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THE

ALCYONARIANS OF THE "THETIS" EXPEDITION.

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ALCYONARIA.

By J. Arthur Thomson and Doris L. Mackinnon.

(Plates lxi-lxxxii.)

The collection of Alcyonarians made by the "Thetis" includes thirty-five species, of which thirteen are new,—a large proportion. When the specimens are arranged in systematic order, it is seen at a glance that the collection has a very definite character, namely, the proportionately large number of Isidæ (*e.g.*, six species of *Mopsea*, four new) and of Primnoidæ (*e.g.*, five new species of *Plumarella*). These Isid and Primnoid colonies are extraordinarily beautiful, and their superficial resemblance to large fronds of Sertularians is striking. It is a matter for gratification that numerous specimens of some of the new species have been preserved, so that it was possible to make sure that one was not dealing with *individual* variations.

Another feature of the collection is the frequent occurrence of encrusting colonies of *Alcyonium (Erythropodium) membranaceum* and *A. reptans* described by Kükenthal, which grow over Gorgonid axes in a very misleading fashion. It is not too much to say that an unprejudiced observer, who had not seen the real state of affairs exposed in unmistakeable cases, would describe these Gorgonid axes encrusted with *Erythropodium* as peculiar Axifera.

LIST OF SPECIES [1].

Order I. STOLONIFERA, *Hickson.*

Family CORNULARIIDÆ.

Clavularia flava, Hickson.

Order II. ALCYONACEA, *Verrill* (pro. parte).

Family ALCYONIDÆ.

Alcyonium (*Erythropodium*) *membranaceum*, Kükenthal.
,, ,, *reptans*, Kükenthal.
* ,, *etheridgei*, sp. nov.

[1] Those that are new are marked with an asterisk.

Family NEPHTHYIDÆ.

Lithophytum flabellum (Q.G.).
**Dendronephthya waitei*, sp. nov.

Order III. PSEUDAXONIA, *G. von Koch.*

Family MELITODIDÆ

Mopsella clavigera, Ridley.
,, *textiformis* (Lamarck)
Psilacabaria gracillima, Ridley.
Parisis australis, Wright and Studer

Order IV. AXIFERA, *G. von Koch.*

Family ISIDÆ.

Mopsea dichotoma (Linné).
,, *encrinula* (Lamarck).
* ,, *australis*, sp. nov.
* ,, *flabellum*, sp. nov.
* ,, *elegans*, sp. nov.
* ,, *whiteleggei*, sp. nov.
Acanthoisis flabellum, Wright and Studer.

Family PRIMNOIDÆ.

Stachyodes studeri, Versluys (*S. regularis*, Wright and Studer).
**Amphilaphis plumacea*, sp. nov.
**Plumarella lævis*, sp. nov.
* ,, *thetis*, sp. nov.
* ,, *corruscans*, sp. nov.
* ,, *filicoides*, sp. nov.
* ,, *versluysi*, sp. nov.
Primnoella australasiæ, Gray.
,, *flagellum*, Studer.
,, *distans*, Studer.
**Caligorgia laevis*, sp. nov.

Family GORGONIDÆ.

Leptogorgia, sp. (?)

Family GORGONELLIDÆ

Ctenocella pectinata (Pallas).

Order V. STELECHOTOKEA, *Bourne.*

Section ASIPHONACEA.

Family TELESTIDÆ.

Telesto trichostemma (Dana).
„ *arborea*, Wright and Studer.

Section PENNATULACEA.

Family KOPHOBELEMNONIDÆ.

Kophobelemnon schmeltzii(Kölliker), = *Sclerobelemnon schmeltzii*, Kölliker.

Family PTEROEIDIDÆ.

Godeffroyia elegans, Kölliker.
Sarcophyllum australe, Kölliker.

Of the thirty-five species in the collection, the following thirteen have been previously recorded from Australian seas :—

Clavularia flava, Hickson.
Mopsella clavigera, Ridley.
„ *textiformis* (Lamarck).
Psilacabaria gracillima, Ridley.
Parisis australis, Wright and Studer.
Mopsea dichotoma (Linné).
„ *encrinula* (Lamarck).
Acanthoisis flabellum, Wright and Studer.
Primnoella flagellum, Studer.
Primnoella australasiæ, Gray.
Ctenocella pectinata, Pallas.
Telesto trichostemma (Dana).
Sarcophyllum australe, Kölliker.

The most striking of the records of distribution are the following :—*Primnoella flagellum*, Studer, previously reported by Hickson from Australian seas, was originally found in the South Atlantic, off Patagonia ; *Primnoella distans*, Studer, was previously found off the West Indies and Brazil ; *Kophobelemnon schmeltzii* (Kölliker), was previously found off Formosa ; *Godeffroyia elegans*, Kölliker, was previously recorded from the Gulf of Siam.

Order I. STOLONIFERA, *Hickson.*

Family CORNULARIIDÆ.

Genus CLAVULARIA, *Quoy and Gaimard.*

CLAVULARIA FLAVA, *Hickson.*

Clavularia flava, Hickson.—A Revision of the Genera of the Alcyonaria Stolonifera with a Description of one New Genus and several New Species. (Trans. Zool. Soc, xiii., 1894, p. 341, pl. l., figs, 12 and 13).

Clavularia flava, Hickson.—Preliminary Report on a Collection of Alcyonaria and Zoantharia from Port Philip. (Proc. Roy. Soc. Vict., (n.s.), ii., 1890, pp. 136-140).

A few small pieces of a *Clavularia* agree with Hickson's description of *C. flava*. The stolons are thin and ribbon-like; the cylindrical polyps, 3·5 mm. in height, with a diameter of about 1·5 mm., are separated from one another by rather wide intervals, 1-2·5 mm. The upper part of the polyp with the tentacles is retracted completely into the stout-walled, heavily-armoured lower portion. The spicules agree with those described by Hickson, but are flesh-pink instead of yellow. The colour of the colony is a deep salmon-pink.

Kükenthal[2] places *Clavularia flava*, Hickson in his amended genus *Anthelia*. His amended genus *Clavularia*, however, is separated from *Anthelia* by having a lower, non-retractile, calyx-like thick-walled portion, and an upper, retractile, thin-walled portion bearing the tentacles. As *Clavularia flava*, Hickson, answers this description, we think that Kükenthal is mistaken in seeking to remove it from its original position in the genus *Clavularia*.

Locality.—Between Port Jackson and Tuggerah.

Previously recorded from the coast of Victoria, shallow water.

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[2]Kükenthal—Alcyonacea—Wissenschaftliche Ergebnisse der Deutschen Tiefsee Expedition, xiii., 1906, p. 11.

Order II. ALCYONACEA, *Verrill* (pro parte).

Family ALCYONIDAE.

Genus ALCYONIUM, *Linnè.*

ALCYONIUM (ERYTHROPODIUM) MEMBRANACEUM *Kükenthal.*

Alcyonium membranaceum, Kükenthal, Alcyonacea—Wiss. Ergeb deutsch. Tiefsee Exped., xiii., 1, 1906, pp. 52-53, pl. 1., fig. 3, pl. ix., figs. 42-44.

Stations 42, 44, 34, 43, 47, 48.

Numerous Gorgonid axes, *e.g.* of *Ctenocella*, are almost covered by *Sympodium*-like growths, which investigation shows to be creeping Alcyonids, agreeing on the whole, with Kükenthal's description of *Alcyonium (Erythropodium) membranaceum.* The cœnenchyma-spicules are very variable in form. There are approximately spherical bodies (diameter ·08-·12 mm.), short thick cylinders with about two bands of thorny warts, forms like cervical vertebrae, and others of more irregular shape. The polyp spicules are spindles. Below the eight points of converging spicules in the anthocodia there is a deep collaret of about eight rows of horizontally disposed slender spindles. The colour of the colonies is light brown.

This species presents considerable difficulties to the classifier. In some specimens the Gorgonid axis is so completely and so evenly overgrown with the Alcyonid, that it is hard to believe that one is not dealing with the natural cœnenchyma. There is, however, a slight tendency to the formation of "independent stocks," and at the tips of the branches the encrustation often forms a well-marked projection beyond the axis. On the more weathered specimens it is instructive to note how the encrusting Alcyonid is brought up sharply against large groups of Cirripedes, Sponges, etc., which have also found the Gorgonid axis a suitable place of attachment.

In the majority of our specimens the internal structure could not be made out with certainty, owing to their being in the dried condition, and extremely friable. In the spirit-specimens, however, the cœnenchyma shows the Alcyonid arrangement of side-canals between the gastral cavities of the polyps, an arrangement that, in Kükenthal's opinion, removes these *Sympodium*-like

forms into the genus *Alcyonium*, where the sub-genus *Erythropodium* is designed for those that grow as membranous expansions.

Locality.—Eleven miles east of Broken Bay.

Previously recorded from 34°7'3" S. Lat., 24°59'3" E. Long., Francis Bay, 100 metres.

ALCYONIUM (ERYTHROPODIUM) REPTANS, *Kükenthal.*

(Pl. lxi., fig. i.)

Alcyonium reptans, Kükenthal, Alcyonacea—Wiss. Ergeb. deutsch. Tiefsee Exped., xiii., 1, 1906, pp. 53-54, pl. ii., fig. 9, pl. ix., figs. 45-49.

Stations 17, 34, 41, 42, 43, 44, 48, 53.

For 57 cm. of its entire length (83 cm.) the axis of a specimen of *Primnoella australasiae* is completely overgrown with a light chocolate-coloured, *Sympodium*-like Alcyonid, which agrees with Kükenthal's description of *Alcyonium (Erythropodium) reptans.* The same species covers a branched Gorgonid axis from which all trace of the original cœnenchyma has disappeared. Numerous smaller specimens also occur that show scarcely more than a fibrous residue of the Gorgonid axis which the *Sympodium*-like mass had originally made its support. Without the more complete specimens with which to make a comparison, these last forms would be very difficult of interpretation.

The spicules in every case are (1) slender spindles with few and simple warts, ·306 x ·084 mm.; ·27 x ·032 mm.; ·204 x ·017 mm.; (2) stouter, blunter spindles with more numerous, projecting tuberculate warts—·255 x ·068 mm.; ·238 x ·052 mm.; (3) flattened spindles with jagged and toothed margins—·323 x ·051.; ·289 x ·034 mm.; (4) a few irregular bodies—·085 x ·051 mm.

Locality.—Eleven miles E. by N. of Barrenjoey, 30-40 fathoms, rocks.

Previously recorded from the east side of Bouvet Island, 470 metres.

ALCYONIUM ETHERIDGEI, *sp. nov.*

(Pl. lxi., fig. 2 and 3; pl. lxii., fig. 3; pl. lxvii., fig. 4; pl. lxix.)

Stations 10, 17, 28, 31, 34, 41, 44.

This striking form is represented by numerous specimens. The largest colonies have the following dimensions.—Height and breadth in centimetres 7·5 x 8, 8·5 x 8·5., and 9·5 x 7., the smallest is ·5 cm. high by ·7 cm. broad.

Nearly all the specimens are complete. From a slightly encrusting base rises a stout stalk-portion, with a diameter, in the largest specimen, of 4·5 cm. This stalk is of very firm consistency, and has a rather harsh, wrinkled surface. The polyparium of the smallest specimen is unbranched and club-shaped. In all the others at a height of 2-3 cm. the stalk-portion divides up into a number of stout, diverging, finger-like lobes, 1-2 cm. in diameter. These subdivide into secondary lobes, usually from 0·5-1·75 cm. in height, with diameters ranging from 1 cm. to 1·75 cm. Upwards from a point about ·5-2 cm. from the base, the entire colony is covered with polyps which, in most of the specimens, are retracted into low, rounded, eight-lobed calyces. The average distance between two polyps is 1·5 mm. The polyps, when fully expanded, have a length of 3·5 mm. They are marked with eight longitudinal grooves, and just below the level of the tentacles they are armoured with eight isosceles triangles, each composed of 8-10 converging pairs of slender spicules. Near the base of each triangle these meet at an angle of about 45°; higher up, they are almost parallel; but very occasionally one or two are directed horizontally below the triangular points. The tentacles are entirely without spicules: they are long and feathery, with about ten long pinnules on each side of the middle line in a single row.

The whole surface of cœnenchyma appears as though dusted over with a thick sprinkling of small, white, glistening spicules, which bear a resemblance to grains of sugar. These are stout double-clubs and capstan-like bodies with a distinct "neck," and, on an average, two whorls of projecting, tuberculate warts. The following measurements were taken of length and breadth in millimetres:— ·187 x ·119; ·17 x ·119; ·119 x ·102; ·085 x ·085. Smaller forms (·102 x ·068 mm.; ·085 x ·051 mm.) approach Kölliker's "Sechser" and are probably young stages of the first. The entire cortex is crowded with spicules of the same form as those on the surface, and similar spicules occur, but much more sparingly in the canal walls.

The spicules of the polyps are spindles and clubs of slender form, with a few projecting warts. Their dimensions in mm. are ·306 x ·034; ·27 x ·068; ·204 x ·017; ·17 x ·017.

The colour of the colonies is greyish-brown to dark-brown; the polyps are a darker shade of the same colour.

In many respects this species comes very near to Hickson's *Alcyonium purpureum*[3].

[3]Hickson—The Alcyonaria of the Cape of Good Hope, part ii.—Marine Investigations in South Africa, iii., 1904, pp. 215-217, pl. vii., fig. 1, pl. ix., fig. 18.

Our species differs from Hickson's in the absence of the characteristic purple colour, the presence of a distinct stalk-portion, the sparser distribution of the polyps, the larger size of the polyp spicules, and the simpler character of the cœnenchyma spicules, the double-clubs in *Alcyonium purpureum* being figured with at least four whorls of warts. The powdered appearance of the surface of the cœnenchyma in our specimens is exceedingly characteristic.

Locality.—Manning Bight, 22 fathoms.

Family NEPHTHYIDAE.

Genus LITHOPHYTUM, *Forskal.*

LITHOPHYTUM FLABELLUM (Q.G.)

Lithophytum flabellum, Kükenthal, Versuch. einer Revision der Alcyonarien, ii. Die Familie der Nephthyiden, i. Theil. Zool. Jahrb., xix., 1903, p. 111.

A single catkin of this species was found among some broken fragments in the present collection.

Locality.—Coast of New South Wales.

Previously recorded from Zanzibar, Solomons, Tumbatu, New Ireland, Carteret Harbour, and Egmont.

Genus DENDRONEPHTHYA, *Kükenthal.*

(*Spongodes* in part).

DENDRONEPHTHYA WAITEI, *sp. nov.*

(Pl. lxii., fig. 4; Pl. lxv., fig. 2; Pl. lxvii., fig. 3.)

Station 25.

Several compact, bushy colonies, from 5 to 7 cm. in height, represent this interesting species. The specimens are all intact, and show great uniformity in their mode of growth. From a luxuriantly-rooting basal attachment rises a somewhat flaccid stalk, which just above the roots has a diameter of 10 mm., but swells out to 16 mm. higher up. At a height of about 2 cm. the stem is surrounded by foliaceous expansions bearing polyps along their edges. Above this, numerous small branches come off, and the stem finally divides into two main branches, which ramify extensively. The stem tends to be exposed on one side in its upper reaches, as there is a much sparser occurrence of branches on one side than on the other.

Over the branching side of the colony the polyp-bundles form a dense covering. The polyps occur in bundles of about six, in typically "glomerate" arrangement.

The polyp-stalks are very long, 1·5-2·5 mm. The polyp-heads are about 1·5 mm. and make an angle with their stalk that may be either a right angle or obtuse. The Stützbündel is very weakly developed; it consists of about four almost smooth spindles.

In contrast with the long polyp-stalk the Stützbündel seems quite inconspicuous, and this gives a *Stereacanthia*-like appearance to the polyp. The armature of the polyp consists of eight longitudinal rows of closely apposed pairs of curved spindles: there are about six to eight pairs in a row, of which the uppermost pair is the most strongly developed. One or both of this uppermost pair may project slightly above the polyp-head. Between the adjacent "points" thus formed, a few small spindles lie without regular arrangement. Unlike the spicules of the Stützbündel and polyp-stalk, which are yellow-brown smooth spindles with scarcely any warts, the spicules of the polyp-head are colourless, bent spindles, with more numerous, rather prominent warts. The following measurements were taken of length and breadth in millimetres:—(1) spicules of polyp-stalk, 1·37 x ·085; ·765 x ·035; ·425 x ·017; (2) polyp-spicules, ·765 x ·051; ·544 x ·034; ·34 x ·017; ·255 x ·025. There is a median row of very small, transversely-disposed spicules along each tentacle.

The spicules of the cortex are, in the upper part of the colony directed more or less transversely. They are long spindles (2·97 x ·17 mm.; 1·78 x ·19 mm.; 5·27 x ·34 mm.) with few, small warts. In the branches these superficial spindles are smaller, and take a longitudinal direction. Below the point where the ring of foliaceous branches comes off, the character of the cortical spiculation changes. There are still a few spindles, but the great majority of the spicules are small opaque, white stars, tri- and quadri-radiates and irregular spiny forms. ·204 x ·17 mm.; ·119 x ·102 mm.; ·102 x ·085 mm.

In the canal-walls of the lower part of the colony a few similar star-like spicules are to be found. In the upper reaches of the canal-walls no trace of spicules could be found.

The colour of the stem is brownish-gray with a reddish tinge on the branches; the roots are dark gray, and the polyps and their stalks are red-brown.

