5 cm). F, oxea, reproduced from Bowerbank (1874, as *Chalina*) (scale 25 μm). G–H, habit, reproduced from Bowerbank (1874, as *Chalina gracilenta*) (scale 1 cm). I, oxea, reproduced from Bowerbank (1874, as *Chalina gracilenta*) (scale 25 μm). J, perpendicular section of choanosome made from Johnston's specimen of *Spongia limbata*, BMNH 1847.9.7.88 (scale 300 μm). K, perpendicular section of choanosome made from BMNH 1910.1.1.383 (*Chalina gracilenta*) (scale 300 μm).

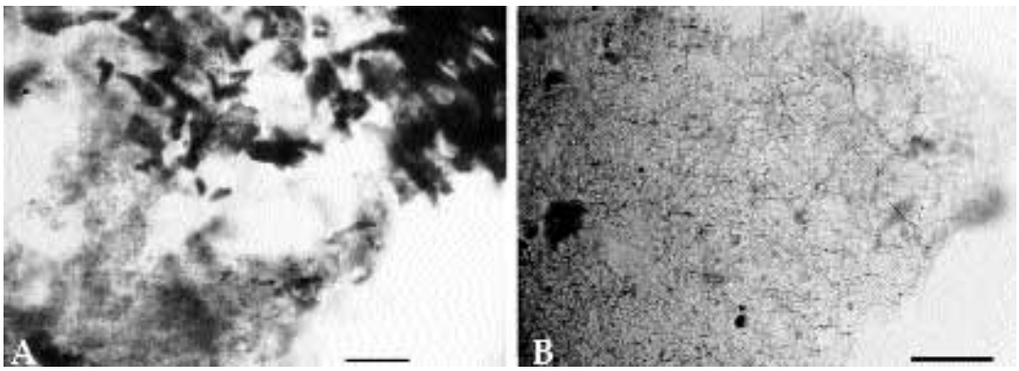

Fig. 3. A, perpendicular section of choanosome made from the holotype of *Nara nematifera* de Laubenfels (1954) (scale 300 μm). B, perpendicular section of choanosome made from the holotype of *Katiba milnei* de Laubenfels (1954) (scale 150 μm).

encrusting, very soft sponge, completely covering a piece of coral of $3.3 \times 2 \times 1.8$ cm. Oscules were not observed. The skeleton (Fig. 3A) is a delicate reticulation of slightly wavy primary lines of 1–2 spicules thick, loosely connected by secondary lines of 1–2 spicules long and 1 spicule thick. Spongin is not abundant, but clearly present at the nodes of the spicules. The oxeas are very slender, straight or slightly curved, $85.5–99 \times 0.9–2.3$ μm. The enigmatic 'threads' mentioned by de Laubenfels (1954) is a symbiotic fungus (Dr W.F. Prud'homme van Reine, pers. comm.). This species is extremely common throughout the tropical Indo-west Pacific, encrusting live coral in particular. It has a distinctive vibrant mauve colouration with the wavy 'surface threads' pale or white, and with very small oscules scattered over the surface. It is mucusy, with a slimy texture that mostly disintegrates if removed from the substratum (J.N.A. Hooper, pers. comm.).

Katiba was erected by de Laubenfels, (1954: 186, fig. 124; by monotypy) for *Katiba milnei* de Laubenfels, 1954. The holotype, USNM 22948 (Ebon Atoll, Marshall Islands) consists of two thin, rather soft crusts on coral rubble of ca. 2×1 cm, with a smooth surface. The skeleton (Fig. 3B) is an extremely delicate reticulation of very small, vestigial, somewhat crooked strongyloxeas of $55.1–\textit{63.9}–77.9 \times 0.4–\textit{0.6}–0.8$ μm, without a clear distinction between primary and secondary lines. Most oxeas are encased in a thin sheath of spongin. The abundant trichodragmata mentioned by de Laubenfels could not be found. The species clearly belongs to *Chalinula*. Similar to *Nara nematifera* this species is also very common throughout the Indo-west Pacific, occurring as extremely thin crusts on dead coral, khaki green in live colouration, and once again nearly impossible to remove intact from the substratum (J.N.A. Hooper, pers. comm.).

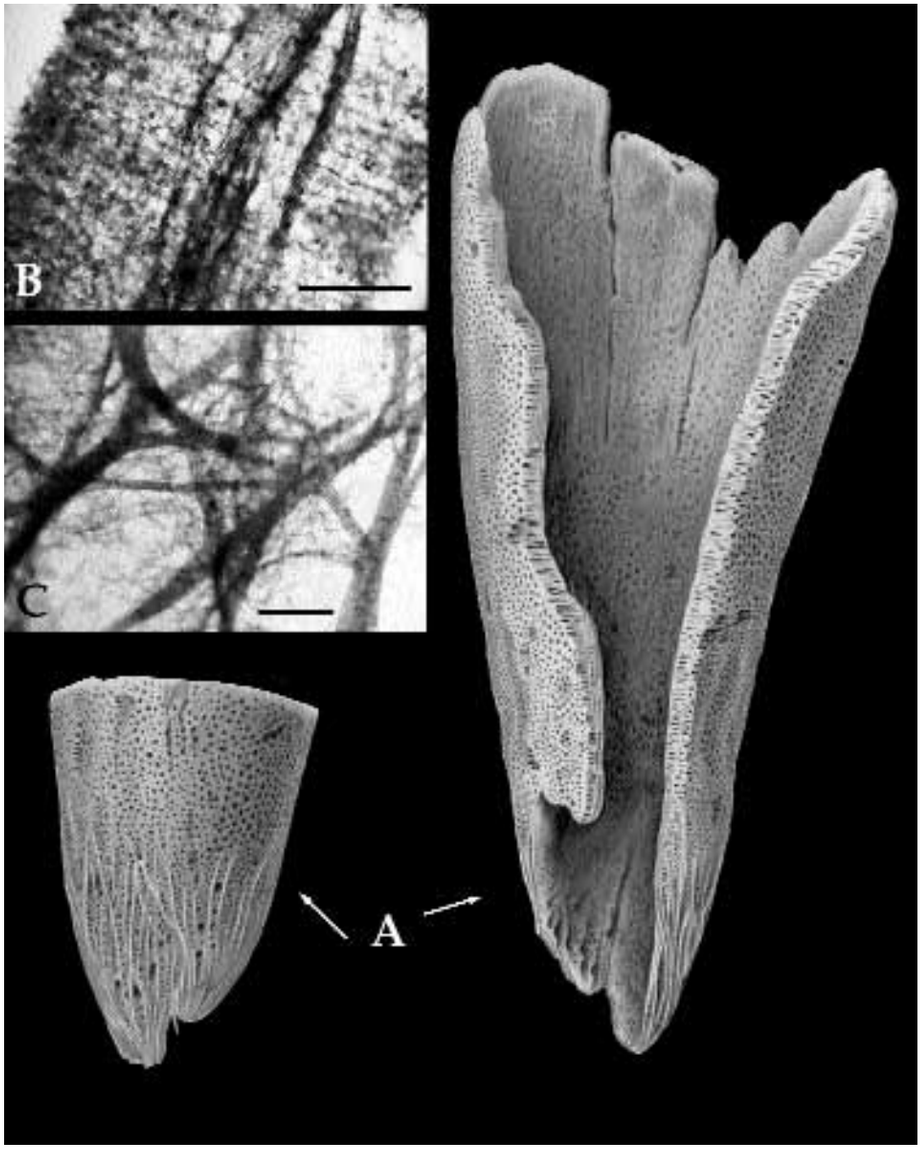

Fig. 4. A, *Cladocroce fibrosa* Topsent, 1892a. Habit, reproduced from Topsent, 1892a. B, *Cladocroce incurvata* Lévi & Lévi, 1983b. Tangential view of ectosomal skeleton made from the holotype (scale 500 μm). C, *Cladocroce aculeata* Pulitzer-Finali, 1982. Perpendicular section of choanosome made from a preserved specimen in ZMA (48/III/01A) (scale 500 μm).

CLADOCROCE TOPSENT, 1892

Synonymy

Cladocroce Topsent, 1892a: 72. *Toxiclona* de Laubenfels, 1954: 73.

Type species

Cladocroce fibrosa Topsent, 1892a (by monotypy).

Definition (modified from Fromont, 1993)

Chalinidae in which the choanosomal skeleton is reinforced by multispicular primary tracts that occasionally anastomose. In between these tracts the skeleton is a rather dense, subisotropic, paucispicular reticulation. Ectosomal skeleton, if present, a tangential, uni- or paucispicular, iso- or subisotropic reticulation. Microscleres, if present, toxas.

Diagnosis

Sponges lamellate or tube-shaped. Colour grey, salmon pink, mauve or ochre. Surface smooth, sometimes conulose. Consistency firm but elastic, compressible. In the lamellate forms the oscules are circular, flush with the surface, rather small, not abundant and they may appear at both sides of the lamellae.

Previous review

Fromont, 1993.

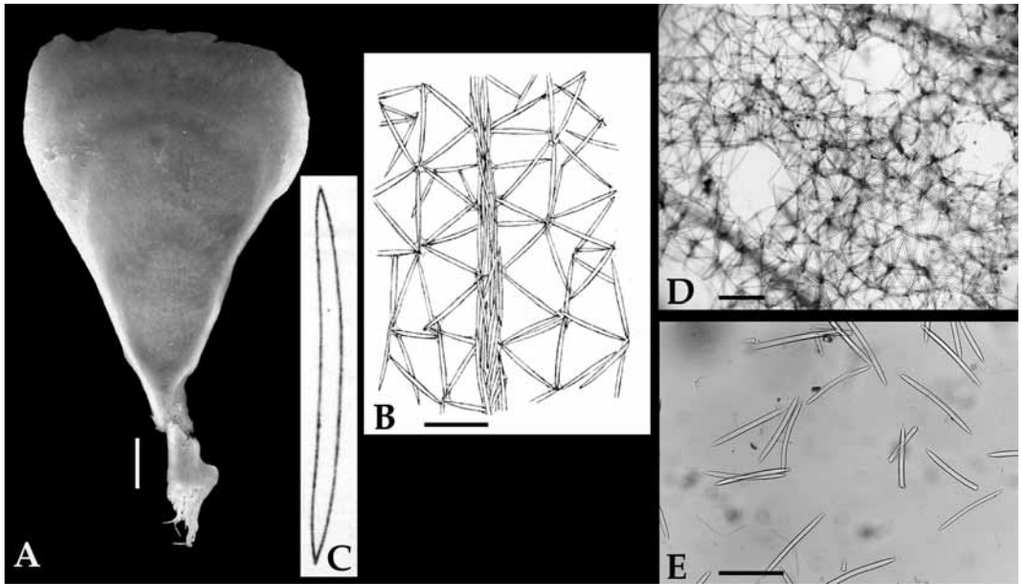

Fig. 5. *Cladocroce gaussiana* (Hentschel, 1914, as *Siphonochalina*). A, habit of preserved specimen in the USNM (scale 1 cm). B, perpendicular section of choanosome reproduced from Hentschel (1914) (scale 150 μm). C, oxea, reproduced from Hentschel (1914). D, perpendicular section of choanosome made from preserved specimen in the NMHN (scale 500 μm). E, oxeas and toxas (scale 250 μm).

Description of type species

Cladocroce fibrosa Topsent, 1892a: 72 (Fig. 4).

Synonymy. *Cladocroce fibrosa* Topsent, 1892a: 72, pl. III figs 1, 2.

Material examined. None.

Description (after Topsent, 1892a). Vase-shaped sponge (Fig. 4A) of grey colour, 15 cm high, 11 cm in diameter, thickness of the wall 0.6 cm. Inner side of the wall finely hispid. Both sides of the wall with openings ('without distinction between pores or oscula') of about 0.6 mm. From the base of the sponge arise several strong, white fibres which branch frequently and diminish in size towards the upper part of the sponge. They consist of oxeas running parallel and bound together by spongin. In between these fibres the skeleton is that of '*Reniera*'. Oxeas robust, 600 × 18 μm. Distribution and ecology. Known only from the type locality, Azores (between Pico and São Jorge), 1300 m.

Remarks. *Cladocroce* is a rare, hitherto somewhat ill-known genus, with mainly deep-water representatives. These are *C. incurvata* Lévi & Lévi (1983b: 974, pl. IV figs 4, 35, New Caledonia), *C. osculosa* (Topsent, 1927b: 19, Portugal, 749–310 m), and *C. spathiformis* Topsent (1904: 242, pl. III fig. 1, pl. XVII fig. 17, Azores, 1165 m). *C. aculeata* Pulitzer-Finali (1982: 109, figs 20, 21) was described from shallow-water from the Great Barrier Reef (see also Fromont, 1993). The holotype of *C. incurvata* is MNHN DCL. 2942; a microscope slide made from this specimen is present in the ZMA and contains a section of the ectosomal skeleton (Fig. 4B). It clearly shows the multispicular tracts and the rather dense, subisotropic skeleton. The oxeas (after Lévi & Lévi, 1983b) are 180–220 × 8–10 μm. *Cladocroce aculeata* is represented in the ZMA by several specimens, which all agree with the description of Pulitzer-Finali (1982) and Fromont (1993) (Fig. 4C).

