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Papers from Dr. Th. Mortensen's Pacific Expedition 1914—16.

XXXV.

Sponges from New Zealand. Part II.

By
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This second and concluding part of my report on New Zealand sponges forms a direct continuation of the first part (Brøndsted [2]).

Euceratosa.

Euspongia irregularis Ldf.

1886. *Euspongia irregularis* Lendenfeld [17] p. 488.
1889. „ „ „ [20] p. 245.

Queen Charlotte Sound. 3—10 f. Hard, in places soft, bottom. 19—20/I. 1915.

Wellington Harbour. 5—10 f. Hard bottom. 16/II. 1915.

North Channel, Kawaii Island, Hauraki Gulf. Hard bottom. 29/XII. 1914.

Hitherto known from the Atlantic, Indian and Pacific Oceans.

With this species I identify some specimens encrusting shells from various localities. I shall not try to refer them to any of Lendenfeld's several varieties, as they appear to me to have been far too arbitrariously established, and the species itself to be too continuously varying for allowing the establishing of distinct subspecies. It is at present impossible to state the geographical distribution with any amount of certainty, on account of the very uncertain descriptions and determinations given by the various authors; it can only be said that very allied forms are found in nearly all warmer seas, and that our specimens seem to be very like the Australian forms.

Andelsbogtrykkeriet i Odense.

Megalopastas elegans (Ldf.)

1889. *Dendrilla elegans* Lendenfeld [20] p. 714.
1905. *Megalopastas elegans* Dendy [7] p. 205.
1924. „ „ Dendy [8] p. 382.

Off New Plymouth. 8 f. Hard bottom. 12/I. 1915.

One somewhat damaged specimen may be referred to this species; it conforms pretty well with the type.

Spongelia elegans Nardo.

1847. *Spongelia elegans* Nardo [22] p. 267.
1889. „ „ Lendenfeld [20] p. 655.

Slipper Island. The coast, low water. 20/XII. 1914.

It is with some doubt that I identify with this species a few fragments, which seem to have been part of a lobose or lumpshaped body; the external appearance therefore does not seem to be like that of the type; the highness of conuli and their mutual distance and also the dimensions of the fibres and their modus of branching and coalescing however conform well with the type. Instead of sand-grains, the fibres are here mainly cored by foreing spicules.

Hitherto known from the Mediterranean (various authors) and Broken Bay, New South Wales (Lendenfeld).

Psammopemma.

As I mean to untertake a revision of the so-called sand-sponges, which are utterly incompletely known, I shall here only enumerate the following species without naming them.

Psammopemma sp. a.

10 Miles NW. of Cape Maria v. Diemen. 50 f. Hard bottom. 5/I. 1915.

Some few beautiful specimens consisting of anastomosing cylindrical or a little flattened branches about 10 mm thick; the biggest specimen is about 150 mm in largest extension. The surface is closely set with small circular openings ca. 250 μ in diameter. Consistence hard on account of the body being completely charged with sand. Colour gray.

Psammopemma sp. b.

Same locality as Ps. sp. a.

One beautiful specimen; irregularly lumpshaped. Largest extension about 100 mm. Surface set with flat ridges and prominences 1—2 mm high and 2—4 mm broad. Big subdermal cavities. Consistence very hard and compact, on account of the tissues being heavily filled up with sand. Colour gray.

Myxospongida.

Halisarca Dujardini Johnst.

Wellington Harbour. 5 f. 16/II. 1915.

Of this almost cosmopolitan sponge we have one specimen, which is lumpshaped with a few big rounded lobes; ca. 45 mm in largest diameter. Colour white.

Calcarea.

Leucosolenia protogenes (H.)

1872. *Ascetta primordialis* var. *protogenes*, Haeckel [10] II, p. 17.
1885. „ *procumbens* Lendenfeld, [16].
1891. *Leucosolenia protogenes*, Dendy, [4], p. 58.
1923. *Clathria procumbens*, Brøndsted [1].

Moko Hinau Island. 5 f. Hauraki Gulf, N. Z. 30/XII. 1914. Island Bay, Wellington, N. Z., the coast. 22/I. 1915.

One specimen from Moko Hinau, up to 14 mm; it covers an aggregation of sand and small shell-fragments. One specimen from Island Bay, up to ca. 40 mm. It is with some hesitation that I refer my specimens to this species; they differ from the type in having the pseudoderm more continuous, the pseudopores accordingly smaller and not conspicuous. There are a few pseudoscula, ca. 1 mm in diameter. The rays of the triradiates are only up to 130 μ (Dendy has 140 μ); shape of the spicules quite the same as in the type.

I think it safe to regard this species as separate from *L. primordialis* H., and, no doubt, Dendy was right in identifying Lendenfeld's *procumbens* with *protogenes;* I also agree with Dendy & Row 1913 [9] in eliminating the genus *Clathria,* having now myself seen perfect transitions from *Leucosolenia* to *Clathria.*

Hitherto known from S. & E.-Coast of Australia (Haeckel, Dendy, Lendenfeld) and Campbell & Auckland Islands (Brøndsted).

Leucosolenia intermedia Kirk.

1895. *Leucosolenia intermedia* Kirk, [14] p. 35.

Island Bay, Wellington, N. Z. The coast. 22/I. 1915.

Several beautiful specimens. Largest one 40 mm. Pseudopores 200—300 μ. Small oscula, ca. 500—800 μ in diameter, on small elevations. Colour grayish white. Spicules are in the main part of the colony regular triradiates, rays 80—90 μ; they are by transitory stages connected with spicules in the pseudoderm, the rays of which attain a length of 160 μ; they are often somewhat alate and curved, sometimes sharp-pointed, sometimes blunt.

External form and spiculation to a high degree (the stouter pseudodermal triradiates attain a bigger size) conform with that of Kirk's *Leucosolenia intermedia*; I therefore refer the sponges in hand to that species. But I have not been able to see the gastral ingrowth, which should have been there in accordance to Kirk, who states, that his sponge has Dendy's canal system type E. But, on the other hand, I cannot with certainty state that such ingrowths do not occur here in my specimens, as the state of preservation is not the best.

Perhaps my specimens are more correctly referred to Haeckel's *Ascetta primordialis* var. *poterion* (Haeckel, [10]). Attention may be called to the possibility of *poterion* being identical with *intermedia*.

Kirk also has the species form Cook Strait, N. Z.

Leucosolenia lucasi Dy.

1891. *Leucosolenia lucasi*, Dendy, [4], p. 45.
1893. „ „ Kirk, [12], p. 178.

Pegasus Bay, Stewart Island, N. Z. The coast. 20/XI. 1914.

Some few colonies, the largest one ca. 20 mm; the individuals may coalesce, so that a slight reticulation is formed; otherwise the dimensions of a single individual fully agree with those given by

Dendy. As to the spiculation it will be seen from fig. 1, that especially the quadriradiates but also the triradiates may be pronouncedly sagittal also in respect to the angles; this holds good of the majority of spicules.

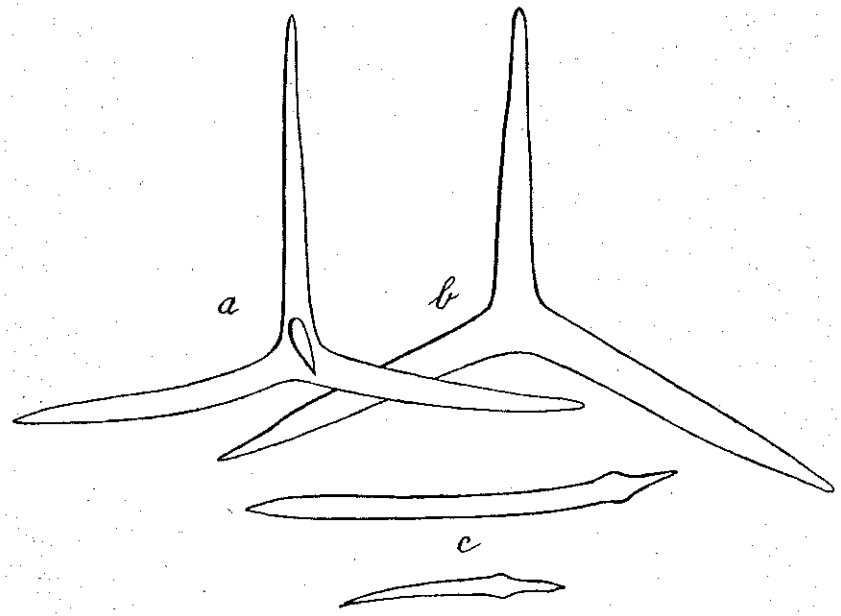

Fig. 1. *Leucosolenia lucasi* Dendy. a. Quadriradiate. b. Triradiate. c. Diradiates.

Hitherto known from outside Port Phillip's Head, Australia (Dendy), and Cook Strait, N. Z. (Kirk).

Leucosolenia echinata Kirk.

1893. *Leucosolenia echinata*, Kirk, [12], p. 177.

Halfmoon Bay, Stewart Isl., N. Z. The coast. 19/XI. 1914.

One colony, ca. 20 mm. The individuals are mostly ca. 0,7—0,8 mm in diameter; they are beautifully hispid. The triradiates and quadriradiates are of about equal size, the rays rarely exceeding 130 μ in length. The triacts are often very much sagittal, as seen in fig. 2. The diradiates never exceed ca. 500 μ in length. The spicules are accordingly a little smaller than in the type.

Hitherto known from Cook Strait, N. Z. (Kirk).

Leucascus clavatus Dendy.

1892. *Leucascus clavatus*, Dendy, [5], p. 78.

