

SOME MARINE SPONGES OF NORTHEAST BRAZIL

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Although representatives of the phylum Porifera are abundant in the coastal waters of Northeast Brazil, only a few scientists have attempted to study the sponges in this area. Carter (1888), writing on the Porifera of Fernando de Noronha, and de Laubenfels (1956) in "Preliminary Discussion of the Sponges of Brazil", classified certain marine sponges. An attempt is made here to describe some marine sponges from Brazil, specifically those found off the coast of Fortaleza (Ceará, Brazil — 3°55'S and 38°31'W).

The Porifera in this study, with the exception of one specimen, are described from dry material collected over a period of several years by various individuals. No records are available concerning the color or consistency of the living specimens, or in some cases, the depth from which the sponge was taken. Many of the specimens were incomplete and often only one sample of a particular species was retained. Thus, in most cases, the sponges received only a tentative identification.

I am especially grateful to Dr. G. Bakus, of the University of Southern California, and Dr. K. Rützler, of the Smithsonian Institution, for verification of the Demospongiae.

METHODS

The following characteristics were noted for each of the sponges studied: color, size, shape and consistency of the dry or preserved sponge, diameter of the oscules, height of the conules, distance between oscules and conules, types and dimensions of the spongin fibers and spicules.

The spongin fibers were studied by slicing a thin section of the sponge with a razor blade, placing it on a slide and observing it under a compound microscope. Spicules of the Demospongiae were isolated by placing 3 mm pieces of tissue from the sponge surface and interior on microscope slides and treating with concentrated nitric acid until all cells

had been hydrolyzed. A permanent mount was then prepared by adding balsam and a coverslip. The spicules of the calcareous sponges were separated from the tissue with sodium hypochlorite.

Camera lucida drawings were made of the spongin fibers and spicules. Spicule measurements are given as lengths and diameters.

LOCALITY OF SPECIMEN COLLECTION

The specimens in the collection of the Laboratório de Ciências do Mar da Universidade Federal do Ceará (LABOMAR) were either dredged off the coast of Fortaleza (Ceará, Brazil), or found at one of the beaches in Fortaleza between 1964 and 1968.

Pieces of some of the sponge specimens were also sent to the British Museum of Natural History.

DESCRIPTIONS OF THE SPECIES

Phylum: Porifera Grant

Class: Demospongiae

Order: Dictyoceratida

Family: Spongiidae

Sub-family: Spongiinae

Genus: *Polyfibrospongia* Bowerbank

Polyfibrospongia sp.

(Figure 1)

Material examined: one dry specimen LABOMAR no. 13, collected on July 2, 1964.

Shape: more or less fan-shaped and cavernous in architecture.

Size: 8 cm in length by 10.5 cm in width.

Color-dry: from light to dark brown internally and externally.

Consistency: somewhat spongy.

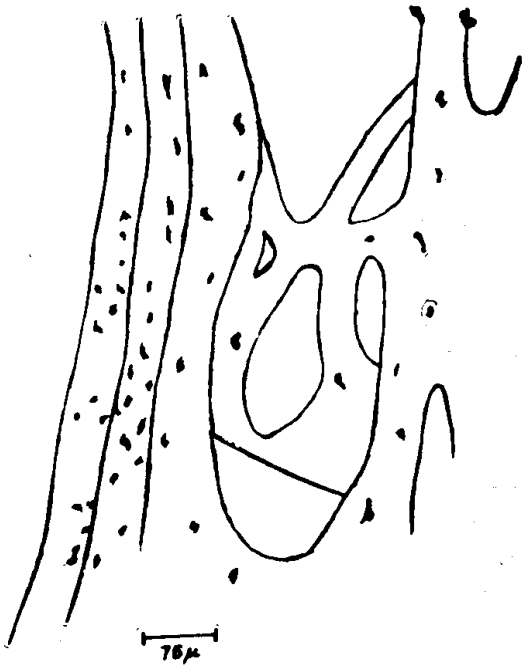


Figure 1 — *Polyfibrospongia* sp. Bowerbank, spongin fibers x80.

Surface: very irregular with conules having rounded summits. The conules measure from 2 to 5 mm in height and are approximately 5 mm apart.

Oscules: indistinguishable.

Skeleton: composed of fascicular ascending fibers measuring 100 to 200 micra in diameter, and filled with foreign particles. Thinner fibers, 40 micra or less in diameter, anastomose with the larger fibers, outlining rectangular, triangular or oval meshes measuring from 50 to 1,000 micra in diameter.

Genus: *Ircinia* Nardo

Ircinia fasciculata (Pallas) de Laubenfels

(Figure 2)

Material examined: one dry specimen LABOMAR no. 10, collected on July 2, 1964.

Shape: ramose with few branches, some of which anastomose forming tunnels between them.

Size: 9.5 cm in height by 8.5 cm in width. The branches measure 1 to 2 cm in diameter and reach a height of 8 cm.

Color-dry: light tan to dull brown internally and externally.

Consistency: tough.

Surface: conulose; the conules measure 1 to 3 mm in height and are 2 to 5 mm apart.

Oscules: widely scattered; they measure 6 mm in diameter and are surrounded by a rim of sharp conules. Below the surface the oscules divide into 3 or 4 canals.

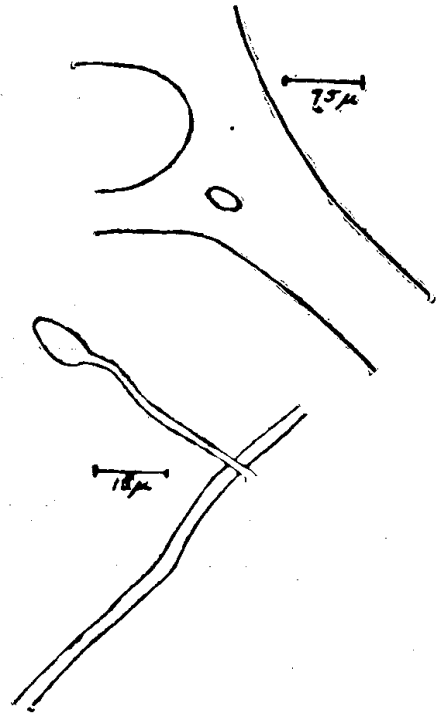


Figure 2 — *Ircinia fasciculata* (Pallas) de Laubenfels, primary spongin fibers x80, thin filaments x400

Skeleton: consists of ascending fascicular tracts of primary fibers about 100 micra in diameter. Thin transparent filaments, characteristic of this genus, are abundant in this specimen. Some of the filaments are 2.5 micra in diameter, with round terminal knobs 8.5 micra wide, whereas others, without knobs, measure 4 to 10 micra in diameter.

Known distribution: circumtropical and subtropical.

Ircinia strobilina (Lamarck) de Laubenfels

(Figure 3)

Material examined: one preserved specimen LABOMAR no. 20, Brit. Mus. Nat. Hist. no. 1969.7.1.10, collected on May 8, 1968 at Mucuripe Beach at a depth of approximately 5 meters.

Shape: flattened ovoid.

Size: 11 cm in length, 10 cm in width and 2.2 cm in depth.

Color-dry: dull brown internally and externally.