In certain features this species approaches very closely *Dendronephthya maxima*, Kükenthal, particularly in the form of the long-stalked polyps with their weakly-developed Stützbündel, and in the remarkable smoothness of the cortical spindles. But our species shows larger polyps, a greater number of spicule pairs in the longitudinal rows on the polyps, and these spicules are not smooth as in *D. maxima*, nor do they show any

tendency to form clubbed ends. Furthermore, the spicules on the tentacles are not arranged in a double row "en chevron." The spindles of the cortex are very much larger than in *D. maxima*; the stars and irregular spiny bodies of the base are similar in both species, but the canal-walls in our specimens do not show any of the numerous, disc-shaped concretions characteristic of *D. maxima*.

Order III. PSEUDAXONIA, *G. von Koch.*

Family MELITODIDAE.

Genus MOPSELLA, *Gray.*

MOPSELLA CLAVIGERA, *Ridley.*

(Plate lxviii., fig. 9.)

Stations 34, 40, 42 and 48.

Mopsella clavigera, Ridley, Report Zool. Coll. H.M.S. "Alert," 1884, p. 360, pl. xxxvii., fig. b. pl. xxxvii., figs. a-a^{III}.

The largest specimens have lengths of 18 cm., 23·5 cm., 30 cm., and 53 cm. respectively. The branching is generally dichotomous, and is strictly in one plane. The branches arise from the nodes, which are very markedly swollen. In the largest specimens they have a diameter of as much as 18 mm. There is no anastomosis.

The polyps are chiefly confined to one surface, over which they are disposed irregularly in slightly projecting verrucæ. Into these the polyps are in the most cases retracted. The polyp armature consists of eight triangular points of three or four converging pairs of delicate spindles; below these are about two rows of similar spicules disposed horizontally. A double row of minute spicules, "en chevron," occurs along the middle line of each tentacle.

The spicules of the cœnenchyma are exactly like those described by Ridley, *i.e.*—(1) orange-coloured fusiform shapes, rather coarsely tuberculate, swollen, tapering, with occasional "Blattkeulen" at one end—·18 x ·034 mm.; ·15 x ·035 mm. (2) "Blattkeulen" of lemon-yellow colour, in shape like small pointed trowels, with a short handle, and a blade formed of about two lancet shaped laminæ—·07 6 x ·034 mm.; ·051 x ·032 mm.; ·042 x ·025.

With regard to the distribution of the cœnenchyma spicules, it may be remarked that the orange-coloured spindles generally

form the lower stratum, over the surface of which the yellow clubs are disposed in a thin layer, which may cover the entire colony, or may be confined to a broad circle round each polyp-opening.

Locality.—Eleven miles east of Broken Bay, 30-40 fms.

Previously recorded from Port Curtis, Queensland, 5-11 fms., Port Molle, 14 fms, Thursday Island, Torres Straits, 4-6 fms.; Dirk Hartog Island, West Australia (Studer).

MOPSELLA TEXTIFORMIS, *Lamarck.*

(Plate lxiii., figs. 4 and 5.)

Mopsella textiformis, Ridley, Report Zool. Coll. H.M.S. "Alert," 1884, pp. 358-360.

The strong basal portion of what must have been a large colony. It is about 23 cm. in height, and the diameter near the base is as much as 3 cm. The length of the inter-nodes varies from 4 to 9 mm., and of the nodes 4-6 mm. The colour of the axis is rose. At the base where it is weathered and the longitudinal canals are exposed, the axis has a very remarkable labyrinthine pattern. The main stem gives off several strong branches in one plane, and these seem to have given off numerous secondary branches strikingly slender in contrast. There has been abundant anastomosis. Most of the cœnenchyma has been worn off, but here and there patches remain of a bright yellow colour. In regard to spicules the specimen agrees well with Ridley's description, but very few of the characteristic dentate "Blattkeulen" have long shafts. In these spicules the shafts are usually orange and the heads lemon-yellow. The nodes contain the usual smooth rods.

Locality.—Lord Howe Island.

Previously recorded from many Australasian Stations.

Genus PSILACABARIA, *Ridley.*

PSILACABARIA GRACILLIMA, *Ridley.*

Psilacabaria gracillima, Ridley, Rep. Zool. Coll. H.M.S. "Alert," 1884, pp. 364-365, pl. xxxvii., figs. d-d^{11}, pl. xxxviii., figs. f-f^{11}.

Stations 34, 36, 48

A number of broken pieces seem referable to *Psilacabaria gracillima*, Ridley. The chief characteristics of this species may

be summarised:—dichotomous branching approximately at right angles and in one plane; absence of anastomosis; the axis of the internodes hard, white, not striated; low, rounded, tubercular polyps arranged in a rather irregular manner, in spirals, and opposite; chief forms of spicules.—(1) large cylinders (·28 to ·31 x ·087 mm.), fusiform to sub-clavate, with thick axis, slightly tapering to round-pointed ends, provided with strong tubercles with tendency to arrangement in whorls; (2) smaller spindles (·21 to ·25 x ·053 to ·071 mm.), more or less curved, with sharp ends and roughened tubercles.

The colour of the specimens is yellowish-brown.

Locality.—South Coast of New South Wales.

Previously recorded from Port Molle, Queensland, 12-30 fathoms; Port Darwin, 8-12 fathoms; East Australia, 42 fathoms

Genus PARISIS, *Verrill.*

PARISIS AUSTRALIS, *Wright and Studer.*

(Plate lxx.)

Parisis australis, Wright and Studer, Chall. Rep., Zool., xxxi., 1889, pp. 183-184, pl. xli., fig. 5.

Stations 13, 34, 44, 47, 48.

This species was founded on two fragments, much overgrown by an encrusting sponge. In the present collection there are numerous specimens, many of them almost entire, so that we are able to amplify the original description.

The largest colony is 35 cm. high, with a spread of 18 cm. From a slightly encrusting calcareous base arises the cylindrical stem, with an average diameter of 6 mm. which soon begins to give off branches. These arise on the sides, alternately and in one plane.

Higher up all distinction between main stem and branches is lost. The upper part of the colony consists of a close tangle of equal sized branches, 3-3·5 mm. in diameter, which divide dichotomously or give off short branches quite irregularly, but invariably in one plane. The tendency is for all the branches to bend upwards at the tip, and the axillary angle is 45°-60°. Though the branches often overlap one another, or even entwine slightly, there is never any anastomosis.

The surface of all the colonies is more or less encrusted with a siliceous sponge, which often entirely obscures the underlying structure, and produces by its numerous projecting spicules a curious brown, velvety surface. Beneath this is the hard pavement-like surface-layer of the *Parisis*, consisting of cream-white cœnenchyma spicules.

In the lower part of the stem the calcareous and horny joints have approximately equal lengths of about 2·5 mm.; but higher up the internodes greatly predominate, 3-4 mm., while the nodes are reduced to mere constrictions, ·5 mm. in length. The internodes are white, and bear somewhat distant longitudinal grooves.

On the younger colonies and smaller branches the arrangement of the polyps is bilateral, but on the larger branches they may occur all round. In one specimen where they were less obscured by sponge-growth than elsewhere, the polyps had a height of ·75 mm. with a diameter of 1 mm.; they projected from the branch as low, rounded warts.

The spicules are exactly like those described by Wright and Studer—*i.e.*, massive warty spindles, some almost as broad as long, and approaching spheres. The warts are high and prominent and finely sculptured. The following measurements were taken of length and breadth in millimetres.—·261 x ·17; ·25 x ·1; ·2 x ·16; ·17 x ·1.

This species is distinguished from *Parisis fruticosa*, Verrill—(1) by the branches coming off at angles of 45°-60°, instead of at approximately right angles; (2) by the polyps occurring all round the branches instead of being strictly bilateral; (3) by the smaller size, and greater slenderness of the spicules.

Locality.—South Coast, New South Wales.

Previously recorded from Station 163 B, off Port Jackson, 35 fathoms.

Order IV. AXIFERA, *G. von Koch.*

Family ISIDAE.

Genus MOPSEA, *Lamouroux.*

MOPSEA DICHOTOMA, *Linné.*

(Plate lxvii. fig. 1.)

Morpsea dichotoma, Wright and Studer, Chall. Rep., Zool., xxxi., 1889, pp. 41-42, pl. ix., fig. 10.

Stations 48, 47. 53.

The largest specimen is an almost complete lyre-shaped colony, rising from a slightly encrusting calcareous base to a height of 22·5 cm. The main stem, 3 mm. in diameter near the base, divides to form two equal branches at a height of 2·5 cm. These two main branches give rise along one side to a number of

secondary branches which run parallel to one another. As these secondary branches are nearly as thick as the main branch from which they spring, the effect of a repeated dichotomy is produced, an effect that is heightened by the tendency of the main branch to bend outwards after each branch is given off, so that its course describes a series of shallow curves. The secondary branches rise straight upwards and may remain unbranched throughout their length, or may divide dichotomously. Branching is strictly in one plane.

The polyps are arranged in close spirals all over the larger colonies, though one young specimen shows the polyps in a single alternating row on each side of the branch.

The polyps are club-shaped, with truncated mouths; they are directed upwards, and bent towards the stem. In the largest specimen the upper parts of the polyps have all been rubbed off, which produces a deceptive appearanee of very short, truncate polyps with their mouths directed outwards from the stem.

There is a considerable variety in the spicules (Pl. lxvii. fig. 1).

(1) There are somewhat flattened, curved spindles, produced on the convex side into a number of sharp, prominent teeth. The following measurements were taken of length and breadth in millimetres.—·238 x ·102; ·187 x ·085; ·118 x ·068; ·102 x ·051.

(2) Spicules of similar form to (1), but simpler and with only a few small warts.—·153 x ·051; ·136 x ·053; ·102 x ·034 mm.

(3) Small "Blattkeulen" with a very small shaft, bearing sometimes a few warts, and supporting a group of sharp, blade-like projections.—·102 x ·085; ·09 x ·068; ·051 x ·032 mm.

(4) Small irregular bodies and "capstans."—·085 x ·085; ·102 x 0·85; 0·68 x 0·51 mm.

The colour of the colonies is pale-brown to cream.

Previously recorded from the Indian Ocean, and Port Jackson, New South Wales, 35 fathoms.

MOPSEA ENCRINULA, *Lamarck.*

Mopsea encrinula, Wright and Studer, Chall. Rep., Zool., xxxi., 1889, pp. 43-44, pl. vii., figs. 1, 1[a], 1[b]., pl. ix., fig 11.

Stations 34, 44, 47.

A few incomplete specimens in the present collection agree closely with the description of *Mopsea encrinula* (Lamarck), given by Wright and Studer. Branching is plume-like in one plane; the club-shaped polyps, 1 mm. long, cover the branches and twigs in a close spiral, and are incurved towards the stem. Many of the spicules are yellow and white flattened spindles, approaching the "lancet-shaped plates" of Wright and Studer's description.

These bear numerous high, projecting warts, which tend to be more numerous towards one side of the spicule than the other, especially if the spicule is curved, when the convex side is always much the stronger toothed ; length by breadth in mm. ·187 x ·051 ; ·15 x ·06 ; ·12 x ·05. There are also scales with very irregular margins and numerous spiny warts.—·102 x ·082 mm. ; ·063 x ·04 mm. ; ·02 x ·02 mm. Thirdly, there are small irregular bodies.—·025 x ·025 ; ·051 x ·025.

The colour of the specimens is orange-brown ; the polyps yellowish-white.

Locality.—Eleven miles east of Broken Bay.

Previously recorded from Australia (North-west Coast), 50 fathoms ; Station 162, off East Moncoeur Island, Bass Strait, 38 fathoms.

MOPSEA AUSTRALIS, *sp. nov.*

(Plate lxiv. figs. 1 and 2., pl. lxvii. fig. 5.)

One specimen has the basal portion almost intact, the others are broken, branching pieces of various lengths. All are in the dried condition. The mode of branching, and, in fact, the whole general appearance of the colony is very similar to *Mopsea dichotoma* (Linné).

The polyps are arranged in close spirals round the branches. They are small (·5-·75 mm. in length), club-shaped, and, in the dry state at any rate, are very closely pressed to the surface of the branch, so that their mouths are hidden. Their armature consists of indistinct longitudinal rows of transversely arranged, slightly overlapping spicules ; there are from fifteen to eighteen of these in the abaxial rows.

The spicules of this species are smaller than those of *M. dichotoma,* and much less spiny. The following types occur—(1) rather broad, flattened, almost scale-like spicules with relatively prominent teeth round their edges, and with a few warts over the surface. These spicules vary in shape from flattened spindles to rough ∞-shapes and ovals. The following measurements were taken of length and breadth in millimetres.—·187 x ·034 ; ·153 x ·068 ; ·119 x ·051 ; ·102 x ·068. (2) Stout spindles and some clubs with prominent warts.—·153 x ·034 mm. ; ·119 x ·017 mm. ; ·102 x ·017 mm. (3) Capstans and small, irregular bodies.—·051 x ·034 mm. ; ·034 x ·034 mm. ; ·068 x ·017 mm. ; ·034 x ·017 mm.

The colour of the dried specimens is deep cream.

It must be admitted that *Mopsea dichotoma* (Linné), *M. elongata,* Roule, and the species at present under discussion, are

very closely related. The only noteworthy difference, as it seems to us, lies in the character of the spicules. Roule lays emphasis on the mode of branching, which he finds to be more sparse in *M. elongata* than in *M. dichotoma*, and with a strong tendency to the formation of long, simple branches. Our new species, *M. australis*, agrees with Roule's description of the branching of *M. elongata*, but it also agrees with the undoubted specimens of *M. dichotoma* in the present collection—so closely, indeed, that it was at first mistaken for that species. We do not think that the mode of branching can here be safely used as a specific distinction. Perhaps the same is true in regard to the details of spicule-form.

Locality.—Eleven miles east of Broken Bay.

MOPSEA FLABELLUM, *sp. nov.*

(Plate lxiii. figs. 1-3 ; pl. lxvii. fig. 6 ; pl. lxxi.)

Stations 34, 44.

This species is based on one complete colony and a number of pieces.

The complete specimen rises from a slightly encrusting calcareous base to a height of 24·5 cm. Branching begins at a height of 5·5 cm. and is very luxuriant ; the branches are confined almost exclusively to one plane, and there is a strong tendency to dichotomy ; they are slender throughout, and do not taper much ; the stouter branches have a diameter 2·5 mm., and the twigs of almost 2 mm., near their tips.

Near the base the diameter of the axis is 4 mm. Here the cœnenchyma has been worn off, and the bulk of the stem is made up of the horny joints which are about 2 mm. long, the calcareous joints being reduced to ·75 mm. ; in some cases they are quite overlapped by the horny joints. Higher up the calcareous joints have lengths of 3-4 mm., and the horny joints ·25-·5 mm. The colour of the horny joints is brown ; that of the calcareous joints varies from cream-white near the base of the colony to orange in the twigs. The calcareous joints bear marked longitudinal flutings. The branches arise from the calcareous joints.

The polyps occur in close-wound spirals all over the stem and branches. In the youngest twigs the spiral is wider, but nowhere is there any trace of a bilateral arrangement. The polyps are club-shaped, with somewhat truncate mouths which are pressed against the cortex of the branch. The average length of a polyp is 1 mm. The calyces are armoured with about eight rather indefinite longitudinal rows of overlapping spicules,

fifteen to eighteen in a row. These spicules are flat, yellow scales, circular, 8-shaped and irregular; they are smooth, or bear a few simple warts, and their margins are deeply dentate or serrate. Their dimensions in millimetres are, ·255 x ·136; ·204 x ·102; ·17 x ·068; ·153 x ·153. A low eight-rayed operculum is formed by similar scales.

The spicules of the cœnenchyma are yellow spindles and cylinders (·187 x ·035; .17 x ·017; ·136 x ·051 mm.). They have relatively few, but large warts. There are also small irregular bodies (·085 x ·051; ·051 x ·034; ·068 x ·05 mm.).

The general colour of the colony is orange-brown, the polyps are rather lighter.

MOPSEA ELEGANS, *sp. nov.*

(Plate lxiv. figs. 3 and 4; pl. lxviii. fig. 5; pl. lxxii.)

Stations 34, 41, 42, 47, 48.

Several beautiful golden-brown colonies, with rich dichotomous, almost parallel, branching. The largest is 34 cm. in height, with a spread of about 5 cm.; the branches have an average diameter of 2 mm. The axis shows the usual white calcareous internodes with fine longitudinal fluting and short amber-coloured nodes.

There is some variety in the origin of the branches. In certain cases the dichotomy is precisely at the node; in other cases the calcareous internode forms immediately below the node a slight shelf from which a new branch arises with a horny node as the first joint. The cœnenchyma is very thin, and, with the exception of a median line on each surface, is in great part hidden by the numerous polyps. These occur in alternating rows on each side, here and there encroaching on the free median spaces. Most of the branches show two rows on each side in their upper reaches, but in the lower parts of the colony three or four rows are often seen. The polyps are somewhat club-shaped, 0·75-1 mm. in height by about 0·5 mm. in maximum breadth. They project at an acute angle to the axis, but the upper parts are incurved. In the upper reaches there are about twenty on each side in a centimetre.

