

MÉMOIRES
DU
MUSÉE ROYAL D'HISTOIRE NATURELLE
DE BELGIQUE
—
HORS SÉRIE

VERHANDELINGEN
VAN HET
KONINKLIJK NATUURHISTORISCH MUSEUM
VAN BELGIE
—
BUITEN REEKS



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Résultats Scientifiques du Voyage aux Indes Orientales Néerlandaises

de

LL. AA. RR. le Prince et la Princesse Léopold de Belgique

PUBLIÉS PAR

V. VAN STRAELEN

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VOLUME II, FASCICULE 11

ALCYONARIA

BY

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BRUXELLES

MUSÉE ROYAL D'HISTOIRE NATURELLE DE BELGIQUE
RUE VAUTIER, 31

1932

Distribué le 31 juillet 1932.

BRUSSEL

KONINKLIJK NATUURHISTORISCH MUSEUM VAN BELGIË
VAUTIERSTRAAT, 31

1932

Uitgedeeld den 31st Juli 1932.

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ALCYONARIA

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The collection of *Alcyonaria* dealt with in this paper consists mainly of dried specimens of the order *Gorgonacea*, remarkable in many cases for their beauty and for the fine preservation of types which are particularly brittle in their dried state. No difficulty was found in examining even the minute dried polyps and their armature; a short soaking in dilute potassium hydroxide softened the tissues sufficiently to allow of careful dissection without displacement of the delicate polyp spicules. Several fine *Tubipora* colonies and two Alcyonacean species, preserved in spirit, are also included.

It has been necessary to form one new species, in the genus *Melitodes*. As to the previously described species, the well known *Tubipora musica* L. and *Sinularia polydactyla* (Ehrb.) have by far the most widespread geographical distribution. Most of the remaining species, from the Aru region, have been recorded only from the East Indies; one species, *Mopsella spongiosa* Nutting, has been only once previously recorded and that from the same locality, Aru.

My thanks are due to Professor Sir J. Arthur Thomson, M. A., L. L. D., for his kindness in entrusting me with this interesting collection, which was sent him by the courtesy of Professor Dr. V. Van Straelen, Director of the Royal Natural History Museum of Belgium, and for his revision of the manuscript. I am also much indebted to Captain A. K. Totton for affording me facilities for examining various type specimens in the British Museum.

LIST OF SPECIES.

ORDER **Stolonifera.**

Family TUBIPORIDAE.

Tubipora musica Linnaeus.

ORDER **Alcyonacea.**

Family ALCYONIIDAE.

Sinularia polydactyla (Ehrenberg).

Family NEPHTHYIDAE.

Capnella imbricata (Quoy et Gaimard).

ORDER **Gorgonacea.**

Sub-Order SCLERAXONIA.

Family BRIAREIDAE.

Iciligorgia orientalis Ridley.

Family SUBEROGORGIIDAE.

Suberogorgia appressa Nutting.

Family MELITODIDAE.

Melitodes esperi Wright and Studer.

Melitodes contorta n. sp.

Mopsella clavigera Ridley.

Mopsella spinosa Kükenthal.

Mopsella spongiosa Nutting.

Mopsella textiformis (Lamark).

Wrightella superba Kükenthal.

Sub-Order HOLAXONIA.

Family PLEXAURIDAE.

Plexauroides mjobergi Broch.

Family MURICEIDAE.

Echinogorgia complexa Nutting.

Family GORGONELLIDAE.

Juncella juncea gemmacea (Valenciennes).

Ctenocella pectinata (Pallas)

ORDER STOLONIFERA

FAMILY TUBIPORIDAE.

Tubipora musica L.

For description see :

HICKSON, *Quart. Journ. Microsc. Sci.*, 1883, XCII, 14 fig.

HICKSON and HILES, *Willey's Zool. Results*, Part 4, 1900, p. 66.

HICKSON, *Introduction to the Study of Corals*, 1924, p. 112, 1 fig.

Some fine dried specimens from Banda and the Island of Wei (North Missoöl) are interesting as an example of the variation possible within this species. Professor Hickson, after examining many hundreds of specimens on the Island of Celebes, came to the definite conclusion that it is unwarrantable to split this genus into the quite large number of species that have been described; every known variety could be found on that shore and there was complete continuity between one extreme variety and another. The shape, size of tubes, distance between platforms, and the shade of red colour are all extremely variable.

Our largest specimen, from Wei, of a rich crimson-red colour, has a height of 18 cm. and a flat top with diameters of 46 and 27 cm. The tubes are rather wide in diameter, up to 2.2 mm., and between two platforms reach a length of 11 mm. The tubes all lie closely parallel with one another : in an even, regular mode of growth, up to 2 mm., apart, but generally only 1 mm. or less.

In strong contrast to this are two colonies and some fragments from Banda. The largest hemispherical mass, slightly hollowed basally, with a height of 14.5 cm. and basal diameters of 29.5 and 25 cm. has the rounded upper surface raised into a large number of small humps or hillocks, with an average diameter of about 3 cm. The tubes are not so straight and evenly close set, but are frequently bent and slope in various directions.

As the shape of the colony indicates, the tubes radiate from the centre of the base, outwards and upwards. The distance between two tubes varies considerably — on the basal inner side they may be 4 mm. apart, but the mouths are closely crowded on the surface of the hillocks, on an average 1.2 mm. apart. The colour is a dull crimson. The tubes are distinctly narrower in diameter, from 1.5-1.8 mm. across; the distance between the origin of platforms on a tube is up to 9 mm. Several broken fragments are identical with this variety.

A flattened cushion-like colony, also from Banda, shows a similar hemispherical type of growth but is very much smaller and flatter, and shows only

a slight indication of surface hillocks. It has a height of only 3.6 cm. and diameters of 13 and 11.5 cm. The tubes are closely set and show the narrow diameter and dull colour of the preceding specimens.

An interesting little fragment from Wei, with a maximum height of 2.4 cm. and diameters of 4.2 and 2.6 cm., is vivid scarlet, very similar in colour to a single tube (1.3 cm. \times 2 mm.) which we examined among the Siboga Expedition *Alcyonaria*, from Biaru Island, Celebes Sea. In its irregular type of growth it resembles the colonies from Banda, but the colour is strikingly different. The longest distance between the origin of two platforms is 6 mm. The openings of the tubes may be practically contiguous, or up to 1.5 mm. apart; and the tubes themselves are up to 2 mm. in diameter.

