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XVI.—*The Sponge-fauna of Madras. A Report on a Collection of Sponges obtained in the Neighbourhood of Madras by Edgar Thurston, Esq.* By ARTHUR DENDY, B.Sc., F.L.S., Assistant in the Zoological Department of the British Museum.

[Plates IX.-XII.]

THE specimens upon the study of which this paper is based were collected in the neighbourhood of Madras by Edgar Thurston, Esq., Superintendent of the Government Central Museum, and forwarded by him to my colleague, Prof. F. J. Bell, to whom I am indebted for the opportunity of examining and describing them.

The collection is of exceptional interest, owing to the fact that it is the first which has been obtained from this particular locality. Indeed, our knowledge of the sponge-fauna of the entire Indian Ocean is extremely deficient. This deficiency is almost certainly due to want of investigation rather than to any actual scarcity of sponges. Mr. Ridley and I have already pointed out, in our Report on the Monaxonida collected by H.M.S. 'Challenger,' that "this little-known field will probably yield a rich harvest to whoever has the good luck to thoroughly investigate it;" and this statement is amply borne out by Mr. Thurston's researches.

The best-known locality for sponges in the Indian Ocean
Ann. & Mag. N. Hist. Ser. 5. Vol. xx. 11

is undoubtedly Ceylon; Bowerbank*, Gray†, and Carter‡ have all written upon the sponge-fauna of this particular district, and the sponge-fauna of Madras, in so far as is evidenced by the material at my disposal, bears a striking resemblance to it. Thus, out of the ten determinable species from Madras, four, viz. *Halichondria panicea* (a cosmopolitan species), *Axinella Donnani*, *Hircinia clathrata*, and *Hircinia vallata*, have already been recorded from the neighbourhood of Ceylon.

There can be no doubt that the present collection was obtained in shallow or moderately shallow water, although there is no record of the depth. Species with a strong development of spongin in the skeleton-fibre predominate, as might have been safely predicted from the climatic conditions of the locality. It is remarkable that all the species, with a single exception, belong to the suborder Halichondrina or else to the Keratosa, which are undoubtedly direct descendants of the former group. The single exception is a new species of the cosmopolitan genus *Suberites*, which I have called *S. inconstans*, owing to its extraordinary variability in external appearance.

In addition to the species recorded below there are in the collection a number of Ectyonine and Homorrhaphid forms, which I have thought desirable to leave undetermined until a better supply of material is forthcoming. Unfortunately all the specimens have been dried, but I hope before long to receive a second instalment preserved in alcohol.

Suberites inconstans, n. sp. (Pls. IX., X.)

There are six specimens of this species in the collection. They present us with an extraordinary range of external form, and yet all agree so closely in the arrangement and in the shape and size of the spicules that it is impossible to distinguish more than one species. I have therefore decided to group all the specimens under three varieties:—(1) *Suberites inconstans*, var. *globosa*; (2) *Suberites inconstans*, var. *mæandrina*; (3) *Suberites inconstans*, var. *digitata*.

* "Report on a Collection of Sponges found at Ceylon by E. W. Holdsworth, Esq.," Proc. Zool. Soc. 1873, p. 25.

† "Sponges from Ceylon," Ann. & Mag. Nat. Hist. ser. 4, vol. xii. p. 266. (This paper is only a brief criticism of Dr. Bowerbank's.)

‡ "Report on Specimens dredged up from the Gulf of Manaar," &c., Ann. & Mag. Nat. Hist. ser. 5, vol. vi. p. 35; "Supplementary Report on the Specimens dredged up from the Gulf of Manaar," &c., Ann. & Mag. Nat. Hist. ser. 5, vol. vii. p. 361.

Suberites inconstans, var. *globosa*. (Pl. IX. figs. 1, 1 a.)

Sponge (Pl. IX. fig. 1) massive, sessile, attached, irregularly spherical, averaging about 160 millim. in diameter. Surface uneven, but without digitate processes, very minutely hispid. Irregularly scattered over the surface are numerous large, more or less circular openings, which must be regarded as the oscula; these average in diameter about 4 millim. in one specimen, while in the other they are smaller. Colour light brownish orange. Texture hard and woody, incompressible; internally cavernous.

Skeleton very irregular, composed of dense masses of loosely aggregated tylostyli, without any defined fibres. At the surface the tylostyli are mostly arranged in brushes with their apices projecting outwards.

Spicules (Pl. IX. fig. 1 a) large, stout, usually slightly curved tylostyli, with well-marked, somewhat elongated heads of the "enormi-spinulate" type and with gradually sharp-pointed apices. Size about 0.57 by 0.022 millim.

There are two specimens of this variety, agreeing fairly closely with one another in external form.

Suberites inconstans, var. *mæandrina*. (Pl. X.)