The superficial spicules are flat, often oval scales, with the following dimensions in millimetres.—·073 x ·066; ·052 x ·052; 0·38 x 0·55. Each scale shows a nucleus, often excentric, with fine ridges radiating from it. One margin of the scale is entire, the other bears more or less deep indentations, and the part of the scale to this side of the nucleus is studded with small warts. The whole might be compared to a ctenoid fish-scale, and they overlap one another, the overlapped part being the smooth portion.

Under low power the polyps present a characteristic punctate appearance, due to the conspicuous nuclei of the scales. The imbrication is well seen on a profile view of the polyps. Besides the scales there are short stout capstan-like bodies (·066 x ·031; ·042 x ·038; ·038 x ·031), with hardly any definite waist, with a knob at each end, and with about six pointed tubercles on each side of the middle line. They correspond closely to Kölliker's "Sechser."

The characteristic features of this new species are its dichotomous sub-parallel branching, the arrangement of the polyps in two alternating rows on each side of the younger branches, and the combination of superficial ctenoid scales with deeper tuberculate capstans.

There are many features in common between this species and two others which have been previously recorded from Australian seas, but it appears to be quite distinct. To mention only two features, we note that our new species may be readily distinguished from *Mopsea dichotoma* (Linné), which has been described in detail by Wright and Studer[4], by the quite different spicules; and from *M. encrinula* (Lamarck), also described by Wright and Studer[5], by the pinnate branching.

Ehrenberg's *Mopsea erythraea*[6] belongs not to *Mopsea* but to *Wrightella* or to *Melithaea*.

Pourtales's *Mopsea eburnea*[7] had eight spicules projecting from the mouth of the polyps, and cannot be included in this genus.

MOPSEA WHITELEGGEI, *sp. nov.*

(Plate lxvi., figs. 2 and 3; pl. lxxiii.)

Stations 10, 40, 44, 48.

This exceedingly delicate and graceful form is typically plume-like in its mode of growth; all branching is in one plane. Both the secondary branches, and the main branches from which they spring, bear numerous slender twigs disposed on each side like the barbs of a feather along the shaft. The calcareous nodes give rise to one twig each, on opposite sides of the branch in alternate succession. A few of the twigs branch again in the same manner. The average distance between two twigs is 1 mm.

The largest specimen is 23 cm. high with a span of 17·5 cm. across its luxuriantly branched upper portion. The basal portion

[4] Wright and Studer—Chall. Rep., Zool, xxxi., 1889, p 41, pl. ix., fig. 10.

[5] Wright and Studer—*Loc. cit.* p. 43, pl. vii., figs. 1, 1, 1; pl. ix., fig. 11.

[6] Klunzinger—Korallenthiere des Rothen Meeres, 1887, p 57, pl. vi., fig. 4, 4^a, 4^d.

[7] Pourtales—Bull. Mus. Comp. Zool. Harvard, i., 1868, p. 132.

of the stem is missing. The stem has a maximum diameter of 4 mm.; the average diameter of the larger branches is 2 mm., and of the twigs, 1 mm. Another specimen, also incomplete, has a height of 16 cm., with a span of 11 cm. The lower part of the stem is overgrown by a sponge.

Polyps occur here and there on the branches, but they are mainly confined to the twigs, along each side of which they are arranged alternately in a single row. Frequently this arrangement becomes irregular, the polyps encroach on the middle line, or a double row may be formed along each side. There are about fifteen polyps to 1 cm. in each row.

The polyps are small, ·5-·75 mm. in height, club-shaped, truncate, and turned upwards towards the tip of the twig. They are covered with closely-fitting, elongated spicules arranged transversely, which either interlock by means of their dentate margins, or overlap one another; the abaxial rows are composed of about sixteen such spicules arranged in an imbricate manner. Similar spicules form a low, eight-rayed operculum. The spicules of the cœnenchyma are like those of the polyps, but follow the longitudinal direction of the stalk and form a sort of pavement over its surface, adjacent spicules being closely interlocked by their teeth. The calcareous internodes of the axis bear fine longitudinal ridges, which are dentate at the upper and lower ends of the joint. The spicules are small, colourless, somewhat flattened spindles and lancet-shaped plates, frequently curved, and bearing numerous sharp, tooth-like warts, which are usually more strongly developed on one side of the spicule than the other. The following measurements were taken of length and breadth in millimetres:—·238 x ·085; ·17 x ·068; ·136 x ·051.

There are also numerous smaller spindles and forms approaching clubs:—·153 x ·025; ·112 x ·035; ·085 x ·034; ·068 x ·017 mm.

The colour of the colonies is pale-brown to cream-white, the axis occasionally tinged with pink.

Locality.—Eleven miles east of Broken Bay.

Genus ACANTHOISIS, *Wright and Studer.*

ACANTHOISIS FLABELLUM, *Wright and Studer.*

(Plate lxii., figs. 1 and 2.)

Acanthoisis flabellum, Wright and Studer, Chall. Rep., Zool., xxxi., 1889, pp. 45-46, pl. viii., figs. 1, 1a., 1b., pl. ix., fig. 12.

Stations 22, 47 and 53.

Some very fine fan-shaped specimens of an orange-brown colour agree with Wright and Studer's description of *Acanthoisis*

flabellum, though there appears to be a stronger tendency to anastomosis than in the Challenger specimens. The height of the largest colony is 24 cm., with a width of 16 cm. across the expanded portion.

A small, broken piece of a colony is of a brown colour with the polyps tending to encroach on the middle line of the branch instead of being strictly bilateral in arrangement. The spicules here are colourless, and rather smaller than in the orange specimens.

Previously recorded from Port Jackson, 30-35 fathoms.

Family PRIMNOIDÆ.

Genus STACHYODES, *Wright and Studer.*

STACHYODES STUDERI, *Versluys.*

Stachyodes regularis, Wright and Studer, Chall. Rep., Zool., xxxi. 1889, p. 55, pl. xi., figs. 2, 2ª; pl. xx, fig. 3.

Stachyodes studeri, Versluys, Die Gorgoniden der Siboga Expedition, ii. Die Primnoidæ, 1906, pp. 94-96, figs. 112-117.

Stations 15, 42, and 44.

Three incomplete specimens 11 cm., 23 cm. and 38 cm. in length respectively. On the most slender specimen the polyps occur in whorls of eight to nine; on the largest there are as many as ten to eleven in a whorl.

Previously recorded from Kermadec Islands, 600 fathoms; Celebes Sea (Siboga), 1080 and 1165-1264 M.

Genus AMPHILAPHIS, *Wright and Studer.*

AMPHILAPHIS PLUMACEA, *sp. nov.*

(Plate lxv., fig. 3; pl. lxviii., fig. 3; pl. lxxiv.)

Stations 22, 40, 44.

This delicate and graceful form bears a certain resemblance to an uncurled ostrich plume. Branching is approximately in one plane, and the branches and twigs show a strong tendency to sweep together in long, drooping curves. Occasionally the branches come off like the barbs along the shaft of a feather, but more generally the branching is dichotomous, or quite irregular.

Three of the four specimens are practically intact. The largest has a height of 18·5 cm. with a diameter near the base of 3 mm., the corresponding dimensions of the smallest are 8·5 cm. and 2 mm.

The cœnchyma is very thin, and allows the dark, bronze-like axis to shine through.

The polyps occur very rarely in two lateral rows; generally they are arranged in a spiral, which becomes closer in the upper part of the colony.

The polyps are 1-1·5 mm. in length. They stand out markedly from the branch at an angle of 45°-60°. They are armoured with eight close-set longitudinal rows of overlapping "ctenoid" scales; there are from eight to twelve in a row on the abaxial side, and a rather smaller number on the adaxial. The uppermost scale of each row is more strongly developed than the rest, and its upper edge is somewhat reflexed, so that it stands out from the operculum. In this way a sort of collar or circum-operculum is formed. Above this eight triangular scales form a well-defined, conical operculum.

The dimensions of the "ctenoid" scales in millimetres are ·316 x ·181; ·255 x ·272; ·204 x ·153. Their free edge is entire or crisply waved, around the well-marked nucleus numerous warts are grouped, and the clear border round the exposed portion of the scale bears strongly-marked radiating ridges.

The opercular scales are isosceles triangles with a strong concavity to the outer surface, and a corresponding ridge internally, which extends for about three-quarters the length of the scale. The surface is elaborately warted, and the narrow clear margin bears ridges. The following measurements were taken of length and breadth in millimetres.—·415 x ·204; ·34 x ·221.

The spicules of the cœnenchyma are approximately circular scales, with a central nucleus, round which warts are grouped. The border is clear, with at most a few low ridges (·187 x ·17 mm.; ·136 x ·119 m.m.; ·112 x ·112 mm.).

The colour of the specimens is fawn to brown.

This species differs from *Amphilaphis regularis*, Wright and Studer, in the following points:—(1) its much more slender build, and bushier, more luxuriant branching; (2) the almost invariable arrangement of the polyps in spirals, and their much denser crowding; (3) the smaller size of the polyps, and (4) the greater number of scales in the abaxial rows of the calyx.

From *Amphilaphis abietina*, Studer, it is distinguished:—(1) by the close spiral arrangement of the polyps; and (2) by showing no tendency for the branches to come off at right angles from the stem.

Locality.—Eleven miles E. by N. of Barrenjoey, 30-40 fathoms.

Genus PLUMARELLA, *Gray.*

PLUMARELLA LÆVIS, *sp. nov.*

(Plate lxvi., fig 1; pl. lxviii., fig. 4; pl. lxxv.)

Stations 44, 47, 48.

A number of incomplete branching pieces, and two complete colonies, of which the larger is 38 cm. high, with a width of 42 cm. across the branched portion. Branching is strictly confined to one plane. From the main branches lesser branches are given off alternately from each side at rather wide intervals; these branches bear long, slender, relatively sparse twigs, alternating in a single row along each side, about five to six on each side in a stretch of 5 cm. These twigs are from 3-7 cm. long, with an average diameter of 1 mm.; they either fork dichotomously or bear a few scattered twigs.

The axis is furrowed, and of a dull yellow colour, with a gold sheen in the upper portions of the colony. The cœnenchyma is very thin; in the lower part of the colony the furrows on the axis show plainly through it. One strongly-marked furrow can be traced on both faces of the colony along the median line of every branch, down to the finest ramifications.

The polyps alternate in a single row along each side of the twigs and lesser branches. There are ten to twelve on each side in a length of 1 cm. They are small, ·5-·75 mm. in length, with truncated mouths directed distally.

The spicules are small, colourless and pale yellow scales of characteristically simple form. The majority are ovals or ∞ shapes, and irregular forms. Their margins are entire or minutely dentate, and their surfaces are either quite smooth, or bear only a few small scattered warts. The following measurements were taken of length and breadth in millimetres:—·171 x ·032; ·112 x ·058; ·102 x ·038; ·077 x ·024; ·058 x ·021. These spicules interlock or overlap one another slightly; on the polyp they are arranged transversely, but the eight longitudinal rows are not very distinct. The operculum is low and flat.

The colour of the colony is dull yellow to golden-brown.

Position.—In certain respects this species comes very near *Plumarellapenna* (Lamarck), as described by Versluys[8]. The polyps are very similar, and the spicules have a strong resemblance. But, on the whole, the spicules of our specimen

[8] Versluys—Die Gorgoniden der Siboga Expedition, ii. Die Primnoidæ, 1906, p. 18.

are smaller than those described for *P. penna*, and are smoother and of more simple outline. The chief point of difference, however, lies in the mode of branching, which in *P. penna* is close and typically feather-like. Versluys speaks of as many as twenty-three twigs on each side of a branch in a stretch of 5 cm.; these twigs, moreover, are never longer than 3 cm. and are always unbranched.

Locality.—Eleven miles east of Broken Bay.

PLUMARELLA THETIS, *sp. nov.*

(Plate lxvi., fig. 5; pl. lxviii., fig. 6; pl. lxxvi.)

Stations 34, 40, 42, 47, 48, 53.

This handsome new species is well represented by dried specimens; two small pieces are preserved in spirit.

The colonies are typically feather-like. The long, frond-like branches bear on each side a row of alternating twigs. These twigs occasionally branch in the same pinnate manner, but usually remain simple. The polyps rarely occur on two sides of the twigs; usually they are arranged all over the twigs in close spirals. On the larger branches they may be confined to two sides, or they may be scattered indefinitely over the whole surface.

None of the specimens show the basal portion. The most richly-branched colony has a height of 32 cm., with a width of 53 cm. The stem has a diameter of 5 mm. The twigs average 3-4·5 cm. in length, with a diameter of 2 mm. There are about fourteen twigs on each side in a length of 5 cms.

Some of the colonies are much more heavily built. A single frond is 43 cm. long, with a diameter of 5·5 mm. at the base. The twigs in this case are 8-10 cm. long, with a diameter of 2-3 mm., and only seven to eight occur in each row in a length of 5 cm.

The polyps are very closely crowded over the twigs. Their average length is 1 mm. The calyx scales are arranged in longitudinal rows, of which the abaxials alone are complete. These consist of about six relatively large, overlapping scales. The adaxial rows are reduced to about one small scale, and the adaxial-laterals are also very few in number and are overlapped by the abaxial-laterals. The calyx scales are broad, shield-like and fan-like, with entire margins around the overlapping portion; the overlapped portion contains the nucleus, surrounded by numerous finely-tuberculate warts. The clear border between the outer margin and the warted portion bears radiating ridges. The following measurements were taken of the length and breadth of

the calyx scales in millimetres:—·544 x ·442; ·408 x ·595; ·289 x ·425; ·272 x ·306; ·204 x ·374; ·357 x ·374. The eight opercular scales are of equal size—·425 x ·238 mm.; ·391 x ·204 mm. They are high, sharply-pointed isosceles triangles, bearing a strong median ridge; another ridge runs at right angles to the median ridge across the basal portion, so that the two together form a sort of T-square. Numerous small warts and jagged projections are grouped along the sides of the main ridges, and occur more sparsely over the "blade" of the scale; the margins of the two long sides of the scale are entire. The spicules of the cœnenchyma are for the most part scales, thicker than those of the calyces, and without the clear border; they show a diversity of form, oval, fan-shaped, triangular, etc., and are closely covered with tuberculate warts which surround an excentric nucleus; their dimensions are:—·374 x ·391 mm.; ·323 x ·153 mm.; ·272 x ·204 mm.; ·204 x ·17 mm. There are also a few small approximately spherical bodies, covered with warts, ·068 x ·068 mm.; ·085 x ·085 mm.; ·102 x ·102 mm.

The colour of the colonies is light brown with polyps of a lighter shade. The axis is dark brown to greenish-bronze, and is finely grooved.

This species agrees in many respects with *Plumarella spinosa*, Kükenthal. *P. spinosa*, however, has the opercular scales of very unequal size, and the scales have throughout a rather different type of ornamentation from that in our specimens.

Locality.—Eleven miles E. by N. of Broken Bay, 30-40 fathoms.

PLUMARELLA CORRUSCANS, *sp. nov.*

(Plate lxv., fig. 4; pl. lxviii., fig. 8; pl. lxxvii.)

Stations 40, 44, 47.

This is an extremely beautiful and graceful form with typically feather-like branching. It is well represented both among the dried specimens and among those in spirit. The largest specimen is an almost perfect colony, about 44 cm. high, with a maximum breadth across the branched portion of 26 cm. A well-developed calcareous expansion, about 2 mm. thick, attaches the colony to the substratum. From this there rises a cylindrical stem, 6 mm. in diameter, which almost from its origin gives off twigs in a single row along each side. At a height of about 19 cm. the stem divides into two main branches, which in their turn give off lesser

branches. All these ramifications bear numerous twigs which alternate in a single row along each side. There are about thirteen twigs in each row in a length of 5 cm.; the average length of a twig is 4 cm.

The polyps occur in a single row on each side of the twigs and branches--those of one row alternating with those of the other. There is great evenness and regularity in their arrangement; they never encroach on the middle line. There are about ten polyps to 1 cm. in each row; the tip of one polyp just reaches to the base of the one immediately above, the length of a polyp being 1 mm. Among the normal-sized polyps in some of the specimens there are here and there large swollen polyps of about twice the size of the others. These contain reproductive bodies.

Seen with a lens, the entire surface of the colony, both cœnenchyma and polyps, presents a glistening frosted appearance that is very characteristic. The axis is almost black, and bears fine longitudinal striations.

The polyps are armed with well-defined longitudinal rows of broad, overlapping scales; there are about six of these in the abaxials, but in the lateral rows the number is considerably reduced, and the adaxials are indistinct. The operculum of eight isosceles triangles is rather high and conical in the normal-sized polyps, but much lower and flatter in the large individuals. The armature of the two kinds of polyps does not otherwise differ in any marked way, except that the scales on the bodies of the large polyps are much larger than those on the small polyps.

The polyp scales are rather thin, fan-shaped "ctenoid" forms, with a well-marked nucleus surrounded by tuberculate warts, and a relatively broad clear border round the upper half of the scale, bearing a few strongly-marked radiating ridges. The following measurements were taken of length and breadth in millimetres:—·255 x ·204; ·204 x ·238; ·17 x ·136.

The opercular scales are, as usual, isosceles triangles with a median ridge, bearing numerous small warts without definite arrangement. These scales are throughout of very uniform size —·459 x ·221 mm. The scales of the coenenchyma are irregularly circular or oval; they are smaller than those of the polyps (·107 x ·136 mm.; ·102 x ·102 mm.), and have a number of warts surrounding an approximately central nucleus.