LOCALITIES : Banda, reef; Weim (N. Misoöl), reef.

Previously recorded from Red Sea, Indian Ocean, tropical Pacific Ocean, West Indies.

ORDER ALCYONACEA

FAMILY ALCYONIIDAE.

Sinularia polydactyla (EHRB.)

For description see :

BURCHARDT, *Alcyonaceen von Thursday Island und Amboina*, II. (JENAIISCHE DENKSCHRIFTEN, 1898, p. 663, 3 fig.)

PRATT, *Alcyonaria of the Maldives*, II, 1903, p. 524.

KOLONKO, *Die Gattung Sinularia*. (MITT. ZOOL. MUS. BERLIN, 1926, XII, p. 319. 5 fig.)

Two large colonies of this well-known monomorphic species show the usual spiculation and mode of growth. One with an uneven base of attachment has a height of 12 cm., with diameters of 13 cm. and 7.5 cm.; the other has a height of 16 cm., with diameters of 14 cm. and 6.4 cm. From the sterile trunk arise the close-set branches, densely covered with crowded lobes or finger-like outgrowths.

The spicules include (1) clubs with, typically, a head bearing compound warts and below this a whorl of blunt prominences at right angles to the axis; (2) small spindles with few simple prominences; (3) large heavy spindles covered with compound warts or simple prominences; the largest measured was 3 mm.; (4) some large tri-radiates.

Both specimens are wrinkled, due to shrinkage in the preservation, and are of a muddy brown colour.

LOCALITY : Weim Island (N. Misoöl).

Previously recorded from Red Sea, Zanzibar, Baui Island, Luzipera, Newhanover, Dutch and British New Guinea, Luzon, Jaluit, Ternate, Maldives, China Strait, Gulf of Manaar, East Madagascar, Mergui, Gulf of Cutch, Palawan.

Capnella imbricata (Q. G.)

For description see :

KÜKENTHAL, *Versuch einer Revision der Alcyonarien*, Nephthyidae, I. (Zool. Jahrb., 1907, XIX, p. 129.

A colony of a grey-brown colour, 5.2 cm. high, with a basal disc attached to a piece of madrepore coral, has an unbranched flattened stem, 1.2 cm. in length, with basal diameters of 10 and 5 mm. This divides into two main branches which give rise to twigs bearing somewhat conical polyp-covered lapets up to 1 cm. long. The polyps, 8 lobed, are incurved, and are densely armoured with small foliaceous clubs. The majority of these show two or three basal warty processes above which arises the foliaceous head; maximum dimensions are 0.1 by 0.08 mm. In some forms, one of the two basal processes is elongated into a definite stalk, the other remaining short; these clubs attain a length of 0.15 mm. Other spicules from the rind and canal walls are four-rayed, many heavily warted, 0.1-0.2 mm. between adjacent rays, and transitional more thickly warted forms passing to large more or less rounded warty spheres or ovals up to 0.3 mm. across.

LOCALITY : Sorong (New Guinea).

Previously recorded from Pacific Ocean, New Ireland; also by the *Siboga*-Expedition (1931) from the eastern part of the Malay Archipelago.

ORDER GORGONACEA

SUB-ORDER SCLERAXONIA

FAMILY BRIAREIDAE.

Iceiligorgia orientalis RIDLEY.

For description see :

RIDLEY, *Zoological Collections of the « Alert »*, 1884, p. 351, 3 fig.

NUTTING, « *Siboga* » *Exped.*, 1911, XIIIb⁵, p. 18, 2 fig.

KÜKENTHAL, *Gorgonaria*, *Das Tierreich*, 1924, p. 18.

A colony agreeing closely in appearance and mode of growth with Nutting's figured specimen has a spread of 24 cm. and a height of 25 cm. Of this height

5 cm. is made up of the rounded main stem, 11.5 mm. in diameter, which gives rise to two main branches, above which the branching is irregular.

The typically flattened branches have compressed edges along which the majority of the polyps are found lying in a well-defined groove in a single row. They show an armature of about four horizontal rows of spindles, above which are 8 points each with two to three pairs of spindles lying in chevron; above these, smaller spindles are continued to the tentacle bases. Scattered polyps are also found, as in Nutting's specimen, on the surface of the branches. These show low, rounded or oval calyces. When two or more of these polyps arise close together, the calyx openings become continuous, so that a slit-like, longer opening results. We find a similar condition along the edges of the branches where the polyps are not without calyces as Kükenthal states them to be but where the compressed portion really consists of the adjacent calyces. The deep groove, like a knife-cut, from which the polyps protrude is simply due to the fused calyx openings. As Nutting noted, this groove is not continuous, and we regard the interruptions as indicating where the calyx openings have remained separate.

The spicules of rind and medulla agree closely with Ridley's description, save that in some of the tuberculate spindles the warts show a distinct tendency to arise in whorls.

The rind is penetrated by nutrient canals both in the stem and in the branches. As there has been some discussion (see THOMSON and DEAN, *Alcyonacea Siboga-Exped. 1931*) as to the presence of nutrient canals in the medulla we welcomed the opportunity of examining another large specimen. The medulla of none of the branches shows canals even at the base of the two main branches, where one has a maximum diameter of 12 mm. In the short unbranched stem, 5 cm. in length, there is a large central canal closely packed with a mass of agglutinated debris, sand grains etc., so dense that it could be picked out as a solid axis or core. This canal ends blindly at the fork of the two main branches, not being continued into either. In addition to this conspicuous central tube two or three very small canals were also observed in the medulla of the main stem.

In view of the fact that canals can be found only in a short main stem, and that low rounded verrucae are present on the surface of the branches and, on our interpretation, along the edge of the branches, we are very doubtful as to the validity of Kükenthal's genus *Machaerigorgia* which he founded for this species.

LOCALITY : Pulo Enu (Aru).

Previously recorded from Torres Straits, Malay Archipelago, Northwest Australia.

FAMILY SUBEROGORGIIDAE.

