

## On Some Alcyonarians from New Zealand Waters.

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[Read before the Otago Institute, 6th December, 1927; received by Editor,  
20th December, 1927; issued separately,  
May 12th, 1928.]

THE only members of the Order Alcyonacea enumerated in Hutton's *Index Faunae Novae Zelandiae* are the two species — *Anthopodium australe* Verrill, and *Lobularia (Alcyonium) aurantiaca* Quoy and Gaimard; of the Order Pennatulacea, *Virgularia gracillima* Kolliker; and of the Order Axifera, the species *Primnoella australasiae* Gray; all of which have been obtained in the waters immediately around the Dominion; the other Alcyonarians there listed are from the neighbourhood of the Kermadecs.

Since the date of publication of the *Index* another pennatulid has been described by myself from Doubtful Sound on the west coast of the South Island, *Sarcophyllum bollonsi* (Benham, 1906).

In the present paper I give an account of five species, of which four are new; these five fall into four families and belong to three of the Orders of Alcyonarians, as will be seen in the systematic summary below in which all the known representatives of the Sub-class Alcyonaria from our neighbourhood are shown.

It is only very rarely that naturalists in New Zealand have the opportunity of collecting in deep waters off our coast, and very little systematic collecting has been done even in the littoral zone, so that there are no doubt other members of the group still waiting discovery.

As will be seen from the following accounts of new species, we owe some of them to the fact that the Government have from time to time sent out ships in connection with the examination and extension of the fisheries; on some of these occasions the Hon. Geo. M. Thomson was fortunately on board, and it is due to his enthusiasm for zoology that some of the new species were obtained; and quite recently I have received marine specimens of various kinds from Lieut. T. A. Vickers, R.N.R., of H.M. Cable-ship "Iris," who has during the last year or two been good enough to send me material collected from considerable depths. I wish here to acknowledge with gratitude the generous help I have received from Commander Hughes in allowing his officers to collect for me.

The "Challenger" gathered only two Alcyonarians from these seas, namely the pennatulid *Virgularia gracillima*, which was later found by the late Dr. Dendy (1896) in Lyttelton Harbour; and the gorgonid *Primnoella australasiae*, which had previously been recorded from Bluff Harbour by Verrill (1876). The genus is defined and figured in the "Challenger" Report (1889, p. xlix) and the species fully described by Verrill (loc. cit. p. 88).

## Class ANTHOZOA.

## Sub-class ALCYONARIA.

## Order 1. STOLONIFERA.

## Family CORNULARIIDAE.

*Clavularia thomsoni* n. sp.*Anthopodium australe* Verrill.

## Order 2. ALCYONACEA.

## Family ALCYONIDEA.\*

*Alcyonium aurantiacum* Quoy and Gaimard.*Anthomastus zealandicus* n. sp.*Anthomastus phalloides* n. sp.

## Order 3. PSEUDAXONIA.

## Family BRIAREIDAE.

## Sub-family SPONGIODERMINAE.

*Spongioderma* (?) *vickersi* sp. n.

## Order 4. AXIFERA.

## Family PRIMNOIDAE.

*Primnoella australasiae* Gray.

## Order PENNATULACEA.

## Family VIRGULARIDAE.

*Virgularia gracillima* Kolliker.

## Family PENNATULIDAE.

*Sarcophyllum bollonsi* Benham.

## CLAVULARIA Quoy and Gaimard.

***Clavularia thomsoni* sp. n.** (Figs. 1-5.)

Collected by the Hon. G. M. Thomson, while on board the G.S.Y. "Hinemoa" in 1915, in Foveaux Strait.

The colony, white in colour, is growing on the costate surface of a simple coral, presumably a species of *Caryophyllia* as the calyx is circular in section; the coral was covered with an encrusting sponge containing needle-like spicules; issuing through this coating of sponge near the lip of the calyx are five polyps, attaining a height of 5 mm., which are so densely and completely covered with calcareous spicules as to give the impression that they are madreporarian corals, independent of one another. It was only on removing the sponge that it was seen that these polyps are in reality connected with each other by a stolon creeping over the surface of the *Caryophyllia*.

The stolon is a narrow, flattened band densely coated with calcareous spicules; it is not much wider than the polyps it bears. It commences on the outer surface of the calyx near its upper end, ascends obliquely to the lip, passes along this for a short distance and then descends into the cup; so that one polyp arises from deep within the cup; this is probably the oldest; two more are just within the lip; two on the outer surface; and in addition there are indications of

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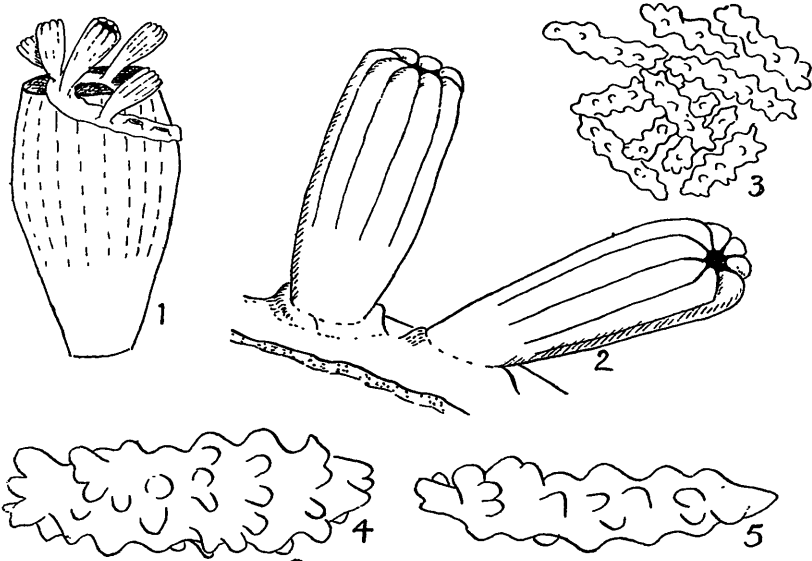
\*Wright and Studer in the Section on Geographical Distribution (p. 295) includes "New Zealand" amongst the habitats of the genus *Sarcophyllum*; but I have failed to find the reference to any species that has been recorded from here.

two others which appear to be mere buds, scarcely rising above the stolon.