Halfmoon Bay, Stewart Isl. The coast. 19/XI. 1914.

Several specimens growing together on a Patella; biggest specimen up to 12 mm in diameter; the body more or less spherical. Surface finely hispid. One naked osculum at the summit, ca. 1 mm

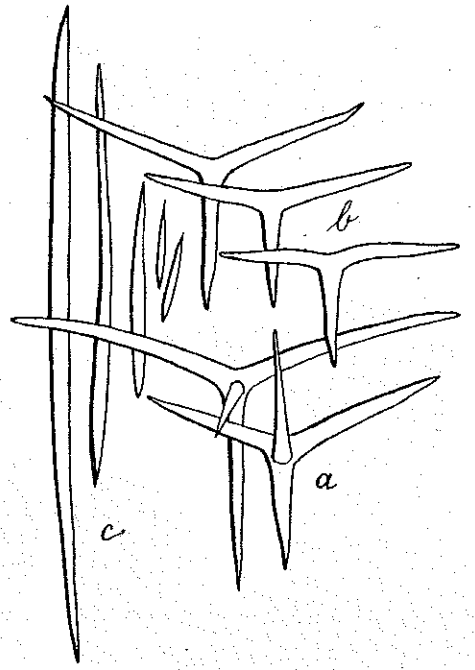

Fig. 2. *Leucosolenia echinata* Kirk. a. Quadriradiates. b. Triradiates. c. Diradiates.

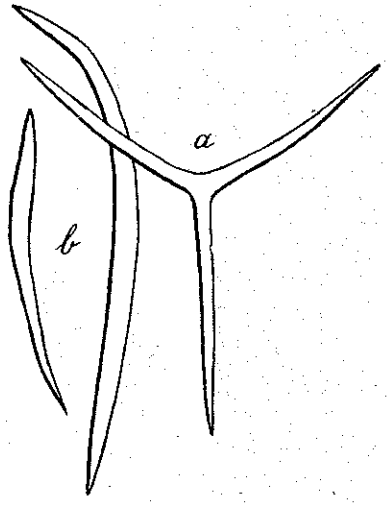

Fig. 3. *Leucascus clavatus* Dendy. a. Triradiates. b. Diradiates.

in diameter, leading into a narrow cloacal cavity. Colour white with a reddish tint.

Specimen in hand (fig. 3) differs slightly from the type in having the distal end of the big oxea sharply pointed, and in having oxea only 40—50 μ thick; the triradiates have sometimes rays, which are slightly curved.

Hitherto known from near Port Phillips Heads (Dendy).

Leucettusa lancifer Dendy.

1924. *Leucettusa lancifer*, Dendy, [8], p. 278.

Slipper Isl. The coast by low water. 20/XII. 1914.

2 Miles E. of North Cape. 55 f. Hard bottom. 2/I. 1915.

Several specimens conforming pretty well with the type.

Hitherto known from Near Three Kings Isl. 100 f. (Dendy).

Leucettusa pyriformis nov. sp.

10 Miles N.W. of Cape Maria van Diemen. 50 f. Hard bottom. 5/I. 1915.

Three specimens, pearshaped, length of biggest specimen 26 mm, thickness ca. 14 mm. Surface a little roughened by the triradiates

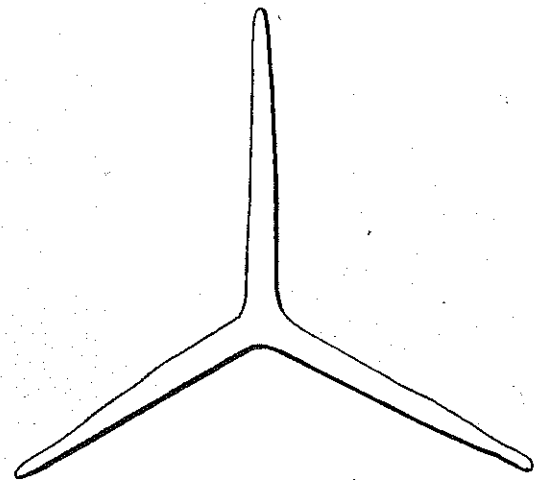

Fig. 4. *Leucettusa pyriformis* nov. sp.

lying tangentially just beneath the dermal membrane; in living state I suppose this roughness not to be present. In preserved condition the dermal membrane has naturally contracted, tightened over the spicules and partly sunk down between them; only a few spicules have protruded through the epidermis. Ostia ca. 200—300 μ in diameter. Oscula, only a few ones in every specimen, ca. 1 mm in diameter, leading into the very spacious cloacal cavity. Consistence rather firm; colour light gray.

Skeleton. All the spicules are lying tangentially, deeply entangled, big and small together; it seems, however, that rather more of the

bigger ones are disposed under the outer surface of the sponge. Body wall 0,6—1 mm thick.

Spicules. Only triradiates (fig. 4), regular; all sizes from the smallest beginnings to a size of ca. 700 μ length of the ray; thickness of rays at the base up to 55 μ; the point of rays often rather blunt; the outmost $^1/_7$ often slightly marked off by a constriction.

Leucettusa mariae nov. sp.

10 Miles N. W. of Cape Maria van Diemen. 50 f. Hard bottom. 5/I. 1915.

One specimen; the body is nearly spherical, attached to a stone by a short stalk; ca. 75 mm high, ca. 40 mm in diameter, stalk

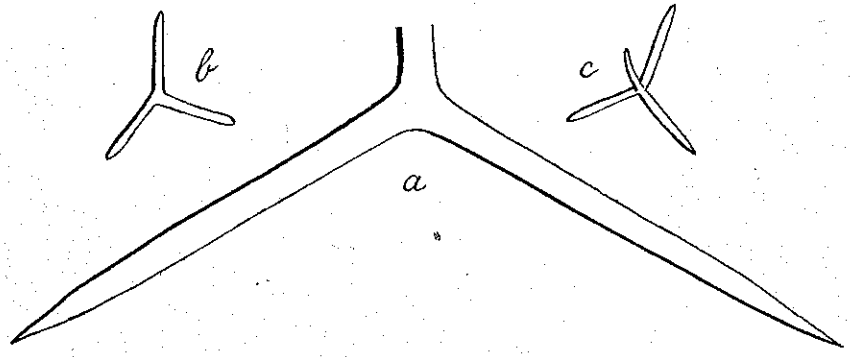

Fig. 5. *Leucettusa mariae* nov. sp. a. Triradiate. b. Pigmy triradiate. c. Pigmy quadriradiate.

ca. 15 mm in diameter. One big osculum at the summit ca. 8 mm in diameter, leading into a very spacious cloacal cavity. Body wall at the thickest part ca. 8 mm thick, diminishing in thickness towards the osculum, where it is only as thin as paper. No fringe of spicules occurs around the osculum. Several spicule-rays are penetrating through the dermal membrane thus making the surface feel rough to the touch. All over the surface are densely scattered the very numerous ostia, which are about 100—150 μ in diameter. Consistence rather loose, like felt; only the outer ca. 0,8 mm thick layer, which is marked off as a cortex, is rather firm; the interior consists of a very lacunar and soft tissue, which only contains pigmy radiates.

Skeleton, only developed in the outer layer of the sponge; there are big radiates lying densely together, tangentially placed, forming a dense crust.

Spicules. 1. Big triradirates (fig. 5a), regular; the rays are measuring up to 900 μ in length by 65 μ in thickness at the base; rays straight, tapering only in the last two thirds to an often rather blunt point. 2. A few big quadriradiates, shape and size as the triradiates; the apical ray of the same form and dimensions as the rays of the basal system. 3. Pigmy triradiates (fig. 5 b) and 4. quadriradiates (fig. 5 c), rather regular; rays ca. 25 μ long; perhaps young forms of the big radiates.

This characteristic and easily recognizable sponge comes near to *L. tubulosa* Dendy 1924, but differs in outer shape, relative thickness of body wall, and in not having the characteristic club-shaped rays of pigmy tetracts of that sponge.

Sycon ramsayi (Ldf.)

1885. *Sycandra ramsayi*, Lendenfeld, [16], p. 1097.
1886. „ „ Carter [3], p. 35.
1892. *Sycon* „ Dendy, [5], p. 82.

Island Bay, Wellington. The coast. 22/I. 1915.

2 specimens, ca. 15 mm high, 4 mm thick, with narrow cloacal tube, accordingly very long radial chambers. The specimens are tolerably well in accordance with the descriptions given by Lendenfeld and Carter; the „Stäbchenmörtel" is very feebly developed, and in most places indeed entirely absent. The dimensions of the rays are very variable, in some instances less than the dimensions given by Lendenfeld, in others exceeding them.

I think the species comes very near to *Sycon ornatum* Kirk.

Hitherto known from Port Jackson, 10 f. (Ldf.), and near Port Phillips Heads (Carter).

? *Sycon ornatum* Kirk.

1898. *Sycon ornatum* Kirk, [15], p. 314.

Pegasus Bay. Stewart Isl. The coast at low water. 20/XI. 1914.

I refer to this species three barrelshaped specimens, ca. 8 mm long, 4 mm thick. In spiculation they agree fairly well with Kirk's description, but they are all devoid of the narrow spicular funnel

characterising the type. Such a funnel may, however, be individually developed, just as well as several *Sycon*-species may include both stipitate and non-stipitate specimens.

Hitherto known from Cook-Strait, between tide-marks.

Grantia primitiva nov. sp.

Moko Hinau Island. Hauraki Gulf. 5 f. Gravel. 30/XII. 1914.
Three Kings. 65 f. Hard bottom. 5/I. 1915.

