

	PAGE.		PAGE.
Tortula emarginata (Doz. et MOLK.) MITT.	8	Trichocolea tomentella (HUDS.) LINDB.	.. 3
Trachypus humilis LINDB.	37	V esicularia Sasaokae SH. OKAMURA.	67
Trematodon drepanellus BESCH.	5	V. Shimadae SH. OKAMURA.	69
T. longicollis MICHX.	5	W eisia viridula (L.) HEDW.	8

On some Japanese Calcareous Sponges belonging
to the Family Heteropiidæ.

By

Sanji Hōzawa, *Rigakushi.*

Zoological Institute, Science College, Tokyo Imperial University.

With 2 plates.

In the collection of calcareous sponges collected by Professor IJIMA and preserved in the Zoological Institute of the Science College, there exist seven species belonging to the family Heteropiidæ. Six of them seem to be new to science. In the present paper I propose to give descriptions of all the species in the following order :

1. *Grantessa shimeji*, n. sp.
2. „ *sagamiana*, n. sp.
3. „ *intusarticulata* (CARTER).
4. „ *basipapillata*, n. sp.
5. „ *mitsukurii*, n. sp.
6. *Heteropia striata*, n. sp.
7. *Amphiute ijimai*, n. sp.

Here let be fulfilled my pleasant duty of expressing my hearty thanks to Professor IJIMA, who has not only kindly placed at my disposal the valuable fruits of his long years' collecting, but has

also rendered me many a courteous help during the course of my investigation.

Family **HETEROPIIDÆ** DENDY.

Genus **Grantessa** von LENDENFELD (emend.).

1. *Grantessa shimeji*, n. sp.

(Pl. I., figs. 1, 2; Pl. II., figs. 10, 11; textfig. 1).

This new species is represented in the collection by five specimens. They differ more or less from one another in certain minor points of external feature, but are practically identical in the finer structure.

The first specimen (Sci. Coll. Spec. No. 1; Pl. I., figs. 1, 2), which is taken for the type, was obtained by K. AOKI in the immediate neighbourhood of the Misaki Marine Biological Station. The sponge forms an irregular hemispherical colony with a height of 45 mm. and maximum diameter of about 85 mm. In the superficial parts, the colony is seen to consist of numerous sub-cylindrical, erect and on the whole radially directed tubes, each of which somewhat tapers distally and terminates with an osculum. The tubes may be 6–10 mm. long, and $1\frac{1}{2}$ mm. broad in the lower parts, where the wall presents a thickness of 0.35–0.6 mm. The wall gradually diminishes in thickness towards the oscular margin. The osculum is approximately circular with a diameter of $\frac{1}{2}$ – $1\frac{1}{2}$ mm. An oscular fringe of oxea is present, but is scarcely visible to the naked eye. The dermal surface is rough, owing to the presence of oxea in scattered tufts projecting almost vertically from it. The gastral surface is also rough on account

of the projecting apical rays of gastral quadriradiates. Several of the tubes are seen to bear diverticulum of varying length, the blind end of which is outwardly directed and may sometimes show a perforation representing osculum at an early stage of breaking through. The deeper parts of the colony give quite a different view from the peripheral. The inner continuations of the radial tubes branch and anastomose with one another and thus form a complicated network of tubes which constitutes the greater part of the mass of the colony. Here the diameter of the tubes and the thickness of wall are somewhat greater than in more peripheral parts of the colony. The sponge is colourless in alcohol, its texture rather firm and compact.

The second specimen (Sci. Coll. Spec. No. 2) was also obtained by K. AOKI at the same locality. It is an irregularly shaped mass, 80 mm. high, and 40 mm. in maximum diameter. The oscular tubes are on the whole of a larger calibre than those of the type-specimen. They reach 14 mm. in length and 5 mm. in width in the widest part, where the wall is nearly $\frac{1}{2}$ mm. thick. The dermal surface is relatively smooth, the tufts of oxea being not so strongly developed as in the type-specimen.

The third specimen (Sci. Coll. Spec. No. 3) was obtained by Prof. IJIMA at the same locality. It is a small colony, provided with about 30 oscular tubes. In external characters it agrees fairly well with the type-specimen.

The fourth specimen (Sci. Coll. Spec. No. 4) was collected by Mr. K. YENDŌ at Ōshima, in the Province of Shima. It is a little smaller than the type-specimen. Height, 30 mm. Maximum diameter, 65 mm. Minimum diameter, 40 mm.

The fifth specimen (Sci. Coll. Spec. No. 5) hails from the same locality as the preceding. It represents an irregularly

roundish mass, measuring about 15 mm. in height and 30 mm. in maximum diameter. On the whole, the oscular tubes are much smaller than those of any other specimen. The largest tube measures only 5 mm. long and 2 mm. broad in the widest part, where the wall is nearly 0.45 mm. thick. The osculum is irregularly circular, measuring about 0.45 mm. in diameter; oscular fringe of oxea not visible with the naked eye.

The following description of canal system and spicules is based on studies of the type-specimen.

Canal system (Pl. II., figs. 10, 11).

The canal system is typically syconoid. Dermal pores, 40–100 μ in diameter, are scattered irregularly over the sponge surface. The dermal cortex is rather weakly developed with a small quantity of mesoglaea. The flagellate chambers are straight, cylindrical and usually not branched; they are radially arranged around the gastral cavity, extending from gastral to dermal cortex. Each chamber is provided with a number of small prosopyles of 10–40 μ diameter, and with a single apopyle at the inner end. The position of nucleus in collar cells is apical. The gastral cortex is nearly as thick as the dermal and is perforated by short but rather wide exhalant canals, which usually arise each from a single chamber and sometimes from two or three chambers. A weakly developed diaphragm occurs at the apopyle. Diameter of exhalant pores 70–150 μ .

Skeleton (Pl. II., figs. 10, 11).

The dermal skeleton is composed of the following elements: 1) triradiates, which are tangentially arranged in several layers without definite orientation; 2) the paired rays of subdermal

pseudosagittal triradiates; and 3) oxea which project nearly vertically from dermal surface and which are grouped in small tufts standing in no definite relation to radial chambers.

The tubar skeleton near the osculum is of the inarticulate type, consisting of the basal rays of subdermal pseudosagittal and subgastral sagittal triradiates (Pl. II., fig. 11). In the remaining parts of the sponge, where the wall is thicker and the chambers are more elongate, the tubar skeleton receives an addition of some rows of sagittal triradiates with outwardly directed basal rays and is thus of the articulate type (Pl. II., fig. 10).

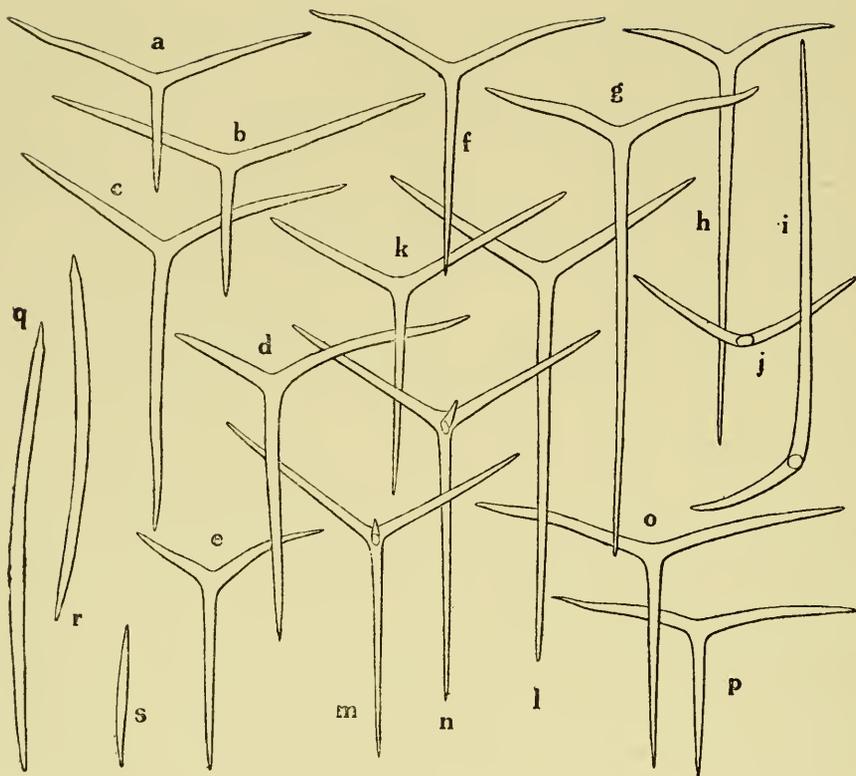
The gastral skeleton is made up of tangentially placed triradiates, of the paired rays of subgastral triradiates and of the facial rays of gastral quadriradiates, of which the apical rays project into the gastral cavity.

The skeleton of the oscular margin is composed of oxea and triradiates. The oxea run longitudinally and parallel with one another as well as with the downwardly directed basal rays of the triradiates.

Spicules.

Dermal triradiates (textfig. 1, *a*, *b*).—Slightly sagittal. Basal ray smooth, straight, ending in a sharp point, about $80\ \mu$ long and $8\ \mu$ thick. Paired rays longer and slightly thicker than basal ray, not quite smooth, almost straight but sometimes slightly crooked, gradually tapering and sharply pointed, about $120\ \mu$ long and $10\ \mu$ thick.

Subdermal triradiates (textfig. 1, *c*, *d*, *e*).—Pseudosagittal. All rays equally thick, lying nearly in the same plane. Basal ray longer than paired rays, straight excepting slight curvature near base, sometimes very slightly crooked, gradually tapering, sharp-

Textfig. 1. *Grantessa shimeji*.

- a, b, Dermal triradiates.
 c, d, e, Subdermal triradiates.
 f, g, Tubar triradiates.
 h, i, j, Subgastral triradiates.
 k, l, Gastral triradiates.
 m, n, Gastral quadriradiates.
 o, p, Triradiates of oscular margin.
 q, r, s, Oxea of oscular margin.
 (All figs. 200×).

pointed, 120–180 μ long and 10 μ thick. Paired rays unequal in length and shape; the longer ray sometimes nearly as long as the shorter, curved, 90–140 μ long and 10 μ thick. The shorter ray almost straight, 60–110 μ long and 10 μ thick.