Consistency: spongy in the preserved specimen; when dried it becomes very hard.

Surface: conulose; the conules measure from 2 to 8 mm in height and are located 4 to 10 mm apart.

Oscules: are mainly found on the upper surface of the sponge and are 2.5 to 5 mm in diameter and 4 to 10 mm apart.

Ectosome: a thick fleshy dermis is present.

Endosome: somewhat cavernous.

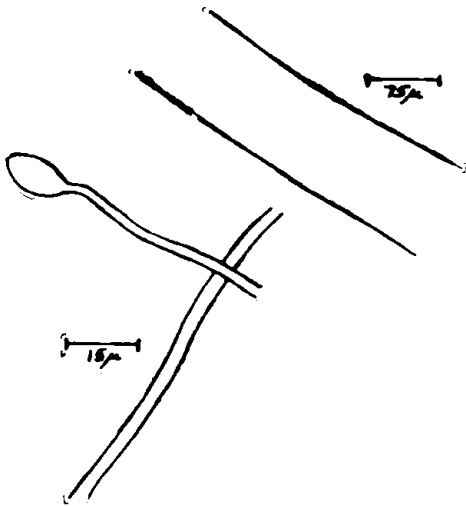


Figure 3 — *Ircinia strobilina* (Lamarck) de Laubenfels, primary spongin fibers x80, thin filaments x400.

Skeleton: a reticulation of uneven fibers 25 to 75 micra in diameter. The filaments are 1 micron in diameter with terminal knobs 8 micra in diameter. The other, somewhat larger, filaments measure about 4 micra in diameter.

Known distribution: West Indies.

Sub-family: Verongiinae

Genus: *Verongia* Bowerbank

Verongia fulva Pallas

(Figure 4)

Material examined: one dry specimen LABOMAR no. 4.

Shape: ramose with three laterally flattened digitate branches extending from the main trunk.

Size: 27 cm in length; the branches measure about 14 cm in length by 2.5 cm in diameter.

Color-dry: dark brown internally and externally.

Consistency: hard and brittle.

Surface: the presence of conules could not be determined in this specimen due to the loss of dermal tissue.

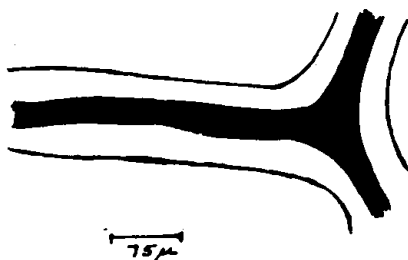


Figure 4 — *Verongia fulva* Pallas, spongin fibers x80.

Oscules: few; they measure 2 to 5 mm in diameter.

Skeleton: is a reticulation of fibers composed of yellow spongin, containing a conspicuous centrally located opaque pith, characteristic of this genus. The fibers are 40 to 100 micra in diameter and outline somewhat circular meshes 260 to 1,000 micra in diameter.

Known distribution: cosmopolitan.

Verongia longissima Carter

(Figure 5)

Material examined: one dry specimen LABOMAR no. 15, collected on July 2, 1964.

Shape: ramose with three solid cylindrical branches.

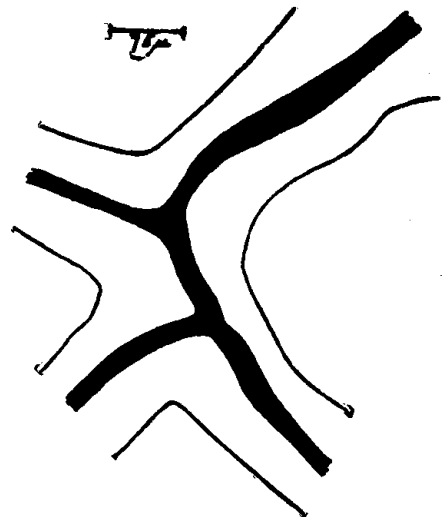


Figure 5 — *Verongia longissima* Carter, spongin fibers x80.

Size: the length and width respectively are 22 cm by 3.4 cm, with the branches measuring up to 18.8 cm in length by 1.4 cm in width.

Color-dry: dark brown internally and externally.

Consistency: hard and brittle.

Surface: the presence of conules could not be determined in this specimen due to the loss of dermal tissue.

Oscules: are located at various sites on the branches, but not at their terminations, and measure 2 to 3.3 mm in diameter.

Skeleton: a reticulation of smooth fibers 85 to 190 micra in diameter with a distinct central opaque pith. The fibers outline meshes 200 to 750 micra in diameter.

Known distribution: Dry Tortugas, West Indies, Australia.

Verongia sp.

(Figure 6)

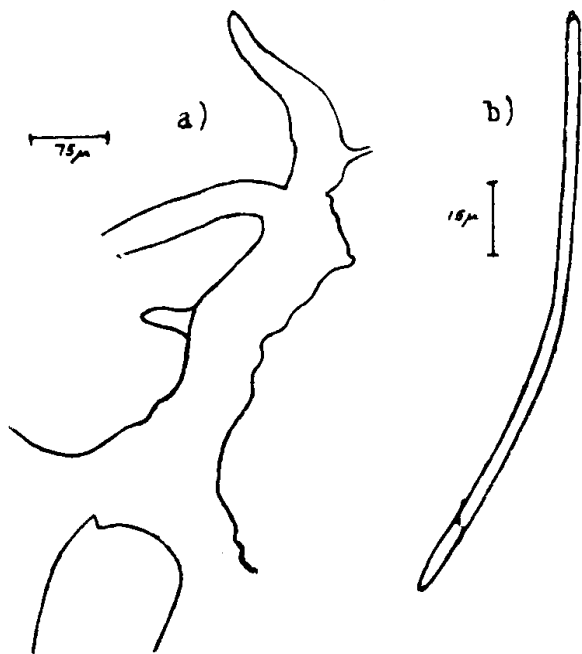


Figure 8 — *Haliclona* sp. Grant: a) spongin fibers x80; b) oxea x400.

to 190 micra in diameter, and the transverse anastomosing fibers are sometimes as small as 25 micra. The fibers outline meshes 150 to 425 micra in diameter.

The spicules are diactinal and measure 115-135 micra x 0.5-2.5 micra. The spicules could be described as either hastate oxeas or oxystrongyles.

Family: Callyspongiidae

Genus: *Callyspongia* Duchassaing & Michelotti

Callyspongia aff. *diffusa* (Ridley) Burton

(Figure 9)

Material examined: one dry specimen LABOMAR no. 1, Brit. Mus. Nat. Hist. no. 1969.7.1.2.

Shape: sprawling ramose, with somewhat flattened branches commonly dividing into smaller branches.

Size: of incomplete sponge is 35 cm in length. The branches measure up to 32 cm in length and 1 to 3 cm in width.

Color-dry: gray externally and tan-gray internally.

Consistency: somewhat spongy.

Surface: smooth to lumpy.

Oscules: located mainly along the lateral surfaces of the branches and measure 1 to 3 mm in diameter and 3 to 9 mm apart.

