



<http://www.biodiversitylibrary.org/>

Transactions of the Connecticut Academy of Arts and Sciences.

New Haven :Published by the Academy,1866-
<http://www.biodiversitylibrary.org/bibliography/7541>

v.12 (1904-1907): <http://www.biodiversitylibrary.org/item/49944>

Article/Chapter Title: Porifera: sponges

Author(s): Verrill

Subject(s): sponges of Bermuda

Page(s): Page 330, Page 331, Page 332, Page 333, Page 334, Page 335, Page 336, Page 337, Page 338, Page 339, Page 340, Page 341, Page 342, Page 343, Page 344, Text, Text

Contributed by: MBLWHOI Library

Sponsored by: MBLWHOI Library

Generated 14 January 2017 11:12 PM
<http://www.biodiversitylibrary.org/pdf4/060486500049944>

This page intentionally left blank.

PORIFERA: SPONGES.*

Numerous species of sponges, some of them of large size and conspicuous on account of their colors, grow on and about the reefs in shallow water, as well as in the sounds. The larger of these mostly

* The following are the principal modern descriptive works relating to the reef sponges found in Bermuda, the West Indies, and Florida :

Carter, H. J.—Some Sponges from the West Indies and Acapulco. *Ann. and Mag. Nat. Hist.*, ser. 5, vol. ix, 1882, pp. 266-301, 346-368, pl. xi, xii.

Describes many silicious sponges.

Duchassaing and Michelotti.—Spongiaires de la Mer Caraïbe. *Natuurk. Verh. Holl. Maats. Wetensch. Haarlem*, vol. xxi, 1864. 25 plates (many errors in references to plates).

Dendy, A.—Observations on West Indian Chalinine Sponges, etc. *Trans. Zool. Soc. London*, xii, part 10, pp. 349-368, pls. 58-63, 1890.

Describes and figures several species.

Higgin, Thomas.—Descriptions of some sponges obtained during a cruise of the steam yacht *Argo*, in the Caribbean and neighboring seas. *Annals and Mag. Nat. Hist.*, ser. 4, vol. xix, p. 291, pl. xiv, 1877.

Hyatt, Alpheus.—Revision of the North American Poriferæ, with remarks upon foreign Species, Part I. *Mem. Boston Soc. Nat. Hist.*, vol. ii, 10 pp., 1 pl., 1875; Part II, *op. cit.*, vol. ii, part 4, pp. 441-554, pl. xv-xvii, 1876.

Lendenfeld, R. von.—Monograph of the Horny Sponges. 955 pp. 4to, 50 plates. Royal Society, London, 1889.

Contains full descriptions of all known species, with anatomy, distribution, etc. Also a complete bibliography of sponge literature, and a general system of classification of sponges.

Maynard, C. J.—No. 2. Sponges. West Newton, Mass., 133 pp., 42 cuts, 4 plates, 1898, publ. by the author.

A popular work; contains descriptions and figures of numerous Florida and Bahama sponges.

Poléjaeff, N.—Report on the Calcareæ. *Voy. Challenger, Zoöl.*, vol. viii, 1883.

Nine Bermuda species are described, mostly from 32 fathoms, off Bermuda.

——— Report on the Keratosa, *op. cit.*, vol. xi, 1884.

One species (*Verongia hirsuta*) is recorded and figured from Bermuda.

Ridley, S. O. and Dendy, A.—Report on the Monaxonida. *Rep. Voy. Challenger, Zoöl.*, vol. xx, part 59.

Contains only a very few Bermuda species.

Solas, Wm. J.—Report on the Tetractinellida. *Rep. Voy. Challenger, Zoöl.*, vol. xxv, part 63.

Three species are described from off Bermuda, in deep water.

Schmidt, O.—Die Spongien Fauna des Atlantischen Gebietes, 1870.

belong to the group of horny sponges (*Keratosa*), which includes the commercial sponges (genus *Spongia*), but there are very few species in Bermuda waters that are sufficiently fine and elastic to be of any value, though two or three species are used by the fishermen for boat-sponges and similar rough uses.

It is quite probable that some of the more valuable Bahama and Florida sponges would flourish at Bermuda, if once introduced there by artificial means, which could easily be done by vessels having live wells.

Most of the horny sponges while living are dark umber-brown, purplish brown, or glossy black, though a few are distinctly yellow, purple, or red. The tube-sponges (*Tuba* or *Spinosella*), which are common and attractive silicious species, are dark yellowish gray to grayish brown in life. The most conspicuous of all the sponges is a very common, large, soft, bright red species (*Tedania ignis*) which grows in various forms, either encrusting or massive and lobate, or even branching. It varies in color from scarlet to bright red and dark red, and is often two to three feet across. It belongs to the group of monaxid silicious sponges.

The Bermuda sponges have hitherto been but little studied, although large collections have been made.*

——— Die Spongien des Meerbusens von Mexico und des Caraibischen Meeres, Jena, 1879, 1880, 2 parts.

Topsent, E.—Une Réforme dans la Classification des Halichondrina. Mémoires Soc. Zoologique de France, vol. vii, pp. 1-36, 1894. Diagnoses of all the genera.

——— Introduction a l'Etude Monog. des Monaxonides de France. Classification des Hadromerina. Archives de Zoologie expérimentale et générale, ser. 3, vol. vi, 1898, pp. 91-113. Diagnoses of all the known genera.

——— The Same, Part III, op. cit., vol. viii, 1900, pp. 1-331, plates i-viii. (Descriptions of Hadromerina, bibliography, etc.)

Whitfield, R. P.—Notice of a New Sponge from Bermuda and of some other Forms from the Bahamas. Bull. Amer. Mus. Nat. History, New York, vol. xiv, pp. 47-50, 1901.

Wilson, H. V.—The Sponges collected in Porto Rico, in 1899, by the U. S. Fish Com. Steamer Fish Hawk. Bull. U. S. Fish Com. for 1900, vol. xx, part 2, pp. 377-411, 1902.

* Mr. G. Brown Goode and Professor W. N. Rice, in 1876 and 1877, made large collections, especially of the horny sponges, some of which were examined by Professor A. Hyatt, while preparing his memoirs on that group of Porifera, but the bulk of Mr. Goode's large collection was not received until after Hyatt's second memoir was completed. Part of this collection is now in the Museum of

Most of the keratose sponges have been recorded in the memoirs of Prof. Hyatt. Those found on the reefs by my parties will be discussed in the latter part of this chapter.*

SILICIOUS SPONGES.