Tubar triradiates (textfig. 1, *f. g*).—Sagittal. Basal ray long, almost straight, gradually tapering and sharply pointed, 120–270 μ

long and $10\ \mu$ thick. Paired rays nearly equal, curved, gradually tapering and sharply pointed, $70\text{--}100\ \mu$ long and $10\ \mu$ thick.

Subgastral triradiates (textfig. 1, *h, i, j*).—Sagittal. Basal ray long, straight, gradually tapering, sharp-pointed, about $250\ \mu$ long and $10\ \mu$ thick. Paired rays nearly equal, widely diverging, lying not in the same plane as the basal ray, slightly curved, gradually tapering to a point, about $80\ \mu$ long and $12\ \mu$ thick.

Gastral triradiates (textfig. 1, *k, l*).—Sagittal. Basal ray much longer than paired rays, quite straight, tapering from base to the sharp point, $140\text{--}270\ \mu$ long and $8\text{--}10\ \mu$ thick. Paired rays straight, almost equal or slightly differentiated in length, somewhat thicker than the basal ray, gradually tapering, sharply pointed, $90\text{--}120\ \mu$ long and $10\text{--}12\ \mu$ thick.

Gastral quadriradiates (textfig. 1, *m, n*).—Almost like gastral triradiates with addition of a short apical ray. Basal ray much longer than paired rays, quite straight, gradually tapering, sharp-pointed, $150\text{--}200\ \mu$ long and $8\text{--}10\ \mu$ thick. Paired rays almost straight, subequal in length, slightly thicker than the basal ray, gradually tapering, sharply pointed, $100\text{--}120\ \mu$ long and $10\text{--}12\ \mu$ thick. Apical ray much shorter and slender than facial rays, ending sharply, slightly curved and directed upwards, $30\text{--}50\ \mu$ long and $8\text{--}10\ \mu$ thick. The quadriradiates situated near the osculum have the paired rays curved and more widely diverging than in those of other parts.

Triradiates of oseular margin (textfig. 1, *o, p*).—Basal ray smooth and straight, gradually tapering, sharp-pointed, slightly longer than paired rays, $100\text{--}150\ \mu$ and $10\ \mu$ thick. Paired rays stouter than the basal, widely diverging, almost at right angles to the basal ray, curved, not quite smooth, sharply or bluntly pointed at end, $100\text{--}130\ \mu$ long and $12\ \mu$ thick.

Oxea.—Usually slightly curved, nearly uniformly thick throughout their length and sharply pointed at both ends, of which the free end is sometimes provided with a more or less distinct nodiform ring. They occur in tufts projecting from the dermal surface and with the inner $\frac{1}{3}$ – $\frac{1}{2}$ of their length imbedded in the chamber layer.

Oxea of oscular margin (textfig. 1, *q*, *r*, *s*).—Similar to those just described, but on the whole longer, being 100–320 μ long and 6–8 μ thick.

Note.—The above described species can not be identified with any previously described. The specific name “Shimeji” is given to it on account of its resemblance in form to certain fungus known in Japan by that name. This sponge is common in the neighbourhood of the Misaki Marine Biological Station. It occurs in especial in abundance in the spring, attached on perpendicular or overhanging faces of rocks below low tide-mark.

Localities.—Misaki ; Ōshima, Province of Shima.

2. *Grantessa saganiana*, n. sp.

(Pl. I., fig. 3 ; Pl. II., fig. 12 ; textfig. 2).

The type-specimen of this new species (Sci. Coll. Spec. No. 20) was collected from a depth of 429–572 m. at Okinose, Sagami Sea.

Sponge consists of a solitary person ; elongate, cylindrical, slightly laterally compressed and bent at base, with an indistinct oscular fringe ; surface slightly hispid, due to large oxea and trich-oxea projecting here and there. The body is about 45 mm. long and 9 mm. in greatest breadth. It narrows towards both ends. The sponge wall is about 1 mm. thick in the middle parts of body ; nearer the osculum the thinner it becomes. The osculum

is elliptical, 6 mm. by 3 mm. wide, and leads into the wide and deep gastral cavity. The colour in alcohol is greyish white; the texture is fairly firm and elastic.

A second specimen (Sci. Coll. Spec. No. 21) was obtained by Prof. IJIMA in the Sagami Sea, off Cape Sunosaki, from a depth of 429 m. It was attached to the spine of *Goniocidaris mikado* (DÖDERLEIN). The specimen is much smaller than the type, measuring 22 mm. in length, 5 mm. in greatest breadth and about 0.8 mm. in thickness of wall. The surface is more strongly hispid than in the type. The osculum is elliptical, $3\frac{1}{2}$ mm. by 2 mm. wide; it is in part provided with a distinctly developed oscular fringe.

The third specimen (Sci. Coll. Spec. No. 22; Pl. 1., fig. 3) was obtained by K. AOKI at the entrance to Enoura, Suruga Bay, from a depth of 380 m. It was found attached at base on a coral together with a polyzoan colony. It represents an elongate, slightly curved and laterally compressed tube, with the surface thickly beset with projecting oxea. Total length 30 mm. Greatest breadth 7 mm. Wall not thicker than 1 mm. The osculum is circular with a diameter of 3 mm. Oscular fringe is rather distinct.

The following account refers to the type-specimen.

Canal system (Pl. II., fig. 12).

The canal system is syconoid. Dermal pores small, circular or oval with a diameter of 40–150 μ , thickly distributed all over the surface of sponge; the pores lead singly, or more frequently several together in groups, into wide inhalant canals through the thin dermal cortex. The inhalant canals extend inwards, around and between the distal ends of flagellate chambers.

Flagellate chambers are arranged radially with regard to the

central gastral cavity, extending nearly through the entire thickness of the sponge wall. They are broad in the proximal parts and become markedly narrower in the distal parts. Sometimes they are seen to be united with one another in the proximal parts and also to divide distally into branches. The nucleus of collar cells occupies an apical position.

The gastral cortex is very thin with a small quantity of mesogloea; it is pierced by very short exhalant canals, arising from either a single or from 2-4 flagellated chambers. A well-developed diaphragm exists at the apopyle. The exhalant canals open into the gastral cavity through small angular meshes, measuring 200-400 μ across and formed by intercrossing rays of gastral tri- and quadri-radiates.

Skeleton (Pl. II., fig. 12).

The dermal skeleton is made up of: 1) triradiates tangentially disposed in a few layers, with basal ray generally directed downwards; 2) the paired rays of subdermal pseudosagittal triradiates; 3) large oxea, which occur here and there in vertical disposition in the sponge wall and which usually project outwards on the dermal side only but may sometimes do so also on the gastral side; 4) trichoxea which are but rarely found.

The tubar skeleton is composed of: 1) the centripetal basal rays of subdermal pseudosagittal triradiates; 2) the centrifugal basal rays of subgastral triradiates; and 3) one or two intermediate rows of triradiates which have their basal ray directed outwards. The above refers to the thick-walled middle parts of the sponge. In the parts close to osculum where the wall is thin, the tubar skeleton consists only of the basal rays of subdermal and subgastral triradiates.

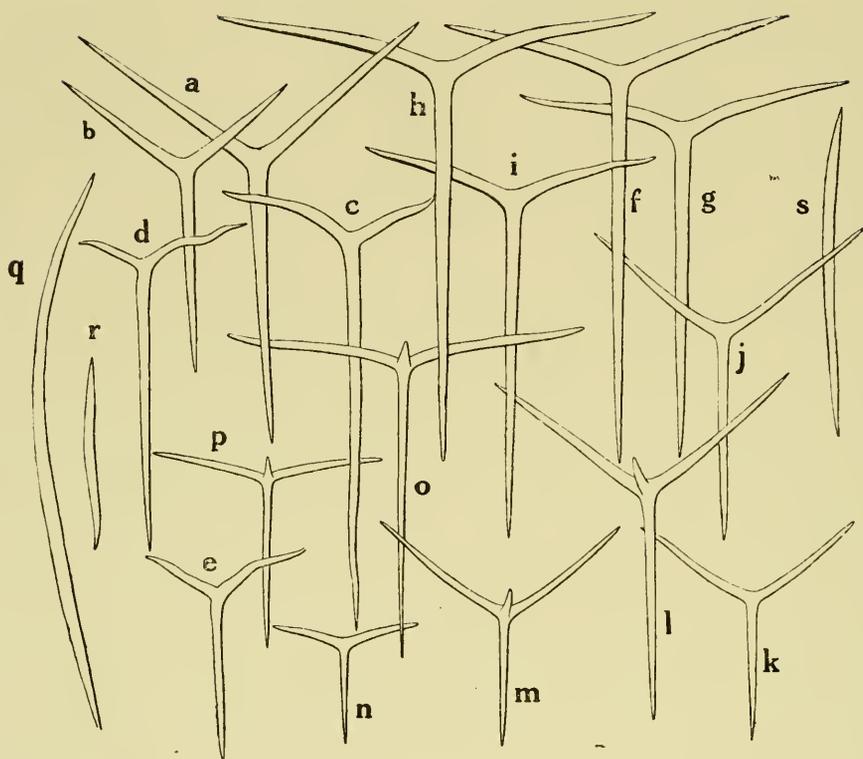
The gastral skeleton consists of the paired rays of subgastral sagittal triradiates, of triradiates, and of the facial rays of quadri-radiates. Of the last, the short apical rays project into the gastral cavity. Triradiates and quadri-radiates are disposed tangentially, otherwise in no definite orientation. The former are always less numerous than the latter.

The skeleton of the oscular margin consists in a close inter-lacement of fine longitudinal trichoxea and of triradiates and quadri-radiates, both which have strongly divergent paired rays and downwardly directed basal ray. To the above there may be added a number of large oxea which run longitudinally and parallel with trichoxea.

Spicules.