The single specimen (Pl. X. fig. 1) consists of a great, hemispherical, cake-like mass, attached by a very broad base to a mass of calcareous debris. Average diameter about 300 millim. The upper surface (Pl. X. fig. 1 a) is uneven, and is also furrowed by numerous, closely-placed, very deep, meandering grooves or elongated pits, each of which is about 2-3 millim. broad, and has slightly prominent margins. There are also usually numerous very small pits between the grooves. The general surface is again very minutely hispid. Colour light brownish orange. Texture hard, woody, and incompressible.

Skeleton and spicules as before, except that the spicules appear to be a trifle shorter.

The meandering pits on the surface, from which I have taken the name of this variety, are doubtless homologous with the circular pits on the surface of the last variety, from which we may imagine them to be derived by a process of lateral elongation. In cases like the present it is of course an open question as to what are to be considered the true oscula.

Suberites inconstans, var. *digitata*. (Pl. IX. fig. 2.)

There are three specimens which I refer to this variety. They differ considerably from one another in external appear-

ance, but all of them show a more or less strongly marked tendency to form digitate processes. All three resemble the preceding specimens in colour and texture, but in two of them the orange colour is more distinctly pronounced.

The specimen (Pl. IX. fig. 2) which I consider most typical of the variety consists of a number of upright, branching and anastomosing, cylindrical processes, springing from a very irregular, thin, basal lamina, which has overgrown a mass of calcareous débris. The finger-like processes are, at any rate usually, tubular, and sometimes there is an osculum at the summit. All the processes and their branches grow vertically upwards. The height of the entire specimen is about 155 millim., and the greatest breadth about the same, while the diameter of the finger-like processes averages about 17 millim. The surface of the sponge is fairly even, and, in addition to being very minutely hispid, is also minutely punctate, the punctuation being most distinct on the lower, paler-coloured parts of the specimen. This punctate character is not confined to this specimen, nor even to this variety, but it appears to be a variable feature.

Of the two remaining specimens of the variety one has the digitate processes very broad and irregular, with a very uneven, corrugated surface; while in the other the digitate processes are almost obsolete.

The skeleton is much the same as in the preceding varieties, except that the fibres are generally more distinct, and, at any rate in the type of the variety, it is possible to distinguish between primary fibres running vertically to the surface and secondary ones crossing them more or less at right angles.

The spicules are of just about the same shape and size as in the two preceding varieties.

Perhaps the most nearly allied of previously described species is Nardo's *Suberites massa**. This occurs in the canals of Venice, and is stated to reach the size of a human head; it is also of a bright orange colour. Thus it must closely resemble the massive varieties of the present species in external appearance; but it differs in the size and form of the spicules, which, in *Suberites massa*, as evidenced by one of Schmidt's preparations in the British Museum, are much longer and relatively very much slenderer than in *S. inconstans*. Another species which resembles *S. inconstans* in the great size to which it grows is Bowerbank's *Hymeniacion* (= *Spirastrella*?) *pulvinatus* †, from near Belize. Bower-

* Cf. Schmidt, Spong. adriat. Meeres, p. 67.

† Proc. Zool. Soc. 1872, p. 126.

bank's species, however, grows to a far greater size and differs widely enough in the arrangement of the oscula on the upper surface and in the smaller size of the tylote spicules.

The most remarkable feature about *S. inconstans* is its extreme variability in external form; it thus affords a striking parallel to the cases of *Spinosella sororia* and *Pachychalina variabilis*, two common West-Indian Chalinine sponges, with which I have dealt at length elsewhere*.

Halichondria panicea, Johnston, var.

1842. *Halichondria panicea*, Johnston, British Sponges, p. 114.

I identify with this well-known and widely-distributed species a single massive specimen measuring about 100 millim. in average diameter, with a well-marked tendency to give off above short, digitate, tubular processes. Surface covered with small monticular prominences. Colour (dry) white below and light pink above. Texture very soft and crumbling.

Both the main and dermal skeletons form a very confused, irregular, and loosely put together reticulation of spicules, apparently with no spongin.

The spicules are the usual slightly curved, long, gradually sharp-pointed, fusiform oxea; they average about 0.7 by 0.014 millim. in size when full-grown, thus agreeing fairly well with those of the Kerguelen variety.

Mr. Carter † has already recorded a sponge which he calls "*Amorphina megalorhaphis*, n. sp.," from Ceylon, and he also remarks, in the same place: "This seems to be a variety of the common British species *Halichondria panicea*, chiefly differentiated by the size of its largest spicules, which is double that of the English one."

The synonymy and geographical distribution of the species will be found in the Report on the Monaxonida dredged by H.M.S. 'Challenger,' p. 2.

Tedania digitata, Schmidt, sp.