Suberogorgia appressa NUTTING.

For description see :

NUTTING, « *Siboga* » *Exped.*, 1911, XIIIb⁵, p. 28, 3 fig.

KÜKENTHAL, *Gorgonaria*, *Das Tierreich*, 1924, p. 43, 4 fig.

A well developed colony, flabellate but not reticulate, 37.5 cm. high with a spread of 54 cm., agrees fully with Nutting's and Kükenthal's descriptions and figures. The rounded main stem, 8 cm. high, gives rise to two main branches; above this the branching is irregular; in some parts, especially on the main branches, it tends to a unilateral arrangement, in others to a lateral alternate type, and in others to dichotomy. The main branches are strongly flattened, and both branches and twigs show a clear groove on both anterior and posterior faces. The tips of the twigs are rounded and several cirripede galls are found as swellings on the branches. The calyces are low and rounded with 8 characteristic knife-like incisions in all stages of contraction. The polyp armature agrees exactly with Kükenthal's figure, consisting of 8 points of spindles in irregular chevron arrangement with a weak collarlet of one or two horizontal rows at the base. These spindles are rather smooth with few low prominences; they are up to about 0.18 mm. in length.

The spicules of the rind are short blunt spindles with terminal warty knobs and usually four whorls of large compound warts; the largest spicule measured was 0.15 mm. in length, the average length is about 0.1 mm. They correspond exactly with those figured by Kükenthal, and so do the spicules of the axis, which are smooth and firmly fused together, along with some horny substance. The axis is not penetrated by canals.

The colour of the colony is terra-cotta, the axis is creamy-white, and the spicules are yellow. This species bears a certain superficial resemblance to *Leptogorgia* (*Lophogorgia*) *lütkeni* (Wright and Studer) which, however, is a Holaxonian, and of a more brown-red colour.

LOCALITY : Pulo Enu.

Previously recorded from Celebes (Macassar) and Aru.

FAMILY MELITODIDAE.

Melitodes esperi WRIGHT and STUDER.

For description see :

WRIGHT and STUDER, *Challenger Report* Alcyonaria, 1889, XXXI, p. 179, 1 fig.

A delicate coral-red fan-shaped colony from Pulo Enu and a small fragment from Enu Island show the usual characters of this species. The dictyo-

tomous branching is in one plane with many anastomoses formed by short side-twigs, about 3 mm. long, from one node to another; the internodes are strongly flattened, with a common length of 8 mm., the maximum being 12 mm.

The yellow polyps are borne on three surfaces of the twigs, leaving the posterior surface bare. Their armature consists of 3-4 rows of horizontal spindles and above these eight points, each with 2-3 pairs of spindles in chevron. The polyp spindles are up to 0.3 mm. in length. In the rind are found numerous rough spindles, some with the thorns more fully developed to one side, also rough headed pseudo-clubs derivable from the spindle type, without any true folia.

The total height of the colony is 21 cm., of which 2.9 cm. belongs to the main unbranched and flattened stalk. The maximum spread of the colony is 23 cm.

LOCALITY : Pulo Enu (Aru).

Previously recorded from Torres Straits, Malay Archipelago, South Africa (?).

Melitodes contorta nov. spec.

(Pl. 1.)

A large, very brittle and broken colony from Sorong, New Guinea, cannot be referred to any described species of *Melitodes*. From an irregular basal mass, encrusting to one side a mass of madreporite and debris, arises a stout stem branching in one plane into a well-developed colony. Two, almost equally large, broken, branched stems seem to belong to the same specimen, having been detached from two stumps, one at the extreme base and the other about 1 cm. up the main axis of the unbroken portion. In all three specimens the stem and the branches show the same tendency to bend and twist.

In the first, attached portion, which has a total height of 37 cm. and spread of 16 cm., the axis, with a diameter of 14 mm., divides at a height of 9 cm. into two main branches, which do not continue erect, but bend over at an angle of 45° from the vertical. The branching is mainly dichotomous and anastomoses are extremely rare; in this portion the branching is almost all in one plane; but some of the terminal twigs may overlap and lie in parallel planes. The nodes are swollen, 3-4 mm. long on the main branches and stem; the internodes are up to 19 mm. long in the twigs though a common length is about 10 mm. The twigs are very slender, some only 1 mm. in diameter in the dried state.

In the second, broken off portion, an unbranched axis 4 cm. long, with basal diameters of 12 and 10 mm., gives rise to a branch which twists and anastomoses with the stem and with another branch given off 4 cm. further up. The branches and twigs lie in several parallel planes.

The third, very twisted and bushy portion has an unbranched, rounded stem 5 cm. long, with a diameter of 11 mm. This divides into two main branches which are twisted in origin and come off almost at a right angle to the

stem. Above this the height is 25 cm.; two of the secondary branches are so twisted and bent round that the whole colony becomes bushy with a spread of 14 cm. and a thickness of 5.7 cm. Stem and branches are all nearly round in section.

The branching in all three portions shows the same tendency to twist, and in the extreme case this leads from branching in one plane to a bushy type of growth. More specimens are needed to show whether this twisting is a true specific character or due simply to environmental factors influencing our particular specimen.

The small polyps, all in a state of contraction, have very low calyces which stand out clearly from the red background of the general coenenchyma as golden-yellow, low mounds with a diameter up to only 0.4 mm. They occur mainly

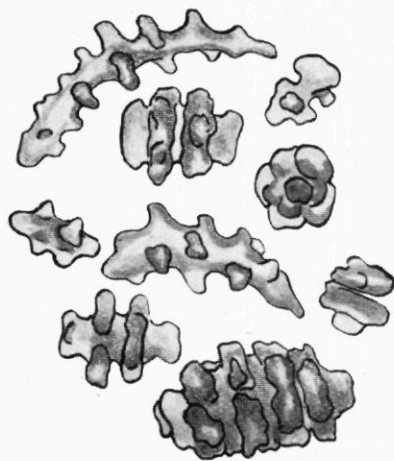


FIG. 1. — *Melitodes contorta* n. sp. *Spicules*. $\times 400$.

on the two sides, leaving a bare streak up the anterior and posterior surfaces; but some of the twigs show polyps arising on three sides, leaving only a posterior bare streak; and a few scattered polyps may arise on one of the bare surfaces of the main branches.