One specimen, barrelshaped, ca. 8 mm long, 3 mm thick; with an oscular fringe of rodshaped spicules, ca. 0,8 mm high. Consistence rather hard, colour light grayish. Osculum ca. 0,4 mm in diameter leading into the cloacal cavity, which is of about the same width; the radial chambers are correspondingly long; they are unbranched, outwardly connected by the feebly developed dermal cortex, which is only 40—50 μ thick; gastral cortex 60—70 μ thick.

Skeleton. 1. Gastral skeleton consists mainly of quadriradiates with rather long, closely set apical rays lending the gastral cavity a densely hispid appearance; between the quadriradiates are

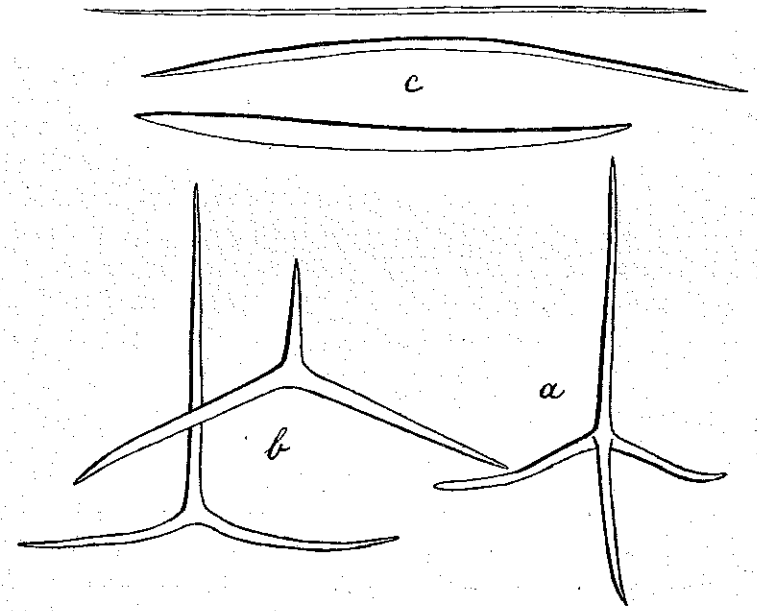

Fig. 6. *Grantia primitiva* nov. sp. a. Quadriradiate. b. Triradiate. c. Diradiates.

triradiates interpolated. 2. Tubar skeleton many jointed, made up of very densely packed triradiates. 3. Dermal skeleton made up of triradiates and big diradiates; the former are more or less irregularly placed; the second are implanted at oblique angles, pointing towards the oscular part of the sponge with their free part; about half of the length of the oxea are free.

Spicules. 1. Quadriradiates (fig. 6a). Basal system more or less regular, all three rays lying nearly in the same plane, all somewhat curved, generally towards the apical ray; this one is in most cases longer than the basal rays, issuing at about a right angle to the plane of the basal system, curved a little towards the osculum; basal rays about 120 μ long, apical ray up to ca. 300 μ, all about 4—5 μ thick. 2. Triradiates (fig. 6b), generally sagittal; lateral rays often standing at right angles to the basal one; this one may be longer or shorter than the lateral rays; all rays are tapering evenly to a rather fine point; lateral rays varying about 120—130 μ, basal ray from ca. 80—170 μ, all rays up to ca. 9 μ in thickness at the base. 3. Diradiates (fig. 6c); big oxea, somewhat curved, the thickest near the middle, up to ca. 25 μ by a length of ca. 600 μ.

This species is evidently nearly related to *Sycon*, the cortex being rather thin, and the radial chambers simple and many jointed.

The specimen from Three Kings is ca. 10 mm high, 6,5 mm thick, oscular fringe ca. 1,5 mm high. It differs a little from the type specimen by having one end of the big oxea set rather abruptly off.

Ute argentea Pol.

1883. *Ute argentea,* Poléjaeff, [23],
1913. *Uteopsis argentea,* Dendy & Row, [9], p. 766.

Hen & Chicken Island. 50 f. Hauraki Gulf, N. Z. Hard bottom. 30/XII. 1914.

10 Miles N. W. of Cape Maria van Diemen. 50 f. Hard bottom. 5/I. 1915.

From the first locality one specimen, 24 mm long, 1,5 mm thick, cylindrical, although a little narrower at the base and summit. From the second locality one specimen, 13 mm long, pedunculated; the stem is gradually fusing into the corpus; the former is ca. 0,8 mm

thick, the latter ca. 2 mm; the corpus is of long ovoid shape; osculum at the summit, ca. 0,8 mm in diameter, leading into the spacious cloacal cavity. Skeleton, shape and dimension of spicules agree fairly well with the type.

I cannot, for the present, follow Dendy & Row in establishing a new genus for this species; its relationship to Ute is so obvious, that the only difference, namely the inarticulate tubar skeleton, is to be regarded as a matter of degree, of degeneration, as it may be, rather than a real structural difference. The essential fact is, that *argentea* has very short radial chambers; but this may be the case in parts of the same individual of other *Ute*-species, whereas other parts have long chambers.

Hitherto known from off Twofold Bay, Australia (Poléjaeff).

Ute syconoides (Carter).

1886. *Aphroceras syconoides*, Carter, [3], p. 135.
1892. *Ute syconoides*, Dendy, [5], p. 92.
1924. ? *Ute syconoides*, Dendy, [8], p. 284.

2 Miles East of North Cape, N. Z. 55 f. Hard bottom. 2/I. 1915.

Two specimens, nearly cylindrical, narrowing a little at the base and at the summit, where the osculum (ca. 1 mm in diameter) is situated; no spicular fringe. Diameter of sponge body 2,5—5 mm, length 15—18 mm. Surface smooth with a silky appearance on account of the longitudinally placed, colossal oxea, which are easily recognized by the naked eye. Body wall ca. 1 mm thick in the middle. Consistence rather firm, colour white to light brown.

The *skeleton* is easily divided into three parts. 1. Gastral skeleton is composed of the quadriradiates in one layer with the gastral ray pointing freely into the cloacal cavity, bent a little towards the osculum. 2. Tubar skeleton, articulated with many joints, ca. 550 μ thick in the thickest part of the sponge-body. 3. The dermal skeleton, consisting of the colossal diradirates placed longitudinally, intermingled with smaller diradiates and triradiates and outwardly coated by „Stäbchenmörtel".

Spicules. 1. Triradiates (fig. 7 b), always more or less sagittal; with straight or curved oral rays; the basal ray may be shorter or longer than the oral rays; these vary from ca. 40 to 130 μ in length; the basal ray from 40 to 300 μ; all the rays 8—9 μ in thickness. 2. Quadriradiates (fig. 7 a). Basal system as the triradiates; the gastral ray is up to ca. 170 μ in length, of same thickness as the other rays. 3. Colossal diradiates (fig. 7 c),

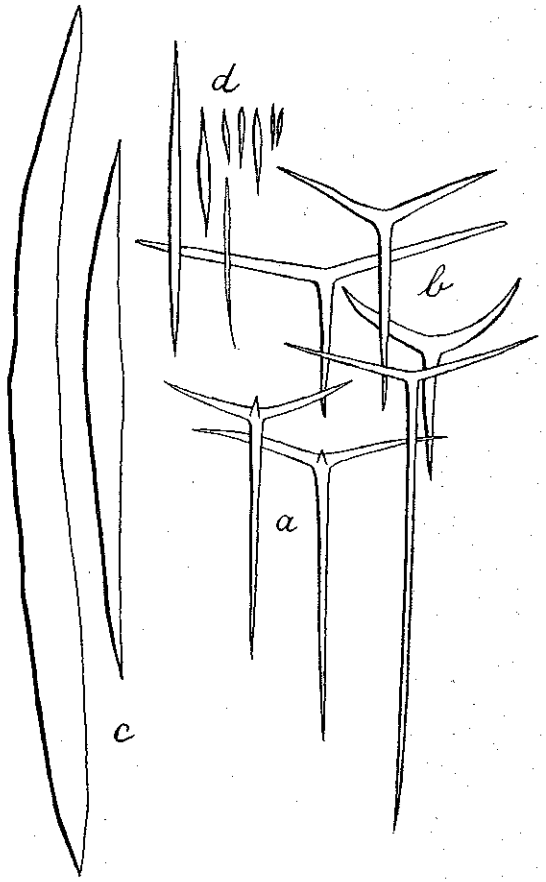

Fig. 7. *Ute syconoides* Carter. a. Quadriradiates. b. Triradiates. c. Colossal oxea. d. Small diradiates.

fusiform, up to ca. 3500 μ by 170 μ; these spicules are by all transitory stages connected with 4. Small diradiates (fig. 7 d) forming the „Stäbchenmörtel"; their dimensions are 30—40 μ by 1—3 μ.

As will be seen by the description, there can be but little doubt, that the specimens in hand are identical with Carter's

syconoides; unfortunately neither Carter nor Dendy have given figures, but Carter's description is as usual sharp and distinct so as to allow a determination with a great amount of safety.

Grantessa intusarticulata (Carter).

1886. *Hypograntia intusarticulata*, Carter, [3], p. 45.
1892. *Grantessa* „ Dendy, [5], p. 108.

Island Bay, Wellington. The coast. 22/I. 1915.

One beautiful branching and anastomosing colony of a total extension of ca. 35 mm; the single individual is nearly cylindrical, a little constricted, however, at the summit; dimensions of an individual naturally much varying, commonly of ca. 8 mm length by 3 mm thickness. Surface extremely finely hispid; each individual provided with an osculum, ca. 0,5—1 mm in diameter. Texture rather soft, colour yellowish white.