1862. *Remera digitata*, Schmidt, Spong. adriat. Meeres, p. 75.

There is one fine specimen which is undoubtedly referable to this widely distributed species. It consists of a low-growing mass rising up into short, digitate, conical processes or large mamillæ, and has a very uneven, corrugated surface. In its present (dry) condition it is of a pale yellow colour tinged with pink, but a label with it states that the colour, when alive, was red.

The measurements of the spicules are as follows:—Smooth

* Proc. Zool. Soc. 1887.

† Ann. & Mag. Nat. Hist. ser. 5, vol. vii. p. 368.

styli, 0.245 by 0.0094 millim.; tylota (with minutely spined heads), 0.2 by 0.0048 millim. (thickness of shaft); oxeote rhabdites, 0.19 by 0.0025 millim.

The species has already been recorded from the Mediterranean, Atlantic, Antigua, Kurrachee, Australia, Mozambique, and the Amirante Islands; and for further details the reader is referred to Ridley's Report on the Zoological Collections of H.M.S. 'Alert' (1884), pp. 417, 607, and to Ridley and Dendy's Report on the Monaxonida dredged by H.M.S. 'Challenger,' p. 51.

Iotrochota baculifera, Ridley, var. *flabellata*.

1894. *Iotrochota baculifera*, Ridley, Zool. Coll. H.M.S. 'Alert,' Brit. Mus., p. 435.

There are in the collection two specimens which have given me a great deal of trouble in determining, and which I have finally decided to regard as belonging to a variety of Ridley's species *Iotrochota baculifera*, the types of which were obtained from Port Darwin, Australia.

Each specimen forms an irregularly shaped, flattened mass, and the larger of the two measures about 160 by 110 millim., and has an average thickness of about 5 millim. Both specimens are of a dark purple colour. The dermal membrane has in most parts been rubbed off, but the surface appears to have been smooth, although very uneven, in life.

The megasclera are (1) fairly stout, commonly somewhat curved styli, usually sharp-pointed, size about 0.176 by 0.0063 millim.; (2) straight tylota, occurring chiefly in the dermal membrane, as is usually the case with diactinal megasclera, size about 0.22 by 0.0048 millim. The microsclera are minute amphiastra ("birotulates") about 0.0126 millim. long.

This variety differs from the types as described by Ridley (1) in the flabellate instead of lobose habit, and (2) in the smaller size of all the spicules.

Axinella Donnani, Bowerbank, sp. (Pl. XI. fig. 1.)

1873. *Isodictya Donnani*, Bowerbank, Proc. Zool. Soc. 1873, p. 28, pl. vi. figs. 2-6.

This remarkable and well-characterized species was originally described and figured by Dr. Bowerbank fourteen years ago from a single dry specimen, and has not since been heard of. The type specimen was obtained from the Pearl-banks, Ceylon, by Mr. Holdsworth, who remarks: "The dark, thick, cup-shaped sponge with undulated margin is not un-

common on the large pearl-bank in from 6½ to 9 fathoms; and I have met with it once or twice on rough ground on other parts of the coast; it is usually attached to some bit of rock, and is always, when alive, of a uniform bright orange-colour. It turns black an hour or two after being taken out of the water. The largest specimen I have seen was about as large again as the one you have. The general shape and colour are always the same" *.

The species is undoubtedly referable to the genus *Axinella*, of which, in both form and arrangement of the spicules, it is a typical member. It is represented in the present collection by four specimens of a dark brownish colour, ranging in diameter from 55 to 130 millim., and in height from 42 to 130 millim. All are distinctly pedunculate and have the same general external appearance although varying widely in details of form. One specimen is almost a facsimile of that figured by Bowerbank and is, moreover, labelled "colour orange," which is a very satisfactory confirmation of Mr. Holdsworth's statement. A second specimen is also cup-shaped, but the wall of the cup, instead of simply undulating, is proliferated outwards into large, branching and anastomosing, vertical lamellæ.

The most remarkable variation in external form is, however, exhibited by a specimen which is not cup-shaped at all, but consists of a number of vertical lamellæ inclined at various angles to one another and attached to a stout peduncle. The surfaces of these lamellæ are furrowed towards the upper margin by numerous deep longitudinal grooves about 1.5 millim. broad, in which lie numerous minute oscula. In a few places only the grooves are very short and stellately arranged, these stellate grooves occurring lower down on the specimen than the longitudinal ones. I have thought it desirable to give an illustration of this remarkable form (Pl. XI. fig. 1).

As the species has already been pretty fully described, I need give no further details except with regard to the spicules. These are fairly stout, gradually sharp-pointed, usually curved styli, averaging about 0.315 by 0.0157 millim. in size. The small and slender styli ("acuates"), mentioned by Bowerbank, are scarce in my specimens; no doubt they are young forms of the larger spicules.

