

DESCRIPTIONS
OF
SOUTH AFRICAN SPONGES
PART II.

BY
R. KIRKPATRICK, F.Z.S.
BRITISH MUSEUM (NATURAL HISTORY)

The present paper includes a description of the Lithistid Sponges obtained by Dr. J. D. F. Gilchrist off the Cape and Natal coasts, and sent by him to the British Museum (Natural History). The collection comprises eight specimens representing four species, all of which are new, and four genera, of which three are new. A description is given also of a new species of *Triptolemus* found in the canals of a dead Lithistid skeleton. The following is a list of the genera and species :—

Order **LITHISTIDA.**

Sub-Order **HOPLOPHORA.**

Family **Tetracladidæ.**

Discodermia natalensis, sp. n.

Family **Scleritodermidæ.**

Microscleroderma hirsatum, gen. et sp. nov.

Sub-Order **ANOPLIA.**

Family **Azoricidæ.**

Lithobaetrum forte, gen. et sp. nov.

Family **Desmanthidæ***Monanthus plumosus*, gen. et sp. nov.Order **CHORISTIDA.**Family **Theneidæ.***Triptolemus incertus*, sp. n.*Discodermia natalensis*, sp. n.

Plate iv., figs. 2, 2a-k, and 3, 3a-d.

Sponge cup-shaped, sub-pedicellate. Outer or poral surface smooth, showing a fine branching venation; inner or oscular surface showing broad bands of minute circular oscules, and beneath the surface, lines of orifices of excurrent canals radiating from the base to the edge of the cup. Pores in groups of two, three, or four, in sub-circular pore areas $150\ \mu$ in diameter; oscules in oscular areas about $250\ \mu$ in diameter, usually one, but occasionally two oscules in each area.

Spicules. Megasccleres.—Desma with cylindrical smooth or slightly tuberculated epactines ($100 \times 3\ \mu$) dividing into much tuberculated branches, the tubercles cylindrical with flattened summits or forming sharp ridges; crepidial axes, each $55\ \mu$.

Phyllotriæne of poral surface: rhabdome $90\ \mu$, conical, pointed; cladome tetracladose, the branches enclosing almost circular pore areas; protocladi $90\ \mu$, deuterocladi $60\ \mu$, tritocladi from 60 — $100\ \mu$; crepidial axes about $40\ \mu$.

Discotriæne (or modified phyllotriæne) of oscular surface with irregularly lobed disk, sometimes giving off three unequal cladi; crepidial axes about $30\ \mu$.

Style $360 \times 7.5\ \mu$, in sparsely scattered bundles near and at right angles to the surface.

Oxea $750 \times 6\ \mu$, slender, straight or irregularly curved.

Tyle $140 \times 5\ \mu$, head $6\ \mu$ in length and width, neck $4.5\ \mu$, scattered about in the tissues.

(These small tyles might be included among the micro-scleres).

Microscleres.—Microxea $80 \times 1\ \mu$, slender, straight, smooth.

Microstrongyle $20 \times 3\ \mu$, straight, fusiform, with granular surface.

Colour dull white, texture hard.

Localities: The type specimen from Natal coast (O'Neil Peak bearing N.N.W. $\frac{1}{4}$ W., distant 8 miles), depth, 55 fathoms; bottom, broken shells.

A second specimen (much worn) also from Natal (Cape

Vidal bearing N.N.E. $\frac{1}{4}$ N., distant $9\frac{1}{2}$ miles), depth, 80-100 fathoms; bottom, rock.

The type specimen has evidently been cut in half, one piece only having been sent to the British Museum.

The cup, which is shallow and expanded, is about 7 cm. in diameter, at the mouth, with an inside depth of 3 cm., and a height of 6 cm., the wall being 1 cm. thick.

The second specimen, which I at first thought to belong to a different species, is also only a half specimen; the shape is rather that of a vase or funnel than a cup, the height being 5 cm., diameter of mouth 7 cm., depth of cavity 4.25 cm., and thickness of wall 6 cm. The walls of the second specimen are flexible, and resemble dark sandstone in appearance; the whole ectosomal surface has been worn away, leaving only the framework of desmas; the spicules (desmas, styles, microxea) resemble those of the type specimen, but the microstrongyles (Fig. 3d) vary slightly, being for the most part cylindrical rather than fusiform. Interspersed through the skeletal framework is a new species of *Triptolemus*, which is described at the end of this paper.

