REPORT ON THE CALCAREOUS SPONGES OBTAINED BY THE SURVEY OF THE CONTINENTAL SHELF BORDERING ON JAPAN.

By

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(With Plate I and 4 text-figures)

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The calcareous sponges dealt with in the present report were secured by the survey of the continental shelf bordering on Japan. The survey was undertaken by the Imperial Fisheries Institute in Tokyo, and was carried out during the years from 1922 to 1930. The number of stations at each of which the dredging was tried, is very great, reaching 658, and they are widely distributed among the seas surrounding Hondo, Shikoku, and Kiushiu.

The specimens of calcareous sponges which have thus far been obtained, and which were submitted for examination and report are thirteen in all. They represent eight species belonging to five genera and three families. Of these eight species, four are identical with those previously known, while the remaining four are here described for the first time.

In view of the richness of the Calcarea fauna in Japanese waters, it is a matter for inquiry why the species obtained by this survey are so surprisingly few.

The following is the list of the species.

Family Homocoelidae DENDY and ROW.

1) *Leucosolenia canariensis* MICHLUCHO-MACLAY.
2) *Leucosolenia soyo*, n. sp.

Family Heteropiidae DENDY.

3) *Grantessa intusarticulata* CARTER.
4) *Amphiute ijimai* HÔZAWA.

Family Grantiidae DENDY.

5) *Grantia glabra*, n. sp.
6) *Grantia kujiensis*, n. sp.
7) *Leucandra dura* HÔZAWA.
9) *Leucandra yuriagensis*, n. sp.

I shall next give a list of the stations, showing their position, depth, and the specimens obtained at each.

Station 61. Lat. N. 40° 3′ 24″; long. E. 142° 11′ 33″;
Off Fudai, Rikuchiu;
depth 170 m. ..... *Leucosolenia soyo*, n. sp. (Spec. No P. 193)

Station 64. Lat. N. 40° 14′ 50″; long. E. 142° 5′ 10″;
Off Kuji, Rikuchiu;
depth 150 m. ..... *Leucosolenia canariensis* (Spec. No. P. 50)
Grantia kujiensis, n. sp. (Spec. No. P. 52)

Station 66. Lat. N. 40° 28′ 40″; long. E. 142° 1′ 51″;
Off Hachinohe, Mutsu;
depth 165 m. ..... *Leucosolenia canariensis* (Spec. No. P. 32)

Station 102. Lat. N. 38° 6′ 30″; long. E. 141° 11′;
Off Yuriage, Rikuzen;
depth 37 m. ..... *Leucandra yuriagensis*, n. sp. (Spec. No. P. 107)

Station 122. Lat. N. 36° 54′ 30″; long. E. 141° 17′;
Off Shioyazaki, Iwaki;
depth 161 m. ..... *Grantia glabra*, n. sp. (Spec. Nos. P. 78, 192)

Station 271, Lat. N. 34° 58′ 3″; long. E. 139° 35′ 20″;
Off Suno-saki, Awa;
depth 82 m. ..... *Grantessa intusarticulata* (Spec. No. P. 184)

Station 278. Lat. N. 34° 42′ 50″; long. E. 138° 30′ 30″;
Seno-umi, Suruga Bay;
depth 79 m. ..... *Amphiute ijimai* (Spec. No. P. 189)

Station 376. Lat. N. 34° 33′ 35″; long. E. 138° 7′ 45″;
Off Omae-zaki, Tôtômi;
depth 64 m. ..... *Leucandra dura* (Spec. No. P. 190)

Station 600. Lat. N. 38° 33′ 37″; long. E. 138° 21′ 50″;
Off Hajiki-zaki, Sado;
depth 168 m. ..... *Leucosolenia soyo*, n. sp. (Spec. Nos. P. 186, 188)

Station 630. Lat. N. 39° 52′ 45″; long. E. 139° 34′;
Off Tsuchizaki, Ugo.
depth 150 m. ..... *Grantia glabra*, n. sp. (Spec. No. P. 191)

Class and Order CALCAREA.

Family **Homocoelidae** DENDY and ROW.

Genus LEUCOSOLENIA BOWERBANK.

1. Leucosolenia canariensis (MICHLUCHO-MACLAY)

(Pl. I, fig. 1)

Nardoa canariensis, MICHLUCHO-MACLAY, 1868, p. 230.
Nardoa sulphurea, MICHLUCHO-MACLAY, 1868, p. 230.
Nardoa rubra MICHLUCHO-MACLAY, 1868, p. 230.