It is with some hesitation, that I refer the specimen in hand to this species. The colonized form may well suit the type; the skeleton is built in just the same way; the dimensions of the radiates also conform fairly well with the type; (the rays, however, seem to be generally somewhat stouter, up to 25 μ in thickness at the base). But the shape of the small diradiates is differing from that of the type: Carter states: „acerates, minute, sinuous, thicker towards one end than the other, viz. that which is lance-pointed"; but in the specimen in hand they are straight, thicker in the middle, from here tapering towards both ends. This little difference is, however, hardly strong enough to justify the establishing of a new form.

Hitherto known from near Port Phillips Heads (Carter) and Port Jackson (Dendy).

Leucandra connectens nov. sp.

10 Miles N. W. of Cape Maria van Diemen. 50 f. Hard bottom. 5/I. 1915.

5 beautiful specimens, attached to stones; cylindrical, digitate, sometimes a little anastomosing, attaining a length of ca. 95 mm, by a thickness of ca. 25 mm; each individual is thickest in the middle, from here somewhat tapering towards both base and

summit; the latter is crowned by an osculum, which is up to 5 mm in diameter, and marked off by a little low collar, but without spicular-fringe. The gastral cavity is cylindrical, of about the same width as the osculum. Surface smooth, dermal membrane very delicate, pierced by numerous ostia, ca. 0,15 mm in diameter. Texture rather firm. Colour whitish.

The *skeleton* is mainly built up of the big triradiates; these are forming more or less regular hexagons around canals in the interior and around ostia in dermal and gastral membrane. The dermal skeleton is fortified by strong quadriradiates with the basal system placed tangentially, and the apical ray directed inwards; the three basal rays are lying between the triradiates in the dermal skeleton, which are here more numerous and more densely packed together than elsewhere in the sponge. Throughout the choanosome are scattered numerous smaller tri- and quadriradiates. The gastral skeleton is not marked off, except by the fact that small quadriradiates are here lying more regularly, though not forming a distinct layer.

Spicules. 1. Triradiates (fig. 8 b), regular; the rays are straight, thickest at the base, tapering to the not very fine point; length up to ca. 400 μ by a thickness at the base of 25—30 μ. 2. Quadriradiates (fig. 8 a); the basal system is regular, curving a little away from surface of the sponge; the rays are tapering from base to point, 350—400 μ in length, 35—40 μ in thickness at the base; the gastral ray is straight, much longer than the basal ones; it is also tapering evenly from base to point; the length is commonly about 700 μ, but may be longer; thickness about 60 μ at base. 3. Pigmy triradiates (fig. 8 c), tolerably regular; rays straight, constricted at the base, 10—15 μ long, 3—4 μ thick. 4. Pigmy quadriradiates; the basal system as pigmy triradiates; the apical ray of same shape and dimensions as the basal rays. 5. Pigmy diradiates (fig. 8 d). Several incomplete small triradiates are found devoid of one or two rays; sometimes two such rays are lying in linear continuation of one another, thus giving rise to pigmy diradiates.

All these pigmy radiates are possibly young forms of the bigger spicules; but they are, as before said, lying in greater numbers in the gastral membrane; it is therefore also possible, that, at least

here, they do not attain bigger sizes; and if so, they must be reckoned independent spicules *per se*.

This beautiful sponge, which ranks among the giants of the Calcarea, is very interesting in taking up a position between *Leucandra* and *Leucilla* (both as defined by Dendy & Row 1913). I should reckon the sponge in hand amongst the *Leucilla*-species

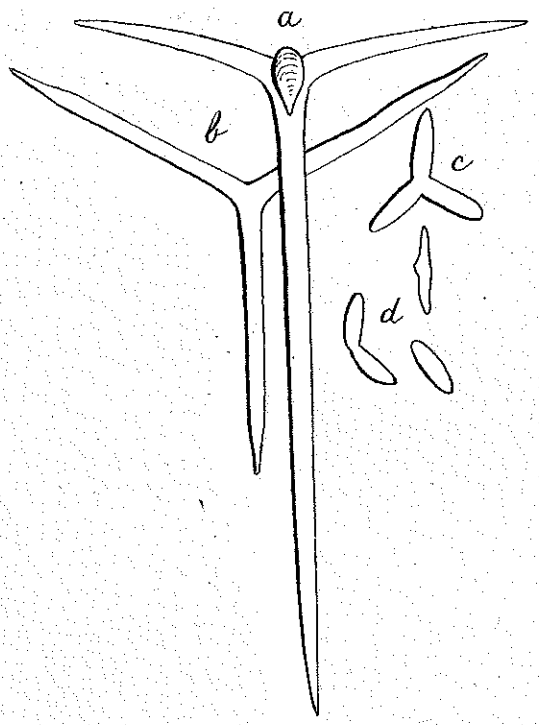

Fig. 8. *Leucandra connectens* nov. sp. a. Quadriradiate. b. Triradiate. c. Pigmy triradiate. d. Pigmy diradiates.

devoid of subgastral quadriradiates, were it not for the several triradiates forming the bulk of the choanosomal skeleton. As it is, I think it safe to refer it to *Leucandra*, just on account of its confused triradiate choanosomal skeleton.

We have here a striking example of the difficulties or, better still, impossibility met with in building up clear defined groups in the Order Calcarea, an example giving clear evidence, that even the families are quite confluent.

Leucandra aspera (O. Schm.)

1862. *Sycon asperum*, O. Schmidt, [24], p. 15.
1872. *Leucandra aspera*, Haeckel, [10], p. 191.

Off New Plymouth. 8 f. Hard bottom. 12/I. 1915.

Five specimens, the biggest one ca. 10 mm in length by 4 mm in diameter. Agree very well in all particulars with the type and Haeckel's description.

Hitherto known from the Mediterranean.

Leucandra haurakii nov. sp.

Moko Hinau Isl. Hauraki Gulf. 5 f. Gravel. 30/XII. 1914.

Two specimens. Barrel-shaped, ca. 9 mm high, 4 mm thick, a little pedunculated; osculum ca. 0,5 mm in diameter leading into the cloacal cavity, which is about 1,4 mm in diameter; surface somewhat uneven and slightly hispid; gastral surface smooth. Chamber system leuconoid, diameter of chambers ca. 50 μ. Texture firm, Colour gray.

Skeleton. Gastral skeleton is made up of one layer of quadriradiates, which are not numerous, no cortex being formed. Chamber skeleton confused, consisting of mainly irregularly placed triradiates with sparsely intermingled quadriradiates; traces of a tubar skeleton can be seen: some few subgastral triradiates occur in several places. Dermal skeleton not forming a crust, even not a continuous layer of tangentially placed triradiates; the big oxea are implanted obliquely in the choanosome piercing the dermal membrane, but only a small part of the spicules is reaching beyond the surface.

Spicules. 1. Quadriradiates; the basal system is a little sagittal, the oral rays forming an angle of a little more than 120^0 with one another; their apices are often somewhat orally bent, they are generally a little longer than the basal ray; the apical ray is rather short, conical, straight, may be very short, nearly vestigial; oral rays about 130 μ, basal ray about 120 μ, apical ray about 50 μ, all rays about 11 μ thick at the base. 2. Triradiates; varying from nearly regular to distinctly sagittal; the rays are mostly a little irregularly curved, mostly about 150 μ long, but may vary up to ca. 250 μ in length, by 13 μ in thickness at the base.

3. Diradiates; these are big oxea a little bent; the two rays may be of about the same length, but one ray is often very short, so that the spicule becomes club-shaped; but both ends are always sharp-pointed. Length up to 1000 μ, generally about 600 μ, by ca. 40 μ in thickness.

I think this species comes very near to *Leucandra aspera* Schmidt.

Leucandra australiensis (Carter.)

1886. *Leuconia fistulosa* var. *australiensis*. Carter, [3], p. 127.
1892. *Leucandra australiensis*, Dendy, [5], p. 97.

Little Barrier Isl. 30 f. Shellbottom. 29/XII. 1914.

Some ramified fragments; one of the fragments has been part of a tube; it is ca. 35 mm in length, up to 10 mm in diameter;

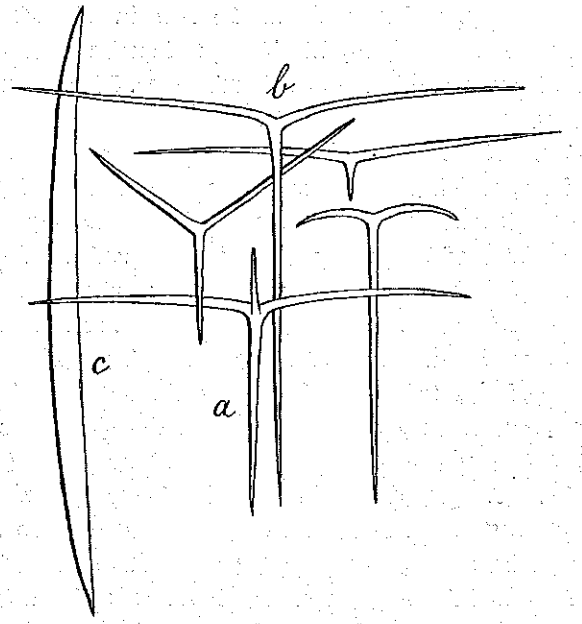

Fig. 9. *Leucandra australiensis* Carter. a. Quadriradiate. b. Triradiates. c Diradiate.

the end of the tube is dividing into two shorter and much smaller tubes, only ca. 4 mm in diameter. The other fragments also show signs of having been part of a cylindrical wall; they are now flattened. The dermal surface is hispid, the gastral surface nearly

smooth. Consistence is soft, thickness of the wall 0,5—0,7 mm. Colour white.