The polyp or "anthocodia," is nearly cylindrical; its length of 5 mm. being rather greater than twice the diameter; the base is slightly narrower than the distal extremity; the tentacles are in each polyp withdrawn into the column. The surface of the polyp is marked by eight shallow and narrow furrows, separating as many ridges which are distally continuous with the bases of the retracted tentacles, so that the free end presents the appearance of an eight-rayed star or rosette.

The base of the polyp is surrounded by a very slightly raised cushion where it springs from the stolon.

The whole surface of the polyp is densely encrusted with spicules, so as to appear almost solid. The spicules are comparatively long, but stout rods, disposed lengthwise along the column, touching, even over-



FIGS. 1-5 *Clavularia thomsoni*.

1. A simple Coral, after the removal of the encrusting Sponge, with the colony of *Clavularia* creeping over the surface of the calyx (nat. size).
2. Two polyps springing from the flat ribbon-like stolon (x 8).
3. A portion of the stolon (x 40) showing the densely massed spicules.
4. A spicule from the body wall of the polyp (x 260).
5. A spicule from the stolon (x 260).

lapping, so that their outlines are individually difficult to trace; they look almost like scales; they do not project from the surface but are entirely embedded in the mesogloea.

After treatment with potash (boiled on the slide) they do not separate at all readily, being evidently bound together by the organic matter, but when sufficiently isolated they are found to have the form of short, broad rods, very rugose with numerous short rounded knobby

processes, closely set and apparently in whorls. A few slender spindles also occur throughout the skeleton, but become recognisable only after treatment with potash. The tentacles are provided with similar spicules and so is the stolon.

These spicules measure from 0.12 mm. to 0.27 mm.; the shorter ones being in the upper part of the column, the longer in the lower part. Measurements are: Length 0.12 with diameter 0.36 mm.; another gives, 0.18 by 0.054 mm.

I have been unable to study the structure of the delicate stolon.

*Remarks:* So far as I have been able to ascertain, this form belongs to the genus *Clavularia*; though the suspicion has crossed my mind that it may be Verrill's *Anthopodium australe*, of which unfortunately no figure is given by the author. On the other hand Hickson (1895) expresses the opinion that this genus is closely related to *Callipodium* on the one side and to *Telesto* on the other, and so should be placed in the group Stolonifera. But the colony under discussion resembles in various ways *Clavularia ramosa* Hickson, from Australia in its general appearance; the polyps recall those of *C. cylindrica* Wright and Studer, which was found at Tristan d'Acunha; while in other respects it seems to be allied to *C. flava* Hickson. In all these species the spicules are referred to as "forming a dense armour" or as being "locked together to form a compact skeleton," as in the present form.

It may be convenient to zoologists in New Zealand to include here the account given by Verrill of *Anthopodium australe*, so that any who may have the opportunity of collecting in Bluff Harbour may be able to recognise the species; and the account in the Bulletin U.S. Museum is not easy of access.

Generic characters copied from the "Challenger" vol. 31, p. 15.

"The colony is incrusting, firm. The polyps are large, prominent, retractile within tubular verrucae. The surface of the coenenchyma and verrucae is minutely granular with dentations of the spicules projecting. These spicules are irregular in outline and closely united together. The spicules, in addition to those mentioned, are spinose spindles and clubs."

On p. 298 it is stated that, "The only species is recorded from Fort Macon, north coast, North Carolina." Either the authors overlooked the record from New Zealand, or the species had been removed to some other genus; I have been unable to trace it.

From Verrill (1876, p. 76) *Anthopodium australe* :—

"Polyp cells cylindrical or somewhat clavate with distinct sulcations at summit, in contraction; the surface covered with small rough spicules: the height variable up to a quarter of an inch or more. They arise from a thin encrusting or stolon-like coenenchyma, which is coriaceous and roughened with spicules, like the polyp cells. The polyps are irregularly scattered along the coenenchyma, which creeps over the upright axis of *Primnoella*. Colour, light orange-red. Height of polyp-cells, mostly 2 mm.—6 mm.; diameter, about 1.5 mm."

Then follows a detailed account of the different kinds of spicules. "Bluff Harbour, New Zealand on *Primnoella australasiae*."

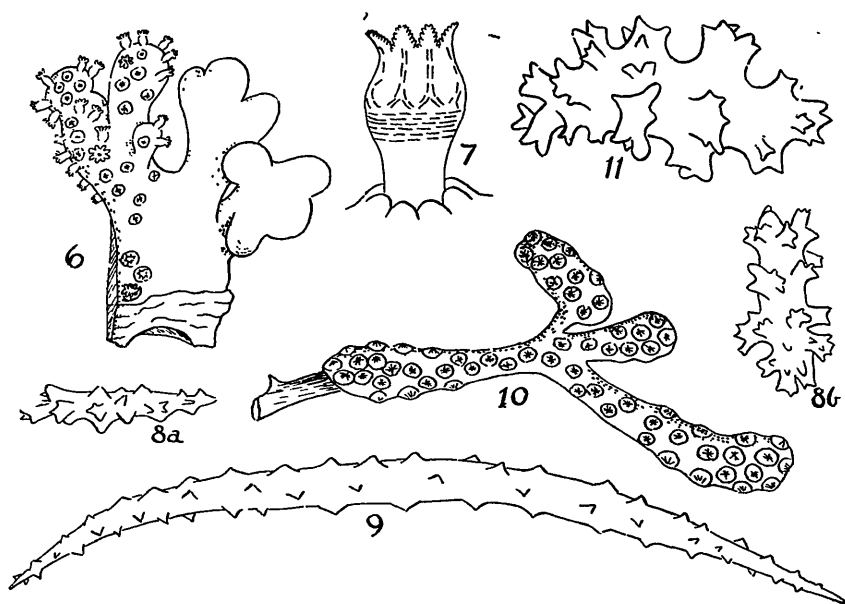
## ALCYONIUM Linnaeus.