The polyp shows an armature of 3-4 rows of horizontally disposed thorny spindles, and above this 8 points, each consisting of three pairs of spindles in chevron. The polyp spindles are yellow in colour. Average dimensions are 0.15×0.025 mm.; maximum dimensions, 0.28×0.025 mm.

The spicules of the calyx walls and of the general coenenchyma are of similar types (Text. Fig. 1); those of the calyx are yellow, those of the coenenchyma red.

They include :

a) delicate, pointed spindles, straight or bent, covered with rather high, blunt processes. These spicules are not numerous. Dimensions 0.1×0.03 mm.;

b) blunt-ended spindles covered with compound warts which are frequently arranged in zones but are in some cases irregularly disposed. Dimensions 0.1×0.05 mm.;

c) numerous smaller blunt spindles with two median zones of warts. These spicules decrease in size till they become almost circular small double-wheels. Dimensions 0.06×0.04 mm.; 0.05×0.04 mm.;

d) small discs or ovals, many with an almost smooth outline, formed by a compact mass of smooth knobs. Dimensions 0.04×0.05 mm. in diameter;

e) irregularly warted clubs with heads not markedly swollen. Dimensions 0.09×0.04 mm.; 0.13×0.03 mm.

The spicules of the nodes are smooth blunt spindles, 0.08×0.01 mm.; those of the internodes are longer and more delicate, often with a slight median swelling; they are up to 0.16 mm. in length with a breadth of 0.008 mm. All resemble smooth sponge spicules and are colourless.

The colour of the colony is a dull crimson-red with bright yellow calyces and yellow polyps. The deeply grooved axis is white with dull yellow nodes.

This species comes nearest in spiculation and in the characters of the polyps to *M. ochracea* (L.). It differs markedly in coloration, however, from this species; though red colonies of *M. ochracea* have been described, our specimens are distinctive in their vivid yellow calyces standing out against a red background, and in the whiteness of the axis. Among the numerous colonies of *M. ochracea* that have been described, there is none with the branching not in one plane.

LOCALITY : Sorong (New Guinea).

Mopsella clavigera RIDLEY.

For description see :

RIDLEY, *Report Voyage « Alert »*, 1884, p. 360, 5 fig.

KÜKENTHAL, *Gorgonaria, Das Tierreich*, 1924, p. 66.

Two beautiful fan-shaped colonies, with the same coloration — a deep pink towards the base, shading into a creamy white in the upper portions; the verrucae are white to brownish on the upper, pink on the lower portion. They show the features of this species; — the branching is in one plane, the main stem is very short, the internodes are undulating and compressed laterally, the nodes are slightly swollen, the meshes are elongated or irregularly polygonal, the low rounded calyces lie on the sides and anterior surface leaving the posterior surface bare.

The spicules (Text fig. 2) agree entirely with those of the type specimen

which we have examined. They include : *a*) delicate bent spindles, finely thorned, from the polyps, up to 0.28 mm. long and 0.03 mm. broad; *b*) very densely and coarsely tuberculate spindle types, generally blunt-ended, sometimes with larger thorns to one side; 0.18×0.07 mm.; 0.2×0.05 mm.; 0.15×0.05 mm.; some short forms of this type nearly circular, 0.07×0.1 mm. in diameter; *c*) clubs derivable from this heavy tuberculate type, not truly foliaceous but densely covered with thorns or compound tubercles; 0.17×0.08 mm.; 0.12×0.05 mm.; *d*) true foliaceous clubs with a short shaft bearing blunt warts, and a head with a single to several flattened folia, which may be rounded to pointed in shape; 0.13×0.05 mm. The spicules are colourless in the white portion of the colony, red, colourless, or tinged with red, in the pink portion.

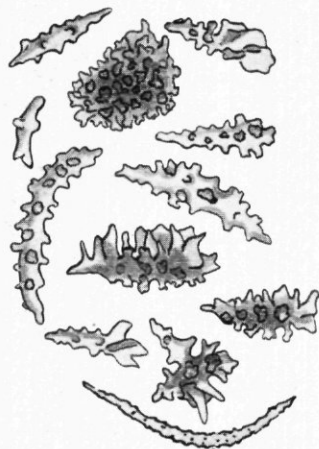


FIG. 2. — *Mopsella clavigera* RIDLEY. *Spicules*. $\times 150$.

The larger colony, with a short unbranched stalk 2.5 cm. in height, with diameters of 16 mm. and 20 mm., has a total height of 29 cm. and spread of 28 cm. The flattened internodes are up to 25 mm. long on the twigs, but common lengths are from 6 to 14 mm.

The polyp armature, not previously described, consists of three rows of horizontally disposed spindles, above which lie eight points, each with 2-3 pairs of spindles arranged in chevron, pointing towards the bases of the tentacles.

The smaller colony, with a total height of 21 cm. and a maximum spread of 28 cm., shows two main trunks, fused at their base, rising from the attaching basal disc.

In both colonies the axis is white, with yellowish nodes.

LOCALITY : Pulo Mariri (Aru).

Previously recorded from Australia.

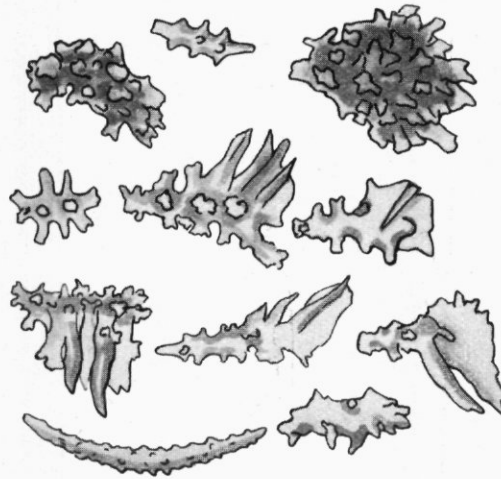
Mopsella spinosa KÜKENTHAL.

(Pl. 2.)

For description see :

KÜKENTHAL, *Abh. Senckenberg. Ges.*, 1911, XXXIII, p. 343, 6 fig.