The new species is most nearly related to *Discodermia discifurca* Sollas from Port Jackson; the slender, straight, smooth microxeas of the former differ markedly from the thicker, curved granular microxeas of the latter species. Further, the small tytes scattered in some abundance in the tissues of *D. natalensis* form a distinctive feature.

Family Scleritodermidæ.

Microscleroderma, gen. nov.

Scleritodermidæ in which the ectosomal spicules are minute signaspires.

Microscleroderma hirsutum, sp. n.

Sponge cup-shaped, expanding from a short massive pedicel* Inner surface uniformly covered with slightly raised oscules 1.2 mm. in diameter, and smooth between the oscules. Outer surface pilose and corrugated, the thick rounded rugæ running from base to edge and branching more or less dichotomously; pores, about .25 mm. in diameter, distributed over extensive cribriform areas in the fossæ and valleys between the rugæ. Edge of cup thick and rounded. Colour of dried specimens pale brown; white in section.

Skeleton formed of monocrepid desmas united into a regular honeycomb-like framework, with oval smooth-edged fenestræ

320 × 220 μ in diameter; with bundles of oxeas between the longitudinal rows of fenestræ, and passing 2 to 4 mm. beyond the outer surface, thus giving rise to a finely hirsute appearance especially in the fossæ and valleys.

Ectosomal spicules minute sigmaspires.

Spicules.—Oxeas 2000 to 5000 × 12 to 30 μ , slender, often undulating in outline, tapering to sharp points.

Desma, generally with curved or semilunar epirhabd averaging 400 × 30 μ and often bifurcate at the ends, smooth on the concave edge, tuberculated and cladose on the convex surface, one clodus in the middle of the convexity, often being of large size and uniformly tuberculated; again, the epirhabd may be almost straight and uniformly tuberculated and cladose.

Sigmaspire, 16.5 × 1.2 μ , usually C-shaped, occasionally with an extra coil, with rounded ends and with granular surface. (The thickenings at the ends, shown in Fig. 1c, disappear on focussing carefully.)

Locality: Durnford Point, Natal, bearing N.W. $\frac{3}{4}$ W., distant 12 miles; depth, 90 fathoms; bottom, broken shells.

There are two specimens of this species, the dimensions in centimetres being as follows:—

	Large Specimen.	Small Specimen.
Height ...	17	5.5
Diameter of orifice ...	22 × 18	6
Length of pedicel ...	3	1.3
Diameter „ ...	7 × 5	3 × 2
Thickness of wall ...	1.5	.57
Depth of cavity ...	11	2.5

On the outer surface of the larger specimen is an ashen gray patch of dead sponge 3 cm. in diameter and 3 mm. in thickness. Several small holes on the surface lead to sand-lined tubes, probably of some worm. The desmas are thicker and more tuberculated in the patch than elsewhere.

The absence of ectosomal microstrongyles from this species led me to suspect that the spicules of this kind occurring in *Scleritoderma flabelliforme* Sollas and *S. packardi* Schmidt were large sigmaspires, and a careful examination tended to confirm this view. The microstrongyles of *S. flabelliforme* are identical with the sigmaspires in all respects except size, since they are C shaped, occasionally with an extra coil, with rounded ends and granular surface; the resemblance in the case of *S. packardi* is less obvious. The ectosomal rhabdi of *Aciculites*, which are curved and usually with granular ends, are also possibly developed from minute sigmaspires.

Briefly, the three genera of *Scleritodermita* are thus characterised :—

Microscleroderma, ectosomal spicules minute sigmaspires.

Scleritoderma, ectosomal spicules minute sigmaspires, and microstrongyles (? large sigmaspires).

Aciculites, ectosomal spicules rhabdi only (? modified sigmaspires).

Family **Azoriciidæ.**

Lithobactrum,* gen. nov.