The colour of the colonies is usually light brown; one dried specimen has a pinkish colour, which is apparently soluble, for a piece put in alcohol stained the liquid pink after a short time.

Locality.—Coast between Port Jackson and Port Hacking.

PLUMARELLA FILICOIDES, *sp.nov.*

(Plate lxv., fig. 5 ; pl. lxviii., fig. 1 ; pl. lxxviii.)

Stations 13, 17, 34, 48.

Several colonies, each a single fern-like frond, the largest 23 cm. in height. From a slightly encrusting base rises the cylindrical stem—3·5 mm. in diameter—which, from a point about 2 cm. above the base bears a single row of twigs along each side, the twigs on one side alternating with those on the other. The average length of these twigs is 4 cm. and their diameter 2 mm. They are rather distant, there being about twelve on each side in a stretch of 5 cm. In a few cases a stouter branch is given off from near the summit of the colony, bearing in its turn lesser twigs in a single row on each side.

The whole surface of the twigs is covered with a close-wound spiral of polyps ; on the stem the polyp-arrangement is bilateral, though here and there a few encroach on the middle line.

The polyps show distinct dimorphism. The majority are very small (·5 mm. long), and inconspicuous, being partially sunk in the cœnenchyma, and pressed against the branch. They are armoured with a few broad scales ; in the abaxials, which are the most complete of the longitudinal rows, there are from three to four scales ; the adaxials are practically absent. The operculum is a sharp cone, formed of eight rather high isosceles triangles.

Here and there among the smaller polyps there are large polyps of about twice the size. These are pressed against the branch, but are so swollen out with reproductive bodies that they project as large, rounded warts. Not only in size do these larger polyps differ from the others ; they have a much lower operculum, and their armature consists of a larger number of scales—there are usually four scales in the abaxial rows and two to three in the adaxial-laterals. The polyp-scales are broad and heavy, approximately fan-shaped, and closely studded with tuberculate warts ; the clear border of the scale is very narrow, and bears well-marked ridges. The following measurements were taken of length and breadth in millimetres :—·476 x ·357 ; ·391 x ·204 ; ·391 x ·51 ; ·289 x ·272. The opercular scales have dimensions of ·391 x ·204 mm.; ·323 x ·204 mm. They are marked with a strong T-square ridge ; the clear border is relatively broad and smooth.

The cœnenchyma is covered with a close mail of rather large scales, similar to those on the polyps, but with the clear border either very narrow or entirely obsolete. The following measure-

ments were taken :—·323 x ·357 mm.; ·272 x ·255 mm.; ·119 x ·085 mm. The colour of the majority of the colonies is red-brown; one small specimen is cream-coloured, with very opaque spicules. The axis is greenish-bronze, with fine longitudinal striations.

Locality.—South Coast, New South Wales.

PLUMARELLA VERSLUYSI, *sp. nov.*

(Plate lxvi., fig. 4; pl. lxviii., fig. 2; pl. lxxix.)

Station 53.

The largest specimen has a height of 22·5 cm. with a width of about 12 cm. across the branched portion; the basal attachment is lacking. The branching is confined to one plane, and is typically feather-like. Along each side of the stem and main branches there is a row of twigs alternating with those of the opposite side. The average length of a twig is 2 cm. with a diameter of 2 mm.; there are about fourteen twigs on each side of a branch in a length of 5 cm. The polyps are arranged bilaterally on the larger branches; on the twigs their arrangement is also lateral, but a few may encroach on the middle line. Usually they stand in a single row, but occasionally the row is doubled.

The polyps are of two sizes; the majority are very small, ·75 mm. in length; here and there occur larger, more swollen polyps, 1·25 mm. in length. In the smaller polyps the armature consists of overlapping scales, of which there are about four in the abaxial longitudinal rows; the lateral rows are very indistinct, and the adaxials practically obsolete; the uppermost of each longitudinal row is larger than the rest and projects, so that a slight circumoperculum is formed. The operculum is well-defined and conical, formed of eight approximately equal isosceles triangles. The armature of the larger polyps is of the same general type as that just described; but the longitudinal rows are even less distinct, the polyp scales are rather larger and more numerous, and the operculum is low.

The polyp-scales are broad and fan-shaped, with a distinct nucleus, numerous tuberculate warts, and a clear fluted margin round the part of the scale that projects when on the polyp. The general appearance of the scales is very similar to those of *Plumarella filicoides*, but they are markedly thinner, and less heavily sculptured than in that species. The following measurements were taken of length and breadth in millimetres:—·425 x ·289; ·306 x ·306; ·255 x ·187. The opercular scales are similar to those of *P. filicoides*, but are less strongly ridged—·34 x ·204 mm.; ·289 x ·187 mm.

The colour of the colony is rufous-brown, the polyps rather lighter.

Position.—This species approaches very closely *Plumarella filicoides*. The chief points of difference from that species are—(1) its more slender build, and greater tendency to branch; (2) the bilateral arrangement of the polyps; (3) the rather larger size of the polyps; (4) the larger number of scales in the abaxial rows on the polyps; and (5) the less heavy type of spicules.

Genus PRIMNOELLA, *Gray*.

PRIMNOELLA AUSTRALASIÆ, *Gray*.

(Plate lxi., fig. 1.)

Primnoella australasiæ, Wright and Studer, Chall. Rep., Zool., xxxi., 1889, p. 88, pl. xviii., figs. 1, 1a, pl. xxi., fig. 15.

Primnoella australasiæ, Versluys, Gorgoniden der Siboga Expedition, ii. Die Primnoidæ, 1906, pp. 52-54, figs. 55-59.

Stations 31, 41, 42, 43, 44, 47, 48, 53, 54.

The three largest specimens are 135 cm., 113 cm., and 83 cm. in length. In very few cases is the cœnenchyma intact; generally it is more or less worn away, and the axis of the colony is overgrown with Palythoids, Cirripedes, and in one case by *Alcyonium* (*Erythropodium*) *reptans*, Kükenthal.

Localities.—Eleven miles east of Broken Bay; Cape Hawke, 25-28 fathoms.

Previously recorded from Australian Seas; New Zealand; Bluff Harbour, Tasmania, 7 fathoms; Port Jackson (New South Wales), 150 fathoms; Station 163A, off Twofold Bay (New South Wales), 150 fathoms.

PRIMNOELLA FLAGELLUM, *Studer*.

Primnoella flagellum, Wright and Studer, Chall. Rep., Zool., xxxi., 1889, p. 85, pl. xviii., figs. 2, 2a, pl. xxi., fig. 12.

Station 48.

A single specimen, 155 cm. in length, without a basal attachment. The lower part of the wire-like axis is worn bare of cœnenchyma; above this, 20 cms. of the length is encrusted with Cirripedes and *Alcyonium* (*Erythropodium*) *reptans*, Kükenthal. The remainder of the colony is a long, flexible, whip-like, unbranched stem, closely covered with polyps arranged in whorls, and having an almost uniform diameter of 2 mm. There are about eight polyps in a whorl; the average length of a polyp is 1·5 mm. The geographical distribution is remarkable.

Previously recorded from—Station 308, off Tom Bay, Patagonia, 175 fathoms; S. Atlantic, near S. American coast, Lat. 43° 56′ 2″ S., Long. 60° 25′ 2″ W., 60 fathoms.

PRIMNOELLA DISTANS, *Studer*.

Primnoella distans, Wright and Studer, Chall. Rep., Zool., xxxi., 1889, pp. 85, 86, pl. xvii., figs. 1, 1a.

Stations 34, 42.

There are a number of broken pieces of this delicate form, some with the peculiar stolon-like basal attachments. The largest specimen is 15·5 cm. long. The polyps are for the most part in opposite pairs, but whorls of three occur. There are usually only five transverse rows of scales in the abaxial rows on the polyp-calyx—never so many as seven to eight, as described by Wright and Studer.

Previously recorded from—Station 23, off Sombrero, West Indies, 450 fathoms; Station 122 A-C, off Pernambuco, 120-400 fathoms; Lat. 22°21′ S., Long. 154° 7′ 7″ E., 550 fathoms.

Genus CALIGORGIA, *Gray* (emend. *Studer*).

CALIGORGIA LAEVIS, *sp. nov.*

(Plate lxv., fig. 1; pl. lxviii., fig. 7; pl. lxxx.)

Stations 47, 48.

Several incomplete branching specimens, the largest with a height of 20 cm. In two cases the stem is partially overgrown by a sponge. Branching is luxuriant and typically dichotomous; the angle of the dichotomy is small. The diameter of the thickest branches is 2·5 mm. The axis is brown.

The polyps are arranged in close whorls on the thicker branches as well as on the slender twigs. The average number of polyps in a whorl is four, but six sometimes occur, especially where a dichotomy is about to be formed, and eight is a common number on the thicker branches. The usual number of whorls in a length of 3 cm. is twenty-two to twenty-four; the length of a polyp is about 1 mm. The mouths are directed distally.

The only complete longitudinal rows of calyx scales are the abaxial and the abaxial-lateral; there are never more than nine overlapping scales in the abaxial rows; the number in the abaxial lateral is more variable, but is usually about six. The adaxial and adaxial-lateral rows are very incomplete, usually consisting of two to three scales. The opercular scales are triangular and pointed, the two abaxials being slightly larger than the others.

The calyx scales are mostly rounded or oval "ctenoid" forms, with a distinct nucleus round which are grouped numerous warts. The outline is usually entire for about two-thirds of the circumference, and the clear space between the central warted portion and the edge is quite smooth, without any hint of ridges or flutings. The following measurements were taken of length and breadth in millimetres—·272 x ·238 ; ·254 x ·153 ; ·221 x ·221 ; ·119 x ·102. The opercular scales are isosceles triangles (·34 x ·17 mm.) ; the margin is entire for the greater part of the two longer sides, and all the upper portion of the scale is smooth ; the nucleus is situated near the base of the triangle, and is surrounded by numerous warts. The spicules of the cœnenchyma are small scales and irregular bodies—·102 x ·085; ·085 x ·051; ·068 x ·068; ·051 x ·034 mm.

The colour of the colonies is pale brown to cream.

This species agrees in many ways with the description of *Caligorgia elegans* (Gray), given by Kinoshita,[9] but is distinguished from that species by the entire margins and smooth borders of the scales, and the smaller number of scales in the abaxial rows of the polyp calyx. It may also be noted that our specimens never have as many as eighteen polyps to a whorl, nor are the polyps ever arranged irregularly on the stouter branches, as in *Caligorgia elegans* (Gray).

Family GORGONIDÆ.

Genus LEPTOGORGIA, *Milne-Edwards* (emend. *Verrill*).

LEPTOGORGIA, *sp.*?

A single specimen is referable to the genus *Leptogorgia*, but it is small and incomplete, and we do not feel justified in saying more than that it is in the neighbourhood of *Leptogorgia alba*, Verrill, and *Leptogorgia flexilis*, Verrill.

The height of the colony is 9 cm., with an almost constant diameter of 2 mm. Four simple branches are given off along one side of the stem at intervals varying from 3·5 to 8 mm. Both stem and branches are somewhat flattened. The polyps are arranged laterally ; their openings are very small and inconspicuous; and they are completely retracted into the cœnenchyma.

The spicules are colourless, double spindles—·132 x ·035 mm.; ·091 x ·046 mm.; ·036 x ·03 mm.; and a few crosses, ·068 x ·045 mm.

The colour of the colony is pale fawn.

Locality.—Between Port Jackson and Tuggerah, N. S. Wales.

[9] Kinoshita—Primnoidæ of Japan, Journ. College Sci. Tokyo, xxiii., 1908.

Family GORGONELLIDÆ.

Genus CTENOCELLA[10], *Valenciennes.*

CTENOCELLA PECTINATA, *Pallas.*

(Plate lxxxi.)

Ctenocella pectinata, Pallas, Elenchus Zoophytorum, 1766, p. 179.

Ctenocella pectinata, Ridley, Zool. Coll. H.M.S. "Alert," 1884, p. 348.

Ctenocella pectinata, Wright and Studer, Chall. Rep., Zool., xxxi., 1889, p lxvi.

Stations 34, 42, 44, 47.

There are several very perfect colonies of typical lyre-shape; they are all in the dried condition. The height of the largest specimen is 50 cm., with a width of 42 cm. From a slightly encrusting base rises a cylindrical stem, 7 mm. in diameter, which soon forks. The two branches thus formed diverge at an angle of 45°, and give off, along the upper side only, a series of parallel, ascending twigs. The space between two twigs is about 8 mm. One or two of these lesser branches may be stronger than the rest, and may give off numerous ascending twigs in turn, or fork dichotomously. More generally, the branches are simple, from 4-12 cm. in length, and with an almost uniform diameter of 2-3 mm.

The axis is light brown, and strongly furrowed. The cœnenchyma is thin, but very compact and smooth; in many places a distinct median furrow can be made out.

The polyps have, on the twigs, an irregular bilateral arrangement, but on the larger branches they occur all over the surface. They are very numerous, about 0·5 mm. apart, and are all retracted into very low, wart-like verrucæ.

The spicules include the following types:—colourless double clubs—·068 x ·034 mm.; ·051 x ·034 mm.; a few crosses—.051 x ·051 mm.; ·034 x 0·34 mm.; and more elongated forms approaching double-spindles, with scarcely any "waist"—·085 x ·025 mm.; ·068 x 0·25 mm.

The colour of the specimens is cream-white to yellowish.

Locality.—Eleven miles east of Broken Bay.

Previously recorded from Indian Ocean, seas of the Moluccas, India and China, Cuba, Australia (Warrior Reefs, Torres Strait, 12 fathoms; off N. W. Cape, W. Australia, 3-4 fathoms).

[10] In his "Revision of the Gorgonellidæ" (Proc. Roy. Irish Academy, 1910, p. 319), Mr. J. J. Simpson has shown convincingly that the genus *Ctenocella* should be merged in *Scirpearia.*

Order V. STELECHOTOKEA, *Bourne.*

Family TELESTIDÆ.

Genus TELESTO, *Lamouroux.*

TELESTO TRICHOSTEMMA, *Dana.*

Telesto trichostemma, Wright and Studer, Chall. Rep., Zool., xxxi., 1889, pp. 264, 265.

Station 44.

Three branching specimens, much overgrown with Hydroids, etc. The largest specimen is 19·5 cm. in height, with an average diameter of 2·5 mm. The polyps are about 5 mm. apart; they are 2·5-3 mm. in height, and project at an angle of 45° to 60°. The spicules are as described by Wright and Studer, *i.e.*, "elongated spindles with strong lateral spines, often provided with lateral branched processes, or forked at one extremity." The colour of the specimens is yellowish-brown.

Previously recorded from Torres Strait, 3-11 fathoms; Fiji Islands; Maldives.

TELESTO ARBOREA, *Wright and Studer.*

(Plate lxvii., fig. 2.)

Telesto arborea, Wright and Studer, Chall. Rep., Zool., xxxi., 1889, pp. 262-264, pl. xxxix., figs. 1, 1a.

Telesto arborea, Thomson and Henderson, Proc. Zool. Soc., 1906, pp. 434-435.

Station 42.

There are a few small, much broken species in the present collection. The lateral polyps have dimensions of 4 x 2 mm. or 5 x 2·5 mm. The colour is dark brown. The spicules are as described by Wright and Studer; we give a figure of them here, as there is apparently none in any previous report of this species.

Previously recorded from Arafura Sea, 49 fathoms; Zanzibar (Kokotoni Harbour, 5 fathoms, and Wasin Channel, 10 fathoms); Maldives.

Family KOPHOBELEMNONIDÆ.

Genus KOPHOBELEMNON, *Kölliker.*

KOPHOBELEMNON SCHMELTZII (*Kölliker*).

Sclerobelemnon schmeltzii, Kölliker, Anatom. Systemat. Beschreib. Alcyonarien, 1 Abth. Die Pennatuliden, 1872, p. 312, pl. xxi., figs. 184A, 184B, 185.

Station 25.

Three specimens of a chocolate-brown *Kophobelemnon*. The colonies are cylindrical, 13-14 cm. high, the polyp-bearing portion rather thicker (7-9 mm.) than the stalk (5-6 mm.); there is no terminal bladder; the polyps are arranged in rather irregular longitudinal rows, leaving only a small bare strip on the pro-rachidial side. The tentacles of the polyps are without spicules. The upper part of the polyps is much poorer in spicules than the lower. Siphonozooids, small, brown, wart-like, in very numerous longitudinal rows. Axis thick, with a tendency to quadrangular cross-section in the lower part of the colony. Spicules biscuit-shaped, flat discs and ∞-shapes, with a few warts. They are very sparse in the cutis of the stalk, numerous in the club portion round the siphonozooids and on the polyps, absent in the interior.

This description agrees with that of *Sclerobelemnon schmeltzii*, Kölliker.

Thomson and Simpson have shown[11] that it is impossible to maintain a hard and fast line between the genera *Kophobelemnon* and *Sclerobelemon*, since there exist species such as *Kophobelemnon bürgeri*, Herklots, and *K. intermedium*, Thomson and Simpson, partaking of the characters of both. We therefore keep this species in the older genus *Kophobelemnon*.

Locality.—Off Newcastle, 24-48 fathoms.

Previously recorded from Formosa.

Family PTEROEIDIDÆ.

Genus GODEFFROYIA, *Kölliker.*

GODEFFROYIA ELEGANS, *Kölliker.*

Godeffroyia elegans, Kölliker, Anatom. Systemat. Beschreib. Alcyonarien, 1 Abth. Die Pennatuliden, 1872, p. 116, figs. 63-65.