I refer — with some doubt — the specimens in hand to Carter's species; with some doubt, because my own specimens are very damaged so as to exclude a direct comparison of the outer shape with that of the type; and because neither Carter nor Dendy give measurements of the tri- and quadriradiates. But as for the rest it seems to me, that Carter's description will suit my specimens. I give here the measurements of the spicules from the New-Zealand specimens: Quadriradiates (fig. 9 a) and triradiates (fig. 9 b): basal ray up to about 400 μ, commonly ca. 200 μ; sagittal rays up to about 300 μ, commonly ca. 150 μ; gastral rays generally 40—60 μ in length, but may be up to 150 μ. All rays 9—10 μ thick. Diradiates (fig. 9 c) commonly about 600—700 μ long, 40 μ thick.

Hitherto known from near Port Phillips Heads (Carter, Dendy).

Leucandra secutor nov. sp.

Hen & Chicken Island, Hauraki Gulf. 50 f. Hard bottom. 30/XII. 1914.

Three Kings. 65 f. Hard bottom. 5/I. 1915.

Several specimens, growing on bryozoans, corals, shells etc. Mostly of very irregular shape, although the initial form may be said to be that of a barrel; the oscula are nearly all situated on conic or barrel-shaped prominences; they are 1—2 mm in diameter, bare, without fringe of spicules; they are leading into gastral cavities of about the same width: 1—3 mm. The biggest specimen measures 23 mm. The surface is over the greater part even and rather smooth; in several places, however, very shaggy, which is easily seen with the naked eye, but in those places the dermal membrane is more or less damaged, the surface indeed making a rather macerated appearance; I therefore think that the surface, when the sponge is quite sound, is smooth, which also well corresponds with the informations to be gathered from the skeleton. The colour is whitish, a little opaque; the consistence hard, rather brittle.

The skeleton consists of three rather sharply separated parts. 1. The dermal skeleton is made up of a ca. 150 μ thick crust of tangentially placed alate triradiates; they are lying very close and

in several layers, thus forming a real armour. 2. The big triradiates form the main skeleton; the facial planes of the triradiates are in most places radially disposed pointing from the interior of the sponge towards the surface. 3. Everywhere in the strands of soft tissues are seen small quadriradiates and diradiates, here and there also trichodragmatas; the small diradiates are especially numerous in and just beneath the dermal crust; the quadriradiates

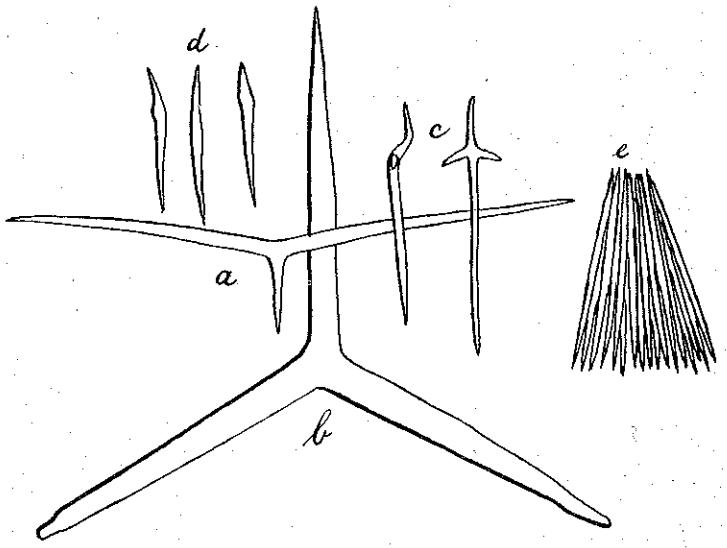

Fig. 10. *Leucandra secutor* nov. sp. a. Dermal triradiate. b. Choanosomal triradiate. c. Quadriradiates. d. Diradiates. e. Trichodragmata.

are particularly to be found in great numbers in the walls of the bigger efferent canals.

Spicules. 1. Dermal triradiates (fig. 10a); basal ray straight, conical, tolerably sharp-pointed, up to about 200 μ; oral rays a little curved, tapering evenly to the points, up to about 800 μ; all rays at the base ca. 40 μ thick; the angle between the oral rays not far from 180°. 2. Choanosomal triradiates (fig. 10b), very stout, rather equiangulated; the rays straight, tapering from the ca. 120 μ thick base to the blunt or sharp apices (these often set off by a constricted part); length of rays up to ca. 1300 μ. 3. Choanosomal quadriradiates (fig. 10c), daggershaped; all four rays are lying nearly in the same plane, the basal ray somewhat crooked,

however; length of basal ray ca. 27 μ, of oral rays ca. 15 μ, of apical ray ca. 78 μ; thickness of all rays at the base ca. 5 μ. 4. Small diradiates (fig. 10d) with rather conical rays; the whole spicule ca. 15 μ long, 1,5 μ thick in the thickest part. 5. Trichodragmata (fig. 10e), about 200 μ long, up to 120 μ thick; the single hairlike straight oxeote about 120 μ long.

This species forms together with *L. nivea* Grant, *L. gladiator* Dy. and *L. Johnstoni* Carter a curious little group, well characterized by its daggershaped quadriradiates; *secutor* comes near to *gladiator* in the sharp distinction between the two forms of triradiates, and differs herein from *nivea;* but it differs from *gladiator* in being devoid of big oxea. The measurements of the spicules are not far from those of *gladiator.*

Leucandra regina nov. sp.

Three Kings, N. Z. 65 f. Hard bottom. 5/I. 1915.

Queen Charlotte Sound, N. Z. 3—10 f. Hard, in places soft bottom. 19/I. 1915.

One specimen from Three Kings, roundish, ca. 10 mm in diameter. One specimen from Queen Charlotte Sound, conical, tapering from the 11 mm broad base to the ca. 1 mm broad summit, where the osculum is situated, the latter without spicular fringe. Length of sponge 19 mm. Surface rather smooth, although rays of the triradiates pierce the dermal membrane here and there, but I regard this as a mainly post mortem phenomenon owing to the contraction of the dermal membrane on preservation. Colour white, consistence a little elastic. The cloacal cavity is rather conspicuous; its walls finely shaggy from the apical rays of the quadriradiates; the openings of the efferent canals are scattered with tolerably equal mutual distance all over the cloacal wall.

Skeleton. The main skeleton is built up of the triradiates, mostly lying so, that the facial plane is directed more or less radially, perpendicularly towards the dermal membrane. This latter is sustained by a thin layer of „Stäbchenmörtel", formed by closely packed, radially arranged, small diradiates; besides this, there is no special dermal skeleton. The gastral membrane and the walls of the efferent canals are sustained by the quadriradiates, the apical rays of which are, as usually, centripetally directed.

Spicules. 1. Triradiates (fig. 11 a), mostly equiangulated, but oral rays often a little longer than the basal ray, scarcely however are the two oral rays of just the same length; sometimes one of the rays is a little curved. All rays evenly tapering and generally very sharp-pointed; length of rays much varying up to ca. 650 μ by a thickness at the base of about 50 μ. 2. Quadriradiates (fig. 11 b); basal system (always?) alate; the oral rays sometimes straight, sometimes bent forwards or backwards; apical ray straight. Oral rays may vary up to 200 μ in length, basal and apical rays up to ca. 170 μ; all the rays are up to 15 μ in thickness at the base. 3. Diradiates (Fig. 11 c) in the dermal membrame, nearly always a little curved; the two rays are clearly set off against one another, often curved in opposite directions; length of the whole spicule ca. 40—50 μ, thickness 2—4 μ.

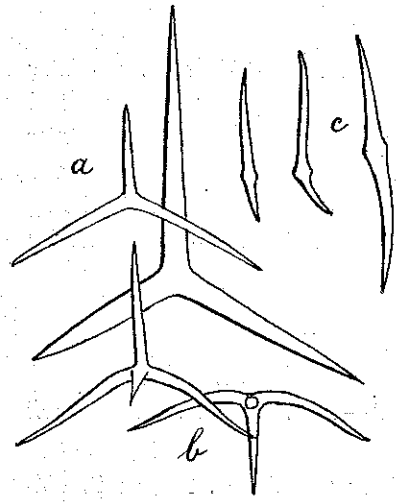

Fig. 11. *Leucandra regina* nov. sp. a. Triradiates. b. Quadriradiates. c. Diradiates.

This sponge comes evidently near to *Leucandra bomba* Haeckel, ([10], p. 209), but differs in not having colossal diradiates, and in the sizes of the spicules.

Leucandra regina nov. sp. var. *regularis* nov. var.

Slipper Island, N. Z. The coast at low water. 20/XII. 1914.

One specimen. Irregularly lumpshaped. 25 mm in greatest extension; two oscula, the biggest 2 mm in diameter, leading into a narrow cloacal cavity; no spicular fringe about the oscula. Surface even. Texture very firm. Colour whitish.

It differs from the type in having nearly all the big triradiates (fig. 12 a) equirayed, and the rays up to 1000 μ in length and 100 μ in thickness; the small diradiates (fig. 12 c) are

here only 30—40 μ, and besides in the dermal membrane, they are also lying in the walls of afferent and efferent canals.