Azoriciida massive club-shaped, with uniformly distributed pores at the sides, and with numerous small oscules on the rounded summit; with fine parallel incurrent canals radiating horizontally inwards from the pores, and excurrent canals passing vertically upwards to the oscules.

Lithobactrum forte sp. n.

Plate iv., figs. 5, 5a-g.

Sponge with characters of the genus.

Pores nearly circular, .25 mm. in diameter; oscules, .75 to 1 mm. in diameter, flush with the surface, sharp edged, oval or circular, in groups with an obscurely radiating arrangement.

Skeleton composed of monocrepid desmas, forming a compact lining to the canals, but looser between the canals.

Spicules.—Desmas of the usual monocrepid type (Fig. 5c-f), $450 \times 50 \mu$; crepis 70μ .

Amphityle $992 \times 8 \mu$, with long oval heads, one larger than the other, the larger being $14 \times 8 \mu$, and the smaller $10 \times 5 \mu$.

Other kinds of monaxon spicules (oxeas, styles, tyles) occur, but are very probably adventitious. The amphityles occur deep in the sponge, and intimately associated with the desmas.

Colour, glistening white.

Locality: O'Neil Peak, Natal Coast, bearing N.N.W. $\frac{1}{4}$ W., distant 8 miles; depth, 55 fathoms; bottom, broken shells.

Following the example of Schmidt and Sollas, the characters of the genus have been based on the external form and the arrangement of the pores, oscules and canal-system; and as Azoriciid sponges are devoid of an ectosomal skeleton and of microscleres, there is not much else to fall back upon.

There are two specimens of this fine sponge. The larger grows from an expanded base (7×5 cm.), immediately above

* λιθός, stone, βάρτραν, club.

which it contracts, and then expands gradually to the summit. The height is 18 cm., breadth 8.5 cm., and thickness 4.5 cm., so that the club is slightly flabelliform; the area of the rounded summit is 5×4 cm.

The smaller specimen has been broken off sharp from its attachment, exposing excurrent canals 1 mm. in diameter; its shape is more cylindrical than the first, and resembles a milestone; its height is 7 cm., and its diameter 4 cm., the diameter at the base being 2.4 cm., and at the summit 3×2 cm.

Locality: O'Neil Peak, Natal Coast, bearing N.N.W. $\frac{1}{4}$ W., distant 8 miles; depth, 55 fathoms; bottom, broken shells.

Family Desmanthidæ.

Monanthus, gen. nov.

Desmanthida in which the skeleton is formed of monocepid desmas of the common type, separate or joined together, and of monaxon megascleres.

Monanthus plumosus, sp. n.

Plate iv., figs. 6, 6a-c. Figs. 7, 7a, b.

Description of the type specimen (Fig. 7, 7a, b). Sponge forming a thick white crust, firm but compressible, with several round oscules flush with the surface.

Skeleton composed of plumose columus extending from base to surface, and formed of bundles of oxeas (mostly) and styles; between the columus monocepid desmas isolated and separate or here and there loosely articulated with each other.

Spicules.—Desma, with smooth epirhabd $140 \times 40 \mu$, often bifurcating at each end with flattened branches, sharp-edged or expanded into flattened articular surfaces; cephalic axis 80μ .

Oxea, $480 \times 25 \mu$, smooth, curved, sharp-pointed.

Style, $600 \times 28 \mu$, slightly curved.

Thiele (Ueber *Crambe crambe* (O.S.) Archiv. f. Naturgesch., 1899, p. 89) expresses doubt whether Topsent's genus *Desmanthus* is Lithistid or Monaxonid; and possibly the position of *Monanthus* would be subject to the same doubt. The desmas of *Desmanthus* are tetracepid, and those of *Monanthus* monocepid; in both instances the desmas seem to be of the ordinary Lithistid type, though in the case of *Monanthus* they often appear to be undergoing degeneration; even in isolated spicules, however, well formed articular surfaces often persist, clearly showing that these spicules are derived from forms which were part of an articulated Lithistid skeleton. In the deeper parts of the type specimen, and in the second specimen of *M. plumosus*, where

portions of articulated skeleton persist, the monaxon spicules are only few in number, but the latter become abundant where the desmas are few in number or absent.