Dermal triradiates (textfig. 2, *a, b*).—Slightly sagittal. All rays straight, smooth and gradually sharp-pointed. Basal ray slightly longer than paired rays, equally thick or a little thicker than these, 240–370 μ long and 20–28 μ thick. Paired rays of nearly equal length, 200–270 μ long and 20 μ thick.

Subdermal triradiates (textfig. 2, *c, d, e*).—Pseudosagittal, irregular. All rays of nearly same thickness but of different length and shape. Basal ray much longer than paired rays, sharp-pointed, its basal parts slightly curved and for the rest straight or nearly so, 200–490 μ long and 16–20 μ thick. Paired rays are of different length and shape, lying not in the same plane with basal ray. The longer of them gradually tapers to a sharp point, is bent near base and is sometimes more or less crooked in the remaining parts, 100–160 μ long and 12–16 μ thick. The shorter ray is sharp-pointed and strongly curved in the middle parts, 90–110 μ long and 16–20 μ thick.

Textfig. 2. *Grantessa sagamiana*.

- | | |
|----------|-----------------------------------|
| a, b, | Dermal triradiates. |
| c, d, e, | Subdermal triradiates. |
| f, g, | Tubar triradiates. |
| h, i, | Subgastral triradiates. |
| j, k, | Gastral triradiates. |
| l, m, | Gastral quadriradiates |
| n, | Triradiate of oscular margin. |
| o, p, | Quadriradiates of oscular margin. |
| q, r, s, | Oxea. |

(a-p, 100 × ; q-s, 40 ×).

Tubar triradiates (textfig. 2, *f, g*).—Sagittal. All rays of subequal thickness. Basal ray straight, tapering in the entire length, 160–480 μ long and 12–24 μ thick. Paired rays equal in length, more or less curved, tapering throughout their whole length, 80–210 μ long and 12–20 μ thick.

Subgastral triradiates (textfig. 2, *h, i*).—Strongly sagittal, nearly similar to tubar triradiates but with oral angles wider in varying degrees. Basal ray straight, smooth, gradually sharp-pointed, 420–480 μ long and 20–24 μ thick. Paired rays lying not in the same plane with basal ray, equally long, slightly curved, gradually sharp-pointed, 180–250 μ long and 16–24 μ thick.

Gastral triradiates (textfig. 2, *j, k*).—Slightly sagittal. All rays equally thick. Basal ray quite straight, smooth, tapering from base to the sharp point, 180–270 μ long and 16–20 μ thick. Paired rays equal in length, almost straight excepting a slight curvature near base, gradually sharp-pointed, 170–210 μ long and 16 μ thick.

Gastral quadriradiates (textfig. 2, *l, m*).—Facial rays exactly similar to gastral triradiates. Basal ray 170–280 μ long and 16–20 μ thick. Paired rays 200–210 μ long and 16–20 μ thick. Apical ray curved, sharp-pointed, nearly as thick as the facial rays but much shorter, 50–70 μ long 16 μ thick.

Triradiates of oscular margin (textfig. 2, *n*).—Basal ray quite straight, sharply pointed, 140–280 μ long and 8–12 μ thick. Paired rays slightly curved, standing nearly at right angles to basal ray, thicker and shorter than the latter, 100–170 μ long and 12–16 μ thick.

Quadriradiates of oscular margin (textfig. 2, *o, p*).—Facial rays exactly similar to triradiates of the oscular margin. Apical ray very short, slightly curved. Basal ray 200–350 μ long and 12 μ thick. Paired rays 150–220 μ long and 12–16 μ thick.

Large oxea (textfig. 2, *q, r, s*).—More or less curved, of varying lengths, nearly uniformly thick in the greater part of their length but tapering at both ends which are sharply pointed, 0.6–1.8 mm. long and 30–50 μ thick.

Trichoxea of oscular margin.—Slender, quite straight, sharply pointed at inner end, generally broken off at outer end. A large example with broken outer end measured $590\ \mu$ in length and $4\ \mu$ in thickness.

Trichoxea of dermal cortex.—Slender, hair-like, generally much thinner than those of the oscular margin, measuring about $2\ \mu$ in thickness.

Note.—This form seems to be quite distinct from any of the hitherto known species. *Grantessa lanceolata* (BREITFUSS)^b may be looked upon as its nearest ally, though showing some marked differences in spiculation.

Localities.—Okinose ; off Sunosaki ; Entrance of Enoura, Suruga Bay.

3. *Grantessa intusarticulata* (CARTER).

(Pl. I., figs. 4, 5 ; Pl. II., fig. 13 ; textfig. 3).

Hypograntia intusarticulata, CARTER, 1885-1886 (1), p. 45.

„ *medioarticulata*, CARTER, 1885-1886 (1), p. 46.

Grantessa intusarticulata, DENDY, 1892 (1), p. 108 ; 1893 (2), pp. 181, 201, Pl. XIII, fig. 18.

Grantia intusarticulata, BREITFUSS, 1897 (2), p. 219.

Sixteen specimens of this species have come under my observation. Thirteen of them (Sci. Coll. Spec. Nos. 6-17, 29) were collected by K. AOKI at Dōketsba in the Sagami Sea from depths varying from 185 to 214 meters ; one (Sci. Coll. Spec. No. 30) came from Jōgashima (Misaki), while the remaining two (Sci. Coll. Spec. Nos. 31, 32) were obtained by Prof. IJIMA from the shallow bottom in the neighbourhood of the Misaki Marine Biological Station.

All specimens in the first group are solitary tubular individuals attached by the narrowed base. They are provided with an

1). *Ebnerella lanceolata* BREITFUSS, 1893 (3), p. 28, Taf. I., Fig. 3-5 ; Taf. IV., Fig. 24, 25.

oval or circular osculum, surrounded by a more or less distinctly developed fringe of oxea. The specimen from Jōgashima is a fragment of oscular tube with base. The last two specimens represent a colony of several small and tubular individuals joined together at their base (Pl. I., fig. 5),

To base further description on I have selected one of the Dōketsba specimens (Sci. Coll. Spec. No. 6; Pl. I., fig. 4). It measures about 60 mm. in total length and 11 mm. in greatest width. The wall reaches about 1 mm. in thickness. The osculum is oval, measuring $2\frac{1}{2}$ by 5 mm. It leads into a wide and deep gastral cavity. The sponge is bent in the basal parts, where it presents a somewhat irregular contour and also gives rise to some tubercular processes for attachment. The dermal surface looks very smooth, while the gastral is somewhat rough owing to projecting apical rays of gastral quadriradiates. Colour in alcohol greyish white. Texture firm, but elastic.

Canal system (Pl. II., fig. 13).

The canal system is typically syconoid. The inhalant canals open on the dermal surface by means of small irregularly roundish, mesh-like pores of 70–100 μ diameter. The canals, after traversing the dermal cortex, unite into larger trunks which lead into the interstices between flagellate chambers. The dermal cortex, which appears finely hispid on account of vertically disposed microxea, is rather thin, being about 100 μ thick; it directly overlies the distal ends of flagellate chambers. The flagellate chambers are elongate and radially arranged in the chamber layer. They are usually simple, but are sometimes divided into two or three parallel and distally narrowing branches. The chambers communicate either singly or several together with exhalant canals, which

are short but relatively wide. Diaphragm is present at each apopyle. The nucleus of collar cells occupies an apical position.

The gastral cortex is almost as thick as the dermal; it is perforated in a mesh-like manner by irregularly quadrate, pentagonal or hexagonal openings (150–250 μ across) of exhalant canals. The epithelium lining the gastral cavity and exhalant canals is very conspicuous, the component cells being relatively large. The apical rays of gastral quadriradiates, as they stand out into the gastral cavity, seem to be covered all over by the epithelium.

Skeleton (Pl. II, fig. 13).

The dermal skeleton consists of triradiates, microxea and the paired rays of subdermal pseudosagittal triradiates. The triradiates lie parallel to the dermal surface with the basal rays in most cases directed towards the sponge base. The microxea are very small, numerous and thickly set. They lie in the dermal cortex at varying angles to the external surface, beyond which the outer ends freely project to a certain extent.

In the middle parts of the sponge the tubar skeleton is formed by the centripetal basal rays of subdermal pseudosagittal triradiates, by the centrifugal basal rays of subgastral sagittal triradiates, and by several intermediate rows of sagittal triradiates, of which the basal rays are centrifugally directed.

The gastral skeleton is chiefly made up of triradiates tangentially placed without definite orientation and arranged in several layers. It also contains the paired rays of subgastral triradiates as well as large quadriradiates, the apical rays of which project into the gastral cavity, pointing towards the osculum.

The oscular margin is composed of trichoxea of varying thickness running longitudinally and parallel with one another, and of

very closely set triradiates, which have very strongly diverging paired rays.

Spicules.

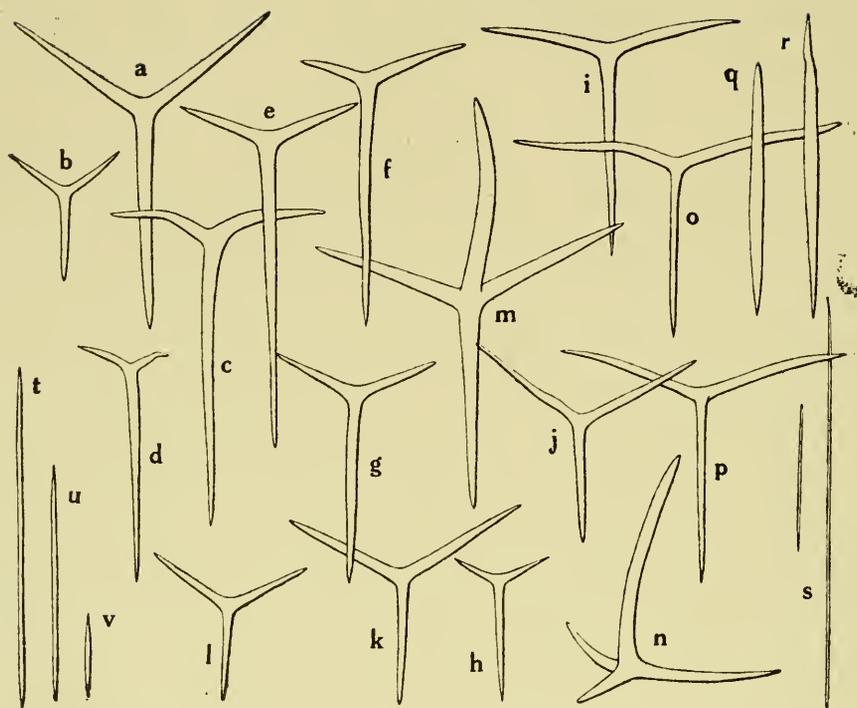
Dermal triradiates (textfig. 3, *a, b*).—Slightly sagittal. Basal ray straight, smooth, gradually and sharply pointed, 120–250 μ long and 16–20 μ thick. Paired rays very slightly curved and gradually sharp-pointed. They are nearly as thick as the basal ray, but shorter, being 80–190 μ long and 12–16 μ thick.

