

[XIII.]

THE SPONGES OF FUNAFUTI.

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THE collection of sponges obtained by Mr. C. Hedley, though small, is nevertheless interesting.

There are sixteen species; of these the following six are described as new—*Spinosella glomerata*, *Gellius aculeatus*, *Clathria pellicula*, *Agelas gracilis*, *Ciocalypa incrustans*, and *Polymastia dendyi*.

Of the above *Agelas gracilis* is the most interesting, as it widens the range of the genus. With the exception of an outlier recorded from Mauritius and doubtfully from Tristan d'Acunha, this genus has hitherto only been known from the West Indies.

The remaining ten species are—

Reniera australis, Lendenfeld, *Reniera* sp.* which may prove to be a variety of *Reniera rosea*, Bowerbank, *Halichondria solida*, var. *rugosa*, Ridley and Dendy, *Echinodictyum asperum*, Ridley and Dendy, of the latter rare and curious species there are two very fine examples, *Acanthella stipitata*, Carter, *A. pulcherrima*, Ridley and Dendy, *Spiraastrella papillosa*, Ridley and Dendy, *Euspongia irregularis*, var. *silicata*, Lendenfeld, *Hippospongia dura*, Lendenfeld, and *Spongelia fragilis*, var. *irregularis*, Lendenfeld.

The species in many cases are represented by single examples.

The smaller specimens had been placed in a solution of four or five p.c. formol, which proved insufficient for their proper preservation. They reached me in a soft and slimy state, too soft in fact to handle with safety, and before a hand-section could be cut they had to be hardened in alcohol. In consequence of their imperfect preservation and their transference to alcohol, the specimens had some of their characters destroyed, which rendered their exact determination unusually difficult.

Mr. Hedley has kindly supplied the following field notes:—

“To a collector accustomed to the sea beaches of temperate zones, and especially to the shores of Sydney Harbour, the absence of large or conspicuous sponges on the reefs of Funafuti is very marked. Rocky shelves and ledges which in England or

* Identical with No. 42, Voy. “Alert,” p. 410.

temperate Australia would be clad by a luxuriant growth of seaweeds and sponges, are here almost entirely monopolised by a rank growth of *Sarcophytum* and its allies.

An expert in spongology would doubtless reap a rich harvest on these reefs by cracking loose, dead coral blocks and securing those minute forms which hide themselves in numerous crevices. But a superficial survey of the rocks from high water mark to a depth of twenty feet; impresses on the observer that the oft described wealth and profusion of life on a coral strand is not equally true of all classes. The larger sponges, at any rate, contribute handsomer, more highly coloured, more numerous and varied forms to a sea-scape in Port Jackson, than they do in the Ellice Islands.

About low water mark the most conspicuous sponge was, perhaps, the coal-black *Euspongia irregularis*, var. *silicata*, growing in cake-shaped masses on the rocks. In similar situations *spinosella glomerata* flourished. Among the *Sarcophyta*, from which, indeed, a casual glance hardly distinguished it, the *Hippospongia dura* encrusted the rocks. From a depth of thirteen fathoms in the lagoon the dredge came up almost choked with *Echinodictyum asperum*, with which the urchins *Laganum* and *Maretia* were associated.

Nearer the centre of the lagoon, in about twenty fathoms, were dredged the new *Olathria pellicula*, encrusting a cluster of cockscomb oyster. This was only taken on one occasion.

The *Reniera* sp. was extremely plentiful in pools in the mangrove swamp, where alone it was met with. It flourished alike in shade and sunlight. At a distance it sometimes appeared as large rose-pink patches, many yards in extent, creeping under stones and climbing on mangrove roots. When deprived of light the beautiful rose-pink tended, under the shelter of the mangrove, to fade into gray. Each sponge mass attained a height of eight or ten inches, and a diameter of about a foot. In the open the growth was reduced to a prostrate network of tubes."

Order MONAXONIDÆ.

FAMILY HOMORRHAPHIDÆ.

RENIERA AUSTRALIS, Lendenfeld.

Reniera australis, Lendenfeld, Aust. Mus. Cat. xiii., Sponges, 1888, p. 78.

There are several examples of this species exhibiting considerable variation; one resembles a piece of pumice-stone with numerous crateriform oscula; others have a comparatively smooth surface, with dome-shaped oscula bearing processes.

On comparing the specimens with the type I find it presents exactly the same external characters.

