BIJDRAGEN TOT DE KENNIS DER FAUNA VAN CURAÇAO.
Resultaten eener Reis van Dr. C. J. VAN DER HORST in 1920.

# GORGONIDS FROM CURAÇAO ISLAND

BY

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(With two plates.)

This report contains an account of a collection of Gorgonids made by Dr. C. J. VAN DER HORST at the island of Curaçao and also of a few specimens collected in the same locality by Ir. G. J. H. MOLENGRAAFF. The Majority of the specimens are taken from Caracas bay at a depth of not more than five metres. The specimens were consigned for report, to the Natural History Department of Aberdeen University through the kindness of Dr. C. J. VAN DER HORST and Dr. L. F. DE BEAUFORT, Director of the Zoological Museum, Amsterdam. Their identification has been checked by Professor J. ARTHUR THOMSON.

The collection includes the following species:

Family MURICEIDAE.

*Muricea muricata* Milne Edwards (?) (1 specimen, bare axis).

Family PLEXAURIDAE.

1. *Eunicea mutica* Duch. et Mich. (14 specimens).
   „ *multicauda* Lamouroux *var.* (2 specimens).
   „ *tourneforti* Milne Edwards (6 specimens).
2. *Plexaura flexuosa* Lamouroux (11 specimens).
   „ *porosa* Esper. (1 specimen).
3. *Pseudoplexaura crassa* W. & S. (2 specimens).
4. *Plexaurella porosa* n. sp. (2 specimens).

Family GORGONIDAE.

*Gorgonia flabellum* Linn. (35 specimens).
„ *pinnata* Lam. (14 specimens).

## Family MURICEIDAE.

### *Muricea muricata* (?) Milne Edwards.

(= *Gorgonia muricata* var., Esper.).

Curaçao, Molengraaff leg., 1 specimen.

A single specimen consisting of a large bare axis is 35 cms. in height with a maximum breadth of 47 cms. The main axis is black, horny, hard, striated with a diameter of 4 cms. just above the broad massive base. It branches profusely in all directions, the ultimate branches being short, slender, slightly compressed, varying in colour from light brown to yellowish.

A noticeable feature is the way in which the axis broadens out at the base of the small branches to form a compressed "wing"-like portion. In this respect our specimen resembles that figured by ESPER, "Pflanzenthiere", Pt. 2. Gorg., Taf. XXXIX. As no trace of the coenenchyma remains the exact identification is impossible.

The large number of specimens has made it possible to study the variability of certain species notably *Eunicea mutica* (= *Plexaura mutica* Duch. et Mich.) and *Plexaura flexuosa* Lamouroux (= *Pl. homomalla*).

A comparative survey of a number of Plexaurid genera has been made.

| *Eunicea.* | *Plexaura.* | *Pseudoplexaura.* | *Plexaurella.* | *Euplexaura.* (Kükenthal). | *Anthoplexaura.* | *Plexauroides.* [1]) | *Paraplexaura.* |
|---|---|---|---|---|---|---|---|
| | | Branching loose, mostly in one plane. | | Branched in one plane. | Bushy, not in one plane. | Colony tall, slender, branched in one plane. | Colony low broad rigid, branched in one plane. |
| *Axis* horny. | horny. | horny sometimes interspersed with calcareous particles. | Partially intercalcified. | Stiff — nearly always intercalcified. | Very thin and lax in end branches, intercalcified. | | |
| *Calyces* prominent bilobed or crenate. | absent. (Variable see VERRILL "Bull. Mus. Comp. Zool. 1864, p. 35). | | | Polyps with converging rows of spindles. | Polyps large in high calyces. | Calyces absent or faintly indicated. | Calyces distinct. |
| *Coenenchyma* thick. | thick and corky. | thick, outer layer soft membranous friable when dry. | Usually very thick. (thin in Pl. phillipiensis) (H.). | | Very thick coenenchyma. | Coenenchyma thin. (W. & S.). | |
| *Spicules:* Outer layer of foliaceous or spiny clubs. Inner layer of spindles (W. & S.). | Long acute spindles some of which are usually very long, mingled with others that are much smaller. (V.). | Outer layer colourless spiny spindles. | Mostly rather small warty double spindles, numerous warty crosses of same size with central naked band. (V.). | *Outer:* mostly short thick oval spindles and double spindles thickly beset with stout warts. | *Outer:* thick spindles with very high relatively narrow truncate warts. | Large foliaceous clubs with ramifying rootlike processes. | In cortex lie foliaceous clubs which frequently pass into plates and spiny clubs. |
| Inner layer of large warty spindles and smaller spindles either of which may be red, violet or colourless. (H.). | Outer layer is composed of club-shaped or spiny spicules of various shapes (spiny clubs, foliaceous clubs, warty clubs, one sided spiny clubs one sided spiny spindles). (Köll.). | *Inner:* numerous purple or violet spicules including spindles with few rays and irregular stellate forms. | Three or four rayed crosses, rays sometimes elongated, sometimes rounded, richly beset with warts. | *Inner:* shorter, more slender spindles with regular girdles of warts. | *Inner:* smaller more slender spicules with whorls of high warts. | | |
| | | | Tri or quadri-partite straight or bent spindles in which one or two prongs remain undeveloped and simple spindles. (Köll.). | | | | |

[1]) We think it possible that some confusion may have arisen between this genus (and perhaps also Paraplexaura) and Muriceids with foliaceous clubs in the verrucæ walls. The type species, *Pl. praelonga* Wright and Studer, is described as having a „crown-and-points" arrangement of the tentacular spicules and this is a Muriceid characteristic.

The chief features of the four genera represented in the collection are as follows:

Eunicea. Calyces [1]) usually prominent, bi-labiate or crenate.
Spicules include very large, broad, warty spindles; much smaller spindles; and foliaceous or spiny clubs.