Subdermal triradiates (textfig. 3, *c, d*).—Pseudosagittal, irregular. Basal ray considerably longer than the paired rays, slightly bent near base, and gradually sharp-pointed, 280–360 μ long and 16–20 μ thick. Paired rays equally thick but differing in length and shape. The longer ray gently curved and gradually sharp-pointed, 80–130 μ long and 12–16 μ thick. The shorter ray more or less angularly curved in the middle, gradually and sharply pointed, 50–120 μ long and 12–16 μ thick.

Tubar triradiates (textfig. 3, *e, f, g, h*).—Sagittal. Basal ray straight, gradually sharp-pointed, much longer and slightly thicker than the paired rays, 120–380 μ long and 12–16 μ thick. Paired rays are of equal or slightly differentiated length, gradually sharp-pointed, straight or slightly bent, 60–120 μ long and 8–12 μ thick.

Subgastral triradiates (textfig. 3, *i*).—Sagittal. Similar to tubar triradiates, but the paired rays are more strongly divergent. All rays lie in the same plane. Basal ray straight, much longer and slightly thicker than the paired rays, 250–330 μ long and 16–20 μ thick. Paired rays slightly curved, gradually and sharply pointed, 100–160 μ long and 12–16 μ thick.

Gastral triradiates (textfig. 3, *j, k, l*).—Regular or very slightly sagittal. All rays gradually and sharply pointed, generally

Textfig. 3. *Grantessa intusarticulata*.

- | | |
|-------------|--------------------------------|
| a, b, | Dermal triradiates. |
| c, d, | Subdermal triradiates. |
| e, f, g, h, | Tubar triradiates. |
| i, | Subgastral triradiate. |
| j, k, l, | Gastral triradiates. |
| m, n, | Gastral quadriradiates. |
| o, p, | Triradiates of oscular margin. |
| q, r, | Microxea. |
| s, | Trichoxea of oscular margin. |
| t, u, v, | Oxea of oscular margin. |
- (a—p, s—v, 100 × ; q, r, 400 ×).

straight, but sometimes slightly crooked, 100–160 μ long and 12 μ thick.

Gastral quadriradiates (textfig. 3, m, n).—Large and very stout, with gradually and sharply pointed facial rays which are equal or slightly differentiated sagittally, and with very strongly developed apical ray, curved and pointed only at the end. In

typical cases, the facial rays are 180–230 μ long and 24 μ thick; the apical ray about 280 μ long and 24 μ thick.

Triradiates of oscular margin (textfig. 3, *o, p*).—Very strongly sagittal. Basal ray longer and more slender than the paired rays, straight, gradually and sharply pointed, 230–310 μ long and 8 μ thick. Paired rays strongly diverging, slightly curved, either gradually sharp-pointed or broadened in the middle and narrowed towards both the base and the pointed end. The oral angles are rather variable.

Microxea (textfig. 3, *q, r*).—Nearly straight, symmetrically sharp-pointed at both ends, sometimes with a hastate point at one end, 76–92 μ long and 4 μ thick,

Trichoxea of oscular margin (textfig. 3, *s*).—Very slender, straight, 210–550 μ long and 2 μ thick.

Oxea of oscular margin (textfig. 3, *t, u, v*).—These resemble trichoxea, but are thicker, straight, almost uniformly thick throughout their length; the ends sharply pointed, 110–450 μ long and 6 μ thick.

Note.—The specimens seem to agree very well in all essential characters with the Australian species first described by CARTER under the names of *Hypograntia intusarticulata* and *H. medioarticulata* and later referred to *Grantessa* by DENDY. I am therefore strongly inclined to identify the Japanese form with that species.

Localities.—Near Port Philip Heads (CARTER); Watson's Bay, Port Jackson (DENDY); Dōketsba and Misaki, Sagami Sea.

4. *Grantessa basipapillata*, n. sp.

(Pl. I., fig. 6; Pl. II., fig. 14; textfig. 4).

This species is based on a single specimen (Sci. Coll. Spec.

No. 23), which was obtained by K. AOKI at Dōketsba, Sagami Sea. It represents in the main an irregularly cylindrical sycon person broken off at one end and which has budded out near the damaged end a second, much smaller person. The mother person is slightly laterally compressed and exhibits several small nipple-shaped protuberances on the sides. It measures about 80 mm. long by 10 mm. broad at the widest part, where the wall is about 1 mm. thick. The osculum is circular with a diameter of $3\frac{1}{2}$ mm; its margin is very thin and plain without fringe. The second person is cylindrical, circular in cross section, about 20 mm. long, 5 mm. broad, and 0.7 mm. in thickness of wall. It shows at the end a small osculum of only $\frac{1}{2}$ mm. diameter. The dermal surface is quite smooth without any projecting spicules. The gastral surface is lined with quadriradiates, of which the short apical rays project inwards. The gastral cavity is very wide and extends through the entire length of the specimen. The colour of the sponge in alcohol is greyish white. Texture is firm but rather brittle.

Canal system (Pl. II., fig. 14).

The canal system is typically syconoid. The dermal cortex is fairly thick. The dermal pores, measuring 40–100 μ across, are thickly distributed over the dermal surface. They lead, either singly or two or three together, into prolonged inhalant canals extending deep into the chamber layer.

The flagellate chambers are arranged radially with regularity. They are nearly straight, circular in transverse section, distally more or less narrowed, and usually, though not always, undivided. Their distal ends are all in about the same plane, just beneath the dermal cortex. The position of nucleus in collar cells is apical.

The gastral cortex is thinner than the dermal and the exhalant canals are short. These spring each from a single or more flagellate chambers. Diaphragm present at apopyle. Gastral openings of exhalant canals are angular mesh-like gaps, measuring about 0.2 mm. across on an average.

Skeleton (Pl. II., fig. 14).

The dermal skeleton is fairly well-developed, being composed of densely intercrossing rays of tangentially placed sagittal triradiates and of the paired rays of subdermal pseudosagittal triradiates.

There is little regularity in the orientation of the dermal triradiates, save in the tendency of their basal rays to take ab-ocular direction.

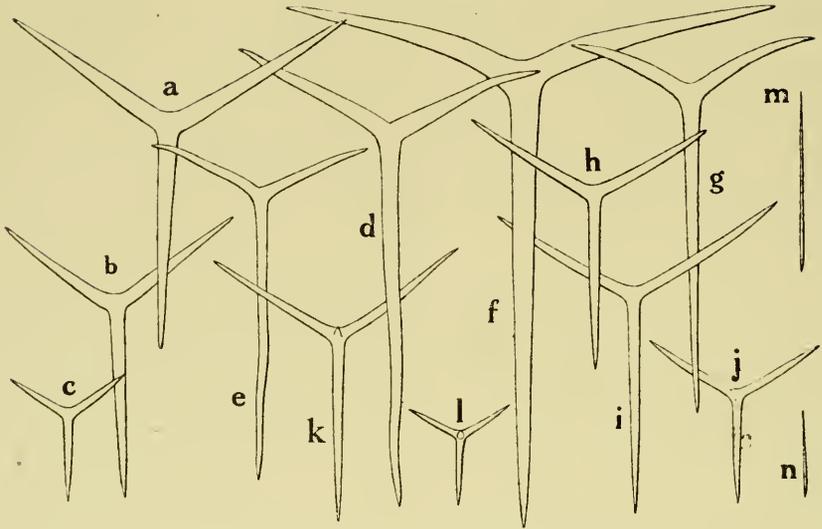
The tubar skeleton is typically inarticulate, being composed of the centripetal basal rays of subdermal pseudosagittal triradiates and of the centrifugal basal rays of subgastral sagittal triradiates.

The gastral skeleton is more weakly developed than the dermal. It is made up of slender triradiates and quadriradiates, both tangentially placed but otherwise without definite orientation, and of the strongly developed paired rays of subgastral sagittal triradiates.

Around the osculum are small oxea which are placed longitudinally and parallel with one another.

Spicules.

Dermal triradiates (textfig. 4, *a*, *b*, *c*).—Slightly sagittal. Basal ray is, as usual, slightly longer and thicker than paired rays; quite straight, tapering from base gradually to a sharp point, 130–460 μ long and 20–48 μ thick. Paired rays nearly equally long, slightly

Textfig. 4. *Grantessa basipapillata*.

- | | |
|----------|-------------------------|
| a, b, c, | Dermal triradiates. |
| d, e, | Subdermal triradiates. |
| f, g, | Subgastral triradiates. |
| h, i, j, | Gastral triradiates. |
| k, l, | Gastral quadriradiates. |
| m, n, | Oxea of oscular margin. |
- (a—c, 66× ; d—n, 100×).

curved at base and tapering throughout their entire length, 150–400 μ long and 16–36 μ thick.

Subdermal triradiates (textfig. 4, *d, e*).—Pseudosagittal, irregular. All rays are of nearly same thickness but of different length and shape. Basal ray nearly straight, sometimes slightly crooked, with sharp point, 360–480 μ long and 20–28 μ thick. The longer paired ray slightly curved and crooked, gradually tapering, sharp-pointed, 140–200 μ long and 16–24 μ thick. The shorter paired ray more straight than the longer, gradually and sharply pointed, 130–170 μ long and 20–28 μ thick.