The Bermuda silicious sponges are represented in our collections by about 38 species, but many of them have not yet been carefully studied and are not now enumerated. The reef species belong mostly to the Monaxonida, in which the skeletal spicules are unbranched; but there are also several representatives of the Tetraxonida, in which part of the skeletal spicules have four branches, often in the form of anchors or grapples with three flukes and a long shank. Several species of this group, forming more or less spheroidal masses, with a radiate interior structure, belong to the

Wesleyan University, and part in the U. S. Nat. Museum and Boston Soc. Nat. History, with Hyatt's identifications, mostly made after his works were published. My own parties, 1898 and 1901, also made large collections. I have compared most of our specimens of Keratosa with those labelled by Professor Hyatt.

Many of the calcareous sponges (9 species, mostly dredged) were described by Poléjaeff in the Reports of the Voy. of the Challenger (vol. viii, part 24), but several others, found on the reefs, are in our collections.

* The following are the principal ones hitherto recognized by me :

Spongia lapidescens. Common: var. *turrita* Hyatt, very common: var. *conifera* Ver. (with finer texture and smaller and more regular cones).

Spongia lignea, var. *crassa* Hyatt.

Spongia anomala Hyatt.

Spongia punctata, var. *bermudensis* Hyatt MSS.

Spongia corlosia, var. *elongata* Hyatt.

Spongia gossypina D. and M. (t. Hyatt).

Spongia cerebriformis, var. *obscura* Hyatt.

Hircina armata (D. & M., *sens. ext.*) Very common: var. *fistularis* V., var. nov., very common; it has hollow branches, with large terminal vents. Also varieties *marginalis*, *cylindrica*, *columnaris*, etc.

Hircina acuta (D. & M.).

Spongelia fragilis (Mont.)=*Dysidea fragilis* H.

Dendrospongia crassa Hyatt. Common.

Aplysina fistularis (Esper), Yellow tube-sponge.

Aplysina hirsuta (Hyatt, as *Verongia*).

Verongula prætexta (Hyatt, as *Aplysina*). This new generic name is proposed as a substitute for *Aplysina* Hyatt, for those species having regular, divergent, angular radial canals, with thin latticed walls, producing a honeycomb-like structure. It includes also: *V.*, *gigantea* H.; *V. rigida* (D. & M.); *V. cellulosa* (H.); *V. aurea* (H.), etc.

genus *Stelletta*; some of them occur under large flat stones, others in sand. A large species, growing in hard, thick, lobate crusts on the reefs, is *Geodia gibberosa*; its hard cortex is filled with spheroidal spicules (sterrasters), fig. 176. Also one of the fleshy sponges.

Oligosilicina. Fleshy or cartilaginous sponges, without a skeleton, but usually with abundant, minute, star-shaped flesh-spicules, with many rays (euasters). Family, *Chondrillidæ*.

MONAXONIDA.

Some of these are conspicuous on account of their large size or brilliant colors, like the very common scarlet sponge (*Tedania*); or have characteristic forms, like the tube-sponges (*Spinoseilla*), but many are inconspicuous and have irregular or incrusting forms.

This order is represented here by several groups, mostly distinguishable by their spicules:

1. *Chalinoidea*, or *Homorhaphida*, in which the spicules are nearly all of one kind, usually fusiform, acute at both ends (*oxea*), and enclosed in or held together by reticulated horny fibers; no flesh-spicules (microscleres). Families, *Chalinidæ* and *Renieridæ*.

2. *Heterorhaphida*, in which the skeletal spicules may be of two or more forms, usually *oxeotes* (*oxea*), combined with needle-shaped forms (*styles*), pin-shaped forms (*tylostyles*); with a head at both ends (*tylotes*); or with both ends blunt (*strongyles*). With these there are usually minute flesh-spicules, generally either C-shaped (*sigmas* or *sigmata*); bow shaped (*toxa*); or slender hair-like forms (*rhaphides*); but never anchor-like (*chelæ*). Families, *Tedanidæ*, *Desmacellidæ*, *Gellioididæ*.

3. *Desmacidontoidea*. In this family the skeletal spicules may be of various forms: *styles*, *tylostyles*, *oxea*, etc., but the flesh-spicules are minute anchor-like forms (*chelæ*) with hooks or flukes at both ends; sometimes these are combined with *sigmata*, etc. The skeletal spicules are usually enclosed in horny fibers. Family, *Esperellidæ*.

4. *Echinonemata*. In these, spicules project as special spines from the surfaces of the fibers: they are usually *styles* or *tylostyles*, often spinulated. Families, *Agelasidæ* (= *Ectyonidæ*), *Clathriadæ*.

5. *Axinelloidea*. Usually branched sponges with distinct axial fibers, which are plumosely branched and filled with *styles*, *strongyles*, or *oxea*. Flesh-spicules seldom present, sometimes *spirasters* or *asters*; never *chelæ*. Family, *Axinellidæ*.

6. *Clavata* or *Suberitoidea*. Massive, lobate, or boring sponges; skeletal spicules mostly *tylostyles* or *styles*; often no flesh-spicules;

when present, spirulas, spirastes, or asters; little or no spongin; no horny fibers; usually a compact cortex. Families, *Suberitidæ*, *Poly-mastidæ*, *Clionidæ*, *Spirastrellidæ*.

Family, *Chondrillidæ*.

Chondrilla nucula O. Schm. Figure 177.

A soft, smooth sponge, with a tough cortex and a lubricous surface, forming small hemispherical masses, or thick convex, often irregular, incrusting forms, usually 1 to 3 inches in diameter, on rocks, dead corals, etc. Color various; most frequently dark olive