Plexaura. Calyces absent.
Spicules include (a) outer layer of club-shaped or spiny spicules of various shapes — spiny clubs, "foliaceous" clubs and in young colonies one sided spiny clubs, one sided spiny spindles and spiny plates. (b) inner layer of long acute spindles and smaller spindles.

Pseudoplexaura. Branching loose, calyces absent.
Spicules consist of (a) outer layer of colourless spindles, (b) an inner layer of numerous small purple stellate forms and irregular spindles.

Plexaurella. Axis usually partially intercalcified.
Spicules consist mostly of simple spindles; small warty double spindles; and numerous three or four rayed warty crosses of similar size with central naked band; small foliaceous clubs.

In his diagnosis of Plexaurella KÖLLIKER includes tri- or quadripartite straight or bent spindles in which one or two arms remain undeveloped. But as all the species of the four genera Eunicea, Plexaura, Pseudoplexaura and Plexaurella included in the collection show a tendency for some of the spindles to branch at one end, or become tri- even quadripartite VERRILL's diagnosis of the spicules seems preferable.

*Eunicea mutica.* (Plate III, figs. 1, 8; Plate IV, fig. 1).

(= ? *Plexaura mutica* Duch. et Mich.).

Caracas bay, 9 specimens.
Curaçao, Molengraaff leg., 5 specimens.

For description see DUCHASSAING et MICHELOTTI Coralliaires des Antilles. p. 28, Plate III, figs. 9 & 10.

A number of specimens varying in height from 7 to 45 cms. agree with the short description of *Pl. mutica* given by DUCHASSAING and MICHELOTTI. Colony arborescent; in the smaller colonies branching is confined to one plane in large specimens the branches tend to lie in one plane. The main branches are very much compressed having a larger diameter of 11—14 mm. while the smaller diameter is only 7—9 mm. The terminal branches are circular becoming compressed where they join the larger branches; they vary in diameter from 5—8 mm. and retain approximately the same diameter throughout. As a rule the branches bend round at a distance of 1—3 mm. from the larger axis and grow up alongside it, sometimes even in contact with it. Occasionally the two may be connected by a "wing"-like out-growth of the coenenchyma. Sometimes there is an irregular "wing"-like narrow out-growth down the side of some of the main branches. Many of the ultimate branches never exceed 1– 3 cms. in height thus giving the colony a rather characteristic appearance.

In all our specimens the base of attachment is small relative to the size of the colony and the thickness of the branches.

The axis is hard, very black, horny and faintly striated; where exposed there is a compressed "wing"-like expansion at the base of the terminal thread-like branches.

In two small alcohol specimens measuring only $7 \times 3$ cms. and $11 \times 6$ cms. respectively the calyces are prominent, measuring on an average 1 mm. in height. Near the base these are cup-shaped with a large circular opening. The margin is divided into eight notches; occasionally the opening is oval in outline so that there appear to be 2 groups of 4 notches; in a few cases the outer margin is slightly raised and turned inwards recalling the bilabiate type of some species of Eunicea. Towards

1) The calyces tend to disappear in old colonies of *E. mutica* and a number are level with the coenenchyma in *E. multicauda var.*

the tips of the branches the openings of the calyces are directed upwards due to the fact that the lower half of the cup is well developed while the upper half is very rudimentary or absent.

In older specimens the calyces tend to disappear especially on the main stems; but in nearly all cases the smallest branches are crowded with small though distinct calyces which gives them a papillated appearance. Alcohol specimens usually show small raised calyces practically all over the surface. Where the calyces are absent the crenate margin makes the pores appear somewhat starshaped.

The spicules include the following chief types:

1. Very large spicules, either white or purple, very broad in the centre gradually narrowing towards both ends. Many of these are slightly curved and are covered with crowded, short, stout, markedly compound warts. They resemble that figured by HARGITT & ROGERS "Alcyon. of Porto Rico", U. S. Fish Commission Bulletin 1900. Vol. 2. 1901, Plate II, fig. 3 for *Eunicea crassa* and measure 0,75—2 mm. in length by 0,15—0,5 mm. in breadth.
2. A few like above with simple warts.
3. Smaller spindles, some very small, either colourless or purple with, in some cases, crowded compound warts, in others a few scattered simple warts. They may also tend to broaden out in the centre.
4. Numerous small clubs, varying from simple spinose forms to foliaceous forms with an upper smooth or serrated leaf-like portion which may bear longitudinal ridges, and a narrow lower portion bearing simple warts, $0{,}15 \times 0{,}08$ mm.
5. Foliaceous clubs like above with a short broad warty basal portion, $0{,}13 \times 0{,}1$ mm.

An occasional tri-radiate and one quadri-radiate form of the large broad spindles occurred.

There is considerable variation in the size and nature of the foliaceous clubs. Very young colonies show numerous large clubs with a broad leaf-like upper portion the edge of which may be smooth, crenate, or deeply lobed, and a lower, very warty, pointed, basal portion. On the surface of the expanded leaf-like part there are several prominent longitudinal ridges. These measure $0{,}3 \times 0{,}15$ mm.; $0{,}25 \times 2$ mm. A number have a broad warty basal portion. These become smaller and more smooth in older colonies and are more numerous in the terminal branches than near the base of the large specimens.

In one of the large dried specimens the small branches are frequently so crowded on the larger branch that they have to grow straight out instead of bending upwards in the manner characteristic of this species.

This species seems to be somewhat transitional between Plexaura and Eunicea. From the nature of the calyces it seems to belong to the latter rather than the former genus. Its spicules also are very like those of *Eunicea tourneforti* and of *Eunicea multicauda var.*

*Eunicea multicauda* Lamouroux *var.* (Pl. III, fig. 2, Pl. IV, fig. 2).

Caracas bay, 2 specimens.

For description see: KUNZE, „Die Gorgonarien Westindiens. — Gattung *Eunicea* Lamouroux. 1916. pp. 532—7; 6 figures.