**Alcyonium aurantiacum** Quoy and Gaimard. (Figs. 6-11.)

Hutton, in his *Index* attributes this species to the genus "Lobularia," which is now abandoned. He makes a slip in using the name of Lamarck for the species. It may be mentioned, too, that Quoy and Gaimard omit the "i" in *Alcyonium*. The following is the diagnosis given by them—to their species—

"Alcyonium, parvum, molle, ramosum, ramis obtusis; polyphis elongatis, clavatis, albis; tentaculis brevissimis rotundatis."

With respect to the last statement, their figure (pl. 22, figs. 16-18) shows the tentacles quite evidently retracted; they did not see them



FIGS. 6—11 *Alcyonium aurantiacum*.

6. The specimen A from Mahia Peninsula region, the erect form of the species (nat. size). A branch and part of the stalk had been cut from the left side; the polyyps are omitted from the right side of the sketch.

7. An anthocodia or polyp (x 10).

8. Spicules from the coenenchyme (x 40).

9. Spicule from the wall of the anthocodia (x 260).

10. The creeping form from Dusky Sound (nat. size).

11. Spicules from the coenenchyme of this form (x 260).

entirely expanded, so that they are in error in saying that they are round.

In the text they state further that the colony measures two to three inches; it is orange on colour, with white tentacles and the polyyps are transparent.

The specimen was obtained in the estuary of the River Thames, (in the North Island) in water of 8 to 10 fathoms.

The figure represents a colony with a long wide sterile stalk supporting half-a-dozen finger-shaped branches, some of them lobed. Figures of the spicules are given.

That is all we know of the species up to the present time, for it has not been met with, or referred to, by any naturalist since 1834.

Of this species I have three specimens, colonies of very different form and colour, but as all three present the same general arrangement of the polyps and the same type of spiculation, I refer them to the same species, for it is acknowledged by those who have made a study of this genus that external features are highly variable within the same species.

It will be convenient, however, to deal with each of the specimens separately.

Some years ago I sent a portion of two of these colonies to Professor Hickson, of the Manchester University, to ask his opinion as to their specific nature, for he has made an extensive study of the group *Aleyonaria* and especially of the genus *Alcyonium*. He replied that he believed each of them, as well as a young colony that I had collected in 1909 at Carnley Harbour in the Auckland Island, which I sent to him at a later date, belonged to this species.

*Specimen A* was collected by the late Mr. L. F. Ayson, during the cruise of s.s. "Doto," in 1901, at a station near the Mahia Peninsula, on the east coast of the North Island.

The colony,\* which is of a pale brown colour, consists at present of a short stalk or sterile region, some 5-7 mm. in length, and a lobed polypiferous region. The stalk has a smooth surface, but is somewhat wrinkled; the proximal extremity of which is hollowed out as if to form the attachment to a shell or stone. The polypiferous region presents a short basal portion which soon divides into three rather flattened lobate branches, lying in one plane; each branch gives origin to a few short, broad, rounded lobes. The entire surface of this polypiferous region is covered with "anthocodia" (Hickson) or polyps in the systematic sense.

The greatest length of the colony is 37 mm., of which the basal portion accounts for 12 mm. on one side; but it is much less on the other side where the first branch springs; it has a diameter of 20 mm., and is nearly cylindrical; but as a piece has been cut off from one side for the purpose of transmitting to Dr. Hickson, probably this side was not so long as 12 mm., and presented a branch corresponding to the one on the other side.

The breadth of the polypiferous region is 40 mm. across the branches.

The coenenchyme is paler in tint than the anthocodiae; it is white and translucent; the anthocodiae are very pale brown (possibly yellow in life), and when fully extended measure 2 mm.; most are completely retracted; others more or less incompletely. They are rather widely spaced, though towards the ends of the branches or

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\* I cut off a part of the stalk and a branch from the left side to send to Dr. Hickson.

lobes they are much closer together, so that they nearly touch one another around the extremities of the lobes.

The fully extended anthocodia is somewhat tub-shaped, being narrower where it springs from the coenenchyme, then swelling out in the middle and is again constricted just below the tentacles. The base is surrounded by rounded lobules, which project slightly from the coenenchyme, like a small "calyx"; and on contraction these lobules close over the anthocodia. The tentacles have on each side a row of short, rounded, closely set pinnules.

The column of the anthocodia is supported by spicules, which near the base have the form of long spindles disposed horizontally in about six tiers; above this the spicules are arranged in converging groups, as usual directed towards the tentacles, where they assume a longitudinal arrangement, passing up the back of the tentacle in bundles.

The spindle-shaped spicule is a long curved rod, pointed at each end, with laterally placed "thorns" or sharp points along its length. These spindles measure from 0.16 to 0.27 mm. in length, with a diameter of about 0.036 mm.

In the coenenchyme the commoner form of spicule is a shorter or longer rod, with rounded ends and covered with rounded "knobs"; these vary from 0.12 mm. to 0.054.; and even 0.01 mm.; the most numerous are the medium sized.

*Specimen B.*—This colony was collected by Hon. G. M. Thomson, in Tasman Bay, in the north of the South Island, during a cruise on the "Doto," in 1900, in connection with the Fisheries Department. I referred to it in a brief summary of the results, printed in the Report by the Minister of Marine; and I described it in the following terms:—

"A handsome, Indian-red species of Alcyonium was obtained in Tasman Bay. It is attached to shells by a short, broad stalk, which bears a number of short rounded lobes or branches covered with polyps, which are white, with an orange band just below the white tentacles."