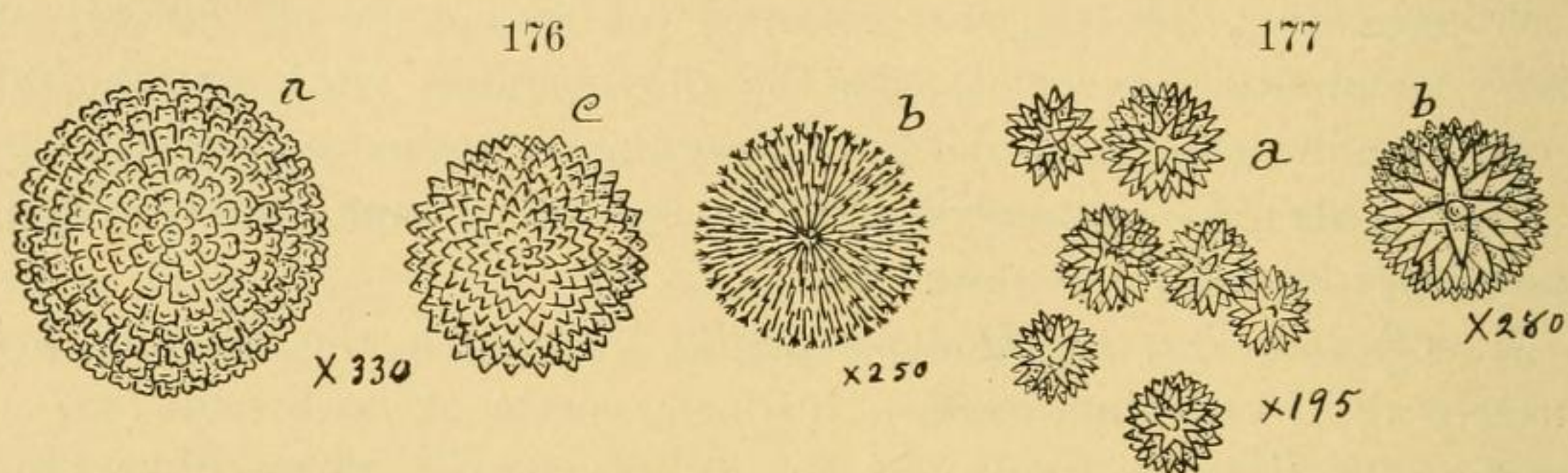


Figure 176.—*Geodia gibberosa*; *a*, *b*, *c*, sterrasters in different stages of growth. Figure 177.—*Chondrilla nucula*; euasters of different sizes. Drawn by A. H. V.

green, varying to smoky brown or blackish, and to light green and yellowish green. Its texture is somewhat cartilaginous and elastic, without skeletal fibers. Minute, spinulated, spherical flesh-spicules (spherasters) are thickly scattered through the interior and more abundantly and partly of larger size in the cortex.

Very common at low tide; occurs, also, throughout the West Indies.

Family, *Chalinidæ*. (See p. 333.)

Spinosella sororia (D. and M.) Dendy. *Tube Sponge*. Figures 141*a*, 179; Plate xxxvi, fig. 1 (21).

Tuba sororia Duch. and Mich., *Spong. mer. Caraibe*, p. 46, pl. viii, fig. 1, 1864. (The name *Tuba* was preoccupied.)

Spinosella sororia Dendy, *Trans. Zool. Soc. London*, vol. xii, p. 360, pl. lviii, fig. 7, pl. lix, fig. 1, 1890.

*Siphonochalina** *papyracea* Schmidt, *Spong. atlant. Gebiet.*, p. 33, 1870, and var. *Bermudensis*.

This species is common at moderate depths, especially in partially sheltered places. It generally forms a group of several upright tubes, 1.5 to 2 inches in diameter, more or less united at the base, with the

* The name *Siphonochalina* has been restricted by recent writers to the tube-sponges having a smooth, even surface. It seems doubtful if this be a good generic character. One species of that group occurs in Bermuda.

free portion often a foot or more high. The opening at the summit of the tubes has a thin edge, usually fringed with little plumose projections. Outer surface usually ornamented with more or less numerous spiniform processes. Oscules on the inner surface of the tubes.

There are numerous varieties, based mainly on the character of the outer surface, which may be quite smooth or it may have various forms of conules. Sometimes the same tube will be smooth distally, for half its length, and covered with aculeate or conical prominences below. The color in life is usually dark yellowish-gray or tawny yellow; when well dried it is usually yellow, yellowish-gray, or yellowish-brown.

Spinosella stolonifera (Whitf.).

Siphonochalina stolonifera Whitfield, Bull. Amer. Mus. Nat. Hist., vol. xiv, p. 47, plates i–iii, 1901.

? *Callyspongia Eschrichtii* Duch. and Mich., op. cit., p. 56. Pl. xii, fig. 1.*

This singular and rare species has smaller tubes than the preceding, with one or two circles of spinose elevations near the top, while an intricate mass of stolon-like processes, mostly not tubular, is given off from the base. The spicules are simple oxeote forms, nearly as in the last.

Pachychalina cellulosa, sp. nov. Plate xxxvD, figs. 8, 9, spicules.

Sponge irregularly dichotomously branched, the branches rounded, unequal, about .75 inch (15–25^{mm}) in diameter, and 4 to 6 inches long, often repent, elastic when wet, subrigid and light when dry. Oscules scattered, very little raised, 3–4^{mm} in diameter. Internal reticulations rather coarse, with rather strong fibers containing much spongin. Beneath the surface layer the canals or areolæ are relatively large (2–3^{mm}), angular, honeycomb-like, separated by thin reticulated walls, and often form linear series. The dermal layer, when intact and dry, is thin, openly but finely reticulated, with the angular pores mostly arranged in groups or double circles around a central pore over the areolæ, and with a small projecting point at each angle. The skeleton fibers are .05 to .12^{mm} in diameter and contain very numerous multiserial, slender, sharp, oxeote spicules, usually .10 to .15^{mm}, rarely .18^{mm} long, mostly shorter than the sides of the meshes, and mostly entirely enclosed in the spongin fibers. Color, when dried, dark reddish brown; lighter red in life.

Our specimens are much infested with the Zoanthid, *Parazoanthus parasiticus*. (See p. 295.)

* In the text the reference is erroneously to pl. vii, fig. 3. Many similar errors occur in referring to the plates in the same work.

***Pachychalina elastica*, sp. nov.**

Sponge tough and elastic when wet, elastic even when dry, digitate and somewhat dichotomous, the branches springing from a short, stout, compressed stem. Branches 10 to 25^{mm} in diameter, and 50 to 75^{mm} long, nearly round, often swollen distally, sometimes coalescent. Oscules large, scattered on the sides. Surface, when dry, conspicuously areolated when the external net-work is lost. The areolæ are 2–3^{mm} in diameter, deep, subangular, and separated by rather stout partitions, often 1–2^{mm} thick, composed of strong and elastic, rather coarsely reticulated fibers, many of those next the surface free at the tips, giving the surface a tufted and spongy appearance. Outer layer easily detached; when present, it consists of a rather open and regular network of slender fibers, allowing the areolæ to be easily seen through it, with the meshes about .2^{mm} wide.

The spicules are slender oxeotes, very acute, often bent, .15 to .20^{mm} long. They are multiserial and crowded in the fibers, but well covered by spongin. Color, when dried, yellowish brown. Not very common on the reefs.

***Pachychalina millepora*, sp. nov. Plate xxxvc, fig. 8.**

A delicate irregularly branched sponge, fragile when dry; surface nearly smooth, very finely reticulated; branches irregular in size and form, varying from 12 to 25^{mm} or more in diameter at different places. Oscules irregularly scattered on the branches, 2–4^{mm} in diameter, with the edges slightly fringed and little raised; sometimes funnel-shaped. Dermal layer very finely and pretty regularly reticulated. The meshes angular or rounded, with minute points at the angles. Areolæ, under the cortex, not crowded, separated by walls equal in thickness to the diameter of the areolæ. Fibers about .03 to .04^{mm} thick, filled with abundant multiserial spicules, which are rather slender oxeotes, mostly .2 to .22^{mm} long, often about equal in length to the sides of the meshes.

