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SUPPLEMENT TO

THE LITTORAL FAUNA OF KRUSADAI ISLAND

IN THE GULF OF MANAAR

PORIFERA

BY

M. BURTON, D.SC.

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PORIFERA OF KRUSADAI ISLAND

By MAURICE BURTON, D.Sc., *Department of Zoology, British Museum (Nat. Hist.), London.*

This report on the sponges of Krusadai Island is so written that it shall serve not only as a faunal list for that area but may help non-specialists in the group in identifying specimens. Little enough can be done in this last respect with so complex a group and it can only be hoped that the brief notes appended and the diagnoses of species may serve to assist those with at best an elementary experience of the phylum.

NOTES ON THE CLASSIFICATION OF SPONGES.

Although the types of spicules composing the skeleton, and their arrangement within the skeleton, remain the most reliable criteria for the recognition of generic and, in many cases, of specific characters, yet many other features may be usefully employed in the identification of species. Thus external form, colour, texture and the arrangement of oscules and pores should all be carefully noted. At the same time it should be constantly borne in mind that all these features are subject to considerable variation.

The same range of variation will be found in the skeleton characters, especially in the matter of size, which varies within the individual, and from one individual to another. In identifying specimens and describing new species some authors prefer to give the range of size for each type of spicule, but in this report, as a rule, only average sizes are given.

PREPARATION OF SPONGES FOR MICROSCOPICAL EXAMINATION.

Although it is preferable that sponges should be preserved from the first in strong alcohol, it is sometimes necessary to make the original preservation in formalin. This should, however, be changed for spirit as soon as possible, and in all cases this medium should be used for permanent storage. Moreover, specimens should be hardened off in strong spirit before mounting for microscopical examination.

The following are in general use for the identification of sponges :—

(1) Hand sections, cut with an ordinary hollow-ground razor, dehydrated in absolute alcohol (for 10 minutes), cleared in clove oil or cedarwood oil (for 10 minutes) and mounted in Canada Balsam.
(2) Teased preparations, dehydrated and cleared as in (1).
(3) Spicule preparations.
(4) Microtome sections.

The examination of hand sections is usually sufficient for experienced workers for ordinary purposes of identification, preparations of boiled out spicules being used as a means of corroborative evidence in checking the various categories of spicules present in the skeleton. The beginner is, however, advised to make preparations of boiled out spicules in identifying every specimen (except in the case of aspiculous Tetraxonida or in Keratosa). Faulty descriptions have frequently resulted in the past from workers of little experience failing to observe the presence of one or more categories of spicules (particularly microscleres) in a given sponge. Teased preparations should only be used where the specimen does not permit of sections being cut, as for example in encrusting forms or in extremely friable specimens. Microtome sections are usually needed only when anatomical features form the basis of identification, as in aspiculous Tetraxonida or in Keratosa.

The following notes on the preparation of sponges for identification may be added :—

(1) *Hand sections.*—These should be sagittal and tangential, to show the structure of the skeleton at right angles to the surface and to show the character of the dermal skeleton (if present). They should be cut as thinly as possible with a razor, or a very sharp scalpel in some cases. Experience will soon show whether a razor or scalpel should be used. Specimens with tough tissues usually respond more readily to the use of a sharp scalpel.

(2) *Teased preparations.*—For encrusting or friable specimens. A small piece of the sponge should be removed with forceps and teased with a pair of needles.

(3) *Spicule preparations.*—Calcareous sponges should be boiled in a test-tube in a solution of caustic potash, siliceous sponges in nitric acid, care being taken to prevent 'bumping' and the consequent loss of the contents of the test-tube. Small pieces of a maximum of 1 to 2 c.c. are usually sufficient to provide an adequate supply of spicules for several preparations. When all flesh has been boiled away and the spicules allowed to settle, the acid or potash should be decanted off and the test-tube filled with distilled water. With the thumb over the mouth of the test-tube, the contents should be gently shaken and afterwards the spicules allowed again to settle. Then the water should be decanted, the test-tube again filled and gently shaken and again allowed to stand. Three separate washings in this way are usually sufficient to remove all potash or acid.

After washing, the spicules can be removed by means of a pipette and allowed to drop on to the microscope slides, which are then dried and completed with Canada Balsam and coverslip. The spicules should be numerous on the slides but well separated : light or heavy concentrations of spicules are tedious to work with.

(4) *Microtome sections.*—The technique for these offers nothing unusual and need not be discussed here.

The scheme of classification here adopted is a modification of that used by various previous authors. In regard to the Tetraxonida it is modelled on that used by Dendy (1921) with the introduction of new names for the suborders and the inclusion of the Clavulidæ and the Tetillidae in the same suborder as the Stellettidae and Geodiidae, namely the Astrosclerophora.

Phylum PORIFERA.

Subphylum NUDA.

Order **Hexatinellida.**

Subphylum GELATINOSA.

Order **Calcarea.**

Order **Tetraxonida.**

Order **Keratosa.**

The subdivision into the subphyla Nuda and Gelatinosa is adopted from Bidder (1929, p. 5).

The orders Hexactinellida and Calcarea are unrepresented in the fauna of Krusadai Island and need not concern us further here. The subdivision of the Tetraxonida may be carried further as follows :—

Order TETRAXONIDA.

Suborder **Homosclerophora.**

Suborder **Streptastrosclerophora.**

Suborder **Astrosclerophora.**

Suborder **Sigmatosclerophora.**

The classification of the Keratosa is at present in a state of uncertainty and it is not proposed here to subdivide the order into more than the suborders Dictyoceratida and Dendroceratida.

THE SPONGE-FAUNA OF KRUSADAI ISLAND.

The recorded fauna of Krusadai Island is confined to the orders Tetraxonida and Keratosa.

Order TETRAXONIDA.

Siliceous sponges with spicules constructed on a 4-rayed plan, or some modification thereof.

Suborder HOMOSCLEROPHORA.

(Not represented in the fauna of Krusadai Island).

Tetraxonida in which the spicules are not differentiated into megascleres and microscleres.

Suborder STREPTASTROSCLEROPHORA.

(Not represented in the fauna of Krusadai Island).

Tetraxonida with spicules differentiated into megascleres and microscleres, the typical microsclere being the streptaster.

Suborder ASTROSCLEROPHORA.

Tetraxonida with spicules differentiated into megascleres and microscleres, the typical microsclere being an aster or some form derived from it.

Sponges of this suborder are usually corticate or subcorticate, with radial skeleton and with external form more or less symmetrical.

Family STELLETIDAE.

Astrosclerophora with skeleton of long oxea and, usually, long-shafted triaenes ; the microscleres are euasters, or some modified form of these, to which microrhabds may be added.

Genus **Stelletta** Schmidt.

Stellettidae with radial skeleton of oxea and triaenes, with euasters only for microscleres.

Stelletta purpurea Ridley.

pl. i, fig. 1 a-d.

For description and illustration see Ridley 1884, p. 473 and Dendy 1905, p. 74 (under *Pilochrota haeckeli*) ; for synonymy see Burton 1926, p. 45.

Diagnosis.—Sponge usually spherical, usually 5-20 mm. diameter, sometimes irregularly massive, with a single apical oscule ; colour ranging from yellow to purple ; skeleton composed of large oxea, orthotriaenes and anatriaenes, small ectosomal oxea and tylasters.

Remarks.—The measurements of the spicules are :—

large oxea (fig. 1 *a*), ·9—3·7 × ·012—·06 mm.,
orthotriaenes (fig. 1 *b*), shaft, 1·0 — 3·6 × ·015 — ·12 mm., cladi, ·07 — ·37 mm.,
anatriaenes (fig. 1 *c*), shaft, 1·0 — 3·5 × ·009 — ·06 mm., cladi, ·04 — ·19 mm., chord,
ectosomal oxea, .1 — ·4 × ·001 — ·01 mm.,
tylasters (fig. 1 *d*), ·006 — ·025 mm., diameter.

Genus **Ecionemia** Bowerbank.

Stellettidae with euasters and microrhabds for microscleres.

Ecionemia bacillifera (Carter).

pl. *i*, fig. 2

Stelletta bacillifera Carter 1887, p. 78, pl. vi, figs. 9-14 ; *E. rotundum* Sollas Id. 1888 1. c., p. 198 ; *Thalassomora nigra* Lendenfeld 1888, p. 40 ; *Ecionema rotundum* Topsent 1893, p. 175 ; *Stelletta lobata* Kieschnick 1896, p. 527 ; *Ancorina simplex* Lendenfeld 1897, p. 96, pl. ix, figs. 12-34 ; *Stelletta lobata* Kieschnick 1898, p. 27 ; *S. truncata* Id. l.c., p. 32 ; *Ecionema baculifera* Lindgren 1897, p. 485 ; 1898, p. 335, pl. xvii, fig. 17, pl. xix, fig. 27 ; *E. bacilifera* Id. 1899, p. 88 ; *Ecionemia agglutinans* Thiele 1899, p. 7, pl. iv, fig. 1, pl. v, fig. 2 ; *E. bacilliferum* Kirkpatrick 1900, p. 131 ; *E. cribrosa* Thiele 1900, p. 31, pl. ii, fig. 7 ; *E. cinerea* Id. l.c., p. 32, pl. ii, fig. 8 ; *E. nigrescens* Id. l.c., p. 34, pl. ii, fig. 9 ; *Ancorina amboinensis* Lendenfeld 1903, p. 63 ; *A. lobata* Id. l. c., p. 63 ; *A. nigra* Id. l. c., p. 64 ; *A. acervus* Id. l.c., p. 64 ; *A. rotunda* Id. l.c., p. 65 ; *A. agglutinans* Id. l.c., p. 65 ; *A. cinerea* Id. l.c., p. 65 ; *A. bacillifera* Id. l.c., p. 66 ; *Ecionemia carteri* Dendy 1905, p. 79, pl.i, fig. 5, pl. iii, fig. 1 ; Id. 1916, p. 242.

Diagnosis.—Sponge spheroidal or irregularly massive ; colour ranging from brown to grey or black ; skeleton composed of large oxea, orthotriaenes and anatriaenes, dermal microrhabds and microasters (tylasters to strongylasters or spherasters).

Remarks.—The measurements of the spicules are :—

oxea, 1·6 — 2·3 × ·004 — ·007 mm.,

orthotriaenes (fig. 2 *c*), shaft, 1·5 — 2·5 mm.,
cladi, ·15 — ·3 mm., long.

anatriaenes (fig. 2 *b*), shaft, 1·8 — 3·0 mm., cladi, ·028 — ·11 mm., chord.,

protriaenes (fig. 2 *a*), shaft, 1·8 by ·01 mm., cladi, ·028 mm. chord,

microrhabds (fig. 2 *e*), ·005 — ·02 mm. long,

tylasters (fig. 2 *d*), ·005 — ·02 mm. diameter.

Of the species of *Ecionemia* from the Indo-Pacific, 10 show a close resemblance not only in regard to their spicular characters but also in their external form and colour. These species, with their salient characteristics are included in the table on page 7.

From this table it is clear that we have to deal with one species only. All the types included here are massive to spherical, usually enclosing a certain amount of pebble, etc.,

in their substance and having a skeleton composed of oxea, orthotriaenes, anatriaenes, asters and microrhabds. The resemblances are very close indeed, the differences slight and including one or more of the following :—

(1) Presence or absence of dermal oxea or anatriaenes.

(2) Presence or absence of protriaenes.

(3) Differentiation of the asters into categories.

These differences may, however, be shown to be negligible.

1. It is commonly found in species of Stellettidae that dermal oxea and hair-like dermal anatriaenes are interchangeable modifications of the same spicule-form, and that their distribution is both variable and sporadic.

2. While it is probable that protriaenes form a normal constituent of the spiculation, they are usually few in number and often completely lacking from some parts of the sponge. The fact that they have been recorded from 6 only of the types under discussion merely means that in the rest they have been overlooked, or are very few in number. A similar state of affairs is frequently seen in species of *Geodia*, in which both protriaenes and anatriaenes are normally found but may often be absent.

3. In 4 of the types tylasters only were found, in 4 others tylasters and spherasters of approximately the same size are recorded, and in 3 others tylasters and strongylasters with roughened rays (i.e., anthasters) are figured. These represent, almost certainly, successive stages in differentiation.

Table showing the main characteristics of the holotypes of a group of ten species of *Ecionemia* from the Indo-Pacific region.

——	Oxea.	Orthotriaene L = shaft. B = cladus.	Anatriaene L = shaft. B = cladus.	Microrhabd.	Aster.	Colour.	Shape.	Locality
Ecionemia agglutinans Thiele.	2·0 × ·07	L 1·7 × ·07 B·25	L 2·5 B·1	·01 ...	Tylaster ·01 ... Spheraster ·01	Brown ...	Massive ...	Celebes
Ecionemia cribrosa Thiele.	2·0 × ·04	L 1·75 × ·07 B ·25	L 3·0 × ·02 B·1	·012 ...	Tylaster ·01 ... Spheraster ·01	Do. ...	Oval ...	Ternate
Ecionemia cinerea Thiele.	2·0 × ·04	L 1·7 × ·06 B·2	L 2·0 × ·017 B· 05	·014 — ·018 ...	Tylaster ·008 ... Anthaster ·016—·02.	Reddish-grey.	Massive ...	Do.
Ecionemia nigrescens Thiele.	2·0 × ·04	L 1·9 × ·05 B·2	L 2·0 × ·015 B ·045	·014 ...	Tylaster ·01 ... Anthaster ·015	Blackish-grey.	Massive or irreg. rounded.	Do.
Ecionemia amboinensis Lendenfeld.	2·3 × ·05	L 2·5 × ·065 B·28	L 2·0 × ·019 B ·11	·005 ...	Tylaster ·007 ... Anthaster ·012.	Do.	Massive ...	Amboina.
Ecionemia bacillifera Carter.	2 × ·06	L 2·0 × ·05 B	L 2·4 × ·015 B ·045	·005—·018	Tylaster ·006—·011 Strongyaster ·006 —·011.	Dark-green to black.	Do. ...	Mergui.
Ecoinemia carteri Dendy.	1·8 × ·037	L 1·5 × ·033 B ·148	L 1·8 × ·01 B·028	·02	Tylaster ·016 ...	Pale grey.	Do. ...	Ceylon.
Stelletta lobata Kieschnick.	...	L 2·0 × ·1 B ·2	L 2·3 × ·018 B ·045	·009	Tylaster ·005 —·01.	Grey-black.	Do. ...	Amboina.
Thalassomora nigra Lendenfeld.	1·6 × ·058	L 1·8 × ·056 B ·3	L ...	·016	Tylaster (?) ·01 ...	Black ...	Spherical.	Queensland.
Ecionema rotundum Sollas.	2·1 × ·059	L 1·6 × ·05 B ·2	L 2·0 × ·013 B ·058	016	Tylaster ·012 ...	Do. ...	Ovate ...	Amirantes.

All measurements in mm.

Family GEODIIDAE

Astrosclerophora with skeleton of long oxea and, usually, long-shafted triaenes ; the chief microsclere is a sterraster, confined to a cortical crust, and euasters of various sorts, to which microrhabds may be added, are present in addition.

Genus **Geodia** Lamarck

Geodiidae with radial skeleton of long-shafted triaenes and oxea ; without microrhabds or spherules.

Geodia areolata Carter

pl. i, fig. 3

G. areolata Carter 1880, p. 133, pl. vi, figs. 36-37 ; Sollas 1888, p. 246 ; *Sidonops areolata* Lendenfeld 1903, p. 103 ; *Geodia areolata* Dendy 1905, p. 87.

Diagnosis.—Sponge spherical in young stages sometimes becoming irregular as growth proceeds, up to 10 cms. or more across ; colour, in spirit, yellow or brown, often mottled with two more of these colours ; skeleton composed of a dermal crust of sterrasters, with internal radially-arranged oxea, orthotriaenes, anatriaenes and protriaenes ; small dermal oxea usually present ; microsters of two kinds, small oxyasters, or strongylasters, forming a dermal layer and scattered in choanosome, and larger oxyasters (varying to strongylasters) found only in choanosome.

Remarks.—The measurements of the spicules are :—

large oxea, 1·6 — 2·0 × ·016 — ·042 mm.,
orthotriaenes (fig. 3 *a*), shaft, 1·6 — 2·8 × ·016 — ·07 mm.,
cladi, ·17 mm. long.,
anatriaenes (fig. 3 *b*), shaft, 3·0 × ·008 mm.,
cladi, 0·03 — ·07 mm. chord,
protriaenes (fig. 3 *c*), shaft, 3·0 × ·008 mm.,
cladi, ·05 — ·07 mm. long,
dermal oxea, ·25 × ·007 mm.,
sterrasters (fig. 3 *d*), ·07 × ·07 mm. (but variable in size),
microsters of dermal layer and choanosome (fig. 3 *f*), ·008 mm. diameter,
microsters of choanosome (fig. 3 *e*), ·017 — ·02 mm. diameter.

It is difficult to give exact details of either the size or the shape of the microsters because the variation in both is fairly considerable. Typically the smaller microsters are strongylasters and the larger microsters are oxyasters, but both may be either strongylasters or oxyasters or a mixture of both. In addition, although the two kinds are typically of different sizes, it sometimes happens that numerous intermediates occur.

Note.—Geodia areolata and *G. picteti* are closely related species and it is possible that they will be shown ultimately to be identical. Moreover, they are both closely related to a large group of species distributed over the eastern North Atlantic, Mediterranean, Indian Ocean, Malay area and the coasts of Eastern Australia, most or all of which may also be shown later to be synonymous with *G. areolata* and *G. picteti*. These species are : *G. inaequalis* Bowerbank, *G. inconspicua* Bowerbank, *G. paupera* Bowerbank, *G. arabica* Carter, *G. globostellifera* Carter, *G. ramodigitata* Carter, *G. berryi* (Sollas), *G. glariosa* (Sollas), *G. nitida* (Sollas), *G. exigua* Thiele, *G. alba* (Kieschnick), *G. kukenthali* Thiele, *G. distincta* Lindgren, *G. arripiens* Lindgren, *G. lindgreni* Lendenfeld, *G. micropunctata* Row and, finally, *G. mulleri* (Fleming) *sensu* Lendenfeld 1903, p. 113.

Geodia picteti (Topsent).

Sydonops picteti Topsent, 1897, p. 431, pl. xviii, fig. 2 ; *Sidonops picteti* Kirkpatrick 1900, p. 130 ; Lendenfeld 1903, p. 103.

Diagnosis.—Sponge spherical or irregularly massive ; colour, in spirit, white or whitish-yellow ; skeleton composed of a dermal crust of sterrasters, with internal, radially-arranged oxea, orthotriaenes, anatriaenes and protriaenes ; microsters of two kinds, small spherasters, with pointed or truncated rays, confined mainly to dermal layer, and oxyasters scattered in choanosome.

Remarks.—The measurements of the spicules are :—

large oxea, ·5 — ·6 × ·03 mm.,
orthotriaenes, shaft, ·5 — ·6 mm.,
cladi, ·09 mm. long,
anatriaenes, shaft, ·6 × ·01 mm.,
cladi, ·04 mm. chord,
protriaenes, shaft, 0·6 × 0·01 mm.,
cladi, ·04 mm. chord,
sterrasters, ·097 by ·085 mm.,
microsters of dermal layer, ·004 — ·006 mm. diameter,
,, choanosome, ·035 — ·04 mm. diameter.

Family CHONDROSIIDAE.

Astrosclerophora without megascleres ; microscleres, when present, euasters.

Genus **Chondrilla** Schmidt.

Chondrosiidae with microscleres.

Chondrilla australiensis Carter.

pl. i, fig. 4.