Skeleton: composed of anastomosing fibers without debris and cored with spicules. The principal fibers are 75 to 125 micra in diameter and the secondary fibers measure 25



Figure 9 — *Callyspongia* aff. *diffusa* (Ridley) Burton: a) spongin fibers x80; b) oxeas x400.

to 60 micra in diameter. The fibers outline rectangular and ovoid meshes 150 to 850 micra in diameter.

The spicules are oxeas measuring 80-100 micra x 2.5-5.0 micra.

Known distribution: East Indies, Central Pacific.

Family: Desmacidonidae

Genus: *Fibulia* Carter

Fibulia aff. *bermuda* de Laubenfels

(Figure 10)

Material examined: one dry specimen LABOMAR no. 11, collected on July 2, 1964.

Shape: composed of a stout stalk from which extend two fingerlike projections.

Size: length and width are 16 cm by 7 cm, respectively. The branches measure 7 cm in height by 2 cm in diameter.

Color-dry: dark brown internally and externally.

Consistency: toughly spongy.

Surface: conulose; the conules measure 1.5 to 3.0 cm in height.

Oscules: abundant, measuring 1.5 to 5.0 cm in diameter and often only 1 mm apart.

Skeleton: cavernous; composed of anastomosing fibers containing much debris, and cored with spicules. The fibers measure 35 to

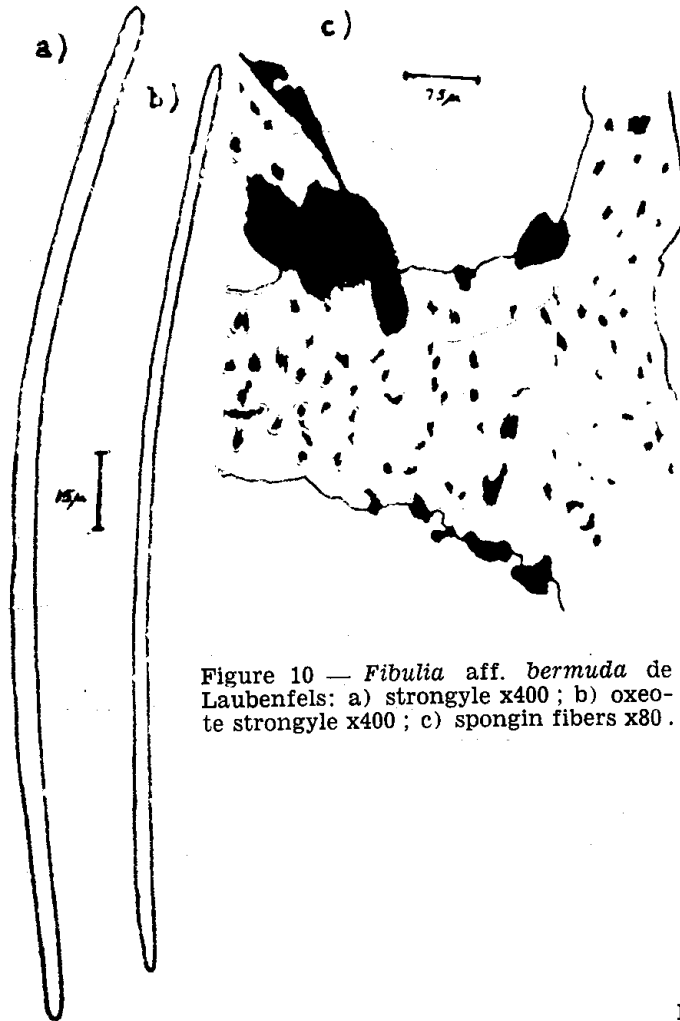


Figure 10 — *Fibulia* aff. *bermuda* de Laubenfels: a) strongyle x400; b) oxeote strongyle x400; c) spongin fibers x80.

165 micra in diameter and outline meshes from 300 to 1,000 micra in diameter. Often a thin layer of spongin with embedded spicules occupies the interstices between the spongin network.

The spicules are abundant strongyles 165-220 micra x 2.5-5.0 micra; oxeote strongyles 190-230 micra x 2.5 micra; thin spicules that may be juvenile strongyles 165-195 micra x 0.25-1.25 micra; very rare raphides 80-90 micra x 0.5 micron.

Known distribution: West Indies, Bermuda.

Order: Poecilosclerida

Family: Adociidae

Genus: *Pellina* Schmidt

Pellina aff. *eusiphonia* Ridley

(Figure 11)

Material examined: one dry specimen LABOMAR no. 2, Brit. Mus. Nat. Hist. no. 1969.7.1.3.

Shape: a series of hollow erect cylinders arising from a basal mass.

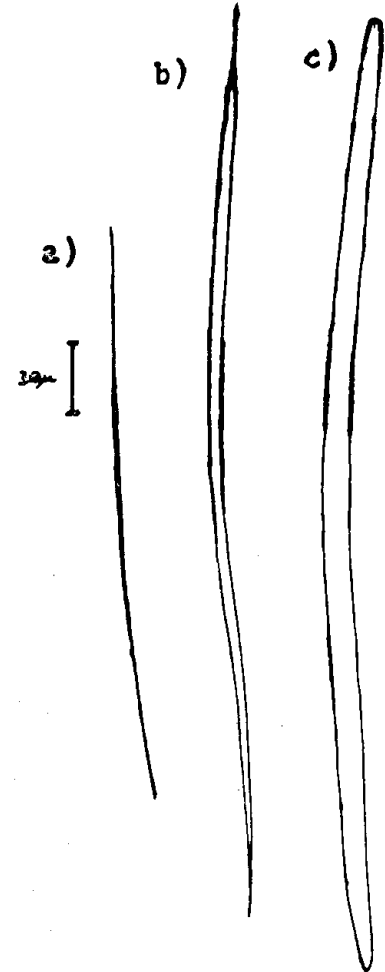


Figure 11 — *Pellina* aff. *eusiphonia* Ridley: a) juvenile oxea x200; b) oxea x200; c) strongylote oxea x200.

Size: total height and width of the sponge are 9.5 cm by 5 cm, respectively. The cylinders reach a maximum length of 6 cm and a maximum width of 0.4 cm. The walls of the cylinders are less than 1 mm thick.

Color-dry: gray-tan internally and externally.

Consistency: spongy, but fragile.

Surface: velvety to the touch due to the many microscopic spicules projecting from the surface.

Oscules: located at the distal terminations of the hollow cylinders.

Skeleton: an isodictyal reticulation of spicules joined at their terminations by small amounts of colorless spongin. Occasionally bundles of spicules form tracts 25 to 50 micra in diameter surrounding meshes 200 to 260 micra wide.

The spicules are oxeas, some curved, others straight, and some of which have strongylote terminations. The oxeas can be divided into three size groups: 400-500 micra x 10-12.5 micra; 330-347 micra x 2.5-5.0 micra; and 195-295 micra x 1-2 micra.

Known distribution: West-central Pacific, Australia.

Family: Agelasidae

Genus: *Agelas* Duchassaing & Michelotti

Agelas sp.

(Figure 12)

Material examined: two specimens LABOMAR no. 5, Brit. Mus. Nat. Hist. no. 1969.7.1.5; LABOMAR no. 6, Brit. Mus. Nat. Hist. no. 1969.7.1.4.