A small incomplete specimen bearing a superficial resemblance to *E. tourneforti*, differs from the latter chiefly in the nature of the calyces. The two short branches are cylindrical, becoming somewhat club-shaped towards their extremities, and have a diameter of 10 and 11 mm. respectively. The thick coenenchyma is brown in colour, and the surface is smoother than that of *E. tourneforti.*

The calyces are rather variable being sometimes prominent, sometimes entirely absent. When prominent, they project at right angles to the axis, average $1-2$ mm. in height and are rather crowded. The opening is large and circular, the margin being divided into eight distinct lobes. In a few cases the lower border somewhat exceeds the upper and is turned inwards to form a very low, rather broad crenate hood.

This specimen is just the end of a dichotomously forked branche; another small specimen consists merely of the tip of a single branch. These specimens agree most closely with *E. multicauda* Lamouroux, although they must have belonged to somewhat more robust specimens than those des-

cribed by KUNZE. The most salient feature is the extraordinary variability in the size of the calyces. The spicules are very like those of *E. tourneforti*; in this species, however, the large white tubercular spindles tend to be more curved and irregular than those of *E. tourneforti* and an occasional spicule is purple; there are also a number of small pale-purple spicules and irregular cruciate forms.

*Eunicea tourneforti* Milne-Edwards. (Pl. III, figs. 3, 3*a*; Pl. IV, fig. 3).

Caracas bay, 6 specimens.

Two complete specimens, measuring 19 × 16 cms. and 40 × 16 cms. respectively, and also several fragments were included in the collection. Colony arborescent, somewhat massive, branches comparatively few in number, very thick (10—16 mm. in diameter) somewhat club-shaped.

In the larger specimen the branches tend to occupy a common plane; they arise obliquely at first but soon bend round and grow upward frequently reaching a height of 20—30 cms. The axis is circular near the base but soon becomes compressed throughout, although the branches themselves are circular.

In the smaller specimen the branches lie in one plane; the main stems are very much compressed, the branches themselves becoming circular towards their extremities.

The colour varies from brown to almost black. The axis is hollow, horny, dark brown or black in colour, with a basal diameter of 9 mm. The calyces are densely crowded in younger specimens becoming more distant in older ones. They reach an average height of 2 mm.; the lower lip is very well developed being prolonged into a horn-like process while the upper lip is rudimentary. The lower lip shows considerable variation; as a rule it is rather broad and is bent over to form a hood which conceals the opening. In some cases it is longer, more acute, with the hood portion raised high above the opening so that the calyx measures 3—3,5 mm. In rare cases the hood is bifid, or ridged. All these types may occur in one specimen.

The coenenchyma is very thick and has a rough granular appearance.

The spicules include:

1. large massive spicules, some curved some straight, thickly beset with short, stout, markedly compound warts, varying in length from 0,7—3,0 mm., in breadth from 0,2—0,65 mm. These are usually very broad in the centre, tapering off on either side, or retaining approximately the same breadth throughout,
2. large spicules similar to above but covered with simple conical warts,
3. very minute foliaceous clubs,
4. numerous small spindles, varying in length, covered with compound or simple warts.

All the spicules are colourless.

*Plexaura flexuosa* Lamouroux (Pl. III, fig. 4; Pl. IV, figs. 4*a*, *b*, *c*).

(= *Pl. homomalla* Lamouroux).

Caracas bay, 9 specimens.
Curaçao, Molengraaff leg., 2 specimens.

There are eleven specimens of this species in the collection, varying in height from 14—45 cms. These vary greatly in form and colour, the coenenchyma is thick, the outer surface is rough being thickly covered with the projecting points of spicules. In alcohol specimens large spindles lie scattered in all directions on the surface, but these tend to get rubbed off in dried ones. The axis is horny, black, hard and faintly striated in dried specimens; and either dark brown or black, somewhat woody in texture in alcohol specimens. The basal diameter of the axis varies from 6—10 mm.; it is reduced to a thread in the ultimate branches.

The specimens may be grouped roughly into the following types according to the mode of branching and the nature of the cells:

1. Branching rather loose, the branches being relatively long and slender, arising for the most part on one side of the axis and bending somewhat in the manner of *Pl. homomalla*. (ESPER,

Pflanzenthiere, Taf. XXIX). The pores are small, distant (1.5—2 mm. apart) with, as a rule, no definite raised border. The branches average 4 mm. in diameter, the secondary branches are frequently dichotomous.

2. Similar to above in mode of branching but with pores relatively much larger, more crowded (less than 1 mm. apart) with raised margin.
3. Branches relatively thicker (diameter of terminal branches 5—8 mm.) and much shorter, many only reaching a length of 0.7—2.5 cms. They grow out obliquely at first but soon bend round to lie almost alongside of the larger branches. Occasionally the main axis is flattened in the plane of the colony. The pores are large, crowded, with a distinct raised border.

   In this type the branches also arise, for the most part, on one side of the axis, but the secondary branches are not, as a rule, dichotomous.
4. In one case the long slender branches grow upward almost parallel to each other much in the manner figured by HARGITT and ROGERS "Alcyon. of Porto Rico", 1901, Pl. IV, fig. 13. The majority of the branches arise on one side of the larger axis, they have an average diameter of 4 mm. and end in a slight club-like swelling. It is interesting to note that right in the centre of the colony some of the terminal branches curve round so that the club-like tips are directed downwards and may even be situated lower down than the points of origin of the branches themselves.

Thus in this one specimen there is a combination of the modes of branching of both *Pl. flexuosa* and *Pl. homomalla*. This dried specimen is rather badly preserved so that the nature of the pores can scarcely be distinguished, but, so far as can be made out, they appear to be small, and crowded with a slight border. Sometimes even in one specimen cells with no raised edge and cells with a distinct raised margin are found.