C. australiensis Carter 1873, p. 23, pl. i, figs. 10-14, 16 ; Lendenfeld 1886, p. 153 ; *C. papillata* Id. l.c., p.153, figs. 13-16 ; *C. corticata* Id. l.c., p.154, figs. 17-20 ; *C. papillata* Carter 1886, p. 278 ; *C. corticata* Lendenfeld 1888, p. 70 ; *C. australiensis* Id. l.c., p. 71 ; *C. papillata* Id. l.c., p. 71 ; *C. globulifera* Keller 1891, p. 327, pl. xviii, figs. 34-35 ; *C. ternatensis* Thiele 1900, p. 65, pl. iii, fig. 19 ; *C. australiensis* Lindgren 1897, p. 484 ; Id. 1898, p. 38 ; Dendy 1905, p. 132 ; *C. australiensis* var. *lobata* Id. l.c., p. 132 ; *C. australiensis* Hentschel 1909, p. 377 ; Id. 1912, p. 320 ; Dendy 1916, p. 101 ; *Chondrillastra australiensis* Topsent 1918, p. 604 ; *C. papillata* Id. l.c., p. 606 ; *C. corticata* Id. l.c., p. 606 ; *C. globulifera* Id. l.c., p. 607 ; *C. ternatensis* Id. l.c., p. 608 ; *Chondrilla australiensis* Dendy and Frederick 1924, p. 496 ; Burton 1924, p. 207 ; Burton and Rao 1932, p. 325.

Diagnosis.—Sponge encrusting to lobose ; greyish-white to reddish brown or purple, often with dark specks ; surface smooth ; consistency tough ; skeleton of two forms of micraster, spherasters (fig. 4 *a*), ·019 — ·036 mm. in diameter, and oxyasters (fig. 4 *b*), c·02 — 0·03 mm. in diameter.

Genus **Chondrosia** Nardo.

Chondrosiidae without microscleres.

Chondrosia reniformis Nardo.

C. reniformis Nardo 1847, p. 272 ; *Gummina gliricauda* Schmidt 1862, p. 38, pl. iii ; *G. ecaudata* Id. l.c., p. 38, pl. iii ; *Chondrosia reniformis* Id. l.c., p. 40 ; Id. 1864, p. 30 ; *C. gliricauda* Id. l.c., p. 30 ; *Gummina ecaudata* Kœlliker 1864, p. 69, pl. viii ; *Chondrosia reniformis* Schmidt 1868, p. 1 ; *C. plebeja* Id. l.c., p. 1 ; *C. reniformis* Schulze 1877, p. 97, pl. viii ; Carter 1881, p. 248 ; Græffe 1882, p. 315 ; *C. ramsayi* Lendenfeld 1886, p. 147, pl. iii, figs. 6–9 ; *C. reniformis* Vosmaer 1887, p. 325, pls. vi, vii, x ; Levinsen 1887, pp. 512–513 ; Lendenfeld 1889, p. 458, pls. xxviii–xxxiii ; *C. plebeja* Topsent 1892, p. 54 ; *C. reniformis* Topsent 1896, p. 124 ; Lendenfeld 1896, p. 38, pl. i, figs. 7, 11, 12, pl. ix, figs 118, 119 ; Topsent 1897, p. 428 ; Kirkpatrick 1900, p. 129 ; *C. plebeja* Id. l.c., p. 129 ; *C. corticata* Thiele 1900, p. 67, pl. iii, fig. 21 ; *C. debilis* Id. l.c., p. 68 ; *C. reniformis* Dendy 1905, p. 133 ; Topsent 1906, p. 568 ; Hentschel 1909, p. 378 ; *C. reniformis* var. *rugosa* Id. l.c., p. 379, pl. xxiii, fig. 19 ; *C. plebeja* Kirkpatrick 1910, p. 128, pl. vii, figs. 4–8 ; *C. reniformis* Hentschel 1912, p. 322 ; Stephens 1915, p. 437 ; *C. plebeja* Id. l.c., p. 437 ; Topsent 1918, p. 609 ; *C. reniformis* Id. l.c., p. 610 ; Babié 1921, p. 13 ; Id. 1922, p. 269 ; Topsent 1925, p. 630 ; Id. 1928, p. 143 ; Burton and Rao 1932, p. 324 * ; Topsent 1934, p. 8. (For description and illustration see Schulze 1877 and Lendenfeld 1896).

* The inclusion of *Chondrosia spurca* as a synonym of *C. reniformis* is wrong ; it should be called *Thymosia spurca* (Carter).

Diagnosis.—Sponge massive or rounded, often spreading ; surface smooth and shiny ; texture firm and tough ; oscules simple, large ; colour yellowish-white or violet-brown ; cortex fibrous, firm, elastic.

" LITHISTIDA."

An aberrant, probably polyphyletic, group of the Tetraxonida, characterised by the possession of a skeleton of interlocking desmas, with various other spicules, triaenes, styli, etc., for accessory megascleres, and with various kinds of astrose and sigmatose microscleres.

Genus **Lophocanthus** Hentschel.

Lithistida with main skeleton of tetracrepid desmas ; with dermal skeleton of lophotriaenes and with styli and rhabdostyli projecting at the surface.

Lophocanthus rhabdophorus Hentschel.

Pl. v, fig. 31.

L. rhabdophorus Hentschel 1912, p. 306, pl. xvii, fig. 1.

Diagnosis.—Sponge thinly encrusting ; surface even, minutely hispid ; oscules and pores not seen ; colour, in spirit, greyish-white or bluish-grey ; main skeleton of tetracrepid desmas, dermal skeleton of lophotriaenes, with styli and rhabdostyli projecting at surface.

Dimensions of spicules :—

desmas (fig. 31 *a-b*), ·15 mm. long,

lophotriaenes (fig. 31 *c*), shaft ·18 to ·26 mm. long,

cladi, ·1 to ·2 mm. long,

styli and rhabdostyli (fig. 31 *d-e*), ·26 to ·65 by ·007 to ·016 mm.

Family TETILLIDAE.

Astrosclerophora with radial skeleton of long oxea and long-shafted triaenes, to which, occasionally, short-shafted triaenes may be added ; microscleres sigmaspirae.

Genus **Chrotella** Sollas

Tetillidae of, usually, rounded form, with porocalices ; without amphitriaenes or subdermal layer of short-shafted triaenes.

Remarks.—The genus corresponds to *Cinachyra* Auctt.

Chrotella australiensis (Carter).

Tethya cranium var. *australiensis* Carter 1886, p. 127 ; *Cinachyra australiensis* Burton 1934, p. 523. (For synonymy and literature see Burton l.c., for illustration see Dendy 1905, pl. vi, fig. 4 and 1921, pl. i, figs. 4, 5, pl. ii, fig. 1, pl. x, figs. 2, 3).

Diagnosis.—Sponge more or less spherical, surface usually coated with a layer of sand ; oscules small and inconspicuous, porocalices usually small and scattered over surface ; skeleton composed of radial bundles of oxea which tend to spread out in divergent brushes at surface ; anatriaenes or protraaenes may be present in small quantites. Microscleres, microxea, which may be sometimes absent, and sigmaspirae.

Family TETHYIDAE

Astrosclerophora of globular or (more rarely) massive form, with radial skeleton of strongyloxea or (rarely) tylostyli ; with a well-differentiated cortex ; microscleres, when present, euasters to which microrhabds may be added.

Genus **Tethya** Lamarck.

Tethyidae with main skeleton of strongyloxea (pl. ix, figs. 54 *a*, 55 *a*, 56 *b*) more rarely tylostyli ; microscleres differentiated into megasters, large spherasters (pl. ix, figs. 54 *b*, 55 *b*, 56 *b*) forming a cortical layer, and micrasters of one or more kinds distributed throughout both cortex and choanosome ; with surface marked by polygonal or rounded areas separated by pore-bearing grooves.

Remarks.—The species of *Tethya* are so alike in external form and in their anatomy that these details can be omitted from their diagnoses.

Tethya repens Schmidt.

pl. ix, fig. 54.

T. repens Schmidt 1870, p. 51 ; *Donatia stella-grandis* Dendy 1916, p. 266, pl. xliv, fig. 5, pl. xlviii, fig. 5 ; *Donatia repens* Burton 1924, p. 1036.

Diagnosis.—Micrasters typically strongylasters with roughened rays, which may become tylote or occasionally, oxeote (fig. 54 *c*—*e*) ; rays of megasters long, often branched (fig. 54-*b*); megascleres range from strongyloxea to tylostyli (fig. 54 a).

Tethya diploderma Schmidt.

pl. ix, fig. 56.

T. diploderma Schmidt 1870, p. 52, pl. iv, fig. 11 ; *Donatia diploderma* Topsent 1918, p. 574 ; Burton 1924, p. 1039.

Diagnosis.—Micrasters tylasters (fig. 56 d), often with ends of rays spined, and long-rayed oxyasters (fig. 56 c) ; rays of latter may be smooth, roughened, tuberculate or laterally spined, often branched.

Tethya robusta (Bowerbank).

pl. ix, fig. 55.

Tetha robusta Bowerbank 1873, p. 10, pl. ii, figs. 12–17 ; *Donatia robusta* Burton 1924, p. 1037.

Diagnosis.—Micrasters typically strongylasters of two kinds : (*a*) with short rays bearing at ends a number of small spines (fig. 55 c) ; (*b*) with long rays, usually bearing a crown of small spines at ends, sometimes sharply-pointed (fig. 55 d).

Tethya japonica Sollas.

T. japonica Sollas 1888, p. 430, pl. xliv, figs. 7-14 ; *Donatia japonica* Burton 1924, p. 1039.

Diagnosis.—Micrasters tylasters only.

Genus **Aaptos** Gray.

Clavulidae of encrusting or rounded form with skeleton of radial bundles of strongyloxea (fig. 55 a) and small, scattered dermal styli ; microscleres absent.

Aaptos aaptos (Schmidt).

Ancorina aaptos Schmidt 1864, p. 33, pl. iv, fig. 11 ; *Tuberella aaptos* Topsent 1900, p. 285, pl. viii, figs. 12-13 ; *Aaptos aaptos* Dendy and Frederick 1924, p. 508. (For synonymy see Topsent l.c. and Dendy and Frederick l.c.).

Diagnosis.—Sponge irregularly encrusting or massive and rounded ; surface smooth or finely hispid ; oscules scattered ; texture firm, fleshy ; colour, in life, white, yellow, brown or red (colour often preserved in spirit) ; skeleton of radial bundles of strongyloxea, 1·0 by ·04 mm., and small dermal styli, ·5 by ·007 mm.

Family CLAVULIDAE.

Astrosclerophora with radial skeleton of tylostyli, rarely styli or oxea, with various sorts of pseudasters for microscleres.

Genus **Pseudosuberites** Topsent.

Clavulidae with main skeleton an irregular reticulation of tylostyli, with a dermal, tangential reticulation of similar spicules ; without miscroscleres.

Pseudosuberites andrewsi Kirkpatrick.

pl. viii, fig. 48.

P. andrewsi Kirkpatrick 1900, p. 135, pl. xii, fig. 2, pl. xiii, fig. 7.

Diagnosis.—Sponge encrusting or massive ; surface smooth, with subdermal canalicular markings ; oscules small, scattered ; texture soft, friable ; colour, in spirit, white or pale yellow ; main skeleton irregular with tendency to form ascending fibres ; spicules ·35 by ·006 mm.

Genus **Laxosuberites** Topsent.

Clavulidae with skeleton of ascending fibres of tylostyli, usually plumose, often connected by loosely-arranged transverse spicules ; spicules not divided into categories.

Laxosuberites cruciatus (Dendy).

pl. viii, fig. 47.

Suberites cruciatus Dendy 1905, p. 131, pl. v, fig. 10 ; Id. 1916, p. 135.

Diagnosis.—Sponge erect, stipitate, branching ; surface uneven, minutely hispid ; pores in areas, oscules small, scattered ; texture soft, flexible ; colour, in spirit, pale brown ; skeleton of loose longitudinal fibres, with distal ends bending towards surface, connected by scattered spicules ; spicules tylostyli, with cruciform bases, ·3 by ·005 mm.

Laxosuberites lacustris Annandale.

pl. viii, fig. 49.

L. lacustris Annandale 1915, p. 45, pl. v, figs. 2-3, text-figs. 10-11.

Diagnosis.—Sponge encrusting ; surface smooth ; oscules small, scattered ; texture soft ; colour alive, white, orange-yellow, or green, in spirit, white ; skeleton of ascending plumose fibres of tylostyli, varying from ·2 to ·6 by ·004 to ·008 mm.

Spirastrella inconstans (Dendy).

pl. viii, fig. 51.

Suberites inconstans et varr. *mæandrina, digitata, globosa* Dendy 1887, pp. 154-157, pls. ix-x ; *Spirastrella inconstans* Burton 1934, p. 570.

Diagnosis.—Sponge massive or composed of a bunch of stout, erect, digitate processes springing from a basal mass ; surface minutely hispid, even or thrown into meandrine folds, often plentifully beset with commensal cirripedes ; oscules scattered in massive forms, at summits of processes in digitate forms ; texture hard, incompressible ; colour, in life,

orange or brick-red ; skeleton a coarse isodictyal, multispicular reticulation of tylostyli (fig. 51 a), ·6 by ·022 mm. ; microscleres slender spinispiræ (fig. 51 b), beset with small wart-like processes, up to ·35 mm. (rarely ·07 mm.) long.

Genus **Terpios** Duchassaing and Michelotti.

Clavulidae of encrusting habit, with skeleton of tylostyli arranged without order ; spicules not differentiated into categories ; microscleres absent.

Terpios fugax Duchassaing and Michelotti.

pl. viii, fig. 50.

T. fugax Duchassaing and Michelotti 1864, p. 102, pl. xxiv ; Topsent 1900, p. 193, pl. vi., fig. 10.

Diagnosis.—Sponge thinly encrusting ; surface even, smooth ; oscules and pores not apparent ; texture soft ; colour, in life, blue, orange, green and yellow (first three colours due to symbiotic algæ) ; skeleton of tylostyli, ·25 to ·4 by ·004 to ·006 mm.

Genus **Timea** Gray.

Clavulidae of encrusting habit, with skeleton of tylostyli arranged vertically on substratum, and with asters for microscleres.

Timea stellata (Bowerbank).

pl. viii, fig. 52.

Hymedesmia stellata Bowerbank 1866, p. 150 ; *Timea stellata* Gray 1867, p. 544 ; *Hymedesmia stellata* Bowerbank 1874, p. 71, pl. xxviii, figs. 5-8 ; Id. 1882, p. 67 ; Topsent 1900, p. 114, pl. iii, fig. 15.

Diagnosis.—Sponge thinly encrusting ; surface even, hispid ; oscules and pores not apparent ; texture soft ; colour, living and in spirit, yellow ; skeleton of tylostyli arranged vertically on substratum ; tylostyli (fig. 52 a), ranging from ·17 by ·001 mm. to 1·0 by ·015 mm.; microscleres chiasters (fig. 52 b), ·014 mm. diameter.

Genus **Cliona** Grant.

Clavulidae of boring habit, excavating the shells of Mollusca, chalk-rocks, coral-rock, etc., but (frequently) assuming a massive form in later stages ; pores and oscules situated on specialised retractile papillæ ; skeleton of tylostyli, often combined with or replaced by oxea, and spinispirae or some modified form of them.

Cliona lobata Hancock.

pl. viii, fig. 53.

C. lobata Hancock 1849, p. 341, pl. xii, figs. 4, 8 ; Topsent 1900, p. 70, pl. ii, figs. 2, 10, pl. iii, fig. 1, pl. iv, fig. 1.

Diagnosis.—Megascleres tylostyli (fig. 53 a), ·2 by ·004 mm. ; microscleres spinispirae (fig. 53 b), ·01 to ·065 by ·002 to ·005 mm.

Genus **Placospongia** Gray.

Clavulidae with axial and cortical layers of sterrospiræ, and with radial bundles of tylostyli ; microscleres spinispirae, microrhabds and euasters of various sorts.

Placospongia carinata (Bowerbank).

pl. ix, fig. 57.

Geodia carinata Bowerbank 1858, pp. 308, 314, pl. xxv, fig. 19, pl. xxvi, fig. 10 ; *Placospongia carinata* Vosmaer and Vernout 1902, p. 9, pl. i, figs. 1-4, pl. ii, fig. 5, pl. iv, figs. 9-13, pl. v, figs. 1, 5, 7-9, 11.

Diagnosis.—Sponge encrusting or massively branching, branches polygonal in section and bearing longitudinal porebearing grooves ; surface smooth, even ; texture hard ; colour, living and in spirit, yellow, brown or red ; skeleton consists, in addition to tylostyli (fig. 57 a—b) and sterrospiræ (fig. 57 h), of spinispirae of many sorts (fig. 57 c—d), microrhabds (fig. 57 e—f) and spheraster (fig. 57 g).

Remarks.—The difference between this species and *P. melebesioides*, which is very similar to it and has the same distribution, is the greater number and variety of the spinispiræ, as well as the difference in development of the sterrospirae, a point well illustrated in Vosmer and Vernout (l.c. pl. iv).

Family HAPLOSCLERIDAE.

Sigmatosclerophora with skeleton of oxea, rarely strongyla, of fairly constant length ; skeleton a reticulation of fibres or single spicules, scalariform, triangular or a dense mass of spicules without order, or a dendritic system of fibres ; microscleres, usually absent, sigmata, trichodragmata and rhaphides.

Genus **Haliclona** Grant.

Haploscleridae with main skeleton a regular reticulation of fibres of oxea, fibres uni- or multispicular ; without special dermal skeleton.

Haliclona madrepora (Dendy).

pl. i, fig. 6.

Reniera madrepora Dendy 1889, p. 78, pl. iv, fig. 9 ; Lindgren 1897, p. 481 ; 1898, p. 6, pl. xvii, fig. 4.

Diagnosis.—Sponge a mass of anastomosing cylindrical branches or, more rarely, rounded lamellae ; surface smooth, minutely hisipid ; texture soft and compressible ; oscules small and scattered ; colour, in spirit, pale yellow or orange ; skeleton varying from unispicular to multispicular with triangular to rectangular mesh, with little spongin ; spicules oxea, ·16 to ·18 by ·007 to ·008 mm.

Haliclona obtusispiculifera (Dendy).

pl. i, fig. 5.

Chalina obtusispiculifera Dendy 1905, p. 150, pl. x, fig. 9.

Diagnosis.—Sponge irregularly branched, branches long, slender, cylindrical ; surface even, minutely hispid ; texture soft and resilient ; oscules and pores not visible ; colour, in spirit, pale yellowish-brown ; skeleton a reticulation of horny fibre cored by slender strongyla ; spicules ·12 by ·007 mm.

Haliclona exigua (Kirkpatrick).

Petrosia exigua Kirkpatrick 1900, p. 139, pl. xii, fig. 7, pl. xii, fig. 4 ; *Haliclona exigua* Burton 1934, p. 532.

Diagnosis.—Sponge a hard, thick nodulated crust ; surface thrown into folds, producing irregular ridges and lobose processes ; texture hard and firm, but friable ; oscules numerous, scattered, with a tendency to formation of linear series on summits of ridges ; colour, in spirit, usually dark brown, rarely yellow ; skeleton a fairly regular isodictyal reticulation ; spicules oxea, ·09 to ·16 by ·003 to ·008 mm.

Haliclona tenuiramosa (Burton).

Chalina tenuiramosa Burton 1930, p. 666.

Diagnosis.—Sponge a mass of long, slender, cylindrical branches ; surface even, minutely hispid ; texture soft, compressible ; vents small, distributed in an irregular linear series; colour, in life, olive-green, in spirit, light brown ; skeleton a unispicular reticulation with triangular or rectangular mesh, with spongin only at nodes of reticulation ; spicules oxea, ·15 by ·006 mm.