Toxiclona was erected by de Laubenfels (1954: 73, by original designation) for *Siphonochalina (?) gaussiana* Hentschel (1914: 136, pl. IV fig. 17, pl. VIII fig. 17). *Toxiclona* was first considered by De Weerdt (2000) to be a synonym of the subgenus *Haliclona*, but this viewpoint cannot be sustained. The ZMA has several specimens from the Antarctic, on loan from the USNM, which conform entirely to Hentschel's *S. gaussiana*, and which exhibit all the characters of *Cladocroce*. The sponges are fan-shaped (Fig. 5A), with a firm but flexible consistency, without apparent oscula or with small, circular oscula either at the outer or on the inner side of the fan. The choanosomal skeleton consists of multispicular tracts, with a rather dense, subisotropic reticulation in between (Fig. 5B, D). The ectosomal skeleton is a tangential, subisotropic reticulation. Spongin moderate. The oxeas are robust, with slightly mucronated, conical points, 207–*255.5*–278 × 9.3–*14.4*–16.8 μm. Microscleres toxas with slightly recurved apices, 93–*134.1*–165 × 1.5–*3.2*–4.5 μm. *Siphonochalina gaussiana* and the genus *Toxiclona* may evidently be assigned to *Cladocroce*.

DENDROXEA GRIESSINGER, 1971

Synonymy

Dendroxea Griessinger, 1971: 152. *Dendrectilla* Pulitzer-Finali, 1983: 593.

Type species

Reniera lenis Topsent, 1892b (by monotypy).

Definition

Chalinidae with a basal densely reticulated mass of spicules, from which arise multispicular, plumose, branching spicular tracts, which thin out towards the surface. Between the primary lines there is a reticulation of single spicules, with many spicules irregularly scattered in between.

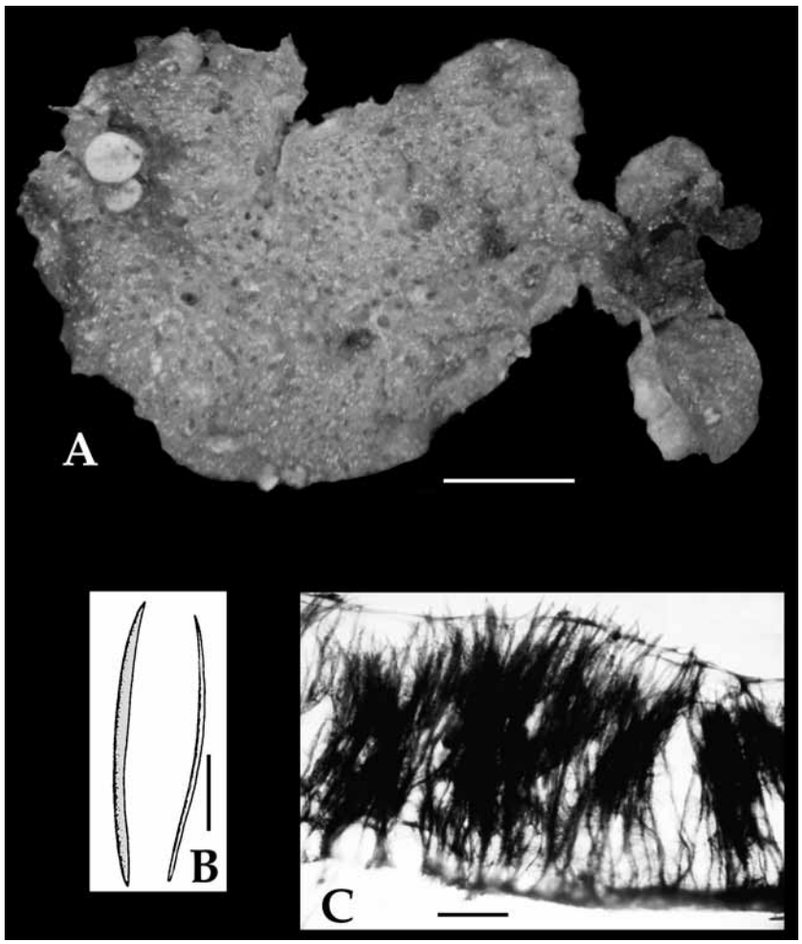

Fig. 6. *Dendroxea lenis* (Topsent, 1892b, as *Reniera*). A, habit of preserved specimen, reproduced from De Weerdt & Van Soest (1986) (scale 1 cm). B, oxeas, reproduced from De Weerdt & Van Soest (1986) (scale 50 μm). C, perpendicular section of choanosome of ZMA Por. 5462, Banyuls (scale 500 μm).

Diagnosis

Soft, thinly encrusting sponges, to 0.5 cm thick, with an even or somewhat irregular surface and greyish-white colour. Oscula indistinct. No ectosomal skeleton. Spongin scarce. Oxeas thin, slightly curved, with tapering points, 118–165 × ca. 3.5 μm.

Previous review

De Weerdt, 2000.

Description of type species

Dendroxea lenis (Topsent, 1892b) (Fig. 6).

Synonymy. *Reniera lenis* Topsent, 1892b: XIX. *Dendroxea lenis;* Griessinger, 1971: 152.

Material examined. Holotype (not examined): Laboratoire Arago de Banyuls-sur-Mer. Other material. NNM–CANCAP 5 stat. 5, Azores (cf. De Weerdt & Van Soest, 1986). ZMA Por. 5464 – Banyuls, France (cf. Van Lent & De Weerdt, 1987).

Description. Thinly encrusting (Fig. 6A), overall size ca. 3 × 1 × 0.5 cm. Surface smooth, even. Oscula indistinct. Consistency soft, somewhat viscous. Colour greyish-white. No ectosomal skeleton. Choanosomal skeleton (Fig. 6C) consisting of branching, multispicular tracts, rising up from a common, basal, densely reticulated mass of spicules. The tracts are connected by transverse single spicules, but there also many loose, disoriented spicules scattered in between. Spongin very scarce. Oxeas (Fig. 6B) thin, slightly curved, with tapering points, 118–165 × ca. 3–3.5 μm. Distribution and ecology. Mediterranean, Azores, Canary Islands. On rocks and in cavities, sublittoral.

Remarks. The single species known from the genus *Dendroxea, D. lenis*, is so far only found in the Mediterranean, Azores and Canary Islands. De Weerdt & Van Soest (1986) mentioned the possibility that *Reniera carmabi* Van Soest (1980) could also be a *Dendroxea*, but De Weerdt (2000) has shown that this species is a synonym of *Chalinula molitba* (de Laubenfels). Despite the fact that the genus contains only one species, it has such characteristic features, different from all the other chalinid genera and subgenera, that it is considered a valid genus.

Dendrectilla was erected by Pulitzer-Finali (1983: 593, fig. 81; by monotypy) for *Dendrectilla tremitensis* Pulitzer-Finali, 1983. From his description it is clear that his species is conspecific with *D. lenis*.

HALICLONA GRANT, 1836

Synonymy

Haliclona Grant, 1836. [*Chalina*] Grant, 1861 *(nomen nudum)*. *Reniera* Schmidt, 1862. *Diplodemia* Bowerbank, 1864. *Gellius* Gray,

1867a. *Orina* Gray, 1867a. *Asychis* Gray, 1867a. *Adocia* Gray, 1867a. *Philotia* Gray, 1867a. *Veluspa* Miklucho-Maclay, 1870. *Euchalinopsis* Lendenfeld, 1887c. *Rhaphisia* Topsent, 1892b. *Halichoclona* de Laubenfels, 1932. *Toxadocia* de Laubenfels, 1936a. *Neoadocia* de Laubenfels, 1950b. *Reniclona* de Laubenfels, 1954. *Kallypilidion* de Laubenfels, 1954. *Rhizoniera* Griessinger, 1971.

Type species

Spongia oculata Pallas, 1766 (by original designation).

Definition

Chalinidae with unispicular secondary lines.

Diagnosis

Cushion-shaped, frequently with oscular mounds or chimneys, branching, tube-shaped, repent ramose, rarely thinly encrusting sponges. Colour purple, violet, pink, brown, yellowish, green, blue, black, sometimes white, orange or red. Some species show a two-colour combination of a whitish ectosome and darker, purple or brownish choanosome. Consistency varying from soft, fragile, to firm, elastic, brittle or corky. Surface rather smooth and even, slightly to rather strongly punctate, sometimes slightly hispid. Oscula usually circular, flush with the surface or at the top of oscular mounds or chimneys. Ectosomal skeleton, if present, either a very regular, tangential, unispicular, isotropic reticulation, with three- to six-sided meshes, or less regular, subisotropic and rather dense or consisting of a discontinuous, rather open reticulation due to many rounded meshes. Choanosomal skeleton a regular, frequently ladder-like reticulation of uni-, pauci- or multispicular primary lines, regularly connected by unispicular secondary lines; it may also be a rather dense, subisotropic reticulation with many subdermal and choanosomal spaces. Spongin is nearly always present, confined to the nodes of spicules or more abundant, sometimes forming the dominant part of the skeleton. Megascleres smooth diactines, oxeas or strongyles, length usually between 80–250 μm, with a thickness of ca. 5–10 μm, rarely larger, up to 370 × 15 μm. Microscleres, if present, sigmas, toxas, raphides or microxeas.

Recent reviews

Griessinger, 1971; Van Soest, 1980; De Weerdt, 1986, 1989, 2000.

KEY TO SUBGENERA OF *HALICLONA*

(1) Choanosomal skeleton an anisotropic, ladder-like reticulation of uni- to paucispicular, ascending primary lines, regularly or less regularly connected by unispicular secondary lines 2
Choanosomal skeleton an iso- or subisotropic reticulation without a clear distinction between primary and secondary lines 4

(2) Skeleton very regular, with straight, uni- to paucispicular ascending primary lines, regularly connected by unispicular secondary lines, spongin always present, at the nodes of the spicules or more copious, oxeas usually short, relatively thick, cigar-shaped, microscleres, if present, toxas ..... ***Haliclona*** *(Haliclona)*
Skeleton less regular, with pauci- to multispicular primary lines, irregularly connected by unispicular secondary lines, with many spicules in confusion 3

(3) Primary lines pauci- to multispicular, somewhat wavy, spongin scarce or absent, oxeas usually slender, with long, hastate points, no microscleres ..... ***Haliclona*** *(Rhizoniera)*
Skeleton towards the inner parts of the sponge becoming a confused, subhalichondroid reticulation, oxeas usually long, stout, with hastate points, microscleres, if present, toxas, sigmas or raphides or a combination of these ..... ***Haliclona*** *(Gellius)*

(4) Both the ectosomal and choanosomal skeleton show a tendency to form rounded meshes, choanosomal skeleton consisting of ill-defined paucispicular primary lines, irregularly connected by unispicular secondary lines, with many choanosomal spaces, spongin scarce to more abundant, oxeas slender, microscleres, if present, toxas or raphides ..... ***Haliclona*** *(Soestella)*
Both the ectosomal and choanosomal skeleton a regular, iso- subisotropic reticulation 5

(5) Ectosomal and choanosomal skeleton a very regular, delicate, unispicular, isotropic reticulation, spongin at the nodes of the spicula, oxeas slender, frequently blunt-pointed to strongylote, microscleres, if present, toxas and sigmas, sponges usually soft, compressible but fragile ..... ***Haliclona*** *(Reniera)*
Ectosomal and choanosomal skeleton forming a subisotropic, paucispicular reticulation, ectosome overlaying the choanosome very loosely with many subectosomal spaces, no spongin, oxeas usually rather stout, microscleres, if present, sigmas, sponges usually brittle, incompressible, fragile ..... ***Haliclona*** *(Halichoclona)*

SUBGENUS *GELLIUS* GRAY, 1867

Synonymy

Gellius Gray, 1867a: 538. *Orina* Gray, 1867a: 539. *Asychis* Gray, 1867a: 539. *Rhaphisia* Topsent, 1892b: XX. *Sigmadocia* de Laubenfels, 1936a: 69. The '*angulata*' group of De Weerdt (1986, 1989).

Type species

Isodictya jugosa Bowerbank, 1866 (original designation) (senior synonym of *Reniera fibulata* Schmidt, 1862: 73).

Definition

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

Diagnosis

Cushion-shaped or submassive sponges, sometimes with a tendency to form fistular outgrowths. Consistency soft, fragile,

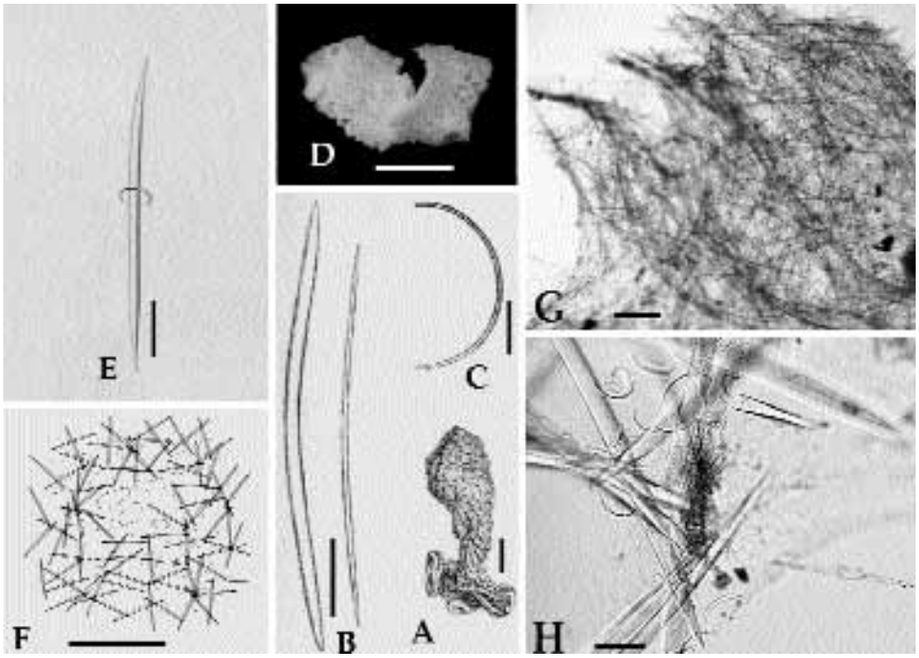

Fig. 7. *Haliclona (Gellius) fibulata* (Schmidt, 1862, as *Reniera*). A, habit, reproduced from Bowerbank (1874, as *Isodictya jugosa*) (scale 0.5 cm). B, oxeas, reproduced from Bowerbank (scale 50 μm). C, sigma, reproduced from Bowerbank (scale 5 μm). D, habit of preserved specimen ZMA Por. 6107 (scale 1 cm). E, oxea and sigma, reproduced from Schmidt (scale 50 μm). F, tangential view of ectosomal skeleton, reproduced from De Weerdt 1986 (scale 250 μm). G, perpendicular section of choanosomal skeleton made from the holotype of *Isodictya jugosa* (scale 300 μm). H, sigmas (scale 25 μm).

sometimes slightly brittle. Spongin scarce or absent. Oxeas commonly robust needles of fairly large size, up to 370 × 15 μm. Microscleres are usually present, and may be toxas, sigmas or raphides or a combination of these.

