penial setæ; strong muscular bands run from the lateral to the ventral pariates in the neighbourhood of the atria, a character which unites this species and *Acanthodrilus annectens* to the genus *Octochætus;* the presence of these muscular strands is perhaps to make up for the absence of penial setæ; the atrial papillæ can possibly be considerably protruded by their means; and, as they (the extruded papillæ) are tapered at the extremity, they can, it is likely, be actually inserted in the spermatothecal orifice, and convey the sperm direct.

"The oviducal pores are placed just in front of the ventral-most setæ.

"The oviducts have no egg-sacs attached to them.

"The sperm-sacs are in segments ix., xi., xii. I could not find any sac in the intervening segment.

"The spermatothecæ are, as in all the *Acanthodrilidæ* (excepting only *A. communis*), two pairs, and lie in the usual segments—*i.e.*, viii., ix.; each pouch has, as in *Acanthodrilus annectens*, more than one diverticulum; in the present species there are two, one of which is rather the larger.

"Closely allied to *Acanthodrilus annectens* as this species undoubtedly is, there will be no difficulty in distinguishing it. The chief points of difference are—(1) position of gizzard, (2) normal position of gonads, (3) form of spermatothecæ."

Corrigenda.—In my last paper (Trans. N.Z. Inst., vol. xxv., p. 117), for *Allolobophora rubicunda* (*subrubicunda*, Eisen), read *Allolobophora rubellus*, Savigny (*Lumbricus campestris*, Hutton).

Art. XI.—*Contribution to a Knowledge of the New Zealand Sponges.*

By H. B. Kirk, M.A.

[*Read before the Wellington Philosophical Society, 11th October, 1893.*]

Plate XXII.

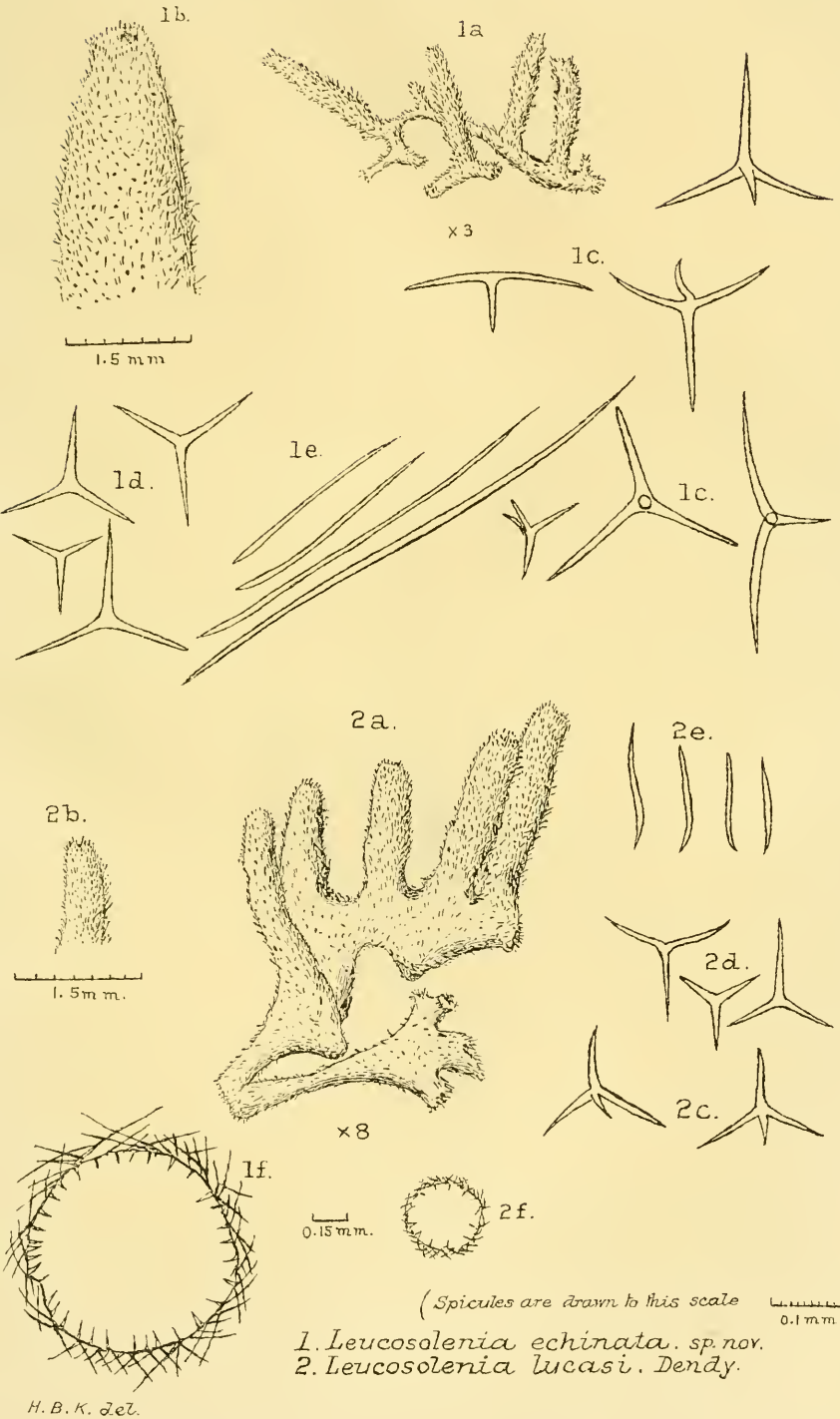
In presenting what is intended to be the first of a series of papers on the New Zealand sponges, I feel that a few words of explanation, perhaps of apology, are necessary. The field of spongiology is such a wide one, it is so difficult to traverse—it has been trodden by so many men of eminence, who, while doing the most valuable work, have not always succeeded in walking in amity there, and whose footsteps, crossing and re-crossing, often make a network difficult to unravel—that it might be thought that most biological workers would do well