Phakellia Ridleyi, n. sp. (Pl. XI. figs. 2, 2 a.)

Sponge (Pl. XI. fig. 2) erect, flabellate, forming thin fronds. There are in the collection two specimens, measuring 80 millim.

* Proc. Zool. Soc. 1873, p. 29.

high by 85 millim. broad and about 3 millim. thick, and 95 millim. high by 67 millim. broad and about 3 millim. thick, respectively. Colour in the dry state light brick-red. Texture hard and fairly tough. Surface marked with longitudinal ridges and furrows; minutely hispid. The dermal membrane appears to have been almost entirely rubbed off. In the present condition of the specimens it is almost impossible to discover the arrangement of the pores and oscula; but there is no reason to doubt that they are arranged here as in other species of the genus, viz. the oscula on one surface and the pores on the other.

The skeleton is reticulate, with stouter, polyspiculous, longitudinal fibres. The crossing fibres are very irregularly developed and ill-defined. There is not very much spongin present.

The spicules are smooth, more or less curved styli (Pl. XI. fig. 2 a), well rounded off at the base, and gradually sharp-pointed at the apex. Size about 0.4 by 0.015 millim.

This is a pretty little species with a characteristic external appearance. I have great pleasure in dedicating it to my friend and late colleague Mr. S. O. Ridley, M.A., who has for many years held a distinguished position amongst spongiologists. The species is remarkable on account of its small size, if we may be allowed to judge of this from only two specimens, and also on account of its red colour.

Raspailia fruticosa, n. sp. (Pl. XII. figs. 2, 2 a.)

Sponge (Pl. XII. fig. 2) erect, consisting of a bushily ramose mass of fairly stout, cylindrical branches placed upon a short peduncle. Most of the branches appear to have arisen by simple furcation of pre-existing ones; but some few are given off in the form of small secondary branches from older and stouter primary branches. The branches anastomose freely at points where they come in contact with one another; all of them tend vertically upwards and end in blunted apices. There are three specimens present; the largest measures 150 millim. in height and 120 in greatest breadth, while the diameter of the branches averages about 7 millim. Two of the three specimens are distinctly compressed in one plane. Colour (dry) dark brown. Texture rather hard and brittle. Surface very distinctly hispid and covered all over with numerous minute perforations, which appear to be the oscula.

The skeleton is distinctly reticulate; it consists in the first place of a more concentrated axial portion occupying the centre of each branch, from which primary fibres radiate upwards and outwards to the surface of the sponge. These radiating

primary fibres are connected with one another by short secondary fibres, which run from one to the other at right angles, and thus give rise to an irregular, rectangularly meshed network. The ends of the primary fibres project beyond the surface in the form of tufts of spicules, and amongst the shorter spicules composing these tufts there also project a number of very long and slender spicules; these reach a considerable distance beyond the surface, and thereby give it its characteristic hispid appearance. There is a considerable amount of amber-coloured spongin present, uniting the spicules into fibres; but the fibres are very ill-defined and irregular, the spicules in the primaries being arranged in a more or less Axinellid manner.

The spicules are of various forms, viz. :—(1) More or less curved, gradually sharp-pointed, fairly stout, smooth styli, averaging in size about 0.315 by 0.01 millim., but subject to considerable variation, especially in diameter; these make up the chief portion of the skeleton. (2) Very long and slender, very gradually sharp-pointed, slightly flexuous, smooth styli (Pl. XII. fig. 2 a); size about 0.8 by 0.007 millim.; occurring at the surface, projecting amongst the smaller spicules as described above. (3) Spined styli, with a few stout, sharp, strongly recurved spines. Sometimes there are three or four unusually large spines arranged like the teeth of a grapple at the extreme apex. There appear to be very few or no spines at the base. These spicules are rather rare; they occur projecting obliquely outwards and forwards from the primary fibres, at or near the surface of the sponge. Size about 0.14 by 0.0095 millim. There occur also fairly numerous, long, slender rhabdites, probably incompletely developed styli.

The external appearance of this sponge is very characteristic, and it appears, judging from the three specimens present, to be very constant; the best idea of it will be obtained by reference to the figure.

Raspailia Thurstoni, n. sp.
(Pl. XII. figs. 1, 1 a, 1 b.)

Sponge (Pl. XII. fig. 1) erect, ramified dichotomously in one plane, pedunculate. Branches long and rather slender, tending vertically upwards, tapering slightly to rather obtuse apices. Height of the larger of the two specimens present 190 millim., breadth about 145 millim., diameter of branches about 4.5 millim. Surface granular, minutely punctate, not distinctly hispid as in the preceding species. Texture hard and tough. Colour (dry) pale yellowish brown; one specimen has a reddish tinge at the base.