Recent review

De Weerdt, 2000.

Description of type species

Haliclona (Gellius) fibulata (Schmidt, 1862) (Fig. 7).

Synonymy (restricted). *Reniera fibulata* Schmidt, 1862: 73, pl. VII fig. 9. *Gellius fibulatus;* Topsent, 1890a: 201. *Gelliodes fibulatus;* Babic, 1922: 268. *Isodictya jugosa* Bowerbank, 1866. *Gellius jugosus;* Gray, 1867a: 538. *Halichondria couchii* Bowerbank, 1874: 203, pl. LXXIII figs 12–15. *Amorphina couchii;* Topsent, 1888: 145. ? *Gellius pyrrhi* Hanitsch, 1895: 211. ? *Gellius arcticus* Hentschel, 1916: 12, fig. 2. Taxonomic decision for synonymy: De Weerdt, 2000.

Material examined. Holotype: not seen. Other material. Specimens of *Gellius fibulatus*: MNHN DT. 2699 – Luc (one microscope slide containing a cross-section, det. Topsent, cf. Topsent, 1890a: 201). MNHN DT. 3204 – Mediterranean (fragment, det. E. Topsent). MNHN DT. 3069 – Saint-Jean-de-Luz (fragments, det. E. Topsent). Holotype of *Isodictya jugosa*: BMNH 1910.1.1.294 – Shetland, figured specimen of Bowerbank, 1874, pl. L fig. 11 (designated as the type by Bowerbank on p. 128 of the same volume).

Description. Cushion-shaped to somewhat laterally spreading sponges (Fig. 7A, D), occasionally with fistular processes. Size up to 10 cm in diameter. Oscula not numerous, circular, 1–2 mm, flush with the surface. Surface smooth, strongly reticulated. Colour pink to dark pink. Ectosomal skeleton (Fig. 7F) an irregular and rather confused, somewhat subisotropic reticulation. Choanosomal skeleton (Fig. 7G) a rather dense and irregular reticulation of paucispicular primary lines, irregularly connected by unispicular secondary lines, with many spicules in confusion. Spongin scarce, at the nodes of the spicules. Spicules: straight or slightly curved oxeas with a long and sharp point, 160–270 × 5–11 μm (Fig. 7B); microscleres irregularly, weakly curved sigmas (Fig. 7C, H), 9.6–37 × 1–2.4 μm. Distribution and ecology. Mediterranean-Atlantic. In the infralittoral, to ca. 60 m, on stones, conglomorates of shells, calcareous algae, sponges, etc.

Remarks. *Haliclona (Gellius) fibulata* is well characterized by the combination of its cushion-shaped form, pink colour, strongly reticulated surface and irregularly, weakly curved sigmas. The species is without doubt conspecific with the later described *Isodictya jugosa* Bowerbank, 1866. Although Schmidt's original material could not be studied and his description and figures of the spicules are rather uninformative (see Fig. 7E), the identity of the species has been made clear by Topsent (1890a: 201; 1925c: 706, pl. VIII fig. 6) and his material in the MNHN (for exact spicule sizes of this material see De Weerdt, 1986). The holotype of *Isodictya jugosa*, BMNH 1910.1.1.294 (Fig. 7A), is a small cushion of rather firm consistency, growing on a piece of conglomerated bryozoans, calcareous algae and tube worms. Oscula were not observed and there is no ectosomal skeleton. The choanosomal skeleton is a subhalichondroid reticulation (Fig. 7E) of paucispicular primary lines, irregularly connected by unispicular secondaries. The oxeas (Fig. 7B) are straight or slightly curved, with long and sharp points, ca. 260 × 8.2 μm. Microscleres sigmas (Fig. 7C, H), irregularly curved, ca. 22 × 1.4 μm. It conforms in every respect to *Haliclona (Gellius) fibulata*. For further synonymy of the species see De Weerdt (1986).

Orina was erected by Gray (1867a: 539, by original designation) for *Halichondria angulata* Bowerbank, 1866: 233. The holotype is BMNH 1910.1.1.173, Guernsey, figured specimen of Bowerbank, 1874, pl. XLI fig. 4, designated as the type by

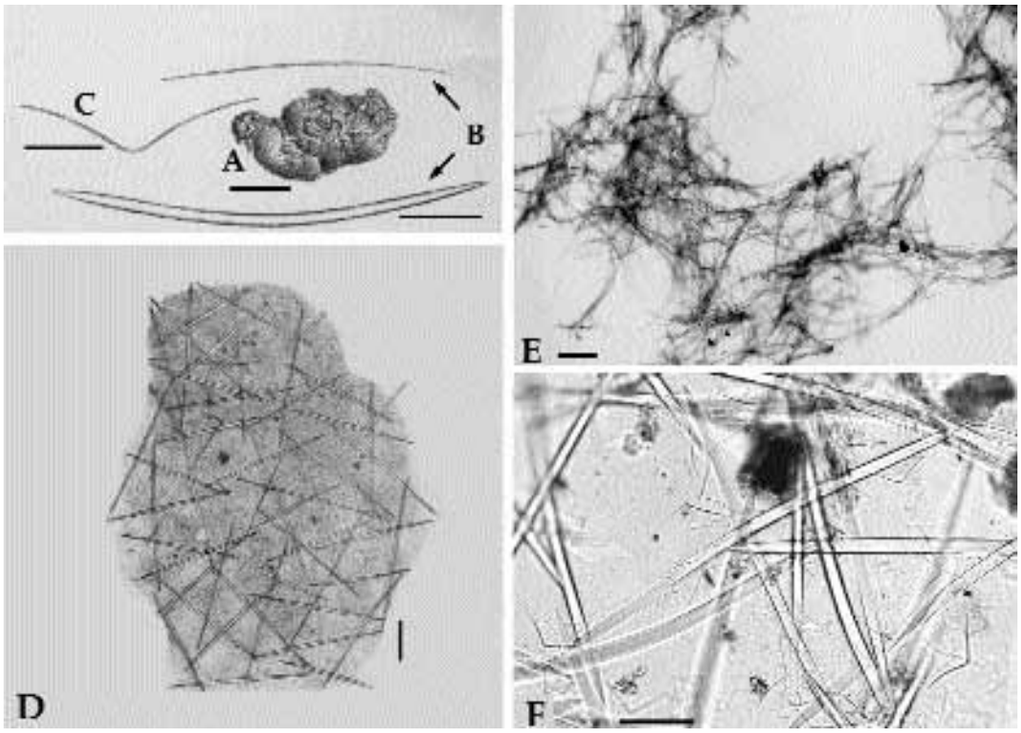

Fig. 8. *Haliclona (Gellius) angulata* (Bowerbank, 1866 as *Halichondria*). A, holotype, reproduced from Bowerbank, 1874 (scale 1 cm). B, oxeas, reproduced from Bowerbank, 1874 (scale 50 μm). C, toxa, reproduced from Bowerbank, 1874 (scale 25 μm). D, tangential view of ectosomal skeleton, reproduced from Bowerbank, 1874 (scale 100 μm). E, perpendicular section of choanosome made from the holotype (scale 300 μm). F, close-up of sigmas and toxas made from the holotype (scale 50 μm).

Bowerbank on p. 101 in the same volume (Fig. 8A). It is an irregularly shaped, rather firm (in the dried state) clump of 2.5 × 1 × 1 cm. The ectosome is for the greater part lost, but is still present in a few places. No oscula were observed. The ectosomal skeleton (Fig. 8D) is a regular, tangential reticulation of intercrossing oxeas. The choanosomal skeleton (Fig. 8E) is a somewhat confused, subhalichondroid reticulation of paucispicular primary lines, irregularly connected by single secondary spicules. The oxeas (Fig. 8B) are long, rather thin, with long and sharp points, 237.5–*277*–307.8 × 6–*7.7*–9.1 μm. There are numerous sigmas (not mentioned by Bowerbank) and toxas, both in the ectosome and choanosome. The sigmas (Fig. 8F) are very regular in shape and size, slightly centrangulated, strongly curved, 9.6–*12*–14.4 × 0.7–*0.9*–1.2 μm. The toxas (Fig. 8C, F) are sharply bent, with recurved apices, also very regular in shape and size, 43.2–*55.6*–63.6 × 1–*1.2*–1.4 μm. *Haliclona (Gellius) angulata* is a valid, Mediterranean-Atlantic species, entirely conforming to the subgenus *Gellius*. For further synonymy see De Weerdt (1986).

Asychis was erected by Gray (1867a: 539, by original designation) for *Reniera fibulata* Schmidt (1862), which needs no further discussion.

Rhaphisia was erected by Topsent (1892b: XX, by monotypy) for *Rhaphisia laxa* Topsent, 1892b. He established the genus for 'Renierinae' without a regular skeleton, with oxeas as megascleres and trichodragmas as microscleres. The species is represented in the MNHN by MNHN DT. 300 (one microscope slide, labeled *Rhaphisia laxa*, 'Type', Banyuls), and MNHN DT. 299 (two microscope slides, Banyuls), but the material of these slides is too scanty to enable a reliable redescription of the skeleton and spicules. In another work Topsent (1892a) described a species from the Azores, 200 and 523 m, as *Thrinacophora ? spissa* Topsent (1892a: 124, pl. VI fig. 12, pl. IX fig. 9), which he later transferred to *Rhaphisia* (Topsent, 1904: 233, pl. I fig. 8, pl. XVII fig. 18) (Fig. 9A–E). Material of this species is in the MNHN represented by MNHN DT. 1051, one microscope slide containing a cross-section. The skeletal architecture (Fig. 9F) is a somewhat confused, subhalichondroid reticulation formed by strongyles of 300.3–785.4 × 15.4–30.8 μm (Topsent mentioned strongyles in three size categories: 1000 × 40 μm, 400 × 15 μm and 300–400 × 5–8 μm). In addition there are numerous trichodragmas (Topsent, 1904: three size categories, viz., 110–160 × 10–12 μm, 70 × 30 μm, and 20–30 × 7–8 μm) and rather sharply curved toxas of 115.5–207.1 × 4.6–6.9 μm (Fig. 9G). The skeletal architecture of Topsent's *Rhaphisia* conforms in every respect to the subgenus *Gellius*.

Sigmadocia was erected by de Laubenfels (1936a: 69, by original designation) for *Gellius textapatina* de Laubenfels, 1926: 567. The holotype (USNM 21446, examined) is a thick crust, rather firm, brittle, 5 × 3.5 × 0.6 cm, with a smooth, even surface, and numerous circular and oval oscula, ca. 1 mm in diameter; ectosome easily detachable. The ectosomal skeleton is a rather confused, tangential reticulation. The choanosomal skeleton is a somewhat confused reticulation, but with tracts showing a tendency to form rounded meshes approaching those of *Xestospongia* de Laubenfels (1932). The megascleres are robust, sharply-pointed oxeas, 415.8–446.8 × 19.3–25.4 μm. Microscleres are sigmas of very variable size and shape, with sharply recurved apices, some of them flagellated, 53.9–123.2 × 2.3–6.2 μm. It is with somewhat hesitation considered a synonym of *Gellius*.