Shape: of specimen no. 5 is irregular. Se-

veral branches, extending in various directions, have fused forming tunnels. Specimen no. 6 is more or less ramose. Most of the branches are lobate projections broader at their terminations. One branch, however, subdivides numerous times forming feather-like branches.

Size: of specimen no. 5 is 20 cm by 18 cm. The anastomosing branches range from 1.8 to 5 cm in diameter. Specimen no. 6 is 8 cm by 14 cm. The branches measure 4 to 6.7 cm in height by 1.2 to 2.4 cm in diameter.

Color-dry: dull brown internally and externally.

Consistency: toughly spongy.

Surface: generally smooth. In specimen no. 6 parts of the surface are covered by a detachable "skin". The part with the feather-like branches is rough.

Oscules: abundant; 0.72 to 9.5 mm in diameter.

Skeleton: a reticulation of fibers measuring 35 to 75 micra in diameter; some fibers are as large as 100 micra. The fibers outline meshes from 100 to 375 micra in diameter. Some spicules protrude from the fibers.

The spicules are acanthostyles with pointed spines 65-165 micra x 2.5-9.0 micra; acanthostyles with blunted (rounded) spines 100-140 micra x 2.5-5.0 micra; some acanthoxeas with pointed spines 85-160 micra x 3-4.5 micra.

Family: Phorbasidae

Genus: *Kieplitela* de Laubenfels

Kieplitela aff. *antrodes* de Laubenfels

(Figure 13)

Material examined: one dry specimen LABOMAR no. 17, Brit. Mus. Nat. Hist. no. 1969.7.1.8.

Shape: club-shaped and of a very cavernous nature. It is attached to the substratum by a small flat pedestal.

Size: 5.4 cm in height by 3.3 cm in width.

Color-dry: light brown internally and externally.

Consistency: hard.

Surface: covered with very sharp protruding spicules.

Oscules: indistinguishable due to the highly cavernous structure of the sponge.

Skeleton: a reticulation of transparent fibers completely filled with closely-packed spicules, some of which protrude from the fibers. The fibers, 35 to 150 micra in diameter, outline meshes 110 to 875 micra.

The spicules are small oxeas (straight and curved) 165-225 micra x 5 micra; larger oxeas (straight and curved) 425-775 micra x 4

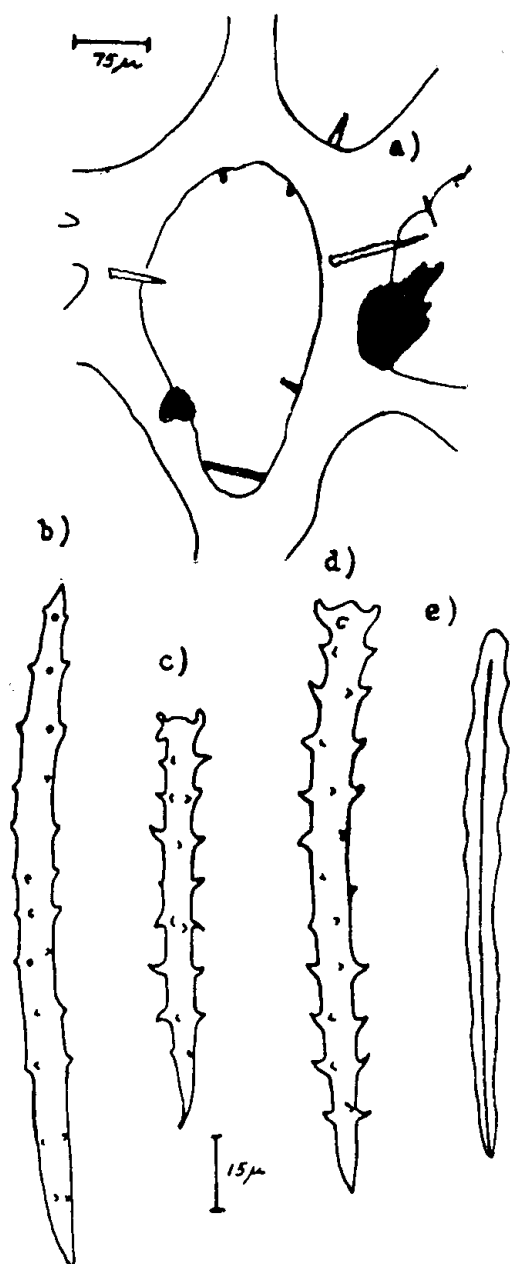


Figure 12 — *Agelas* sp. Duchassaing and Michelotti: a) fibers x80; b) acanthoxea x400; c — d) acanthostyles x400; e) acanthostyle with rounded spines x400.

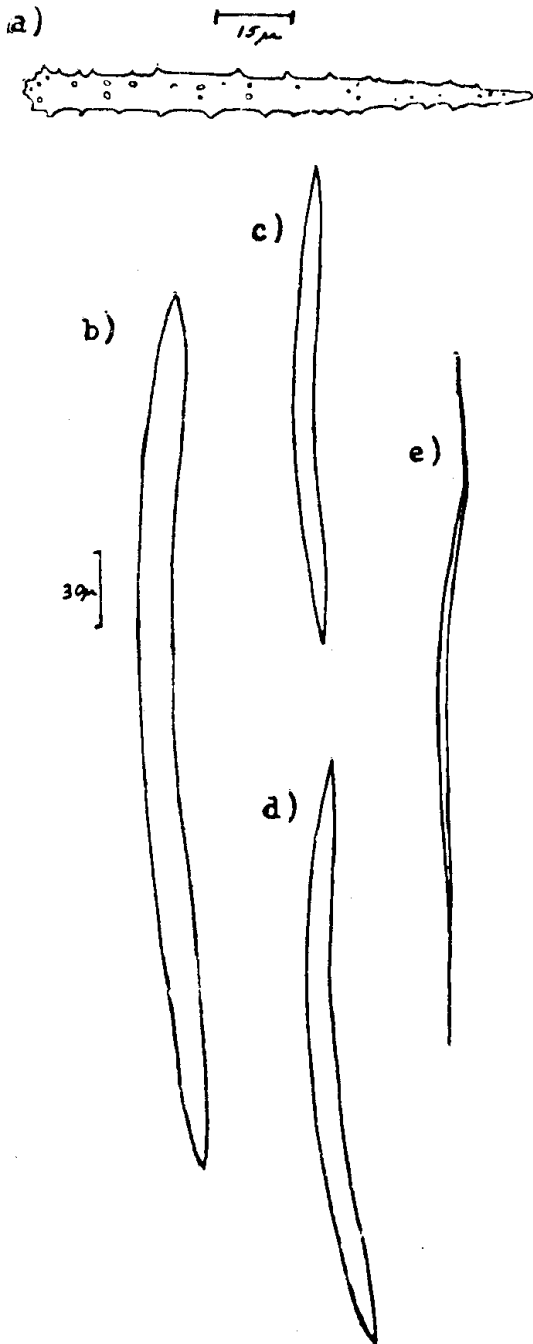


Figure 13 — *Kieplitela* aff. *antrodes* de Laubenfels:
a) acanthostyle x400; b — e) oxeas x200.