The skeleton consists in the first place of an extremely dense and tough, slender, cylindrical axis, measuring in the branches about 0.6 millim. in diameter. This axis is composed of a solid mass of rather dark amber-coloured spongin, with numerous imbedded spicules. From it numerous primary fibres radiate upwards and outwards to the surface of the sponge, joined together at right angles by secondary fibres, so as to give rise to a very dense network with irregularly rectangular meshes. Both primary and secondary fibres contain a large proportion of spongin. The primary fibres terminate at the surface in dense, elongated tufts of spicules arranged in a typical Axinellid manner, amongst them being a very great number of the strongly spined styli. The very long, slender styli, projecting far beyond the surface and forming so characteristic a feature of *Raspailia fruticosa*, are not present, and it seems very probable that they are functionally replaced by the numerous spined styli, which, it must be remembered, are very rare in the preceding species.

Spicules:—(1) Smooth, very gradually sharp-pointed, more or less curved styli (Pl. XII. fig. 1 b), usually short and stout, measuring about 0.28 by 0.014 millim., but often longer and slenderer and sometimes shorter and stouter; in short, very variable in size: these spicules form the main mass of the skeleton. (2) The spined styli (Pl. XII. fig. 1 a); more or less curved, stout, and tapering gradually towards the apex. The spines are very stout and sharp-pointed and strongly recurved towards the base, which is usually quite smooth; commonly the spicule terminates in three or four large spines arranged around the projecting apex like the teeth of a grapnel, the apex itself being represented merely by a low rounded wart; or sometimes the spicule may terminate in a sharp-pointed apex with no spines. Size of spicule about 0.025 by 0.0094 millim. These spicules are very abundant in the position indicated above. In boiled-out preparations a few very much elongated, slender, smooth styli, like those occurring at the surface of *Raspailia fruticosa*, make their appearance; but I have not observed them *in situ*.

I have much pleasure in naming this species after Mr. Thurston, to whom I am indebted for the opportunity of studying and describing this valuable collection. It is interesting to find two species so nearly resembling one another in all essential characters, yet so totally distinct from one another, as *Raspailia fruticosa* and *Raspailia Thurstoni*, both coming from the same locality. They may be distinguished from one another immediately both by their external

appearance and by their spiculation, and although there are in the collection three specimens of the one species and two of the other, none of them show any transitional condition between the two species. It is also very interesting to observe how different spicules are utilized in the two species for the same function, viz. the protection of the surface.

Hircinia clathrata, Carter.

1881. *Hircinia clathrata*, Carter, Ann. & Mag. Nat. Hist. ser. 5, vol. vii. p. 366.

With this species I identify two dry, washed-out specimens of fair size. There can be no reasonable doubt as to the identification, for Mr. Carter's original specimen, which came from the Gulf of Manaar, is sufficiently well characterized to make it certain, although I have been unable to examine the type.

The species has hitherto been recorded by Carter from the Gulf of Manaar and from the Red Sea.

Hircinia vallata, n. sp.

Hircinia vallata, R. v. Lendenfeld, MS.

Sponge more or less semicircular in outline. Consisting of an erect, thick, flattened lamella, with a narrow, smoothly curved upper margin, along which the oscula are placed. Surface flat, like the surface of a wall, honeycombed by numerous shallow, rounded or polygonal depressions. Texture very coarse, rough and cavernous; there is an enormous quantity of foreign matter present, such as sand, sponge-spicules, &c. Colour brownish grey. The oscula are, as already stated, arranged along the upper margin of the sponge; they are the openings of wide exhalant canals, radiating upwards from deep down in the body of the sponge. In the single specimen from Madras there are also numerous much smaller round openings scattered over both flattened surfaces of the sponge; but it is not certain whether these are oscula or not; they do not occur in the Ceylon specimen, to be mentioned later on.

The single specimen from Madras measures 140 millim. in height by 290 millim. in width; it is 45 millim. thick in the centre of the base and 12 millim. thick in the centre of the upper margin. The oscula and the large exhalant canals leading up to them average about 4.5 millim. in diameter. The Ceylon specimen is of the same general form, but broader, thicker, and not quite so high.

The skeleton is excessively coarse, loose, and irregular; in many places it seems to consist only of a rough network of foreign bodies, including spicules of all shapes and sizes, cemented together by spongin, while sometimes longer or shorter stretches of pale-coloured fibre occur, containing no foreign bodies at all. The filaments are abundant, forming tangled masses.

There is in the collection of the British Museum a specimen from Ceylon, which I have already had occasion to refer to, and which belongs to the same species as the Madras specimen. It was collected by Mr. E. W. H. Holdsworth, and is labelled in Dr. Bowerbank's handwriting "*Stematomenia*." It is obviously one of the two specimens referred to by him, in his "Report on a Collection of Sponges found at Ceylon by E. W. H. Holdsworth, Esq.,"*, under that name; but he appears to have considered these two specimens unworthy of description.