***Pachychalina monticulosa*, sp. nov. Plate xxxvd, figs. 6, 7.**

Sponge encrusting, or massive and irregularly lobulate, bearing subconical or mammiform elevations, each having at the summit a rather large oscule, 3–5^{mm} in diameter. Internal texture not very fine; dermal reticulation formed by small polygonal meshes, visible to the naked eye. Subdermal areolæ rounded, very unequal in size, the larger about 1^{mm} broad, separated by walls usually about as wide, made up of irregular and somewhat coarse reticulations, tympanized by films of sarcode. Fibers rather coarse, uneven, with numerous

slender, acute, oxeote spicules, mostly entirely enclosed in the reddish spongin, but many are partly free in the meshes.

The spicules are mostly about .22–.26^{mm} long. Very common.

Color red in life; reddish brown when dry.

Pachychalina micropora, sp. nov. Fig. 178. Plate xxxvc, fig. 7, spicules.

A delicate sponge, friable when dry, encrusting, or forming small convex or lobate masses. Surface smooth; dermal layer thin, distinct, very finely reticulated, the pores microscopic, oscules few, 4–5^{mm} in diameter, mostly on summits of low conules. Subdermal areolæ small, about .5–1^{mm} in diameter, with rounded angles, and separated by walls often 2–3^{mm} thick and finely reticulated. Fibers slender, multispiculose, with small amount of spongin. Spicules very small and mostly decidedly short, mostly bent oxeotes (see figures) about .01–.015^{mm} in length, by .00066 to .00094^{mm} in diameter.

A few long slender oxeotes, about .45^{mm} long (fig. 7, *b* of plate), were also observed; they may be of extraneous origin.

Color yellowish white when dry.



Figure 178.—*Pachychalina micropora*; one of the conules, with oscule, × 2; by A. H. V.

Cribrochalina Bartholmei (D. & M.).

Spongia Bartholmei Duch. and Mich., op. cit., p. 42, pl. vi, figs. 3, 4, 1864.

When well grown this has the form of a large regular funnel, or of a broad cup, with a short narrow stem. It may become 10 inches high and 6 to 8 broad. The sides are 8 to 12^{mm} or more thick, not thinning much at the edges, which are rounded. The surface of both sides is smooth and very finely reticulated, the meshes .1 to .2^{mm} in diameter.

The oscules are mostly on the inside of the cup, numerous but inconspicuous and very small, mostly .2 to .3^{mm} in diameter.

In one large specimen from Bermuda there were two stout fistular side-lobes at the base, with a terminal oscule about 6–8^{mm} wide.

The skeletal fibers are densely spiculose, stout, and reticulated, much as in *Pachychalina*, the radial ones plumose, but the sponge is harder and firmer when dry, though soft when wet.

The spicules are polyserial, very slender oxeote forms, variable in size; some are nearly styliform, being blunt at one end and acute at the other. Much fine calcareous sand is imbedded in the outer layers.

Bermuda, on a reef in Bailey Bay, one large specimen in Amer. Mus. Nat. Hist., coll. Whitfield; Bahamas, Whitfield.

Family, *Desmacellidae*. (P. 333.)

Desmacella jania, sp. nov. Plate xxxvc, figs. 5, 6.

? *Terpios jania* Duch. and Mich., Spong., p. 101, pl. xxii, fig. 8.

Our examples of this curious species are massive and irregularly lobulate, 2 to 3 inches high; the lobes are more or less conical, with a terminal osculum, 3 to 5^{mm} in diameter. The whole surface and often most of the thickness of the walls are composed largely of a small slender-branched coralline (*Jania*), white when dry. Toward the base of the sponge this often nearly disappears, as if absorbed. The spicules are mostly long, slender tylostyles, .22 to .25^{mm} long, mostly with small round heads, and mixed with styles of about the same length. The microscleres are minute, strongly curved, c-shaped sigmas, about .037 to .040^{mm} long.

Other sponges, associated with *Jania* in the same way, have been described as the *Reniera fibulata* of Carter (1882). The *Terpios jania* D. and M. may not be this species, though it had the same form, for its spicules were not described. When treated with acids the form of the sponge is still preserved, with the translucent organic basis of the *Jania* imbedded in its structure, even close to the edges of the oscules.

Family, *Esperellidae*. (P. 333.)

Esperiopsis fragilis V., sp. nov. Plate xxxvc, figs. 1-3.

A very porous, fragile sponge, forming crusts or irregular masses 15-20^{mm} or more thick, soft while living, friable when dry. Surface, as dried, irregularly pitted or vermiculate; subdermal channels irregular, deep, often labyrinthiform, .5 to .7^{mm} wide, separated by walls made up of fine irregular meshes, hispid at the surface.

Dermal layer thin, mostly destroyed, easily detached; pores microscopic, numerous; oscules scattered, small. Skeletal fibers delicate, composed mostly of numerous, closely packed, slender spicules. These are mostly slender tylostyles and styles, about .27 to .32^{mm} long, with smaller tyloles .16 to .21 long, with well-rounded ends. Microscleres numerous, very small sigmas (fig. 2, *d*, *d'*), and isochelæ

(*c, c'*); the latter with the flukes minutely three-toothed. A few very long acute oxeotes, much larger than the other spicules (fig. 3, *b, b*), were scattered through the sponge; perhaps they were extraneous. Numerous minute circular disks (fig. 2, *z*) were present, but disappeared when treated with acids; they are probably symbiotic algæ.

Family, *Tedanidæ*. (P. 333.)

Sub-family, *Tedaninæ* Ridley and Dendy; Topsent, etc.

Tedania ignis (D. and M.) *Scarlet Sponge*. Fig. 180. Plate xxxvc, fig. 4, spicules.

Thalysias ignis Duch. and Mich., op. cit., p. 83, pl. xviii, fig. 1, 1865.*

? *Arcesias hostilis* D. and M., op. cit., p. 97 (encrusting form).

? *Tedania digitata*, var. *bermudensis* Ridley and Dendy, Voy. Chall., xx, p. 51.

Amphimidon variabilis Maynard, Sponges, p. 31, fig. 19, pl. iv (colored), non Duch. and Mich.