The subgenus *Gellius* is not very common, and it may have a preference for deeper water. There are only three shallow water

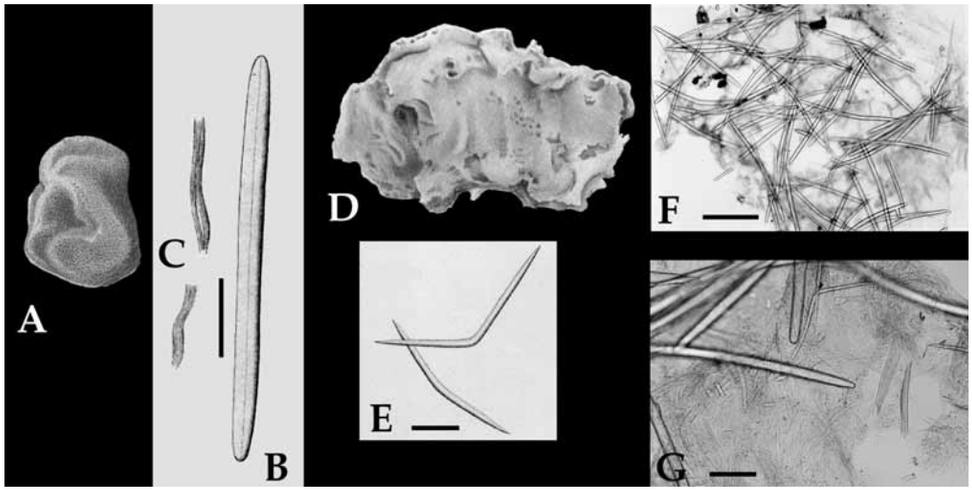

Fig. 9. *Haliclona (Gellius) spissa* (Topsent, 1892a, as *Thrinacophora* ?). A, habit, reproduced from Topsent (1892a) (no size given). B, strongyle, reproduced from Topsent (1892a) (scale 100 μm). C, trichodragmas, reproduced from Topsent (1892a) (scale 100 μm). D, habit, reproduced from Topsent (1904, as *Rhaphisia*) (no size given). E, toxas, reproduced from Topsent (1904) (scale 50 μm). F, perpendicular section of choanosome (from microscope slide MNHN DT. 1051) (scale 300 μm). G, close-up of trichodragmas and toxas (scale 50 μm).

species known from the North East Atlantic region: *H. (G.) angulata* Bowerbank, *H. (G.) fibulata* Schmidt, and *H. (G.) rava* Stephens, and only one in the Caribbean: *H. (G). tenerrima* Burton. It is presently unknown how many species occur in the Pacific and Antarctic, but in the deeper parts of the Caribbean it is represented by *H. (G.) calcinea* Burton and *H. (G.) megasclera* Lehnert & Van Soest (1996).

SUBGENUS *HALICHOCLONA* DE LAUBENFELS, 1932

Synonymy

Halichoclona de Laubenfels, 1932: 114. *Neoadocia* de Laubenfels, 1950b: 15. The '*fistulosa*' group of De Weerdt (1986, 1989; De Weerdt *et al*., 1991). *Pellinella* Thiele, 1905: 471.

Type species

Halichoclona gellindra de Laubenfels, 1932 (by monotypy).

Definition

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

Diagnosis

Massive, tubiform, cushion-shaped or encrusting sponges, with a strong tendency in several species to form fistular outgrowths. Oscula usually large, not numerous. Colour orange, pink, purplish or white; in some species there is a two-colour combination of a whitish transparent ectosome and a darker coloured, purple or orange choanosome. Consistency relatively crisp and brittle, only slightly compressible. Spongin absent or very scarce, at the nodes of the spicules. Ectosomal skeleton of the same structure as the choanosome, usually very loosely overlaying the choanosome, from which it may be separated by extensive subectosomal spaces. Choanosomal skeleton a subisotropic, somewhat confused reticulation, commonly intercepted by many choanosomal spaces. Megascleres usually acerate or hastate oxeas, reaching substantial sizes in some species. Microscleres, if present, microxeas or sigmas.

Previous review

De Weerdt, 2000.

Description of type species

Haliclona (Halichoclona) gellindra de Laubenfels, 1932 (Fig. 10).

Synonymy. *Halichoclona gellindra* de Laubenfels, 1932: 114, fig. 68.

Material examined. Holotype: USNM 22063 – Carmel, California.

Description (partly after de Laubenfels, 1932). The holotype consists of very small fragments of indefinite shape (Fig. 10A). De Laubenfels (1932) described the species as: 'Encrusting sponges, 2 to 4 mm thick, somewhat more than 4 cm^2 in area.' Consistency fragile. Colour in life pale lavender, in spirit cream. Oscules few, irregular in shape, about 1 mm in diameter, often with raised collars nearly 1 mm high. Surface superficially smooth. Ectosomal skeleton ('specialization') a crust of tangentially placed oxeas; easily removed 'in flakes'. Choanosomal structure a very regular isodictyal reticulation. The ectosomal skeleton is not present anymore, but this may have disappeared upon preservation. The choanosomal skeleton (Fig. 10B) is a rather dense, confused, subisotropic reticulation; it is denser and less regular than described by de Laubenfels. No visible spongin. The oxeas are rather small, hastate, with very sharp, long points, 105–*111.6*–121.5 × 5.6–*6.2*–6.9 μm. Distribution and ecology. Known only from the type locality, Carmel, California, intertidal.

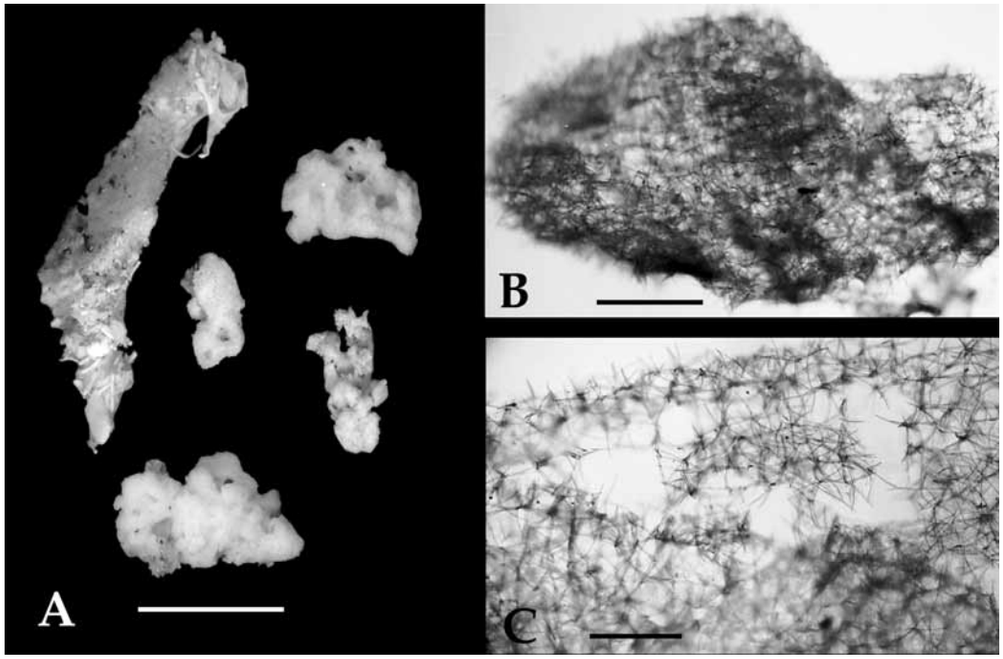

Fig. 10. *Haliclona (Halichoclona) gellindra* (de Laubenfels, 1932, as *Halichoclona*). A, holotype (fragmented) (scale 0.5 cm). B, perpendicular section of choanosome made from holotype (scale 500 μm). C, *Haliclona (Halichoclona) fistulosa* (Bowerbank, 1866), perpendicular section of choanosome of preserved specimen ZMA Por. 5656.

Pellinella was erected by Thiele (1905: 471) for *Pellinella conica* Thiele, 1905 (by monotypy). From his description and especially drawings it is clear that this is a species of *Haliclona (Halichoclona)*.

Remarks. De Laubenfels described the choanosomal skeleton as a very regular, isodictyal structure, but the slide made from the holotype clearly shows a rather dense, subisotropic reticulation. Though scanty, the information from de Laubenfels' description and the holotype is just sufficient to get a picture of characters shared by several chalinid species, for which the name *Pellina* has been applied by authors. This starts with Griessinger (1971), who re-introduced the name *Pellina* Schmidt, 1870 for chalinid sponges with a crisp, fragile consistency, large ectosomal spaces and a dense, irregularly meshed choanosome. He placed *Haliclona (Halichoclona) semitubulosa* Lieberkühn (1859, as *Spongia*) in this genus, together with the Mediterranean-Atlantic *Haliclona (Halichoclona) fistulosa* Bowerbank (1866, as *Isodictya*), *Haliclona (H.) magna* Vacelet (1969, as *Reniera*) and *Haliclona (H.) parietalis* Topsent (1893c, as *Reniera*). Van Soest (1980) transferred *Pellina* to his new family Oceanapiidae and used the genus for fistule bearing sponges with a simple spicule complement of small oxeote megascleres (cf. also Van Soest & Sass, 1981). De Weerdt 1986 reviewed the history of the genus *Pellina* and concluded that it is a synonym of *Halichondria* Fleming, 1828. *Halichoclona* is the only available name for these crisp, fragile sponges with a subisotropic skeleton. Though frequently developed, fistules do not necessarily have to be present.

Neoadocia was erected by de Laubenfels (1950b: 15) for *Neoadocia mokuoloea* de Laubenfels (1950b: 15, fig. 8). The holotype, USNM 22745, from Moku O Loe, Kaneohe Bay, Hawaii, is a cushion of 3×2×1 cm, without visible oscula, very soft and fragile. Both the ectosomal and choanosomal skeleton (Fig. 11A–B) are subisotropic, entirely conforming to *Halichoclona*. The oxeas are slender, with long, rather sharp points, 129–*135.7*–144 × 6–*6.2*–6.9 μm. Raphides, as mentioned by de Laubenfels, could not be detected.

SUBGENUS *HALICLONA* GRANT, 1836

Synonymy

Haliclona Grant, 1836: 6. [*Chalina*] Grant, 1861 (*nomen nudum*). *Diplodemia* Bowerbank, 1864: 202. *Adocia* Gray, 1867a: 552. *Veluspa* Miklucho-Maclay, 1870: 5. *Lessepsia* Keller, 1883: 19. *Euchalinopsis* Lendenfeld, 1887c: 744. The '*oculata*' group of De Weerdt (1986, 1989).

Type species

Haliclona oculata (Pallas, 1766) (by original designation; Grant, 1836: 6).

Definition (modified from De Weerdt, 2000)

Choanosomal skeleton consisting of a very regular, ladder-like reticulation of uni- to paucispicular primary lines, regularly connected by unispicular secondary lines. Ectosomal skeleton, if present, a unispicular, tangential, isotropic reticulation; occasionally with the oxeas 'intercrossing'. Oxeas short, rather robust, fusiform or with acerated points. Spongin moderate to abundant. No microscleres.

Diagnosis

Sponges branched, repent ramose or thinly encrusting. Consistency varying from soft, flexible, to firm, corky. Oscula in the branched and ramose forms circular, small, but clearly visible; in the branched form they may be arranged alongside the narrower sides of

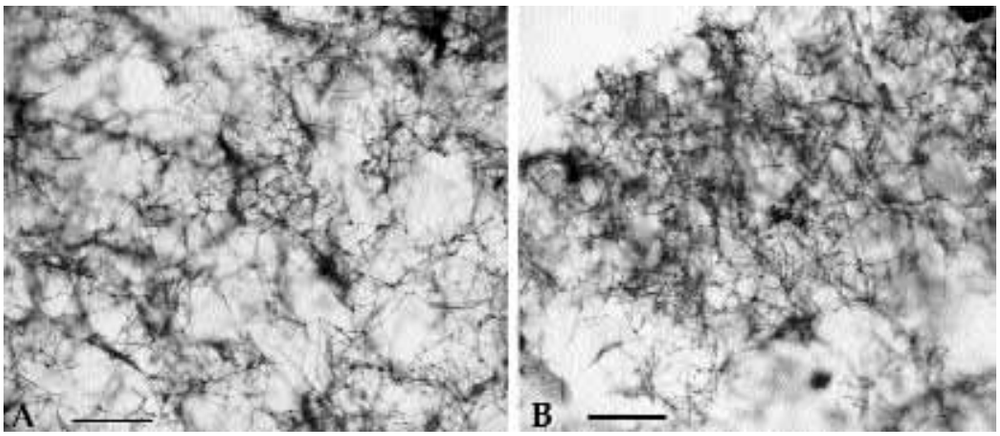

Fig. 11. *Haliclona (Halichoclona) mokuoloea* (de Laubenfels, 1950b, as *Neoadocia*). A, tangential view of ectosomal skeleton made from holotype (scale 500 μm). B, perpendicular section of choanosome (scale 500 μm).

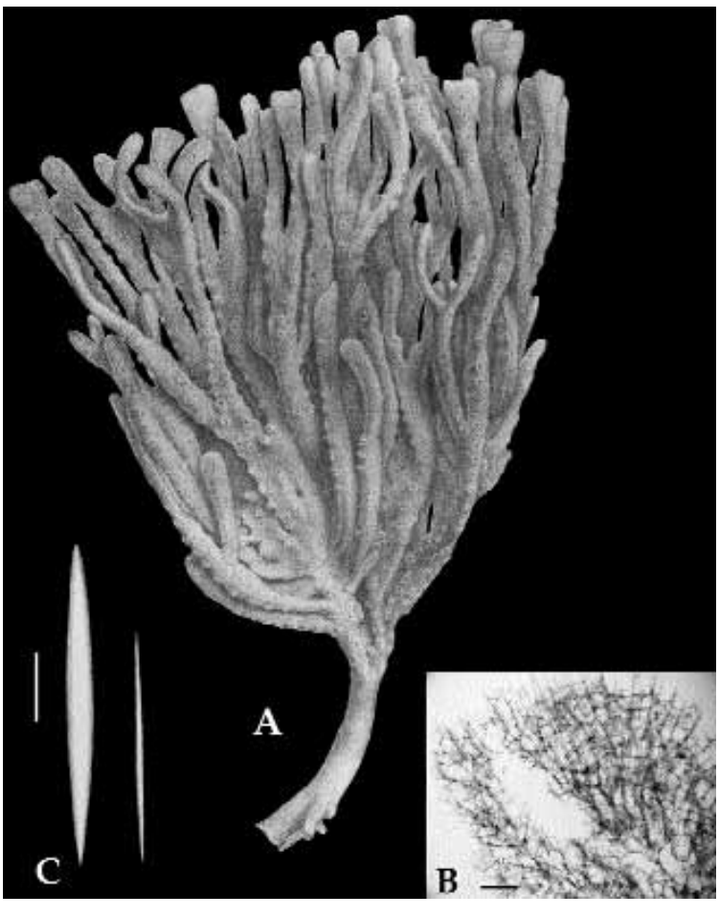

Fig. 12. *Haliclona (Haliclona) oculata* (Pallas, 1766 as *Spongia*). A, habit, reproduced from Bowerbank (1874, as *Chalina*). B, perpendicular section of choanosome made from preserved specimen ZMA Por. 5557 (scale 250 μm). C, oxeas, reproduced from Bowerbank (1874) (scale 25 μm).

the branches; in encrusting sponges they are very small, with a slight tendency to be surrounded by star-shaped aquiferous canals.