Haliclona camerata (Ridley).

Reniera camerata Ridley 1884, p. 605, pl. liii, fig. H, pl. liv, fig. n ; Topsent 1897, p. 474 ; Dendy 1922, p. 31 ; *Haliclona camerata* Burton 1934, p. 531. (For illustration see Ridley l.c.)

Diagnosis.—Sponge generally subcylindrical or subconical, but perforated by large irregular openings and with cavernous interior* ; surface smooth, gently undulating ; inner surface of cavities pitted by opening of exhalant canals ; colour, in spirit, yellow, pale brown or olive-green ; consistency compressible, flexible and slightly friable ; skeleton ranging from uni- to multispicular, with triangular or polygonal mesh, but with little spongin ; spicules oxea, ·16 to ·32 mm. by ·005 to ·02 mm.

Hemihaliclona gen. n.

Genotype.—Amphimedon viridis Duchassaing and Michelotti 1864, p. 81.

Diagnosis.—Haploscleridae with skeleton of branching systems of fibres, cored by spicules running outwards to surface connected by numerous irregularly placed single spicules or by occasional spicule-fibres.

Hemihaliclona viridis (Duchassaing and Michelotti).

pl. i, fig. 7.

Amphimedon viridis Duchassaing and Michelotti 1864, p. 81, pl. xvi, figs. 2-3 ; *Pachychalina variabilis* Dendy 1887, p. 504 ; *Dactylochalina viridis* Keller 1889, p. 391, pl. xxiii, figs. 40-41 ; *Pachychalina variabilis* Dendy 1890, p. 353, pl. lviii, fig. 3, pl. lx, fig. 2 ; *Chalina polychotoma* (Specn. R.N. 325), Dendy 1895, p. 243 ; *C. viridis* Id. l.c., p. 244 ; *Reniera tabernacula* Row 1911, p. 316, text-fig. 9 ; *Ceraochalina differentiata* Dendy 1922, p. 43, pl. iii, fig. 7, pl. xii, fig. 11 ; *Reniera tabernacula* Burton 1926, p. 74 ; *Cladochalina variabilis* Burton 1927, p. 512.

Diagnosis.—Sponge variable in form : irregularly massive, lamellar with digitate or branching processes, or branching ; surface even, minutely hispid, markedly porose ; exture soft, compressible ; oscules usually numerous, scattered ; colour, in life, green, in spirit, pale yellow to brown or olive green ; skeleton of branching systems of horny fibres, cored by spicules, connected by numerous, irregularly disposed single spicules or, occasionally, by transverse connective fibres ; spicules oxea, ·06 to ·15 by ·003 to ·012 mm.

Genus **Adocia** Gray.

Haploscleridae with isodictyal skeleton (mesh triangular or rectangular, unispicular or multispicular) of oxea ; special dermal skeleton a tangential unispicular reticulation of similar spicules.

* In reality, the sponge is composed of compact lamellae, 1-2 mm. thick, much folded and anastomosing to form labyrinthine system of passages.

Adocia pigmentifera (Dendy).

pl. i, fig. 8

Reniera pigmentifera Dendy 1905, p. 143, pl. ix, fig. 10.

Diagnosis.—Sponge massively flabellate in younger stages, becoming pyriform in adult; surface even, in young stages, becoming meandrine in upper parts of older specimens; oscules, about 5 mm. diameter, few and scattered, arranged in linear series on margin in flabellate forms; texture soft, compressible; colour, in life, dark green, in spirit, olive-green to brown; skeleton mainly a unispicular reticulation, very irregular in parts; spicules oxea, sometimes modified to styli or strongyla, ·14 by ·007 mm.

Remarks.—The holotype of the species is a mass of small pieces which can at best give only a slight indication of the true external form, but from the examination of other specimens in the British Museum collections, it is possible that the Krusadai Island specimen does belong to this species. It is large, 8 cms. high and 6 cms. in diameter at the widest point, irregularly pyriform with a pronounced depression at the summit, and with the surface becoming more and more marked with small meadrine ridges as the upper parts of the sponge are reached.

Adocia semifibrosa (Dendy).

Reniera semifibrosa Dendy 1916, p. 111, pl. ii, fig. 13.

Diagnosis.—Sponge massive, with surface thrown into irregular folds or produced into subpapillate processes; surface smooth, even; oscules scattered, large and prominent; texture soft, friable; colour, in spirit, pale yellowish-grey; main skeleton a unispicular reticulation, with a multispicular subdermal reticulation; spicules oxea, ·16 by ·01 mm.

Adocia carnosa (Dendy).

pl. i, fig. 11

Gelliodes carnosa Dendy 1889, p. 83, pl. iv, fig. 7; 1905, p. 137, pl. vii, fig. 5; G. *carnosa* var. *laxa* Id. 1922, p. 29, pl. ii, fig. 1.

Diagnosis.—Sponge a proliferous mass of slender anastomosing tubes, fused to a greater or lesser extent to form a lamellar mass bearing numerous tubular processes each terminating in a vent; surface smooth, even; texture soft, compressible; colour, in life, grey, dried and in spirit, brownish-grey; main skeleton of multispicular ascending fibres with fairly regular bispicular conjunctives; dermal skeleton a regular unispicular reticulation with a fair amount of spongin; spicules oxea, ·12 to ·14 by ·006 to ·008 mm., and sigmata, ·017 to ·02 mm. chord.

Adocia pumila (Lendenfeld).

Siphonochalina pumila Lendenfeld 1887, p. 806 ; *Adocia pumila* Burton 1934, p. 537, pl. i, figs. 1-7. (For synonymy and description see Burton l.c.)

Diagnosis.—Sponge massive with proliferations on surface, or composed of massive anastomosing branches, or consisting of a basal plate from which arise well-marked oscular tubes ; surface entirely smooth or bearing groups of tubercles or low spines ; texture firm but compressible ; oscules conspicuous but scattered ; colour, in spirit, pale yellow to brown ; main skeleton a reticulation of spongin fibres cored by spicules, ascending fibres multispicular, connectives uni- or bispicular ; subdermal portions of main skeleton without spongin and often entirely unispicular ; dermal skeleton a regular, unispicular network ; spicules oxea, ·18 by ·008 mm., and sigmata, ·024 mm. chord.

Genus **Callyspongia** Duchassaing and Michelotti.

Haplosclerida with main skeleton a regular reticulation, usually of multispicular fibre or of stout spongin fibre cored by a few spicules only ; spicules oxea ; special dermal skeleton a large-meshed reticulation of multispicular fibres, meshes triangular or polygonal, subdivided by secondary (unispicular or multispicular) or tertiary (usually unispicular) fibres.

Callyspongia diffusa (Ridley).

Cladochalina diffusa Ridley 1884, p. 672, pl. xli, fig. D. ; *Callyspongia diffusa* Burton 1934, p. 541, fig. 6. (For synonymy and description see Burton l.c.).

Diagnosis.—Sponge massive, often with low tubular oscules, to tubular and repent or erect and tubular, or flabellate with oscules arranged around margins or scattered over one face, or cylindrical and repent with long slender branches ; surface smooth or sparingly spinose, minutely hispid ; texture firm but compressible ; colour, in life, purple, violet or yellowish brown, in spirit, yellowish brown, dried, yellowish-brown or yellowish-green (often in dried or spirit specimens traces of purple or violet colour remains) ; main skeleton a coarse network of stout multispicular fibres ; dermal skeleton a network of multispicular fibres forming a triangular mesh subdivided by unispicular secondary fibres and echinated by tufts of spicules set at right angles ; spicules oxea, ·07 to ·14 by ·004 to ·006 mm.

Remarks.—The external form of the species is markedly variable but the Gulf of Manaar specimens are almost invariably flabellate. Did not this form occur elsewhere, e.g. off the Australian coasts, and frequently alongside other forms of the same species, there might be some justification for regarding it as a distinct variety.

Callyspongia fibrosa (Ridley and Dendy).

Dasychalina fibrosa Ridley and Dendy 1886, p. 330 ; *Pachychalina fibrosa* Id. 1887, p. 21, pl. iv, figs. 3-4 ; *Chalina spinifera* Carter 1887, p. 66, pl. v, figs. 1-2 ; *Pachychalina spinilamella* Dendy 1889, p. 80 ; *P. fibrosa* Lindgren 1897, p. 481 ; Id. 1898, p. 11, pl. xix, fig. 6 ; *P. spinilamella* Dendy 1905, p. 149, pl. vii, fig. 4 ; *Cladochalina fibrosa* Burton 1927, p. 510 ; *C. spinilamella* Id. l.c., p. 511 ; *Sclerochalina spinilamella* Burton 1930, p. 669. (For illustration and description see Ridley and Dendy 1887, and Dendy 1889 and 1905.)

Diagnosis.—Sponge composed of massive anatomosing branches or of a series of low tubes arising from a basal mass ; surface smooth or ornamented with spines ; oscules, in branching forms, conspicuous and scattered ; texture firm and only slightly compressible ; colour, in spirit, olive-green to brown, dried, brown or drab ; main skeleton a coarse reticulation, often very irregular, of multispicular fibre ; dermal skeleton an irregular reticulation of multispicular fibres subdivided by more slender multispicular secondary and bispicular tertiary fibres ; spicules oxea, ·1 to ·15 by ·005 to ·008 mm.

Remarks.—The species has been recorded by other authors, Kirkpatrick, Hentschel and Wilson, from other parts of the Indo-Pacific but these records are of doubtful value and re-examination of the original material is necessary to establish the accuracy of them. Further, *Pachychalina spinosissima* Dendy, given by Lindgren (1898) as a synonym of this species is in reality a separate species of *Callyspongia*.

Callyspongia spinosissima (Dendy).

Pachychalina spinosissima Dendy 1887, p. 524, pl. xliv ; P. *subcylindrica* Id. 1905, p. 148, pl. x, figs. 1-2 ; Id. 1922, p. 41, pl. viii, fig. 1 ; *Cladochalina subcylindrica* Burton 1927, p. 511.

Diagnosis.—Sponge composed of long, subcylindrical branches ; surface smooth, often bearing stout spines ; texture firm but compressible ; oscules conspicuous, scattered along branches ; colour, in spirit, yellowish brown ; main skeleton a coarse, irregular reticulation of multispicular fibres ; dermal skeleton an irregular reticulation of multispicular fibres, often subdivided by uni- or bispicular secondary fibres ; spicules oxea, ·16 to ·2 by ·006 to ·01 mm.

Callyspongia fistularis (Topsent).

Sclerochalina fistularis Topsent 1892, p. 25, pl. i, fig. 1.

Diagnosis.—Sponge composed of numerous low tubes arising from a basal mass ; surface covered with small spines or spinose tubercles ; oscules at apices of erect tubes ; texture firm, only slightly compressible ; colour, in spirit, pale yellow ; main skeleton an irregular

network of stout multispicular fibres, with ascending and conjunctive fibres ill-defined ; dermal skeleton a close-meshed reticulation of multispicular fibres, subdivided by uni- or bispicular secondary fibres, echinated by single spicules or brushes of spicules ; spicules oxea, ·06 to ·07 by ·001 mm.

Genus **Petrosia** Vosmaer.

Haplosclerida with skeleton a dense, irregular and confused reticulation of oxea and strongyla, usually one or both of which are differentiated into two sizes ; without special dermal skeleton.

Petrosia testudinaria (Lamarck).

Pl. i, fig. 10

Alcyonium testudinarium Lamarck 1815, p. 167 ; *Reniera crateriformis* Carter 1882 p. 115 ; *R. testudinaria* Ridley 1884, p. 409 ; *R. crateriformis* Carter 1887, p. 71 ; *Petrosia testudinaria* Dendy 1889, p. 77, pl. iii, figs. 1-3 ; Dendy 1905, p. 144, fig. 1 ; Hentschel 1912, p. 403 ; Topsent 1920, p. 7 ; Wilson 1925, p. 399, pl. xl, fig. 6 ; *P. testudinaria* var. *fistulophora* Id. l.c., p. 401, pl. xl, fig. 5, pl. xli, figs. 1-2, pl. xlviii, figs. 8 ; *P. testudinaria* Topsent 1933, p. 40. (For description and illustration see Dendy 1889 and Wilson L.c.)

Diagnosis.—Sponge crateriform, with numerous ribbing processes, often produced into fistulæ, running from base to summit on outer surface ; surface smooth, porose ; texture hard but friable ; colour, in life, pink, in spirit and dry, brownish yellow ; skeleton an irregular network of stout multispicular fibres composed of spicules loosely bound together ; spicules varying from oxea to strongyla, ·37 to ·44 by ·017 to ·022 mm.

Genus **Oceanapia** Norman.

For synonymy see Burton 1934, p. 545.

Haplosclerida with rounded body bearing blind fistulæ or oscular tubes ; surface smooth ; main skeleton a uni- or multispicular reticulation ; dermal skeleton, usually, a tangential unispicular reticulation.

Oceanapia media (Thiele).

pl. i, fig. 9

Rhizochalina media Thiele, 1899, p. 19, pl. iv, fig. 2, pl. v, fig. 11.

Diagnosis.—Main skeleton of multispicular fibres forming an irregular network ; dermal skeleton a unispicular network ; spicules oxea, ·3 by ·016 mm.

Family DESMACIDONIDAE.

Sigmatosclerophora characterised by the possession of chelae for microscleres, to which sigmata, toxa, trichodragamta or other microscleres may be added ; main skeleton usually of styli or subtylostyli, smooth or spined, rarely of oxea only, often echinated by acanthostyli.

Section MYCALEAE.

Desmacidonidae with skeleton of smooth styli or subtylostyli, acanthostyli or acanthoxea rarely present ; microscleres anisochelae or isochelae palmatæ ; without differentiation of spicules into those of main skeleton and auxiliary or special dermal spicules.

Genus **Mycale** Gray.

Mycaleae with skeleton an irregular reticulation of multispicular fibres, either isodictyal or formed of ascending fibres branching and anastomosing, of styli or subtylostyli ; microscleres anisochelae to which sigmata, toxa or raphides may be added.

Mycale grandis Gray.

pl ii, fig. 13

M. grandis Gray 1867, p. 533 ; *M. armata* Thiele 1903, p. 950, fig. 16 ; *M. grandis* Hentschel 1912, p. 337 , pl. xviii, fig. 15 ; Burton 1934, p. 547. (For description and illustration see Thiele l.c. and Hentschel l.c.)

Diagnosis.—Sponge encrusting or massive, sometimes with oscular tubes ; surface smooth ; texture soft, compressible ; colour, alive or in spirit, yellow, yellowish-grey or yellowish-brown ; skeleton of subtylostyli, 3 sizes of anisochelae, 2 sizes of sigmata, and raphides.

Dimensions of spicules :

subtylostyli (fig. 13 *a*), ·43 to ·6 by ·01 to ·02 mm.,
large anisochelae (fig. 13 *b*—*c*), ·075 to ·145 mm. chord,
medium-sized anisochelae (fig. 13 *d*), ·015 to ·032 mm. chord,
smaller anisochelae (fig. 13 *e*), ·015 to ·018 mm. chord,
large sigmata (fig. 13 *f*), ·04 to ·057 mm. chord,
small sigmata (fig. 13 *f*), ·013 to ·019 mm. chord,
raphides (in bundles) (fig. 13 *g*—*h*), ·032 to ·1 mm. long.

Mycale tenuispiculata (Dendy).

pl. ii, fig. 14

Esperella tenuispiculata Dendy 1905, p. 161.

Diagnosis.—Sponge irregularly massive, with tendency to form rounded lobes or short, thick branches ; surface uneven ; texture soft ; oscules few, small, scattered ; colour, in spirit, grey to brown ; spicules tylostyli, small anisochelae and sigmata.

Dimensions of spicules :

subtylostyli (fig. 14 *a*), ·2 by ·004 mm.,
anisochelae (fig. 14 *b*), ·02 mm. chord,
sigmata (fig. 14 *c*), ·036 mm. chord.

Mycale mytilorum Annandale.

pl. ii, fig. 15.

M. mytilorum Annandale 1914, p. 152, pl., fig. 1, pl. xi, figs. 2-3.

Diagnosis.—Sponge encrusting; surface mainly smooth; texture soft; oscules inconspicuous; colour, in life, brick-red, in spirit, yellow; skeleton of subtylostyli, anisochelæ and sigmata.

Dimensions of spicules:

subtylostyli (fig. 15 *a*), ·2 by ·005 mm.,
anisochelae (fig. 15 *b*—*f*), up to ·02 mm. chord,
sigmata (fig. 15 *g*—*i*), ·04 mm. chord.

Mycale madraspatana Annandale.

pl. ii, fig. 12

M. madraspatana Annandale 1914, p. 154, pl. x, fig. 3, pl. xi, fig. 4.

Diagnosis.—Sponge encrusting; surface uneven; texture soft; oscules small, inconspicuous; colour, in life, brick-red, in spirit, yellow; skeleton of substylostyli, anisochelae, sigmata and toxa.

Dimensions of spicules:

subtylostyli (fig. 12 *a*), ·28 by ·005 mm.,
anisochelae (fig. 12 *b*—*d*), ·02 and ·048 mm. chord,
sigmata (fig. 12 *e*), ·08 mm. chord,
toxa (fig. 12 *f*), ·14 to ·35 mm. long.

Mycale gravelyi sp.n.

pl. ii, fig. 16

Holotype.—B.M. 31·11·28·178.

Diagnosis.—Sponge thinly encrusting, not more than 1 mm. thick; surface even, smooth; oscules and pores not apparent; texture friable; specimen readily detachable from substratum when preserved in spirit; colour, in spirit, white; tissues charged with an abundance of refringent granules, up to ·01 mm. diameter; subtylostyli, thickest in middle and tapering at one end to a point and to the other to end in an elongated oval head, ·51 by ·014 mm., anisochelae, larger, in rosettes, ·035 to ·045 mm., smaller, ·014 to ·024 mm.; sigmata, ·07 mm. chord.

Remarks.—The skeleton of this species presents no unusual feature and the species differs from other known species of *Mycale* in the small size of the anisochelae together with the absence of toxa and trichodragmata. In most species of this genus from the Indo-Pacific

the large anisochelae are considerably larger than those of the present species, and usually there are trichodragmata and toxa in addition to the sigmata. In some European species of the genus, the anisochelae correspond in size with those of *M. gravelyi* sp. n. but there are invariably either toxa or trichodragmata, or both, present.

Mycale sp.

There are three specimens of an encrusting *Mycale* from the Krusadai Islands, which seem referable to *M. mytilorum* (Annandale), but the manner in which they differ among themselves and from the holotype is worth noting. The spicules in the holotype are subtylostyli, ·18 to ·26 by ·004 to ·005 mm., anisochelæ, ·019 mm. chord, and sigmata, ·04 mm. chord. In the three specimens under discussion the measurements of these spicules and the frequency of occurrence vary to some extent. The megascleres are approximately the same in all three specimens and measure on an average ·32 by ·004 mm., and the same may be said of the sigmata, which measure ·045 to ·05 mm. chord. In the first specimen, on the other hand, the chelae measure ·011 mm., ·015 mm., and ·032 mm. chord, but whereas the smaller chelae are fairly abundant, the larger are more scarce and seldom found in rosettes. In the second specimen the chelae are very rare, only a few measuring ·011 mm. chord, were found. In the third specimen, the chelæ are more abundant than in either of the two preceding specimens and the larger of them are commonly found in rosettes.

Genus **Biemna** Gray.

