

## Family Timeidae Topsent, 1928

### Klaus Rützler

Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, DC, 20560-0163, USA.  
(ruetzler.klaus@nmnh.si.edu)

Timeidae Topsent (Demospongiae, Hadromerida) now contains only *Timea* because *Diplastrella* was moved to the Spirastrellidae. These sponges are thin, colorful (mostly red) crusts with choanosomal tylostyles arranged in vague tracts, ectosomal tylostyles in bouquet arrangement. Euasters occur throughout the body and form a dense layer at the surface. Species are cryptic and are found in shaded habitats of warm-temperate to tropical shallow-water environments.

**Keywords:** Porifera; Demospongiae; Hadromerida; Timeidae; *Timea*.

### DEFINITION, DIAGNOSIS, SCOPE

#### Synonymy

Timeidae Topsent, 1928c: 145. Choanitidae de Laubenfels (subfamily Timeinae Topsent), de Laubenfels (1936a, 1950a). Spirastrellidae, in part, Wiedenmayer (1977b).

#### Definition

Crustose Hadromerida with tylostyles and euasters.

#### Diagnosis

Sponges form very thin crusts on shells or under rock. Tylostyles are arranged in tracts ending as bouquets at the sponge surface where they cause a hispid appearance. Additional tylostyles occur in criss-cross fashion between the tracts. Microscleres are euasters, which are dispersed throughout the tissue, denser at the substrate and toward the surface, and are forming an ectosomal crust.

#### Scope

Of four nominal genera only one, *Timea*, is recognized.

#### History and biology

All species known in this family are encrusting (1 mm thick, or less), and therefore have a similar body plan as many spirastrellids and clionoids. Tracts of tylostyles rise from the substrate toward and beyond the surface (ectosome), causing a velvety feel when touched. Microscleres form a protective crust at the surface. The major exhalant canals leading toward the oscula bulge up and give a radiating vein-like appearance. Color reported for Timeidae is generally red or brown. The sponges cover only a few square centimeters of substratum and are best found by examining the lower surfaces of rock or coral plates in shallow water. Nothing is known about reproduction or other aspects of biology.

#### Remarks

Recent authors treated *Diplastrella* as part of the Timeidae (Hartman, 1982; Hooper & Wiedenmayer, 1994). With the transfer

of *Diplastrella* to the Spirastrellidae (see Rützler, this volume), only one genus, *Timea*, remains in the family.

### TIMEA GRAY, 1867

#### Synonymy

*Hymedesmia*, in part, Bowerbank, 1866: 149; 1874b: 71. *Timea* Gray, 1867a: 544. *Kotimea* de Laubenfels, 1936a: 147. *Halicometes sensu* de Laubenfels, 1950a: 99. Not *Halicometes* Topsent, 1898: 112. *Timeopsis* Lévi, 1958: 22.

#### Type species

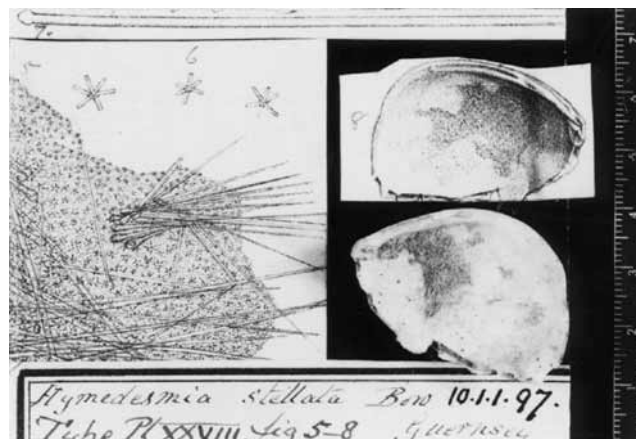
*Hymedesmia stellata* Bowerbank, 1866 (by monotypy).

#### Definition

Same as family.

#### Diagnosis

Same as family.



**Fig. 1.** *Timea stellata* (Bowerbank). Illustration original prepared by the author of the holotype and kept with the specimen in the collection of BMNH. It was the base of Bowerbank's (1874b) plate XXVIII figs 6–8.

The inner walls of the calicles are ornamented by vertical rows or clumps of spines. Growth occurs by intramural budding. Living tissue is restricted to a thin surface layer and to the lumen of the outermost tabulae and contains a siliceous spiculation of megascleres in the choanosome and common, relatively large microscleres condensed in the ectosome. Exhalant canals converging upon the slightly elevated oscula create a star-like pattern that is also impressed into the surface of the calcitic calicles and is termed astrorhizae. Spicules consist of tylostylote megascleres, points directed outward, and spiraster-like microscleres.

#### Previous reviews

Hartman & Goreau (1975); Vacelet (1981, 1990); Hartman (1982); Reitner & Engeser (1987); Hooper & Wiedenmayer (1994).

#### Description of type species

*Acanthochaetetes seunesi*† Fischer, 1970 (Fig. 1). This description is based on the Jurassic type species and supplemented by description of the closely related 'living fossil' *Acanthochaetetes wellsi* Hartman & Goreau, 1975.