The specimen (Fig. 7) encrusts *Pachastrella isorrhopa* Kpk, and in its complete state (for part of it has been cut off and retained by Dr. Gilchrist) it probably formed a circular patch about 5 cm. in diameter, .6 cm. thick in the centre, and sloping down to a thin rounded margin.

A second specimen (Fig. 6) of what appears to me to belong to the same species, and which I name var. *tubulatus*, presents in its mode of growth certain remarkable features which seem to be due to adaptation.

In a deep fissure in a specimen of *Pachastrella isorrhopa* there were two white tubes, 2.3 cm. in length and 2 mm. in diameter. On cutting into the *Pachastrella* the tubes were seen to emerge from an irregularly shaped nodule about 25 mm. in diameter embedded in the sponge, and only distinguished from the rest of the *Pachastrella* by a slight difference in shade.

The oscular tubes are composed of two layers, an inner formed of fan-shaped bundles of oxeas, arranged spirally and obliquely upwards, and an outer layer formed of a felt work of oxeas.

The nodule is formed of bundles of oxeas and styles and of patches of monöcrepid desmas of nearly the same character of those of the above described type specimen; the oxeas and styles were usually slightly larger, viz., about 900 μ , and the desmas thicker and with larger articular surfaces.

Although the body of the Lithistid is completely surrounded and, to all appearances, incorporated, yet under the microscope the thin line of the dermal membrane of the *Pachastrella* can be made out.

Carter points out (Ann. Mag. N. H. 1876 (4), xviii., p. 410) that it is a characteristic of *Pachastrella* to incorporate any objects with which it comes in contact. In the case of the second specimen of *M. plumosus*, the oscular tubes appear to have arisen in response to the needs of the sponge, so nearly engulfed by the *Pachastrella* on which it grew.

The inclusion of *Monanthus* in the family *Desmanthidae* (see Mém. Soc. Zool. France, 1898, xi., p. 231) renders necessary a slight enlargement of Topsent's definition, viz.: to "mégaclères monactinaux," to add "ou diactinaux."

Localities: Both the typical form and var. *tubulatus*, encrusting or invested by *Pachastrella isorrhopa*, from the Natal Coast (Cone Point bearing N.W. $\frac{1}{2}$ W., distant 4 miles) depth, 34 fathoms; bottom, broken shells. The typical form also from E. London Coast (lat. 33° 6' 30" S., long. 28° 11' E.) depth, 85 fathoms, encrusting *Placospongia labyrinthica*.

Triptolemus incertus, sp. n.

Plate iv., figs. 4 and 4a-f.

Description.—The sponge burrows in the canals of the dead skeleton of a specimen of *Discodermia natalensis* mihi. A section of the *Discodermia* (Fig. 4, between the crosses) shows the larger incurrent and excurrent canals more or less filled up with centrotriænes of all sizes. The only other spicules proper to this species of *Triptolemus* are small curved, smooth microxea and very minute metasters, the latter being rare.

Spicules. Megascleres.—Centrotriænes of various sizes, the cladi being simple or branched one, two, or three times, usually dichotomously, but sometimes into three branches not in the same plane; frequently the final branches are curved.

Dimensions of a large spicule: rhabdome $310\ \mu$, straight, pointed; protocladi $180\ \mu$, deuterocladi $90\ \mu$.

Microscleres.—Microxea, $100 \times 3\ \mu$ to $180 \times 4\ \mu$, fusiform, smooth, curved, sharp-pointed.

Metaster, total length including spines, $10\ \mu$.

There are four known species of *Triptolemus*, viz.: *T. intextus* Cr., *T. parasiticus* Cr., *T. cladosus* Sollas, and the present form. *T. intextus* has microxeas bearing blunt spines; the centrotriænes are only $180\ \mu$, those of *T. incertus* being $500\ \mu$; on the other hand, the amphiasters of Carter's species are $100\ \mu$ in length.

Sollas's species contains both smooth and trichose microxeas; and the centrotriænes do not attain to such a size as those of *T. incertus*.