to avoid it. The field is, however, a splendid training-ground for the earnest student, and there is much work of great value to be done that can well be done by an observer who is content to describe, in words and by drawings, what he sees and no more, and who, when resorting to diagrams, makes it clear that they are diagrams, and not drawings. Some of this work in relation to the New Zealand sponges, it is hoped, may be done and may be described in the series of papers contemplated, and in the criticisms that will be evoked. Only the publication by each worker of what is known to him, or of what he thinks is known to him, and the correcting of his errors by other workers, can prepare the way for the production of a monograph of the group in New Zealand.

The worker that deals with a group of which there is a widely-recognised classification is enabled to reduce his material to order with some confidence and ease; but in this group every writer of note, and many a one besides, has proposed a scheme that is largely his own, and often he has been the only worker that has adopted his scheme. There has, however, been advance; and the classification of the sponges, which might have been regarded as a very murky and troubled fluid a few years ago, has become clearer and colloid, and may be expected to solidify, in time, in a satisfactory form. The advance that has been made is very largely owing to the magnificent work done by the men to whom the material of the "Challenger" expedition was intrusted, and the classification proposed by them will be generally followed in these papers.

I wish to acknowledge the great help and encouragement that I have received from Dr. Dendy, one of the foremost workers of the day. This help was not confined to good advice, but took also the concrete form of a number of European and Australian types of calcareous sponges, including a large number of the blocks from which Dr. Dendy had cut his own sections. The confidence so generously bestowed on an unknown worker has formed one of the strongest reasons I have had for persevering in this work.

As it must be long before the material collected is sufficient for the production of a monograph, and as much preparatory work has to be done, and some of it probably undone and done again, it is proposed, in the interests of students generally, to describe the New Zealand sponges in something like their natural order, beginning with the Calcarea. As, moreover, the literature of the subject is very scattered, and much of it is difficult to obtain, it is deemed advisable to copy the descriptions of New Zealand forms that may be identified as already described, amplifying and illustrating the description where it seems necessary to do so.


1b.
1a
x3
1c.
1.5 mm
1d.
1e.
1c.
2a.
2e.
2b.
1.5 m m.
2d.
2c.
×8
1f.
0.15 mm.
2f.
(Spicules are drawn to this scale 0.1 mm.)
1. Leucosolenia echinata. sp. nov.
2. Leucosolenia lucasi. Dendy.
H. B. K. del.

The scheme of classification followed in dealing with the Calcarea will be generally that adopted by Dr. Dendy in his "Monograph of the Victorian Sponges," part i., and his "Synopsis of the Australian Calcarea Heterocœla."

The present paper contains the descriptions of two simple ascons, one of which I believe to be new.

Phylum—*Porifera*, *Parazoa*, or *Spongiæ*.

Class—*Calcarea* (Grant).—Sponges in which the skeleton is composed of calcareous spicules.

Order—*Homocœla* (Poléjaeff).—Calcarea in which the endoderm consists throughout of collared cells.

Section I.—*Homocœla simplicia* (Dendy).—"*Homocœla* in which the ascon persons either remain solitary and do not form colonies, or in which they form simple colonies in which the component ascon persons may branch but never form complex anastomoses nor give off radial tubes, so that the individuality of the different members of the colony is easily recognisable."

Genus—*Leucosolenia* (Bowerbank).—Of the characters of the order.

1. Leucosolenia echinata, sp. nov.

The sponge forms colonies of ascon persons springing from a hollow, creeping, and anastomosing sponghoriza. The ascon persons are cylindrical, and are generally wider than the sponghoriza. They are usually about 6·5mm. in height and may be as much as 1·5mm. in diameter. Each tube has a terminal osculum. The colour of the sponge is brownish-white.

The skeleton consists of triradiate, quadriradiate, and oxeote spicules. The radiates are arranged in a single layer in the mesoderm, the apical rays of the quadriradiates projecting into the gastral cavity. The thicker end of the oxeotes is embedded in the mesoderm, and the thin portion projects outwards and generally upwards through the ectoderm.

Spicules.

Triradiates (Pl. XXII., fig. 1*d*): These are generally regular, but are frequently slightly sagittal, in which case the oral angle is the largest and the basal ray the longest. The ordinary length of the rays is 0·1mm., but the basal ray may be 0·13mm. long. The thickness of the rays at the base is generally 0·01mm., and they taper to a point.

