

## Family Aplysinidae Carter, 1875

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Aplysinidae (Demospongiae, Verongida) are characterised by having an anastomosing fibrous skeleton of polygonal meshes with no organisation in one plane or orientation in relation to the surface. Two genera are included, found predominately in the Caribbean and Mediterranean, and another genus, *Aiolochoiria*, is appended as *incertae sedis* within Verongida, previously allocated incorrectly to *Pseudoceratina* (Pseudoceratinidae).

**Keywords:** Porifera; Demospongiae; Verongida; Aplysinidae; *Aiolochoiria*; *Aplysina*; *Verongula*.

### DEFINITION, DIAGNOSIS, SCOPE

#### Synonymy

Aplysinidae Carter, 1875c. Verongiidae de Laubenfels, 1932.

#### Definition

Verongida with an anastomosing skeleton of polygonal meshes which have no tendency to be organised in one plane (Fig. 1A). The fibres have normal bark and pith elements, contain no foreign detritus and are of moderately even dimensions throughout the sponge. The choanocyte chambers are diplodal, small, and spherical, and are set in a dense collagenous matrix. All species display a marked oxidative colour change at death or on exposure to air, quickly changing from the normal yellow or yellow-green through blue to dark brown or purple. Pigmentation, other than superficial casts attributable to cyanobacteria, is uniform throughout the sponge. Secondary metabolites include a range of brominated tyrosine derivatives with strong antimicrobial activity, similar and often identical structures occur in the Aplysinellidae, Druinellidae and Ianthellidae, they thus characterise the order Verongida. A range of aplystane sterols also characterise the Aplysinidae, and Druinellidae. The sponges are oviparous, and, while extrusion of gametes has been observed, no larvae have been described.

#### Scope and distribution

Three valid genera, *Aplysina*, *Verongula*, with *Aiolochoiria* also included as *incertae sedis* within Verongida and suspected

affinities to this family. Distribution is Caribbean and Mediterranean predominantly. Records from Red Sea, Indian Ocean, West Central Pacific, Australia and West coast of North America all need to be verified as it is likely that the species in question belong either to the Pseudoceratinidae or Aplysinellidae.

#### History and biology

The family was established by Carter (1875c) and its priority over Verongiidae de Laubenfels, 1932 has been well established (Wiedenmayer, 1977b; Bergquist, 1980b). The type genus *Aplysina* remained the sole genus until Verrill (1907) established *Verongula*. Sponges belonging to both genera can attain very large size, up to 1.5 m in some cylindrical forms, encrusting, spreading and ramose habits are also common.

#### Remarks

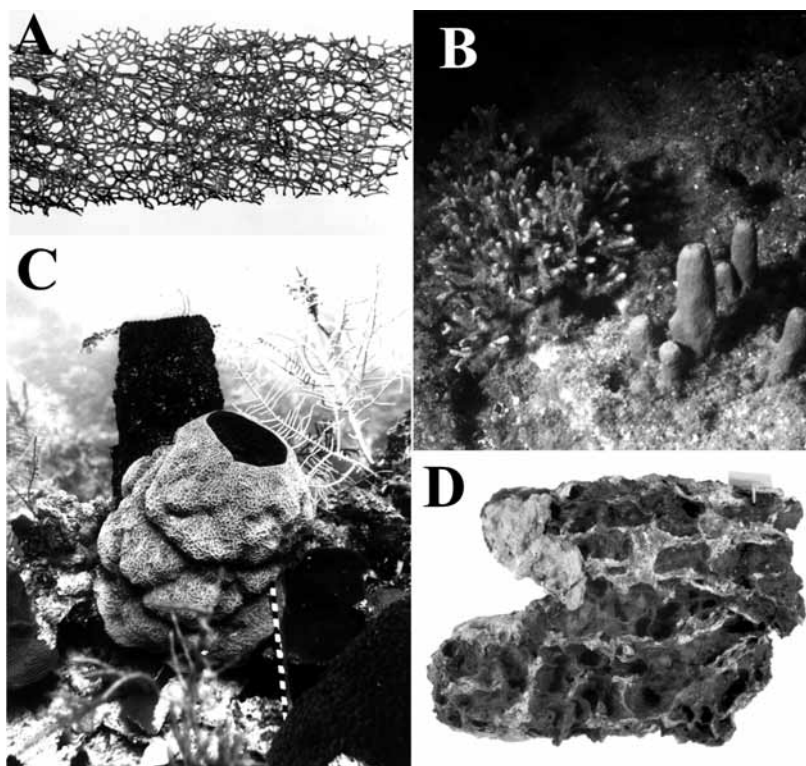
The Aplysinidae is a cohesive group, like other verongioid families it is sharply distinct from other fibrous Porifera. The characteristics of the skeleton, defined precisely, are distinctive and knowledge of ultrastructural histology, biochemistry and reproductive pattern when considered together testify to the long independent evolution of this group of taxa.