The total diameter of a large centrotriæne of *T. cladosus* is only $142\ \mu$.

The habitats of the four species are as follows:—

Triptolemus intextus Cr. on a Lithistid (*Corallistes bowerbankii*) from St. Vincent, 374 fathoms.

T. parasiticus, on a specimen of *Carpenteria*; habitat unknown.

T. cladosus Sollas, found with a Lithistid, *Corallistes thomasi*, from near the Ki Islands, 140 fathoms.

T. incertus mihi, Cape Vidal, Natal coast, bearing N.N.E. $\frac{1}{4}$ N., distant $9\frac{1}{2}$ miles; depth, 80-100 fathoms; bottom, rock; burrowing in a Lithistid (*Discodermia natalensis* mihi).

Note on *Tetilla casula* (Carter).

Dr. Gilchrist writes to me:—"We now have in the tanks of our Marine Station living specimens of the peculiar hemispherical sponge with flat under surface (*Tetilla casula*, Carter). This form seems to be an adaptation to prevent sinking into the sand, as the animal in the tank remained steadily on the surface of the sand on which it was placed."

A brief description with figures of a specimen of this species sent to the Museum by Dr. Gilchrist was given in the first part of "Descriptions of South African Sponges." The circular flat under surface of the hemisphere had a satiny smoothness, and was surrounded by a fringe of spicules (oxeas and protriænes). Some species of *Tetilla* (*T. polyara*, *T. euplocamus*) are spherical or ellipsoidal and provided with a tuft of anchoring spicules; others, again, are spherical and free or hemispherical and fixed.

EXPLANATION OF PLATE.

- Fig. 1. *Microscleroderma hirsutum*, sp. n. $\frac{1}{3}$ natural size.
 1a. Outer or poral surface. Natural size.
 1b. Section, $\times 3$.
 1c. Two monocrepid desmas, $\times 100$.
 1d. Oxea, $\times 100$.
 1e. Sigmaspires, $\times 700$. (The terminal thickenings do not really exist, and disappear on focussing).
- Fig. 2. *Discodermia natalensis*, sp. n. $\frac{2}{3}$ natural size.
 2a. Outer or poral surface, $\times 80$.
 2b. Inner or oscular, $\times 80$.
 2c. Phyllotriæne of poral surface, $\times 100$.
 2d, e. Discotriænes of oscular surface, $\times 100$.
 2f. Small tyle, $\times 420$.
 2g. Oxea, $\times 420$.
 2h. Style, $\times 420$.
 2j. Microoxea, $\times 700$.
 2k. Microstrongyles, $\times 700$.
- Fig. 3. *Discodermia natalensis*, a much worn specimen.
 $\frac{2}{3}$ natural size.
 3a, b. Tetracrepid desmas, $\times 100$.
 3c. Style, $\times 100$.
 3d. Microstrongyles, $\times 700$.
- Fig. 4. Section of wall of specimen drawn in Fig. 3, slightly enlarged, showing a patch (lighter in shading) of *Triptolemus incertus*, sp. n., in the midst of the Lithistid skeleton of the *Discodermia*.
- Figs. 4a-d. Centrotriænes, $\times 100$.
 4e. Microoxea, $\times 100$.
 4f. Metaster, $\times 1625$.

Fig. 5. *Lithobactrum forte*. $\frac{1}{2}$ natural size.

5a. Vertical section showing in-current and ex-current canals. Natural size.

5b. Section of skeleton showing canals.

5c-f. Monocrepid desmas, $\times 100$.

5g. Amphityle, $\times 420$.

Fig. 6. *Monanthus plumosus* in *Pachastrella*, var. *tubulatus*.
 $\frac{2}{3}$ natural size.

6a. Section of the same. $\frac{2}{3}$ natural size.

6b. Part of an oscular tube, slightly magnified.

6c. Monocrepid desma, $\times 100$.

6d. Oxea, $\times 100$.