Stations 22, 54.

Kölliker gives the following statement of the generic characters —"Small, delicate sea-pens, of the same type of growth as *Pter-*

[11] Thomson and Simpson—An account of the Alcyonarians collected by R.I.M.S.S. "Investigator" in the Indian Ocean. Part ii, 1909.

oeides. The siphonozooid-plate forms on the ventral border of the pinnule a cushion that extends on to the keel. Pinnules provided with *one* strong supporting row of needle-like spicules on the ventral border only, otherwise without strong rays of spicules. Autozooid zone abutting on the ventral spicule row, supported by numerous small needles, and having several rows of autozooids on each side."

This diagnosis was founded on a single specimen of small dimensions. Our three specimens agree with it in all essentials, but are very much larger.

The following table gives their dimensions in centimetres :—

	Sp. A.	Sp. B.	Sp. C.
Length of entire colony	19	18	14
,, rachis	10	9·5	8·5
,, stalk	9	8·5	5·5
Breadth of rachis	5·5	5	4·5
,, stalk	1·4	1·2	1·1
,, keel in the middle ...	1·5	0·8	0·9
Length of pinnules on ventral side...	3	2·5	2
Maximum breadth of pinnules ...	1·1	0·9	0·8
Number of pinnules on each side ...	35	27	26

The colour of all three specimens is dark brown, with a purplish tinge on the keel and pinnules.

Previously recorded from the Gulf of Siam.

Genus SARCOPHYLLUM, *Kölliker*.

SARCOPHYLLUM AUSTRALE, *Kölliker*.

(Plate lxxxii.)

Sarcophyllum australe, Kölliker, Anatom. Systemat. Beschreib. Alcyonarien, 1 Abth. Die Pennatuliden, 1872, p. 116, figs. 66, 67.

Stations 28, 31, 32, 54.

A number of specimens agree in the main with Kölliker's account of *Sarcophyllum australe*. At the intersections of the pinnules there are, on the ventral side, prominent transverse cushions bearing minute siphonozooids. The spicules in the interior of the lower part of the stem are relatively enormous, white 8-shaped forms and a few discs, at once visible to the naked eye. With regard to the other characters, we found some variation in the different specimens, variations that may well be dependent on the age and vigour of the colony. For instance, in the larger specimens there are numerous rows of autozooids on the pinnules, in accordance with Kölliker's account, but a small and obviously young specimen has on most pinnules only one row

of autozooids, rarely two. Hickson notes much the same thing in his Preliminary Report on a collection of Alcyonaria and Zoantharia from Port Phillip.[1 2]

Again, one of the marks that is given by Kölliker to distinguish the genus *Sarcophyllum* from *Pteroeides* is the absence of spicule-rays in the pinnules. We found this to hold true for all the larger specimens, but, in the young colony above referred to, which has much less fleshy pinnules, the rays of spicules were very well marked. This seems to us of considerable interest as indicating the danger that arises from basing genera on characters that may be present in the full-grown form only. We were in considerable difficulty in the present instance, until we detected the eminently characteristic spicules of *Sarcophyllum australe* in the base of the colony. The following table gives the dimensions in cm. of the largest, and of the smallest specimens :—

	Specimen A.	Specimen B.
Length of the entire colony ...	22·5	7·2
,, rachis	13	3·5
,, stalk...	9·5	3·7
Breadth of the rachis	6·5	0·9
,, stalk	5·5	0·3
Maximum breadth of pinnules ...	3	0·4
Height of pinnules in the middle ...	2	0·4
Number of pinnules on each side ...	30	27

In all the larger colonies the stalk is greatly swollen midway between the rachis and the base. The smallest specimen shows no such swelling.

The colour of the specimen is light brown to dark chocolate-brown, sometimes with a purplish tinge here and there.

Localities.—Cape Hawke, 10-12 fathoms, and 25-28 fathoms; off Port Stephen, 32-48 fathoms.

Previously recorded from Australia—Port Phillip, Victoria (Hickson).

[1 2]Hickson—Proc. Roy. Soc. Vict., n.s., ii., 1890, p. 136.

EXPLANATION OF PLATE LXI.

Fig. 1.—*Alcyonium* (*Erythropodium*) *reptans*, Kükenthal, growing on axis of *Primnoella australasiæ*, Gray. x 5.

Fig. 2.—Polyp of *Alcyonium etheridgei*, sp. nov. x 20.

Fig. 3.—Lobe of colony of the same with expanded polyps. x 2.

1

2

3

G. DAVIDSON, Del.

[This plate should read Plate LXI not XLI. See previous page.—Sub-Editor.]

EXPLANATION OF PLATE LXII.

Fig. 1.—*Acanthoisis flabellum*, Wright and Studer. x 2.

Fig. 2.—Detail of the same. x 20.

Fig. 3.—Very young colony of *Alcyonium etheridgei*, sp. nov. x 2.

Fig. 4.—*Dendronephthya waitei*, sp. nov. Complete colony. Nat. size.

1

3

4

2

G DAVIDSON, Del.

EXPLANATION OF PLATE LXIII.

Fig. 1.—Small portion of colony of *Mopsea flabellum*, sp. nov. Nat. size.

Fig. 2.—Axis of same. x 3.

Fig. 3.—Enlargement of polyps. x 12.

Fig. 4.—Spicules of *Mopsella textiformis*, Lamarck.

Fig. 5.—Axis of same, with a few patches of cœnenchyma. Nat. size.

1

2

3

4

5

G. DAVIDSON, Del.

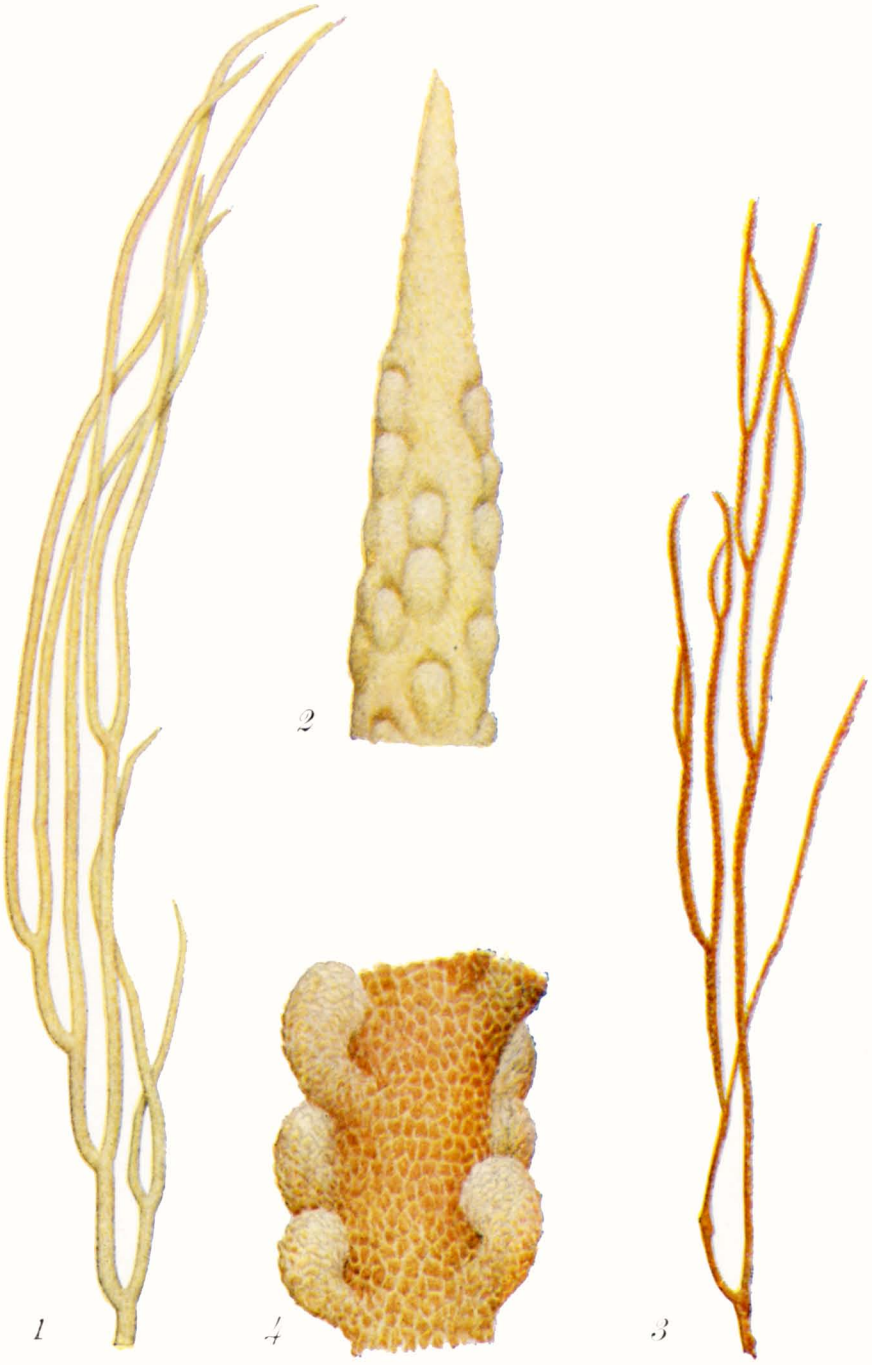
EXPLANATION OF PLATE LXIV.

Fig. 1.—*Mopsea australis*, sp. nov. Nat. size.

Fig. 2.— ,, ,, . Enlarged tip of a dried branch. x 15.

Fig. 3.— ,, *elegans*, sp. nov. Small portion of a colony. Nat. size.

Fig. 4.— ,, ,, . Enlargement of stem and polyps. x 25.



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EXPLANATION OF PLATE LXV.

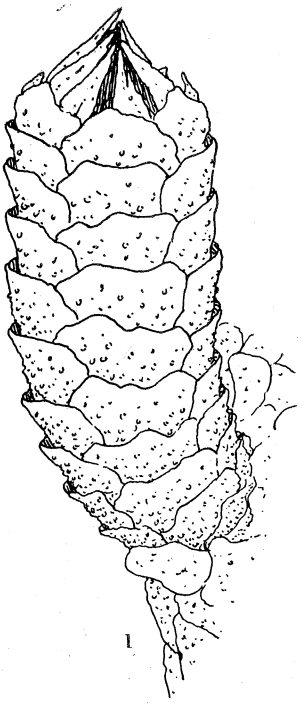
Fig. 1.—Polyp of *Caligorgia lævis*, sp. nov.

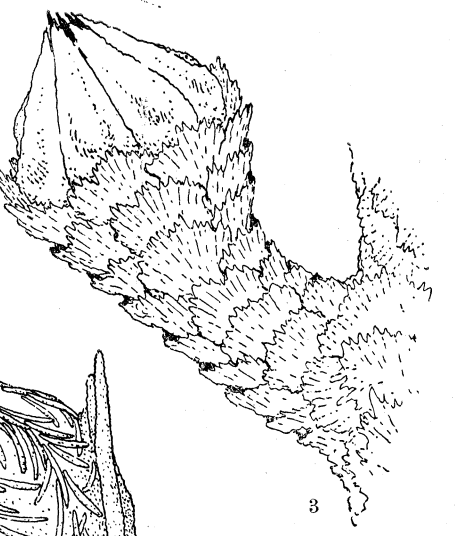
Fig. 2.— ,, *Dendronephthya waitei*, sp. nov.

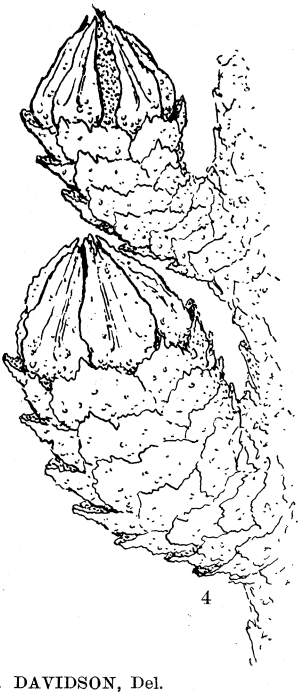
Fig. 3.— ,, *Amphilaphis plumacea*, sp. nov.

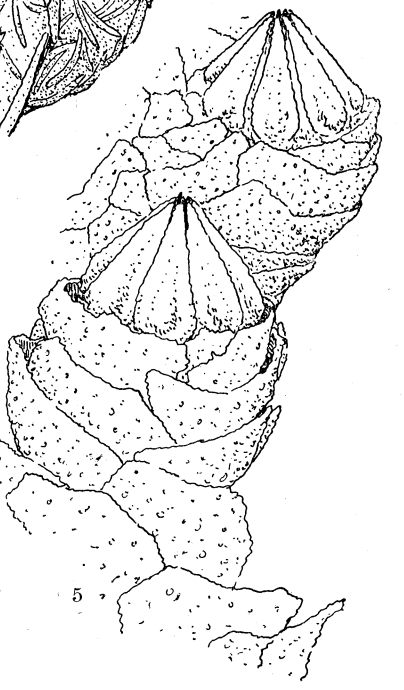
Fig. 4.— ,, *Plumarella corruscans*, sp. nov.

Fig. 5.— ,, *Plumarella filicoides*, sp. nov.









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EXPLANATION OF PLATE LXVI.

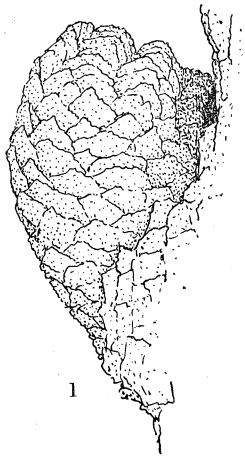
Fig. 1.—Polyp of *Plumarella lævis*, sp. nov.

Fig. 2.— ,, *Mopsea whiteleggei*, sp. nov.

Fig. 3.—Spicules of the same.

Fig. 4.—Polyp of *Plumarella versluysi*, sp. nov.

Fig. 5.— ,, ,, *thetis*, sp. nov.



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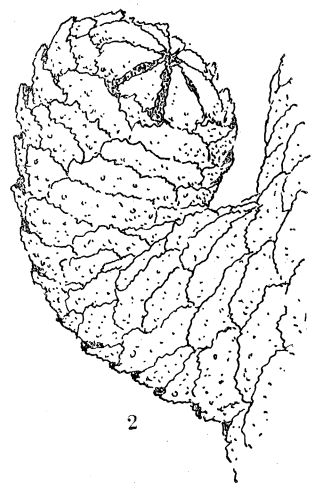

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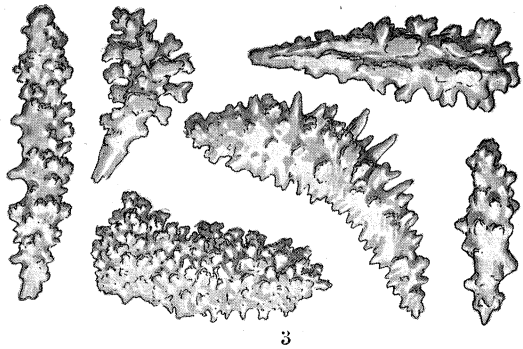

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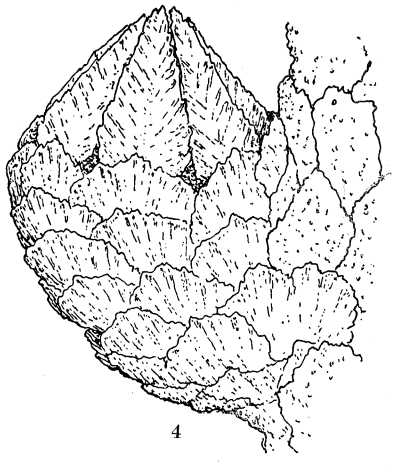

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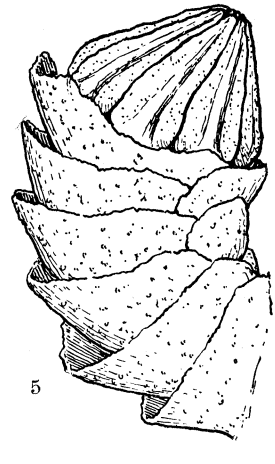

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EXPLANATION OF PLATE LXVII.

Fig. 1.—Spicules of *Mopsea dichotoma*, Linné.

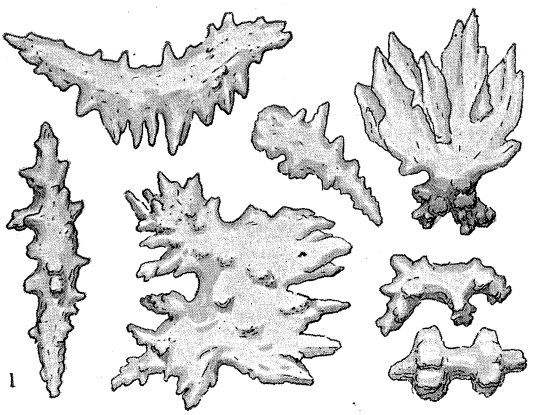
Fig. 2.— ,, *Telesto arborea*, Wright and Studer.