12.5 micra; acanthostyles 100 micra x 6 micra; thin oxeas, probably juvenile, 230-290 micra x 1 micron; rare style of varying lengths 360-1,375 micra x 2.5-6.0 micra.

Known distribution: West-central Pacific.

Family: Microcionidae

Genus: *Microciona* Bowerbank

Microciona prolifera (Ellis & Solander) Verrill

(Figure 14)

Material examined: two dry specimens,

LABOMAR no. 8, Brit. Mus. Nat. Hist. no. 1969.7.1.6; LABOMAR no. 18.

Shape: ramose, with somewhat flattened branches.

Size: 55 cm in height by 37 cm in width. The branches measure from 7 to 50 cm in length and from 1 to 5.5 cm in width.

Color-dry: pinkish-gray externally and tan internally.

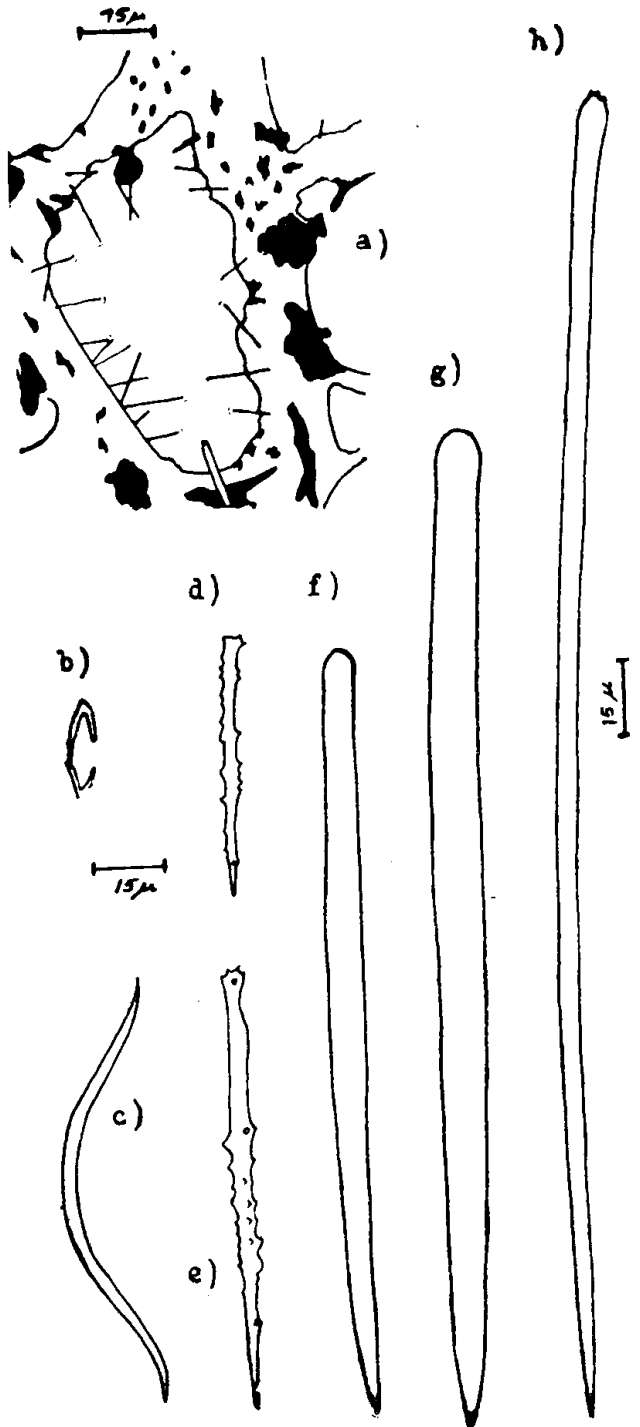


Figure 14 — *Microciona prolifera* (Ellis and Solander) Verrill: a) spongin fibers x80; b) palmate isochela x400; c) toxa x400; d — e) acanthostyles x400; f — g) styles x400; h) subtylostyle x400.

Consistency: toughly spongy.

Surface: hispid, characterized by a distinctive system of ridges and depressions.

Oscules: indistinguishable.

Skeleton: consists of a reticulation of fibers filled with foreign particles and commonly echinated by spicules, mostly acanthostyles.

The spicules are thick styles 120-250 micra x 7.5-10.0 micra; thin styles about 215 micra x 4 micra; thin subtylostyles about 250 micra x 4 micra; small acanthostyles 45-55 micra x 2.5-3.0 micra; larger acanthostyles 80-90 micra x 2.5 micra; isochelas 20 micra in length; toxas 60-80 micra in length (not observed in specimen no. 18).

Known distribution: Atlantic coast of the U.S.A.; Arabian Sea; Willapa Bay, Washington; San Francisco, California.

Order: Halichondrida

Family: Axinellidae

Genus: *Axinella* Schmidt

Axinella sp.

(Figure 15)

Material examined: one dry incomplete specimen LABOMAR no. 3.

Shape: ramose with long solid circular branches from which extend filamentous projections.

Size: the size of the incomplete specimen was 30 cm in length by 0.4 to 0.8 cm in width. The filamentous projections were about 5 mm in length by 0.1 to 0.5 mm in diameter.

Color-dry: dull brown externally and internally.

Consistency: very tough.

Surface: rough due to the numerous fibrous projections with echinating spicules.

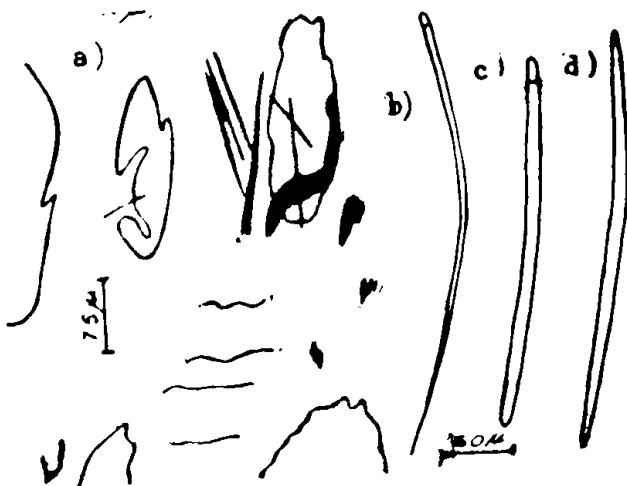


Figure 15 — *Axinella* sp. Schmidt: a) spongin fibers x80; b) style x100; c) strongyle x100; d) oxea x100.

Oscules: indistinguishable.

Skeleton: a reticulation of fibers filled with spicules, some of which are echinating. The fibers range from 30 to 140 micra in diameter and outline small meshes from 85 to 375 micra in diameter.

The spicules are oxeas (curved and straight) 200-400 micra x 7-15 micra; oxeote strongyles (curved and straight) 200-420 micra x 7-15 micra; some styles 320 micra x 4 micra.

Family: Halichondriidae

Genus: *Halichondria* Fleming

Halichondria sp.

(Figure 16)

Material examined: one dry specimen LABOMAR no. 7.

Shape: an ovoid mass (probably incomplete).

Size: 5 cm by 8 cm.

Color-dry: dull white externally and internally.