Mycaleae with skeleton of styli forming a halichondrioid or isodictyal reticulation, or a system of ascending fibres, which branch and anastomose ; microscleres sigmata, raphides and trichodragmata, usually of more than one size each.

Biemna peachii var. **fistulosa** (Topsent).

pl. iii, fig. 18.

Desmacella peachii var. *fistulosa* Topsent 1897, p. 462, pl. xviii, fig. 11.

Diagnosis.—Sponge encrusting or irregularly massive, with oscular tubes in form of fistulae ; surface smooth ; texture soft and friable ; colour, in spirit, greyish white ; skeleton of styli, sigmata and microxea and trichodragmata, of 2 sizes.

Dimensions of spicules :

styli (fig. 18 *a*), ·3 by ·008 mm.,
sigmata (fig. 18 *b-c*), ·015 to ·06 mm. chord,
trichodragmata (fig. 18 *d-e*), ·033 and ·11 mm. long,
microxea (fig. 18 *f*), ·105 by ·003 mm.

Genus **Paresperella** Dendy.

Mycaleae with skeleton a reticulation of styli or subtylostyli ; microscleres anisochelae and serrated sigmata, to which toxa may be added.

Paresperella bidentata Dendy.

pl. ii, fig. 17.

P. bidentata Dendy 1905, p. 163, pl. xi, fig. 1.

Diagnosis.—Sponge massive ; surface uneven ; texture soft, friable ; oscules inconspicuous ; colour, in spirit, yellowish-brown ; skeleton composed of tylostyli, anisochelae and serrated sigmata.

Dimensions of spicules :

tylostyli (fig. 17 *a*), ·3 by ·005 mm.,
anisochelae (fig. 17 *d-e*), ·028 mm. chord,
sigmata (fig. 17 *b-c*), ·05 mm. chord.

Section Myxilleae.

Desmacidonidae characterized by the possession of tornota, which usually form a special dermal skeleton but may occasionally be confined to main skeleton ; microscleres isochelae of various kinds, to which sigmata may be added.

Genus **Lissodendoryx** Topsent.

Myxilleae with chelae arcuatæ and without echinating spicules ; main skeleton of styli or acanthostyli arranged in an isodictyal or, less commonly, a halichondrioid reticulation.

Lissodendoryx sinensis Brøndsted.

pl. iii, fig. 19.

L. sinensis Brøndsted 1929, p. 228, fig. 5.

Diagnosis.—Sponge branching, repent, with cylindrical branches ; surface uneven, minutely hispid ; texture soft, friable ; oscules small, scattered ; colour, in spirit, dark brownish-grey ; skeleton of smooth styli, tornota, isochelae of two sizes and sigmata of two sizes.

Dimensions of spicules :

styli (fig. 19 *a-b*), ·16 to ·2 by ·007 mm.,
tornota (fig. 19 *c*), ·16 to ·28 by ·007 mm.,
isochelae (fig. 19 *d-f*), ·012 and ·027 mm. chord,
sigmata (fig. 19 *g-h*), ·012 and ·035 mm. chord.

Genus **Tedania** Schmidt.

Myxilleae with skeleton a halichondrioid or sub-isodictyal reticulation of styli rarely acanthostyli, and with dermal tornota ; microscleres onychata.

Tedania nigrescens (Schmidt).

pl. iii fig. 22.

Reniera nigrescens Schmidt 1862 p. 74 ; *Tedania nigrescens* Burton and Rao 1932, p. 353. (For synonymy see Burton and Rao L.c.).

Diagnosis.—Sponge encrusting or massive with digitate processes or conspicuous oscular tubes ; surface smooth, verrucose or minutely papillate ; texture soft, friable ; oscules conspicuous, scattered ; colour, in life, yellow, orange or red, in spirit, yellow, olive-green, orange or red ; skeleton a halichondrioid reticulation of styli with onychata scattered in meshes and with dermal tornota.

Dimensions of spicules :
styli (fig. 22 *a*), ·22 by ·008 mm.,
tornota (fig. 22 *b*), ·2 by ·004 mm.,
onychata (fig. 22 *c*) ·15 to ·2 by ·001 mm.

Section CLATHRIEAE.

Desmacidonidae with auxiliary spicules slender subtylostyli, usually found chiefly in dermis ; microscleres typically isochelae palmatae and toxa.

Genus **Clathria** Schmidt.

Clathrieae with megascleres subtylostyli of varying sizes completely or incompletely differentiated into one or more sizes, the largest often being modified to styli, occasionally basally-spined, which can be distinguished according to position as coring, interstitial or dermal spicules ; with echinating spicules small styli or acanthostyli ; miscroscleres isochelae palmatae and toxa.

Clathria frondifera (Bowerbank).

pl. iii, fig. 21.

Halichondria frondifera Bowerbank 1875, p. 288 ; *Amphilectus frondifer* Vosmaer 1880, p. 115 ; *Clathria frondifera* Ridley 1884, p. 488, pl. xlii, fig. i, pl. liii, fig. J ; *C. reinwardti* var. *subcylindrica* Id. L. c., p. 446 ; *C. frondifera* Ridley and Dendy 1887, p. 149 ; *C. corallitincta* Dendy 1889, p. 85, pl. iv, fig. 8 ; *C. frondifera* Topsent 1892, p. 21 ; Lindgren 1897, p. 480 ; Id. 1898, p. 27 ; *Rhaphidophlus filifer* var. *spinifera* Id. L.c., p. 29, pl. xvii, fig. 7, pl. xix, fig. 18 ; *C. frondifera* Dendy 1905, p. 170 ; *C. frondifera* et var. *dichela* et *major* Hentschel 1912, pp. 360-361 ; *C. nuda* Id. L.c., p. 364, pl. xix, fig. 28 ; *C. corallitincta* Dendy 1916, p. 128 ; Id. 1922, p. 65 ; *Tenacia frondifera* Burton and Rao 1932, p. 337.

Diagnosis.—Sponge massive and clathrous, or composed of anastomosing lamellae bearing digitate or spinose processes ; surface smooth or irregularly tuberculate ; oscules not apparent ; texture firm, compressible ; colour, in life, " red-coral," in spirit, grey to yellow, dried, grey or yellow with traces of red ; skeleton a reticulation of fibres cored by styli and echinated by acanthostyli, with basally-spined subtylostyli of two sizes, larger interstitial, smaller dermal, with isochelae palmatae and toxa for microscleres.

Dimensions of spicules :
styli (fig. 21 *a*), ·19 to ·3 by ·01 to ·015 mm.,
interstitial subtylostyli (fig. 21 *b*), ·2 to ·4 by ·006 to ·01 mm.,
dermal subtylostyli, ·06 to ·2 by ·003 to ·008 mm.,
acanthostyli (fig. 21 *c*), ·013 to ·016 mm. chord,
chelae (fig. 21 *d*) ,·015 mm. chord,
toxa (fig. 21 *e*), up to ·2 mm. long.

Remarks.—The species has been fully discussed by Burton and Rao (I.c.) but following further examination of the material now included in this species I would suggest that *Rhaphidophlus ridleyi* Lindgren *R. seriatus* Thiele *R. erectus* Thiele and *R. topsenti* Thiele, which were formerly regarded as synonyms of this species may possibly be distinct, and are treated as such here.

Clathria procera (Ridley).

Rhaphidophlus procerus Ridley 1884, p. 451, pl. xxxix, fig. K, pl. xlii, fig. o ; *Echinonema gracilis* Id. L.c., p. 617, pl. liv, fig. 1 ; *Rhaphidophlus spiculosus* Dendy 1889, pl. iv, fig. 4 ; *Clathria spiculosa* et var. *ramosa* Id. 1905, p. 171 ; *C. spiculosa* et var. *ramosa* et *macilenta* Hentschel 1912, pp. 363-364 ; *C. spiculosa* Dendy 1916, p. 128 ; *C. procera* Dendy 1921, p. 64 ; *Tenacia procera* Burton and Rao 1932, p. 340.

Diagnosis.—Sponge irregularly or dichotomously branched ; surface slightly uneven ; texture soft, elastic ; vents small, scattered, or not apparent ; colour, in life, vermilion to purple, in spirit, yellow to reddish brown ; skeleton an irregular reticulation of stout spongin fibres cored by subtylostyli, with interstitial and dermal subtylostyli of different sizes ; microscleres isochelae palmatae and toxa.

Dimensions of spicules :
subtylostyli of fibres, ·22 to ·36 by ·013 mm.,
interstitial subtylostyli, ·28 by ·008 mm.,
dermal subtylostyli, ·18 to ·2 by ·006 mm.,
isochelae, ·009 to ·016 mm. chord.
toxa, ·045 to ·056 mm. long.

Clathria procera var. **tessellata** (Dendy).

Clathria spiculosa var. *tessellata* Dendy 1905, p. 171, pl. viii, fig. 2.

Remarks.—This variety differs from the typical form of the species in the following particulars :

(1) The external form is irregularly lamellate, the lamellae bearing digitate processes on the upper margins ;

(2) The surface is tessellated.

Clathria decumbens Ridley.

pl. iii, fig. 23.

C. decumbens Ridley 1884, p. 612, pl. liii, fig. K, pl. liv, fig. g ; Ridley and Dendy 1887, p. 148 ; *Wilsonella decumbens* Hallmann 1912, p. 239.

Diagnosis.—Sponge massive ; surface smooth, undulating ; oscules small, scattered ; texture firm, compressible ; colour, in spirit, brown ; skeleton a fairly regular reticulation of fibres cored by basally-spined styli, and echinated by acanthostyli ; basally-spined styli, of same dimensions as coring spicules, as well as subtylostyli, also found interstitially, in small numbers ; microscleres chelae, of two sizes ;

Dimensions of spicules :

basally-spined styli (fig. 23 *a*), ·16 by ·006 mm.,
acanthostyli (fig. 23 *b*), ·09 by ·008 mm.,
sybtylostyli, (fig. 23 *c*), ·16 by ·004 mm.,
chelae (fig. 23 *d-e*), ·021 to ·032 and ·011 mm. chord.

Genus **Colloclathria** Dendy.

Clathrieæ with skeleton of fibres cored by styli and echinated by acanthostyli ; with auxiliary subtylostyli of two sizes, smaller in dermal brushes, larger interstitial to main skeleton ; microscleres isochelae palmatae, toxa and colloscleres.

Colloclathria ramosa Dendy.

pl. iii, fig. 20.

C. ramosa Dendy 1922, p. 74, pl. vii, fig. 2, pl. xiv, fig. 4.

Diagnosis.—Sponge composed of cylindrical branches, repent ; surface uneven, minutely hispid ; oscules small, scattered ; texture tough, compressible ; colour, in spirit, light brown ; skeleton an irregular reticulation of fibre cored by styli and echinated by acanthostyli, with sparsely scattered dermai subtylostyli ; microscleres isochelae palmatae of two sizes, toxa and colloscleres (abnormal isochelae).

Dimensions of spicules :
styli (fig. 20 *a*), ·3 by ·019 mm.,
acanthostyli (fig. 20 *c-d*), ·07 by ·008 mm.,
dermal subtylostyli (fig. 20 *b*), ·4 by ·008 mm.,
isochelae palmatae (fig. 20 *f-h*), ·016 and ·004 mm. chord, respectively,
toxa (fig. 20 *e*), up to ·2 mm. long,
colloscleres (fig. 20 *i-l*), ·012 by ·004 mm.

Genus **Microciona** Bowerbank.

Clathrieae with skeleton of plumose columns of large styli or acanthostyli, with small echinating acanthostyli, these spicules in encrusting forms all echinating substratum ; with one size only of auxiliary subtylostyli ; microscleres isochelae palmatae and toxa.

Microciona atrasanguinea Bowerbank.

pl. iv, fig. 24.

M. atrasanguinea Bowerbank 1864, p. 188, pl. xxxiii, fig. 368, pl. xxxiv, fig. 369 ; Id. 1866, p. 138 ; Parfitt 1868, p. 14 ; Bowerbank 1874, p. 63, pl. xxiv, figs. 14-19 ; *Amphilectus atrasanguineus* Vosmaer 1880, p. 115 ; *Microciona atrasanguinea* Bowerbank 1882, p. 54 ; *Plumohalichondria atrasanguinea* Dendy 1922, p. 60, pl. xiii, fig. 1 ; Burton and Rao 1932, p. 344 ; Burton 1934, p. 37.

Diagnosis.—Sponge encrusting or massive and low-growing ; surface minutely papillate or tuberculate ; oscules small, scattered ; texture firm, compressible ; colour, in life, blood-red, in spirit, red of various shades ; skeleton of plumose columns of subtylostyli echinated by acanthostyli, with dermal subtylostyli, and toxa and isochelae palmatæ for microsceleres.

Dimensions of spicules :
main subtylostyli (fig. 24 *a*, *a*), ·35 to ·5 by ·012 to ·014 mm.,
acanthostyli (fig. 24 *a*, *b*), ·16 by ·007 mm.,
dermal subtylostyli (fig. 24 *a*, *c*), ·26 by ·004 mm.,
toxa (fig. 24 *a*, *d*), ·035 mm. long,
isochelae, ·007 mm. chord.

Microciona longitoxa (Hentschel).

pl. v, fig. 29.

Hymeraphia longitoxa Hentschel 1912, p. 381, pl. xx, fig. 39.

Diagnosis.—Sponge thinly encrusting ; surface even, minutely hispid ; oscules and pores not seen ; colour, in spirit, yellow ; skeleton of long styli set at right angles to substratum, echinated by acanthostyli ; dermal subtylostyli ; isochelae palmatae and toxa for microscleres.

Dimensions of spicules :
styli (fig. 29 *a-b*), ·6 to ·84 by ·002 to ·026 mm.,
(styli with roughened bases, intermediate between
styli and acanthostyli (fig. 29 *c*), ·24 to ·4 by ·013 to ·015 mm.)
acanthostyli (fig. 29 *d*), ·064 to ·08 by ·006 to ·007 mm.,
subtylostyli (fig. 29 *e*), ·43 to ·58 by ·004 to ·009 mm.,
toxa (fig. 29 *g-h*), ·4 to ·56 mm. long.
chelae (fig. 29 *f*), ·012 mm. chord.

Microciona toxifera (Hentschel).

pl. v, fig. 30.

Hymeraphia toxifera Hentschel 1912, p. 382, pl. xx, fig. 40.

Diagnosis.—Sponge thinly encrusting ; surface even, minutely hispid ; pores and oscules not seen ; colour, in spirit, pale violet or yellow ; skeleton of basally-spined tylostyli set at right angles to substratum, echinated by small acanthostyli, with dermal subtylostyli, and isochelae and two sizes of toxa for microscleres.

Dimensions of spicules :
basally-spined styli (fig. 30 *a*), ·2 to ·46 by ·01 mm.,
acanthostyli (fig. 30 *c*), ·1 to ·15 by ·005 mm.,
subtylostyli (fig. 30 *b*), ·14 to ·38 by ·003 to ·005 mm.,
isochelae (fig. 30 *e*), ·021 to ·023 mm. chord,
toxa (fig. 30 *d*), ·12 to ·15 and ·056 to ·08 mm. long respectively.

Genus **Echinodictyum** Ridley.

Clathrieae with irregularly reticulate skeleton of fibres of oxea or styli, or both, echinated by acanthostyli ; with auxiliary and dermal styli or subtylostyli ; but without microscleres.

Echinodictyum clathratum Dendy.

pl. iv, fig. 25.

E. clathratum Dendy 1905, p. 175, pl. xi, fig. 4.

Diagnosis.—Sponge a clathrous mass of thin, flattened trabeculæ ; surface even, conulose ; texture soft, tough, resilient ; oscules not seen ; colour, in spirit, pale greyish-yellow ; main skeleton an irregular reticulation of multispicular fibres cored by oxea and echinated by acanthostyli, with long styli scattered in meshes and dermal brushes of small slender styli.

Dimensions of spicules :

oxea, of main skeleton (fig. 25 *a-b*), ·25 by ·006 mm.,

long styli (fig. 25 *c*), 1·26 by ·012 mm.,

dermal styli (fig. 25 *d*), ·34 by ·002 mm.,

acanthostyli (fig. 25 *e*), ·1 by ·006 mm.

Section RASPELIEAE.

Desmacidonidae with skeleton ranging from a reticulation of fibre cored by long styli (or oxea or subtylostyli) and echinated by acanthostyli (rarely acanthoxea or acanthostrongyla), to an axial skeleton of long styli (or oxea or subtylostyli) with radial columns of similar spicules echinated by acanthostyli ; skeleton often of plumose columns or, in encrusting forms, of styli and acanthostyli echinating substratum ; echinating spicules often basally-smooth and curved in lower third ; auxiliary spicules slender subtylostyli or styli, usually in brushes surrounding outermost spicules of main skeleton ; microscleres usually absent, when present sigmata or thraustoxa.

Genus **Aulospongus** Norman.

Raspelieae with plumose columns of stout subtylostyli and basally-smooth acanthostyli, both curved in basal third ; without auxiliary subtylostyli or microscleres.

Aulospongus tubulatus (Bowerbank).

pl. iii, fig. 24.

Haliphysema tubulatus Bowerbank 1873, p. 29, pl. vii ; *Aulospongus tubulatus* Norman 1878, p. 267 ; Dendy 1889, p. 89, pl. v, fig. 11 ; Id, 1922, p. 61.

Diagnosis.—Sponge flabellate, globular or subglobular[1] ; surface uneven ; texure firm, friable ; oscules not apparent ; colour, in life, red or pinkish red, in spirit, yellow, dried, reddish-brown to yellow ; skeleton of ascending plumose columns of subtylostyli and basally-smooth acanthostyli, both curved sharply in the basal third.

Dimensions of spicules :

subtylostyli (fig. 24 *a*), ·38 by ·014 mm.,

acanthostyli (fig. 24 *b*), ·12 by ·004 mm.

[1] When the sponge is associated with a polychæte worm its shape is globular ; when free of the symbiont, it is flabellate.

Genus **Raspelia** Nardo.

Raspelieae with skeleton ranging from a reticulation of fibre cored by long styli (or oxea or subtylostyli) and echinated by acanthostyli (rarely acanthoxea), to an axial skeleton of long styli (or oxea or subtylostyli) with radial columns of similar spicules echinated by acanthostyli ; dermal spicules slender styli or subtylostyli in brushes, usually surrounding bases of long styli similar to those of main skeleton ; without microscleres.

Raspelia hornelli (Dendy).

pl. iv, fig. 27.

Raspailia hornelli Dendy 1905, p. 172, pl. xi, fig. 7.

Diagnosis.—Sponge erect, arborescent ; surface coarsely granular, minutely hispid, punctate ; texture tough, compressible ; oscules not seen ; colour, in spirit, dark brown ; skeleton a reticulation of horny fibres, cored by styli, oxea or strongyla, showing a well-marked axial condensation of fibres from which ascending fibres run to surface and end in surface brushes of one or more large stylı surrounded by numerous slender styli ; main skeleton echinated by acanthostyli.

Dimensions of spicules :

large styli (fig. 27 *a*), ·65 by ·018 mm.,
oxea (fig. 27 *d-g*), ·2 to ·46 by ·012 to ·014 mm.,
small styli (fig. 27 *b*), ·3 by ·002 mm., strongyla, ·2 by ·024 mm.,
acanthostyli (fig. 27 *c*), ·08 by ·008 mm.,

Genus **Rhabderemia** Topsent.

Raspelieae of encrusting habit with rhabdostyli echinating substratum ; microscleres sigmata, microstyli or thraustoxa.

Rhabderemia indica Dendy.

pl. v, fig. 28.