Its colour is still, after being 27 years in alcohol, of that "Indian-red" colour that it had when it reached me in 1900. But the polyps are now yellow, due perhaps to the fact that the orange pigment below the tentacles has diffused during these years.

It was of this colony that I sent a portion to Hickson and what remains here is too small for me to determine its shape; it is a mere rounded irregular mass, for no doubt I sent the greater part to Manchester. This fragment is now more contracted than is Specimen A, so that the anthocodiae are pressed tightly together, touching one another so that no coenenchyme is visible between them. The fragment seems therefore to be the end of a branch. Each of the anthocodiae is surrounded by a short calyx-like cushion at its base, which is evidently the same as the lobes referred to above, but exaggerated by the great contraction of the whole colony.

The anthocodiae are yellow, with white tentacles; when fully retracted each anthocodia is covered over by these eight lobes of red coenenchyme; but when only partially retracted, that is with the

tentacles partially withdrawn, these appear as eight white knobs within the red lobes.

It was no doubt to these retracted polyps that Quoy and Gaimard refer in their account of the species; they did not see the fully expanded tentacles.

The colony is male; the white "spermagems" being visible in some of the polyps, forced upwards no doubt by the strong contraction, when the colony was immersed in the preservative.

The spicules, which have a deep yellow tint, are of the usual two forms—

- (a) Short, broad rods with very numerous stout, knobby processes, arranged apparently in whorls; they average about 0.09 mm. in length;
- (b) Longer spindles with thorns, the length being from 0.12 to 0.18 mm.

On the wall of the anthocodia these spindles are longer and stouter and are also curved, and attain a length of 0.5 mm.

*Specimen C.*—Was collected more than thirty years ago in Dusky Sound, in the S.W. of the South Island, by W. Docherty.

It is a creeping colony, growing round the stem of what appears to be an Antipatharian; its colour is a yellowish-brown, a good deal darker than Specimen A.

It consists of a central portion, along the axis of the support, and two unequal branches springing from the two sides at approximately one-third of the distance from one end of the central region; these branches are swollen distally.

The main axis measures 50 mm. with a diameter of 6 mm. near each extremity, but half this width in the middle and at the point of origin of the lateral branches. One branch forms an angle of about 30° with the axis, and is 30 mm. in length, with a diameter of 8 mm. near its rounded end. The other branch also arises at a similar angle: it is at first very narrow, but soon enlarges and swells out into a cylindrical mass of about 15 mm. long and 7 mm. wide, which is at right angles to its narrow basal region.

The anthocodiae are distributed all over the surface as in the other specimens, and are much more closely arranged near the extremities, while in the middle area they are more distant.

The spicules are of deep yellow colour and have the same form as in the other two specimens.

*Remarks.*—Although it is impossible to be sure of the identification of these specimens with Quoy and Gaimard's species, since they, like other naturalists of the period, contented themselves with external features only (which we now know are of little value); yet since the only species hitherto recorded from the waters of New Zealand is this one, which was obtained from the estuary of the Thames (North Island), the probability is great that we are dealing with the same species.

*A. aurantiacum*, as now described, differs from the Australian *A. etheridgei* (Thomson and Mackinnon) as well in its colouration as in its spiculation; for I find no "club-shaped" spicules with one end



much wider than the other, such as these authors' figure on Pl. 67, fig. 4.

The creeping colony from Dusky Sound differs also from *A. reptans*, as figured by the same authors, in that the anthocodiae are much more closely arranged in the New Zealand form, as well as in other details. It differs from any of the species described from S. Africa and from those described on the "Challenger" Report; but I have to confess that my library, and those to which I have access, do not permit me to make a complete comparison with other species of the genus.

#### ANTHOMASTUS Verrill.

##### **Anthomastus zealandicus** sp. n. (Figs. 12-19.)

This handsome Alcyonarian was collected by Lieut. Vickers in 517 fathoms at a spot 21 miles north of Doubtless Bay near the extreme north of the North Island.

It is a deep carmine-coloured, mushroom-shaped colony with very large polyps, of the same colour as the coenenchyme.

The height of the colony is 30 mm., of which the cylindrical stalk or sterile region occupies 15 mm. with a diameter of 12 mm. The "capitulum" is circular in outline and very convex; its margin is somewhat undulating owing to the presence of polyps near the edge; its diameter is 25 mm. and it overhangs the stalk by 4 mm.

The capitulum carries only about two dozen large "autozooids," a few of which are fully expanded, though they have been compressed by the walls of the phial into which the colony was placed. Others are more or less retracted, and some fully so. When the tentacles are retracted they are incurved as in *Alcyonium*.

The height of the extended anthocodiae or polyps is 8-10 mm., and the diameter at their base 5 mm. Over the upper part of the capitulum they are more widely spaced, being about 4 mm. apart, while near the margin, which is apparently younger, they are nearer together, so as almost to touch.

The surface between these autozooids is entirely covered with the "siphonozooids," which appear as small round pustules, each with a minute apical pore, the mouth of the zooid.

The tentacles have one row of long narrow pinnules along each of the sides, which are as long as, or even longer than, the width of the tentacle.

The base of the autozooid is surrounded by a circular cushion, standing up slightly from the coenenchyme.

A portion of the surface of the capitulum was cut tangentially and the whole "skin" is seen to be supported by long spindle-shaped spicules lying in all directions, with a dense superficial layer of short, broad "knobby" rods.