Consistency: stiffly spongy.

Surface: velvety to the touch due to the many microscopic spicules protruding from the surface.

Oscules: 2.5 to 4.5 mm in diameter.



Figure 16 — *Halichondria* sp. Fleming, oxeas x80.

Skeleton: composed of randomly arranged spicules occasionally bound to each other at their terminations by transparent spongin.

The spicules are oxeas, straight and curved, of three different sizes: 713-875 micra x 25 micra; 625 micra x 12.5 micra; and 325 micra x 8.8 micra.

Family: Hymeniacidonidae

Genus: *Hymeniacidon* Bowerbank

Hymeniacidon aff. *dystacta* de Laubenfels

(Figure 17)

Material examined: two dry specimens, LABOMAR no. 12; LABOMAR no. 14, Brit. Mus. Nat. Hist. no. 1969.7.1.7, collected on July 2, 1964.

Shape: specimen no. 12 is fan-shaped, no. 14 is composed of two fan-shaped structu-

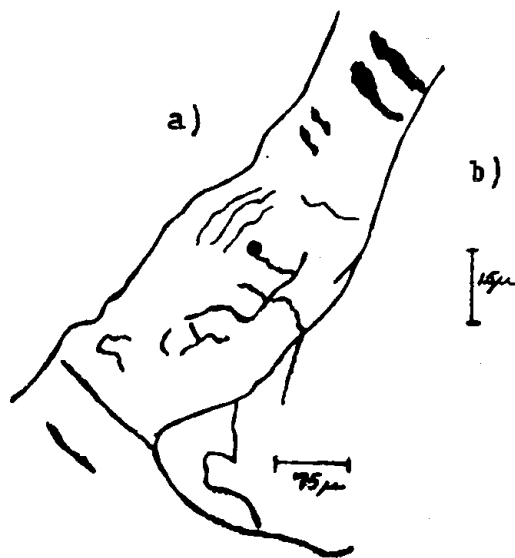


Figure 17 — *Hymeniacidon* aff. *dystacta* de Laubenfels: a) spongin fibers x80; b) style x400.

res connected to each other by a central bridge, like the letter H.

Size: of both sponges, about 9 cm by 7 cm.

Color-dry: dark brown externally and orange internally.

Consistency: tough.

Surface: rough due to the protrusion of numerous sharp fibers.

Oscules: not evident.

Skeleton: composed of very uneven fibers, some anastomosing, many branching, measuring from 37 to 175 micra in diameter, and surrounding meshes from 60 to 525 micra wide. Often the spaces between the fibers are filled with spongin. Spicules can be seen within the fibers; some fibers are echinated by spicules.

The spicules are all slightly subtylote styles 180-280 micra x 2-5 micra, although some as small as 95 x 1.5 micra were observed.

Known distribution: West-central Pacific.

Order: Choristida

Family: Craniellidae

Genus: *Cinachyra* Sollas

Cinachyra rhizophyta Uliczka

(Figure 18)

Material examined: one dry specimen LABOMAR no. 21, Brit. Mus. Nat. Hist. no. 1969.7.1.1, collected on April 8, 1968 in shallow water at Mucuripe Beach.

Shape: somewhat pentagonal.

Size: 1.7 cm in height by 2.6 cm in width.

Color-dry: light brown internally and externally.

Consistency: hard.

Surface: rough with projecting spicules thickly placed over most of the surface of the sponge.

Oscules: indistinguishable.

Skeleton: composed of spicules held together, in part, by transparent spongin. The spicules in the ectosome are arranged parallel to the surface of the sponge, while those in the endosome are randomly arranged.

The spicules are abundant oxeas of varied dimensions, mainly 1,650-2,500 micra x 19-27 micra; abundant prodiaenes with rhabds about 1,900 micra x 6 micra, and clads 50-165 micra x 1.0-2.5 micra; abundant protriaenes with rhabds about 1,000 micra x 2.5 micra, and clads 60-140 micra x 2.5-5.0 micra; very rare anatriaenes with rhabds about 1,000 micra x 7.5 micra and clads 40 micra x 2.5 micra; and abundant sigmaspires approximately 8 micra in length.

Known distribution: West Indies.

Cinachyra alloclada Uliczka

(Figure 19)

Material examined: one dry specimen LABOMAR no. 22, collected on April 15, 1968 in shallow water at Mucuripe Beach.

Shape: triangular (sponge is incomplete).

Size: 0.94 cm in height by 1.7 cm in width.

Color-dry: dull brown internally and externally.

Consistency: hard.

Surface: rough, with spicules thickly placed over the exterior of the sponge.

Oscules: indistinguishable.

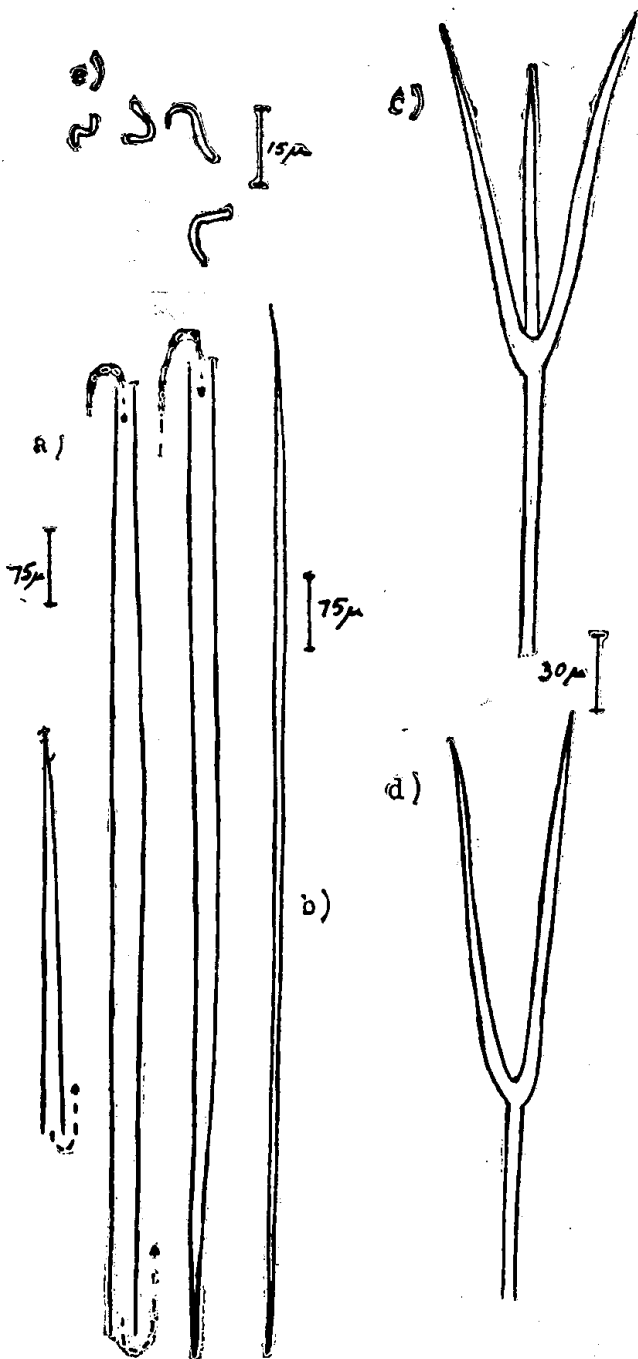


Figure 18 — *Cinachyra rhizophyta* Uliczka: a — b) oxeas x80; c) prototriaene x200; d) prodiaene x200; e) sigmaspires x400.