**Synonymy.** *Acanthochaetetes seunesi*† Fischer, 1970: 199, 201–202, fig. 32, pl. F3–5. Only extant representative: *Acanthochaetetes wellsi* Hartman & Goreau, 1975: 2–12, figs 1–9, 11–14 = *Tabulospongia horiguchii* Mori, 1976.

**Material examined.** Holotype (not seen): MNHN Institut de Paleontologie R05599 – type material consists of 1 specimen, 2 fragments, 4 sections; description is partly based on Fischer's (1970) photographs (pl. F, figs 3–5). Holotype of *Acanthochaetetes ramulosus*† Fischer: USNM 32196. Paratype of *A. wellsi* Hartman & Goreau: USNM 24410 – Puntan Madag, Saipan, Marianas Islands, coll. T. F. Goreau, 27 July 1969. Other material. USNM 51487 – South Point Cave (wall), Ngermeuangel, Koror, Palau, coll. D. Williams & J. Bozanic, 18 April 1985. Numerous specimens from New Caledonia and Philippine from the authors' collection.

**Description.** The Mesozoic material consists of a fragmented but seemingly spheroid colony composed of radiating tubes, oval or circular in cross-section, ranging from  $0.8 \times 0.8$  mm to  $1.1 \times 0.7$  mm in maximum perpendicular diameters. Recent material of *Acanthochaetetes wellsi*: Massive sclerosponge with calcitic skeleton made up of adjoining vertical tubes (calicles) with common walls. Basal parts of the calicles partitioned by vertical tabulae. Walls ornamented by spines that are arranged in vertical lines or clumped irregularly. Both walls and spines have a microstructure of stacked lamellae. The surface of the skeleton shows starlike impressions (astrorhizae) from meandering exhalant canals converging upon single oscula. Epitheca with concentric growth lines covering lower surface of sponge. Size ranging from under 1 cm to over 18 cm (diameter of live tissue area). Living tissue (as seen on only extant species, *A. wellsi*) cream-colored, restricted to a coating of the calcareous skeleton, including the spaces in the calicles above the outermost tabulae. Siliceous spicules (observed in *A. wellsi*) occur in the living tissue and include erect tylostyles (points toward the surface,  $286 \times 3.4$   $\mu$ m, 7.4  $\mu$ m head diameter) and spiraster-like and amphiaster-like microscleres ( $5 \times 6$ – $20 \times 28$   $\mu$ m) localized in a layer in the outer tissue. Microsclere spines are often branched and closely spaced thus obscuring the axis. Some microscleres can be seen adhering to the calcareous skeleton (Fig. 1) and may thus become incorporated during fossilization, as described for *A. seunesi* (Reitner & Engeser,

1983). Growth rate of *A. wellsi* is very slow; estimated from carbon isotope records it ranges from 50–450  $\mu$ m/yr (Böhm *et al.*, 1996; Reitner & Gautret, 1996).

**Remarks.** Based on *Acanthochaetetes wellsi*, the only known living representative of the genus, Hartman & Goreau (1975) and Hartman (1982) suggested to place the 'sclerosponge' family Acanthochaetetidae in a separate order, Tabulospongia. We disagree with this suggestion as it overemphasises the presence of a calcareous skeleton and prefer to position *Acanthochaetetes* in the Hadromerida.

#### WILLARDIA WILLENZ & POMPONI, 1996

#### Synonymy

*Willardia* Willenz & Pomponi, 1996.

#### Type species

*Willardia caicosensis* Willenz & Pomponi, 1996 (by original designation).

#### Definition

Spirastrellid sclerosponge with basal aragonite skeleton of penicilliate spherulitic microstructure, ornamented by pillar-shaped processes at the surface.

#### Diagnosis

Encrusting sponges secreting a basal calcareous skeleton of aragonite that is attached to the substratum but may have free edges curling downward. The surface of the calcareous base, where it is covered by cellular tissue, is densely ornamented by finger-like processes (Willenz & Pomponi, 1996: fig. 5), ca. 1 mm tall. Oscula are slightly elevated and in the center of converging, vein-like surface canals. Siliceous megascleres (tylostyles) are arranged in brushes at the sponge surface. Microscleres (diplasters) are concentrated near the surface and along major aquiferous canals. In places, spicules may become embedded in aragonite.

#### Previous review

Willenz & Pomponi, 1996.

#### Description of type species

*Willardia caicosensis* Willenz & Pomponi, 1996 (Fig. 2).

**Synonymy.** *Willardia caicosensis* Willenz & Pomponi, 1996: 208, figs 1–22.

**Material examined.** Holotype (not examined): RIB-POR 49 – Grand Turk Island, Turks and Caicos Islands, 21°31'59"N, 71°07'97"W, 114 m, collected 1994. Paratypes: BMNH, HBOI, YPM – same locality.

**Description (from Willenz & Pomponi, 1996).** The sponge forms 5 mm thick, plate-like crusts, up to 20 cm in diameter, and is attached to the substratum by its aragonite basal skeleton; the plate margin is free and curled downward, toward the substratum. The live tissue is yellow to tan orange and has a velvety appearance from perpendicular spicule brushes embedded in the surface.