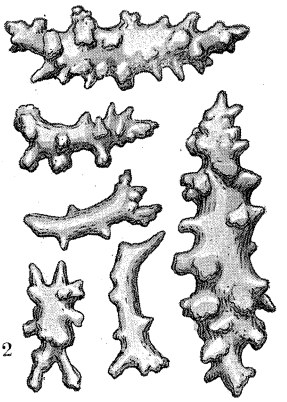
Fig. 3.— ,, *Dendronephthya waitei*, sp. nov., (a) cortex ; (b) base, (c) Stützbündel, (d) polyp.

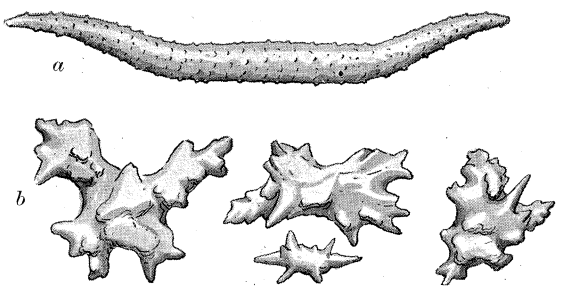
Fig. 4.— ,, *Alcyonium etheridgei*, sp. nov.

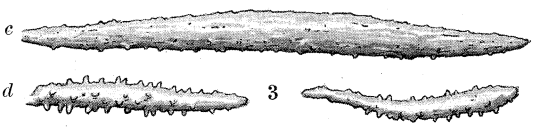
Fig. 5.— ,, *Mopsea australis*, sp. nov.

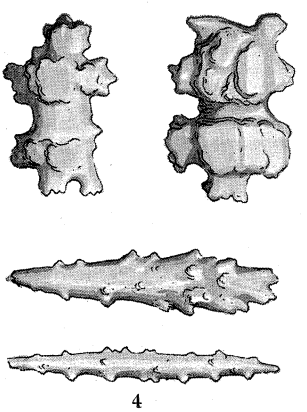
Fig. 6.— ,, ,, *flabellum*, sp. nov.

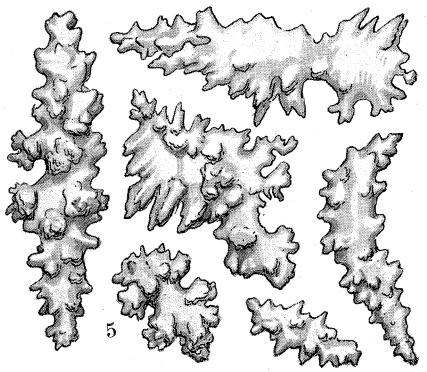


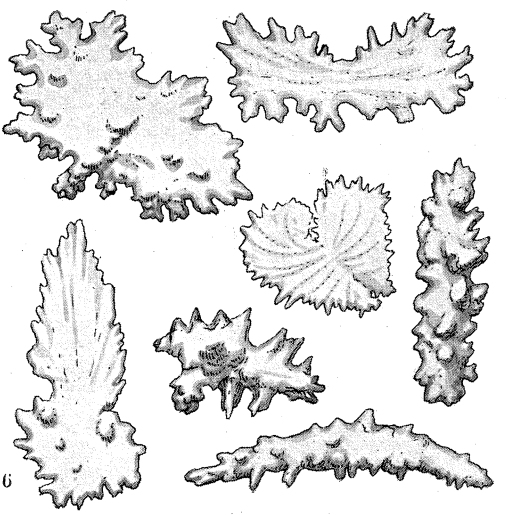












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EXPLANATION OF PLATE LXVIII.

Fig. 1.—Spicules of *Plumarella filicoides*, sp nov.

Fig. 2.— ,, ,, *versluysi*, sp. nov.

Fig. 3.— ,, *Amphilaphis plumacea*, sp. nov.

Fig. 4.— ,, *Plumarella lævis*, sp. nov.

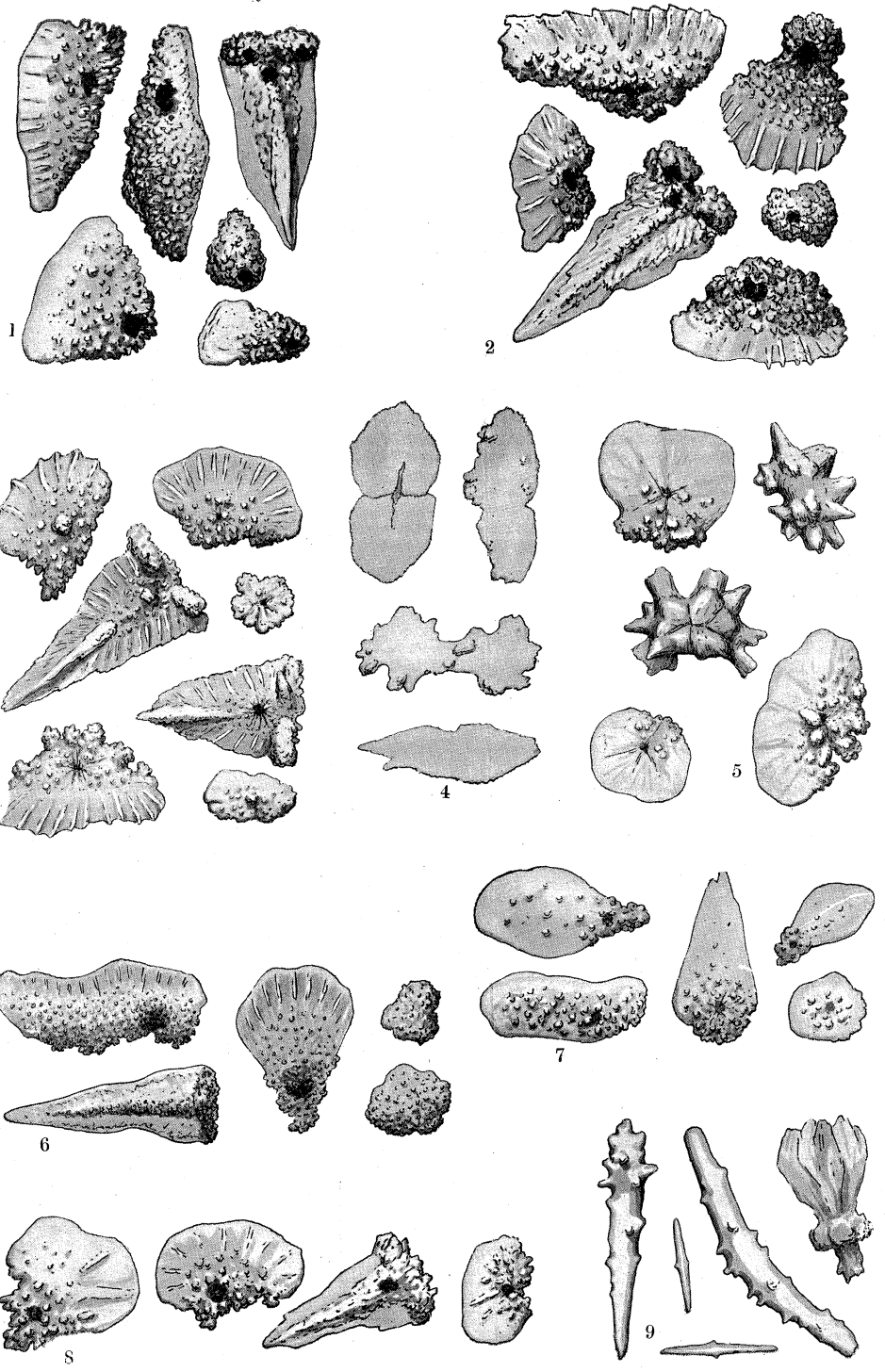
Fig. 5.— ,, *Mopsea elegans*, sp. nov.

Fig. 6.— ,, *Plumarella thetis*, sp. nov.

Fig. 7.— ,, *Caligorgia lævis*, sp. nov.

Fig. 8.— ,, *Plumarella corruscans*, sp. nov.

Fig. 9.— , *Mopsella clavigera*, Ridley.



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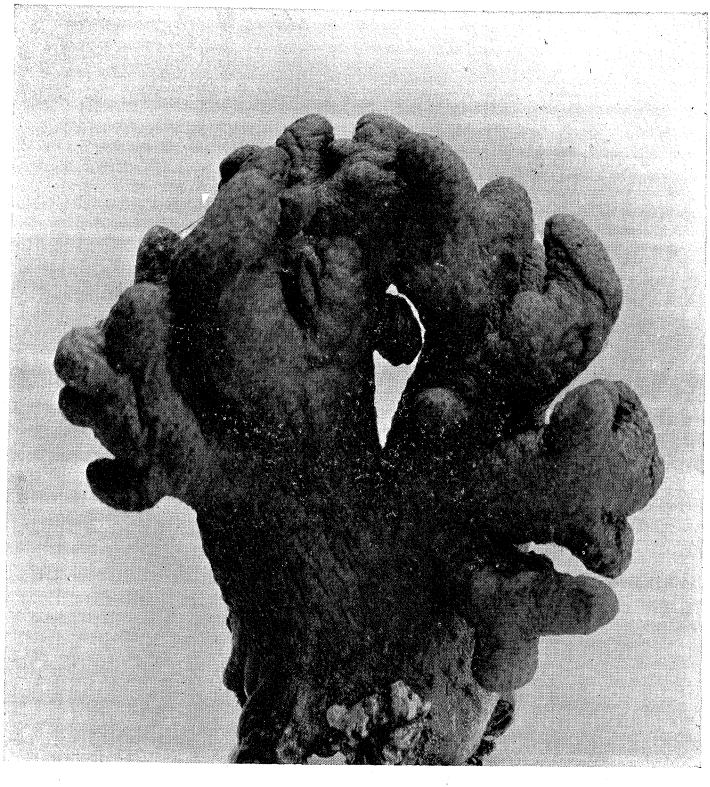
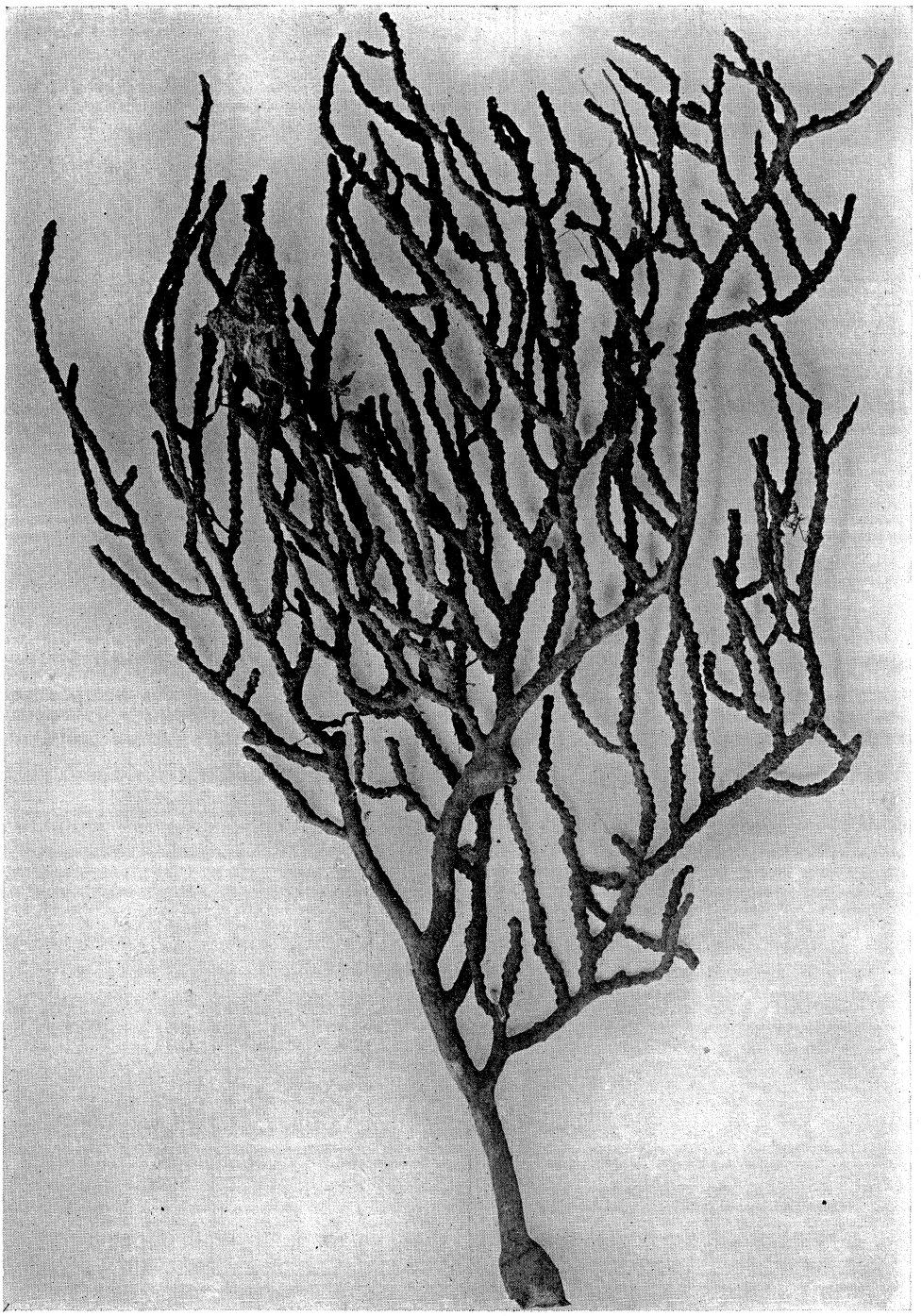
EXPLANATION OF PLATE LXIX.

Alcyonium etheridgei, sp. nov. Nat. size.



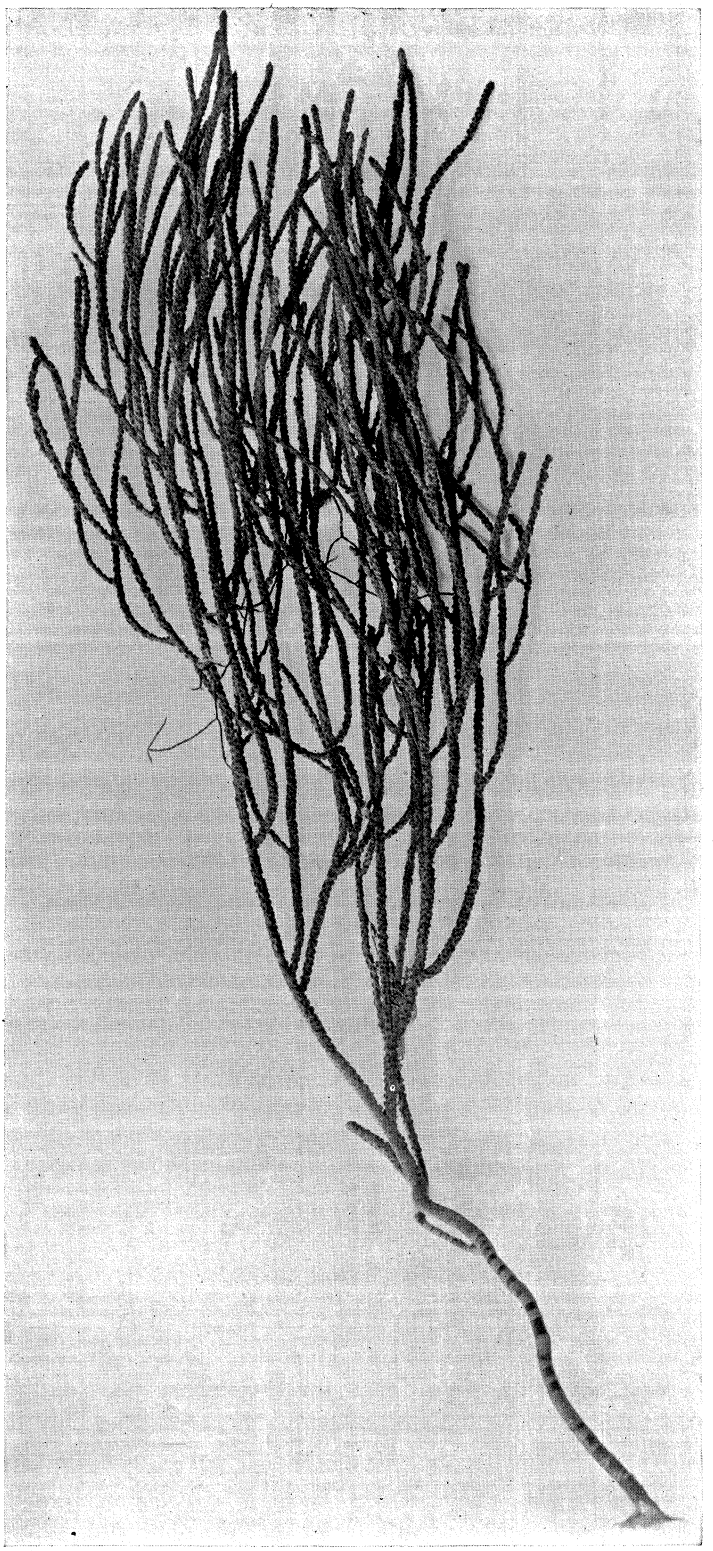
EXPLANATION OF PLATE LXX.

Parisis australis, Wright and Studer. $\frac{3}{4}$ nat. size.