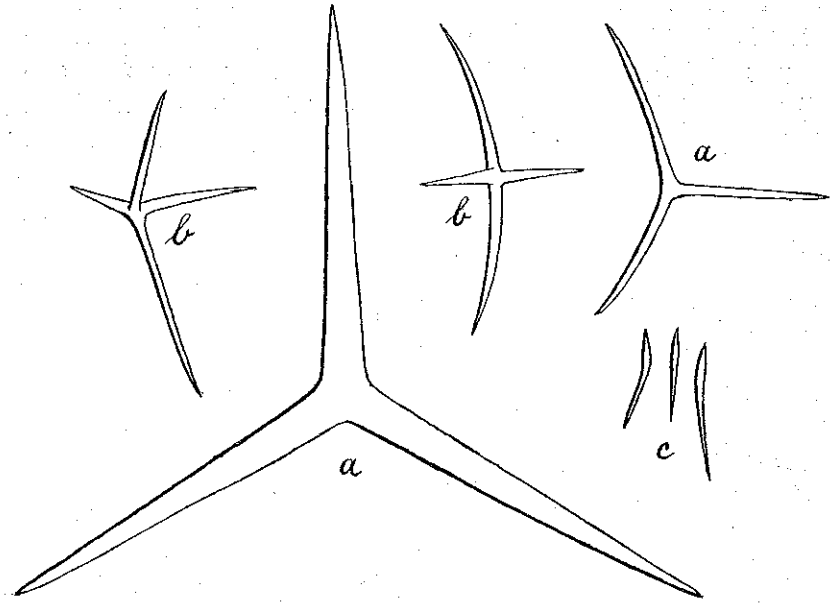

Fig. 12. *Leucandra regina* nov. sp. var. *regularis* nov. var. a. Triradiates. b. Qnadriradiates. c. Diradiates.

Leucandra vesicularis nov. sp.

10 Miles N. W. of Cape Maria van Diemen. 50 f. Hard bottom. 5/I. 1915.

One specimen, attached to a shell; lump-shaped, nearly globular, 43 mm in diameter. Surface a little warty, finely hispid. Dermal membrane very delicate, fortified by a single layer of small oxea lying tangentially; ostia ca. 40 μ in diameter, very numerous. There has been a single rather big osculum at the top of the sponge, but unfortunately the part of the sponge around that opening is almost entirely torn off; from the remaining parts we may suppose this osculum to have been 4—5 mm in diameter and without spicular fringe. There is a very spacious central cavity with the openings of rather big efferent canals; thickness of the body wall in the thickest parts ca. 8 mm; it will therefore be seen, that the sponge

is quite bladder like. Texture of the body wall firm and hard, rather stony. Colour white.

Skeleton. 1. The gastral skeleton (both in cloacal cavity and in the biggest efferent canals) consists of quadriradiates in one layer; the apical rays are directed perpendicularly towards the surface and projecting freely into the lumen. 2. The main skeleton is composed of the di- and triradiates forming a dense mass of

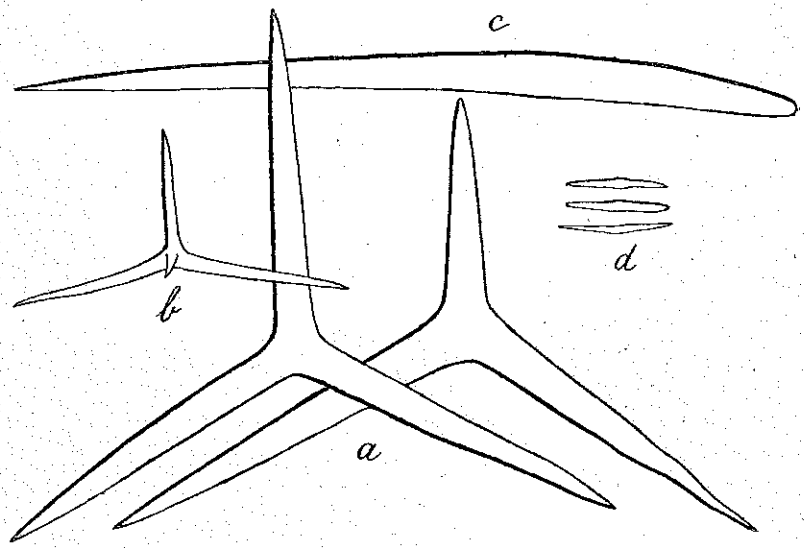

Fig. 13. *Leucandra vesicularis* nov. sp.
a. Triradiates. b. Quadriradiates. c. Big diradiate. d. Pigmy diradiates.

spicules; the triradiates are lying without any order; the diradiates are mainly directed radially and often projecting a little beyond the surface; they are more numerous in the outer part of the sponge. 3. The dermal skeleton is formed by the same sort of triradiates as are found in the choanosome, lying in a few layers; the dermal membrane proper is, as before said, fortified by the small diradiates lying tangentially in one layer.

Spicules. 1. Quadriradiates (fig. 13 b); the basal system is alate; the angle between the oral rays and the basal one nearly 90°; all rays very slender, in most cases a little curved or somewhat irregularly bent. Oral rays ca. 185 μ, basal ray 140 μ, apical ray ca. 130 μ; thickness at the base of all the rays ca. 11 μ.

2. Triradiates (fig. 13 a); stout, equiangulated, but not equiradiated; rays evenly tapering from base to the fine point. Length of biggest ray up to 750 μ, thickness at base 78 μ. 3. Diradiates (fig. 13 c), colossal oxea, the shorter ray always rather blunt, the longer always very sharp-pointed; a little curved; length up to 1500 μ or even more, thickness up to 90 μ. 4. Diradiates (fig. 13 d), pigmy dermal oxea, 25—35 μ.

(The following species had been overlooked till now; it therefore does not appear in its proper place, among the Astrotetraxonia.)

? *Chondrosia collectrix* Ldf.

1888. *Chondrosia collectrix* Lendenfeld, [19], p. 74.

Off New Plymouth, N. Z. 8 f. Hard bottom. 12/I. 1915.

If is with some doubt that I refer to this species a sponge encrusting a crab, Serpula-tubes etc.; it is about 25 mm in largest diameter, grayish-black of colour, rather hard of consistence. Surface smooth. The interior charged with all sorts of small foreign particles, mostly sand-grains and fragments of various sponge-spicules.

Hitherto known from Port Jackson.

Discussion of zoo-geographical problems concerning the Sponge-fauna of New Zealand and the Auckland- and Campbell Islands.

Up to 1924 our knowledge of the Sponge-fauna of New Zealand was very scanty; only the Leucosolenidae and perhaps the Euceratosa were comparatively well known through the works of Kirk and Lendenfeld. But in 1911 the British "Terra Nova" Expedition carried on some dredgings North of New Zealand; and in December 1914 and January 1915 Dr. Th. Mortensen made large collections at various points at those islands. The result in

regard of sponges is now at hand: Dendy's work from 1924 and my own report on Dr. Mortensen's material.

It is a lucky circumstance, that the two collections admirably supplement one another: the "Terra nova" material is from rather deep water from a confined area North of New-Zealand, whereas Dr. Mortensen's material (besides containing forms from localities close to those of "Terra Nova") covers species from North to South of N. Z., and both forms from comparatively deep water and several shallow-water forms; we therefore now have a representative picture of the New Zealand sponge-fauna.

It will be convenient to give here an — as far as I know — complete list of sponges from New Zealand mentioned in the literature:

Order *Calcarea*

Leucosolenia cerebrum Haeckel
„ *challengeri* Poléjaeff
„ *clathrus* Schmidt
„ *depressa* Dendy
„ *echinata* Kirk
„ *intermedia* Kirk
„ *laxa* Kirk
„ *lucasi* Dendy
„ *protogenes* Haeckel
„ *proxima* Dendy
„ *rosea* Kirk
„ *stolonifer* Dendy
Leucascus clavatus Dendy
„ *simplex* Dendy
Leucettusa lancifer Dendy
„ *mariae* Brøndsted
„ *pyriformis* Brøndsted
„ *tubulosa* Dendy
Sycon ornatum Kirk
„ *pedicellatum* Kirk
„ *ramsayi* Lendenfeld
Grantessa intusarticulata Carter
„ *poculum* Poléjaeff
Grantia primitiva Brøndsted
„ *ramulosa* Brøndsted
Sycute dendyi Kirk
Ute argentea Poléjaeff
„ *syconoides* Carter
Leucandra aspera O. Schmidt
Leucandra australiensis Carter
„ *connectens* Brøndsted
„ *haurakii* Brøndsted
„ *regina* Brøndsted
„ „ var. *regularis* Brøndsted
„ *secutor* Brøndsted
„ *vesicularis* Brøndsted
Lamontia zona Kirk

Order *Hexactinellida*

Rossella ijimai Dendy
Symplectella rowi Dendy

Order *Tetraxonida*

Sub-order *Astrotextraxonida*

Stelletta columna Dendy
„ *crater* Dendy
„ *maori* Dendy
„ „ var. *bistellata* Dendy
„ *sandalinum* Brøndsted
„ *novæ-zealandiæ* Brøndsted
Myriastra biformis Brøndsted
Ancorina alata Dendy
„ *novæ-zealandiae* Dendy
„ *osculifera* Dendy
„ *progressa* Lendenfeld var. *diplococcus* Dendy
„ *stalagmoides* Dendy

Penares tylotaster Dendy
Jaspis novæ-zealandiæ Dendy
Asteropus simplex Carter
Spongosorites novæ-zealandiæ Dendy
Geodia regina Dendy
„ *rex* Dendy
Geodinella vestigifera Dendy
Monosyringa Mortensenii Brøndsted
Donatia japonica Sollas
„ *multistella* Lendenfeld
„ *fissurata* Lendenfeld
Chondrosia collectrix Lendenfeld