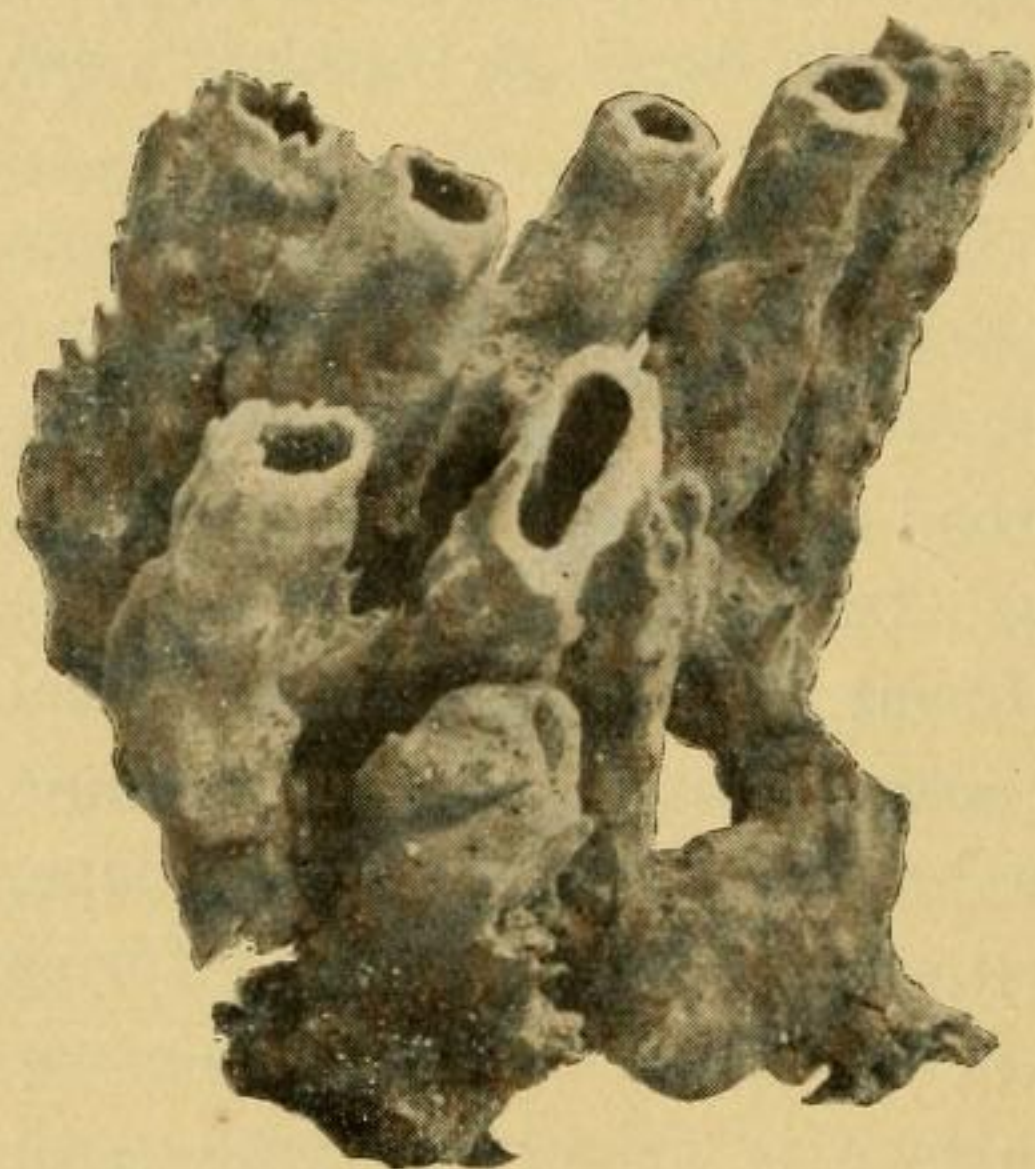
This is one of the most abundant Bermuda sponges and is very conspicuous in shallow water on account of its brilliant colors, which vary from bright scarlet to blood-red. In life it is very soft and brittle. When young it forms broad thin incrustations on rocks, dead corals, shells, and other sponges. Later it grows up into large irregular lobulate or convex massive forms, often with large conical or fistular elevations, each bearing a large terminal osculum. Sometimes it is branched, or encrusts the branches of dead gorgonians, etc. It often penetrates into the cavities of dead corals and forms a red film over the surface, but there is no proof that it forms excavations for itself. When dry the surface is usually covered with rather deep, irregular, angular pits or areolations, 2–3^{mm} in diameter, with a small central pore, the ridges between being thin and sharp; in some cases a thin dermal film remains over the areolæ. The interior is made up of small irregular angular and rounded reticulations of slender spiculose fibers, with irregular channels and lacunæ, some often of large size. The spicules are of several forms: 1. the spicules in the fibers are mostly long, slender styles and subtylostyles; 2. oxeotes, acute at both ends; 3. smaller, slender, often bent, tylole spicules, with both ends slightly enlarged, which are abundant in the external layer, mixed with oxeotes; 4. very slender, long, acute, capillary forms (rhopaloids) abundant, both singly and in fascicles. The larger spicules are .23 to .30^{mm} long.

* This sponge has the several forms of spicules characteristic of *Tedania* (1867). But though *Thalysias* D. and M. antedated the latter, it was a heterogeneous group, not intelligibly defined, and if adopted at all some other species may be taken as its type.

Owing to its softness it is not easy to dry the larger specimens in good condition without previously hardening in alcohol; even then the specimens often collapse. When dry the color is usually pale green or yellowish white. It may form masses 6 to 8 inches thick and 12 to 20 broad.

It is reputed to be poisonous if handled. It certainly irritates the skin of many persons and causes eruptions and intense itching. This is probably due to the very fine and sharp spicules entering the skin, as in the case of other similar sponges. Also common in Florida and the West Indies. It is closely related to Mediterranean and Pacific Ocean forms of the genus (*T. digitata*, etc.).