Quadriradiates (Pl. XXII., fig. 1*c*): These are more numerous than the triradiates, and larger. They are sagittal, the oral angle being the largest and the basal ray the longest; the oral angle may be as great as 180°. The points of the oral rays may be curved towards each other in their own plane or

towards the point of the apical ray. Ordinary length of basal ray, 0·15mm.; of oral rays, 0·13mm.; and of apical rays, 0·07mm. Thickness of rays at base, 0·015mm. They taper evenly to a point. The apical ray is slightly curved away from the basal ray, and the point is directed towards the osculum of the sponge.

Oxeotes (Pl. XXII., fig. 1*e*) : These are slender and at times almost filiform. They generally taper irregularly to sharp points at both ends. The thickest part of the spicule is generally near the basal end, and near this end is often a sharp bend in the spicule. Sometimes the spicules are slightly truncated or quill-shaped at the base. Length, 0·24mm. to 0·73mm.; greatest breadth, 0·01mm., but sometimes the greatest breadth is not more than 0·005mm.

The projecting oxeotes give this sponge a hispid appearance, observable with the naked eye. The fact that although generally directed towards the oscule they often project at right angles to the axis of the tube, and are often directed towards the sponghoriza, gives the tubes the echinated appearance that suggests the specific name of the sponge. This appearance, and the comparatively large size of the sponge, are the external characters that distinguish it from *L. lucasi*, Dendy, to which it is allied. The microscopic characters that distinguish it at once from *L. lucasi* are the immense size and more tapering shape of its oxeotes, and the fact that its quadriradiates are for the most part noticeably larger and less regular than the triradiates. The triradiates are larger than those of *L. lucasi*.

Localities.—Cook Strait, Poverty Bay, Kawakawa (near East Cape).

In a sponge that appears to be a form of this, and that occurs on Stewart Island, there is a tendency in the ascon tubes to branch. The 4-radiates in this sponge are not larger than the 3-radiates, and are much less numerous. The oxeotes, moreover, are smaller, and do not tend so decidedly to be filiform. This form makes a near approach to *L. lucasi*.

2. Leucosolenia lucasi, Dendy.

The following account of the sponge is slightly compressed from Dr. Dendy's description :—

Sponge forming loose colonies, the ascon persons being connected at their base by a hollow creeping sponghoriza. Ascon persons small, cylindrical, thin-walled tubes, 2mm. or 3mm. in height, and 0·7mm. in diameter. When the sponge is full-grown each tube has a wide osculum at the summit. Outer surface of tubes minutely hispid. Colour in spirits, white.

Skeleton of 4-radiates, 3-radiates, and oxeotes. The radiates are arranged in a single layer in the thickness of the

mesoderm, the apical rays of the 4-radiates projecting into the gastral cavity. Broader ends of oxeotes embedded in the mesoderm; narrower ends projecting outwards and upwards.

Spicules.

Triradiates: Sagittal, but the three angles about equal; basal ray long and gradually sharp-pointed; 0·1mm. × 0·005; oral rays slightly curved away from one another, gradually sharp-pointed, 0·07mm. long.

Quadriradiates: About same size as 3-radiates, apical ray shorter than the others, gradually sharp-pointed, curving slightly upwards.

Oxeotes: Irregularly fusiform, sharply pointed at both ends, broader at one end than at the other, usually bent suddenly at a slight angle near the broader end, often slightly and irregularly curved, tapering gradually to a fine point at the narrow end, but with a very slight annular swelling at a short distance below the apex. They measure up to 0·16mm. in length by 0·005mm. in diameter at the broadest part.

See "Monograph of the Victorian Sponges," page 45, and plates.

A single colony, part of which is figured at Pl. XXII., fig. 2*a*, from Cook Strait, is in my opinion identical with Dr. Dendy's sponge. It shows, however, some slight differences. The bent form of the oxeotes is more frequent and pronounced than in a specimen of *L. lucasi* that Dr. Dendy has kindly sent me from St. Vincent's Gully, and the oral rays of the 3-radiates are often turned slightly towards instead of away from each other. The annular swelling near the apex of the oxeotes is not always present.

EXPLANATION OF PLATE XXII.

Fig. 1*a*. *Leucosolenia echinata* × 3.
Fig. 1*b*. „ a portion of an ascon person magnified to scale.
Fig. 1*c*. „ 4-radiate spicules.
Fig. 1*d*. „ 3-radiate spicules.
Fig. 1*e*. „ oxeote spicules.
Fig. 1*f*. „ cross-section showing arrangement of spicules. Many of the oxeotes are cut across, and appear shortened.

Fig. 2*a*. *Leucosolenia lucasi* × 8.
Fig. 2*b*. „ a portion magnified to same scale as 1*b*.
Fig. 2*c*. „ 4-radiate spicules.
Fig. 2*d*. „ 3-radiate spicules.
Fig. 2*e*. „ oxeote spicules.
Fig. 2*f*. „ cross-section showing arrangement of spicules. Drawn to same scale as 1*f*.