Sub-order *Sigmatotetraxonida*

Aciculites pulchra Dendy
Lepidospongia incrustans Dendy
Craniella zetlandica Carter
Cinachyra novæ-zealandiæ Brøndsted
„ *uteoides* Dendy
Gellius flagellifer Ridley and Dendy
„ *imperialis* Dendy
„ *petrocalyx* Dendy
„ *regius* Dendy
„ *tubulo-ramosus* Dendy
Gelliodes biformis Brøndsted
„ *strongylofera* Brøndsted
Halichondria panicea Johnston
„ *reticulata* Brøndsted
Reniera cinerea Grant
„ *clathrata* Dendy
„ *laxa* Lundbeck
„ *pulcherrima* Brøndsted
„ *scyphanoides* Lamarck
Petrosia coralloides Dendy
Chalina oculata Bowerbank var. *novæ-zealandiæ* Dendy
Chalina ramosa Gray
Pachychalina affinis Brøndsted
„ *aurantiaca* Lendenfeld
„ *conica* Brøndsted
„ *lunae* Brøndsted
Ceraochalina pergamentacea Ridley
Siphonochalina communis Carter
„ *latituba* Dendy
„ *minor* Dendy var. *regalis* Dendy
Siphonochalina stellidermata Carter
Chalinopsilla australis Lendenfeld var. *reticulata* Lendenfeld
„ *palmata* Carter
Oceanapia arcifera Dendy
„ *aberrans* Dendy
Phloeodictyon fistulosum Bowerbank
Isodictyon cavicornuta Dendy
Tetrapocillon novæ-zealandiæ Brøndsted
Guitarra antarctica Hentschel
„ *bipocillifera* Brøndsted
„ *novæ-zealandiæ* Dendy
Desmacidon novæ-zealandiæ Brøndsted
Mycale novæ-zealandiæ Dendy
Esperiopsis edwardii Bowerbank
„ *macrosigma* Stephens var. *novæ-zealandiæ* Dendy
„ *megachela* Dendy
Artemisina jovis Dendy
„ *elegantula* Dendy
Desmacella vestibularis Wilson
Biemna novæ-zealandiæ Dendy
„ *sp.* Dendy
Iophon lævistylus Dendy
Iophonopsis major Brøndsted
„ „ var. *tenuis* Brøndsted
„ *minor* Brøndsted
„ *sp.* Dendy
Bubaris oxeata Dendy
„ *elegans* Dendy
„ *ornata* Dendy
„ *vermiculata* Bowerbank
Clathria macropora Lendenfeld
„ *scotti* Dendy
„ *terræ-novæ* Dendy
Microcionia novæ-zealandiæ Brøndsted
„ *heterospiculata* Brøndsted
„ *pyramidalis* Brøndsted
Raspailia topsenti Dendy
„ *inæqualis* Dendy
Rhabderemia coralloides Dendy

Hymedesmia lundbecki Dendy
Anchinoë fristedti Dendy
„ *novæ-zealandiæ* Dendy
„ *affinis* Brøndsted
Myxilla novæ-zealandiæ Dendy
„ *crelloides* Brøndsted
Phoriospongia kirkii Carter
Crellomyxilla intermedia Dendy
Lissoplocamia prima Brøndsted
Tedania crista-galli Dendy
Tedaniopsis turbinopsis Dendy
Tedanione connectens Brøndsted
Pyloderma demonstrans Dendy
Amphiastrella kirkpatricki Dendy
Cornulum novæ-zealandiæ Brøndsted
Inflatella spherica Dendy
Histodermella australis Dendy
Parahigginsia phakellioides Dendy
Axinella sinclairi Gray
„ *colvillii* Brøndsted
„ *globula* Brøndsted
Stylotella digitata Lendenfeld
Hymeniacidon racemosa Brøndsted
„ *haurakii* Brøndsted
„ *novæ-zealandiæ* Brøndsted
„ *erecta* Brøndsted
Discorhabdella incrustans Dendy
Trachycladus stylifer Dendy
Echinonema anchoratum Carter var. *lamellosa* Lendenfeld
Latrunculia spinispiraefera Brøndsted
Dotonella mirabilis Dendy
Suberites carnosus Johnston var. *novæ-zealandiæ* Dendy
„ *axinelloides* Brøndsted
„ *perfectus* Brøndsted
Polymastia conigera Bowerbank
Microtylostylifer anomalus Dendy

Order *Euceratosa*

Megalopastas elegans Lendenfeld
Euspongia irregularis Lendenfeld
Hippospongia equina O. Schmidt var. *elastica* Lendenfeld
„ *canalicula* Lendenfeld var. *microtuba* Lendenfeld
Phyllospongia perforata Hyatt
„ *macropora* Lendenfeld
„ *papyracea* Esper
„ *distans* Lendenfeld
„ *arbuscula* Lendenfeld
„ *foliascens* Pallas
„ *spiralis* Lendenfeld
Thorecta squalidus Lendenfeld
„ *meandrinus* Lendenfeld
„ *exemplum* Lendenfeld var. *tertia* Lendenfeld
„ *byssoides* Lamarck
Aplysina ramosa Lendenfeld
„ *procumbens* Lendenfeld
„ *meandrina* Lendenfeld
Stelospongia serta Lendenfeld
„ *australis* Lendenfeld var. *conulata* Lendenfeld
Sigmatella corticata Lendenfeld var. *papillaris* Lendenfeld
Haastia navicularis Lendenfeld
Psammopemma crassum Carter
„ *sp. sp.* Brøndsted
Spongelia hirciniformis Carter
„ *elegans* Nardo
„ *spiculivora* Dendy
„ *varia* Gray

Myxospongia

Halisarca dujardini Johnston

As will be seen, we know at present 198 forms of sponges from New Zealand, evidently only a minor part of the sponge-fauna of those islands, as may be concluded from the fact, that two large collections only have 10 species in common. In the

same direction points the great amount of new species and varieties in the two collections: Dendy describes 60 new species of a total of 88; in Dr. Mortensen's material are 46 new forms of a total of 78.

But although our knowledge of the New Zealand sponge-fauna is still far from complete, I think it large enough to draw certain conclusions in regard to its zoo-geographical relations.

We may employ two methods in comparing the N. Z. sponge-fauna with that of other areas: 1. The statistical, as it may be called, which simply enumerates the localities outside N. Z., where N. Z. sponges have been found, and 2. The relationship-method, which tries to state, where the N. Z.-sponges have their nearest allies, in other words, which looks for the sponge-fauna outside of N. Z. which is the most akin to the fauna of that area.

In employing notably the statistical method, it must be born in mind, that the following discussions naturally only may lead to a provisional result, on account of the very imperfect state of knowledge of some of the sponge-faunas taken into consideration.

About 198 species and varieties are known from N. Z.; of these the following 50 species may be regarded as reliably recorded from both N. Z. and other areas.

It will be seen, that 33 of the enumerated 50 species are also found in Australian seas, 12 in the Northern part of the Indian Ocean. Noteworthy is, that 10 species are found at the East coast of America, ranging from Baffin's Bay to Cape Horn, but probably this is due to the comparatively satisfactory knowledge of sponges from various areas of this long coast; it can scarcely be imagined, that N. Z. and some of those regions should have any close relation to one another; I therefore think, that some of these species will some day or other prove to be nearly cosmopolitan, as 5 of the enumerated species from N. Z. have already been proved to be so. Only two species are recorded from Antarctic seas, and these two were also found in various places in the Northern part of the Atlantic ocean.

Hence it is quite obvious from the statistics, that the relatives of the N. Z. sponges are to be found in Australian seas, more distinctly S.-E. of Australia, even if allowance be given to the well founded knowledge of that sponge-fauna. I wish here to lay stress upon the fact, that a big portion of the Calcarea, viz. 12 species

List of the Sponge-faunas of New Zealand and the Auckland- and Campbell Islands.

Name	S. & E. Australia	S. & W. Australia	N. Part of Indian Ocean	Pacific Coast of Asia	Sunda Islands to N. Australia	Pacific Islands	S. Africa	W. of America	E. of America	W. of Africa Europe	Antarctica (Kerguelen etc.)	Mediterranean	
Leucosolenia stolonifer Dy.	+												
Grantessa poculum Pol.	+												
Asteropus simplex Carter	+	+	+						+				
Craniella zetlandica Carter													almost cosmopolitan
Gellius flagellifer R. & D.			+						+	+			
Pachychalina aurantiaca Ldf.	+												
Ceraochalina pergamentacea Ridl.	+				+				+				
Siphonochalina communis Carter	+		+						+				
„ *stellidermata*	+												
Chalinopsilla palmata Carter	+												
Phloeodictyon fistulosum Bow													almost cosmopolitan
Esperiopsis Edwardii Bow.									+	+	+		
Desmacella vestibularis Wilson								+					
Bubaris vermiculata Bow.			+							+	+		
Phoriospongia kirkii Carter	+		+										
Polymastia conigera Bow.			+							+			
Megalopastas elegans Ldf.	+												
Spongelia hirciniformis Carter	+												
Leucosolenia lucasi Dy.	+												
„ *protogenes*	+												
Ute argentea Pol.	+												
Ute syconoides Carter	+												
Sycon Ramsayi Ldf.	+												
Grantessa intusarticulata Crt.	+												
Leucandra aspera												+	
Leucascus clavatus Dy.	+												
Euspongia irregularis Ldf.	+	+	+		+		+		+				
Halisarca Dujardini Johnst.													almost cosmopolitan
Donatia japonica Soll.			+		+								
Halichondria panicea Johnst.													almost cosmopolitan
Reniera cinerea Grant													almost cosmopolitan
Reniera scyphanoides	+		+	+									Red sea
Reniera clathrata Dy.	+												
Reniera laxa Ldbk.									+				
Suberites perfectus R. & D.	+												
Phyllospongia perforata Hyatt.	+	+			+								
„ *papyracea*		+	+				+						
„ *foliascens* Pallas	+	+	+		+	+							
Hippospongia equina var. *elastica* Ldf.	+	+							+			+	
Thorecta exemplum var. *tertia* Ldf.	+								+				
„ *byssoides* Lam.	+	+											
Stelospongia australis var. *comulata* Ldf.	+	+						+					
Sigmatella australis var. *papillosa* Ldf.	+		+		+				+				
Psammopemma crassum Carter	+												
Leucosolenia clathrus Schm.												+	
„ *challengeri* Pol.					+								
„ *cerebrum* Haeckel												+	
„ *proxima* Dy.	+												
„ *depressa* Dy.	+												
Leucascus simplex Dy.	+												
	33	8	12	1	7	1	2	2	10	4	2	4	

of the 36 from N. Z. known species, that is 33 per cent, are found at S. E. Australia; it is an important fact, because most of the Calcarea are distinct shallow-water forms. This point will, however, be discussed later on.