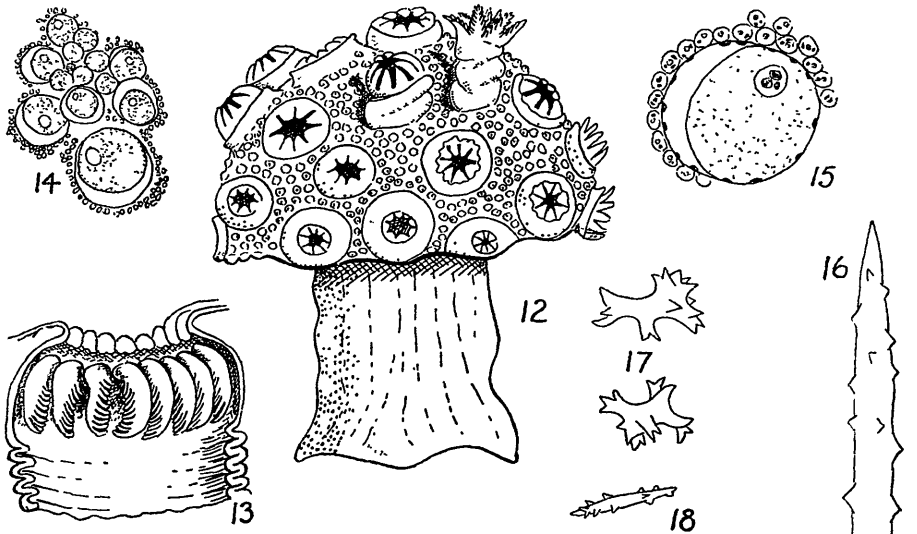
The spicules are red, and the colour is not affected by boiling in caustic potash; it is this colour which gives the colour to the colony. The short superficial spicules of the coenenchyme measure from 0.054 to 0.07 mm.

The spindles of the deeper layer measure from 0.36 to 0.6 mm. the majority are 0.5 mm.

In the anthocodia the same two kinds of spicules are present, but those of the tentacles are rather shorter spindles, from 0.27 to 0.45 mm. in length.

In the wall of the stomodaeum the spindles are very much shorter, and are arranged in circles or transverse tiers, allowing the folding of the wall on contraction.

On the stalk the spindles are disposed lengthwise and the short knobby rods are very densely arranged; here the spindles have a

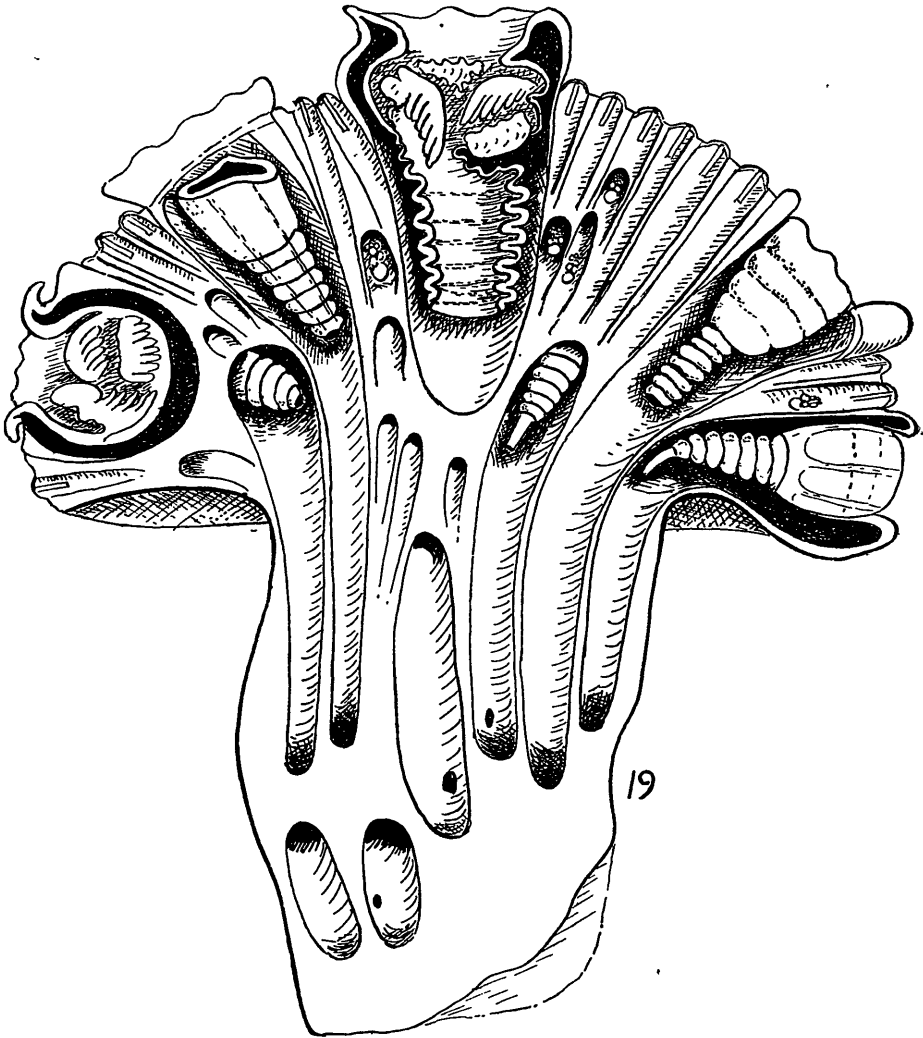


FIGS. 12—19, *Anthomastus zealandicus*.

- 12.—The entire colony (x 2). The small circles between the large polyps are the siphonozoids.  
 13.—The upper portion of an autozoid opened to show the manner of retraction of the tentacles (x 4).  
 14.—An ovary (x 260).  
 15.—An ovum much enlarged.  
 16.—One of the thorny spindles (x 260).  
 17.—A knobby rod from the superficial layer of the coenenchyme (x 260).  
 18.—One of the short spindles from the stomodaeal wall (x 260).

length of 0.36 to 0.45 mm., and the knobby rods from 0.054 to 0.07 mm.