Skeleton: composed of spicules occasionally held together by transparent spongin. The spicules in the ectosome are arranged parallel to the surface of the sponge while those in the endosome are randomly arranged.

The spicules are abundant oxeas of varied dimensions mainly 3,700-4,200 micra x 25-38 micra; abundant prodiaenes with rhabds about 3,000 micra x 6 micra, and clads about 150 micra x 2.5-5.0 micra; abundant prototriaenes with rhabds about 2,000 micra x 15 micra, and clads up to 150 micra x 14

micra; abundant anatriaenes with rhabds 3,000-7,700 micra x 6-12 micra, and clads 25-65 micra x 6 micra; and abundant sigmaspires approximately 8 micra in length.

Known distribution: West Indies.

Class: Calcarea

Order: Calcarea

Family: Homocoelidae

Genus: *Clathrina* Gray

Clathrina sp.

(Figure 20)

Material examined: one dry specimen LABOMAR no. 25, collected on May 28, 1968 at Titã Beach, attached to *Phyllogorgia dilatata* (Esper).

Shape: composed of a clathrate mass of anastomosing tubes.

Size: 0.5 cm by 0.25 cm.

Color-dry: pale pink-tan.

Consistency: hard.

Surface: microscopically rough due to protruding spicules.

Oscules: abundant, all less than 1 mm in diameter.

Skeleton: asconoid. The spicules are tri-radiates with paired rays 25-122 micra x 5-13 micra, basal ray 25-107 micra x 5-13 micra; and quadriradiates with paired rays 30-112 micra x 5-13 micra, basal ray 30-82 micra x 5-13 micra, apical ray is very short and could not be accurately measured.

Family: Heterocoelidae

Genus: *Leucilla* Haeckel

Leucilla sp.

(Figure 21)

Material examined: one dry specimen LABOMAR no. 24, collected on May 28, 1968 at Titã Beach attached to *Phyllogorgia dilatata* (Esper).

Shape: a solitary hollow ovoid with a fringed terminal vent.

Size: 0.58 cm by 0.35 cm.

Color-dry: pale pink, almost white.

Consistency: firm.

Surface: microscopically rough due to protruding spicules.

Oscules: a single terminal oscule 1 mm in diameter.

Skeleton: leuconoid. The spicules are tangentially arranged, and of the following types: thin oxeas of the terminal vent about 2,300 micra x 2.5-6.0 micra; thick oxeas 425-750 micra x 12-15 micra; quadriradiates of varying sizes with paired rays 100-375 micra x 6.2-37.0 micra, basal ray 150-475 micra x

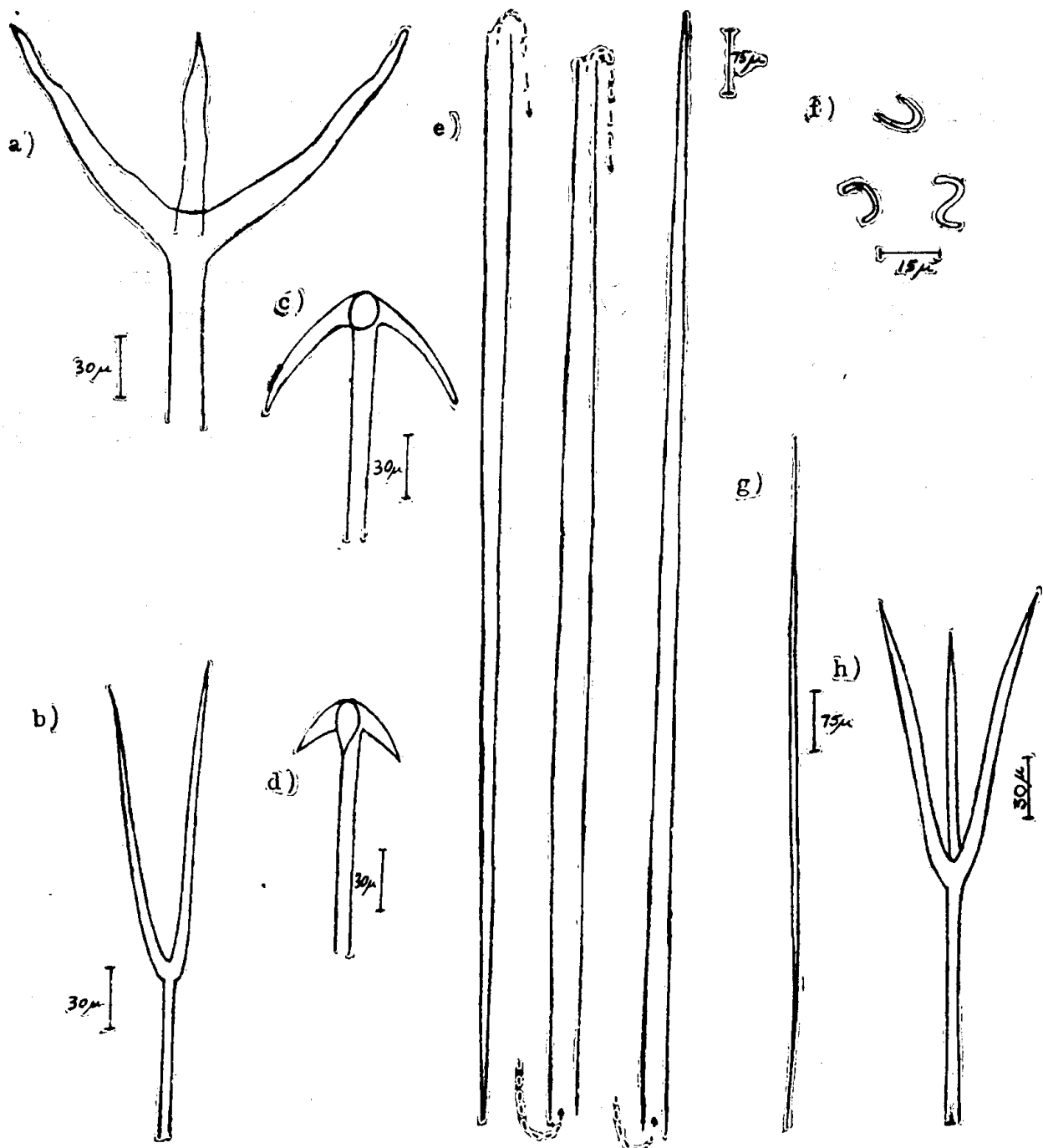


Figure 19 — *Cinachyra alloclada* Uliczka: a) protriaene x200; b) prodiaene x200; c — d) anatriaenes x200; e) oxea x80; f) sigmaspines x400; g) oxea x80; h) protriaene x200.