Dr. von Lendenfeld, in working over the British Museum collection of horny sponges for his forthcoming monograph of the group, has given the manuscript name "*Hircinia vallata*" to the species in question, a name to which I of course adhere.

Genus HIPPOSPONGIA, Schulze.

There are in the collection two fair-sized specimens, evidently both belonging to the same species. They are massive and give off from the upper surface hollow digitate processes. One specimen, which has evidently been dredged in the living condition, has the skin still attached and shrunk on to the skeleton; this gives to the surface a uniform black colour. The other specimen is only a washed-out skeleton, and is of a dirty greyish-yellow colour. The primary lines of the skeleton are densely cored by foreign spicules, and the interspaces between them are filled with an angularly-meshed network of horny fibre, containing no foreign bodies and averaging in diameter about 0.007 millim.

In the almost hopeless state of confusion at present existing with regard to the classification and nomenclature of the horny sponges, I shall not attempt to attach a definite specific name to these two specimens. Suffice it to say that they closely resemble von Lendenfeld's *Euspongia canaliculata* †,

* Proc. Zool. Soc. 1873, p. 25.

† "A Monograph of the Australian Sponges," Proc. Linn. Soc. New South Wales, vol. x. p. 502.

but differ in the absence of a distinct dermal reticulation of foreign bodies, such as is described and figured for that species, although irregularly scattered foreign bodies are fairly abundant in the skin. Dr. von Lendenfeld informs me that he now believes his *Euspongia canaliculata* to belong to the genus *Hippospongia*. At the time when he wrote his description of it he believed it to be identical in part with Mr. Carter's *Euspongia anfractuosa*, notwithstanding which he gave it a new name of his own, citing *Euspongia anfractuosa* as a synonym. Doubtless in his forthcoming monograph of the horny sponges this most perplexing question will be further elucidated.

EXPLANATION OF THE PLATES.

PLATE IX.

Fig. 1. *Suberites inconstans*, var. *globosa*, $\times \frac{1}{2}$.

Fig. 1 a. The same; tylostylus, $\times 190$.

Fig. 2. *Suberites inconstans*, var. *digitata*, $\times \frac{1}{2}$.

PLATE X.

Fig. 1. *Suberites inconstans*, var. *maandrina*, $\times \frac{1}{2}$.

Fig. 1 a. The same; portion of upper surface, nat. size.

PLATE XI.

Fig. 1. *Axinella Donnani*, $\times \frac{1}{2}$.

Fig. 2. *Phakellia Ridleyi*, nat. size.

Fig. 2 a. The same; stylus, $\times 284$.

PLATE XII.

Fig. 1. *Raspailia Thurstoni*, $\times \frac{2}{3}$.

Fig. 1 a. The same; three of the spined styli, $\times 284$.

Fig. 1 b. The same; smooth stylus, $\times 284$.

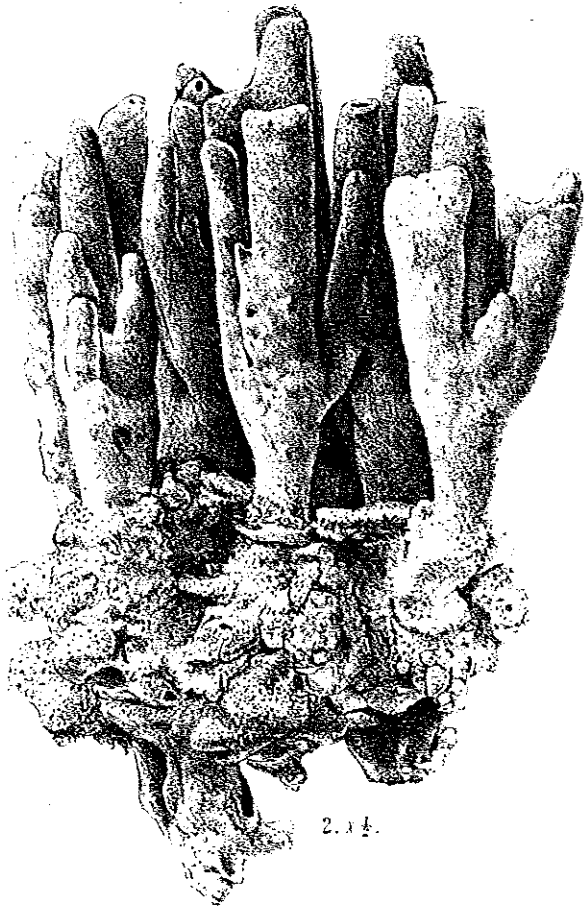
Fig. 2. *Raspailia fruticosa*, $\times \frac{2}{3}$.