R. indica Dendy 1905, p. 180, pl. xii, fig. 10.

Diagnosis.—Sponge encrusting ; surface smooth, uneven, granular ; oscules small and scattered ; texture soft, friable ; colour, in spirit, dull grey ; skeleton of plumose columns of rhabdostyli, loosely connected by scattered or transverse spicules ; microscleres small acanthostyli and much contorted sigmata.

Dimensions of spicules :

rhabdostyli (fig. 28*a-c*), ·24 by ·006 mm.,
acanthostyli (fig. 28*d*), ·044 by ·002 mm.,
sigmata (fig. 28 *e*), ·012 mm. chord.

Genus **Endectyon** Topsent.

Raspelieae with skeleton a reticulation of stout styli echinated by acanthostrongyla ; with dermal tufts of long styli at ends of ascending fibres ; auxiliary subtylostyli in dermis ; without microscleres.

Endectyon thurstoni (Dendy).

pl. iv, fig. 26.

Raspailia thurstoni Dendy 1887, p. 161, pl. xii, fig. 1 ; *Hemectyon thurstoni* Burton and Rao 1932, p. 347.

Diagnosis.—Sponge erect, stipitate, dichotomously branched ; surface even, granular, porose ; texture hard and tough ; oscules not apparant ; colour, in life, red (?), in spirit, yellow, dried, yellowish-brown ; skeleton a dense reticulation of styli (fig. 26 *a*), varying from ·25 to ·35 by ·01 to ·014 mm., echinated by acanthostrongyla (fig. 26 *b*) (grapnel spicules), measuring ·15 mm. by ·01 mm.

Genus **Axinella** Schmidt.

Axinellidæ with skeleton composed of styli and oxea of more or less equal proportions ; skeleton consisting typically of a dense axial reticulation running longitudinally through centre of sponge and an extra-axial reticulation with primary fibres, composed largely of styli, running at right angles to axial skeleton, and secondary, or connective, fibres, composed mainly of oxea ; without special dermal skeleton.

The typical form of the skeleton is very commonly modified in the following ways : 1) all the spicules may be styli or all oxea ; 2) long styli or oxea may be found interstitially to the main skeleton ; 3) the axial reticulation may be absent ; 4) the extra-axial reticulation may be replaced by plumose columns.

Axinella lyrata (Esper)

pl. vii, fig. 41.

Spongia lyrata Esper 1806, pl. lxvii, figs. 1-2 ; *Raspaigella lyrata* Ehlers 1870, p. 23 ; *Auletta aurantiaca* Dendy 1889, p. 92, pl. v, fig. 13 ; *A. lyrata* Id. 1905, p. 194.

Diagnosis.—Sponge erect, stipitate, flabellate, as though formed by fusion of numerous vertical tubes ; oscules in series along upper margins of sponge ; surface minutely conulose and hispid ; texture tough, compressible and resilient ; colour, in spirit, yellowish-grey ; skeleton a sub-isodictyal reticulation of fibre cored by styli (fig. 41 *a*) and oxea (fig. 41 *b*), measuring ·4 by ·005 mm.

Axinella donnani (Bowerbank).

pl. vi, fig. 32.

Isodictya donnani Bowerbank 1873, p. 28, pl. vi, figs. 2-6 ; *Axinella donnani* Dendy 1889, p. 158, pl. xi, fig. 1 ; *Phakellia donnani* Dendy 1916, p. 119 ; Id. 1922, p. 116.

Diagnosis.—Sponge infundibular, flabello-digitate or flabellate (often proliferous) ; surface even, minutely hispid, with longitudinal grooves near upper margins and, often, stellate grooves in lower portions of body ; texture firm, compressible ; colour, alive, orange, in spirit, reddish-brown to yellow ; skeleton either isodictyal or composed of ascending plumose columns ; spicules oxea or styli, or mixture of both, often differentiated into categories of different lengths ; spicules ranging from ·2 to ·5 mm. long.

Axinella flabelliformis (Keller).

pl. vi, fig. 38.

Acanthella flabelliformis Keller 1889, p. 394, pl. xxiv, fig. 48 ; Dendy 1905, p. 193.

Diagnosis.—Sponge flabellate, stipitate ; surface beset with longitudinal ridges showing a tendency to break up into conuli, with deep grooves between ridges bearing numerous small scattered oscules ; texture tough, compressible, resilient ; colour, in life, blue-black, in spirit, deep violet or greyish-brown ; skeleton a sub-isodictyal reticulation of spongin fibres filled with oxea, sometimes plumosely arranged ; oxea measuring ·3 by ·006 mm.

Axinella carteri (Dendy).

pl. vi, fig. 37.

Acanthella carteri Dendy 1889, p. 93, pl. iv, fig. 6 ; *A. aurantiaca* Keller 1889, p. 396, pl. xxiv, fig. 47 ; *A. carteri* Dendy 1905, p. 193, pl. viii, fig. 6 ; *A. aurantiaca* Topsent 1906, p. 562 ; Row 1911, p. 356 ; *A. carteri* Dendy 1922, p. 119, pl. v, fig. 5.

Diagnosis.—Sponge proliferously sub-lamellar or branching ; surface covered with short stout spines or ridges ; pores and oscules not apparent ; texture tough, resilient ; colour, in life, orange-red, in spirit, yellow ; skeleton an irregular network of styli, mainly ·4 by ·021 mm., with a few slender styli, 1·2 by ·011 mm., and, rarely, oxea or strongyla as modifications of smaller styli.

Axinella ceylonensis Dendy.

pl. vi, fig. 35.

Phakellia ceylonensis Dendy 1905, p. 192, pl. viii, fig. 3, pl. xiii, fig. 5.

Diagnosis.—Sponge proliferously lamellar, stipitate ; surface finely conulose and minutely hispid ; pores and oscules not apparent ; texture tough and resilient ; colour, in spirit, greyish brown ; skeleton of plumose columns of styli and oxea running vertically to surface ; spicules, of two sizes, ·2 by ·008 and ·45 by ·005 mm.

Axinella bubarinoides Dendy.

pl. vi, fig. 33.

A. bubarinoides Dendy 1922, p. 114, pl. xvii, fig. 1.

Diagnosis.—Sponge small, cushion-shaped or irregularly massive; surface even, slightly hispid, marked by convergent grooves containing vents; texture firm, hardly compressible; colour, in spirit, light brownish-yellow; skeleton composed of plumose ascending columns of small styli, ·48 by ·034 mm. and strongly bent in the basal third, with long styli, 1·3 by ·25 mm., lying interstitially to columns.

Axinella conulosa Dendy.

pl. vi, fig. 34.

Phakellia conulosa Dendy 1922, p. 116, pl. vi, fig. 4, pl. xvii, fig. 2.

Diagnosis.—Sponge proliferously lameller, stipitate; surface conulose, conuli sometimes uniting to form longitudinal ridges; pores and oscules not distinguishable; texture tough, flexable, resilient; colour, in spirit, a light brown; skeleton of loosely plumose columns of styli running vertically to surface, without secondary connecting fibres; spicules styli, of two sizes, ·69 by ·03 mm. and 1·5 by ·02 mm.

Genus **Acanthella** Schmidt.

Axinellidae with skeleton of styli and vermiform strongyla (or oxea) typically differentiated into two parts, an axial skeleton of branching, multispicular fibres and an extra-axial skeleton of styli, with bases implanted in axial skeleton and apices directed towards, often projecting beyond, surface; skeleton often composed of a system of branching fibres in which strongyla and styli are indiscriminately mixed, with no distinction between axial and extra-axial skeletons; in encrusting forms, strongyla form a basal layer with styli rising erect from it; without special dermal skeleton.

Acanthella cavernosa Dendy.

pl. vi, fig. 36.

A. cavernosa Dendy 1922, p. 120, pl. vii, fig. 7, pl. xvii, fig. 3.

Diagnosis.—Sponge massive, sub-stipitate; surface coarsely aculeate, with glabrous parchment-like dermal membrane pierced here and there by large oscula leading into cavernous interior of sponge; texture compressible, resilient; colour, in spirit, yellowish grey, with pinkish tinge; skeleton of branching tree-like fibres composed of styli (fig. 36 *b*), up to ·88 mm. by ·011 mm. and sinuous strongyla (fig. 36 *a*), 1·3 by ·011 mm.

Acanthella elongata (Dendy).

pl. vii, fig. 42.

Auletta elongata Dendy 1905, p. 195, pl. xiii, fig. 7 ; *A. elongata* var. *fruticosa* Id. 1916, p. 119, pl. ii, fig. 17 ; *A. elongata* Id. 1922, p. 121.

Diagnosis.—Sponge erect, stipitate, tubular ; surface even, minutely hispid ; oscules at ends of tubes ; texture compressible, resilient ; colour, in spirit, yellowish-grey ; skeleton composed of stout, longitudinal fibres, with plumose columns running to surface ; spicules styli and oxea (fig. 42 *d-f*), ·8 by ·022 mm., and strongyla (fig. 42 *a-c*), 1·2 by ·022 mm.

Genus **Halichondria** Fleming.

Axinellidae with main skeleton a confused reticulation of oxea of variable size ; special dermal skeleton a confused, tangential reticulation of similar spicules.

Halichondria glabrata Keller.

pl. vi, fig. 43.

H. glabrata Keller 1891, p. 311, pl. xvi, fig. 9 ; Burton 1926, p. 75.

Diagnosis.—Sponge thinly encrusting, occasionally bearing well-marked ridges (i.e., folds) ; surface smooth, even ; oscules few, scattered, marked by sub-dermal grooves radiating from vent ; texture soft, friable ; colour, in spirit, light grey ; skeleton of oxea, ·4 to ·54 by ·008 mm.

Genus **Prostylissa** Topsent.

Axinellidae with main skeleton a reticulation of oxea, and a dermal tangential skeleton of similar spicules with which small styli are associated.

Prostylissa fœtida (Dendy).

pl. vii, fig. 45.

Hymeniacidon fœtida Dendy 1889, p. 87, pl. iv, fig. 5 ; *Amorphinopsis fœtida* Topsent 1897, p. 445 ; *Ciocalypta fœtida* Lindgren 1897, p. 483 ; Id. 1898, p. 31 ; *Axinella halichondrioides* Dendy 1905, p. 190, pl. xii, fig. 7 ; *Leucophloœus fœtidus* Id. l.c., p. 197 ; *Prostylissa siamensis* Topsent 1925, p. 208, figs. 1-2.

Diagnosis.—Sponge massive, slightly lobose ; surface smooth, reticulate ; oscules on summits of lobes ; texture soft, compressible ; colour, alive, grey, in spirit, white to blackish grey ; skeleton of large oxea (fig. 45 *a*), ·8 by ·02 mm., forming a loose, irregular reticulation internally and a tangential dermal reticulation, latter ornamented with small styli (fig. 45*b*), ·2 by ·007 mm.

Prostylissa oculata (Kieschnick).

pl. vii, fig. 39.

Suberites oculatus Kieschnick, 1896, p. 534 ; *Ciocalypta oculata* var. *maxima* Hentschel 1912, p. 428, pl. xxi, fig. 61.

Diagnosis.—Sponge encrusting or massive, with digitate processes ending blindly or with oscules at summits ; surface smooth ; texture soft, compressible ; colour, in spirit, whitish-grey ; skeleton of oxea (fig. 39 *a*), often rounded at one end (i.e. pseudoxea), ·8 mm. long and small styli (fig. 39 *b*), ·3 mm. long.

Prostylissa heterostyla (Hentschel).

pl. vii, fig. 40.

Ciocalypta heterostyla Hentschel, 1912, p. 424, pl. xiv, fig. 3, pl. xxi, fig. 58.

Diagnosis.—Sponge encrusting or massive, with digitate processes ; surface smooth ; oscules and pores not apparent ; texture soft, compressible ; colour, in spirit, white ; skeleton of styli of two sizes, ·5 by ·012 mm. and ·3 by ·005 mm.

Genus **Trachyopsis** Dendy.

Axinellidae with skeleton an irregular reticulation of oxea of variable size, with (often) a tendency for those spicules near surface to be arranged more or less at right angles to it ; without dermal skeleton.

Trachyopsis cavernosa (Topsent).

Halichondria cavernosa Topsent, 1897, p. 477, pl. xix, fig. 16.

Diagnosis.—Sponge encrusting or massive ; surface thrown into folds, minutely hispid ; pores and oscules not apparent ; texture firm but compressible ; colour, in spirit, yellow or brown ; skeleton a loose, irregular reticulation of oxea, 1·0 by ·017 mm.

Trachyopsis solida var. **rugosa** (Ridley and Dendy).

Halichondria solida var. *rugosa* Ridley and Dendy, 1887, p. 4.

Diagnosis.—Sponge massive, sessile ; surface roughened by minute prominences ; pores and oscules not apparent ; texture firm, slightly compressible ; colour, in spirit, yellow or dark brown ; skeleton a dense, irregular reticulation of oxea, 1·0 by ·038 mm.

Trachyopsis aplysinoides (Dendy).

Halichondria aplysinoides Dendy, 1922, p. 39, pl. iii, figs. 3-5, pl. xii, fig. 9.

Diagnosis.—Sponge massive or massively branching ; surface often faintly nodulated and ridged ; vents few and large, or numerous, small and scattered ; texture firm, slightly compressible ; colour, in spirit, dark brown externally, lighter brown internally ; skeleton a lax reticulation of single spicules, with a tendency to form loose fibres running to surface ; spicules oxea, up to 1·0 by ·03 mm.

Genus **Liosina** Thiele.

Axinellidae with skeleton of long oxea, mainly modified to strongyla (or pseudoxea), scattered in a loose reticulation with only a slight tendency to formation of fibres.

Liosina paradoxa Thiele.

pl. viii, fig. 46.

L. paradoxa Thiele, 1899, p. 17, pl. ii, fig. 5, pl. iv, fig. 4, pl. v, fig. 9.

Diagnosis.—Sponge massive; surface uneven, raised into a series of rounded prominences ; oscules and pores not apparent ; texture soft, friable ; colour, in spirit, greyish-brown ; skeleton of oxea or strongyla, ·6 to ·9 by ·02 mm.

Genus **Myrmekioderma** Ehlers.

Axinellidae with skeleton a confused reticulation of oxea and acanthoxea.

Myrmekioderma granulatum (Esper).

pl. vii, fig. 42.

Alcyonium granulatum Esper, 1830, p. 71, pl. xxiv ; *Myrmekioderma granulatum* Ehlers, 1870, p. 28 ; *Acanthoxifer ceylonensis* Dendy, 1905, p. 157, pl. ix, fig. 5.

Diagnosis.—Sponge massive or encrusting ; surface minutely hispid or granular, uneven, nodular or tubercular ; nodules or tubercles usually low, rounded or polygonal, and separated by grooves which may be broad or shallow, or narrow with prominent margins ; texture compact, flesh with much incorporated foreign debris ; pores and oscules not apparent ; colour, in spirit, light brown ; spicules, oxea sometimes styli (fig. 42 *b*), ·17 by ·012 mm., acanthoxea (fig. 42 *c*), ·4 by ·008 mm., and trichodragmata (fig. 42 *d*), ·016 by ·004 mm.

Order KERATOSA.

Porifera with skeleton of horny fibres only, often reinforced by the inclusion of sand or foreign spicules.

Suborder DENDROCERATIDA.

Keratosa with skeleton a network of fibres.

Genus **Spongia** Linnaeus.

Keratosa with skeleton a close-meshed reticulation of ascending fibres, containing foreign bodies, connected by a polygonal-meshed network of more slender fibres without foreign bodies.

Spongia officinalis var. **ceylonensis** Dendy.

Euspongia officinalis var. *ceylonensis* Dendy, 1905, p. 211, pl. xiv, fig. 3, pl. xvi, fig. 5.

Diagnosis.—Sponge massive, ranging from sub-globular to sub-pyriform, with flattened summit bearing several conspicuous oscules ; surface minutely conulose ; texture firm, compressible, elastic ; colour, living, deep purple becoming yellow on lower parts (colour little changed on preservation) ; skeleton composed of ascending fibres, filled with broken sponge-spicules, ·4 mm. diameter, connected by a polygonal-meshed network of secondary fibres, free of foreign matter ; diameter of meshes variable, ·17 mm. across on an average, fibres ·02 mm. diameter.

Genus **Hircinia** Nardo.

Keratosa with skeleton differentiated into ascending, usually fasciated, systems of fibres often filled with foreign inclusions, connected by an irregular secondary network of more slender fibres ; interstices of skeleton filled to a varying extent with " filaments."

Hircinia fusca Carter.

H. fusca Carter, 1880, p. 36 ; Dendy, 1905, p. 219, pl. xiv, fig. 1.

Diagnosis.—Sponge massive, digitate or lobately branched ; surface conulose ; vents small ; texture tough, compressible, resilient ; colour, in spirit, brown ; ascending fibres of skeleton composed of foreign inclusions held together by slender spongin threads, secondary network of foreign inclusions in linear series cemented together by spongin threads ; thin layer of foreign bodies in ectosome.

Hircinia ramosa Keller.

H. ramosa Keller, 1889, p. 345, pl. xx, fig. 5 ; *H. schulzei* Dendy, 1905, p. 221, pl. xvi, fig. 3 ; *H. ramosa* Row, 1911, p. 372 ; Burton, 1934, p. 579, pl. i, fig. 11, text-fig. 16.

Diagnosis.—Sponge irregularly branched, branches cylindrical, slender, attached at many points to calcareous debris ; surface conulose, marked by subdermal canals ; oscules single or in sieves in membrane covering subdermal canals ; texture stiff, compressible, resilient ; colour, in spirit, yellow ; skeleton of ascending non-fasciated fibres, widely placed, connected at irregular intervals by a round-meshed lattice work of secondary connecting fibres ; main fibres, usually containing broken sponge-spicules, ·12 mm. in diameter, secondary fibres, variable in diameter, up to ·1 mm.

Hircinia aruensis Hentschel.

H. aruensis Hentschel, 1912, p. 445, pl. xvi, fig. 6 ; Burton, 1933, p. 242 ; 1934, p. 580.

Diagnosis.—Sponge encrusting or massive ; surface conulose ; oscules small, scattered ; texture tough, compressible, resilient ; colour, in spirit, yellow or purple-brown ; skeleton with ascending fibres non-fasciated or only sub-fasciated, secondary connecting fibres

comparatively few and of same size as ascending fibres ; whole skeleton filled with foreign inclusions (sand or sponge-spicules) ; fibres ·075 to ·13 mm. thick, meshes of skeleton 1·5 mm. across.

Genus **Dysidea** Johnston.

Keratosa with skeleton composed of stout ascending fibres connected by a secondary reticulation of irregular mesh formed of more slender fibres, whole skeleton obscured to a greater or lesser extent by the inclusion of foreign bodies ; without special dermal skeleton or ectosomal layer of foreign bodies.

Dysidea fragilis (Montagu).

Spongia fragilis Montagu 1818, p. 114, pl. xvi, figs. 1-2 ; *Dysidea fragilis* Burton 1934, p. 583, pl. ii, figs. 2-11, text-figs. 18-33.

Diagnosis.—Sponge encrusting, massive, lobose or sub-flabellate ; surface conulose ; oscules small, scattered, rarely in linear series ; texture firm, compressible, elastic ; colour, in spirit, white, grey, yellow or brown ; skeleton in its elementary form of stout ascending fibres connected by a secondary network of polygonal mesh, by inclusion of foreign bodies skeleton may be entirely obscured.

Genus **Luffariospongia** gen. n.

Genotype.—Hircinia clathrata Carter 1881, p. 366.

Diagnosis.—Keratosa with skeleton composed of an irregular network of polygonal mesh, with no distinction into ascending or connective fibres, but with fibres of variable thickness ; foreign inclusions usually absent, at most only sparingly present ; without special dermal or ectosomal layer of foreign inclusions.