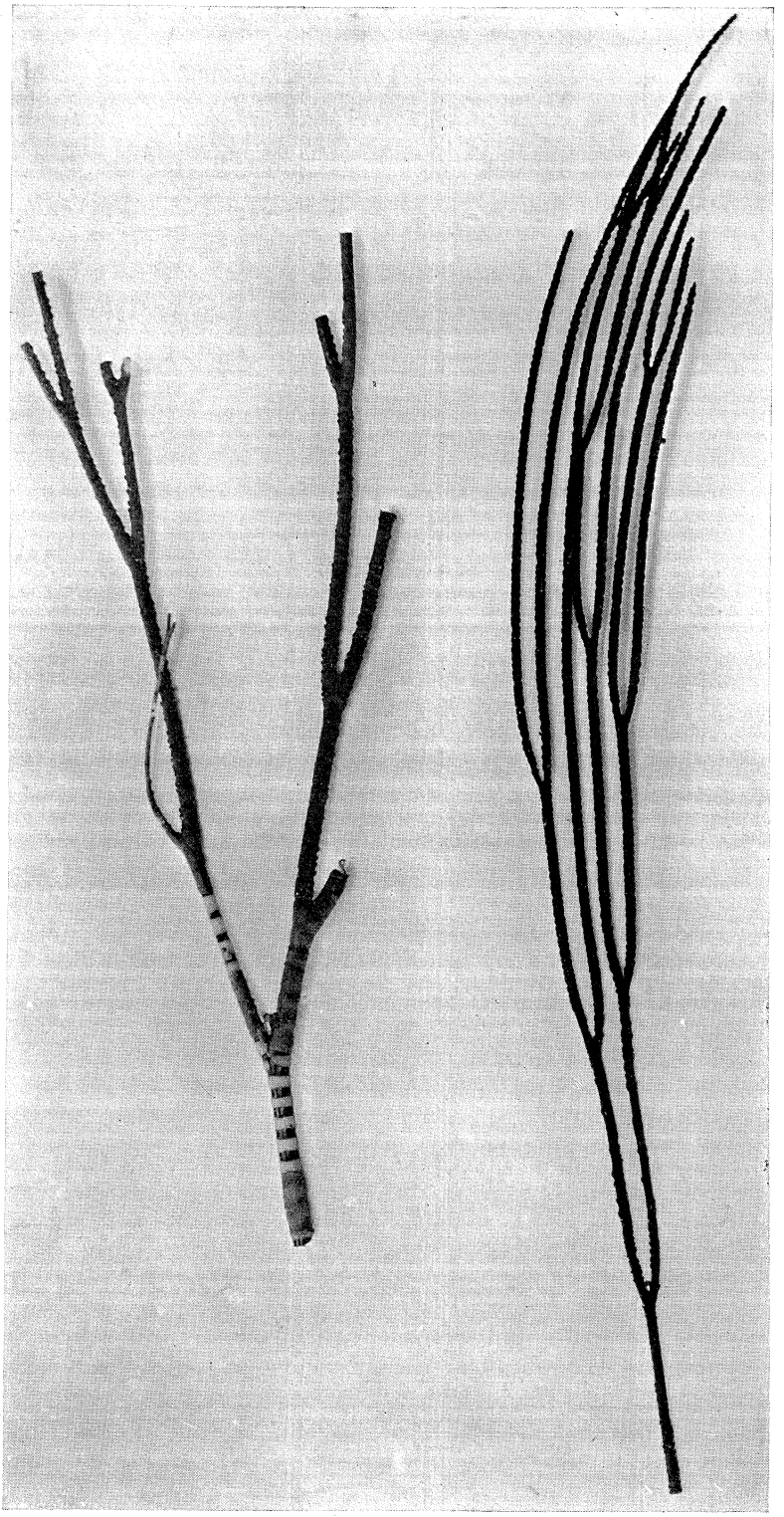
EXPLANATION OF PLATE LXXI.

Mopsella flabellum, sp. nov. Nat. size.



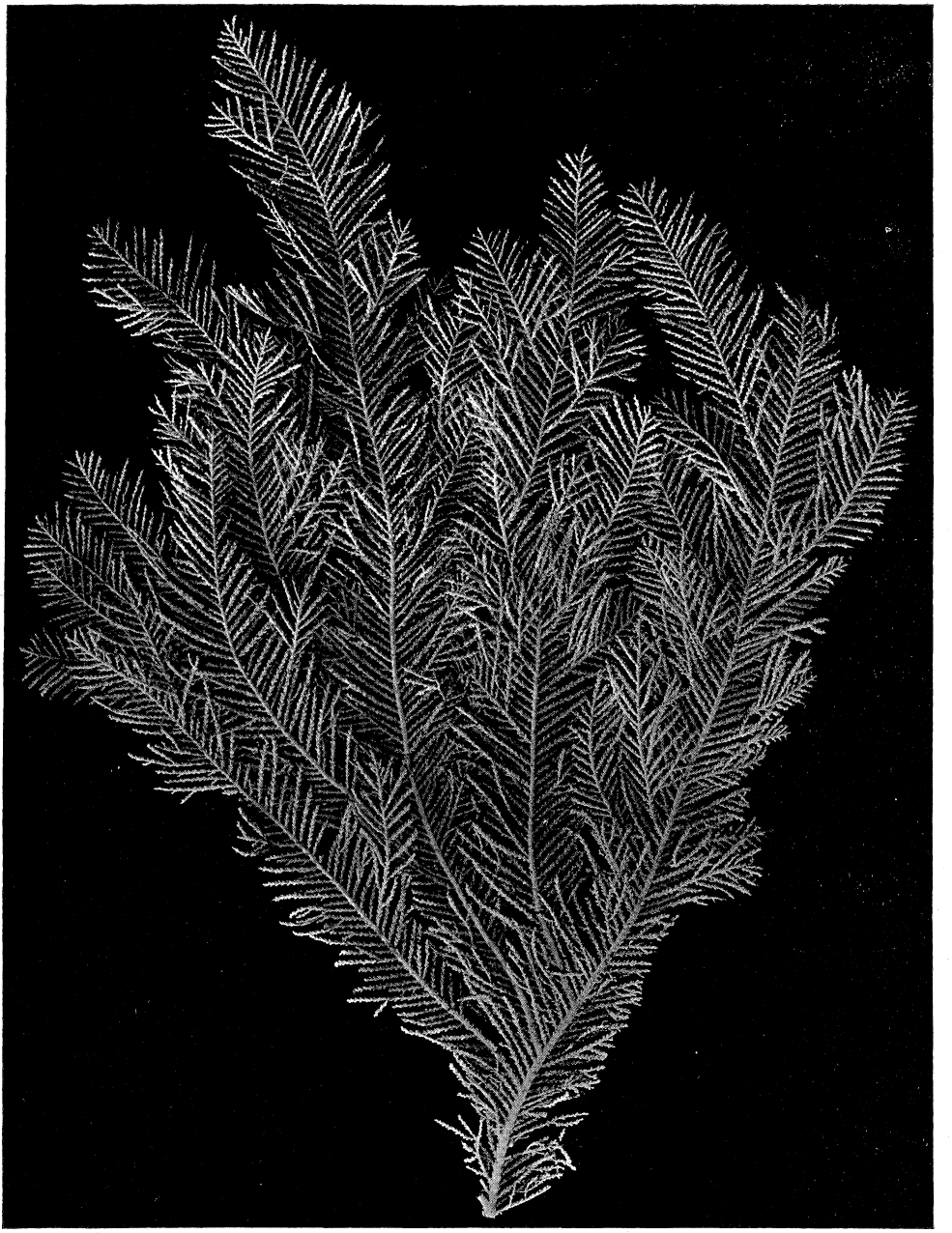
EXPLANATION OF PLATE LXXII.

Mopsea elegans, sp. nov. Nat. size.



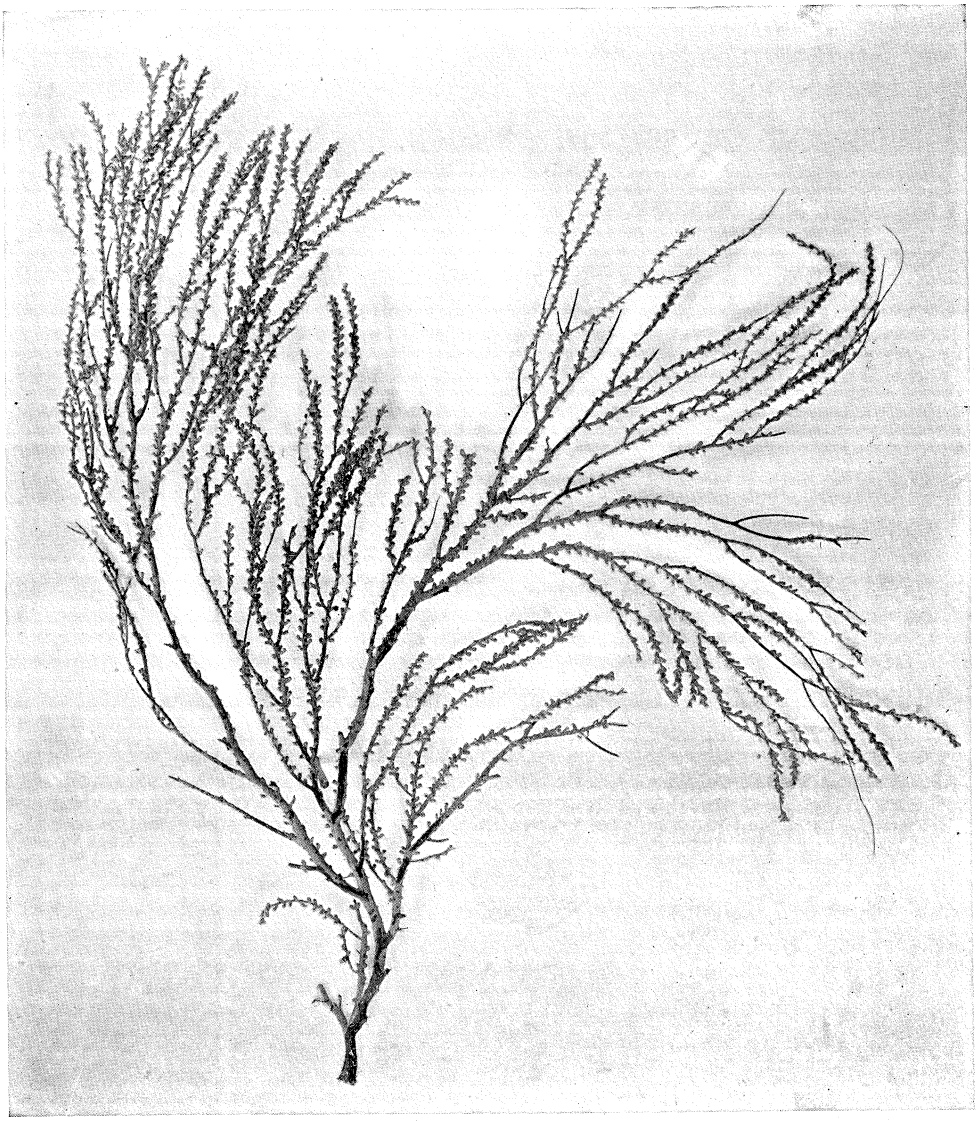
EXPLANATION OF PLATE LXXIII.

Mopsea whiteleggei, sp. nov. Nat. size



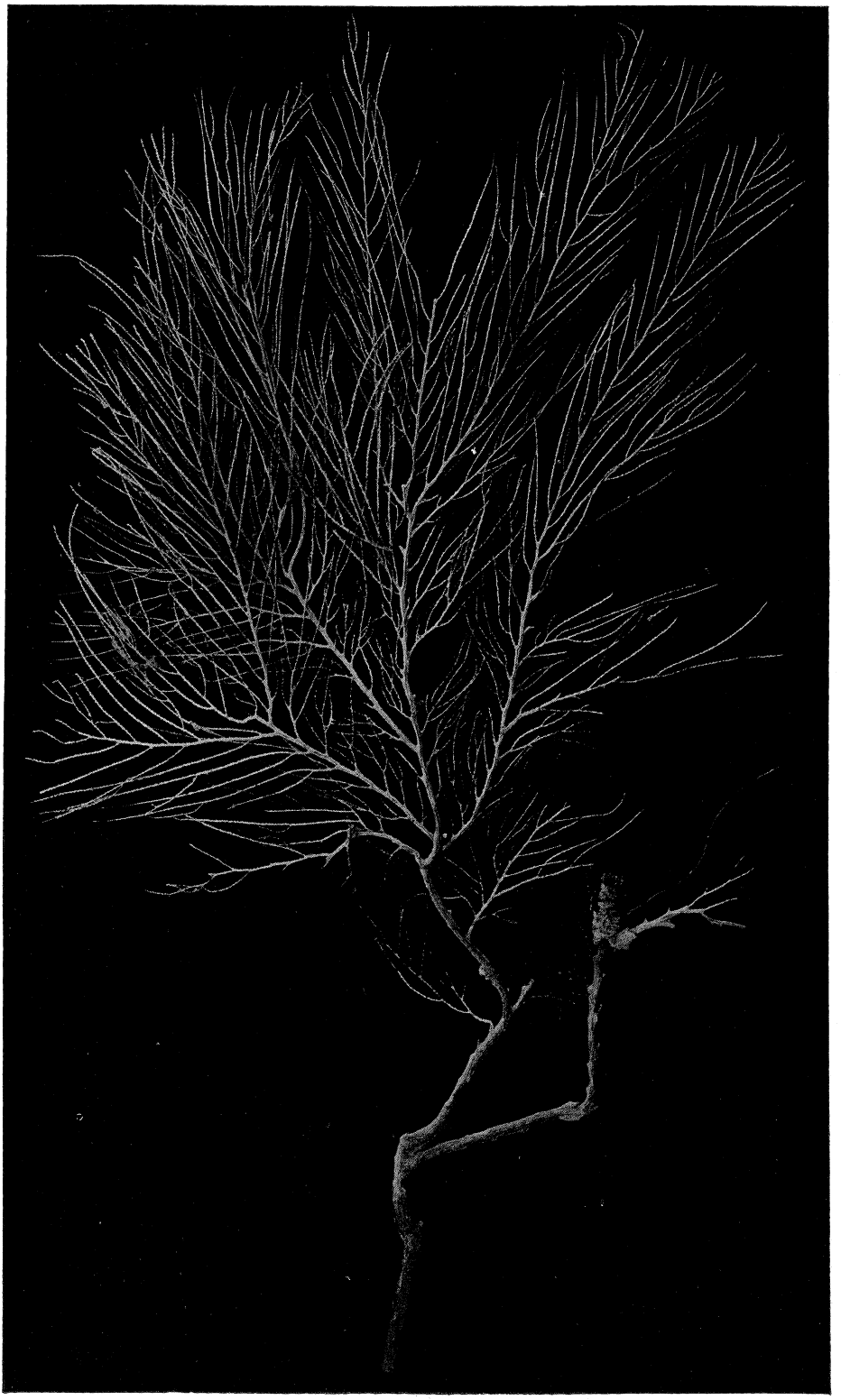
EXPLANATION OF PLATE LXXIV.

Amphilaphis plumacea, sp. nov. Nat. size.



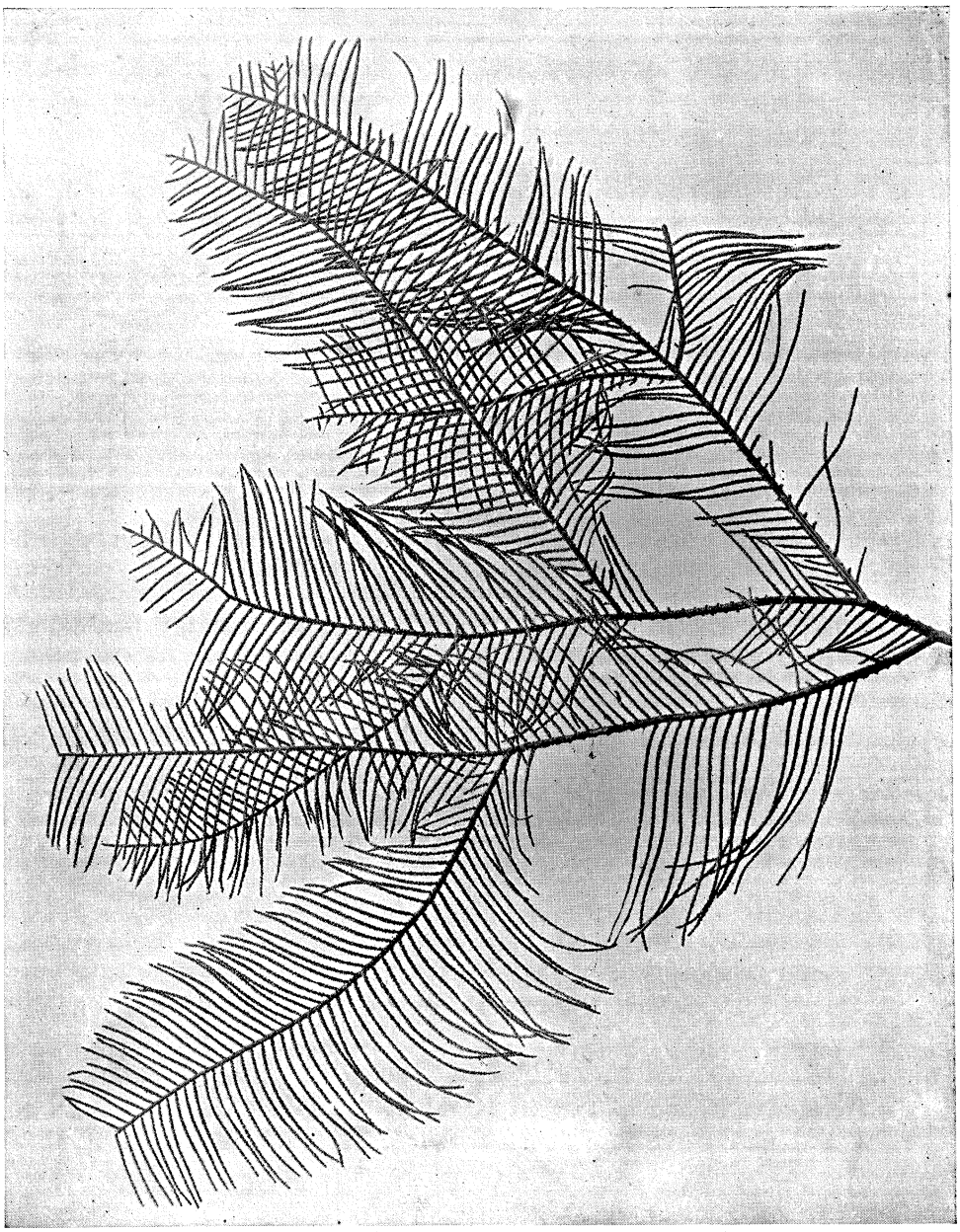
EXPLANATION OF PLATE LXXV.