Fig. 2 a. The same; very long, slender stylus, $\times 284$.

XVII.—On the Pyrochroidæ of Japan.

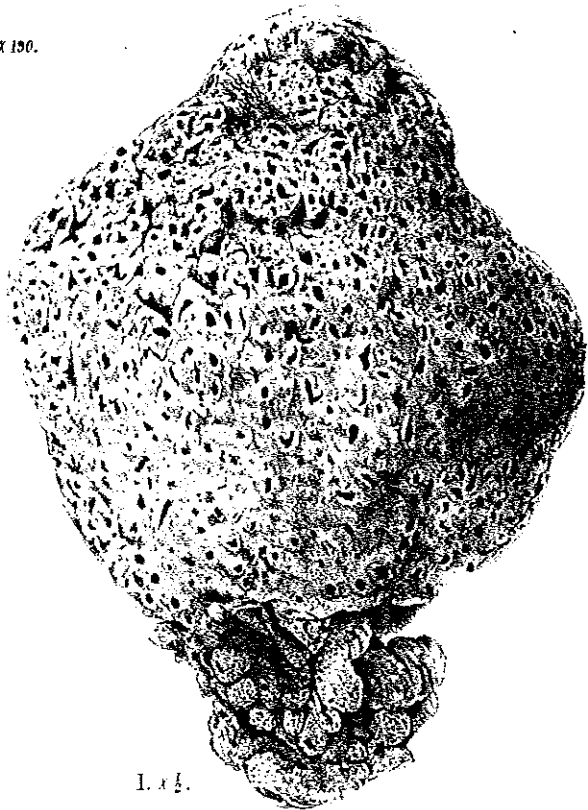
By GEORGE LEWIS, F.L.S.

THE collection made in Japan in 1880 and 1881 contains twelve species of Pyrochroidæ, and there is a certain similitude between them and those known from the United States; this will be seen best from the following table, which gives the genera and number of species of both countries:—



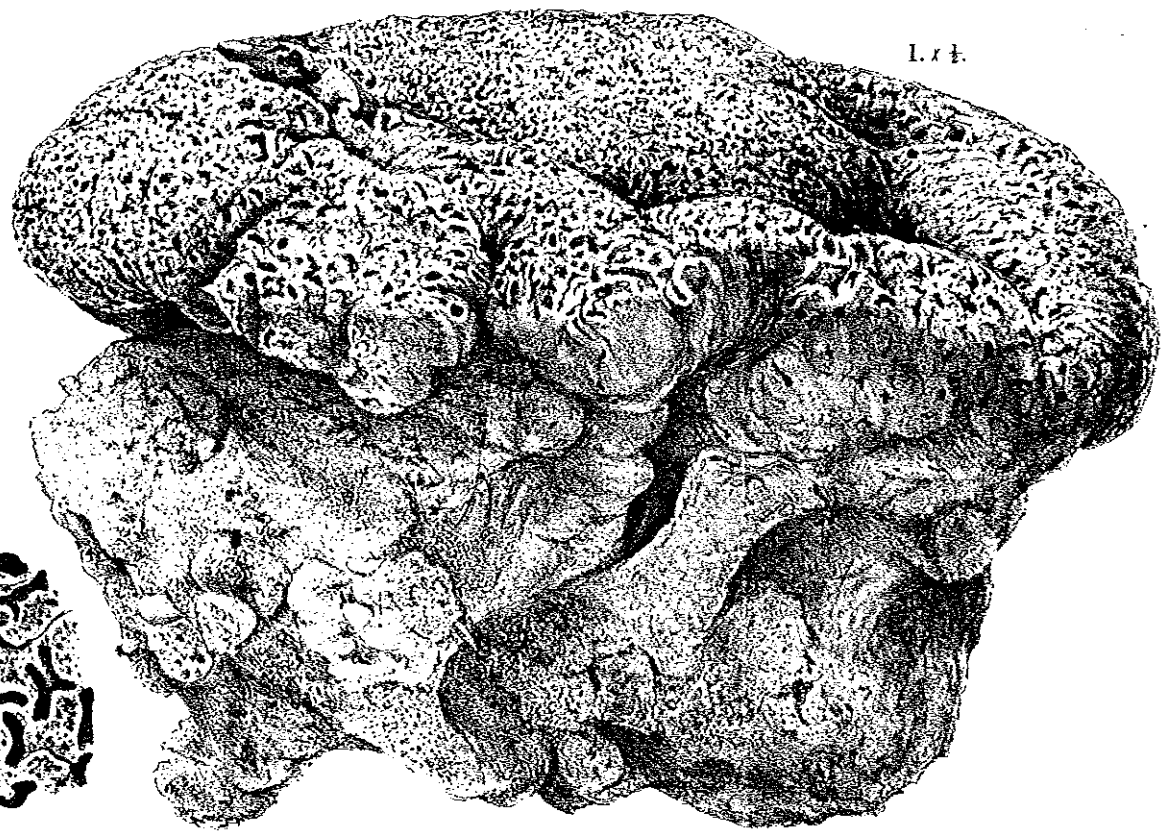
2. x 1/2.