Previous review

De Weerdt, 1986; 2000.

Description of type species

Haliclona oculata (Pallas, 1766) (Fig. 12).

Synonymy (restricted). *Spongia oculata* Pallas, 1766: 390. *Haliclona oculata;* Grant, 1841: 5. *Halichondria oculata;* Johnston, 1842: 94, pl. III figs 1, 2. *Chalina oculata;* Bowerbank,

1864: 208, pl. XIII fig. 262; 1874: 169, pl. LXVI figs 1–3. *Chalinula oculata;* Schmidt, 1870: 77. *Euchalinopsis oculata;* Lendenfeld, 1887c: 744. *Haliclona oculata tavaresi* Arndt, 1941: 25. *Spongia dichotoma* Linnaeus, 1767: 1299. *Halichondria cervicornis* Johnston, 1842: 96, pl. VI figs 1, 2, pl. V figs 1, 2. *Chalina cervicornis;* Bowerbank, 1866: 364; 1874: 171, pl. LXVII figs 1–3. *Diplodemia vesicula* Bowerbank, 1864 pl. XIV fig. 273, pl. XXIII fig. 324, pl. XXXVI fig. 377; 1866: 357; 1874: 178, pl. LXX figs 12–14. *Isodictya pygmaea* Bowerbank, 1866: 313; 1874: 141, pl. LVI figs 6–10. *Chalina grantii* Bowerbank 1866: 375; 1874: 173, pl. LXVIII figs 6, 7. *Pachychalina grantii;* Ferrer-Hernandez, 1922: 18. *Veluspa polymorpha* var. *gracilis* Miklucho-Maclay, 1870: 5, pl. I figs 1, 2, pl. II figs 22, 3. *Veluspa polymorpha* var. *digitata* Miklucho-Maclay, 1870: 5, pl. I figs 3, 4. *Veluspa polymorpha* var. *arctica* Miklucho-Maclay, 1870: 5, pl. I fig. 11, pl. II figs 22, 2. *Chalina arbuscula* Verrill, 1873: 742. *Isodictya varians* Bowerbank, 1874: 307, pl. LXXXVIII figs 1–6. *Chalina flemingii* (pars) Bowerbank, 1874: 357. *Reniera gracilis;* Dybowsky, 1880: 47, pl. III fig. 3, pl. IV fig. 16. *Haliclona gracilis;* Koltun, 1959: 216, fig. 175. ? *Pachychalina caulifera* Vosmaer, 1882a: 33, pl. I fig. 14, pl. III figs. 64–66. Taxonomic decision for synonymy: De Weerdt, 1986.

Material examined. ? Holotype: BMNH 1841.1.13.46 – two dried specimens, connected by a small rope, with a label (probably by Ridley): '*Spongia oculata*, 106, 4/3.45', and another label: '*Chalina oculata* (Pallas), Type? (History to be investigated)'. Other material. BMNH 1847.9.7.2 – *Chalina oculata*, Johnston Collection (JC), Firth of Fourth. ZMA – several specimens identified as *Haliclona oculata. Halichondria cervicornis*: BMNH 1847.9.7.144 – figured specimen of Johnston, 1842, pl. V fig. 2. Holotype of *Diplodemia vesicula*: BMNH 1877.5.21.2082 – Shetlands, figured specimen of Bowerbank, 1874, pl. LXX fig. 12. *Isodictya pygmaea* Bowerbank: BMNH 1932.1.5.10 – Scarborough, figured specimens of Bowerbank, 1874, pl. LVI figs 6–8 (the specimen of his fig. 6 designated lectotype by De Weerdt, 1986). Holotype of *Chalina grantii* Bowerbank: BMNH 1932.1.5.12 – figured specimen of Bowerbank, 1874, pl. LXVIII fig. 6. Microscope slide of *Chalina arbuscula* Verrill: BMNH 25.11.1.775a – Dendy Collection, Wood's Hole Museum. *Isodictya varians* Bowerbank: BMNH 1877.5.21.2083 – Mersey. *Chalina flemingii* Bowerbank: BMNH 1877.5.21.2079 – Peterhead, described by Bowerbank, 1874: 357. *Chalina oculata*: BMNH 1847.9.7.144, BMNH 1847.9.7.2 – Johnston Collection, Firth of Fourth. *Halichondria cervicornis*: figured specimen of Johnston, 1842, pl. V fig. 1. *Chalina cervicornis*: BMNH 1877.5.21.2080 – Bowerbank Collection, Torquay, figured specimen of Bowerbank, 1874, pl. LXVII fig. 1.

Description. Solid branches, growing from a common stalk which is attached to the substratum with a pedicel (Fig. 12A). There is a considerable variation in the number and degree of fusing of the branches. The branches may be thin and delicate (diameter 0.2–0.4 cm), entirely isolated from each other, but they may also grow much thicker and broader, and fused to such a degree that the sponge becomes almost flabelliform. Usually the branches are somewhat laterally compressed. The oscula are always small and circular, 1–3 mm, mainly arranged along the narrower sides of the branches. Height of the sponge up to 30 cm. Surface smooth, velvety, slightly hispid. Consistency rather soft, but elastic, compressible, not fragile. Colour light brown. Skeleton: ectosomal skeleton usually absent, occasionally consisting of an irregular, incoherent reticulation of some tangentially orientated spicula. Choanosomal skeleton (Fig. 12B) a regular, ladder-like reticulation of uni- to paucispicular primary lines, regularly connected by unispicular secondary lines. Spongin moderate to abundant, especially towards the base of the sponge. Spicules: short, fat, fusiform oxeas with short, sharp points (Fig. 12C), stylote and strongylote modifications rather common, 80–145 × 5–12 μm. Distribution and ecology. Arctic-Boreal. Infralittoral, to ca. 100 m, on rocky and sandy bottom, attached to stones, *Mytilus*, etc. The species can tolerate low salinity and turbid water with suspended silt.

Remarks. The large number of synonyms of *Haliclona (Haliclona) oculata* is easily explained by its variable growth form and common occurrence, and the tendency of earlier authors to describe every growth form as a variety or a new species. Contrary to its variable growth form, the skeletal architecture and size and shape of the oxeas is fairly consistent and characteristic, enabling reliable identification of the species. For a detailed treatment of the synonyms one is referred to De Weerdt (1986); here only the type species of the nominal genera which are synonymous with the subgenus *Haliclona* will be dealt with.

Diplodemia was erected (by monotypy) by Bowerbank (1864: 202) for *Diplodemia vesicula* Bowerbank. BMNH 1877.5.21.2082 is the holotype, figured specimen of Bowerbank, 1874, pl. LXX fig. 12, designated as the type on p. 178 of the same volume. See also Bowerbank, 1864, pl. XIV fig. 273, pl. XXIII fig. 324 [not fig. 234 as erroneously printed], and pl. XXXVI fig. 377. Bowerbank erected the genus for this species because of the combination of a fibrous skeleton and 'membranous and spiculous ovaries'. The holotype consists of a small cluster of gemmules, attached to a 'valve of a pecten' (Fig. 13A), held together by spongin fibres of 26.4–43.2 μm thick, cored by oxeas of ca. 93.6–124.8 × 2.9–6 μm (Fig. 13B–D). The oxeas within the gemmules measure 100.8–*111.4*–117.6 × 4.3–*4.8*–5.3 μm. The gemmules (Fig. 13E–F) are ca. 950 μm in diameter. There is no doubt that the species belongs to *Haliclona (Haliclona) oculata*, in which the development of gemmules is a common feature.

Adocia was erected by Gray (1867a: 552, original designation) for *Isodictya simulans* Bowerbank (1866: 308). There are several species described by Bowerbank and other authors which are synonymous with *Haliclona (Haliclona) simulans*, for which one is referred to De Weerdt (1986). The species was first described by Johnston (1842: 109, pl. VIII figs 1–6) as *Halichondria simulans*, initially transferred by Bowerbank (1861: 71) to *Haliclona*, then to *Chalina* (Bowerbank, 1864: 101), and then to *Isodictya* (Bowerbank, 1866: 101). Johnston's specimen of his plate VIII fig. 5 is catalogued as BMNH 1847.9.7.9, and designated lectotype by De Weerdt (1986: 98). *Isodictya simulans* is in the BMNH represented by several specimens. BMNH 1932.1.5.2a, from Hastings, is the specimen figured by Bowerbank (1874, pl. LI fig. 5), designated as 'genolectotype' of *Adocia* by Burton, 1934a: 534 (Fig. 14A–B). He kept *Adocia* for species with a dermal skeleton. It has, in the dried state, a light yellowish-brown colour and fragile, though somewhat corky consistency. The sections made from this specimen show a skeleton clearly damaged by the handling; the ectosomal skeleton is a somewhat subisotropic, tangential, basically unispicular reticulation with intercrossing oxea; the choanosome consists of paucispicular primary lines, irregularly connected by unispicular secondaries. There is a moderate to considerable amount of spongin at the nodes of the spicula. The oxeas are short, fat, cigar-shaped, with rather short and sharp points, 108–*119.7*–141.6 × 5–*6.6*–9.1 μm. See Fig. 14C for a drawing of the choanosomal skeleton, and Fig. 14D for the ectosomal skeleton

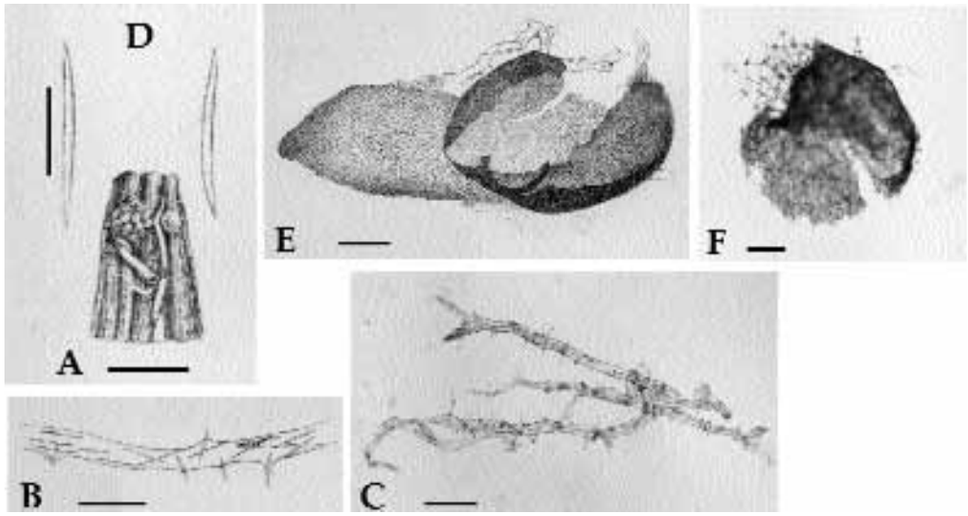

Fig. 13. *Haliclona (Haliclona) oculata* (Pallas, 1766, as *Spongia*). A, gemmules attached to the 'valve of a pecten', reproduced from Bowerbank (1874, as *Diplodemia vesicula*) (scale 1 cm). B, spongin fibres cored by oxeas, reproduced from Bowerbank, 1864 (scale 100 μm). C, spongin fibres, microscope slide made from the holotype of *Diplodemia vesicula* (scale 100 μm). D, oxeas reproduced from Bowerbank, 1874 (scale 50 μm). E, gemmules, reproduced from Bowerbank, 1864 (scale 100 μm). F, gemmule microscope slide made from the holotype of *Diplodemia vesicula* (scale 100 μm).

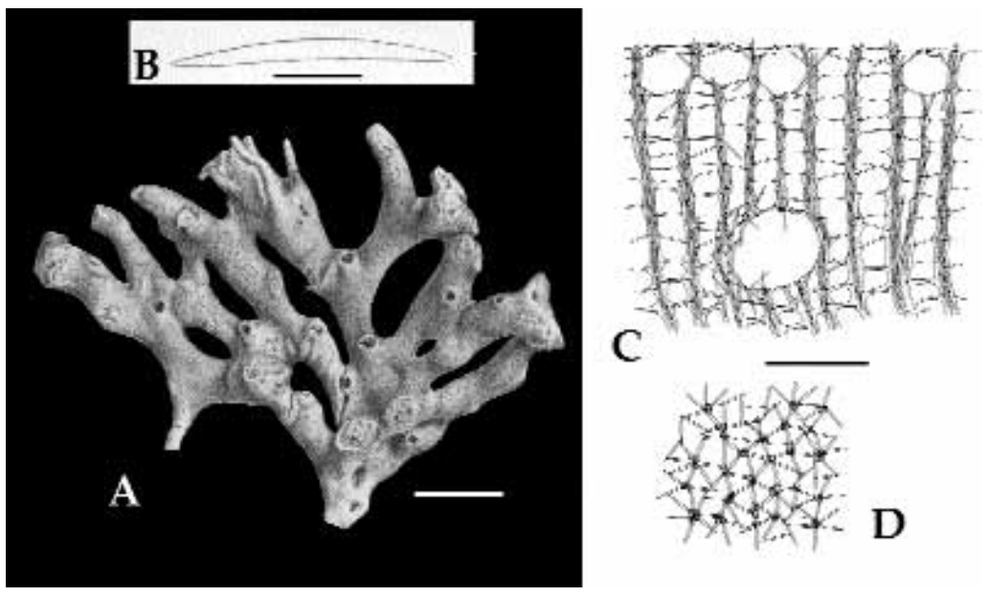

Fig. 14. *Haliclona (Haliclona) simulans* (Johnston, as *Halichondria*). A, habit, reproduced from Bowerbank (1874, as *Isodictya*) (scale 1.5 cm). B, oxeas, reproduced from Bowerbank (scale 50 μm). C, perpendicular section of choanosomal skeleton made from preserved specimen in ZMA (scale 500 μm). D, tangential view of ectosomal skeleton (scale 500 μm) (after De Weerdt, 1986).

of a preserved ZMA specimen of *Haliclona (Haliclona) simulans*. The conspecifity of Johnston's and Bowerbank's *simulans* is obvious. The presence of a distinct ectosomal skeleton is considered a primitive character within the Haplosclerida (see De Weerdt, 1989), therefore there is no reason to keep *Adocia* separate from *Haliclona*.