#### Previous reviews

Wilson, 1925; de Laubenfels, 1948; Van Soest, 1978; Bergquist, 1980b.

### KEY TO GENERA

- (1) Sponge surface smooth, even, finely conulose ..... *Aplysina*  
Sponge surface thrown into low folds producing a honeycomb-like appearance ..... *Verongula*  
Surface with rounded tubercles surrounding depressions to give an overall polygonal appearance ..... *Aiolochoiria*



**Fig. 1.** A, *Verongula gigantea*, dry skeleton showing polygonal skeletal pattern. B, *Aplysina aerophoba*, in situ, showing spreading habit and upright tubular components. Banyuls, Mediterranean (photo J. Vacelet). C, *Verongula reiswigi*, in situ, showing honeycombed surface morphology and tubular habit common in the family. Discovery Bay, Jamaica, 29 m (photo H. Reiswig). D, *Aplysina praetexta*, dry holotype MCZ 7243, Nassau, Bahamas.

#### APLYSINA NARDO, 1834

##### Synonymy

[*Aplysia*] Nardo, 1833 (preocc.). *Aplysina* Nardo, 1834. *Fistularia* Bowerbank, 1844. *Verongia* Bowerbank, 1845. *Luffaria* Duchassaing & Michelotti, 1864.

##### Type species

*Aplysina aerophoba* Schmidt, 1862: 25 (by subsequent designation; de Laubenfels, 1948).

##### Definition

Aplysinidae characterised by possession of fibres of only one kind with no foreign detritus and having a thick pith component. The fibres form a regular reticulum with large polygonal meshes and no specialised surface arrangement. Sixty three species have been described under the names *Aplysina* and *Verongia*. Many of these will prove to be synonyms but re-examination is difficult since dry material yields little information and for many species no material at all has survived.

##### Previous reviews

Schulze, 1878a; Vacelet, 1959; Van Soest, 1978; Bergquist, 1980b.

##### Description of type species

*Aplysina aerophoba* Schmidt, 1862 (Fig. 1B).

**Synonymy.** *Aplysina aerophoba* Schmidt, 1862: 25; *Verongia aerophoba* Vacelet, 1959: 87.

**Material examined.** Holotype: Unknown. No slide material available which can be certainly associated with the holotype (the species is however common and well described in the literature). Other material. Mediterranean material from field collections (J. Vacelet, R. Pronzato). Extensive collections of Mediterranean and Adriatic material in collections of the BMNH, and MNHN.

**Description.** A thick spreading sponge with irregularly disposed digitate extensions each with an apical, slightly sunken osculum (Fig. 1B). Lateral extensions protrude from the upright tubular structures and may represent undetached buds. Colour bright yellow in life changing to brown purple in alcohol. Surface is covered with low irregularly dispersed conules. Choanocyte chambers are spherical, 20 µm in diameter set in an evenly collagenous matrix. Fibre skeleton with polygonal meshes, around 3 mm across; individual fibres cylindrical, 80–150 µm diameter with pith 30–70 µm. Fibre bark clearly laminated merging with the vesicular, homogeneous pith.

**Habitat.** Mediterranean, shallow rocky substrates exposed to light, 1–20 m depth.

**Remarks.** The species has been well described by Schulze (1878a) and Vacelet (1959). As noted above, many species have been assigned to *Aplysina* and its frequently used synonym *Verongia*. This is not surprising given that the external appearance in life of sponges belonging to this genus is so distinctive, yellow colouration changing through an oxidation sequence on damage to

dark purple or brown, slimy flexible texture becoming solid on death, collagenous consistency and conulose surface. It is now apparent that most or all of these features are shared with other, lesser known members of the order Verongida and that marked differences in body organisation exist within the group. To assign species to genera within this wider group requires careful study of histology and fibre construction and organisation. These characters are not accessible in the field and, in the case of the skeleton, become impossible to study in detail because the sponges become rock hard. As information becomes available species now within *Aplysina* will be assigned to other genera, particularly to *Suberea*.

### VERONGULA VERRILL, 1907

#### Synonymy

*Verongula* Verrill, 1907: 332.

#### Type species

*Aplysina praetexta* Hyatt, 1875: 405 (by subsequent designation; de Laubenfels, 1936).

#### Definition

Aplysinidae with skeletal and histological characteristics largely identical to those of *Aplysina* differing only in having a radially prismatic architecture, which is particularly evident peripherally. The effect in life is to confer a honeycomb-like appearance to the surface (Fig. 1C).