In a longitudinal section of the colony each autozoid is found to be continued down the stalk to the base, as is usual in the family; it appears to be independent of other cavities except that near the lower end there are wide transverse canals putting the autozoids into communication. The cavities of the siphonozoids are also continued downwards for a long way, but I am unable to say how they terminate. There are no longitudinal canals such as are described by Moseley for



19.—A longitudinal section of the colony (x 4). The plane of the section passes through autozooids at different levels; in the centre it almost bisects one, and the tentacles are seen inflexed, the lower end of the stomodaeum has escaped from the section; right and left are autozooids in which the tentacles are not involved, but the stomodaeum is present; some others partly appearing in the section show the termination of the stomodaeum. Some of the siphonozooids contain ovaries.

*Sarcophytum*, but the entrances of transverse canals can be seen in the walls of the siphonozooids.

The stomodaeum of the autozoid is very long and tapered; it consists of two regions,— (a) the much longer upper region which is highly muscular and on contraction is thrown on to a series of close folds or pleats; and (b) a short non-muscular narrow tubular region at the lower end.

On the contraction the tentacles are not merely withdrawn into the body but are inflexed with their apices directed downwards towards the stomodaeum.

The siphonozooid has a short simple tubular stomodaeum, suspended by eight mesenteries, of which however only four reach to its lower end, and only two are continued down the whole length of the zoid.

In several of these siphonozooids there are ovaries, which are absent in the autozoids, and in this feature the colony differs from *Sarcophytum*. Each ovary has the form familiar in *Alcyonium* — a bunch of eggs of increasing sizes. Each egg is enveloped by a distinct unilaminar investment or follicle of flat cells, outside which are rounded cells of larger size which seem to be merely adherent and do not form a definite layer. These cells are granular and colourless, but contain one, two or sometimes three shining red granules; similar cells block the mouths of the siphonozooids, and I take them to be Zoochlorellae.

*Remarks:* In the fine account of the structure of *Sarcophytum* by Moseley (1881, p. 117, Pls. 1, 2) the autozoids are referred to as the "sexual zooids" and the siphonozooids are contrasted therewith as non-sexual; Wright and Studer in their "Report on the Alcyonaria" (1889) state that *Sarcophytum purpureum* Dan. and Kor. has siphonozooids which bear the sex-organs, and they therefore place this species in the genus *Anthomastus* Verrill. The red spicules, the shape of the spicules as well as the sexuality of the siphonozooids which I describe for the present species, agree with their account of the two species of *Anthomastus* described in that Report.

Hickson (1900, p. 74) stated that he considered the facts insufficient to separate the genus from *Sarcophytum*, but in 1904 (p. 217) accepts Verrill's genus and redescribes *A. grandiflorus*.

Another feature in which the present species differs from *Sarcophytum* is in the absence of longitudinal canals which serve to connect the various zooids. Further, Moseley states that the tentacles are pulled downwards when the autozoid is contracted and so figures them, as does Pratt (1903) for *Sclerophytum* (pl. 30, fig. 22), whereas in the New Zealand species they are inflexed, and the apices are directed downwards.

It may be mentioned that in *A. canariensis* and in *A. steenstrupi* the autozoids are, as in the present species, few and large (see Challenger Report, 1889).

The figures given of the spicules in the species of *Sarcophytum* in that Report, as well as in other accounts, show that the "spindles" are not much longer than the "knobby rods," whereas in *Anthomastus* they are a good deal longer; though in none do they reach the great size shown by Hickson (1900) for *S. trochiforme* from South Africa. This species I should have referred to the genus *Anthomastus*,

but he prefers to regard it as "intermediate" between the two genera, though he gives no details of anatomy which will enable us to decide the matter.

As to the shape of the colony, although the mushroom shape was formerly regarded as almost diagnostic of the genus *Sarcophytum*, yet as Pratt has shown, this shape may occur in the young forms of *Lobophytum* and of *Sclerophytum*. *Anthomastus* has usually the form of a rounded polypiferous region, and I am not aware that hitherto any species has been described with the very definite mushroom form of the present species. All of which indicates how difficult, if not impossible, it is to allocate the species of these animals to their real genera from external form alone, and illustrates the necessity of examining the finer anatomy.

***Anthomastus phalloides* n. sp. (Figs 20-24.)**

A single colony was obtained by Hon. G. M. Thomson during the experimental fishery cruise in the G.S.Y. "Hinemoa," in 1915. Unfortunately neither the exact station at which it was dredged nor the depth was noted, but it seems probable that it was somewhere in Foveaux Strait.

The specimen had been forced into a phial too small for it, with the result that it is somewhat distorted; it is abruptly bent near its base, and at one point was ruptured, but by careful manipulation I was able to make the following measurements.

The colony is finger-shaped, pale yellowish in colour, and consists of a short sterile stalk and a long polypiferous region. The surface of the stalk is smooth, though somewhat wrinkled by contraction; it measures 12 mm. in length, and has a diameter of about 17 mm. But this is not its real length, for on cutting down the stalk I found that the cavities of the various polyps opened at the lower surface and that sand had entered for a distance of some 7 mm. in the cavities. Hence the present base of the stalk which is concave and appeared to represent the base of attachment is in reality a cut surface, which has contracted in the centre and produced this concavity.

The polypiferous region, which is very distinctly marked off from the stalk, is 35 mm. in length and 12 mm. in diameter at its base, tapering slightly to 8 mm. near the rounded apex. The texture is firm and hard, and the surface between the autozooids is much wrinkled with narrow deep furrows running round the circumference, undulating and irregular, marking out ridges which widen and shorten or even disappear, so that the whole surface appears corrugated; it is on the widened parts of these ridges that the mouths of the siphonozooids are situated.