Subgastral triradiates (textfig. 4, *f, g*).—Strongly sagittal, strongly developed. Basal ray quite straight, tapering from base to a sharp point, slightly thicker than the paired rays, 400–550 μ long

and 28–40 μ thick. Paired rays strongly diverging, almost of equal length, gradually tapering, sharply pointed, curved, lying in a plane different from that of basal ray, 140–300 μ long and 24–30 μ thick.

Gastral triradiates (textfig. 4, *h, i, j*).—All rays are of nearly equal thickness. Basal ray quite straight, tapering throughout their entire length, sharply pointed, 140–280 μ long and 12–16 μ thick. Paired rays nearly equal in length, either straight or slightly curved, gradually and sharply pointed, 130–200 μ long and 12–16 μ thick.

Gastral quadriradiates (textfig. 4, *k, l*).—Facial rays are exactly similar to gastral triradiates. Apical ray poorly developed. Basal ray 90–250 μ long and 12–16 μ thick. Paired rays 70–200 μ long and 8–12 μ thick. Apical ray smooth, slightly curved, sharply pointed, 20–30 μ long and 12 μ thick.

Oxea of oscular margin (textfig. 4, *m, n*).—Quite straight, spindle-shaped, usually thickest nearer proximal than distal end, tapering towards both sharply pointed ends. The free projecting ends usually broken off. Some complete examples measured 110–240 μ long and 3–4 μ thick.

Locality.—Dökotsba, Sagami Sea.

5. *Grantessa mitsukurii*, n. sp.

(Pl. I., fig. 7; Pl. II., fig. 15; textfig. 5).

The single specimen (Sci. Coll. Spec. No. 24), representing this new species, is a small colony of irregularly anastomosing tubes, the individuality of which is indicated only by the oscula numbering six in all. Each osculum is surrounded by a very feebly developed fringe of oxea. The specimen was collected by the late

Prof. MITSUKURI at Koajiro, close to the Misaki Marine Biological Station. The tubes measure 3–5 mm. in breadth, and the wall 1 mm. in thickness. The size of oscula is various, ranging from $\frac{1}{2}$ –2 mm. in diameter. They lead into the common gastral cavity of a habitus corresponding to that of the entire specimen. The colour in alcohol is greyish white. The texture is rigid.

Canal system (Pl. II., fig. 15).

The canal system is syconoid, though not in a very typical way. The dermal cortex is very strongly developed. The dermal pores are circular and small, measuring about $60\ \mu$ across on an average.

The flagellate chambers, which are radially arranged around the gastral cavity, extend through the greater part of the thickness of wall. They are rather narrow, not quite straight, but more or less crooked; most of them branch once or twice in the distal parts. The position of nucleus in collar cells is apical.

The gastral cortex is much thinner than the dermal. It forms a continuous lacework, the angular meshes (150 – $300\ \mu$ across) of which are visible to the naked eye. The meshes referred to constitute the openings of exhalant canals into the gastral cavity. The exhalant canals, arising from a single or more flagellate chambers, are short.

Skeleton (Pl. II., fig. 15).

The fairly thick dermal skeleton is made up of: 1) sub-regular or slightly sagittal triradiates, lying tangentially in several layers in a rather confuse arrangement; 2) the paired rays of subdermal pseudosagittal triradiates; and 3) small oxea grouped into small tufts which project from the sponge surface.

The tubar skeleton is of the inarticulate type, being composed of the strong basal rays of subdermal pseudosagittal triradiates as well as of subgastral sagittal triradiates of varying sizes, respectively directed centripetally and centrifugally.

The gastral skeleton is thinner than the dermal. It is composed of the strong paired rays of subgastral sagittal triradiates, and of sagittal triradiates which are similar to those of the dermal skeleton except in being slightly smaller and rather more regularly arranged.

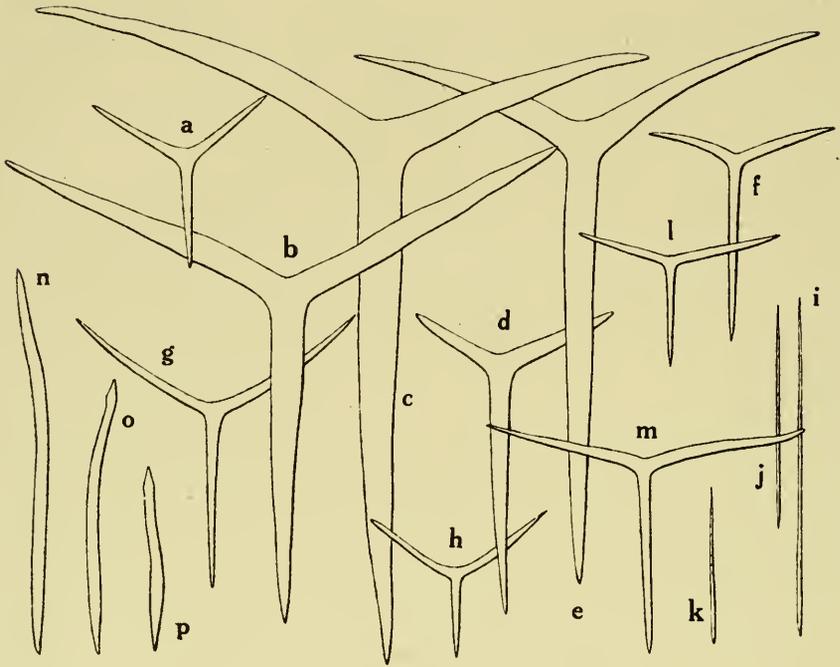
The skeleton of the oscular margin is composed of oxea and triradiates, both placed densely together. The former run longitudinally and parallel with one another, the latter have strongly divergent paired rays.

Spicules.

Dermal triradiates (textfig. 5, *a, b*).—Subregular or slightly sagittal, varying in size. All rays conical, nearly straight, often slightly irregularly contoured, tapering from base to sharply pointed end, 130–410 μ long and 20–50 μ thick. Towards the osculum the triradiates become distinctly sagittally differentiated.

Subdermal triradiates (textfig. 5, *c, d*).—Pseudosagittal, irregular, strongly developed. All the rays differing in length, somewhat irregular in contour. Basal ray almost straight, tapering from base to sharp point, occasionally slightly thicker than paired rays, 320–630 μ long and 30–60 μ thick. Paired rays are equal in thickness, but unequal in length and shape. The longer ray usually curved, sometimes crooked, gradually tapering, 160–430 μ long and 30–50 μ thick. The shorter ray less curved than the longer, gradually pointed, 120–330 μ long and 30–50 μ thick.

Subgastral triradiates (textfig. 5, *e, f*).—Strongly sagittal. On

Textfig. 5. *Granulosa mitsukurii*.

- | | |
|----------|--------------------------------|
| a, b, | Dermal triradiates. |
| c, d, | Subdermal triradiates. |
| e, f, | Subgastral triradiates. |
| g, h, | Gastral triradiates. |
| i, j, k, | Oxea. |
| l, m, | Triradiates of oscular margin. |
| n, o, p. | Oxea of oscular margin. |
- (All figs. 100×).

the whole, they are about equally well developed as subdermal pseudosagittal triradiates. Basal ray almost straight, gradually sharp-pointed, slightly thicker than paired rays, 240–580 μ long and 20–50 μ thick. Paired rays almost equally long, tapering from base to sharp point, 130–310 μ long and 16–50 μ thick.

Gastral triradiates (textfig. 5, *g, h*).—Slender. Basal ray quite straight, tapering in their entire length, sharply pointed, 120–220 μ long and 16–24 μ thick. Paired rays curved at base, gradually

sharp-pointed, nearly as long as basal ray, 160–200 μ long and 16–24 μ thick.

Oxea (textfig. 5, *i, j, k*).—Very small, slender, straight, broadest nearer one end than the other, tapering towards both pointed ends. One example measured was 130 μ long and 4 μ in the thickest part.

Triradiates of oscular margin (textfig. 5, *l, m*).—Basal ray quite straight, gradually tapering, sharp-pointed, 130–250 μ long and 12–16 μ thick. Paired rays stouter and shorter than basal ray, nearly at right angles to the latter; straight or slightly curved, 120–220 μ long and 16–20 μ thick.

Oxea of oscular margin.—There exist two kinds of oxea. The thicker kind is irregularly curved and rather bluntly pointed at ends; sometimes provided with a nodiform ring at the free end, 250–470 μ long and 16–20 μ thick (textfig. 5, *n, o, p*). The thinner kind resembles oxea of dermal cortex, but is longer; broadest near the inner end, 300–460 μ or more long and 4–6 μ thick.

Note.—This interesting species seems to be closely related to *Grantessa sycilloides* (SCHUFFNER)¹⁾ of the Indian Ocean, but can be distinguished from it chiefly by the external appearance, by the presence of thin dermal oxea, by the flagellate chambers being laterally not fused with one another, and by the basal rays of subgastral sagittal triradiates being equally developed as in those of subdermal. The species is named after the late Professor MITSUKURI, the collector of the type-specimen.

Locality.—Koajiro Misaki.

1) *Sycortis sycilloides* SCHUFFNER, 1887 (1), p. 420, Taf. XXV, Fig. 10.

Genus **Heteropia** CARTER (emend.).

6. *Heteropia striata*, n. sp.

(Pl. I., fig. 8 ; Pl. II., fig. 16 ; textfig. 6).

This new species is based on three specimens in the Science College. Two of them were obtained by the late Professor MITSUKURI at Koajiro, near the Misaki Marine Biological Station. A third specimen was collected by myself at Aburatsubo, also close to the Misaki Marine Biological Station. It was found attached to the under side of a floating log.

The first specimen (Sci. Coll. Spec. No. 25 ; Pl. I., fig. 8), which is herewith made the type of the species, is a small colony of about eighteen tubular individuals, united together at their base and most of which are bent in the same direction. They are broadest at base and taper distally. The larger individuals are provided with terminal osculum fringed with very feebly developed trichoxea ; the smaller individuals show neither osculum nor the fringe. The largest individual measures 8 mm. in total length and 3 mm. in greatest breadth, the wall reaching about 0.7 mm. in thickness. The osculum is circular with a diameter of about 0.6 mm. The surface shows longitudinal striation due to the presence of large oxea in dermal cortex, and is hispid on account of vertically projecting hair-like oxea. Colour in alcohol is white ; texture rigid.