The colour of the specimens from Funafuti varies from light to dark coffee brown, that of the type from Port Jackson is now (in spirit) burnt umber colour; in the description it is stated to be gray. The specimen is attached to a piece of wood, which may have stained it this colour.

The spicules exhibit a little variation in size, but the average is about the same as in the type, *i.e.*, 0.12 by 0.004 mm.

Low water-mark on reefs in the lagoon.

RENIERA SP.

This form appears to be identical with No. 42 *Reniera sp.* described by Ridley.*

There are numerous specimens in the collection, but owing to the fragile nature of the sponge all are more or less broken. The sponge consists of thin lamellæ, which form folds or tubes, with fairly large oscula at the summits; the tubes are from 5 to 10 mm. in diameter, and from 5 to 30 mm. in height, the walls are from 1 to 2 mm. in thickness, the oscula are 5 mm. in diameter. Texture very fragile when dry, in spirit slightly elastic, but easily broken if handled. Surface rather smooth in appearance to the unaided eye; when seen with a moderate magnifying power it is minutely reticulate with numerous round pores. Colour, when alive rose pink, in spirits pinkish gray.

Megasclera—Small curved oxea suddenly tapering to acute points, varying slightly in length and thickness, usually about 0.12 by 0.006 mm.

Possibly this form may be a variety of *Reniera rosea*, Bowerbank. According to Topsent, *Reniera cinera*, Grant, is identical with *R. rosea*, Bowerbank. Grant's species is recorded from the Philippines.

Mangrove swamp (*ante p.* 324).

HALICHONDRIA SOLIDA, var. RUGOSA, Ridley & Dendy.

Halichondria solida, var. *rugosa*, Ridley & Dendy, Chall. Rep. Zool., xx., p. 4.

A single example agreeing with the description in colour, surface, and texture. The spicules, however, are slightly less in size; the larger, stouter forms are about 0.85 by 0.025 mm. They vary greatly in length and thickness; they are usually slightly curved and taper rather suddenly a few diameters from the ends, which are more or less rounded.

Reefs in the lagoon among the *Sarcophyta*.

* Ridley—Voy. "Alert," 1884, p. 410.

SPINOSELLA GLOMERATA, sp. nov.

(Plate xviii., fig. 1).

Sponge, large cake-shaped, attached by a broad base. From the upper irregularly convex surface arise numerous short narrow tubes. The largest example is somewhat water worn, and measures 300 mm. in its long and 250 mm. in its short diameter, and about 70 mm. in height. The tubes vary greatly in size. The larger are 30 mm. in height, 10 mm. in external diameter, without the spinose processes, the internal diameter averages about 5 mm., the largest are about 8 mm. the smallest about 2 mm.

Colour of the dried sponge is light brownish gray.

The tubes are rarely free, being more or less united laterally throughout their length. The surface is beset with numerous prominent aculeations, they vary from 3 to 6 mm. in length, and are usually about 3 mm. apart; the summits of the tubes are fringed with from five to twelve of these processes. The dermal surface consists of a close reticulation of fine fibres, with numerous circular pores 0.2 to 0.5 mm. in diameter. The oscula are 1 to 1.5 mm. in diameter, and are fairly abundant on the inner surface of the tubes.

The main skeleton is composed of well developed horny fibre, with a polygonal or subrectangular mesh. The main fibres are from 0.8 to 1 mm., the secondaries 0.5 mm. in diameter, the former are sparsely cored with slightly curved oxeote spicules, the latter by a series of three or four, in the slender connecting fibres the spicules are uni- or biserially arranged.

Megasclera—Slightly curved oxea with rather blunt points.

Size—About 0.07 by 0.002 mm.

Reefs in the lagoon at low water, plentiful.

FAMILY HETERORRHAPHIDÆ.

GELLIUS ACULEATUS, sp. nov.

(Plate xviii., fig. 3).

Sponge incrusting (attached to a piece of coral), measuring 45 mm. by 20 mm., and from 5 to 12 mm. in thickness.

Surface very uneven possessing numerous compressed prominences, from 4 to 7 mm. in height, 0.5 to 0.8 mm. in their broad diameter, and from 1 to 3 mm. apart, proximally the processes are connected by narrow ridges, distally they taper to acute points; they are more or less compressed throughout their length, rarely rounded.

Dermal membrane, thin, smooth and somewhat opaque, pores not visible, oscula few, scattered, occurring between the aculeate processes, subcircular in shape and from 1.2 to 1.5 mm. in diameter.

Texture soft, compressible, moderately tough.