6.2-37.0 micra, and apical ray 75-275 micra x 6.2-37.0 micra; triradiates of varying sizes with paired rays 75-210 micra x 4-12.5 micra, and basal ray 150-450 micra x 6-12 micra.

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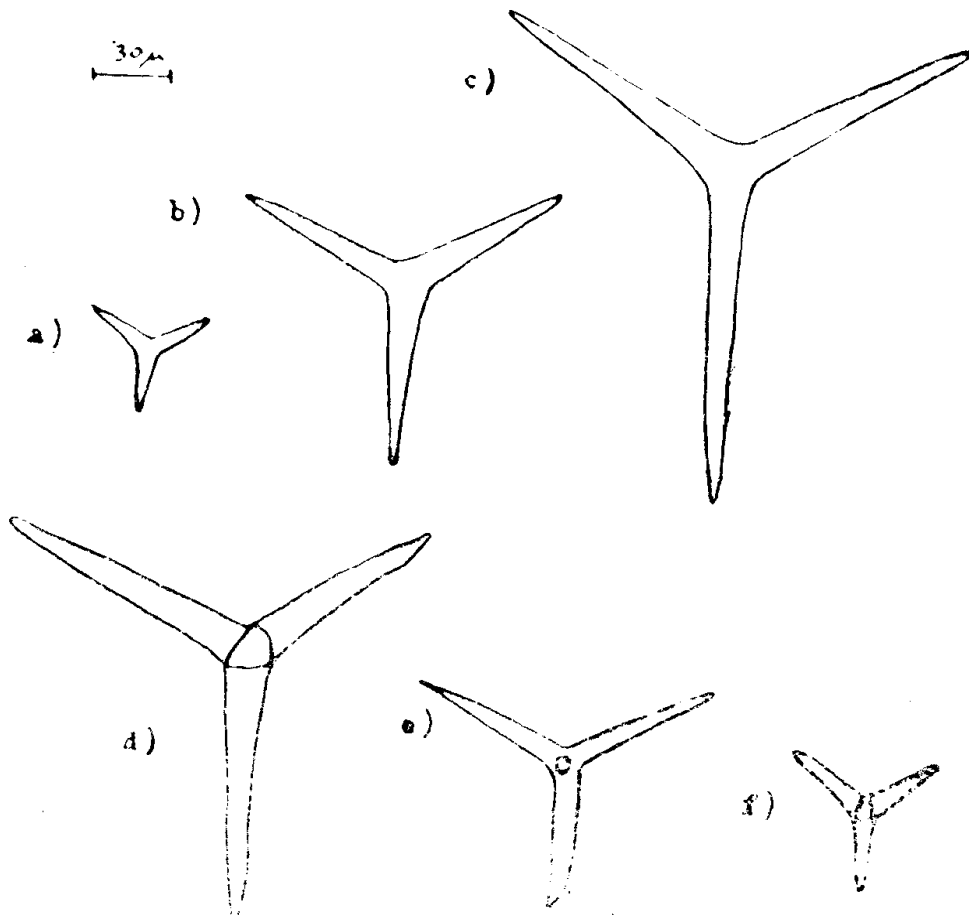


Figure 20 — *Clathrina* sp. Gray: a — c) triradiates x200 ; d — f) quadriradiates x200.

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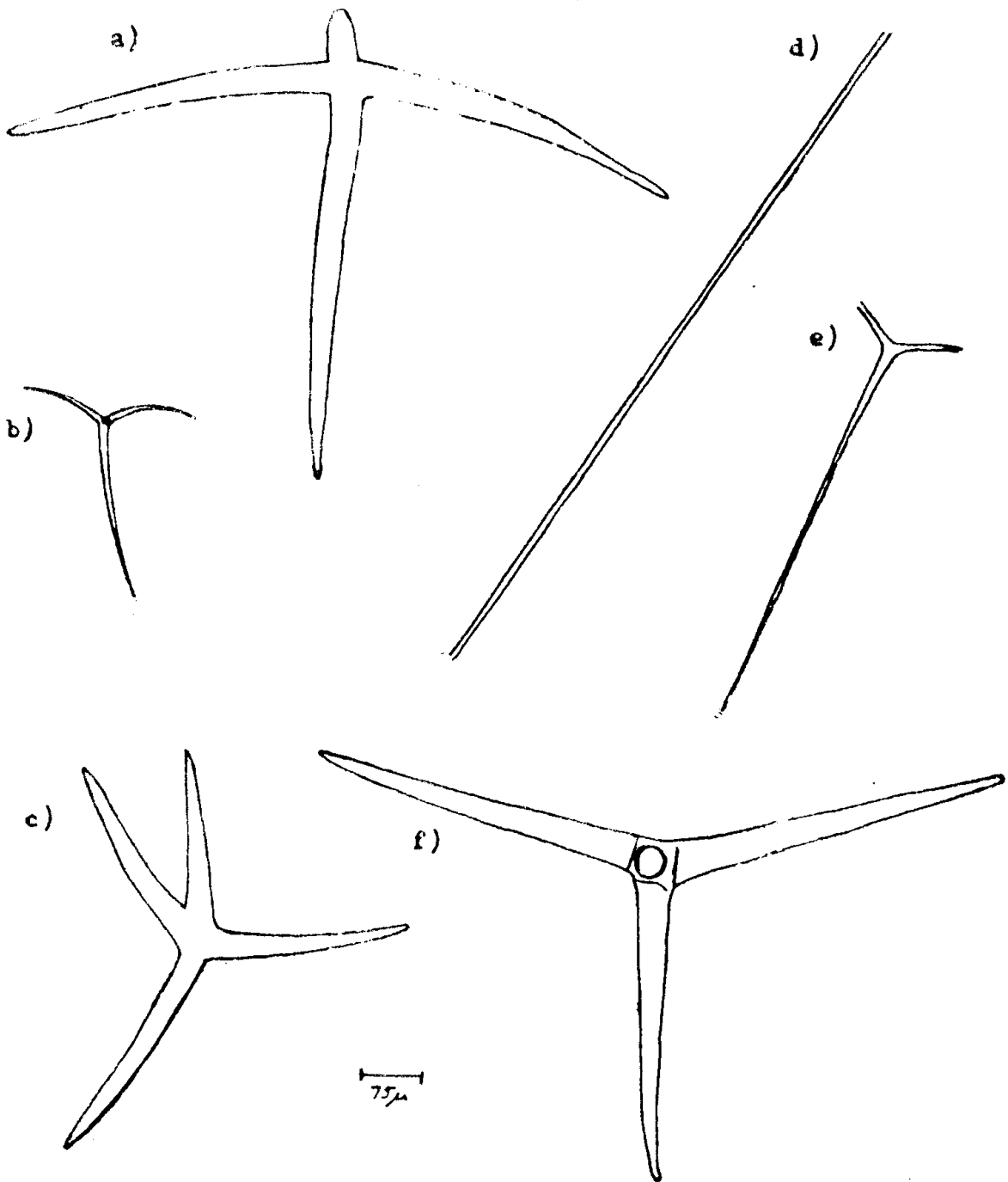


Figure 21 — *Leucilla* sp. Haeckel: a — c) quadri-radiantes x80 ; d) oxea x80 ; e) triradiate x80 ; f) quadri-radiate x80 .

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