The second specimen (Sci. Coll. Spec. No. 26) closely resembles the first in both external appearance and microscopical structure.

The third specimen (Sci. Coll. Spec. No. 27) is the largest of all. The colony is composed of numerous branching and anastomosing tubes of varying calibre. Most of the tubes are provid-

ed at their free end with a circular osculum of $\frac{1}{2}$ – $1\frac{1}{2}$ mm. diameter; the marginal fringe is scarcely visible to the naked eye. The tubes attain a breadth of about 5 mm.; thickness of wall about 1 mm. The colour of the sponge in the preserved state is brownish white.

The following description is based on the type-specimen.

Canal system (Pl. II., fig. 16).

The canal system of this species is not of the true syconoid type, unlike others of the genus. It is rather of an intermediate type between the sylleibid and the leuconoid.

The flagellate chambers vary much in shape and size, from those of spherical shape measuring 50–100 μ diameter to others of an elongate sac-like configuration, say, 200 μ by 80 μ in dimension. They are closely set in the chamber layer, showing a somewhat radial—though not quite strictly radial—arrangement around wide and long, sometimes slightly branched exhalant canals. The position of nucleus in the collar cells is apical.

The exhalant canals perforate the thin gastral cortex and open into the gastral cavity by angular mesh-like pores of various sizes, up to 150–250 μ in length.

Skeleton (Pl. II., fig. 16).

The fairly thick dermal skeleton consists of: 1) small sagittal triradiates, lying tangentially in several layers, with their basal rays generally directed towards sponge base; 2) large oxea running longitudinally; and 3) the paired rays of subdermal pseudo-sagittal triradiates. Besides these, there may occur slender hair-like oxea, very sparsely distributed and projecting on the dermal surface.

The tubar skeleton may be said to be on the whole of the inarticulate type. It is chiefly composed of the basal rays of subdermal pseudosagittal and subgastral sagittal triradiates. The oppositely directed rays in question lie side by side almost in their entire length. Usually the subdermal triradiates are less developed than the subgastral.

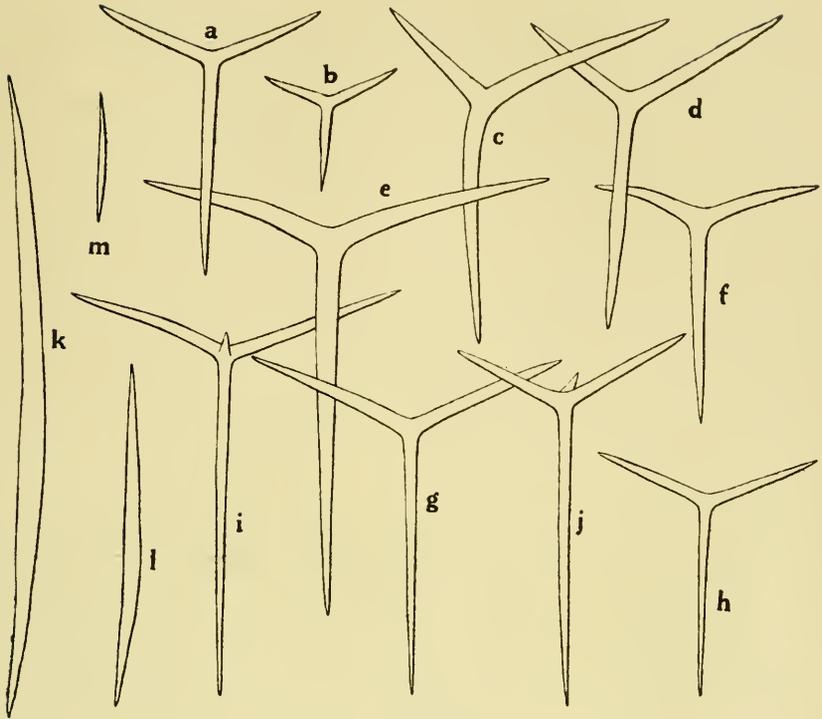
The gastral skeleton is much thinner than the dermal. It is made up of the paired rays of subgastral sagittal triradiates, of sagittal triradiates placed tangentially and with their basal rays pointing towards sponge base, and of a few quadriradiates which have their short apical ray projecting into the gastral cavity.

The skeleton of oscular margin is, in full-grown individuals, composed of oxea and of triradiates, both closely set. The former are of two kinds: the one is similar to that found in dermal cortex, while the other is very thin and hair-like. The oscular triradiates, which are apparently differentiated from the gastral triradiates, have very slender basal ray and the stouter paired rays standing nearly at right angles to it.

Spicules.

Dermal triradiates (textfig. 6, *a*, *b*).—Slightly sagittal. All rays of equal thickness, tapering from base to sharp point. Basal ray quite straight, 80–170 μ long and 8–12 μ thick. Paired rays of about the same length, almost straight, 60–100 μ long and 8–12 μ thick.

Subdermal triradiates (textfig. 6, *c*, *d*).—Pseudosagittal, stout, all rays of different length but of nearly the same thickness, not quite smooth. Basal ray generally curved near base, gradually and sharply pointed. Paired rays of different length and shape. The longer ray is slightly shorter than the basal ray, almost

Textfig. 6. *Heteropia striata*.

- | | |
|----------|-------------------------|
| a, b, | Dermal triradiates. |
| c, d, | Subdermal triradiates. |
| e, f, | Subgastral triradiates. |
| g, h, | Gastral triradiates. |
| i, j, | Gastral quadriradiates. |
| k, l, m, | Dermal oxea. |
- (a—j, 150×; k—m, 40×).

straight excepting the slight curvature near base, gradually tapering to a sharp point. The shorter ray almost straight, tapering from base to sharp point. In a typical case, the basal ray is $190\ \mu$ long; the longer paired ray $130\ \mu$ long; and the shorter paired ray $110\ \mu$ long; all $16\ \mu$ thick.

Subgastral triradiates (textfig. 6, *e, f*).—Sagittal, with sharply pointed rays of nearly equal thickness. Basal ray straight, tapering from base to sharp point, $150\text{--}300\ \mu$ long and $16\text{--}20\ \mu$ thick.

Paired rays much diverging, almost of equal length, slightly curved, 90–170 μ long and 16–20 μ thick.

Gastral triradiates (textfig. 6, *g, h*).—Sagittal. Basal ray usually much longer and slightly thinner than paired rays, quite straight, tapering gradually from base to sharp point, 170–230 μ long and 8–12 μ thick. Paired rays almost of equal length, straight or slightly curved, gradually and sharply pointed, 90–150 μ long and 12–16 μ thick. The spicules closely resemble dermal triradiates but may be distinguished from these by the larger size, by the basal ray being thinner than paired rays, and by their more regular arrangement.

Gastral quadriradiates (textfig. 6, *i, j*).—Similar to gastral triradiates, except in the presence of apical ray. Apical ray very short, thinner than either of the basal or paired rays, slightly curved and gradually sharp-pointed, 40–60 μ long and 6–8 μ thick.

Large dermal oxea (textfig. 6, *k, l, m*).—Strongly developed, spindle-shaped, a little irregular in outline, generally broadest at a point nearer proximal than distal end and tapering towards both sharply pointed ends. They are more or less curved, and are of very variable length, 0.49–2 mm. long and 30–90 μ thick.

Trichoxea of dermal cortex.—Hair-like, straight or slightly curved, generally with the free end broken off, 2–4 μ thick. A large example measured 700 μ in length and 2 μ in thickness.

Trichoxea of oscular margin.—Nearly like those of dermal cortex. Here again, the free end is usually found broken off. An example, incomplete at one end, measured 240 μ in length and 4 μ in thickness.

Note.—I have referred this new species to the genus *Heteropia*, chiefly because of the presence in dermal cortex of the large oxea running nearly parallel with the surface. Remarkable is the non

syconoid type of its canal system, in which respect it differs from all other members of the genus. It is evidently a species closely related to *Heteropia glomerosa*.¹⁾

Localities.—Kojiro and Aburatsbo, near the Misaki Marine Biological Station.

Genus **Amphiute** HANITSCH.

7. *Amphiute ijimai*, n. sp.

(Pl. I., fig. 9; Pl. II., fig. 17; textfig. 7).

This new species is represented in the collection by three specimens, all obtained at Dōketsba, Sagami Sea, from a depth of 215–257 m.

The first specimen (Sci. Coll. Spec. No. 18), which I make the type of the species, is a single person of a somewhat curved and laterally compressed, elongate cylindrical form, broadest at a part a little above the middle. The total length is about 60 mm. and the greatest breadth 12 mm. The osculum is in part damaged, besides being in a collapsed state. It shows neither an oscular fringe nor a collar. The gastral cavity is deep and extends throughout the entire length of the sponge. The lower part of the sponge is drawn out in a stalk-like manner, the body in this region being narrowed to a breadth of 5 mm. The dermal surface of the sponge, except in the lower parts, is smooth and shows fine longitudinal striation due to the presence of large oxea in dermal cortex. Thickness of the wall, as measured in the broadest part of the sponge, is about 1 mm. The

1) *Leuconia glomerosa* BOWERBANK, Proc. Zool. Soc. London, 1873, pp. 17–19, Pl. IV, Figs. 1–6; *Heteropia glomerosa*, DENDY, 1915 (4), pp. 83–86, Pl. I, Figs. 3, 3a, 3b; Pl. II, Figs. 8a–8g.

colour in alcohol is greyish white. The texture is rather soft and not very compact.

The second specimen (Sci. Coll. Spec. No. 19) consists of a single cylindrical person with the lower parts torn off. It is 37 mm. long and 10 mm. broad in the broadest part, where the thickness of wall is less than 2 mm. The osculum, turned towards one side, is irregular in shape and measures about 3 mm. across in a way. Its margin is very thin and without an obvious fringe or collar. The colour in alcohol is greyish white; the texture is firm and elastic.