It will be seen that the various descriptions of *Pl. flexuosa* and of *Pl. homomalla* differ somewhat. Our specimens seem to combine in different degrees the various features of both these species. Moreover, VERRILL "Bull. Mus. Comp. Zool." 1864, p. 34 and HARGITT & ROGERS agree that *Pl. flexuosa* "varies greatly in form and colour as well as in the degree of prominence of the cells....." Thus it seems to us that *Pl. homomalla* is not a distinct species but a variation of *Pl. flexuosa.* [1])

The spicules, also, show a large amount of variation. This does not seem to bear any relation to the external features of the specimens but depends rather on (a) the age of the specimen, and (b) the part of the colony from which the spicules are taken.

The spicules include the following types:

(a). *Spindles.* 1. Near the base of an old colony the spindles are mostly long, stout, rather blunt, with high somewhat distant compound warts measuring $0{,}9 \times 0{,}18$ mm.; $0{,}65 \times 0{,}16$ mm.

2. In the branches of an old colony there are narrow, acute spindles covered with smaller, more distant, simple warts, measuring $0{,}7 \times 0{,}09$ mm., $0{,}4 \times 0{,}1$ mm. Besides these there are many small, slender, markedly curved spindles with numerous small sharp points on the concave side and often larger more blunt ones on the convex side.

| 1) | *Plexaura flexuosa* Lam. = *Pl. salicornoides* (M. Edw.). | *Plexaura homomalla* Lam. |
|---|---|---|
| Hargitt & Rogers "Alcyon. of Porto Rico", p. 284—5. | "Stem cylindrical branches 5—8 mm. in diameter. Calicles wholly included and leave pit-like depressions". | "Size of stem and branches average somewhat smaller. Calicles also included but often have a definite raised border. Branches arise obliquely from the base but soon become vertical". |
| Duch. & Mich. | | "The pores of this species are very small and the branches always bent over". |
| Milne Edwards. | "Calices bien distincts". Diameter 4 mm. in terminal branches. | "Calices peu distincts". Diameter of main branches 10 mm. of terminal branches 4 mm. |

3. In a very young colony the spindles are very broad, measuring 0,7 × 0,25; 0,59 × 0,2 mm. Many have a number of long spines on one end, or long spines down one side.

The majority of the spindles are colourless, though an occasional specimen shows many purple ones. Many branch at one end, or become tri- or quadri-partite.

(b). Small irregular forms, both colourless and purple, including capstans, irregular stars, crosses, etc. These are more numerous near the base of both young and old colonies, than in the branches.

(c). Small spiny clubs many of which pass into irregular spiny plates.

These are larger and more numerous in young specimens and in the branches of old colonies. They tend to become smoother, more foliaceous in old colonies.

*Plexaura porosa* (Esper). (Pl. III, fig. 5; Pl. IV, fig. 5).

Caracas bay, 1 specimen.

A single complete specimen, measuring 20 × 10 cms., agrees with the description of *Gorgonia porosa* and with ESPER's figure (Pflanzenthiere, Vol. 2. Taf. X. Fig. 1).

The branching is sub-dichotomous, the terminal branches being circular and tapering gradually to a point. The main stems are slightly compressed, and have a maximum diameter of 11 mm.

The axis, which has a basal diameter of 5 mm., is light brown, somewhat woody in texture near the base, becoming dark brown almost black in the branches. The thick coenenchyma is yellowish brown in the outer layer becoming purple nearer the axis; the part immediately surrounding the axis is somewhat membranous and frequently remains adhering to the axis after the rest of the coenenchyma has been removed.

The pores are circular, slightly under 1 mm. in diameter; a short distance below the opening there is a slightly-projecting rim (ESPER, Pflanzenthiere, Taf. X, fig. 2), which is divided into eight lobes.

The spicules include the following types:

1. narrow pointed spindles, about 0,4 mm. long, bearing rather distant simple warts. These are mostly colourless, a number are tri-radiate,
2. broader somewhat stouter spindles, with crowded whorls of compound warts. These frequently divaricate at one end or occasionally become cruciate. The majority are deep purple and measure 0,2—0,3 mm. in length by 0,06 mm. in breadth,
3. a number of very spiny club-like forms varying in size and shape; these include simple warty clubs very thorny at the broad end; short broad "stachel-keule" with a very spiny leaf-like portion; irregular spiny plates.

*Pseudoplexaura crassa* W. & S. (Pl. III, fig. 6; Pl. IV, fig. 6).

(= *Plexaura crassa* Verrill).

Caracas bay, 2 specimens.

A large incomplete specimen measuring 42 × 10 cms. agrees with the description of *P. crassa*, WRIGHT and STUDER "Report on Alcyonaria of Challenger Exped.," pp. 142—3. The branching is very loose, the presumably main stem, which is 42 cms. long, giving off three branches all on the same side of the axis. The lower of these branches again divides after a distance of 5 cms., giving rise to two long branches each measuring 26 cms. These branches arise obliquely at an angle of about 60° but soon bend round growing upwards almost parallel to each other.

The axis is dark brown, cylindrical, with a basal diameter of 7 mm. The central cavity is filled with a soft white substance, and tends to disappear in older portions. There is a small amount of calcareous matter near the centre of younger portions.

The outer layer of the coenenchyma is soft; the polyps are completely retractile and have no spicules on the tentacles. The cells are crowded on the stem and branches, are oval in outline, and some of those near the lower end of the specimen show a depressed rim round the opening. Further up many of the cell openings are surrounded by a slight raised border which differs from that found in some specimens of *Plexaura flexuosa* in being soft and membranous.

The spicules include the following types:

1. long, narrow, pointed spindles with whorls of rather high compound warts, measuring 0,7 × 0,12 mm., 0,45 × 0,1 mm. The majority of these are colourless, a few are purple,
2. smaller, more slender spindles irregularly covered with more simple conical warts,
3. numerous small irregular deep-purple forms including spindles, crosses, double stars,
4. a few simple warty clubs 0,4 mm. long, broad at one end gradually tapering to a point. An occasional one tends to become foliaceous.