A large brittle colony 39 cm. in height, with a spread of 33 cm., can be referred to this species. The branches arise from a short basal stem which has diameters of 1.6 and 1.2 cm. They lie in one plane and tend to keep parallel to each other. The branching is mainly dichotomous and U-shaped, and anastomoses are very common. The majority of the internodes are up to about

FIG. 3. — *Mopsella spinosa* KÜKENTHAL. Spicules. $\times 200$.

1 cm. long; in one or two of the twigs, however, they are up to 1.5 cm. long. The nodes are slightly swollen, appearing accentuated owing to the dried state of the colony, with the coenenchyma somewhat shrunken. In the lower branches they reach a length of 6 mm. The branches are flattened but the twigs are almost circular, about 1 mm. in diameter. This flattening was noted by Nutting in his description of *M. studeri* (= *M. spinosa*). Two or three cirripede galls are present.

The polyps occur on three sides, leaving only a small bare posterior streak. Their armature consists of two to three horizontal rows of spindles and above these 8 points, each usually consisting of two pairs of thorny spindles in chevron. These spindles are often bent, with the thorns most developed on the convex side towards the middle. They are red in colour or red tinged with yellow, and are up to 0.28 mm. long. The horizontal spindles have an average breadth of 0.02 mm.

The yellow spicules (Text. Fig. 3) of the calyces and the general coenenchyma include : *a*) foliaceous clubs with the folia coming off at an angle from the thorny shaft, as is typical of this species; these may attain a length of 0.2 mm., but the average length is 0.15 mm. Occasionally the folia arise vertically from the shaft but this is much less common; *b*) short forms consisting of a number of rather thorn-like folia arising from a very short flat base; common dimensions 0.1×0.08 mm.; *c*) thorny spindles or forms blunter at one end and so approaching a club type, often with heavy thorns developed on one side; up to 0.25×0.11 mm.; *d*) small irregular forms with large prominences often in two median zones; from the tentacles; dimensions 0.05×0.03 mm.

In the nodes there are smooth bars with a slight median swelling; up to 0.1 mm. long. The dimensions of the thorned spindles and foliaceous clubs are slightly above those given by Kükenthal, but exactly similar forms are present.

The colour of the calyces and rind is yellow, the polyps are red and the axis is a soft pink. Kükenthal reported a colony with similar colouring from the same locality (Aru), but he did not note the colour of the axis, which in this species is usually blood-red.

LOCALITY : Pulo Mariri (Aru).

Previously recorded from Malay Archipelago (including Aru) and North-west Australia.

Mopsella spongiosa NUTTING.

For description see :

NUTTING, « *Siboga* » *Exped.*, 1911, XIIIb⁵, p. 49, 2 fig.

Two large flabellate and reticulate colonies seem to be referable to this species, though, as they are dried, the sponginess of texture is not apparent. The larger colony has a height of 47 cm. and a spread of 45 cm. The main branches arise close to the basal disc of attachment; they are flattened (with diameters of 3 : 2 mm.) though the terminal twigs are almost cylindrical. The nodes are longer than the internodes towards the base, up to about 1 cm., but commonly, even at the base, from 6-8 mm. in length. The internodes are up to 22 mm. long; the close meshes are generally a narrow oblong in shape, the branches tending to lie parallel with each other.

The polyps lie thickly on three sides, leaving the posterior surface bare. Their armature consists of two to four horizontal rows of spindles and above this eight points, each typically with one pair of thorny bent spindles in chevron. Occasionally a third spindle may lie alongside the pair. The maximum length of polyp spindle is 0.25 mm.; the horizontal spindles are very delicate, seldom over 0.01 mm. in breadth.

The spicules include *a*) the typical foliaceous club as figured by Nutting,

in which the large folia arise almost at right angles to the shaft. The foliaceous portion may consist of a single flat plate, of several flat folia, or may be split up by vertical fissures so that the folia approach thorns; the form is exceedingly varied, as Nutting states. The longest measured had a length of 0.22 mm.; b) « unilateral » spindles with thorns or folia highly developed to one side, the other side covered with warts; the folia may be up to 0.12 mm. long; c) warted or thorned spindles of varying size, the warts sometimes arranged in whorls; d) warty clubs, not foliaceous, 0.15×0.05 mm.; e) small irregular forms with large blunt processes; common dimensions, 0.04×0.03 mm.; 0.07×0.04 mm.

The smaller colony has a height of 37 cm. and a spread of 42 cm. Cirripede galls occur on both specimens.

Both colonies are of a dirty cream colour, with a dull crimson axis.

This species comes very near to *M. spinosa* in branching and spiculation, though the latter is not identical; but the armature of the polyp differs quite appreciably both in numbers and size of spicules; and after a close comparison of the two species we are convinced they are not the same.

LOCALITY : Pulo Mariri (Aru).

Previously recorded from Aru.

Mopsella textiformis (LAMARK).

For description see :

KÜKENTHAL, Gorgonaria, *Das Tierreich*, 1924, p. 65.

A fragment of a large colony, with a length of 22.5 cm. and a basal diameter of 1.4 cm., consisting mainly of bare axis, almost entirely denuded of coenenchyma, shows the features of this species. Thus the colony is flattened in one plane, the stem gives rise to very much more slender branches, anastomoses are frequent, the nodes are short and somewhat square, the internodes show deep longitudinal furrows. The polyps lie on the sides and one surface.

The spicules include bent thorny yellow spindles up to 2.8 mm. long; red spindles up to 2.2 mm.; foliaceous clubs, red, yellow or orange, or yellow with a red stalk. Of the few clubs that we obtained for measurement the longest was 0.18 mm.

The internodes vary greatly in length from 2 mm. to 1.4 cm. This is longer than previously recorded. The nodes are deep red, the internodes a duller crimson, the polyp calycès yellow to orange.

LOCALITY : Duizend eilanden (Java).

Previously recorded from Australasia.

Wrightella superba KÜKENTHAL.

For description see :

NUTTING, « *Siboga* » *Exped.*, 1911, XIIIb³, p. 52.

KÜKENTHAL, *Ergeb. Deutsch. Tiefsee-Exped.*, XIII, 2, p. 172.