Luffariospongia clathrata (Carter).

Hircinia clathrata Carter 1881, p. 366 ; Dendy 1887, p. 163 ; Id. 1889, p. 96 ; *Hippospongia clathrata* Dendy 1905 p. 215, pl. xiv, fig. 2.

Diagnosis.—Sponge massive or massively branching ; surface even, minutely conulose ; body consisting of tubular processes with walls punctured by large, irregular openings covered in life with thin tympani of ectosome ; oscules confined to ectosomal tympani ; texture firm, compressible, elastic ; colour, in life, purple or reddish-brown, in spirit, brown ; skeleton fibre varying from ·04 to ·07 mm. diameter and meshes from ·04 to ·4 mm. diameter.

Genus **Aplysinopsis** Lendenfeld.

Keratosa with skeleton a rectangular reticulation of medullated fibres ; ascending fibres with foreign inclusions, connecting fibres free of inclusions ; without special dermal skeleton.

Aplysinopsis reticulata Hentschel.

A. reticulata. Hentschel 1912, p. 437, pl. xv, fig. 1, pl. xvi, fig. 9.

Diagnosis.—Sponge massive, lobo-digitate ; surface conulose and marked with ridges connecting apices of conuli ; oscules large, usually at summits of lobes ; texture firm, compressible, resilient ; colour, in spirit, yellow, grey or black ; ascending fibres, ·15 to ·22 mm. thick, with an axial core of broken sponge-spicules, connecting fibres irregularly-placed, ·025 to ·13 mm. thick ; meshes of skeleton ·2 to ·5 mm. across ; thin ectosomal layer of foreign inclusions.

Genus **Spongionella** Bowerbank.

Keratosa with main skeleton regularly reticulate, with large meshes, composed of fibres showing a distinct lamellation ; without special dermal skeleton or foreign inclusions in fibres.

Spongionella nigra Dendy.

S. nigra Dendy 1889, p. 94 ; *Megalopastas nigra* Id. 1905, p. 205, pl. xiv, fig. 7, pl. xv, figs. 5-8.

Diagnosis.—Sponge composed of vertical lamellæ springing from a basal plate ; surface even, granulated ; oscules in groups, abundantly scattered on one surface of each lamella ; texture tough, very compressible and resilient ; colour, alive and in spirit, black ; ascending fibres ·05 mm. diameter, connecting fibres ·025 mm. diameter ; meshes of skeleton ·07 to ·15 mm. across, often subdivided by irregular tertiary fibres.

Spongionella pulvilla (Dendy).

Megalopastas pulvillus Dendy 1905, p. 206, pl. xv. fig. 3.

Diagnosis.—Sponge cushion-shaped, flattened dorso-ventrally ; surface even, granulated ; oscules small, compound, scattered ; texture firm, compressible, resilient ; colour, in spirit, yellowish-grey ; ascending fibres ·1 mm. diameter, connecting fibres ·04 mm. diameter ; connecting fibres irregularly-disposed with regard to ascending fibres, sometimes regularly transverse, often set at a varying angle.

Spongionella tubulosa sp. n.

(pl. ix, fig. 58).

Holotype.—B.M. 31. 11. 28. 13.

Diagnosis.—Sponge composed of a mass of tubes arising from a common base, each tube up to 10 mm. high and 5 mm. in diameter ; surface minutely tuberculate ; texture soft, compressible ; colour, in spirit, yellow ; skeleton a regular isodictyal network of pale-coloured spongin fibres, ascending fibres ·03 mm. diameter, conjunctive fibres ·015 mm. in diameter ; meshes of skeleton up to ·16 mm. across.

Genus **Duriella** Row.

Keratosa with skeleton composed of an irregular network of fibres filled with foreign inclusions, showing no differentiation into ascending or connecting fibres ; at certain points, notably in surface conuli, trellis-like plexuses of fibre are developed ; dermal tangential skeleton of fibres filled with foreign bodies.

Duriella nigra Row.

D. nigra Row 1911, p. 370, pl. xli, fig. 29.

Diagnosis.—Sponge massive, with erect digitate processes ; surface minutely conulose, conuli connected by a series of radiating ridges ; oscules numerous, irregularly-scattered ; texture tough, compressible, resilient ; colour, in spirit, black ; skeleton a loose, irregular network of fibres, ranging from ·03 to ·3 mm. diameter, usually forming a plexus of fibres at each junction and in the surface conuli ; meshes 2 to 3 mm. across ; dermal reticulation composed of fibres radiating from apices of conuli.

Suborder DENDROCERATINA

Keratosa with dendritic skeleton of pithed fibres, to which horny spicules may be added ; usually entirely without foreign inclusions or special dermal skeleton.

Genus **Dendrilla** Lendenfeld

Dendroceratina with dendritic skeleton but without horny spicules.

Dendrilla membranosa (Pallas).

Spongia membranosa Pallas, 1766, p. 398 ; *Dendrilla membranosa* Burton, 1934, p. 595.

Diagnosis.—Sponge massive or, more typically lobo-digitate ; surface smooth, with well-developed spinose conuli set well apart ; oscules small, scattered ; texture soft, compressible, resilient ; colour, alive and in spirit, yellow to red or purple ; skeleton a tree-like system of stout fibres.

Genus **Hexadella** Topsent

Dendroceratina without skeleton.

Remarks.—The absence of a skeleton makes for doubt as to the correct position for this genus in any scheme of classification, but the anatomical characters and texture of its representatives are so like those of the members of the genus *Dendrilla* as to leave little doubt that the various species of *Hexadella* are reduced Dendroceratina.

Hexadella purpurea sp.n.

Psammopemma purpureum Kirkpatrick, 1900, p. 358 ; nec *Aplysina purpurea* Carter.

Diagnosis.—Sponge thinly encrusting, agglutinating calcareous and other debris ; surface smooth, even ; oscules not apparent ; texture tough ; colour, alive and in spirit, purple.

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APPENDIX.

List of localities and records of colour in life.

Two collections of sponges have been dealt with in the above descriptions, one from the Madras Museum and one from the Madras Fisheries Department. As the latter included a number of specimens not collected in the Gulf of Manaar it is important that all localities should be recorded. When colour notes recorded from the living sponge are recorded on the lables they have been noted in the list.

Species dealt with by Mr. Burton in the report but not represented in the Museum collection have been marked with an asterisk (*). A few species in the Krusadai collection have not been recorded in the report. These are marked with a single dagger (†).

Name.	Locality and colour.
Leucosolenia coriacea †	Krusadai Island.
Stelletta purpurea Ridley	Pamban Bridge and Shingle Island.
Ecionemia bacillifera (Carter)	Kilakarai, Krusadai Island, Pamban Bridge (bright yellow) and Shingle Island (lemon yellow).
Geodia areolata Carter	Off Pondicherry (dull white and brown) and off Madras (brick red).
G. picteti (Topsent)	Krusadai Island.
Chondrilla australiensis Carter	Shingle Island (whitish shading to dull brownish or dull purplish).
Chondrosia reniformis Nardo	Shingle Island and Pamban Bridge (grey shading to whitish).
Lophocanthus rhabdophorus Hentschel ...	Pulli Reef, and Krusadai Island (dull pink).
Chrotella australiensis (Carter)	Krusadai Island (yellowish) and Shingle Island (ochraceous becoming greenish at surface).
Tethya repens Schmidt	Krusadai Island.
T. diploderma Schmidt	Shingle Island (ochraceous).
T. robusta (Bowerbank)	Pamban Bridge (thick surface layer white, rest ochraceous) and Kilakarai.
T. japonica Sollas	Shingle Island.
Aaptos aaptos (Schmidt) *	.....
Pseudosuberites andrewesi Kirkpatrick ...	Krusadai Island (dull yellow) and Shingle Island.
Laxosuberites cruciatus (Dendy) ...	Pulli Reef and S. Lagoon, Krusadai Island.
L. lacustris Annandale *	.....
Spirastrella inconstans (Dendy) * ...	.....
S. purpurea (Lamarck) †	Off Negapatam (mud colour), between Pamban and Kutikal (brown), Krusadai Island (orange), Shingle Island (dull apricot, greenish brown, whitish), Rameswaram and Pamban Bridge.
Terpios fugax Duchassing and Michelotti.	Shingle Island and Pamban Bridge (black).

Name.	Locality and colour.
Timea stelletta (Bowerbank)	Pulli Reef, Krusadai Island (red).
Cliona lobata Hancock	Pamban Bridge (bright red in life) and Pamban.
Placospongia carinata (Bowerbank) ...	Pamban Bridge (dull yellow).
Haliclona madrepora (Dendy)	Shingle Island (black).
H. obtusispiculifera (Dendy) *	.....
H. exigua (Kirkpatrick)	Rameswaram, Krusadai Island, Pulli Reef (red surface, white body), S. Lagoon, Krusadai Island.
H. tenuiramosa (Burton)	Rameswaram and Shingle Island.
H. camerata (Ridley)	Pulli Reef, Krusadai Island.
Hemihaliclona viridis (Duchassing and Michelotti).	S. Lagoon, Krusadai Island and Shingle Island (pale blue).
Adocia pigmentifera (Dendy) *	.....
A. semifibrosa (Dendy)	Shingle Island.
A. carnosa (Dendy)	Tuticorin Pearl Bank (dirty yellow with bright brownish tint).
A. pumila (Lendenfeld)	Shingle Island (dull grey, apparently full of mud).
Callyspongia diffusa (Ridley)	Between Pamban and Kutikal.
C. fibrosa (Ridley and Dendy)	Between Pamban and Kutikal.
C. spinosissima (Dendy)	Krusadai Island, Shingle Island (pale greyish), between Pamban and Kutikal (pale blue grey).
C. fistularis (Topsent)	Pulli Reef, Krusadai Island and between Pamban and Kutikal (pale violet).
Petrosia testudinaria (Lamarck)	Off Negapatam (very light violet).
Oceanapia media (Thiele)	Pulli Reef and S. Lagoon, Krusadai Island.
Mycale grandis Gray	Pamban Bridge, Shingle Island (dull ochre) S. Lagoon, Krusadai Island.
M. tenuispiculata (Dendy)	Shingle Island.
M. mytilorum Annandale *	.....
Mycale madraspatanam Annandale ...	Pulli Reef and Krusadai Island.
M. gravelyi n.sp.*	.....
M. plumosa Carter †	Pamban Bridge.
Biemna peachii var. *fistulosa* (Topsent) ...	Shingle Island.
Parasperella bidentata Dendy	S. Lagoon, Krusadai Island.
Lissodendoryx sinensis Brondsted ...	Krusadai Island.
Tedania nigrescens (Schmidt) *	.....
T. digitata Schmidt †	Between Pamban and Kutikal (red), Kutikal and Krusadai Island.
Clathria frondifera (Bowerbank) ...	Off Negapatam (salmon pink), between Pamban and Kutikal and Krusadai Island.
C. procera (Ridley)	Shingle Island ; between Pamban and Kutikal.
C. p. var. *tessellata* (Dendy) *	.....

Name.	Locality and colour.
C. decumbens Ridley	Pulli Reef and Krusadai Island.
Colloclathria ramosa Dendy *	.....
Microciona atrasanguinea Bowerbank ...	S. Lagoon, Krusadai Island (dull orange) and Pamban Bridge.
M. longitoxa (Hentschel) *	.....
M. toxifera (Hentschel) *	.....
Echinodictyum clathratum Dendy ...	Pamban Bridge.
Aulospongus tubulatus (Bowerbank) ...	Off Negapatam (brick red), Tuticorin (orange red) and Rameswaram.
Raspelia hornelli (Dendy) *	.....
Rhabderemia indica Dendy	Off Negapatam (light yellow).
Endectyon thurstoni (Dendy)	Rameswaram.
Axinella lyrata (Esper)	Off Negapatam (dirty brown).
A. donnani (Bowerbank)	Off Madras (brown).
A. flabelliformis (Keller) *	.....
A. carteri (Dendy)	Tuticorin Pearl Bank (orange).
A. ceylonensis Dendy *	.....
A. bubarinoides Dendy	Off Negapatam (dirty white).
A. conulosa Dendy *	.....
Acanthella cavernosa Dendy	Off Madras (light yellow).
A. elongata (Dendy)§	Off Madras (dirty white).
Halichondria glabrata Keller	Shingle Island ; Sandy Pt., Krusadai Island.
Prostylissa foetida (Dendy)	Pamban Bridge.
P. oculata (Kieschnick) *	.....
P. heterostyla (Hentschel)	Shingle Island.
Trachyopsis cavernosa (Topsent) * ...	.....
T. solida var. *rugosa* (Ridley and Dendy) *	.....
T. aplysinoides (Dendy) *	.....
Liosina paradoxa Thiele	Pulli Reef, Krusadai Island and Shingle Island.
Myrmekioderma granulatum (Esper) ...	Tuticorin Pearl Bank (bright yellow).
Spongia clathrata (Carter) †	Rameswaram.
Spongia officinalis var. *ceylonensis* Dendy.	Pamban Bridge (brownish, dirty whitish), Pulli Reef, Krusadai Island (black) and Rameswaram.
Hircinia fusca Carter *	.....
H. ramosa Keller	Pamban Bridge and Rameswaram (dull bluish brown shading to whitish).
H. aruensis Hentschel *	.....
Dysidea fragilis (Montagu)	S. Lagoon, Krusadai Island.
Luffariospongia clathrata (Carter) ...	Tuticorin Pearl Bank (light green with yellow shades) and Krusadai Island.
Aplysinopsis reticulata Hentschel * ...	.....

Name.	Locality and colour.
Spongionella nigra Dendy *	.....
S. pulvilla (Dendy)	Off Madras (reddish).
S. tubulosa n.sp.*	.....
Duriella nigra Row	Kutikal (red).
Dendrilla membranosa (Pallas)	Off Madras (black).
Hexadella purpurea n.sp.	Krusadai Island (yellowish shading to greenish) and Shingle Island.
Phloeodictyon sp.†	Pamban Bridge (white), and Pulli Reef, Krusadai Island.
Sideroderma navicelligerum (Carter) † ...	S. Lagoon Krusadai, Island.

PLATE I.

Figure 1. *Stelletta purpurea* Ridley. *a.* Oxeote, × 30 ; *b.* orthotriaene, × 30 ; *c.* anatriaene, × 30 ; *d.* tylaster, × 500.

,, 2. *Ecionemia carteri* Dendy. *a.* Protriaene, × 45 ; *b.* anatriaene, × 45 ; *c.* orthotriaene, × 45 ; *d.* tylaster, × 500 ; *e.* microrhabd, × 500.

,, 3. *Geodia areolata* Carter. *a.* Orthotriaene, × 40 ; *b.* anatriaene, × 40 ; *c.* protriaene, × 40 ; *d.* sterraster, × 300 ; *e.* tylaster, × 500 ; *f.* oxyaster, × 500.

,, 4. *Chondrilla australiensis* Carter. *a.* Spheraster, × 300 ; *b.* oxyaster, × 300.

,, 5. *Haliclona obtusispiculifera* (Dendy). Strongyle, × 400.

,, 6. *Haliclona madrepora* (Dendy). Oxeote, × 300.

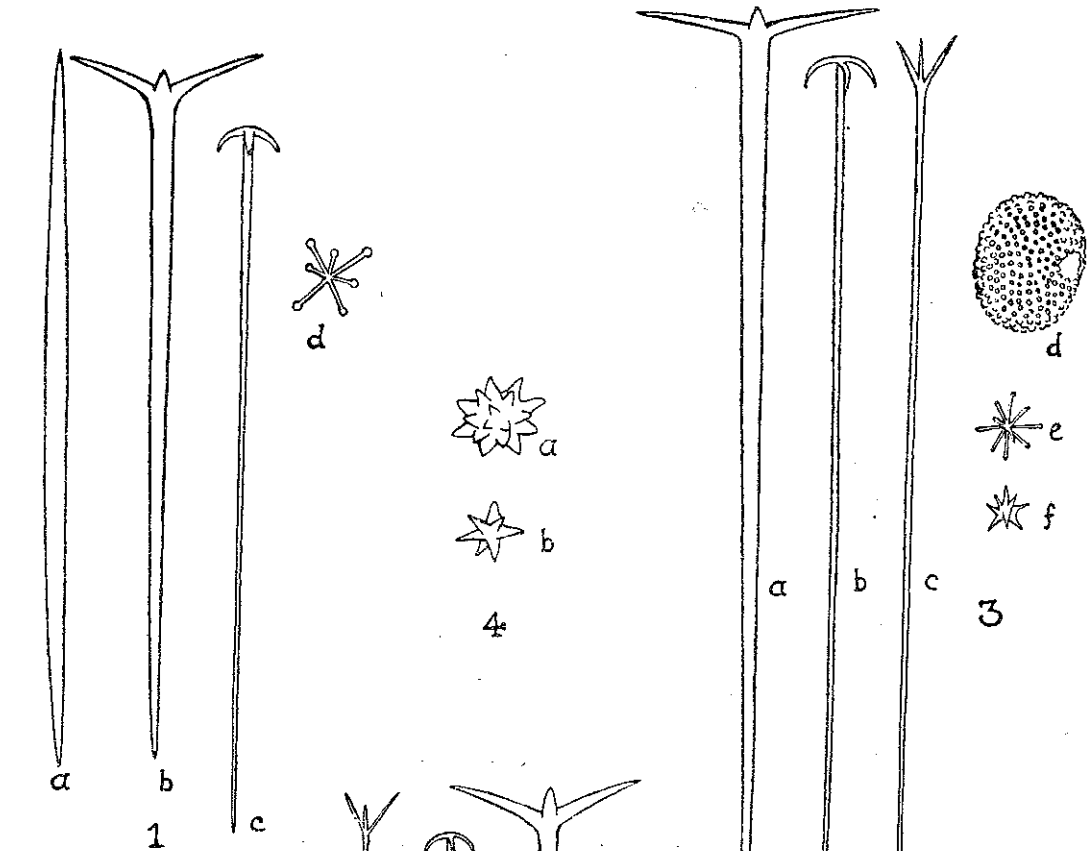
,, 7. *Hemihaliclona viridis* (Duchassaing and Michelotti). Oxeote, × 400.

,, 8. *Adocia pigmentifera* (Dendy). Oxeote, × 400.

,, 9. *Oceanapia media* (Thiele). Oxeote, × 120.

,, 10. *Petrosia testudinaria* (Lamarck). Oxeote and strongyle, × 150.