Colour in spirit dirty cream.

The skeleton consists of large strongylote spicules, which run more or less vertically from the base to the surface, either singly or in twos or threes, as they approach the surface they converge, forming whip-like bands from 0.1 to 0.2 mm. wide; at the surface they form the main support of the aculeations.

In addition to the large strongyla there are numerous small oxeote spicules irregularly distributed throughout the body of the sponge; they are scarce or absent from the dermal membrane, and from the aculeate processes. Sigmata of about one and a half turns are abundant and evenly distributed in the dermal membrane, internally they appear to be confined to definite tracts.

Megasclera—(a) Straight, elongate, round ended strongyla gradually tapering from the centre to the extremities.

Size—About 1.6 by 0.02 mm.

(b) Oxea, small, slender, straight, tapering gradually at each end to acute points.

Size—About 0.14 by 0.0035 mm.

Microsclera—Very slender sigmata of about one and a half turns; length about 0.02 mm.

Deep water in the lagoon.

This species is allied to *Gellius carduus* in outward form, the spicules are, however, very much larger than in that species.

CLATHRIA PELLICULA, sp. nov.

Sponge incrusting, from 1 to 1.5 mm. in thickness; surface minutely conulose, with numerous pores in groups of from four to six. Oscula scattered, circular, about 0.25 mm. in diameter.

Colour in spirits yellowish-gray.

Skeleton columnar, consisting of whip-like multispicular fibres, with little or no spongin; they are made up of irregularly disposed smooth styli or subtylostyli and accompanied by spined styli; there are but few spicules between the fibres. The dermal skeleton consists of rather distant radiating tufts of smooth styli.

Megasclera—(a) Smooth styli or subtylostyli of the fibres, gradually sharp pointed, the slightly enlarged basal extremities of the larger spicules often minutely spinose.

Size—About 0.23 by 0.0042 mm.

(b) Smooth slender styli or subtylostyli of the dermal tufts.

Size—Variable from 0.25 to 0.4 by 0.0035 mm.

(c) Echinating styli, straight, gradually tapering to sharp points, spines irregularly disposed, strong, and recurved, the apical fourth of the spicule almost smooth.

Size—0.1 by 0.008 mm.

Microsclera—(a) Minute slender isochelæ; length about 0·015 mm.

(b) Long slender toxa, with a short slight bend in the middle, straight limbs, and smooth acute points; length 0·35 mm.

This species forms a thin skin-like covering over an oyster shell, *Ostræa crista-galli*, Linn.

Obtained in the lagoon in eighteen fathoms of water.

AGELAS GRACILIS, sp. nov.

(Plate xviii, fig. 4).

Sponge subcylindrical, unbranched, attached to fragments of shells. There are four pieces, three of which take the form of simple filaments measuring from 2 to 3 mm. in diameter, and from 25 to 75 mm. in length. The fourth example consists of six or seven processes arising from an expanded base; at their origin and for about half their length they are somewhat irregular, a little flattened and joined together at various points, giving the basal portion a clathrous aspect. The upper half terminates in a series of subcylindrical filaments from 5 to 25 mm. in height and 2 mm. in diameter, which taper gradually to the extremities.

The texture is spongy and soft, but pretty tough. Colour in spirits grayish-yellow. The surface is uneven, hispid, beset with numerous minute conuli from 0·2 to 0·5 mm. high and 2 to 5 mm. apart. A few minute pores are visible between the conuli.

The skeleton is reticulate, the stout primary fibres forming an axial plexus from which secondary and connecting fibres are given off. The mesh is oblong or oval, rarely angular. The primary fibres measure 0·07 mm., the secondaries 0·045 mm., and the connecting fibres 0·025 mm.

The echinating spicules situated on the main fibres are numerous and generally more or less parallel with them, on the more slender fibres they are usually at right angles to their support.

Megasclera—Of one kind only, consisting of straight or but little curved, verticillately spined styli, from the truncated base they taper gradually to sharp points. The verticils vary in number from 16 to 24, according to the size of the spicule. The first three or four are closer than the rest, and consist of prominent straight spines, towards the apex the spines are recurved.

Size—Variable from 0·1 to 0·22 mm. by 0·007 to 0·013 mm. The verticils are about 0·01 mm. apart.

Obtained by tangles, associated with *Gorgonia*, in forty to seventy fathoms, on the western slope of the atoll.

ECHINODICTIUM ASPERUM, *Ridley & Dendy*.