#### Scope

4 valid species.

#### Previous reviews

De Laubenfels, 1948; Wiedenmayer, 1977b; Van Soest, 1978.

#### Description of type species

*Verongula praetexta* (Hyatt, 1875) (Fig. 1).

**Synonymy.** *Aplysina gigantea* Hyatt, 1875: 405.

**Material examined.** Holotype: MCZ 7243 – Nassau, Bahamas. Other material. Authors' collections – Discovery Bay, Jamaica.

**Description.** Sponge with thickly spreading base from which elevated oscular turrets arise. The surface is characterised by a honeycomb like sculpturing. These polygonal areas walled by the underlying skeleton can individually be 3–4 cm in extent, producing long surface furrows. Colour in life, superficially yellow, with greenish and purple patches, produced by localised oxidation of the yellow pigment which extends throughout the sponge. When dead the sponge is dark purple-black. Texture is firm, dry sponge is incompressible. The skeletal architecture is peripherally lamellate-clathrate supporting the surface relief, similar but less well marked structure extends throughout the sponge. Fibres 70–200 µm in diameter, thickest near the surface, pith 50–70% of the fibre diameter.

**Remarks.** Species of *Verongula* display an elaborate surface architecture, a honeycomb like morphology. This requires some

organisation of the superficial elements of the skeleton, the fibre components supporting the ridges are not recognisable primary elements with direct orientation to the surface, they are plates of polygonal meshes identical to those found in deeper regions of the body.

#### Distribution

Caribbean.

### AIOLOCHROIA WIEDENMAYER, 1977 (INCERTAE SEDIS)

#### Synonymy

[*Dendrospongia*] Hyatt, 1875: 400 (preocc., de Laubenfels, 1948: 127). *Aiolochroia* Wiedenmayer, 1977b: 74.

#### Type species

*Dendrospongia crassa* Hyatt, 1875: 401 (by monotypy).

#### Definition

Verongida, uncertain family placement; a massive, sometimes lobate to multitubular sponge, with pigment oxidation characteristics typical of the Verongida. It is notable for the fact that all colour states can be presented at the surface in different specimens in the same locality at the same time. Surface with rounded tubercles surrounding depressions to give an overall polygonal appearance, less marked in life than in fixed material. Fibrous skeleton well developed, both bark and pith elements represented, fibre outline irregular with short protruberences. Skeletal pattern largely dendritic but reticulate in the sub-surface region and occasionally in deeper areas.

#### Previous reviews

Lendenfeld, 1889a; de Laubenfels, 1948, 1949b; Wiedenmayer, 1977b; Van Soest, 1978; Bergquist, 1980b, 1995.