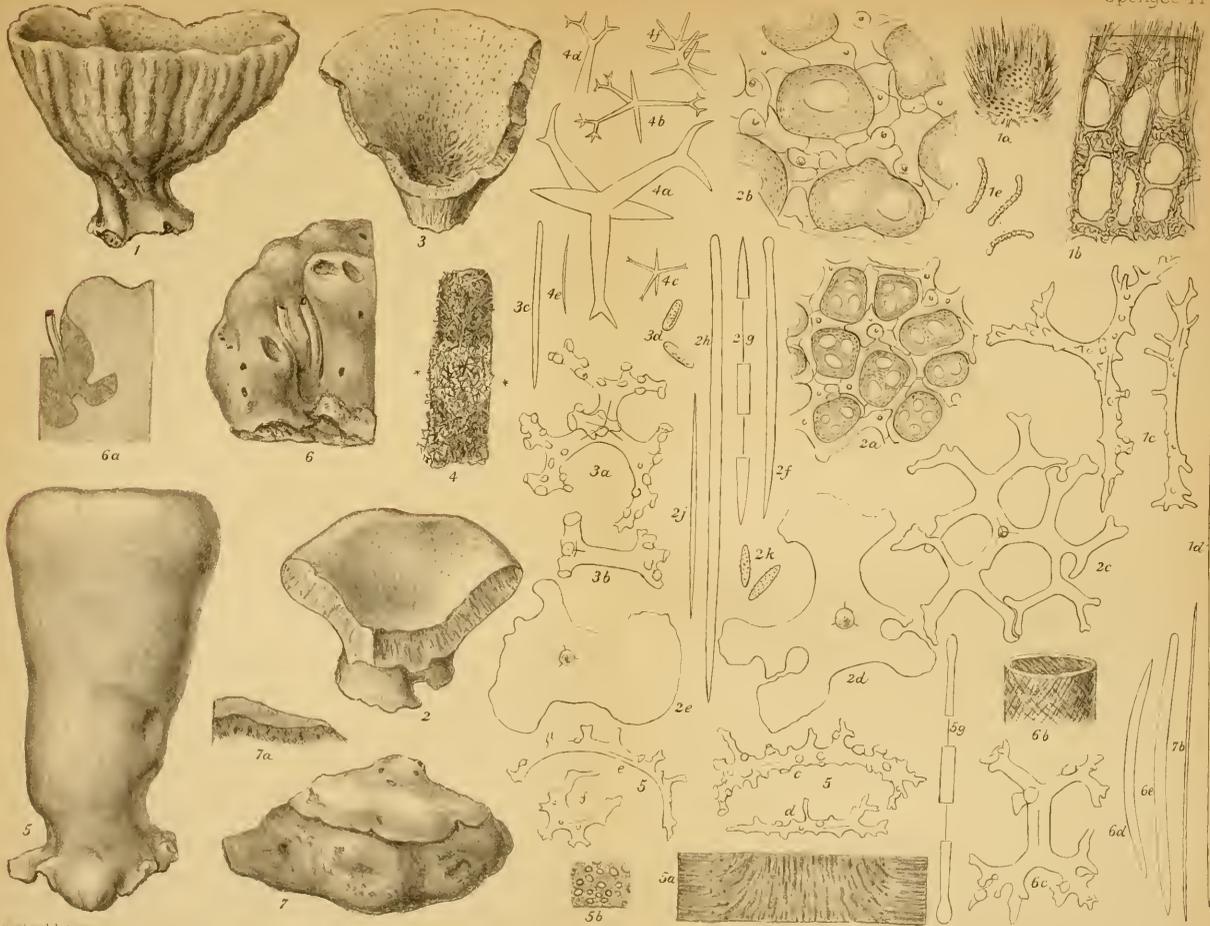
6e. Style, $\times 100$.

Fig. 7. *Monanthus plumosus* on *Pachastrella*, sp. n. $\frac{2}{3}$ natural size.

7a. Vertical section. $\frac{2}{3}$ natural size.

7b. (At lower right corner of plate) a slender oxea from the dermal membrane, $\times 100$ (very probably foreign).*

* NOTE. The fact that the variety is designated as fig. 6 and the type as fig 7, while only the spicules of the var. are figured, is due to the discovery of a second specimen of the "type" leading to an alteration of the author's views after the plate had been printed off.



P. ...