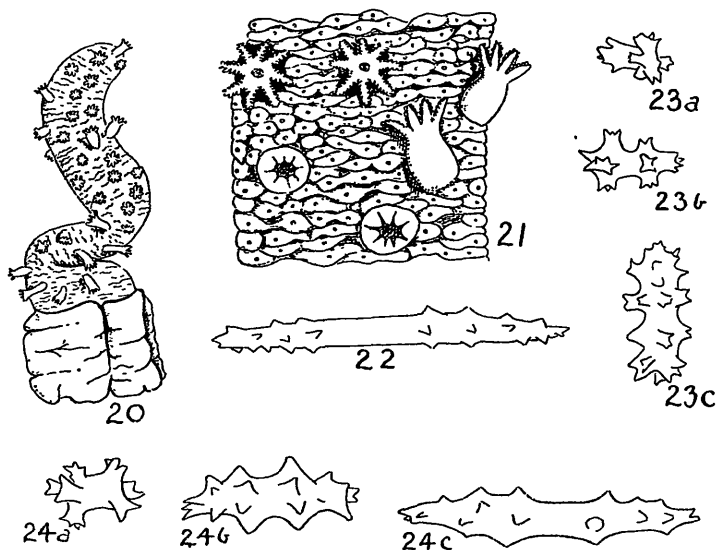
The autozooids are long, colourless and retractile, and widely spaced; they attain a length of 4 mm. from base to tips of the tentacles when extended. The column is transparent and has no spicules in its wall; some are fully extended, others in various degrees of retraction.

The spicules of the polypiferous region are of the two types—(a) short, knobby rods from 0.05 to 0.074 mm. in length; and (b) Thorny spindles of from 0.16 to 0.25 mm.

The knobby rods are so densely packed that it is difficult to detect the spindles through the screen formed by them.

In the stalk, at any rate in the outer layers, there are no spindles, but the knobby rods are here, too, very dense, and some of them are longer than in the upper region, attaining a length of 0.09 to 0.1 mm., but in the deeper parts of the colony as seen in a vertical section spindles are found, which are disposed parallel to the axis of the zooids, and are longer than those nearer the surface.

In the lower part of the polypiferous region the autozooids are about 5 mm. apart; in the upper part they become closer, till they are separated by only 2 mm.



FIGS. 20—24, *Anthomastus phalloides*.

- 20.—The colony, unnaturally bent, (nat. size).  
 21.—A portion of the surface of the coenenchyme (x 4). The small dots in the corrugated areas between the autozooids are the mouths of siphonozoids.  
 22.—A thorny spindle from the polypiferous region (x 260).  
 23.—Knobby rods or "double crosses" from the superficial layer of the coenenchyme (x 260).  
 24.—Spicules of various sizes from the stalk (x 260). (a) A double cross; (b) a knobby rod; (c) a thorny rod.

There is no "cushion" at their base, the wall of the polyp passing directly into the coenenchyme.

Large spherical objects, which at first I supposed were ova, occur in several of the siphonozoids, but sections show them to be hollow spheres with a wall composed of several layers of minute cells; they are no doubt a stage in the development of spermatozoa to which name "spermagems" has been given. They have been forced upwards into this position by the strong contraction when placed in the preservative.

The colony bears considerable resemblance to *Acrophytum claviger* Hickson (1900, p. 74): this, however, possesses club-shaped spicules, much broader at one end than the other, which tapers to a

point, and spicules are stated to be rare in the deeper parts of the colony. Of *Alcyonium sarcophytoides* Burchardt, Stuart Thomson (1921, p. 157) gives a description of a colony which seems to have a similar form, but siphonozooids have not been definitely recognised therein.

#### SPONGIODERMA Kolliker.

##### **Spongioderma (?) vickersi** n. sp. (Figs. 25-31.)

A portion of an arborescent colony of a pale colour, consisting of a cylindrical stem, bearing short branches, with non-retractile polyps, the whole densely covered with spicules which project from the surface and render it rough.

It was collected by Lieut. Vickers, of H.M.C.S. "Iris," in 517 fathoms, at a station 21 miles north of Doubtless Bay, on the east coast of the North Island.

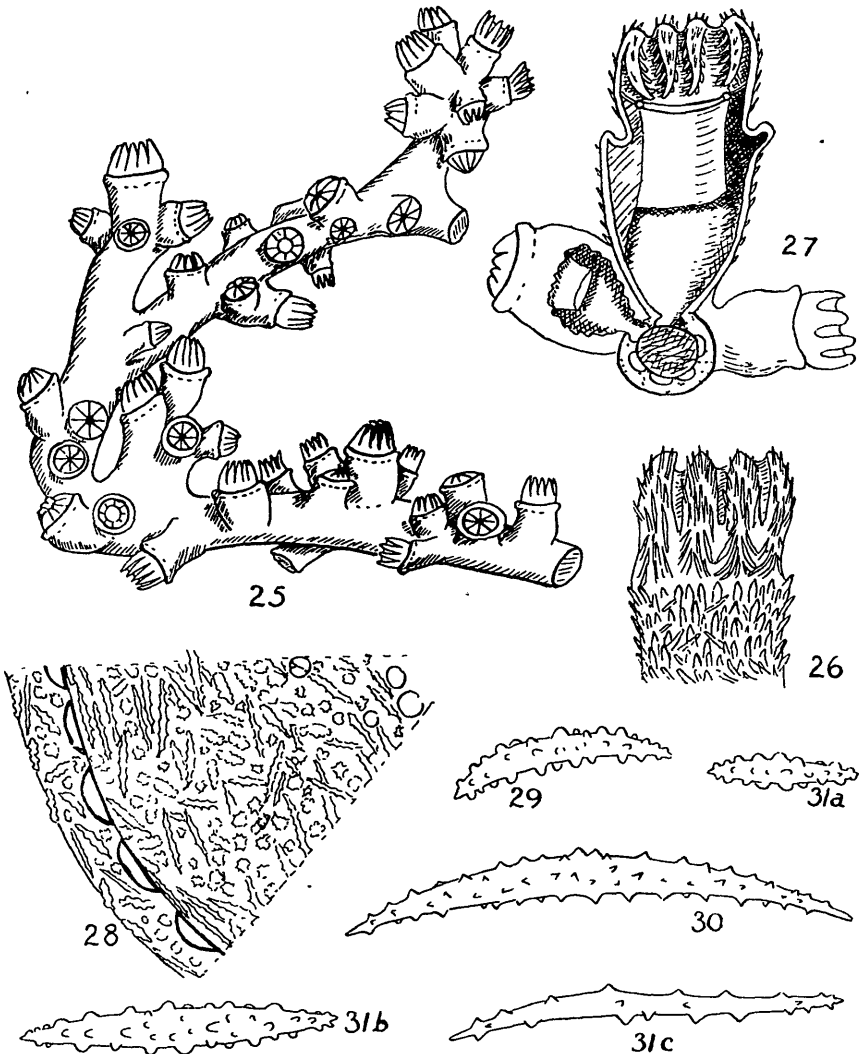
The cylindrical stem measures about 80 mm., but it had been put into a phial too narrow and too small for it, so that the stem is bent and some of the branchlets are broken off. This stem after bearing a short branch set on each side, each of about 12 mm. length, bifurcates into two similar branchlets at its termination. At the point of bifurcation the stem is broadened out and flattened, the diameter of the stem being 3.5 mm., and the broader portion 8 mm.