The third specimen (Sci. Coll. Spec. No. 28; Pl. I., fig. 9) is rather spindle-shaped and slightly laterally compressed. It measures 80 mm. in total length, 12 mm. in greatest breadth, and about $1\frac{1}{2}$ mm. in maximum thickness of wall. The osculum at the upper truncate end is almost naked, with thin irregularly undulating margin. It leads into a wide and deep gastral cavity. The narrowed stalk-like base of the sponge is provided with a number of small irregular processes for attachment. The colour in alcohol is white and the texture is fairly firm and elastic.

The following description is based on the type (first) specimen.

Canal system (Pl. II., fig. 17).

The canal system stands somewhat intermediate between syllebid and leuconoid types, approaching more nearly the latter than the former. The dermal pores, measuring 80–150 μ in diameter, are closely distributed all over the surface. Canals starting from several pores join together to form very wide inhalant canals which run deep into the wall. The exhalant canals are also very wide and extend through the greater part of the wall thickness.

They open into the gastral cavity by apertures of 150–250 μ diameter, separated by interspaces of 50–250 μ .

The flagellate chambers, densely arranged between inhalant and exhalant canals, are generally of an oval shape, about 80–150 μ in the shorter diameter. Some of them, especially those in the periphery of the sponge, may be of a more or less elongate shape and are arranged radially around the exhalant canal, thus suggesting the sylleibid condition.

Skeleton (Pl. II., fig. 17).

The dermal skeleton is composed of microxea, triradiates, large oxea and the paired rays of subdermal pseudosagittal triradiates. Nearly all the microxea stand vertically to the dermal surface. Those at the oscular margin stand out parallel with the long axis of the sponge. The triradiates are placed tangentially in a few layers, with the basal ray pointing more or less downwards. The large oxea generally run longitudinally, covering all over the sponge surface.

The tubar skeleton is of the inarticulate type, being composed of the centripetal rays of subdermal pseudosagittal triradiates and of the centrifugal rays of subgastral sagittal triradiates. The ends of the rays mentioned usually reach beyond the middle of the wall, and there exist between them no intermediate spicules indicative of an articulate skeleton.

The gastral skeleton is thinner than the dermal and contains the paired rays of subgastral triradiates as well as large oxea and quadriradiates. The oxea nearly resemble those of the dermal cortex, but are much less numerous and somewhat more irregularly placed. The quadriradiates are slender-rayed and fairly large in

number. Their basal rays point downwards, while the apical rays project into the gastral cavity.

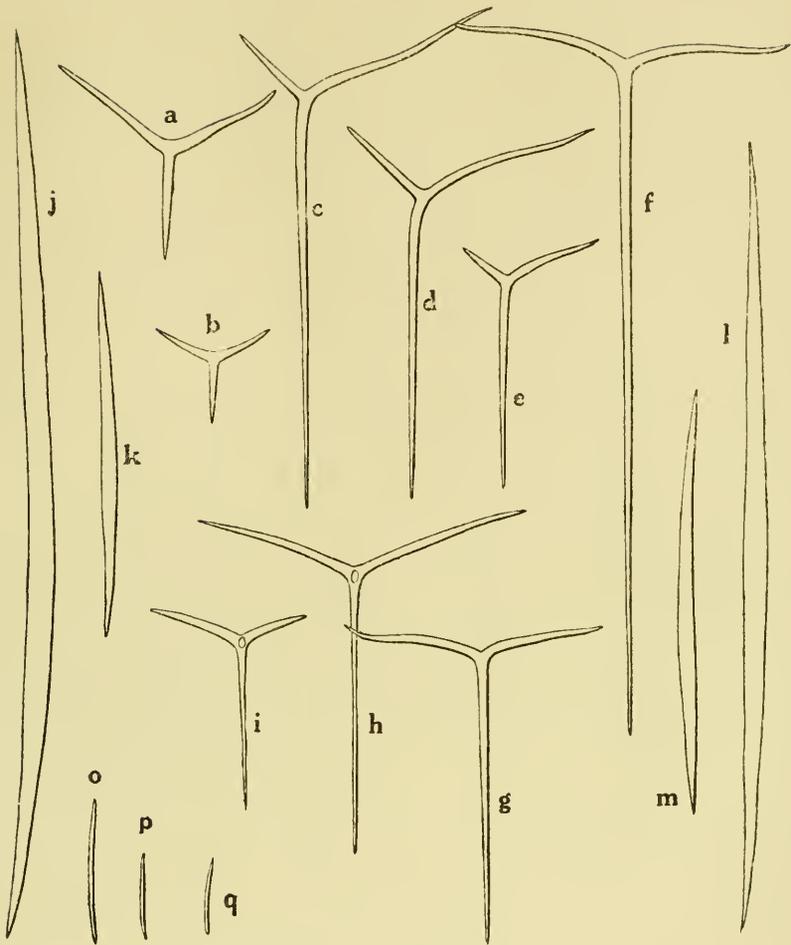
Spicules.

Dermal triradiates (textfig. 7, *a, b*).—Typically slightly sagittal. Basal ray straight, gradually tapering and sharply pointed, either slightly longer or shorter and a little more slender than the paired rays, 80–190 μ long and 8–12 μ thick. The paired rays subequal in length, generally straight excepting a slight curvature near base, sometimes a little crooked, gradually tapering, sharp-pointed, 80–180 μ long and 12–14 μ thick.

Subdermal triradiates (textfig. 7, *c, d, e*).—Pseudosagittal. All rays of different length and shape. Basal ray longer than the paired rays, straight except being slightly bent near base, gradually sharp-pointed, 280–600 μ long and 14–16 μ thick. The shorter of the paired rays is nearly straight, gradually tapering and sharply pointed, 80–170 μ long and 12 μ thick. The longer of the paired rays slightly bent near base, sometimes crooked farther out, gradually and sharply pointed; they are as thick as the basal ray and in most cases thicker than the shorter of the paired rays, 150–280 μ long and 14–16 μ thick.

Subgastral triradiates (textfig. 7, *f, g*).—Strongly sagittal, with the paired rays very strongly divergent. Basal ray quite straight, and gradually sharp-pointed, 380–880 μ long and 12 μ thick. Paired rays almost as thick as the basal ray, equal or slightly differentiated in length, gently curved or crooked, gradually tapering and sharply pointed, 170–220 μ long and 12 μ thick.

Gastral quadriradiates (textfig. 7, *h, i*).—Slender; facial rays sagittal in most cases. Basal ray generally the longest, quite straight, distinctly tapering in the basal parts but less so in the

Textfig. 7. *Amphite ijimai*.

- | | |
|----------|-------------------------|
| a, b, | Dermal triradiates. |
| c, d, e, | Subdermal triradiates. |
| f, g, | Subgastral triradiates. |
| h, i, | Gastral quadriradiates. |
| j, k, | Large dermal oxea. |
| l, m, | Large gastral oxea. |
| o, p, q, | Microxea. |

(a-i, o-q 100×; j-m, 40×).

remaining greater parts, 230-360 μ long and 8 μ thick. Paired rays slightly curved, a little thicker than the basal, with a wide oral angle, generally equally long but sometimes differentiated

in length, nearly uniformly thick in the greater parts of their length, pointed at end, 90–230 μ long 12 μ thick. Apical ray almost straight, sometimes slightly crooked in the apical parts, gradually sharp-pointed, under 150 μ length and 8 μ thickness.

Large oxea of dermal cortex (textfig. 7, *j, k*).—Usually large, straight or slightly curved, thickest at about the middle, gradually tapering towards sharp-pointed ends, 1.2–3 mm. long and 50–80 μ thick.

Large oxea of gastral cortex (textfig. 7, *l, m*).—Nearly similar to those of dermal cortex, being differentiated from these only in the fewer number and in the less regular arrangement.

Microxea (textfig. 7, *o, p, q*).—Generally slightly curved, nearly uniformly thick throughout their length, and pointed at both ends, 110–210 μ long and 6–8 μ thick.

Note.—This species appears to be referable to *Amphiute* HANITSCH, by the presence of subdermal pseudosagittal and subgastral triradiates and of the large longitudinal oxea in both dermal and gastral cortices. But it differs in several respects from the only other known species of the genus *Amphiute paulini*, which was first described by HANITSCH (1, 2) and afterwards also by BREITFUSS (4) from the west coast of Portugal. The difference consists chiefly in the present form being solitary, in the osculum being destitute of a distinct and conspicuous fringe, and in the dimensions and other details of the characters of most spicules.

I take pleasure in naming this interesting species after Professor IJIMA.

Locality.—Dōketsba, Sagami Sea.

List of References.

- Arnesen, E.** (1) (1901). Spongier fra den norske kyst. I. Calcarea. Systemmatisk katalog med bemerkinger og bestemmelsestabel. Bergens Mus. Aarbog, 1900 (1901), No. 5.
- Bowerbank, J. S.** (1) (1872-1876). Contributions to a General History of the Spongiadae. Proc. Zool. Soc. London, 1872, pp. 115-129, 196-202, 626-634, Pl. V, VI, X, XI, XLVI-XLIX; 1873, pp. 3-25, 319-333, Pl. I-IV, XXVIII-XXXI; 1874, pp. 298-305, Pl. XLVI, XLVII; 1875, pp. 281-296; 1876, pp. 768-775, Pl. LXXVIII-LXXXI.
- Breitfuss, L.** (1) (1896). Kalkschwämme der Bremer-Expedition nach Ost-Spitzbergen im Jahre 1889 (Prof. W. KÜKENTHAL und Dr. A. WALTER). Zool. Anzeiger, Bd. XIX, No. 514, pp. 426-432.
- (2) (1897). Catalog der Calcarea der zoologischen Sammlung des königlichen Museums für Naturkunde zu Berlin. Arch. für Naturgesch., Jahrgang LXIII, Bd. 1, pp. 205-226.
- (3) (1898). Kalkschwammfauna des weissen Meeres und Eismeerküsten des europäischen Russlands mit Berücksichtigung und Aufstellung der Kalkschwammfauna der arktischen Region. Memoires de l'Acad. Imperiales Sciences, St. Petersburg, (Ser. 8), Vol. VI, No. 2, Taf. I-IV.
- (4) (1898). Kalkschwammfauna der Westküste Portugals. Zool. Jahrb. Syst. Abt. Bd. XI, pp. 89-102, Taf. XI.
- (5) (1898). Kalkschwammfauna von Spitzbergen. Nach dem Sammlung der Bremer-Expedition nach Ost-Spitzbergen im Jahre 1889 (Prof. W. KÜKENTHAL und Dr. A. WALTER). Zool. Jahrb. Syst. Abt. Bd. XI, pp. 103-120, Taf. XII, XIII.
- Carter, H. J.** (1) (1885-1886). Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia. Ann. Mag. Nat. Hist., (Ser. 5), Vol. XVII, pp. 431-441, 502-516; Vol. XVIII, pp. 34-55, 126-149.