179



180

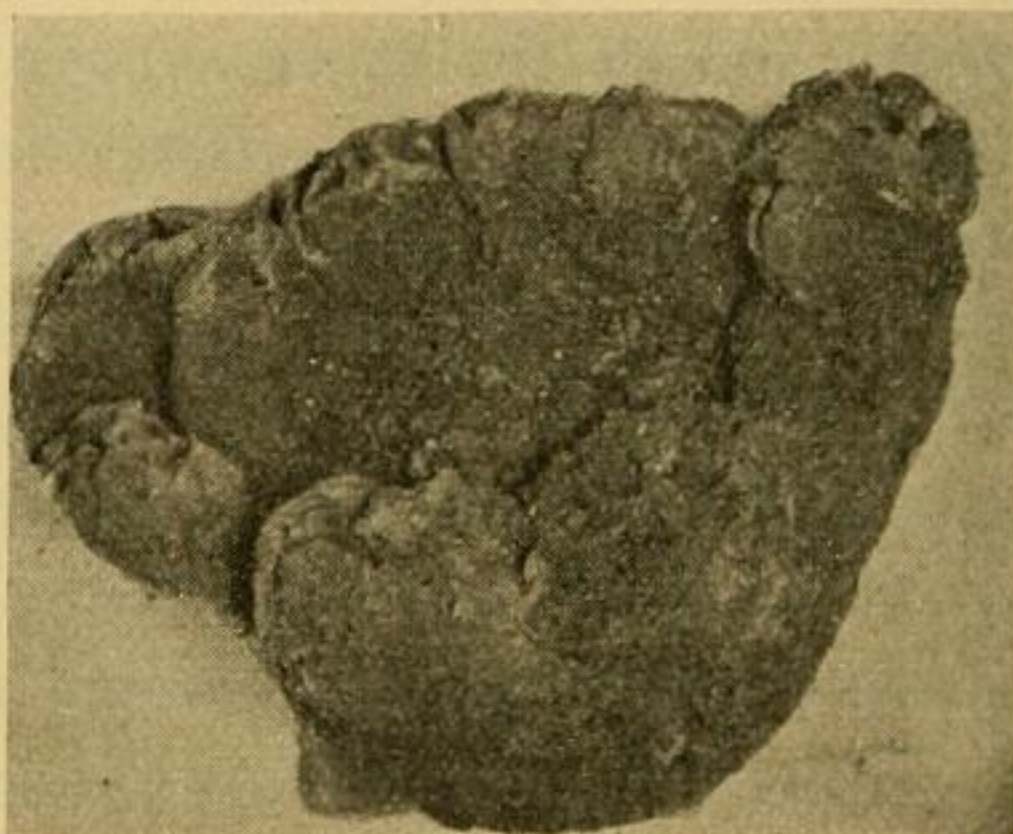


Figure 179.—Tube-sponge, *Spinosella sororia*, var., $\frac{1}{4}$ nat. size.

Figure 180.—Scarlet Sponge, *Tedania ignis*, from a dry specimen of the massive form. $\frac{1}{4}$ nat. size. Both phot. by A. H. V.

Family, *Axinellidæ*. (P. 333.)

Axinella appressa, sp. nov. Plate xxxvD, figs. 10, 11.

Sponge divided into numerous, upright, slender, angular branches, 6 to 8^{mm} thick, covered with small, irregular, conical and compressed elevations, mostly directed upward, and slightly hispid; subdermal areolæ tubular, roundish, very unequal. The larger, 1^{mm} wide, rather close together. Dermal layer seldom preserved, thin, with small pores often arranged in small circular groups over the areolæ. Fibers rather strong, closely filled with rather long, mostly curved, stylote spicules, the longer ones .32 to .40^{mm}; the shorter ones .20 to 25^{mm} long. The primary fibers are not very distinct from the others,

but form evident loose axial lines, ascending and divergent, plumosely branched in the branchlets and conules.

Color red in life, buff when dry. Found also in the Bahamas and Florida.

Axinella rudis, sp. nov. Plate xxxvD, fig. 13.

Sponge upright, with tall, rather stout irregular branches, 15–20^{mm} in diameter. Sides of branches covered with irregular, very unequal, rough tubercles and lobules, mostly blunt and ascending, 2–5^{mm} high; 1–4^{mm} broad; on the lower parts of branches and stem they become much smaller and more verruciform. Surface rough or subhispid, everywhere irregularly reticulated with rather coarse stiff fibers. Oscules abundant in the depressions, .5 to 1^{mm} in diameter, surrounded by more numerous smaller pores. Color, in life, bright red; when dried it often retains a rose-red color, gradually changing to reddish or orange-brown.

The fibers have a good amount of light yellow spongin. The spicules in the fibers are mostly rather large and stout, often curved, acute stylotes; with these are some slender, and a few almost capillary styles, or raphides, nearly as long as the others; very few regular, slender, tricurved toxa were also noticed in the thin dermal layer.

It occurs also on the Florida reefs.* It belongs to the group named *Pandaros* by Duch. and Mich. It is related to *A. Walpersii* D. & M., but that has flat or flabellate branches; also to *A. angulosa* and *A. pennata* of D. and M. (as *Pandaros*).

Family, *Polymastidae*. (P. 334.)

Polymastia varia, sp. nov. Plate xxxvD, figs. 1, 1a.

Sponge compact, thick, encrusting and also massive, sometimes with a nearly even surface, often tuberculate, or when large rising into long finger-like elevations 1 to 1.5 inches high and .3 to .5 inch in diameter, often concave at top but not fistular. Some of the masses are 3 to 5 inches thick and broad. Surface, when dry, hard and compact, often appearing granulated or subareolate, and minutely hispid with the projecting points of small tylostylote spic-

* *Axinella rosacea*, sp. nov. Plate 35D, fig. 12. A similar species occurs at Florida and Bahamas. It has stunter branches densely covered with groups of short capitate and tuberculate branchlets, often forming rosette-like forms. Color light red or pink when dried. Stylote spicules much stouter than in *A. angulata*, the larger ones .28 to .34^{mm} long; with these are much more slender oxeates .37 to .40^{mm} long.

ules, perpendicular to the surface. Internal texture rather compact, with irregular canals; thick supporting lines of densely crowded spicules run in various directions in the interior. Color, in life, orange-red; dull orange-brown when dry.

Spicules are tylostyles of various sizes, mostly .36 to .48^{mm} long and .008 to .014 in diameter, rarely styles by reduction of the heads; the heads are mostly regularly oval, sometimes slightly three-lobed.

After a long search only a single microsclere was found; it was a minute spinispirula of about 1½ turns.

Common on the reefs; perhaps a boring sponge when young.

Family, *Clionidæ*. (P. 334.)

Heterocliona, gen. nov. Type, *Papillina cribraria* Sch.

Sponge massive or goblet-shaped when large, perhaps boring when young; interior very cavernous when dry, supported by irregular columns of crowded tylostyles. Cortex thick, tough, smooth, and lubricous in life; filled with tylostyles tangentially arranged. Microscleres few, spirulas or spirasters. Oscules usually grouped in large clusters.

Heterocliona cribraria (Schm.). Plate xxxvD, figs. 2, 3.

? *Papillina cribraria* Schm., Spong. Atl. Gieb.

This massive, cavernous sponge often grows to great size, sometimes becoming 2 feet or more in diameter, and over a foot high. The upper surface, when large, usually has a large central cup or one or more cones, each with a large terminal oscule, 15 to 25^{mm} in diameter; other smaller oscules occur close together, in clusters, over the top and border of the sponge. When young (1–2 inches across) the form may be cylindrical, capitate, or mushroom-like, with few, 3–10, oscules, .5–10^{mm} in diameter, above. The surface is smooth, in life, with a tough blackish cortex.