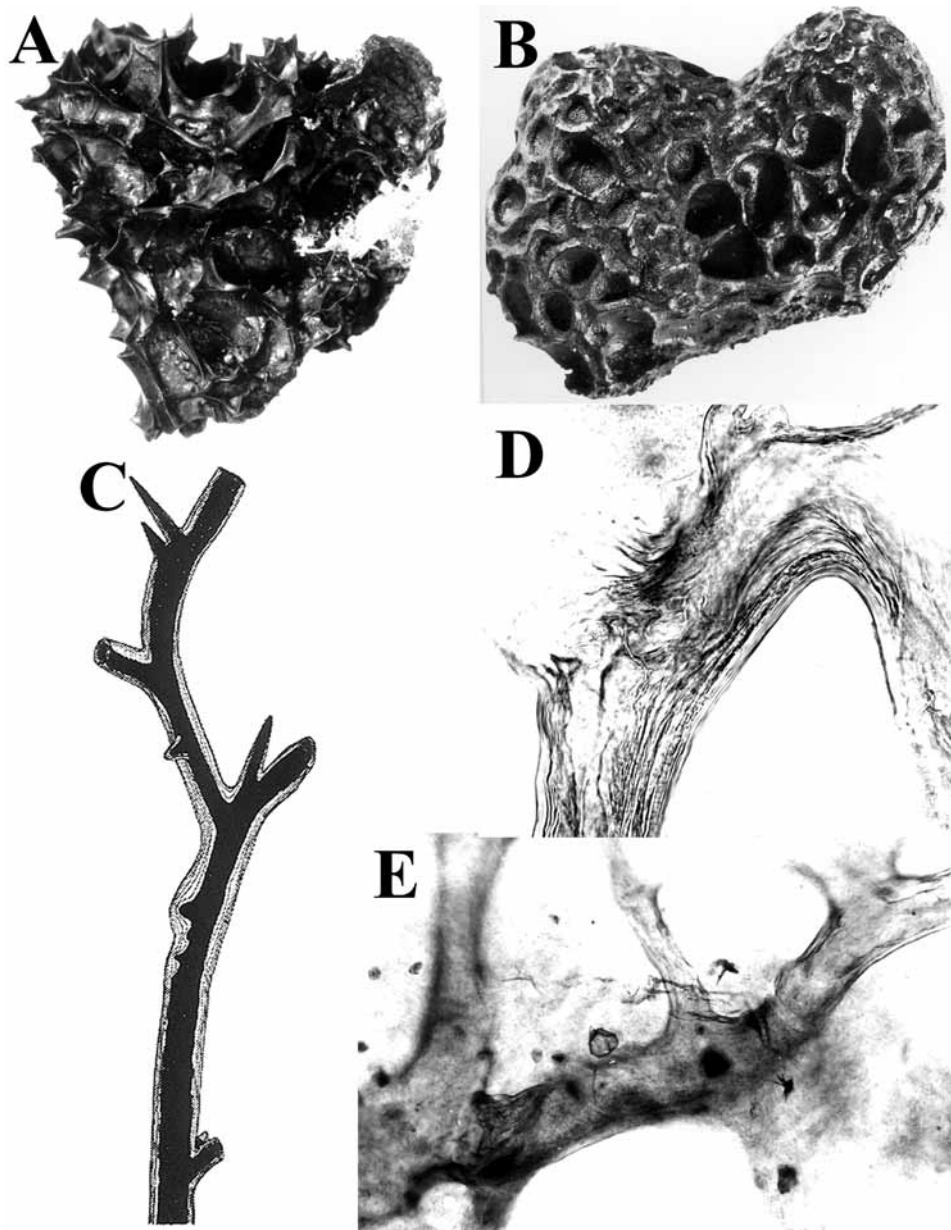
#### Description of type species

*Aiolochroia crassa* (Hyatt) (Fig. 2).

**Synonymy.** *Dendrospongia crassa* Hyatt, 1875: 401; *Aplysina crassa*; Lendenfeld, 1889a: 423, in part; *Verongia crassa*; de Laubenfels, 1948: 86, in part; *Pseudoceratina crassa*; Bergquist & Hartman, 1969: 250, 253; Bergquist, 1980b: 494. *Ianthella ardis* de Laubenfels, 1950a: 31.

**Material examined.** Lectotype: BMNH 1887.7.11.39 (dry). Other material. Authors collections – Discovery Bay, Jamaica. Holotype of *I. ardis*. BMNH 1950.5.23.1.

**Description.** Massive, occasionally lobate, superficially multi-hued in life, in alcohol dark purple, internally yellow in life. The surface carries low tubercles surrounding shallow depressions producing a polygonal pattern (Fig. 2A). Fibres are relatively sparse in relation to matrix, both bark and pith represented, the latter 30–80 percent of the diameter, individual fibres 80–500 µm in section with nodular outgrowths along the length. (Fig. 2C–E). Skeletal pattern is largely dendritic, but fibres do form a reticulum,



**Fig. 2.** *Aiolochroia crassa* (Hyatt). A, lectotype, BMNH 1887.7.11.39. B, alcohol preserved specimen from Discovery Bay, Jamaica, showing surface pattern. C, diagrammatic representation of a fibre (after Van Soest, 1978). D–E, photomicrographs of fibres showing irregular, roughened surface and nodules ( $\times 200$ ).

sporadically in deeper regions of the sponge, more regularly so at the surface. Choanosome is uniformly but lightly collagenous, ectosome is dense, choanocyte chambers 15–20  $\mu\text{m}$  in diameter.

**Remarks.** *Aiolochroia crassa* is a common shallow water Caribbean sponge. Its referral to *Pseudoceratina* by Bergquist & Hartman (1969) was in error, lacking, as stated by Bergquist (1995), support from good histological preparations and first hand knowledge of the wider range of structure found within the Verongida.

Verongida contains four families, two with reticulate skeletons (Aplysinidae and Ianthellidae) and two with dendritic skeletons (Aplysinellidae and Pseudoceratinidae). *Aiolochroia* has a skeleton which on first appearance seems to fall between the

Aplysinidae and Aplysinellidae, and more careful preparation of skeletal elements is required before reaching a conclusion on its taxonomic position. The impression of the skeleton is that it is a reduction of a reticulate structure which would point possibly to sub-family status within the Aplysinidae. The matrix histology with light collagen deposition likewise supports this, as do the surface morphology and the distribution of the genus. The irregular bark nodules are unique.

#### Distribution

Caribbean. The species has been recorded from 153 m depth but it is common in shallow water, 1.5 m depth, reaching maximum abundance between 40–60 m.