Many of the spindles are branched, being divaricate at one end, tri- or tetra-radiate.

A large dried specimen of an arborescent colony measuring 59 × 20 cms. bears a close resemblance to *Plexaura crassa* (HARGITT & ROGERS "Alcyon. of Porto Rico", 1901, Pl. IV, fig. 1) [1]). The branching is loose, the long slender branches frequently reaching a height of 30 cms. or more. The branches bend round a short distance from their points of origin growing upward almost parallel to each other, and retain approximately the same diameter (4 mm.) throughout.

The axis is almost circular, hard, horny, light brown or grey in colour, and somewhat woody in texture. The coenenchyma is thick measuring 2,5 mm. on an average, though it may be even as thick as 5 mm. near the base. The whole surface is covered with large oval pores which are frequently surrounded by a small depressed rim.

The spicules are identical with those of *Ps. crassa* only the irregular purple forms are more numerous while the colourless spindles are few in number. This is probably due to the outer membranous layer of coenenchyma containing the colourless spindles having been rubbed off.

*Plexaurella porosa* n. sp. (Pl. III, fig. 9; Pl. IV, fig. 7).

Caracas bay, 2 specimens.

Two specimens, one a complete though somewhat damaged colony (42 × 15 cms.), the other a small terminal fragment, bear a superficial resemblance to *Plexaura porosa*. Many of the branches in the larger specimen end in a slight club-like swelling; where this is absent the branches retain approximately the same diameter throughout (4 mm.). The pores are quite different from those of *Plexaura porosa*; they are more distant, slightly smaller, and though circular in outline, there is no hint of the inner projecting ring. When fully retracted the polyps seem to be situated at the base of a deep pit.

The spicules differ greatly from those of *Plexaura porosa* and include:

1. long acute spindles either colourless or purple, many of which divaricate at one end, or become tri- or quadri-radiate forms in which one or two of the arms remain rudimentary (0,3—0,5 × 0,05 mm.),
2. many relatively short, broad double spindles thickly beset with whorls of compound warts; these have a distinct, though narrow, naked waist and may be bent in the centre to form "kneed" double spindles. They measure 0,18—0,4 mm. in length by 0,1 mm. in breadth, are either purple or colourless; the shorter ones approach double wheels.
3. numerous minute foliaceous clubs with a rounded, smooth leaf-like portion and a short warty basal portion,
4. numerous small deep-purple irregular forms.

Many of the double spindles show a tendency to become tetraradiate giving rise to crosses with a narrow central naked band. Two of the arms frequently remain undeveloped. Sometimes the double spindles give off only one small branch which may remain quite rudimentary. This agrees with KÖLLIKER's description of the spicules of the genus Plexaurella.

The large number of double spindles many of which tend to from crosses, places these specimens in the genus Plexaurella. We adopt this generic name with some hesitation, however, as the axis gives little or no trace of being intercalcified.

1) See also CHESTER, "Structure of *Pseudoplexaura crassa* W. & S." Proceedings of American Academy of Arts and Sciences, Vol. XLVIII, No 20, pp. 737—8, 1913.

In the large dried specimen there is a curious fusion of two branches.

This specimen is superficially like the large dried colony of *Pseudoplexaura crassa*; it is relatively more slender, and branches more frequently. The ultimate branches, though also long and slender rarely exceed 15 cms. in length while those of *P. crassa* frequently exceed 30 cms. The axis is dark brown, almost black in colour, horny, hard, with a basal diameter of 9 mm. It is very thin and hollow in the smallest branches, the central cavity being filled with a white loosely-packed pith.

Family GORGONIDAE.

*Gorgonia flabellum* Linn. (Pl. IV, fig. 8).

(= *Rhipidogorgia flabellum* Val.).

Caracas bay, 28 specimens.
Curaçao, Molengraaff leg., 7 specimens.

See: ESPER, "Pflanzenthiere", Vol. 2, Taf. II—IV. HARGITT and ROGERS, "Alcyonarians of Porto Rico" (1901). Pl. III, fig. 3.

Numerous specimens of a large, branched, fan-shaped colony, exhibiting a net-like structure due to anastomosis of the branches. The form is very variable, and although the branching is confined to one plane, as a rule, an occasional piece may be found projecting at right angles to the main fan. The colour also varies, being either (a). yellow, (b). yellow with purplish markings especially on the broad membranous base, or (c). pale purple. The terminal branches are either free or fused to form a definite margin.

The spicules consist of spindles, double spindles, and small bracket-shaped spicules or "scaphoid scales" which combination is characteristic of the genus Gorgonia (W. & S.). With regard to this genus VERRILL (Amer. Journ. Sc. & Arts, Vol. XLVIII; p. 424, 1869), says:

"It has become necessary to restrict this genus to those species having small double-spindles, mingled with small bracket-shaped or crescent shaped spicula, corresponding to Dr. KÖLLIKER's second section of *Gorgonia*.

"As thus limited the species known to me may be arranged thus:

A. Flabelliform, G. flabellum Lin....."

Although the presence of these "bracket-shaped" spicules is a convenient characteristic for distinguishing species of the genus Gorgonia from those of the genus Leptogorgia it cannot be regarded as a rigid distinction. For instance, in the case of *Gorgonia australiensis* Ridley the presence of these "bracket-shaped" spicules was at first overlooked (RIDLEY, "Report of Zool. Coll." H.M. S. "Alert", London, 1884, p. 342) and the species referred to the genus Leptogorgia. This mistake was subsequently corrected (RIDLEY, "Alcyon. of Mergui Archipelago", Journal Linn. Soc. Vol. XXI, 1887, footnote on p. 328). We have examined a large number of specimens of *G. australiensis* and find that the number of these "bracket-shaped" spicules varies greatly being numerous in some specimens (especially of the yellow variety) few or practically absent in others. In both the species described in this report they are numerous.