A large colony of this brilliantly coloured species, broken in many fragments, the two largest having each a length of 22 cm. The branching is irregularly dichotomous, not reticulate though anastomoses are common; the branches are cylindrical; the polyps are thickly disposed on three surfaces of the branches and twigs; the internodes reach a length of 18 mm., the nodes, but slightly swollen, are only 2-3.5 mm. long. The polyps are for the most part retracted, their calyces appearing as brilliant red, low verrucae on the surface of the general coenenchyma which is a bright lemon-yellow. (In Nutting's specimen the colour is described as orange yellow with red calyces). The polyp spicules and the axis are also bright red. The polyp-armature shows four rows of horizontal spindles and above this eight points, each with a pair of spindles in chevron; the tentacles bear an armature of small red jagged spicules.

The spicules includes straight and bent thorny red spindles from the polyps, up to about 0.5 mm. in length; most numerous, small foliaceous clubs with a very short base and the folia resembling an unopened bud; also short warted spindles and rods and small irregular forms.

LOCALITY : Banda Sea.

Previously recorded from Malay Archipelago (including Banda).

SUB-ORDER HOLAXONIA**FAMILY PLEXAURIDAE.****Plexauroides mjöbergi** BROCH.

(Pl. 3.)

For description see :

BROCH, *Svenska Akad. Handl.*, 1916, LII, 11., p. 38, 3 fig.

This species was established by Broch for a 9 cm. twig of a colony, the branching of which was unknown. A well-developed colony from Pulo Enu agrees so closely with his description of spiculation, polyps and coloration (which is unusual in a *Plexauroides* where the colour is generally red) that we refer it to *P. mjöbergi*.

The colony has a total height of 24 cm. and a spread of 26 cm. The short

rigid unbranched stalk with a small basal attaching disc has a height of 3.1 cm.; the horny axis from which the coenenchyma has been stripped is practically cylindrical, with a diameter of 4 mm. Above this the branching is lateral, and the main branches or twigs tend to come off alternately on each side from the main stem. The diameter of the largest primary branch is 4 mm. Secondary and tertiary branches arise more frequently, however, on the outer side of the primary branches, that is to say on the side furthest from the centre. The average diameter of a twig is 2 mm. The branching is for the most part in one plane, though some of the branches and twigs overlap in parallel planes. There are no anastomoses; the tips of twigs and branches, always blunt, tend to be slightly swollen. Some cirripede galls are present. The longest unbranched terminal twig is 7.8 cm. long.

The polyps are closely crowded on all surfaces; they are dark brown, without calyces, and show a very weak armature (in many cases absent altogether) of up to 8 delicate spindles or rods, which may attain a length of 0.18 mm. They lie vertically in the polyp wall pointing to the tentacles. Our colony differs in one respect from Broch's description that we could find no polyp spicules of the type he figures with large blunt outgrowths. In our specimen the delicate polyp spicules are covered with a few very low thorns, or are almost straight, smooth or wavy spindles or rods.

The spicules include heavy foliaceous clubs with a strongly warted base from which arise numerous more or less vertical folia, the majority of which are pointed and fang-like. These forms vary considerably in shape: some are more rounded, 0.38×0.3 mm., 0.22×0.18 mm.; other are broader than long, 0.32×0.37 mm., 0.28×0.45 mm., 0.32×0.57 mm., so that in the extreme forms the appearance is that of a heavy spindle or oval, thorned and foliaceous on one side, warty on the other; others are elongated clubs with the thorny base lengthened and sometimes pointed, up to 0.5 mm. long with a breadth of 0.18 mm.

In the deeper rind there are warty spindles up to about 0.4 mm. long, triradiates and irregular forms. In the lower rind adjacent to the polyps there are small irregular forms with blunt outgrowths, including small quadriradiates, and more regular minute forms with two terminal zones of warts, average dimensions 0.1×0.05 mm.

The colour is a dull yellowish brown, darkening to a more smoky colour towards the twigs, but dark discoloured patches are present. The axis of the main stem is black, lightening to a yellowish brown on branches and twigs. The spicules are a dull yellow.

LOCALITY : Pulo Enu (Aru).

Previously recorded from North-west Australia.

FAMILY MURICEIDAE.

Echinogorgia complexa NUTTING.

For description see :

NUTTING, « *Siboga* » *Exped.*, 1910, XIIIb, p. 67, 3 fig.

KÜKENTHAL, *Gorgonaria*, *Das Tierreich*, 1924, p. 200, 1 fig.

A colony 16.5 cm. in height with a spread of 12 cm. shows all the main features of this species. The reticulation of the branching is, however, more compact; the branches lie markedly parallel with one another and the connecting twigs are shorter, an average length being 4.5 cm. The branches have an equal diameter of 2 mm. throughout, save for the terminations of the twigs which are often slightly swollen. The axis of the unbranched basal stem is denuded of coenenchyma and has a diameter of 3 mm. The first branch comes off at a height of 1.8 cm.

The numerous low calyces are contiguous on all sides. The polyps show an armature (not previously described) consisting of eight points, each with one pair of spindles in chevron, and under these 2-4 rows of horizontal spindles.

In addition to the polyp spindles the spicules include *a*) the usual Echinogorgian type, with a multiradiate, tuberculate basal portion, embedded in the coenenchyma, from which project the upper smooth folia. These folia are very numerous and arise vertically from the base, lying for the most part parallel. *b*) There are heavy spindles and plates, some of which can be seen lying on the surface of the coenenchyma, of varying size, closely covered with compound warts. In some, one side is densely covered with compound tubercles, while numerous large thorns project from the other side. These heavy spindles frequently reach a length of 0.7 mm. and a breadth of 0.25 mm.; one was observed which had a length of 1.4 mm. with a breadth of 0.25 mm., but this length seems exceptional. Some triradiate derivatives of the heavy spindle type are present.

Kükenthal includes *E. complexa* in the group of *Echinogorgia* species in which relatively heavy spicules are not present in the upper surface of the rind. This is a mistaken view, however, as Nutting figures one of these types. Also, we have closely examined specimens from the same station as Nutting's specimen (THOMSON and DEAN, *Siboga*-Expedition, XIIId) which closely agree with his, and in these the largest superficial spindle we observed had a length of 0.7 mm. and breadth of 0.3 mm. After a close comparison of our *Siboga* specimens with the present colony we are fully convinced that they are of the same species, which should be placed in the group with relatively heavy superficial spindles in the rind.