When we are going to untertake an inquiry as to species allied to N. Z. forms from other areas, to see whether such an inquiry will give the same result as the statistical method, it will be necessary only to pay attention to such forms, which are very distinctly characterizable, or at least forms which can be reckoned to readily recognizable genera or subgenera. It will appear obvious, that such genera as f. i. *Leucosolenia, Donatia, Geodia, Reniera, Halichondria* and several others must be excluded from this inquiry, because the characters of the species in these genera are so confluent and variable, that it is only with a considerable amount of uncertainty, that f. i. a species from N. Z. can be said to be nearer allied to another species from, say, Tasmania than one from Antarctic seas. If from the material at our disposal we pick out genera containing species with outstanding characteristics, there will remain only few forms, which we may employ. I think, that only the following will serve our purpose.

Guitarra. This genus is characterized by its peculiar chelæ, the *placochelæ*; the known species are found in various places in the Atlantic and Antarctic oceans, and at N. Z. Two forms are known from N. Z. The one, *Guitarra bipocillifera* Brst. seems at present to take up a unique position among the species of the genus, it must, therefore, go out of the discussion. About the other, *G. antarctica* Hentschel, Dendy [8] writes: "There is a suggestion of an Antarctic affinity in the presence of a variety of Guitarra antarctica and of the genus Tedaniopsis, but at the present state of our knowledge of the sponge distribution it would hardly be safe to go beyond this." I think however, that Dendy's variety *novæ zealandiæ* would merit specific rank, and I do not think, that it is considerably more closely allied to *G. antarctica* than to other described species; the suggestion as based upon *Guitarra*, is therefore, I think, only a very faint one.

Tedaniopsis. Here we have a, for the present, readily recognizable genus. As pointed out by Dendy, [8], Hentschel's *Oceanapia kirkpatricki* is to be regarded as a *Tedaniopsis.* As, however, no

other species with certainty belonging to this genus is recorded from the Antarctic (nor from other places), I think it premature to say too much about this genus as being especially characteristic of the Antarctic; I therefore think, that *Tedaniopsis turbinata* Dendy can tell us but very little about a possible affinity between the N. Z. and Antarctic sponge-faunas.

Amphiastrella, although closely related to *Inflatella,* is easily recognized; the only two known species are *A. kirkpatricki* Dy. and *A. birotulifera* Dy., the former from N. Z., the second from S. Australia. The case is a very similar one to that of *Tedaniopsis;* but I think the two species of *Amphiastrella* much nearer related to one another than the two species of *Tedaniopsis* inter se, the probability of giving evidence for relationship between the two sponge-faunas is therefore greater.

Several species of the well defined genus *Trachycladus* are found and hitherto only found at the Australian coasts; it may therefore be said, that this genus seems to be characteristic of the Australian sponge-fauna; now Dendy describes a new species from N. Z., viz. *T. stylifer;* this, it seems to me, is a strong argument for the relationship of the two said sponge-faunas.

The new genus *Tetrapocillon* is unique in possessing the highly characteristic spicules, the tetrapocilli. In my remarks about that genus, I mentioned a sponge from S. Australia (Victoria) dredged by Dr. Th. Mortensen, but as yet not described; this sponge contains just the same tetrapocilli and belongs to the same genus. This fact also supports the view of a nearer relationship of the two sponge-faunas.

The *Euceratosa* is a group which is most richly developed in warmer seas; it is a group with indistinct and confluent genera and species; its isolated genera and species cannot therefore be employed in this discussion; but the fact, that the group is, as a whole, so well represented, is in itself a strong evidence for the theory of deriving the N. Z. sponge-fauna from warmer seas.

In reconsidering all the above said, it can be but little doubtful, that the sponge-fauna of N. Z. is for the overwhelming part very closely related to that of Australia, whereas seemingly connections with other areas (f. i. the Antarctic and Magellanic) and are to be regarded mainly as occasional, without deeper signification.

Although many endemic forms are found at N. Z., it will appear rather strange that the sponge-fauna of those seas has not separated farther from that of Australia. And this fact forces us to investigate whether or not a direct interchange between the two areas may be taking place.

It will be known[1]), that the Westwind current on the Southern Hemisphere touches the South coast of Tasmania and Australia, and then Cape Providence of New Zealand, a portion of it going up along the North-West coast of N. Z. This current could be the only one to be supposed to carry sponge-larvæ from Australia to N. Z. (The East-Australian current goes down to Tasmania and flows from here East-ward with the West-wind Current). The middle velocity of this current is about 16 sea-miles pr. 24 hours, but may flow as fast as 24, that is about 40 km; even if we allow a velocity of 50 km pr. 24 hours, it will take ca. 25 days for a distance of 1250 km, which is the lowermost distance between a point off the East coast of Tasmania, where a comparatively shallow-water sponge (0—200 m depth) can produce its eggs, to a point West off Cape Providence, where the larva can settle. But observations (rather few, however), of the time between hatching and attachment, state that this time varies from 1 to 5 days; hence it will seem very improbable, that sponge-larvæ might nowadays come from Australia (Tasmania) to N. Z.

Transport of sponges on floating algae is, as far as I know, only of rare occurrence; at all events it would be hazardized to make such a transport responsible for a considerable part of the N. Z. sponge-fauna.

There is, however, another possibility to be taken into consideration: Between the Coral-sea N. E. of Australia and N. Z. there is an area of comparatively shallow water with depths from 500 to 1000 m. It may be, that several of the socalled shallow-water forms (coast-forms) are able to live at these depths, and if so, there is a possibility for a slow migration of species nowadays between the two areas. But we know so very little about the vertical distribution of most of the sponge-species that it is impossible to say much about this question. But the little, we know, does

[1]) The following exposition is chiefly based on Krümmel's Handbuch d. Ozeanographie, 1907.

not point in that direction; we may here think especially of the Calcarea, which is, as well known, a group mostly inhabiting shallow water, and as before said, 33 per cent of the N. Z. Calcarea are also found at Australia.

It must, therefore, be regarded as a well established theory that the affinity of the sponge-fauna of the two areas has its root in a past earth-epoch; and it is well known that the geological structure of N. Z. is very like that of Australia. It therefore seems probable that the two areas have had closer relation in space than nowadays, probably have been continuous. But still it will seem strange that the sponge-faunas are so closely allied and alike one another, though the two areas have been separated for long geological epochs. Here Hinde and Holme's work shows us that many sponges from Eocene-Oligocene strata at Oamaru on the East-coast of N. Z. are so like living forms that it may be safely supposed that many species have remained unaltered from then till now. It may therefore also be supposed that the N. Z. sponge-fauna has not had time enough yet to develop any far from the common sponge-fauna of Australia-New Zealand.

The sponge-fauna of the Auckland- and Campbell Islands has, as well as the Echinoderm-fauna, as shown by Dr. Th. Mortensen [21], its nearest relation to that of N. Z.; this opinion is based on the following consideration.

From the said islands are known some 47 species of sponges (Brøndsted, [1] p. 167). Of these only the following 15 are known from outside the area.

Clathria procumbens Ldf. = *Leucosolenia protogenes* H. S. and E. of Australia and N. Z.
Leucosolenia echinata Kirk. N. Z.
Leucandra conica Ldf. S. Australia.
Reniera cinerea Grant. Almost cosmopolitan (N. Z.).
„ *heterofibrosa* Lundbeck. North Atlantic.
„ *implexa* Schm. Mediterranean, Azores, Gulf of Manaar.
„ *laxa* Lundbeck. North Atlantic. N. Z.
„ *clathrata* Dendy. South Australia. N. Z.
Esperiopsis normani Bow. North Atlantic.
Stylotella agminata Ridl. E. of Australia.
Antherochalina concentrica Ldf. North Atlantic, N. Z.?

Ceraochalina multiformis Ldf. var. *dura* Ldf. N. Z.
Euchalinopsis oculata Bow. Australia, N. Z.? North Atlantic.
Thorecta exemplum Ldf. var. *tertia* Ldf. Australia, N. Z., North Atlantic.
Spongelia elastica Schulze var. *lobosa* Schulze. Mediterranean. North Atlantic. Australean seas.

Of these species 7—8 are known from N. Z.; only three are not known from Australian seas including N. Z., and these three are only recorded from areas which cannot be supposed to have the slighest connection with the Auckland- and Campbell Islands. I therefore think Mortensen [21] quite right in writing: "The Auckland-Campbell Islands belong exclusively with New Zealand, this fauna being not at all subantarctic in its character".

I may resume my opinion of the discussed problems as follows:

The New Zealand sponge-fauna and that of the "Subantarctic" Auckland- and Campbell Islands are very closely related to one another and to that of Australia; other possible relationship can hardly be detected at the present state of our knowledge.

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