The spicules include the following types:

1. Short, stout, double spindles with whorls of stout compound warts, measuring 0,08 × 0,04 mm.
2. Slightly longer, narrower spindles with distant whorls of smaller warts, measuring 0,1 × 0,02 mm.
3. Short stout "scaphoid-scales", slightly curved, with compound warts on the inner concave surface; the convex surface being sometimes smooth, sometimes scolloped. These measure 0,1 × 0,05 mm.

*Gorgonia pinnata* Lam. (Pl. III, figs. 7, 7*a*; Pl. IV, fig. 9).

(= *G. acerosa* (Esper Pflanzenthiere Vol. 2, Taf. XXXI)).

Caracas bay, 10 specimens.
Curaçao, Molengraaff leg., 4 specimens.

A number of specimens of a large branched colony, the largest reaching a height of about 95 cms., answering to ESPER's description of *G. acerosa* and called by KÖLLIKER (Icones Histiol., 1864, p. 139), *G. pinnata* Lam.

The figure given in HARGITT & ROGERS ("Alcyonarians of Porto Rico", Pl. III, fig. 2, 1901), gives a good idea of the general appearance of the large dried specimens.

Colony compressed arborescent; one or more stout branches arise from the broad attaching base, each giving off a number of long, narrow, plume-shaped branches which may again divide. The axis is dark brown or black in colour, slightly furrowed, the almost circular base having a diameter of 10—14 mm. Further up the axis becomes laterally compressed, and is reduced to a mere thread in the smallest branches. Each plume consists of a large number of twigs arising alternately on either side of the flattened axis; though frequently they are so crowded as to appear opposite. A single median groove is found on either side of the twigs; the larger branches are furrowed.

The polyps are arranged in two irregular rows on either side of the twigs; the verrucæ are small, very slightly prominent, tending to disappear in dried specimens. The colour is yellow with, in some cases tinges of purple. As a rule the purple spicules are confined to the layer next the axis.

The spicules are of the typical *Gorgonia* type, the "scaphoid scales" being very numerous though narrower and more curved than those of *G. flabellum*. They are on the whole more slender and graceful than those of *G. flabellum*, and include:

1. small double spindles, with whorls of compound warts, measuring $0{,}11 \times 0{,}04$ mm.
2. longer, more slender measuring $0{,}15 \times 0{,}01$ mm.
3. slender crescent-shaped spicules with about 4 small warts on the concave side, smooth on the convex side, measuring $0{,}13 \times 0{,}01$ mm.

There are also many types transitional between the crescent-shaped spicules and the simple spindles.

A comparatively small colony, preserved in alcohol, and measuring $35 \times 24$ cms.; and a few fragments bear a close resemblance to the other specimens of *G. pinnata*. The polyps project beyond the slightly prominent verrucæ, so that the specimen resembles the figure of *G. pinnata* (Ellis & Sol. Tab. 14, fig. 3). They are, however, much more gelatinous than the other alcohol specimens and very few of the spicules boil out. So far as can be made out, the spicules resemble those of *G. pinnata* but no "scaphoid" scales were found in any of the slides.

A large, badly damaged colony ($60 \times 45$ cms.) resembles *G. pinnata* in general habit. Six main branches arise from the broad base of attachment, and grow up to a height of 50—60 cms., in the form of long narrow plumes, each giving off 1—5 smaller lateral plumes.

The bare black axis is deeply furrowed, the axis of all the lateral branches is reduced to a mere thread and is pale yellow, almost white in colour. Very little of the coenenchyma remains; on boiling with potash it swells up and becomes gelatinous so that very few spicules boil out. These, are on the whole very like those of *G. pinnata* but only one or two rather broken "scaphoid scales" were observed.

## LIST OF ILLUSTRATIONS.

### PLATE III.

Drawings of:

1. *Eunicea mutica* young colony n. s. $\times 2$. A polyp enlarged.
2. *Eunicea multicauda var.*
3. „ *tourneforti.*
3a. „ „ n. s. $\times 2$.
4. *Plexaura flexuosa* n. s.
5. „ *porosa* enlarged to show 8-lobed rim.
6. *Pseudoplexaura crassa* n. s.
7. *Gorgonia pinnata* n. s.
7a. „ „ decorticated axis.