The interior, when dried, is very cavernous, with large irregular cavities partly intercepted by irregular, often curved, broad bands and columns of densely packed bundles of spicules. In drying much of the soft sarcode often decays and runs out of these cavities.

The spicules are mostly long, slender, curved tylostyles, with a slightly enlarged mostly ovate head; they are about .23 to .34^{mm} long; others of the same size are subtylostyles and styles. In the dermal layer they mostly lie tangentially and in radiate groups, without much order.

Microscleres are mostly wanting; after a long search only two or three were found; they were minute, slender, spined spirasters or spinispirulæ, with about $1\frac{1}{2}$ turns, and very minute, nearly straight rhabdi.

Irregular and ovoid dark brown pigment bodies are abundant.

Color in life, dark smoky brown or black, common; the largest seen were in Harrington Sound; also occurs on Florida reefs (Yale Mus.).

Cliona caribbæa Carter. *Boring Sponge.* Fig. 181. Plate xxxvD, fig. 4.

Cliona caribbæa Carter, Ann. and Mag. Nat. Hist., ser. 5, vol. ix, p. 346, pl. xii, fig. 26, 1882.

Cliona viridis (pars.) Topsent, Archives Zool. Exper. et General, vol. viii, p. 84, pl. iii, fig. 3d, 1900.

While young this common species excavates extensive and irregular cavities in shells and corals, especially in *Porites*. Later in life it may grow up into thick, massive, dull yellow, convex forms, 6 inches to a foot or more in diameter, with large oscules and a coarsely verrucose surface.* Interior coarsely cavernous,† as dried, and supported by irregular bands and columns of compacted tylostylote spicules. The soft sarcode quickly decays and runs out, in drying, with a very offensive odor. Cortical layer compact. It usually includes numerous fragments of shells and corals.

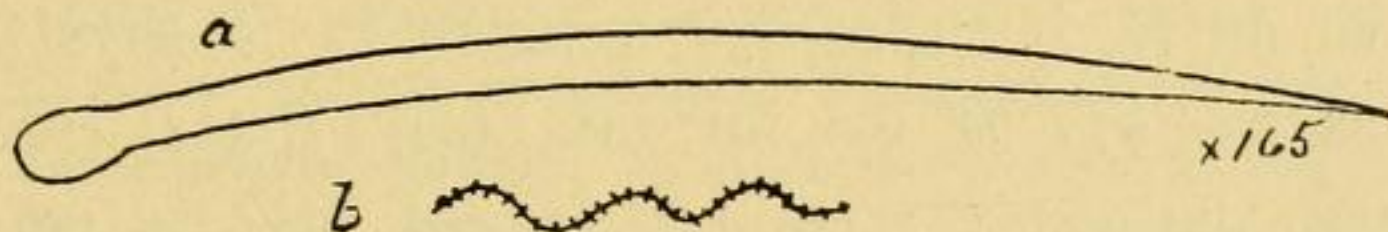


Figure 181. *Cliona caribbæa*; a, one of the tylostyles from the boring sponge, $\times 165$; b, a microsclere (spinispirula) much more enlarged (after Carter).

The spicules of this massive form (see pl. 35d, fig. 4) are mostly essentially like the one figured by Carter (fig. 181). They are variable in size and form, mostly .28 to .40^{mm} long; many are rather stout with a fusiform shaft; most are more slender with the shaft less fusiform; few are styles. The head is generally ovate, not very large. No microscleres were found after long searching.

* In this form it corresponds to the genus *Oscarella*. Topsent (1900) referred this species and many other forms to *Cliona viridis* of Europe, in which he included, as massive states, *Osculina*, and *Papillina* = *Papillella* Vos.

† The massive form here described may not be the adult of the Carter's species; therefore I propose for it the provisional name *Cliona sordida*. See plate.

Spirastrella mollis, sp. nov. Plate xxxvD, fig. 5.

An encrusting species forming soft films .5 to 3^{mm} or more thick on dead, cavernous corals, and also penetrating into the cavernous spaces,—perhaps a boring sponge when young. Surface smooth; no oscules nor pores visible to the naked eye in alcoholic specimens; interior without visible canals. Skeletal spicules, long slender tylostyles, scattered and in groups (fig. 5, *a*), mostly with regular well-rounded heads, but some have ovate or elongate heads; in some the heads are much reduced. Microscleres (*b, b'*) are relatively large, spined spirasters, abundant in the cortical layer; they mostly have three or four whorls of sharp conical spinules; some are strongly curved (*b'*).

(To be continued.)

SOURCES OF ILLUSTRATIONS IN THE TEXT.