Veluspa was erected (by original designation) by Miklucho-Maclay (1870) for *Veluspa polymorpha* var. *gracilis* Miklucho-Maclay (1870: 5, figs 1–2) (Fig. 15). Although the original material has not been studied, the description and figures leave no doubt about the conspecificity of this species with *Haliclona (Haliclona) oculata*.

Lessepsia was erected (by monotypy) by Keller (1883: 19) for *Lessepsia violacea* Keller (1882: 19, pl. I figs 1–2). The holotype of *L. violacea* could not be examined (it is not present in the Museum für Naturkunde der Humboldt-Universität, Berlin), but

Keller gave a good description of the species. He described it as a very delicate, cushion-shaped sponge, with one large osculum of 5 mm diameter, and a few smaller ones, with a vivid violet colour, growing between shells of the mussel *Mytilus variabilis*. The skeleton a delicate, irregular reticulation with three to four sided meshes, with oxeas completely embedded in spongin. Primary lines uni- to paucispicular, with only very few spicula scattered in between the lines. The oxeas with both ends pointed or rounded, 100–120 μm. Although Keller described the skeleton as 'irregular', his figure (l.c., fig. 2) shows a rather regular structure, conforming to the subgenus *Haliclona*. Keller considered the species and new genus to be placed between '*Chalinula*' and '*Reniera*'. It is here placed in the synonymy of the subgenus *Haliclona*.

Euchalinopsis was erected by Lendenfeld (1887c: 744), for *Chalina oculata* (Bowerbank, 1864), subsequently designated as type species by Burton (1934a: 529).

Toxiclona de Laubenfels (1954), type species *Siphonochalina gaussiana* Hentschel (1914), was first considered by De Weerdt (2000) to be a synonym of the subgenus *Haliclona*. This viewpoint cannot be upheld anymore, and the species is now transferred to *Cladocroce* (see above).

SUBGENUS *RENIERA* SCHMIDT, 1862

Synonymy

Reniera Schmidt, 1862: 73. *Prianos* Gray, 1867a: 520. *Philotia* Gray, 1867a: 522. *Toxadocia* de Laubenfels, 1936a: 69. *Reniclona* de Laubenfels, 1954: 64. *Kallypilidion* de Laubenfels, 1954: 110. The '*aquaeductus*' group of De Weerdt (1986, 1989; De Weerdt *et al*., 1991).

Fig. 15. *Haliclona (Haliclona) oculata* (Pallas, 1766). Habit, reproduced from Mikluco-Maclay (1870 as *Veluspa polymorpha* var. *gracilis*) (scale 2 cm).

Type species

Reniera aquaeductus Schmidt, 1862: 73 (by subsequent designation; de Laubenfels, 1932: 61).

Definition

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

Diagnosis

Delicate sponges with a cushion-shaped or encrusting, laterally spreading growth form, also masses of anastomosing slender branches intermittently and loosely attached to the substratum, or clusters of tubes; some species have a tendency to form long, thin, blind-ending proliferations. Oscula at the end of oscular chimneys or mounds, or flush with the surface. Consistency varying from soft, compressible but fragile to moderately firm. Several species produce slime strands when torn apart. Colour commonly bright, varying from purple, violet to orange and yellow. Surface smooth, even. Ectosomal skeleton, if present, a regular, tangential, unispicular, isotropic, reticulation. Choanosomal skeleton also a delicate, regular, unispicular, isotropic reticulation. Spongin always present at the nodes of the spicula, but never abundant. Oxeas frequently blunt-pointed or strongylote. Microscleres, if present, toxas and sigmas.

Previous reviews

Griessinger, 1971; Van Soest, 1980; De Weerdt, 1989, 2000.

Description of type species

Haliclona (Reniera) aquaeductus Schmidt, 1862 (Fig. 16).

Synonymy. *Reniera aquaeductus* Schmidt, 1862: 73, pl. VII figs 6, 6a, 6b; Griessinger, 1971: 126, fig. 4a; Boury-Esnault & Lopes, 1986: 199, fig. 48, pl. III, 12.

Material examined. Holotype: Not seen. Topotypical specimen: BMNH 1867.7.26.47a (dry) – one of Schmidt's specimens of *Reniera aquaeductus* from the type locality, Sebenico, Adriatic.

Description (partly after Boury-Esnault & Lopes, 1986). Laterally spreading masses up to 15 cm in diameter and 0.5–1.5 cm thick, from which arise fistule-like outgrowths of 5–7 mm high and other elevations. Oscules at the top of these elevations, with a diameter of 1–3 mm (Fig. 16A). Colour light purple or pink, consistency soft, very fragile. Surface smooth and even. Ectosomal skeleton (Fig. 16C) a very regular, tangential, unispicular and isotropic reticulation. Choanosomal skeleton (Fig. 16D) also a very regular, delicate, unispicular, isotropic reticulation, without clear distinction between primary and secondary lines. Oxeas (Fig. 16B) blunt-pointed or strongylote, ca. 145–175 × 6–8 μm. Spongin moderate, at the nodes of the spicula. Distribution and ecology. Mediterranean, Azores, on hard substratum, 5–35 m.

Remarks. *Prianos* was erected by Gray (1867a: 520, original designation) for *Reniera amorpha* Schmidt, 1864: 38. Holotype

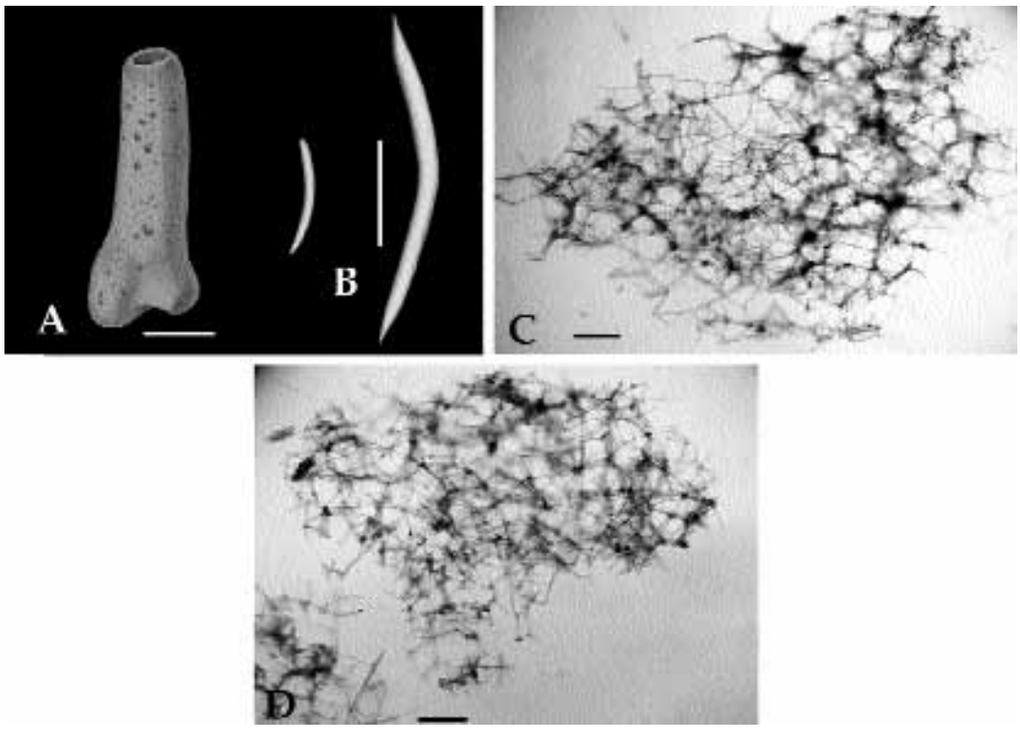

Fig. 16. *Haliclona (Reniera) aquaeductus* (Schmidt, 1862, as *Reniera*). A, habit, reproduced from Schmidt (1862) (scale 1 cm). B, oxeas, reproduced from Schmidt (scale 50 μm). C, tangential view of ectosomal skeleton made from specimen in BMNH identified by Schmidt (scale 250 μm). D, perpendicular section of choanosomal skeleton made from specimen in BMNH identified by Schmidt (scale 250 μm).

LMJG 15628 (not examined). Topsent (1925c: 710) considered it a junior synonym of *Reniera cratera* Schmidt, 1862: 73, which is followed here.

Philotia was erected by Gray (1867a: 522, by original designation) for *Isodictya varians* Bowerbank, 1866: 281. This species was first established for a single specimen, illustrated in Bowerbank, 1874, pl. XLVIII figs 14–16 and designated as type on p. 124 of the same volume. This specimen forms part of four specimens in the BMNH, identified by Johnston as *Halichondria cinerea* (cf. Johnston, 1842: 111, pl. IV figs 3 and 4), all dried and mounted on a piece of carton. They have the numbers BMNH 1847.9.7.41 (Johnston's card '17d'), 1847.9.7.42 (Johnston's card '17e'); 1847.9.7.71 (left, larger specimen on Johnston's card '17c') and 1847.9.7.156 (right, smaller specimen on Johnston's card '17c)'. Of these, only the sponge on card '17d' was considered by Bowerbank to belong to '*cinerea*' (cf. Bowerbank, 1866: 274–279), the others were re-identified by him as *Isodictya varians* (1847. 9.7.42), *I. peachii* (1847.9.7.71), and *I. permollis* (1847.9.7.156) respectively. Having reexamined these specimens there is no doubt that they all belong to *Haliclona (Reniera) cinerea* (Grant, 1826d) (cf. De Weerdt, 1986 and De Weerdt & Stone, in De Weerdt, 1987). The holotype of *I. varians* is a light greyish-brown, fragile cushion of 1 × 2.5 × 1 cm (Fig. 17A), without visible oscula, with a smooth surface. The ectosomal skeleton is a very regular, tangential, unispicular, isotropic reticulation. The choanosomal skeleton (Fig. 17C) has the same structure, very regular and isotropic. There is a considerable amount of spongin at the nodes of the oxeas. These are short, rather fat, cigar-shaped, with many stylote modifications (Fig. 17B), 76.8–*100.3*–112.8 × 4.8–*7.6*–10.3 μm. The species clearly belongs to *Haliclona (Reniera) cinerea*. The other specimens in the BMNH identified by Bowerbank as *I. varians* all belong to *Haliclona (Haliclona) oculata* (Pallas) (e.g., BMNH 1019.1.1.349, figured specimen of Bowerbank, 1874, pl. LXXXVIII, fig. 1). See Figs 17D–E for slides of Johnston's specimens of *Halichondria cinerea* marked '17e'.

Toxadocia was erected by de Laubenfels (1936a: 69, by original designation) for *Gellius abbreviatus* Topsent (1918: 538, San Thomé). It was described as 'very small specimens' of 10 × 6 × 1–2 mm, white, with a loose structure, slightly hispid, without distinct oscules. Skeleton of a simple structure, forming multispicular lines towards the periphery, with rather abundant spongin at the nodes of the spicules. Megascleres slightly curved strongyles, 100–110 × 5.5–6 μm. Microscleres toxas of variable size, the larger ones 56–70 × 1.7–2.4 μm, the smaller ones 20 × 0.8 μm, with intermediates. Topsent's material is represented in the MNHN by two microscope slides, MNHN DT. 2057, labeled: 'Type, Praia das Conchas, 3.8.1906, Det. E.T., Descr. E.T., Arch. Zool. 1918, 57, p. 538–540', one of which contains a cross-section. The skeleton is a very regular, unispicular, isotropic reticulation (Fig. 18A); multispicular lines could not be detected, and the spongin is less abundant than mentioned by Topsent. The strongyles (Fig. 18B) measure 96–117 × 4.5–6 μm; the toxas (Fig. 18C), abundant, measure 24–66.9 × 0.9–2.4 μm. As already mentioned by Topsent, the species is very similar to the Arctic *Haliclona (Reniera) primitiva* (Lundbeck, 1902: 69, pl. XIII fig. 11, as *Gellius*; cf. De Weerdt, 1986). Both species have the regular, unispicular, isotropic skeletal architecture typical of the subgenus *Reniera*.

Reniclona was erected by de Laubenfels (1954: 64, by original designation) for *Isodictya permollis* Bowerbank, 1866, which is a junior synonym of *Haliclona (Reniera) cinerea* (Grant, 1826d).