,, 11. *Adocia carnosa* (Dendy). Oxeote and sigma, × 400.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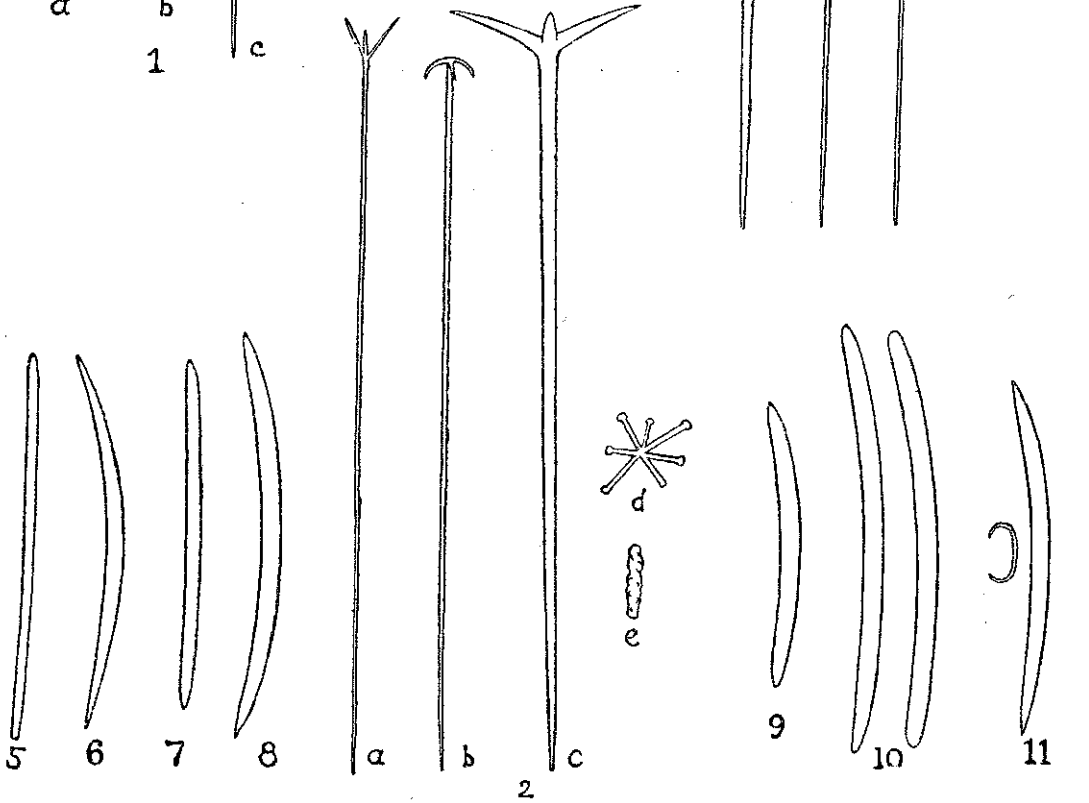
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PLATE II.

Figure 12. *Mycale madraspatana* Annandale. *a.* Subtylostyle, × 300; *b.* large anisochela, × 600; *c-d.* small anisochela, × 600; *e.* sigma, × 300; *f.* toxon, × 100.

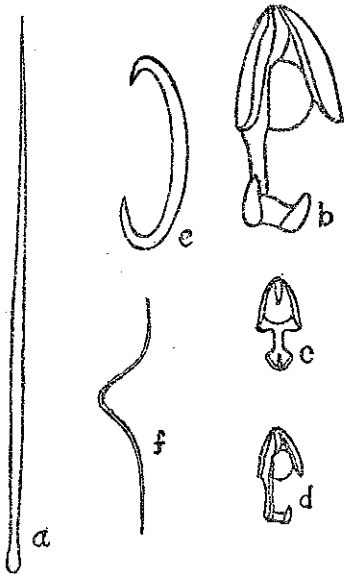
„ 13. *Mycale grandis* Gray. *a.* Subtylostyle, × 100; *b-c.* large anisochelæ, × 300; *d.* medium-sized anisochela, × 300; *e.* small anisochela, × 300; *f.* large and small sigmata, × 300; *g-h.* raphides, × 150.

„ 14. *Mycale tenuispiculata* (Dendy). *a.* Subtylostyle, × 300; *b.* anisochela, × 300; *c.* sigma, × 300.

„ 15. *Mycale mytilorum* Annandale. *a.* Subtylostyle, × 350; *b.* anisochelae much enlarged, × 1,500; *c-f.* anisochelae, × 600; *g-i.* sigmata, × 300.

„ 16. *Mycale gravelyi* sp. n. *a.* Subtylostyle, × 180; *b-c.* anisochelae, × 500; *d-e.* sigmata, × 500.

„ 17. *Paresperella bidentata* Dendy. *a.* Tylostyle, × 500; *b-c.* serrated sigmata, × 500; *d-e.* anisochelae, × 500.



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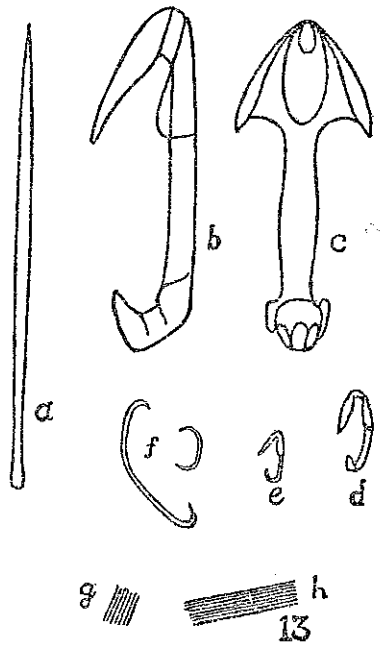

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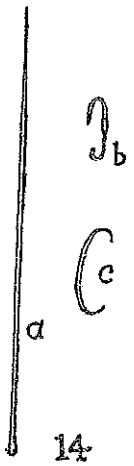

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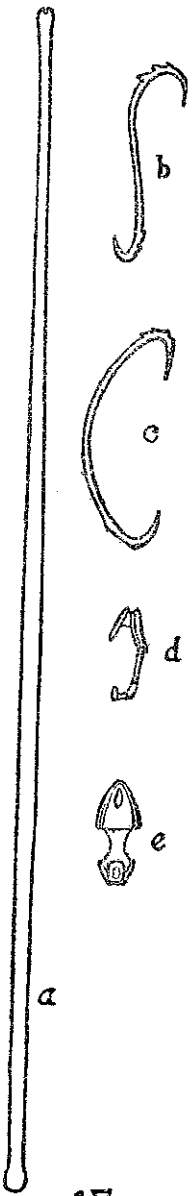

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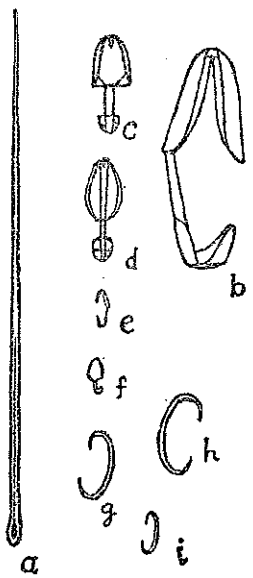

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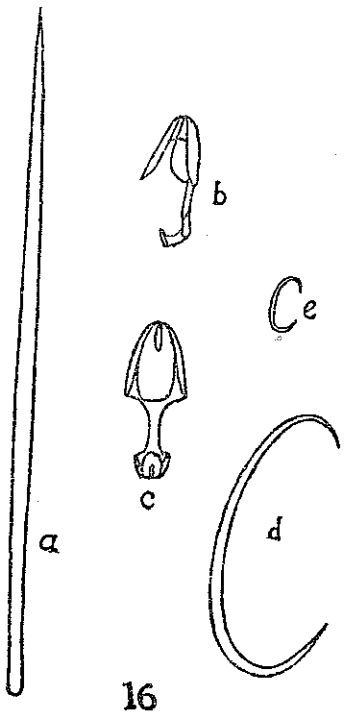

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PLATE III.

Figure 18. *Biemna peachii* var. *fistulosa* (Topsent). *a.* Style, × 300 ; *b-c.* sigmata, × 300 ; *d-e.* trichodragmata, × 150 ; *f.* microxeote, × 150.

„ 19. *Lissodendoryx sinensis* Brondsted. *a-b.* Styli, × 250 ; *c.* tornote (the upper end is incorrectly drawn, it should be the same as the lower end), × 250 ; *d-f.* isochelae, × 300 ; *g-h.* sigmata, × 300.

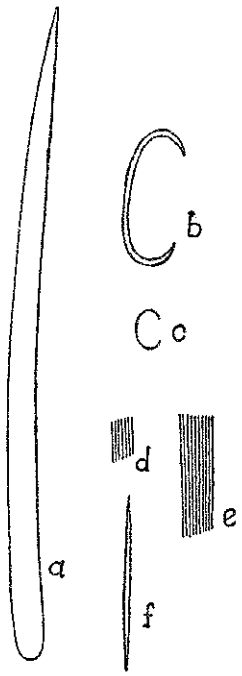
„ 20. *Colloclathria ramosa* Dendy. *a.* Style × 300 ; *b.* subtylostyle, × 300 ; *c-d.* acanthostyli, × 600 ; *e.* toxa, × 1,000 ; *f-h.* isochelae, × 1,000 ; *i-l.* colloscleres, × 1,000.

„ 21. *Clathria frondifera* (Bowerbank). *a.* Style, × 200 ; *b.* subtylostyle, × 200 ; *c.* acanthostyle, × 200 ; *d.* isochela, × 200 ; *e.* toxon, × 200.

„ 22. *Tedania nigrescens* (Schmidt). *a.* Style, × 300 ; *b.* tornote, × 300 ; *c.* onychata, × 300.

„ 23. *Clathria decumbens* Ridley. *a.* Style, × 300 ; *b.* acanthostyle, × 300 ; *c.* subtylostyle, × 300 ; *d-e.* isochelae, × 200.

„ 24. *Aulospongus tubulatus* (Bowerbank). *a.* Style, × 150 ; *b.* acanthostyle, × 150.



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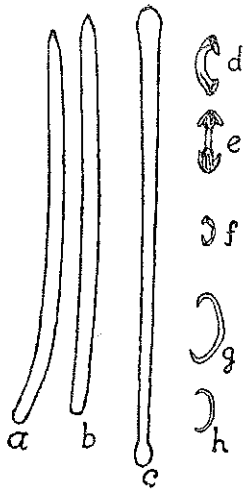

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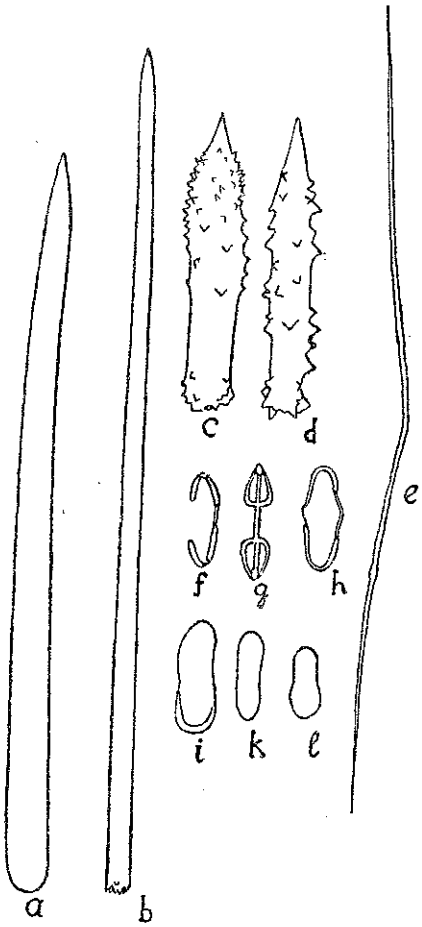

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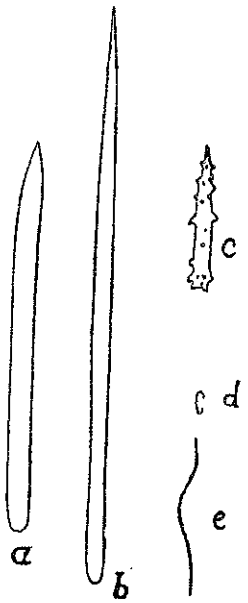

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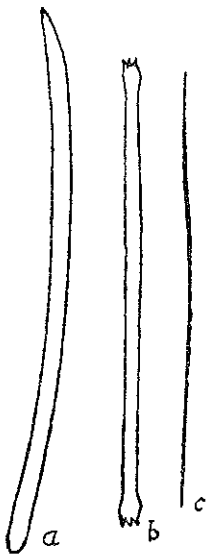

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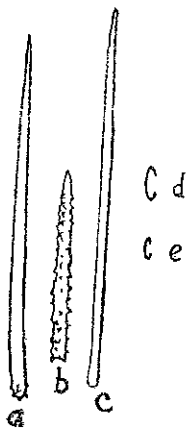

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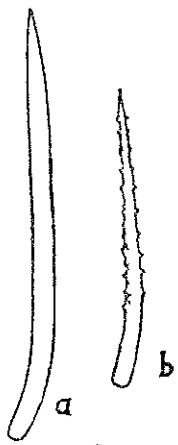

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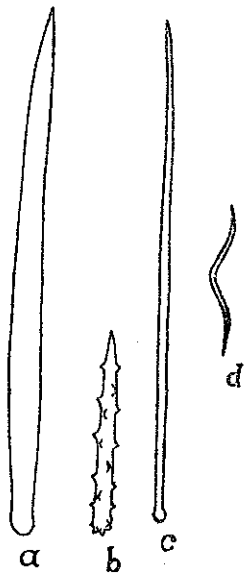
PLATE IV.

Figure 24*a*. *Microciona atrasanguinea* Bowerbank. *a*. Subtylostyle, × 150 ; *b*. acanthostyli, × 150 ; *c*. subtylostyli, × 100 ; *d*. toxon, × 600.

,, 25. *Echinodictyum clathratum* Dendy. *a-b*. Oxeote ; *c*. long styli ; *d*. dermal styli ; *e*. acanthostyli ; all × 230.

,, 26. *Endectyon thurstoni* (Dendy). *a*. Styli ; *b*. acanthostrongyla ; all × 300.

,, 27. *Raspelia hornelli* (Dendy). *a*. Large styli ; *b*. dermal styli ; *c*. acanthostyli ; *d-g*. oxea ; all × 230.



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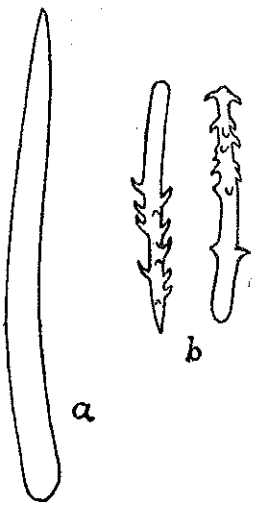

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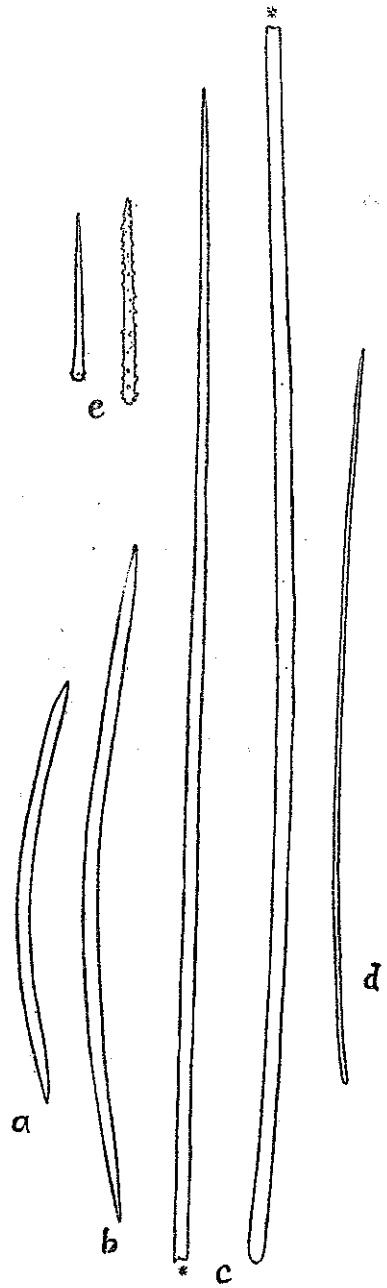

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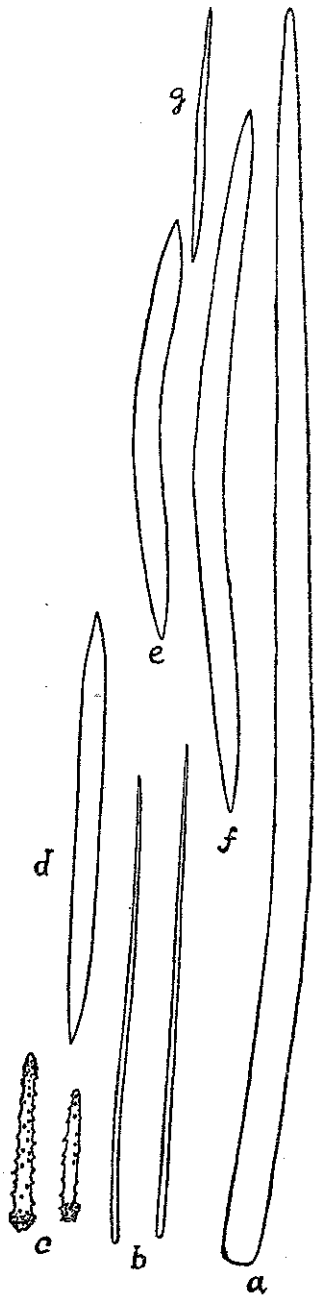

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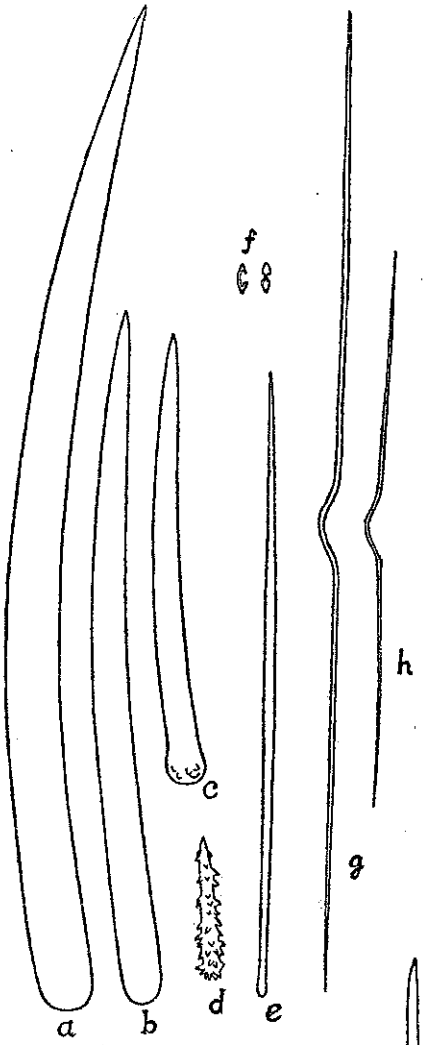
PLATE V.

Figure 28. *Rhabderemia indica* Dendy. *a-c.* Rhabdostyli, × 200 ; *d.* acanthostyli, × 500 ; *e.* sigmata, × 500.

,, 29. *Microciona longitoxa* (Hentschel). *a-c.* Styli ; *d.* acanthostyle ; *e.* subtylostyle ; *f.* chelæ ; *g-h.* toxa ; all × 200.

,, 30. *Microciona toxifera* (Hentschel). *a.* Basally-spined style ; *b.* subtylostyle ; *c.* acanthostyle ; *d.* toxa ; *e.* chelæ ; all × 200.

,, 31. *Lophacanthus rhabdophorus* Hentschel. *a-b.* Desmas ; *c.* lophotriaene ; *d-e.* rhabdostyli ; all × 200.