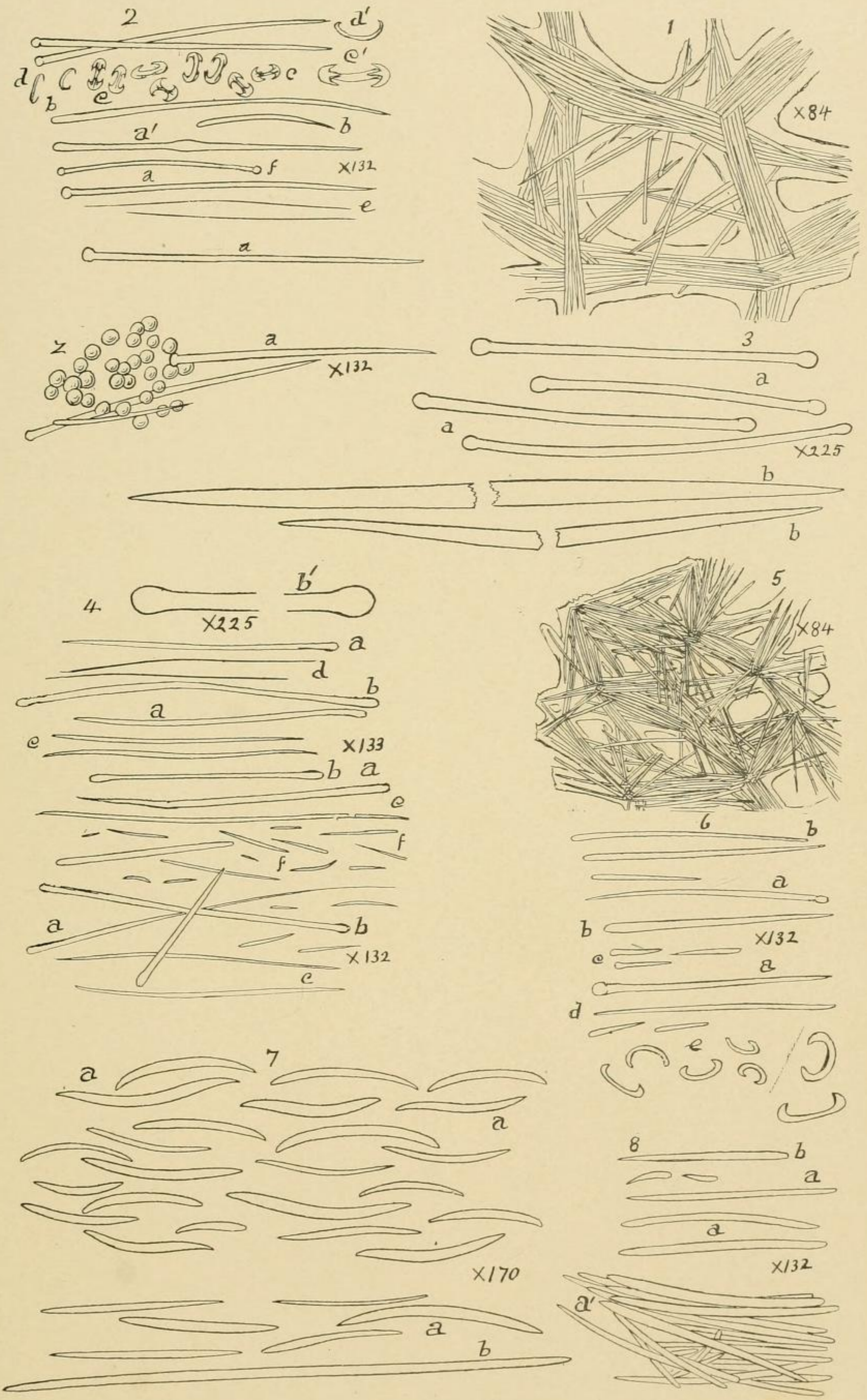
The following cuts are from photographs and drawings by Mr. A. Hyatt Verrill:—1, 20, 30, 34*a*, 34*b*, 36*b*, 36*c*, 37, 38, 39, 40, 41, 43, 43*b*, 45, 59, 59*a*, *b*, *c*, 60, 61, 62, 63, 66, 67, 70, 71*a*, *b*, 72, 72*a*, *b*, 73, 75, 77, 79, 80, 81, 82, 83, 84, 85, 90, 91, 94, 95, 96, 96*a*, 97*a*, 99, 100, 101, 101*a*, 102, 103–114, 116*a*–119, 121, 122, 125–128, 129, 129*a*, 131–135, 137, 138, 141, 144–162, 164, 176–180.

The following were by Mr. M. C. Cooke:—6, 16, 18.

The following are from photographs bought in Bermuda:—8, 9, 10, 14, 15, 17, 21, 22, 25, 33*a*, 33*b*.

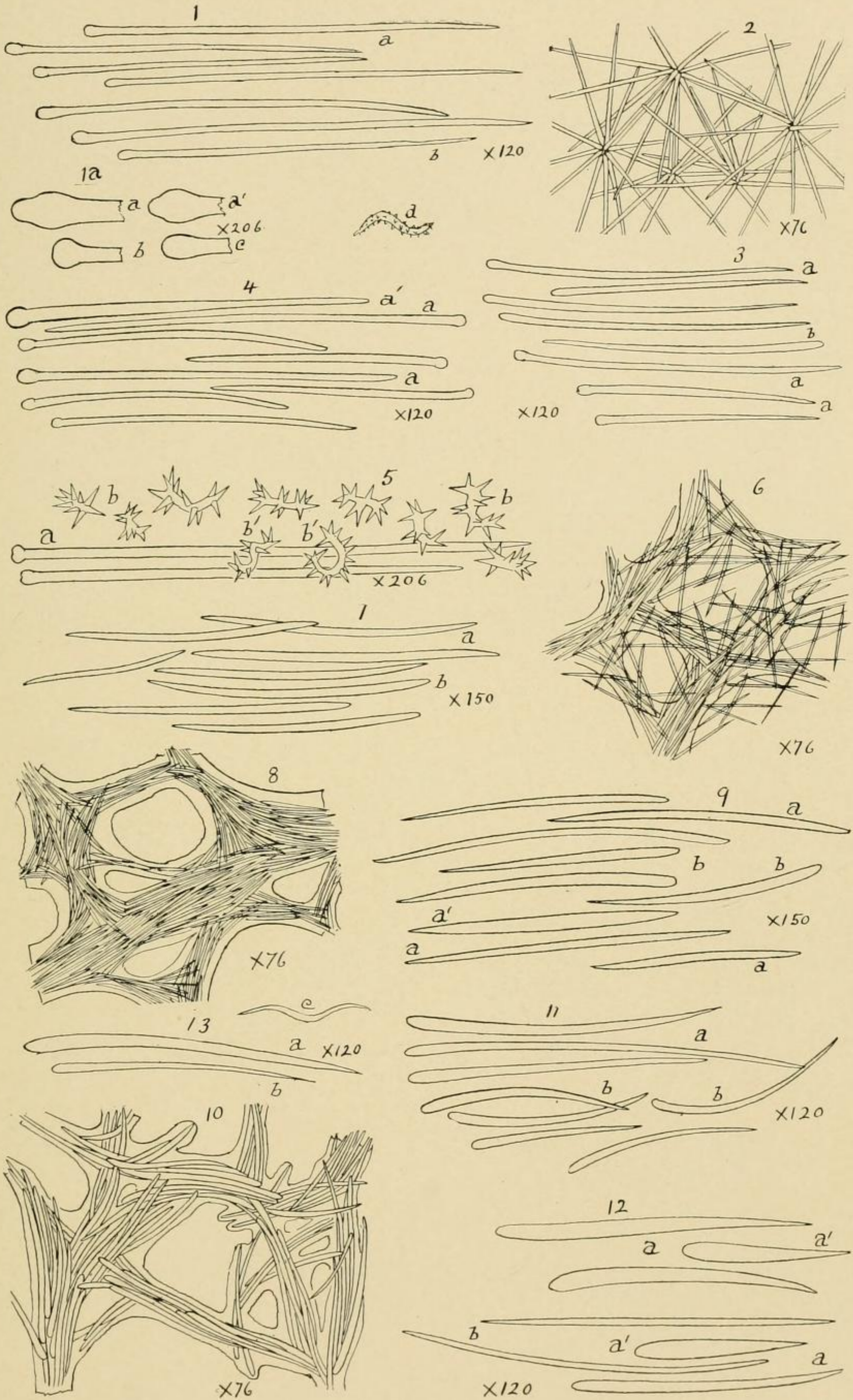
The following were loaned by the publishers of Webster's International Dictionary:—36, 36*a*, 43*a*, 142.

The sources of others are given under the cuts.



A. Hyatt Verrill, del.

BERMUDA SPONGES: SPICULES.



A. Hyatt Verrill, del.

BERMUDA SPONGES: SPICULES.