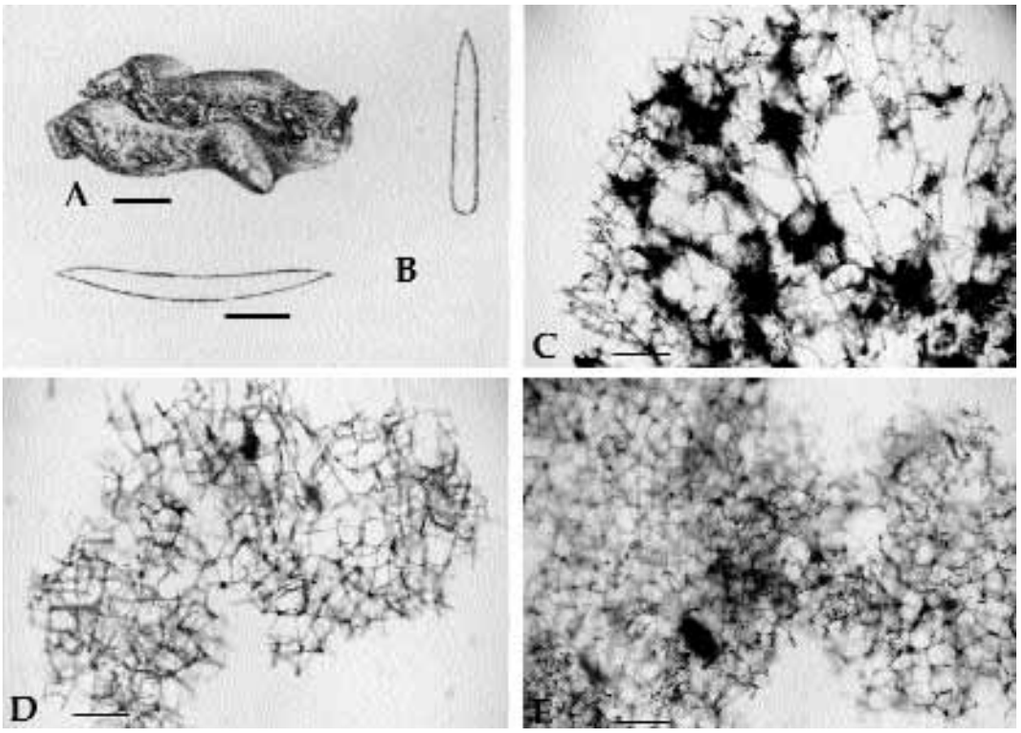

Fig. 17. *Haliclona (Reniera) cinerea* (Grant, 1826d, as *Spongia*). A, habit, reproduced from Bowerbank (1874, holotype *Isodictya varians*) (scale 0.5 cm). B, oxeas, reproduced from Bowerbank (scale 25 μm). C, perpendicular section of choanosomal skeleton made from holotype of *I. varians* (scale 250 μm). D, perpendicular section of choanosomal skeleton made from Johnston's specimen '17e' (as *Halichondria cinerea*) (scale 250 μm). E, tangential view of ectosomal skeleton made from Johnston's specimen '17e' (scale 250 μm).

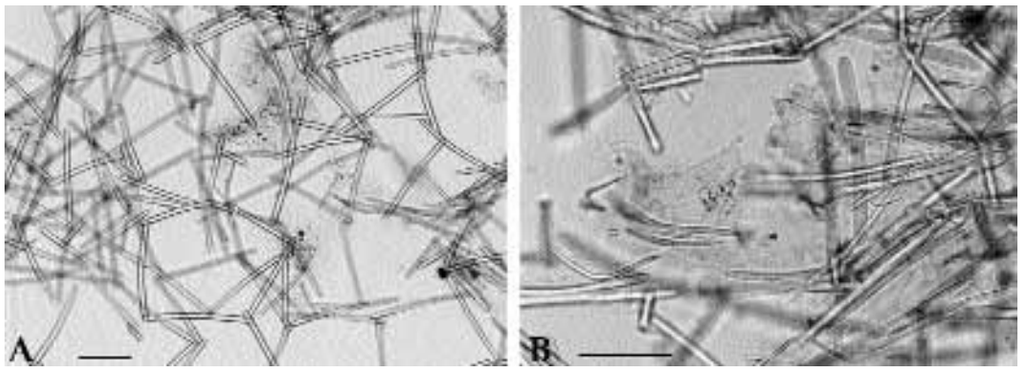

Fig. 18. *Haliclona (Reniera) abbreviata* (Topsent, 1918 as *Gellius*). A, perpendicular section of choanosomal skeleton made from Topsent's slide (scale 50 μm). B, toxas made from Topsent's slide (scale 50 μm).

The lectotype of *I. permollis* (designated by De Weerdt & Stone, in De Weerdt, 1987) is BMNH 1932.1.5.11, Scarborough, the specimen figured by Bowerbank, 1874, pl. XLVIII fig. 9. It is a flat crust of 5 × 3.5 × 0.2 cm (Fig. 19A), growing on a stone, of a very fragile consistency, light grey with yellowish tinges, with about five circular oscules flush with the surface, and a diameter of 1–2 mm. There is a clearly visible ectosomal skeleton. The ectosomal skeleton (Fig. 19C) is a very regular, tangential, unispicular, isotropic reticulation. The choanosomal skeleton (Fig. 19D) is also a very regular, unispicular, isotropic reticulation. There is some spongin at the nodes of the spicules. The oxeas (Fig. 19B) are slightly curved, with acerated, short points, 100.8–*112.2*–122.4 × 5–*6.2*–7.7 μm. The identity of the sponges collected by de Laubenfels at Ponapé (USNM 23035 and 23060) and identified by him as *Reniclona permollis* (de Laubenfels, 1954: 67) still needs to be established, but they certainly do not belong to the eastern Atlantic *Haliclona (Reniera) cinerea* (cf. De Weerdt, 1986, 1989).

Kallypilidion was established by de Laubenfels (1954: 110, by monotypy) for *Kallypilidion poseidon* de Laubenfels (1954: 110, fig. 70, pl. IX fig. a; Palau Islands), which is a junior synonym of *Siphonochalina fascigera* Hentschel (1912: 398, pl. XVI fig. 3) (Fig. 20A–B). De Laubenfels erected the genus for the single species on basis of the external shape: 'It is characterized sharply by its external shape, which is regularly that of a very thin-walled bowl or vase. It is easily detached from the substratum and, when

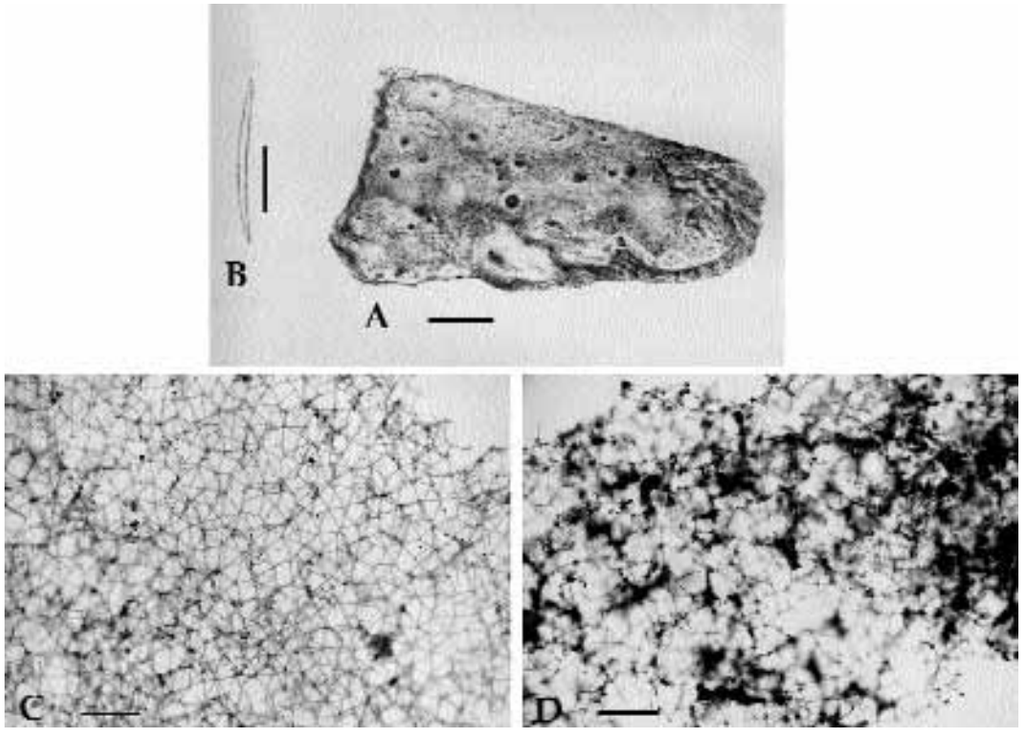

Fig. 19. *Haliclona (Reniera) cinerea* (Grant, 1826d, as *Spongia*). A, habit, reproduced from Bowerbank (1874, as *Isodictya permollis*) (scale 2 cm). B, oxeas, reproduced from Bowerbank (scale 50 μm). C, tangential view of ectosomal skeleton made from Bowerbank's specimen (scale 250 μm). D, perpendicular section of choanosomal skeleton made from Bowerbank's specimen (scale 250 μm).

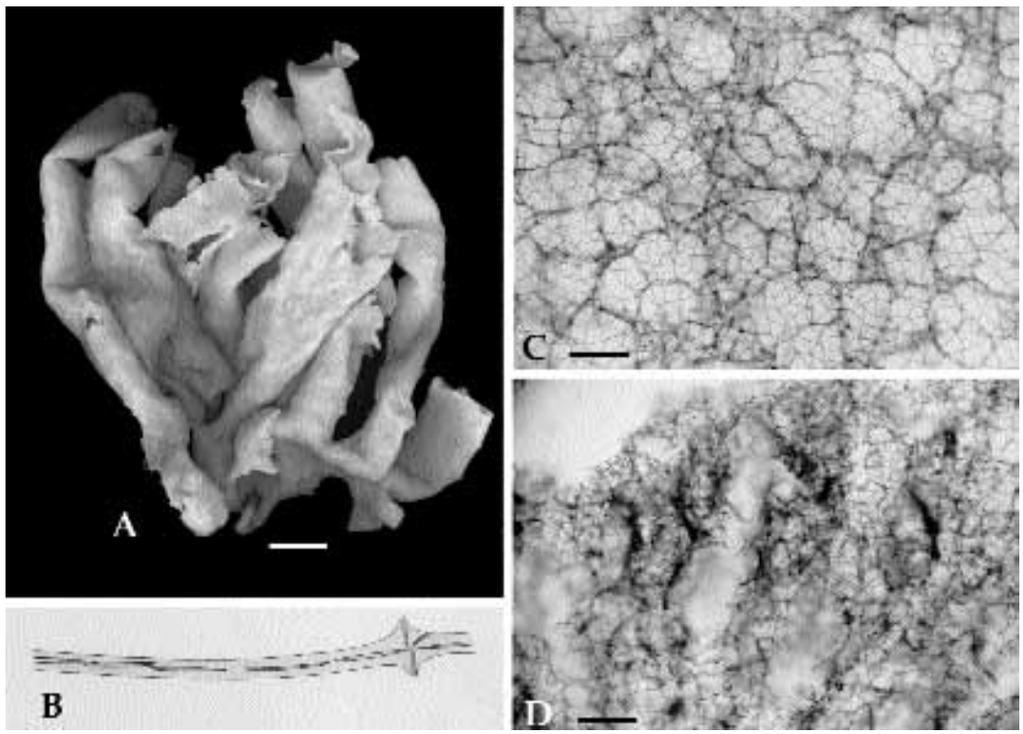

Fig. 20. *Haliclona (Reniera) fascigera* (Hentschel, 1912 as *Siphonochalina*). A, habit of preserved specimen, ZMA Por. 15268 (scale 2 cm). B, spongin fibre cored by oxeas, reproduced from Hentschel (no size given). C, tangential view of ectosomal skeleton made from holotype of *Kallypilidion poseidon* de Laubenfels (1954) (scale 250 μm). D, perpendicular section of choanosomal skeleton made from holotype of *Kallypilidion poseidon*.

turned upside down, strikingly resembles a brimless cap, such as a man might wear. The name is derived from the Greek for 'beautiful hat', or 'cap' (which was possibly used as a head gear by Poseidon; de Laubenfels, 1954: 111). He described the colour as a vivid light blue, very slightly verging toward violet. Consistency flexible, 'like that of wet paper.' Surface mostly very smooth, with here and there a few lumps. The ectosomal skeleton a tangential, isodictyal reticulation, 'as characteristic of the Adociidae', and the endosome 'also strikingly isodictyal in nature'. The oxeas united by spongin, measuring 64–77 × 2–3.5 μm. In addition to the basal isodictyal reticulation there are tracts of fibres containing a moderate amount of spongin. The holotype, USNM 23121 has been examined and consists of a tube, 6 cm high, 2 cm thick at the base, gradually increasing to 2.6 cm at the top. The top part of the tube is recurved. Consistency soft, surface smooth, punctate. The ectosomal skeleton (Fig. 20C) a very regular, tangential, unispicular, isotropic reticulation. The choanosomal skeleton (Fig. 20D) also a regular, unispicular, reticulation. A moderate amount of spongin unites the spicules at the nodes. The oxeas are slender, slightly curved, somewhat fusiform, 72–*77.9*–81.9 × 3–*3.4*–4.2 μm. In all respects the species fits within the subgenus *Reniera*. The original material of *Siphonochalina fascigera* Hentschel (1912, Banda Sea) could not be studied, but Hentschel's description (see also Fig. 20B) leaves no doubt about the conspecifity of his species with *Kallypilidion poseidon*. The ZMA holds several specimens of *Haliclona (Reniera) fascigera* from Indonesia, and Hooper (pers. comm.) reports that the species is commonly observed in many of the western Pacific island and Great Barrier Reef faunas.