- Carter, H. J.** (2) (1886). Description of a new species (*Aphroceras ramosa*). (in HIGGIN, T., Report on the Porifera of the L.M.B.C. district). Proc. Lit. Phil. Soc. Liverpool, Vol. XL. Appendix.
- Dendy, A.** (1) (1892). Synopsis of the Australian Calcarea Heterocœla; with a proposed Classification of the Group and Descriptions of some New General and Species. Proc. Roy. Soc. Victoria, (n.s.), Vol. V, pp. 69-116.
- . (2) (1893). Studies on the Comparative Anatomy of Sponges. V. Observations on the Structure and Classification of the Calcarea Heterocœla. Quart. Journ. Microsc. Sci., (n.s.), Vol. XXXV, pp. 159-257, Pl. X-XIV.
- . (3) (1913). Report on the Calcareous Sponges collected by H.M.S. "Sealark" in the Indian Ocean. Trans. Linnean Soc. London, Zool. Vol. XVI. Part. I, pp. 1-29, Pl. I-V.
- . (4) (1915). Report on the Calcareous Sponges collected by Mr. JAMES HORNELL at Okhamandal in Kattiawar in 1905-6. Report to the Government of Baroda on the Marine Zoology of Okhamandal in Kattiawar, Part II, 1915.
- Dendy, A. and Row, W. H.** (1) (1913). The Classification and phylogeny of the Calcareous Sponges, with a Reference List of all the described Species, systematically arranged. Proc. Zool. Soc. London, 1913, pp. 704-813.
- Haeckel, E.** (1) (1872). Die Kalkschwämme, eine Monographie. Berlin, 1872.
- Hanitsch, R.** (1) (1894). Amphite, eine neue Gattung heterocœler Kalkschwämme. Zool. Anzeiger, Vol. XVII, p. 433.
- . (2) (1895). Notes on a Collection of Sponges from the west coast of Portugal. Trans. Liverpool Biol. Soc., Vol. IX, pp. 205-219, Pl. XII, XIII.
- Jenkin, C. F.** (1) (1908). The Marine Fauna of Zanzibar and British East Africa, from Collections made by CYRIL CROSSLAND, M. A., in the Years 1901 and 1902. The Calcareous Sponges. Proc. Zool. Soc. London, 1908, pp. 434-456.

- Lambe, L. M.** (1) (1900). Sponges from the Coast of North-eastern Canada and Greenland. *Trans. Roy. Soc. Canada, (Ser. 2), Vol. VI, Sect. 4*, pp. 19-49, Pl. I-VI.
- Lendenfeld, R. von.** (1) (1885). A Monograph of the Australian Sponges. Part III. The Calcispongiae. *Proc. Linn. Soc. New South Wales, Vol. IX*, pp. 1083-1150, Pl. LIX-LXVII.
- Polejaeff, N.** (1) (1883). The Calcarea. Report on the Scientific Results of the Voyage of H.M.S. Challenger, *Zoology, Vol. VIII*.
- Preiwisch, J.** (1) (1904). Kalkschwämme aus dem Pacific. Ergebnisse einer Reise nach dem Pacific, Schaninsland 1896-1897. *Zool. Jahrb. Syst. Abt., Bd. XIX*, pp. 9-26, Taf. II-IV.
- Ridley, S. O.** (1) (1881). Spongida, Account of the Zoological Collections made during the Survey of H.M.S. Alert in the Straits of Magellan and on the Coast of Patagonia. *Proc. Zool. Soc. London, 1881*, pp. 107-137, Pl. X, XI.
- Row, W. H.** (1) (1909). Report on the Sponges Collected by Mr. CYRIL CROSSLAND in 1904-5. Part I. Calcarea. *Journ. Linn. Soc. London, Zoology, Vol. XXXI*, pp. 182-214, Pl. XIX, XX.
- Schuffner, O.** (1) (1877). Beschreibung einiger neuer Kalkschwämme. *Jenaische Zeitschr. Vol. XI*, pp. 403-433, Pl. XXIV-XXVI.

S. HŌZAWA :
ON SOME JAPANESE CALCAREOUS SPONGES.

PLATE I.

Plate I.

- Fig. 1. *Grantessa slimeji*, n. sp.; natural size.
Fig. 2. *Grantessa slimeji*, n. sp.; natural size.
Fig. 3. *Grantessa sayamiana*, n. sp.; natural size.
Fig. 4. *Grantessa intusarticulata* (CARTER); natural size.
Fig. 5. *Grantessa intusarticulata* (CARTER); natural size.
Fig. 6. *Grantessa basipapillata*, n. sp.; natural size.
Fig. 7. *Grantessa mitsukurii*, n. sp.; natural size.
Fig. 8. *Heteropia striata*, n. sp.; natural size.
Fig. 9. *Amphiute ijimai*, n. sp.; natural size.

S. HŌZAWA :
ON SOME JAPANESE CALCAREOUS SPONGES.

PLATE II.

Plate II.

- Fig. 10. *Grantessa shimeji*, n. sp.
Part of a horizontal section ; 150 × .
- Fig. 11. *Grantessa shimeji*, n. sp.
Part of a horizontal section ; 150 × .
- Fig. 12. *Grantessa saganiana*, n. sp.
Part of a horizontal section ; 100 × .
- Fig. 13. *Grantessa intusarticulata* (CARTER).
Part of a horizontal section ; 100 × .
- Fig. 14. *Grantessa basipapillata*, n. sp.
Part of a horizontal section ; 100 × .
- Fig. 15. *Grantessa mitsukurii*, n. sp.
Part of a horizontal section ; 100 × .
- Fig. 16. *Heteropia striata*, n. sp.
Part of a horizontal section ; 150 × .
- Fig. 17. *Amphiute ijimai*, n. sp.
Part of a horizontal section ; 100 × .

Fig. 10

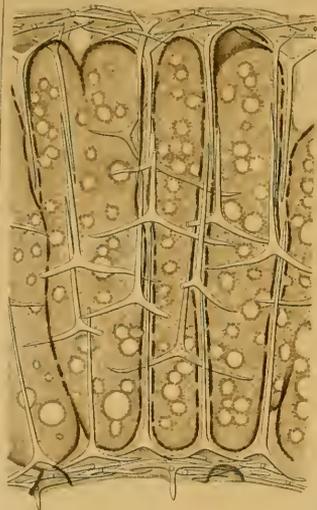


Fig. 11

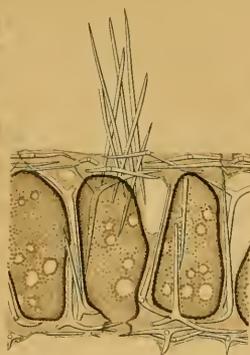


Fig. 16



Fig. 14

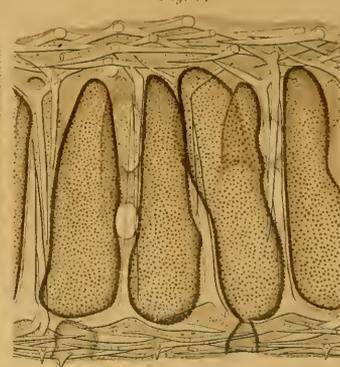


Fig. 13

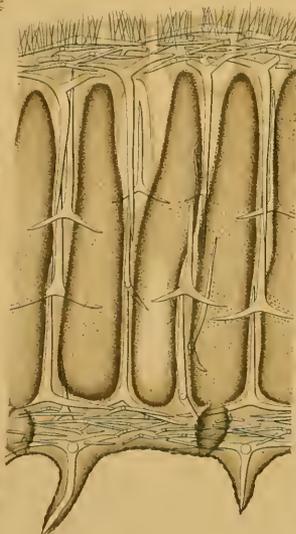


Fig. 15

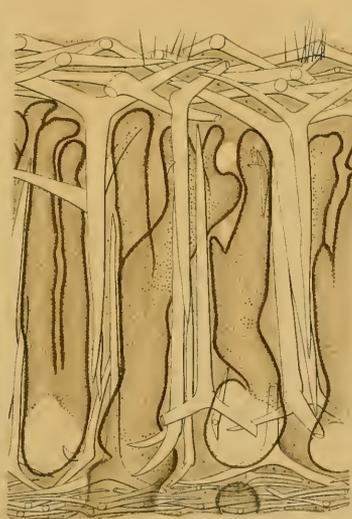


Fig. 17

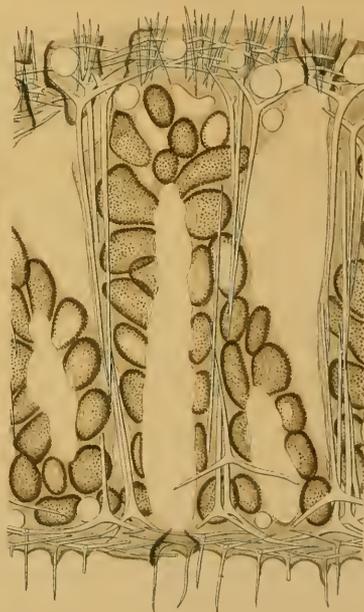


Fig. 12



S. Hozawa del.