The colour is brown, with a very dark brown, almost black axis.

LOCALITY : Pulo Enu (Aru).

Previously recorded from New Guinea, Flores Sea.

FAMILY GORGONELLIDAE.

Junceella juncea gemmacea (VAL.)

For description see :

SIMPSON, *Proc. Irish Acad.*, 1910, XXVIII, p. 294, 5 fig.

KÜKENTHAL, *Gorgonaria, Das Tierreich*, 1924, p. 363.

A typical colony of this fully described species has a total height of 30 cm. with a maximum spread of 29 cm. The main stem gives rise at a height of 3.7 cm. to three main branches; and above this the branching is for the most part dichotomous, the growth being bushy. The polyps are borne on all sides, though on the lower portions of the colony a small bare longitudinal streak is sometimes found on two opposite surfaces, sometimes only on one surface. The spicules include the characteristic simple clubs up to 0.1 mm. in length, and symmetrical double-stars or double-clubs with a median waist and knobbed ends covered with simple prominences.

The colour is orange. Some of the branches are overgrown with a sponge.

We follow Kükenthal and Toeplitz (1929) in merging *Junceella gemmacea* (Val.) in *J. juncea* (Pall.) with which it is identical save that the latter is unbranched.

LOCALITY : Pulo Enu (Aru).

Previously recorded from the Indo-Pacific Ocean, including Aru.

Ctenocella pectinata (PALL.)

(Pl. 4.)

For description see :

SIMPSON, *Proc. Irish Acad.*, 1910, XXVIII, p. 319, 10 fig.

KÜKENTHAL, *Gorgonaria, Das Tierreich*, 1924, p. 376.

Three colonies, two of a salmon-pink colour, and one white, all from the same locality, show the very distinctive mode of growth of this genus, the main stem forking into two primary branches which give rise to a row of secondary branches on the upper side only. Each of the three colonies, curiously enough, bears a large clump of the egg-cases of the giant Whelk, *Semifusus (Megala-tractus) incisus*, attached at the junction of the stem with the two primary branches.

The spicules of the three colonies are identical, save that in the white colony they are colourless, in the pinkish colonies they vary from almost colourless to a deep yellow. They include a) typical double clubs, often with a zone of larger warts on each side of the short shaft and with the ends covered with a

mass of smaller warts; dimensions up to 0.075×0.04 mm.; b) double spindles, covered irregularly with warts; dimensions up to 0.095×0.04 mm.; c) delicate narrow double spindles about 0.05×0.07 mm. in length and about 0.01 mm. in breadth. All these measurements are slightly larger than is usual in this species.

The polyps, borne in several rows on the sides of the branches, are all strongly contracted, and the verrucae appear merely as low swellings on the coenenchyma.

The largest colony, pink in colour, with a total height of 19 cm. and a spread of 28.5 cm., has a stalk 4 cm. long, which forks into two primary branches lying almost horizontally. From these the secondary branches arise almost at right angles, the outermost ones sloping slightly towards the mid-line. Two of the secondary branches fork dichotomously; another gives off a small lobe-like branch on one side; and a fourth forks, one of the forks branching again dichotomously, the other bearing a small branch, 2 mm. in length.

In the white colony, which has a total height of 24 cm., a main stem of 5.5 cm. and a spread of 7 cm., the two primary branches lie at an angle of about 30° to each other so that the secondary branches from the two sides overlap. On one of the forks the branching is normal; on the other rather abnormal. Here the branch behaves as a second main stem; the first secondary branch is enlarged and bears on one side four tertiary branches; one of these forks dichotomously.

In the smaller pink colony, which has a total length of 12 cm., the growth of one of the primary branches is twisted and somewhat obscured by the huge egg-case mass attached at its base. The mass has a length of 12.5 cm. and a breadth of 7 cm.

LOCALITY : Pulo Enu (Aru).

Previously recorded from Indian and Malayan regions.