1a. x 150.



1. x 1/2.

1. x 4.



1a. nat. size.

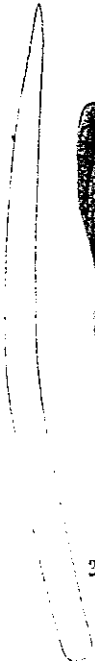


Murchison, Proc. Linn.

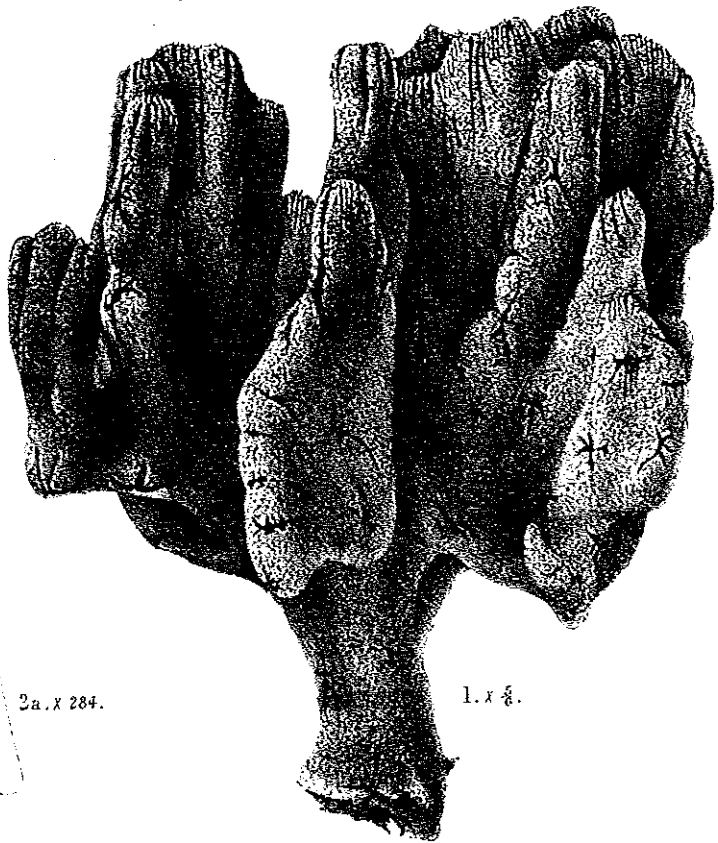
2. nat. size.

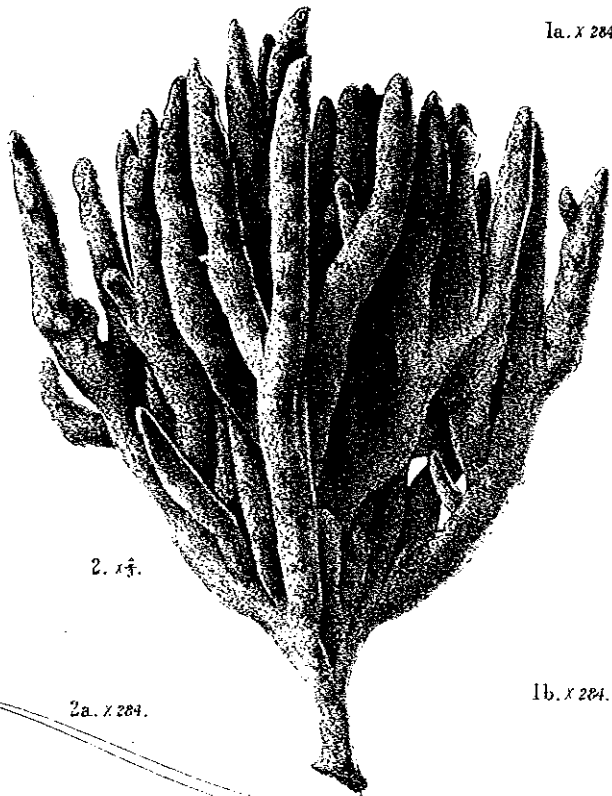


2a. x 284.

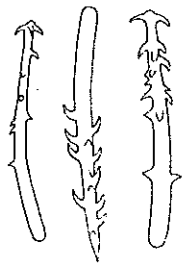


1. x 4.





1a. x 284.



1. x 4.