SUBGENUS *RHIZONIERA* GRIESSINGER, 1971

Synonymy

Rhizoniera Griessinger, 1971: 152. The '*rosea*' group of De Weerdt (1986, 1989).

Type species

Reniera rhizophora Vacelet, 1969 (by monotypy).

Definition

Chalinidae with a regular anisotropic, ladder-like choanosomal skeleton consisting of pauci- to multispicular ascending primary lines, connected by unispicular secondary lines. Ectosomal skeleton usually absent, if present, consisting only of some vaguely strewn tangentially orientated oxeas. Spongin scarce or absent.

Diagnosis

Sponges thickly encrusting, cushion-shaped with oscular chimneys or mounds, or massive, rarely stalked. Consistency soft to moderately firm, sometimes viscous. Surface frequently slightly hispid through projecting spicules of the primary lines. Colour brown, pink, purple or bluish-grey. Megascleres usually slender oxeas with acerated points. No microscleres. Consistency soft to moderately firm.

Previous review

De Weerdt, 2000.

Description of type species

Haliclona (Rhizoniera) rhizophora Vacelet, 1969 (Fig. 21).

Synonymy. *Reniera rhizophora* Vacelet, 1969: 212, fig. 53, pl. IV fig. 3; *Rhizoniera rhizophora;* Griessinger, 1971: 152, fig. 21.

Material examined. Holotype: MNHN JV 68-13 – Mediterranean.

Description (partly after Vacelet, 1969). Club-shaped sponges (Fig. 21A), with a stalk attached to the substratum, to 8 cm high; main body 2–4 cm high, 1.5–2.5 cm thick. Colour grey in spirit. Consistency rather soft, stalk not very rigid. Oscula apical, 2–3 mm in diameter. No ectosomal skeleton. Choanosomal skeleton (Fig. 21B) a somewhat irregular reticulation of paucispicular primary lines, irregularly and loosely connected by unispicular secondary lines, with many loose spicules scattered in between. Throughout the skeleton run multispicular tracts, arising from the stalk, 30–85 μm in diameter. Spongin very scarce, at the nodes of the spicula. Oxeas slender, hastate, 220–330 × 5–7.5 μm. Distribution and ecology. Mediterranean, 130–150 m.

Remarks. The type species differs from all other species assigned to *Rhizoniera* by the possession of a stalk and the reinforcement throughout the sponge of extensions of the multispicular tracts originating from the stalk. Because of this, the regular anisotropic skeleton of pauci- to multispicular primary lines connected by unispicular secondaries, as found in all other members assigned to the subgenus, is somewhat obscured in the type species. See for comparison Fig. 21C, which is the choanosomal skeleton of *Haliclona (R.) rosea* (Bowerbank, 1866, as *Isodictya*). Presently, it does not seem appropriate to keep *Rhizoniera* as a separate genus or subgenus, or to erect a new subgenus for species with a better developed anisotropic skeleton, because *R. rhizophora* has a stalk and occurs in deeper water. Though perhaps not the most appropriate, *Rhizoniera* is, however, the only available name for species with this type of skeleton.

SUBGENUS *SOESTELLA* DE WEERDT, 2000

Synonymy

Haliclona (Soestella) De Weerdt, 2000: 7.

Type species

Reniera mamillata Griessinger, 1971 (by original designation).

Definition

Chalinidae with a subanisotropic choanosomal skeleton consisting of ill-defined paucispicular primary lines, irregularly connected by paucispicular secondary lines. There is a slight but consistent tendency of the spicules to form rounded meshes. Ectosomal skeleton a discontinuous, tangential, rather open reticulation, due to many rounded meshes framed by spicules in lines of 2–5 spicules thick. Spongin always present at the nodes of spicules, but never abundant. Oxeas usually slender. Microscleres, if present, sigmas, toxas or raphides.

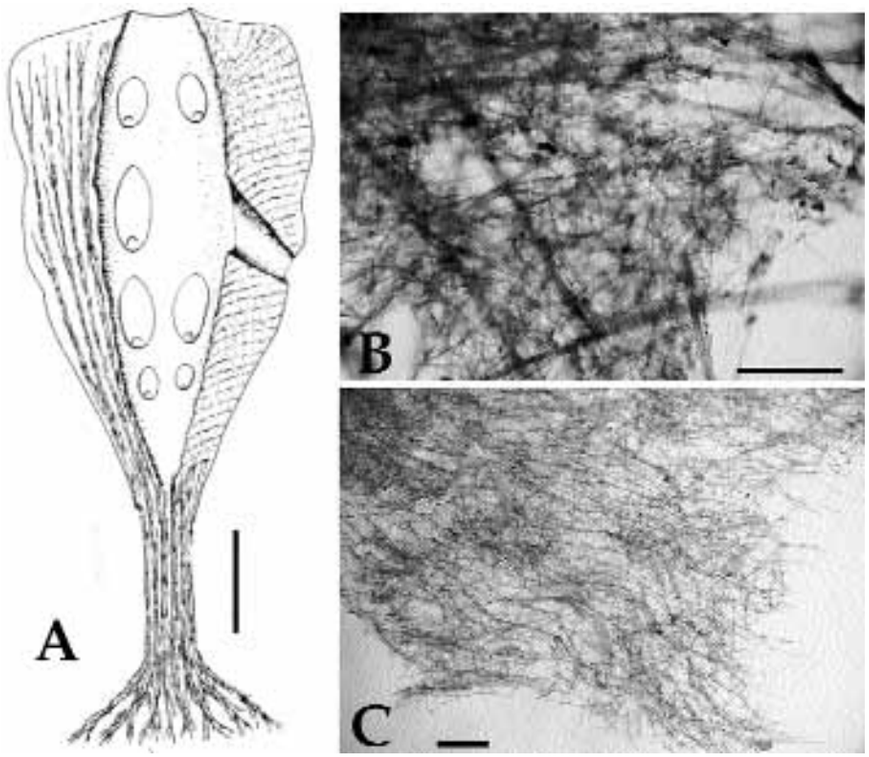

Fig. 21. *Haliclona (Rhizoniera) rhizophora* (Vacelet, 1969 as *Reniera*). A, habit, reproduced from Griessinger (1971, as *Rhizoniera*) (scale 1 cm). B, perpendicular section of choanosomal skeleton made from the holotype (scale 500 μm). C, perpendicular section of choanosomal skeleton of preserved specimen of *Haliclona (Rhizoniera) rosea* (Bowerbank, 1866 as *Isodictya*), ZMA Por. 4182 (scale 500 μm).

Diagnosis

Growth form irregularly massive, thickly encrusting, lobate/cushion-shaped, or digitate. Oscula at the end of oscular chimneys or mounds, alongside the branches of digitate forms, flush with the surface in encrusting forms. Consistency varying from soft to moderately firm. Surface even or somewhat irregular, slightly to rather strongly punctate. Colour varying from light to dark brown, black, green to dark red. Ectosomal skeleton a discontinuous, tangential, rather open reticulation, due to many rounded meshes framed by spicule lines of 2–5 spicules thick. Choanosomal skeleton a subanisotropic reticulation consisting of ill-defined paucispicular primary lines, irregulary connected by paucispicular secondary lines. Spongin always present at the nodes of spicules, but never abundant. Oxeas usually slender. Microscleres, if present, sigmas, toxas or raphides.

Previous review

De Weerdt, 2000.

Description of type species

Haliclona (Soestella) mammilata Griessinger, 1971 (Fig. 22).

Synonymy. *Reniera mammilata* Griessinger, 1971: 132, figs 5b, 6c, j, pl. I fig. 3; *Haliclona mamillata;* Van Lent & De Weerdt, 1987: 135.

Material examined. Holotype: MNHN DJMG 4 – Dubrovnik, Adriatic. Other material. ZMA Por 5460 – Cap l'Abeille, 32 m, Banyuls.

Description (after Griessinger, 1971 and Van Lent & De Weerdt, 1987). Massive base (25 mm thick) from which arise differently shaped (mammiform, vulcano-shaped) osculiferous elevations, up to 7 cm high (Fig. 22A–B). Colour pink-orange, sometimes with yellowish tinges at the base. Consistency moderately soft, compressible, somewhat viscous. The ectosomal skeleton (Fig. 22C, F) is a rather irregular, tangential, discontinuous reticulation of spicules forming rounded meshes. The choanosomal skeleton (Fig. 22E) also a somewhat irregular reticulation of ill-defined primary lines, irregularly connected by unispicular secondary lines, with a vague tendency to form rounded meshes. Spongin scarce, at the nodes of the spicula. Oxeas (Fig. 22D) with tapering, rather short points, 105–180 × 2.5–6.8 μm.

Remarks. The subgenus *Soestella* was erected by De Weerdt (2000) for a group of sponges named 'du type *Reniera arenata*' by Griessinger (1971: 130). All the species assigned by Griessinger to this group, as well as most species of the group 'du type *R. fulva*' show a high resemblance in skeletal architecture, conforming to the above given definition of *Soestella*. Van Soest (1980: 12) based his redefinition of '*Reniera*' on this group of sponges, but without having studied the type species of *Reniera, Reniera aquaeductus* Schmidt (1862). This species, with its entirely unispicular, isotropic skeleton, is clearly different from the above mentioned group of species.

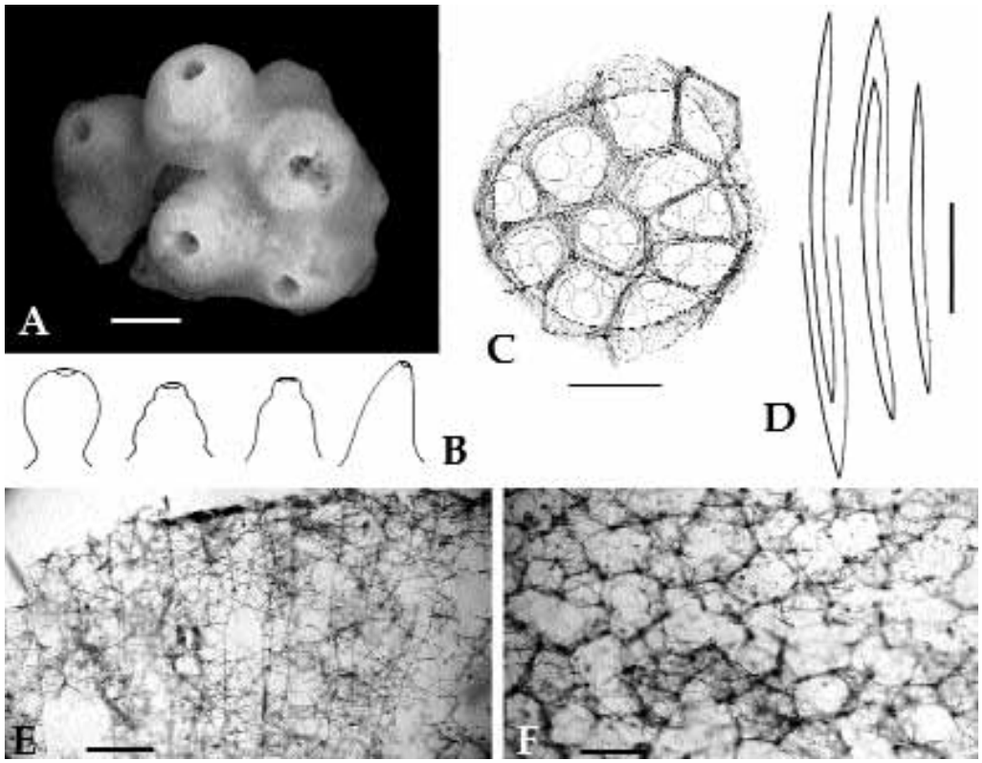

Fig. 22. *Haliclona (Soestella) mamillata* (Griessinger, 1971 as *Reniera*). A, habit of preserved specimen, ZMA Por. 5460 (scale 1 cm). B, different shaped osculiferous elevations, reproduced from Griessinger. C, tangential view of ectosomal skeleton, reproduced from Griessinger (scale 250 μm). D, oxeas, reproduced from Griessinger (scale 50 μm). E, perpendicular section of choanosomal skeleton made from holotype (scale 500 μm). F, tangential view of ectosomal skeleton made from holotype (scale 500 μm).

GENUS *INCERTAE SEDIS*

The genus *Protoschmidtia* Czerniavsky, 1878: 392 (1879: 95; 1880: 30) was erected for *Protoschmidtia simplex* Czerniavsky, 1878: 392 (1879: 95; 1880: 31) (here designated type species), from the northern shores of the Black Sea, from the midshore. The description in Latin is not very informative. The shape is encrusting with tubular elevations, and was compared with '*Reniera palmata*' and '*Amorphina grossa*'. Spicules are described as 'short with acute endings'. Together this conveys an image of a *Haliclona*-type of sponge. Three other species of *Protoschmidtia* were described in the same publication, and of only one (*Protoschmidtia* (sic) *foraminosa* Czerniavsky, 1878: 393 (1879: 98; 1880: 33), pl. I (=pl. V) figs 6–7) data on spicule size (140–210 × 7–12 μm) and shape are provided. This is consistent with an assumed synonymy with *Haliclona*. Several other authors (Ridley, 1884a; Thiele, 1903; Burton, 1928a) employed *Protoschmidtia* mostly for species belonging to the order Haplosclerida.