LIST OF PLATES

1. *Melitodes contorta* n. sp. $\times 4/5$.
 2. *Mopsella spinosa* KÜKENTHAL. $\times 1/2$.
 3. *Plexauroides mjobergi* BROCH. $\times 3/5$.
 4. *Ctenocella pectinata* PALLAS. $\times 1/2$.
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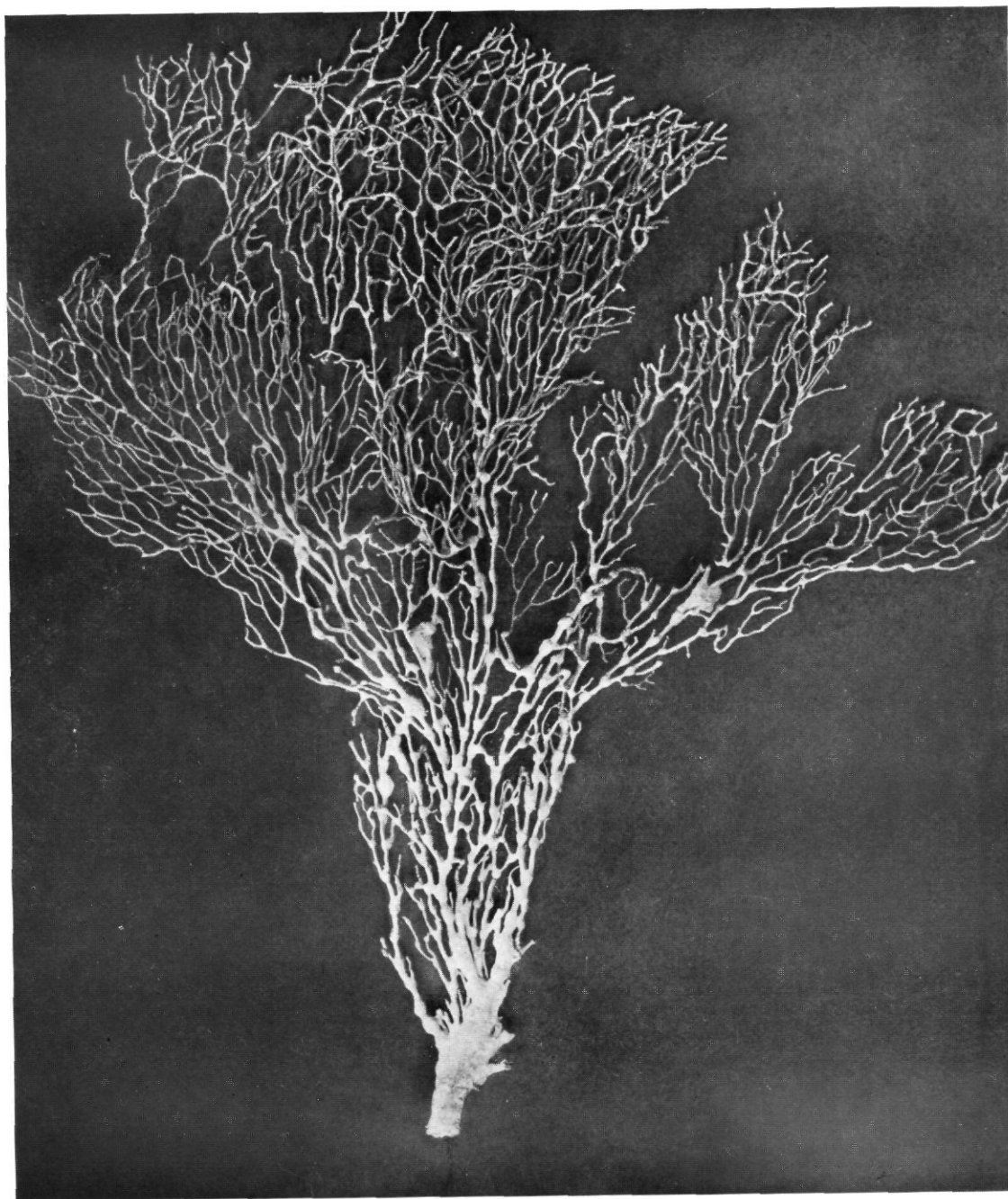
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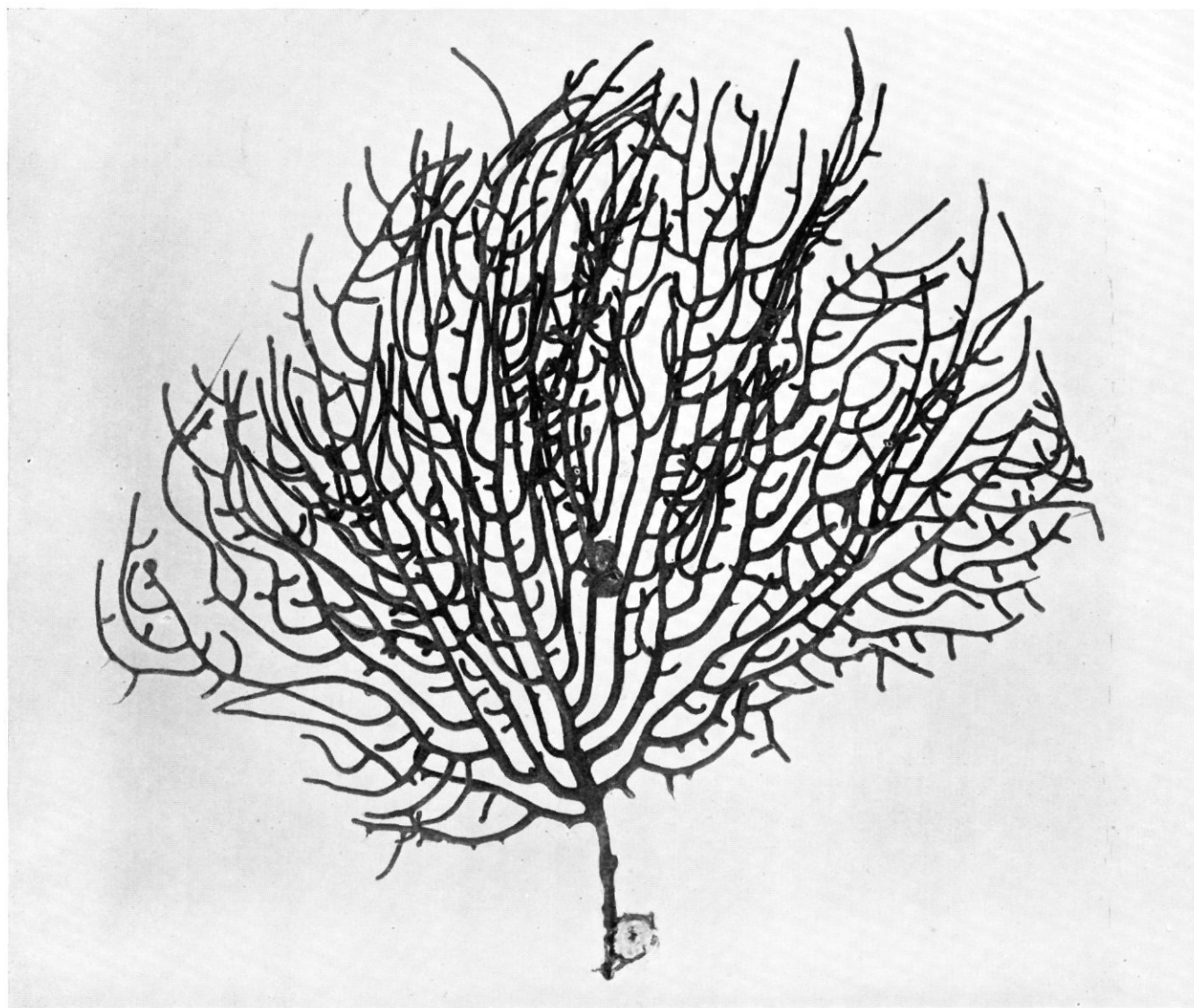
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Metitodes contorta n. sp. $\times 4/5$.



Mopsella spinosa Kükenthal. $\times 1/2$.



Plexauroides mjobergi Broch. $\times 3/5$.



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