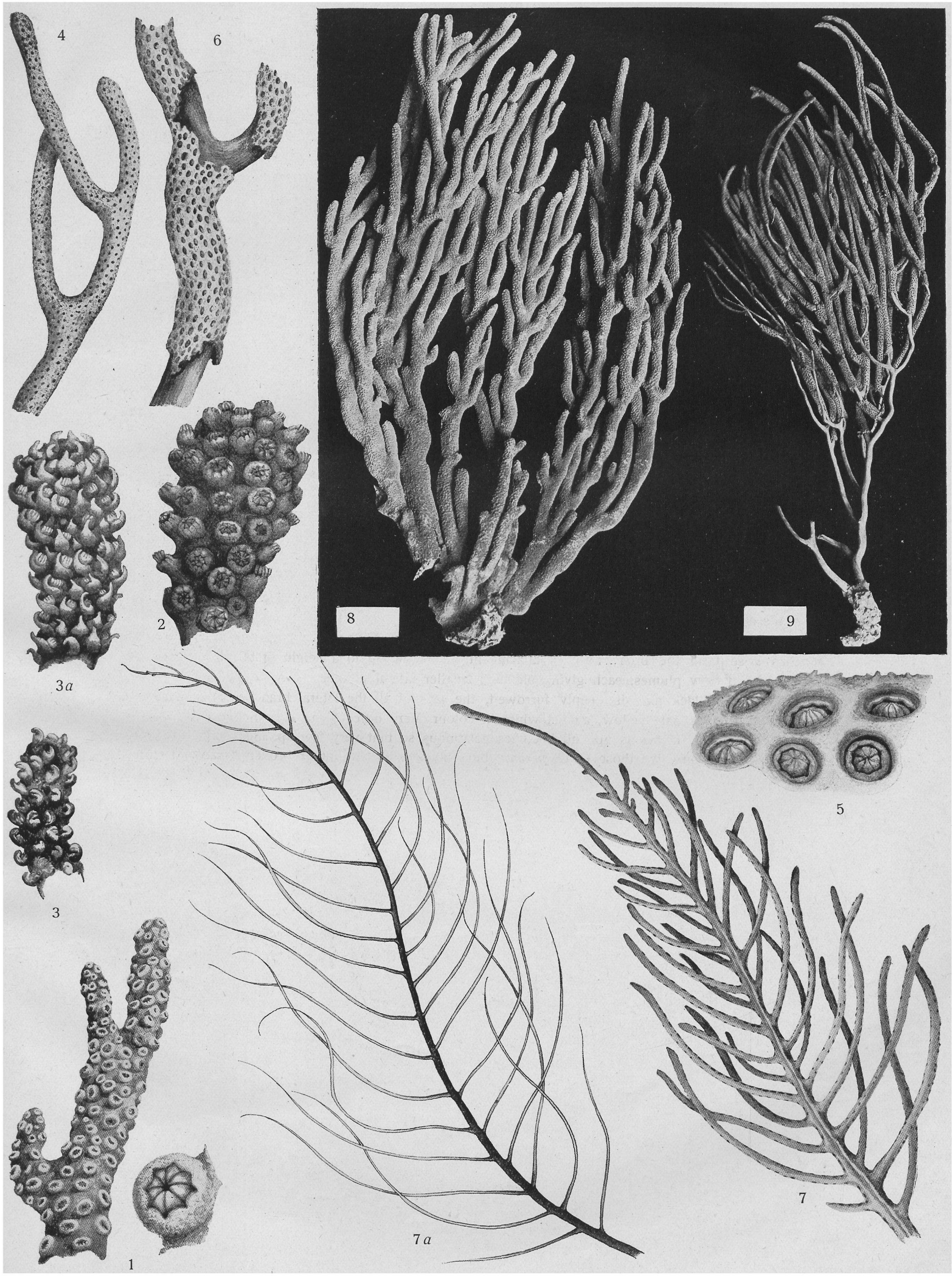
Photographs of:

8. *Eunicea mutica* old colony.
9. *Plexaurella porosa.*

### PLATE IV.

Spicules of:

1. *Eunicea mutica.*
2. „ *multicauda var.*
3. „ *tourneforti.*
4. *Plexaura flexuosa* (variation).
   (a) Old colony, base.
   (b) Young colony, base.
   (c) Old colony, tip of branch.
5. *Plexaura porosa.*
6. *Pseudoplexaura crassa.*
7. *Plexaurella porosa.*
8. *Gorgonia flabellum.*
9. „ *pinnata.*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8
9
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5
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7a
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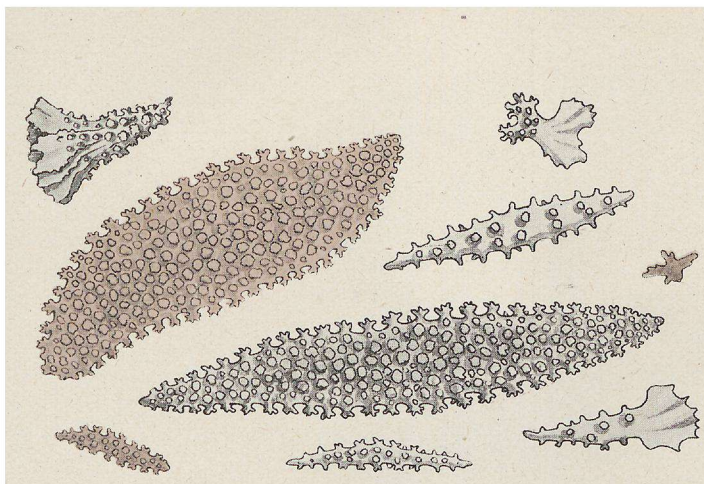

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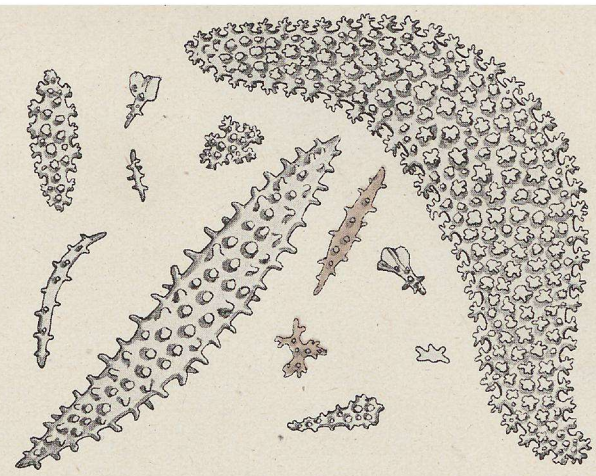

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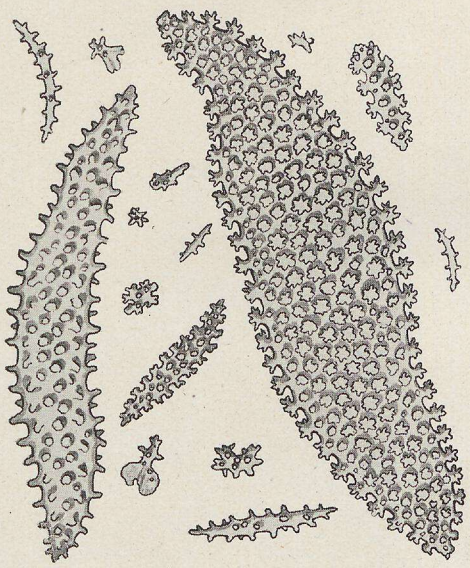