At the end of these branchlets the polyps are clustered together, but along the stem they are less crowded and irregularly spaced; they are of unequal sizes and the smaller are interspersed among the larger, though there is not much difference in the dimensions. The polyps are comparatively short and stout, measuring from 3 mm. to 4 mm. in either direction; each is slightly enlarged just below the tentacles, and the effect is enhanced by a constriction immediately below these, followed by a thickened rim at the upper end of the column. The tentacles are in every case more or less retracted, that is "inturned," but the bases are very prominent and separated from each other by deep furrows, so that at first one is led to suppose that the tentacles are in some instances fully extended.

A dissected polyp shows that it is only the tentacles that are retracted, this region being withdrawn for a very short distance into the upper part of the column, and so causing the circular rim above referred to. The stomodaeum is wide and extends about halfway down the polyp body; it has a thin wall, is without spicules and without muscles, except the strong circumoral sphincter; its wall is thus not pleated, but hangs straight down.

The inturned tentacles show 4-6 pairs of long and narrow pinnules.

The stem is composed of a superficial cortex or "sarcosome" investing very closely the central medulla or "axis." Between the sarcosome and the axis is a series of wide, shallow canals, running longitudinally; each is surrounded by mesogloea, but owing to the poor preservation I can detect no cellular lining. These canals are, however, continuous with the cavities of polyps, as is seen in a dissected specimen. The individual polyps are not directly connected



FIGS. 25—31, *Spongioderma* (?) *vickersi*.

- 25.—A portion of the colony (x 2). The apparent "tentacles" are in reality the bases of the inturned tentacles, with deep furrows between; in none of the polyps are they extended.
- 26.—The upper end of a polyp (x 6). The whole surface is roughened by projecting ends of spicules.
- 27.—A bisected polyp with two younger ones and a cross-section of the stem (x 6). Details are somewhat diagrammatic; the inflexed tentacles; the oral sphincter and the extent of the stomodaemum are seen; as well as the communication of the polyp cavities with the longitudinal subdermal canals of the stem.
- 28.—A portion of a transection of the stem (x 25), showing the "sarcosome" with its subdermal canals.
- 29.—A spicule from a tentacle (x 40).
- 30.—A spicule from the wall of a polyp near its base (x 40).
- 31.—a, b, c: Spicules from the stem (x 40); the main mass consists of types like that labelled b.



with one another, but each springs from one of the canals, which possibly branch as they run along the stem; but I did not follow them out.

The entire surface of the colony, the polyps and the tentacles, is roughened by the projecting points of spicules, which are very densely arranged and crowded together to form a sort of armour. Even the projecting points are covered with a thin stainable membrane, the mesogloea, but the ectoderm had disappeared.

The spiculation differs somewhat in different parts; the column is provided with short, stout, round-ended rods with many rounded knobs. These spicules, though arranged rather irregularly, in the upper part of the column, tend to take on a longitudinal position; some of these project from the surface. Besides these, there are some spindle-shaped, or even bow-shaped, spicules.

Above the subtentacular constriction the spicules become longer spindles, with thorny processes, and become disposed in converging groups directed towards the bases of the tentacles, the outer surface of which is supported by very long spindles, arranged, of course, lengthwise, the points projecting considerably beyond the bases of the inturned tentacles.

On the stem, the superficial "sarcosome" presents a coating of obliquely and irregularly-disposed, short, knobby spicules, very densely fitted together, and below them occur longitudinally-disposed, long, thorny spindles.

The medulla or central axis consists entirely of spicules densely aggregated and with very sparse mesogloea; it presents no canals, but a few small sub-circular spaces occur towards the centre, which I take to be due to spicules having dropped away.

The spicules are rather more loosely packed towards the centre than peripherally, they are disposed both longitudinally and concentrically; spindles and knobby rods are present.

When boiled in potash, these two sorts are found to be accompanied by spicules of intermediate character, but the most numerous are long spindles with thorny outgrowths, and the short knobby rods. Taking the spicules from all parts of the colony, they range from 0.25 to 0.72 mm. in length, with a diameter varying from 0.036 to 0.07 mm.

*Remarks:* It is evident that this species belongs to the sub-family Spongioderminae in which the axis is devoid of "solenia" or canals. In the text books and other literature available I can find only three genera allotted to this sub-family; and from the diagnosis of *Spongioderma*, as given by Wright and Studer, it agrees most closely with this. It is certainly neither *Titanideum* nor *Iciligorgia*. The only species of *Spongioderma* that is mentioned in the "Challenger" Report is *S. verrucosum* Mobius, from Algoa Bay; and in it the polyps are "retractile into the calices." It is therefore with much hesitation that I place the new species within the genus; for in it the polyps are certainly not retractile; only the tentacular crown is partially withdrawn into the column of the polyp. But without literature, and with but very little knowledge of the group, I leave it here for some authority on the matter to place it in its proper genus.

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