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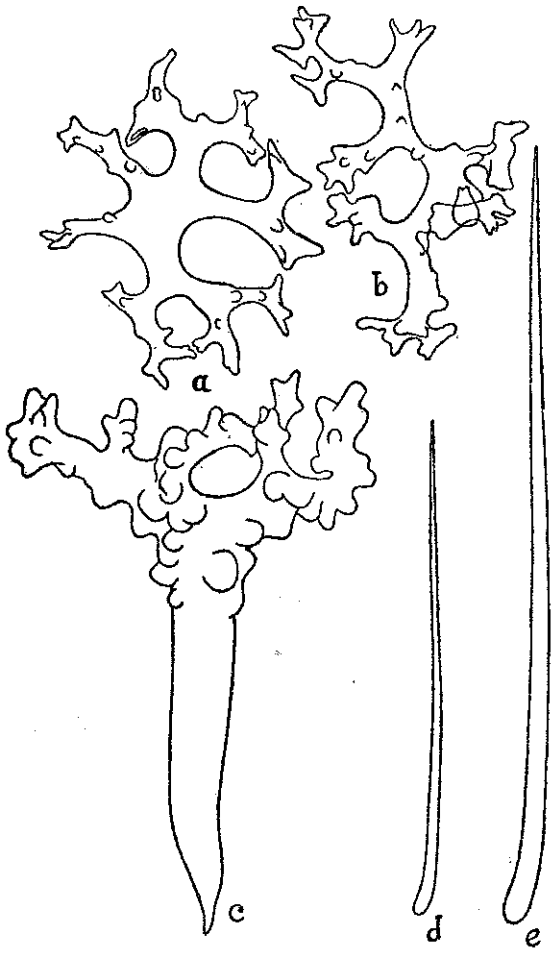

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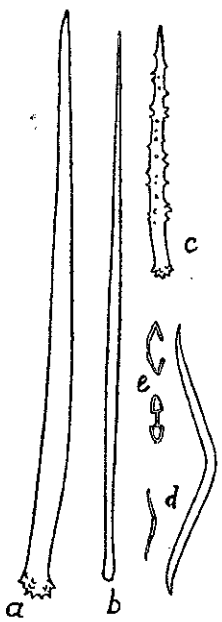

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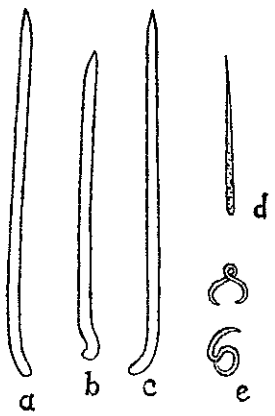

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PLATE VI.

Figure 32. *Axinella donnani* (Bowerbank). Style, × 200.

,, 33. *Axinella bubarinoides* Dendy. *a*. Long style ; *b*. short styli ; all × 120.

,, 34. *Axinella conulosa* (Dendy). *a-d*. Styli, × 100.

,, 35. *Axinella ceylonensis* (Dendy). *a-b*. Styli ; *c-e*. oxea ; all × 230.

,, 36. *Acanthella cavernosa* Dendy. *a*. Sinuous strongyle ; *b*. style ; all × 160.

,, 37. *Axinella carteri* (Dendy). *a-c*. Styli ; *d*. oxeote ; all × 120.

,, 38. *Axinella flabelliformis* (Keller). Oxea, × 200.

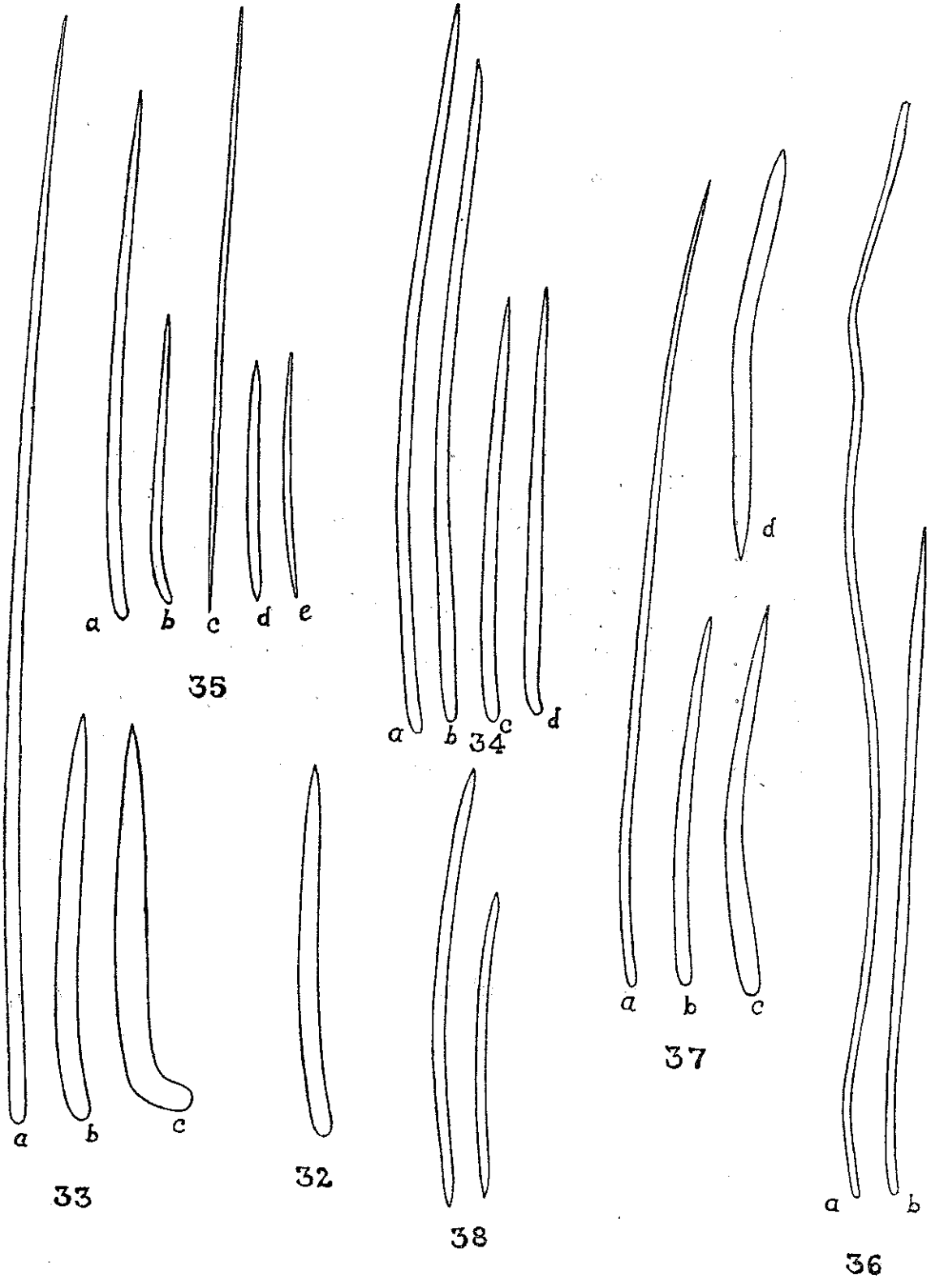
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PLATE VII.

Figure 39. *Prostylissa oculata* (Kieschnick). *a.* Pseudoxeote ; *b.* small style ; all × 150.

„ 40. *Prostylissa heterostyla* (Hentschel). *a.* Style ; *b.* small style ; all × 150.

„ 41. *Axinella lyrata* (Esper). *a.* Style ; *b.* oxeote ; all × 200.

„ 42. *Acanthella elongata* (Dendy). *a-c.* Strongyla ; *d-e.* styli ; *f.* oxeote ; all × 80.

„ 43. *Halichondria glabrata* Keller. Oxeote, × 200.

„ 44. *Myrmekioderma granulatum* (Esper). *a.* Style ; *b.* oxeote ; *c.* acanthoxeote ; *d.* trichodragmata ; all × 230.

„ 45. *Prostylissa foetida* (Dendy) *a.* Oxeote ; *b.* small style ; all × 120.

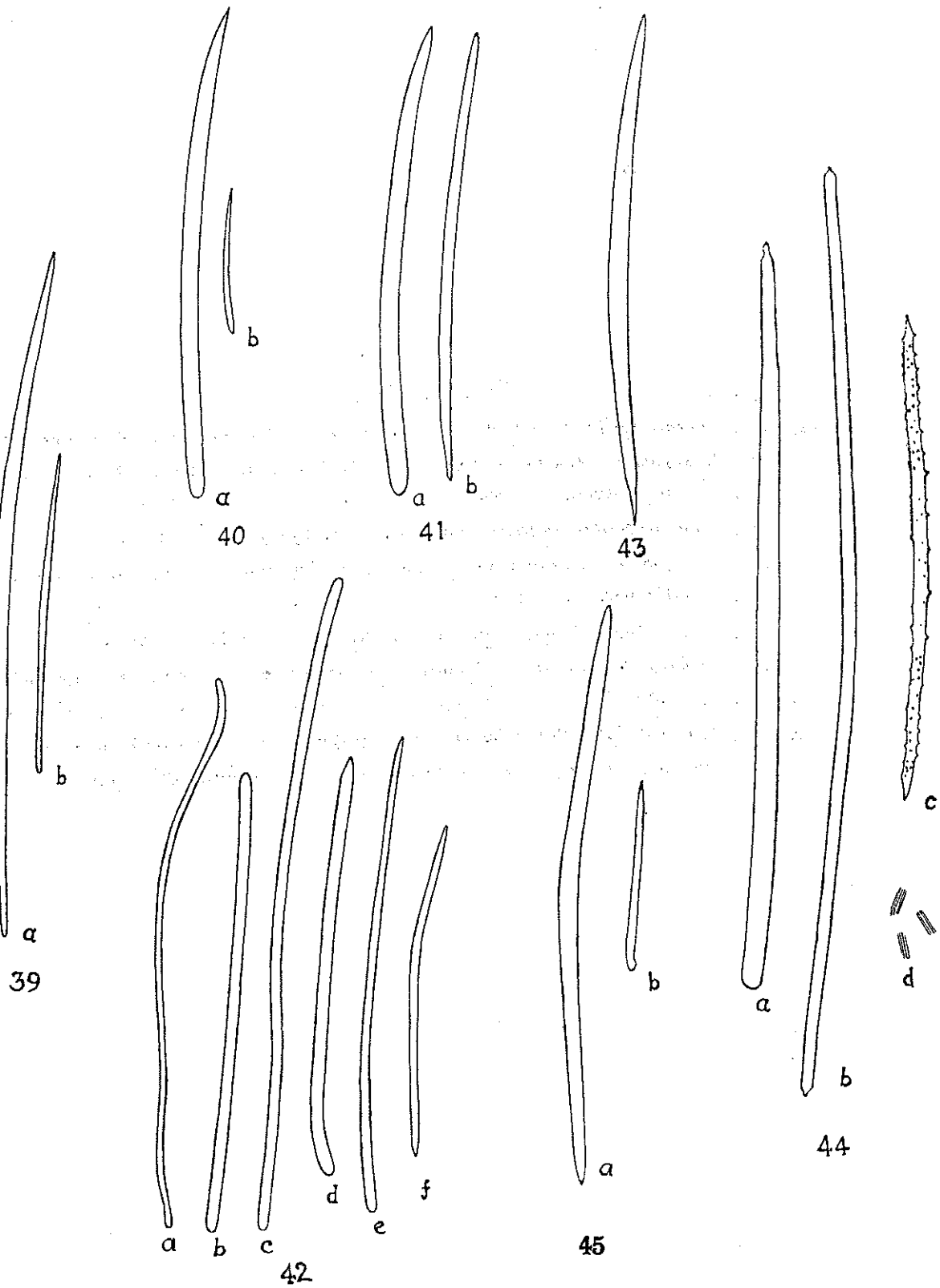
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PLATE VIII.

Figure 46. *Liosina paradoxa* Thiele. *a.* Pseudoxeote ; *b.* strongyle ; all × 150.

„ 47. *Laxosuberites cruciatus* (Dendy). *a-b.* Tylostyli, × 530 ; *c.* bases of tylostyli enlarged, × 1,000.

„ 48. *Pseudosuberites andrewsi* Kirkpatrick. Tylostyle, × 260.

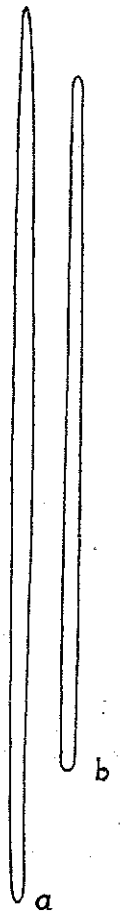
„ 49. *Laxosuberites lacustris* Annandale. *a-b.* Tylostyli, × 200 ; *c.* bases of tylostyli enlarged, × 400.

„ 50. *Terpios fugax* Duchassaing and Michelotti. Tylostyle, × 200.

„ 51. *Spirastrella inconstans* (Dendy). *a.* Tylostyle, × 180 ; *b.* spinispira, × 300.

„ 52. *Timea stellata* (Bowerbank). *a.* Tylostyle, × 100 ; *b.* chiasters, × 600.

„ 53. *Cliona lobata* Hancock. *a.* Tylostyle ; *b-c.* spinispiræ, all × 400.



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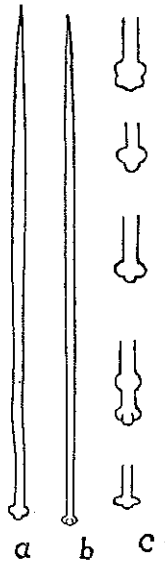

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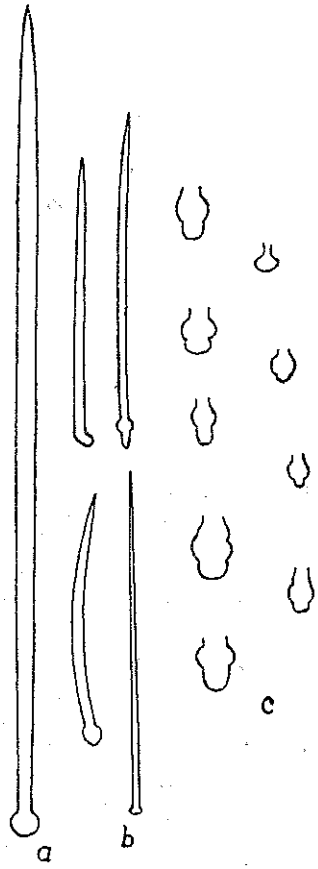

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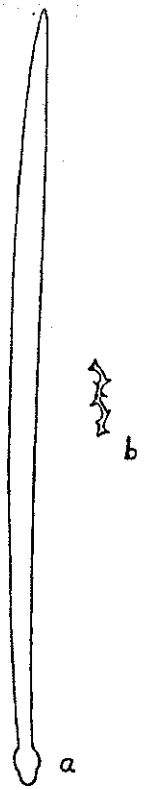

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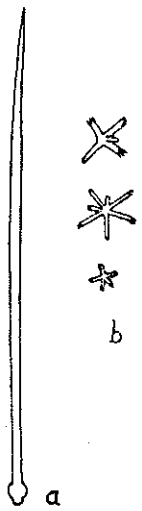

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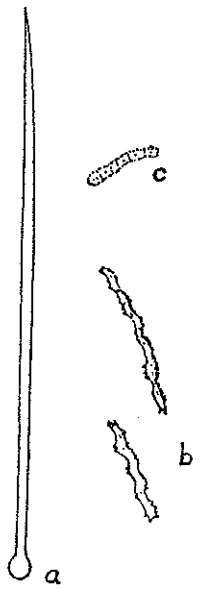

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PLATE IX.

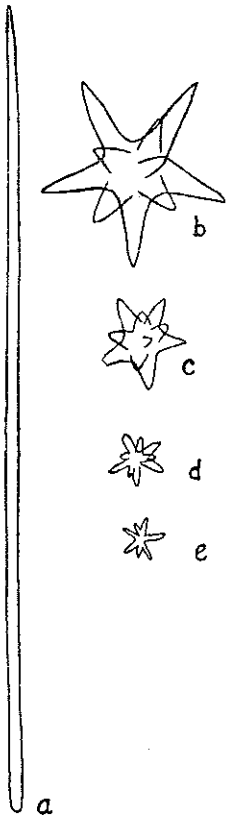
Figure 54. *Tethya repens* Schmidt. *a*. Strongyloxeote, × 60; *b-c*. spherasters, × 100; *d-e*. strongylasters, × 200.

„ 55. *Tethya robusta* (Bowerbank). *a*. Strongyloxeote, × 60; *b*. spheraster, × 100; *c-d*. strongylasters, × 400.

„ 56. *Tethya diploderma* Schmidt. *a*. Strongyloxeote, × 60; *b*. spheraster, × 100; *c*. oxyaster, × 400; *d*. tylaster, × 400.

„ 57. *Placospongia carinata* (Bowerbank). *a-b*. Tylostyli, × 100; *c-d*. spinispiræ, × 500; *e-f*. spiny microrhabds, × 500; *g*. spheraster, × 500; *h*. sterrospiræ. × 400.

„ 58. *Spongionella tubulosa* sp. n. Section of skeleton at right angles to surface, × 100.



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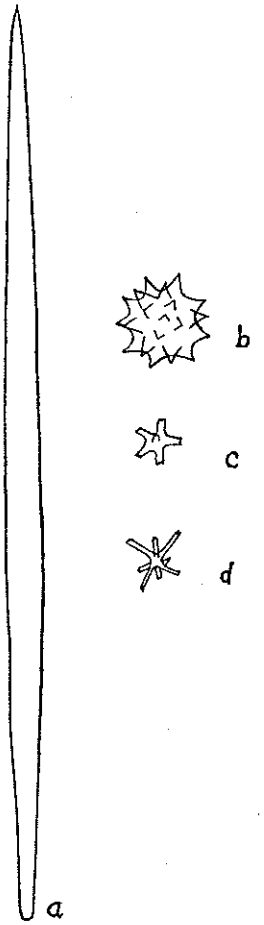

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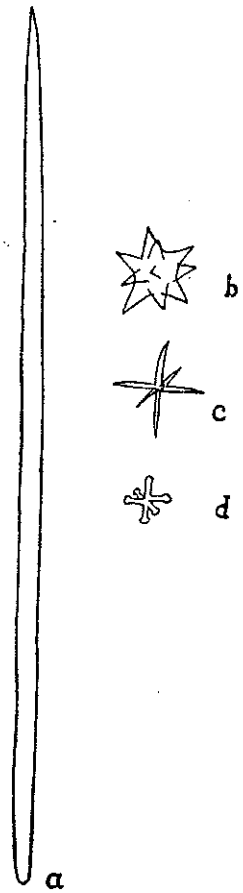

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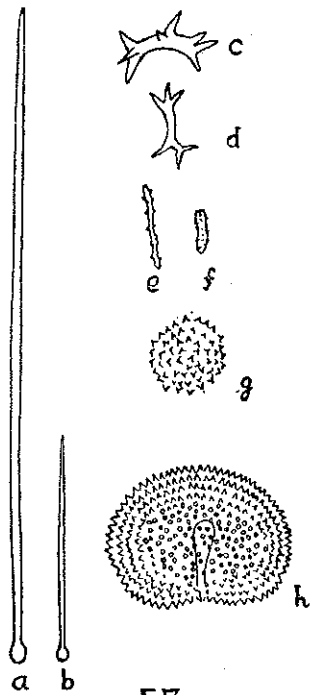

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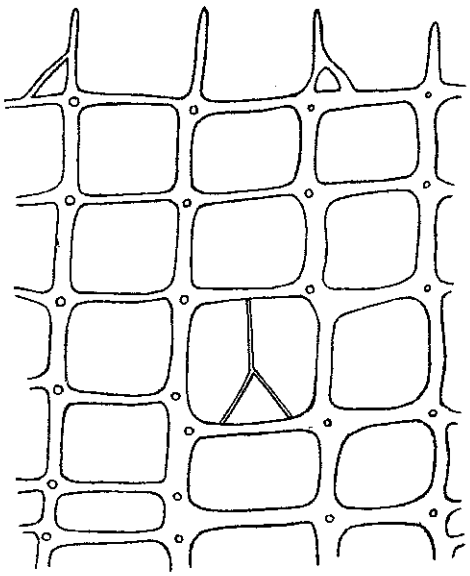

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