Echinodictium asperum, *Ridley & Dendy*, *Chall. Rep. Zool.*, xx., p. 165, pl. xxxii., fig. 2.

Of this well marked species there are two examples, one dry the other in spirit. The dried example measures 170 mm. by 120 mm., and 100 mm. in height. The one in spirit measures 120 mm. by 95 mm., and 90 mm. in height. They are thus larger than those obtained by the Challenger Expedition.

The spined styli are smaller than those of the type, they seldom exceed 0·12 in length.

Colour in spirit, gray.

Dredged in the lagoon in company with *Laganum* and *Maretia*.

FAMILY AXINELLIDÆ.

ACANTHELLA STIPITATA, *Carter*.

Acanthella stipitata, Carter, Ann. and Mag. Nat. Hist., (5), vii., p. 380, pl. xviii., fig. 8; Ridley & Dendy, Chall. Rep. Zool., xx., p. 178; Dendy, Proc. Roy. Soc. Vic., (n.s.) ix., 1896, p. 237.

A small fragment is here somewhat doubtfully referred to this species.

Deep water in the lagoon.

ACANTHELLA PULCHERRIMA, *Ridley & Dendy*.

Acanthella pulcherrima, Ridley & Dendy, Chall. Rep. Zool., xx., p. 177, pl. xxxii., fig. 3.

A single specimen of this species is in the collection.

Associated with the preceding.

CIOCALYPTA INCRUSTANS, sp. nov.

(Plate xviii., fig. 2).

Sponge incrusting, forming large flat expansions of a fairly uniform thickness. There are several pieces, the largest is 55 mm. by 45 mm., and 10 mm. in thickness.

Colour in formol yellowish-white.

Texture soft and fragile, readily breaking by its own weight if handled.

Surface minutely conulose; the conuli are from 1 to 1·5 mm. apart, and from 0·5 to 1 mm. in height.

The dermal membrane is thin and transparent, with numerous inhalent pores which are situated in the depressions between the conuli. Oscula scattered about 2·5 mm. in diameter, with slightly raised margins.

Skeleton.—The main skeleton consists of columns of spiculo-fibre without much obvious spongin. The columns run vertically from the base to the surface where they terminate and form the support of the dermal membrane. The columns are from 0·3 to 0·6 mm. in diameter, they are separated by spaces 0·4 to 0·6 mm. wide.

The fibres are pretty uniform in diameter without any well defined branches. Occasionally they appear to be connected by a somewhat dense bundle of spicules. The intercolumnar spaces are sparsely spiculate. The spicules are rather irregularly arranged, both in the spaces and the columns. There are no traces of a special basal or dermal layer of spicules.

Megasclera—Of two kinds, stylote and oxeote. (*a*) The styli are usually curved, rarely straight, often bent a short distance from the well rounded base; they taper gradually from about the middle to sharp points.

Size—Variable, about 0·2 to 0·04 mm. by 0·0095 mm.

(*b*.) The oxea are not so numerous as the styli, they are usually bent in the middle, and taper gradually to sharp points.

Size—About 0·35 by 0·0075.

Besides the above, there are a number of very slender oxea and styli scattered through the body, probably the young of the larger forms.

Reefs in the lagoon.

FAMILY SUBERITIDÆ.

POLYMASTIA DENDYI, sp. nov.

(Plate xviii., fig. 5).

Sponge sessile, consisting of a series of mammiform processes more or less united at their bases, the upper third or half being free. The single example in the collection is 35 mm. in its long and 25 mm. in its short diameter, and about 8 to 12 mm. in height. The mammiform processes are roundly conical, varying somewhat in size; they are from 4 to 12 mm. in diameter at the base.

The sponge is pretty firm, elastic, and moderately tough, the surface has an appearance like velvet, due to the projecting stylote spicules.

The oscula are minute, and are situated in the centre of a smooth membrane at the summits of the processes. The aperture is about 0·25 mm. in diameter. The smooth membrane about 1·5 mm. The oscula margin is plain or but very slightly raised, pores not visible.

Colour in spirits light sandy gray.

Skeleton composed of numerous, slender columns of spiculo-fibre running vertically towards the surface, where they terminate in tufts of diverging spicules which project a considerable distance beyond the dermal layer, and give the surface the characteristic velvety appearance. The dense dermal layer of small spicules is about 0·3 mm. in thickness; they are somewhat irregularly dis-

posed, not strictly vertical to the surface as is usually the case in other species.