Plumarella lævis, sp. nov. Half nat. size.



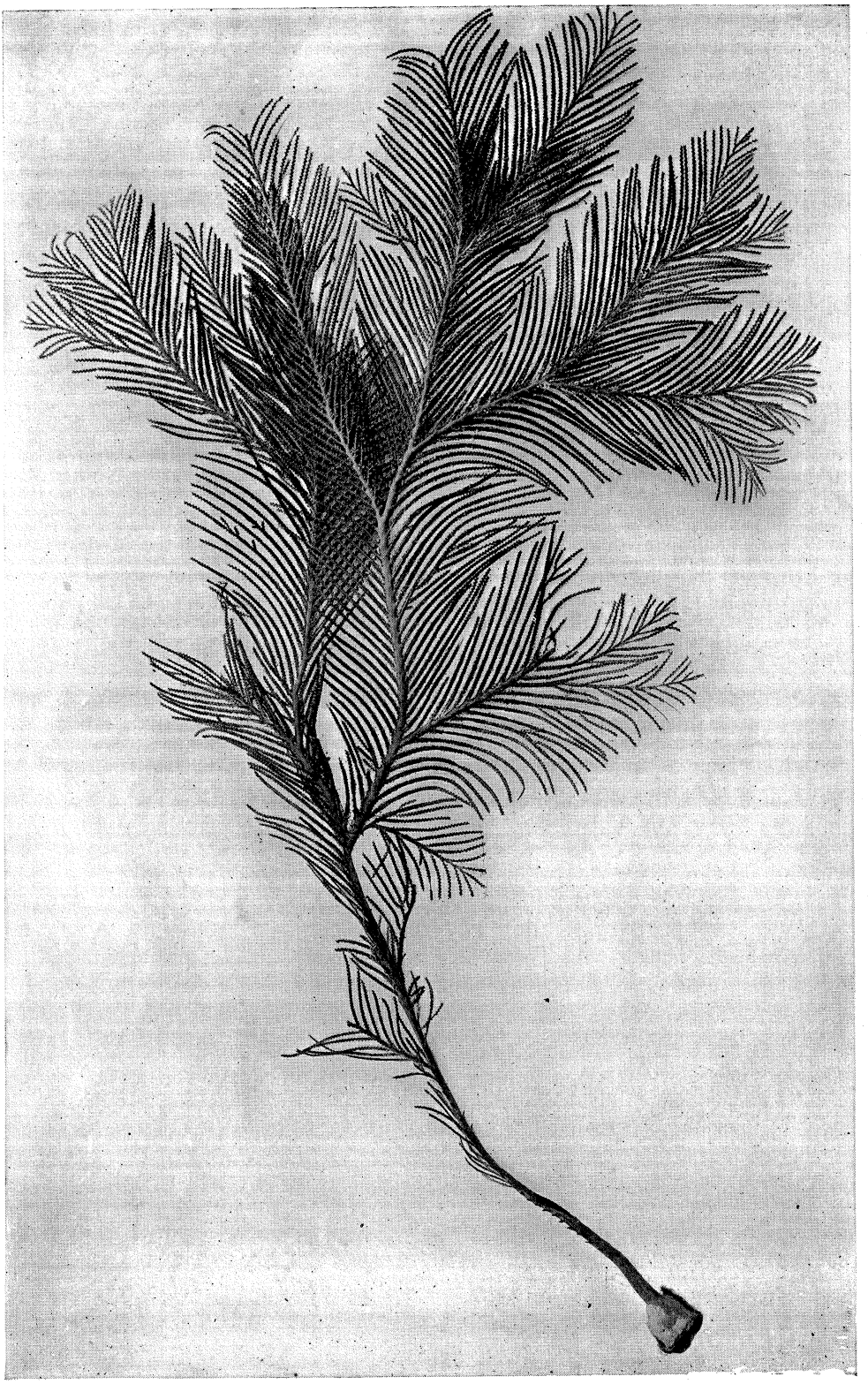
EXPLANATION OF PLATE LXXVI.

Plumarella thetis, sp. nov. Nat. size.



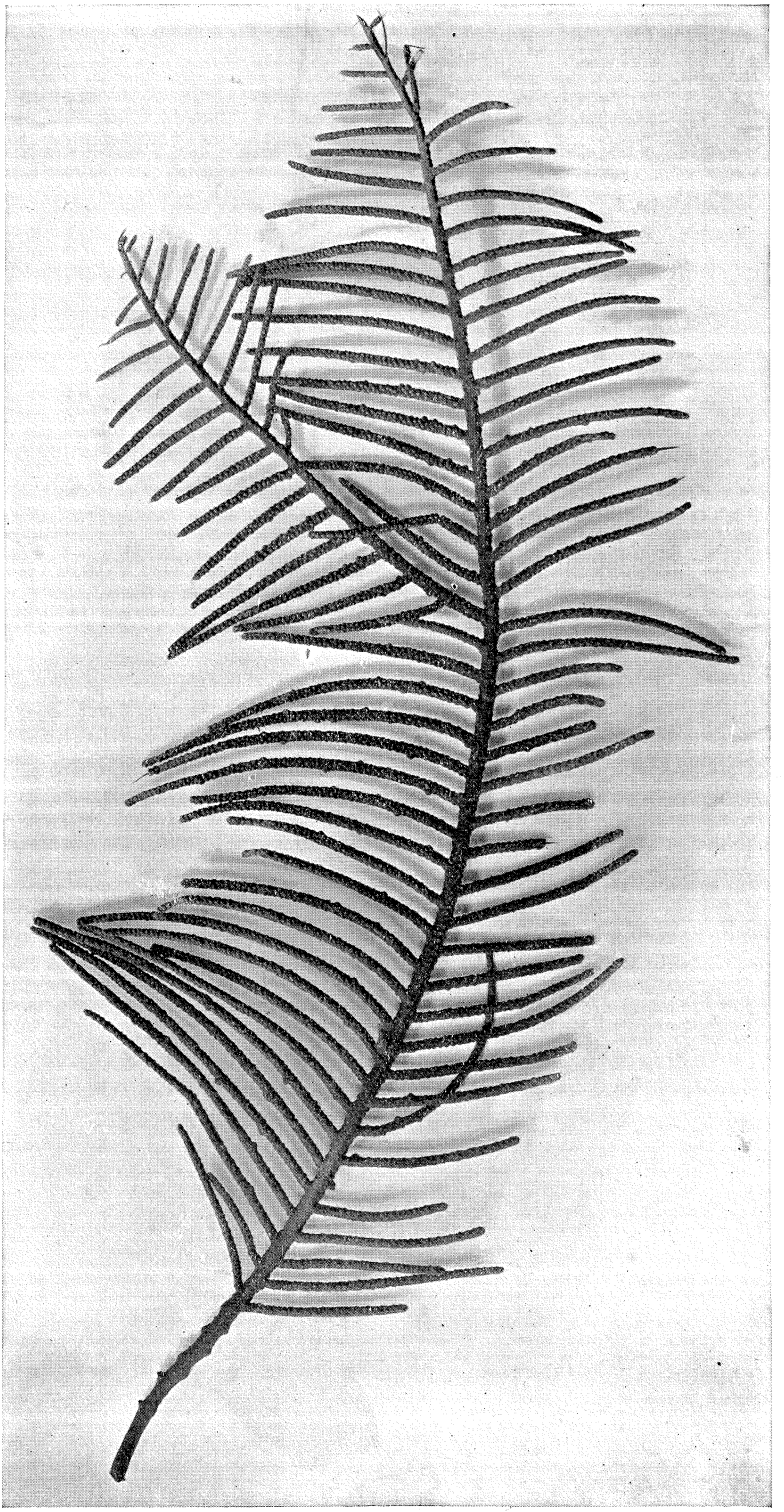
EXPLANATION OF PLATE LXXVII.

Plumarella corruscans, sp. nov. Half nat. size.



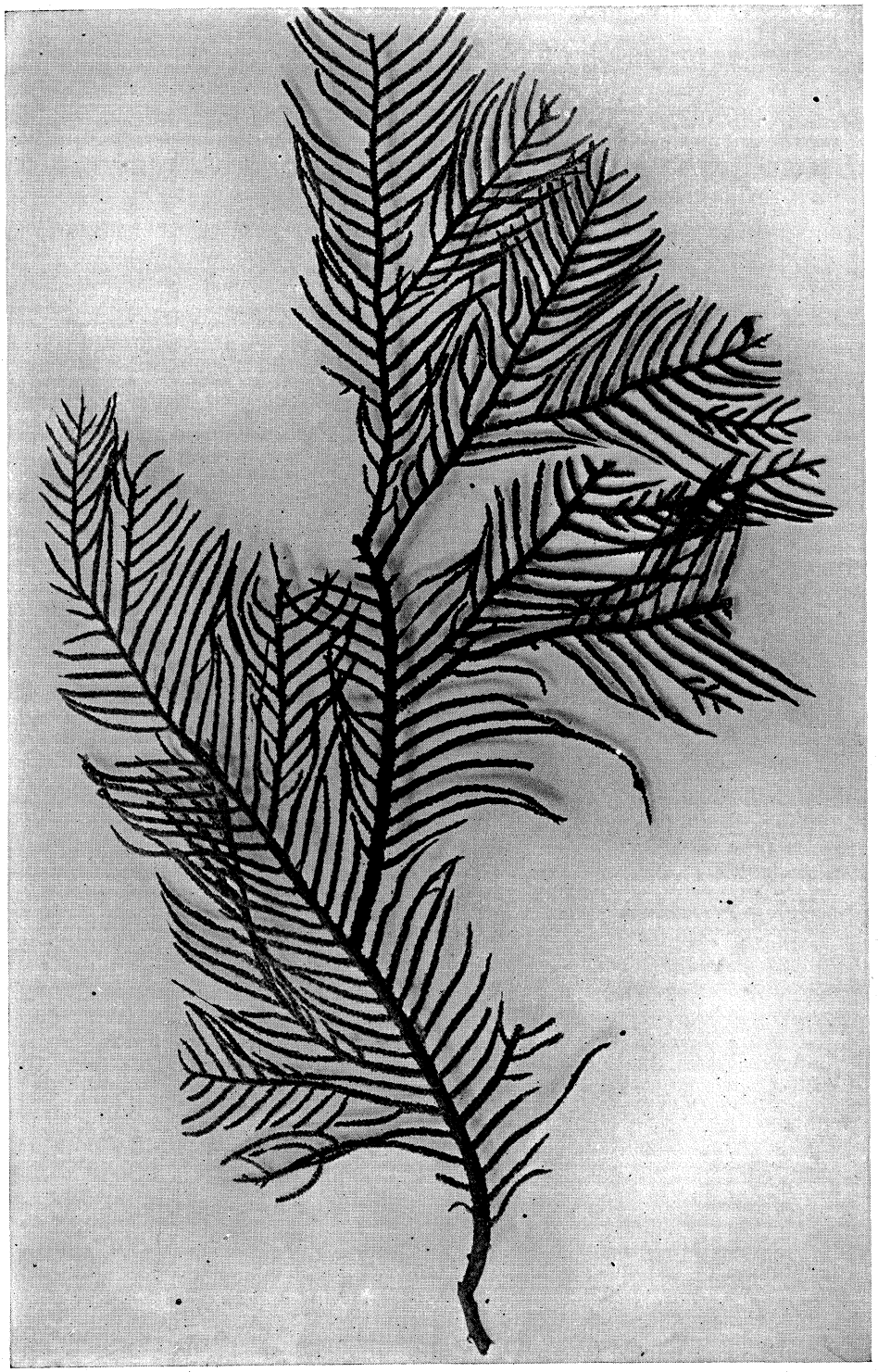
EXPLANATION OF PLATE LXXVIII.

Plumarella filicoides, sp. nov. Nat. size.



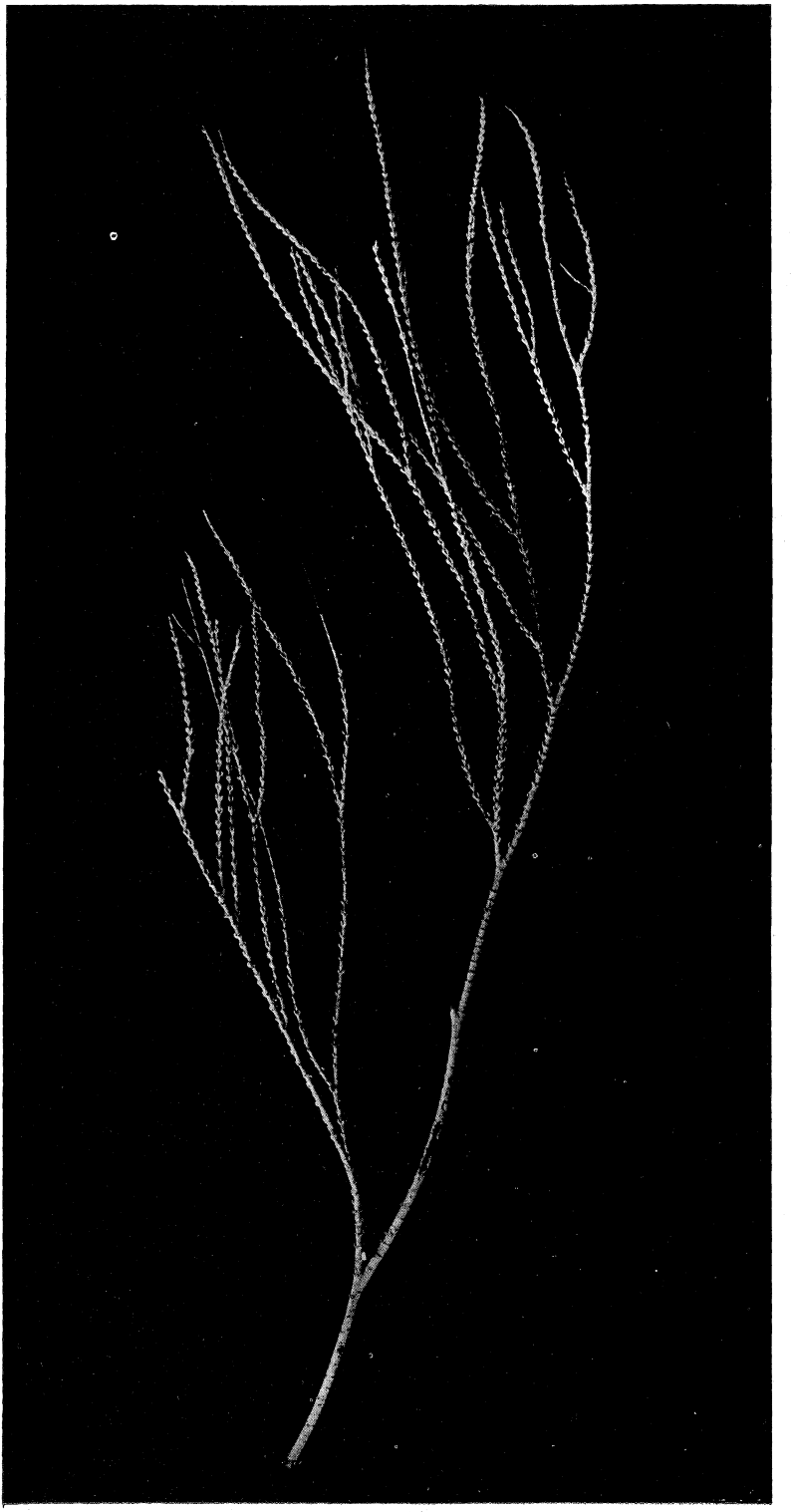
EXPLANATION OF PLATE LXXIX.

Plumarella versluysi, sp. nov. Nat. size.



EXPLANATION OF PLATE LXXX.

Caligorgia lævis, sp. nov. Nat. size.



EXPLANATION OF PLATE LXXXI.

Ctenocella pectinata, Pallas. Half nat. size.

EXPLANATION OF PLATE LXXXII.

Sarcophyllum australe, Kölliker. Nat. size.