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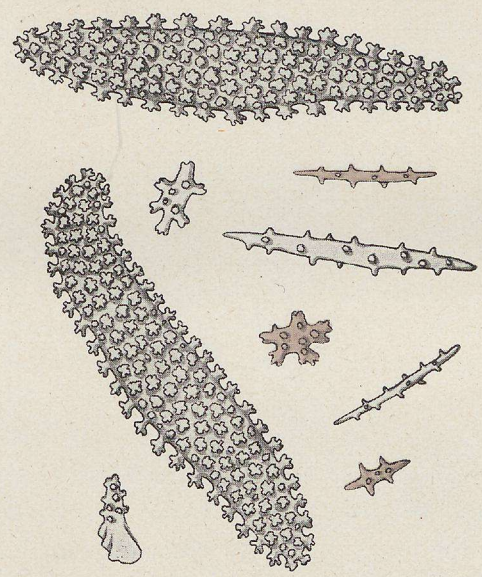

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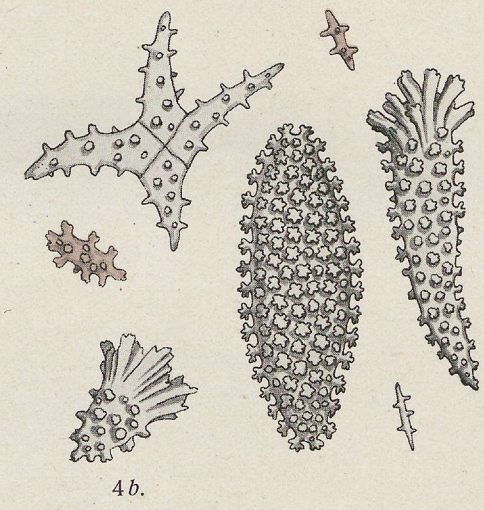

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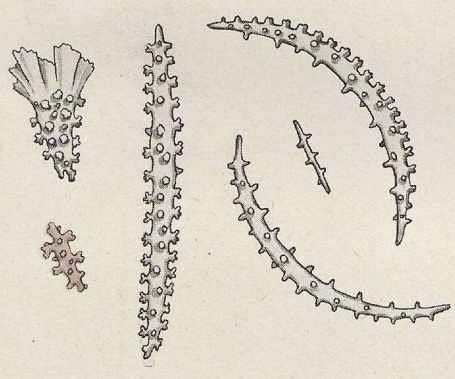

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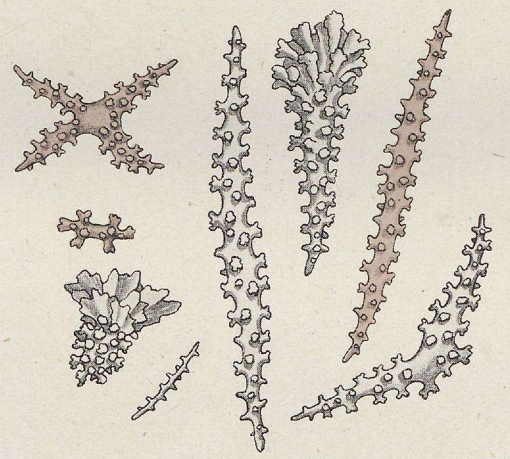

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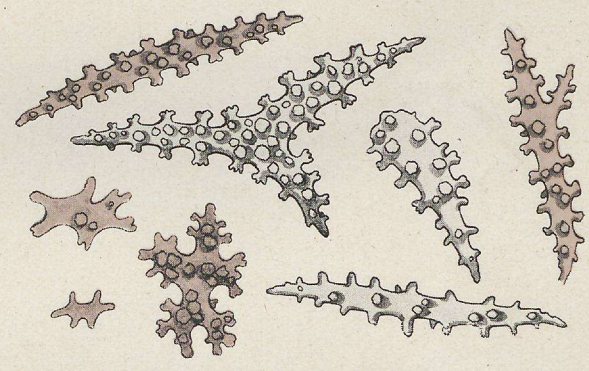

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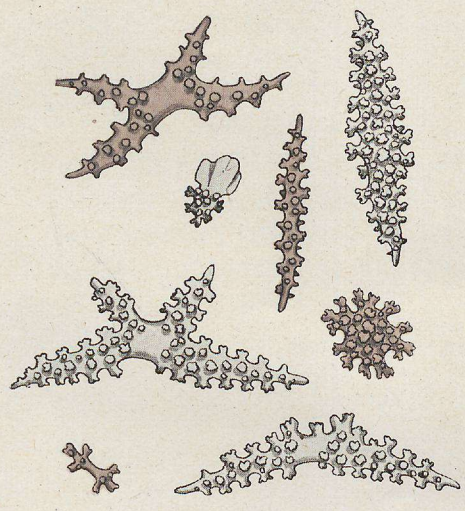

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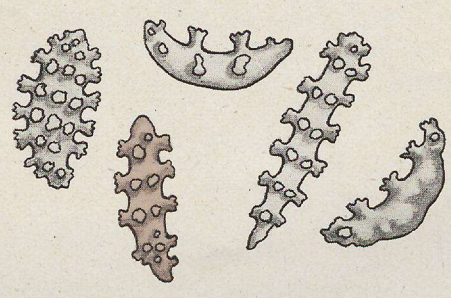

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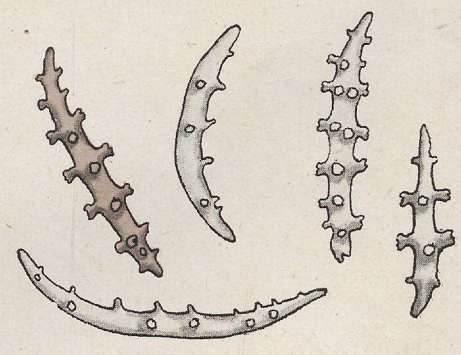

9.