Megasclera—(a) Of the main body, large straight styli, a little tapering to a rounded base, and gradually tapering to a not very acute apex, many of the larger spicules which project through the dermis, are suddenly contracted at about one or two diameters from the distal extremity.

Size—About 1.5 by 0.012 mm.

(b) The small slender styli of the dermal layer have a rounded base and a tapering acute apex, a few similar spicules are found scattered throughout the body of the sponge, especially in the walls of the canals.

Size—About 0.19 by 0.0025 mm.

Reefs in the lagoon associated with *Sarcophyta*.

FAMILY SPIRASTRELLIDÆ.

SPIRASTRELLA PAPILOSA, *Ridley & Dendy*.

Spirastrella papillosa, Ridley & Dendy, Chall. Rep. Zool., xx., p. 232, pl. xli., fig. 5; pl. xlv. figs. 11–11g.

A much broken specimen is here somewhat doubtfully referred to this species.

The example is reduced to a pulp, and it is impossible to say what its external characters were; during growth it appears to have enveloped large quantities of broken shells, calcareous seaweeds, and bits of coral.

The size and character of the spicules agree closely with the description given in the Challenger Report.

Colour in formol orange.

Occurring in the crevices of dead coral, shallow water on the lagoon reefs.

Order MONOCERATINA.

FAMILY SPONGIDÆ.

EUSPONGIA IRREGULARIS, var. SILICATA, *Lendenfeld*.

Euspongia irregularis, var. *silicata*, Lendenfeld, Mon. Horny Sponges, 1889, p. 255, pl. xiii., fig. 2; pl. xxi., fig. 10.

Two examples of this species are in the collection, one in spirit the other dry. The colour of the spirit specimen is dark blackish brown externally, internally of a light salmon.

The main fibres of the skeleton are charged with foreign spicules, from the secondary and connecting fibres they appear to be absent.

On the reefs in the lagoon (*ante* p. 324).

HIPPOSONGIA DURA, *Lendenfeld*.

Hippospongia dura, Lendenfeld, Mon. Horny Sponges, 1889, p. 298, pl. 17, fig 15.

There are five pieces, all of which appear to have been cut from one large specimen. The sponge evidently formed a cake-shaped mass; it consists of stout lamellæ joined at various points, both vertically and at the surface, with a number of subcylindrical or long, narrow meandering lacunæ between.

The dermal membrane is continued over the whole surface of the sponge. Groups of from 20 to 30 oscula pores occur in the membrane overlying the lacunæ, the pores vary in shape from round to oval, and are from 1 to 3 mm. in diameter.

Isolated reticulate patches, with small inhalent pores, exist on the elevated parts of the surface chiefly between the conuli; the rest of the surface is smooth and imperforate. The general surface is uneven and conulose; the conuli are variable in height and in their relative distance apart. They are all more or less connected by low intervening ridges, and usually about 3 mm. high, and about the same distance from each other, especially on the marginal and elevated regions; elsewhere they are low and widely separated.

The skeleton consists of a dense network of uniform fibres, entirely free from foreign bodies; they are scarcely separable into main and secondaries, and measure from 0.015 to 0.02 mm. in diameter.

In the denser parts of the sponge the fibres are arranged in trellis-like clusters, the mesh is elongate, angular, rarely with rounded corners; the fibres at their points of union are not perceptibly dilated, but retain their cylindrical form.

In the lagoon with *Sarcophyta*.

This species has hitherto only been recorded from the American coast of the North Atlantic.

FAMILY SPONGELIDÆ.

SPONGELIA FRAGILIS, var. IRREGULARIS, *Lendenfeld*.

Spongelia fragilis, var. *irregularis*, Lendenfeld, Mon. Horny Sponges, 1889, p. 662, pl. xxxvii., fig. 10.

This species is represented by several examples in a much broken condition.

Colour in spirit, yellowish-gray.

Occupying crevices in dead and honeycombed blocks of coral, on the lagoon reefs.

I owe the accompanying illustrations to my colleague, Mr. Edgar R. Waite, from whose careful drawings they have been reproduced.

EXPLANATION OF PLATE XVIII.

- Fig. 1. *Spinoseella glomerata*, sp. nov. Nat. size.
,, 2. *Ciocalypa incrustans*, sp. nov. Nat. size.
,, 3. *Gellins aculeatus*, sp. nov. Nat. size.
,, 4. *Agelas gracilis*, sp. nov., spicule. Greatly enlarged.
,, 5. *Polymastia dendyi*, sp. nov. Nat. size.