Torroma canariense, HAECKEL, 1870. p. 244.
Torroma rubrum, HAECKEL, 1870, p. 245.
Ascaltis canariensis, HAECKEL, 1872, p. 52, Pl. 9, figs. 1–3; Pl. 10, figs. 1, a–c.
Ascaltis compacta, SCHUFFNER, 1877, p. 404, Pl. 25 fig. 9.
Leucosolenia nanseni, BREITFUSS, 1896, p. 427; 1898, p. 106, Pl. 12, figs. 1–9,
Leucosolenia canariensis, LAKSCHEWITSCH, 1886, p. 300. Pl, 7, fig. 1; THACKER, 1908, p. 762, Pl. 40, fig. 3, text-figs. 157–160; DENDY and ROW, 1913, p. 724; HÒZAWA, 1918, p. 528.

There are in the collection two specimens of this sponge. The first (Spec. No. P. 50; Pl. I, fig. 1) was secured at Station 62 (Lat. N. 40° 14′ 50″, long. E. 142° 05′ 10″) at a depth of 150 m.

The sponge forms an irregularly shaped massive colony composed of Ascon-tubes branching and anastomosing in a very complex manner. It grows vertically upwards, being attached to the substratum by a small number of processes at the base. The colony is more or less flattened from side to side, the surface even showing no irregular ridges and depressions at all, and, moreover, many very small conical papillae formed by the union of Ascon-tubes each of which is without any distinct osculum at its summit are scattered over it. The height of the specimen is about 70 mm., the greatest breadth about 30 mm., and the greatest thickness about 18 mm. The pseudoderm, which is formed by the outer Ascon-tubes is perforated by numerous pseudopores; they are irregularly rounded or oval in shape, and measure about 1 mm. in maximum diameter.

The second specimen (Spec. No. P. 32) which was obtained at Station 66 (Lat. N. 40° 28′ 40″, long, E. 142° 01′ 51″) from a depth of 165 m. is much smaller than the first. It is irregularly shaped, measures about 23 mm. in height, about 17 mm. in the greatest breadth, and about 10 mm. in the greatest thickness. The pseudopores are rather wide compared with those of the first specimen, and attain 2 mm. in maximum diameter.

The texture is fairly rigid in the outer part of the colony but is rather delicate in the interior. The colour turns greyish-white in alcohol.

Structure.—The canal system of this species seems to agree well with that proposed as type B by DENDY[1]. But, as stated above, the absence of true oscula leading directly into a space lined by collared cells and formed by the union of Ascon-tubes indicates a lipostomous condition.

The skeleton of the walls of the Ascon-tubes is mainly composed of triradiates arranged in several but not many layers in an irregular manner, and there may be added a small number of quadriradiates with their apical rays projecting into the cavity of the Ascon-tubes. The spicules

[1] DENDY, 1891, pp. 27, 28.

which occur in the wall of the outer Ascon-tubes are, more or less, stouter and are more closely set than in that of those in the interior of the colony.

Spicules.—Triradiates regular with rays rather slender, straight, usually rather bluntly-pointed, 100–130 μ long, 8–12 μ thick at base.

Quadriradiates similar to triradiates except in the presence of the apical ray. The apical ray which projects at right angles from the centre of the facial rays is nearly straight in the basal parts but rather curved in the apical, terminating in a very fine point. The apical ray is slightly shorter and much narrower than the facial rays, 80–100 μ long about 6 μ thick at base.

Localities.—Canary Islands (MICHLUCHO-MACLAY); Cape Verde Islands (THACKER); Mauritus (SCHUFFNER); Minorca (LAKSCHEWITSH); Spitzbergen, Arctic Ocean (BREITFUSS); off the north point of Capper Island, Commander Islands (HÔZAWA).

Remarks.—This species was first described by MICHLUCHO-MACLAY as having been found in 1868 on the Coast of Lanzerote, Canary Islands. Since that time it has been reported by several investigaters such as HAECKEL (1870, 1872), SCHUFFNER (1877), BREITFUSS (1896, 1898), LAKSCHEWITSCH (1886), DENDY and ROW (1913), etc, the specimens being obtained from various parts of the world. In 1908 THACKER gave a full account discussing the synonymy and the affinities of this species.

In 1918 I reported this species as found in the Commanders Islands in Kamchatka, and I am now able to report the same species as having been found in Japanese waters.

Judging by the facts above mentioned, the present species seems to be widely distributed all over the world, and may thus be considered to be cosmopolitan.

2. **Leucosolenia soyo**, n. sp.

(Pl. I, fig. 2; text-fig. 1)

Of this species there exist three specimens in the collection.

The first specimen (Spec. No. P. 188; Pl. I, fig. 2) was obtained at Station 600 (Lat. N. 38° 33′ 37″, long. E. 138° 21′ 50″) at a depth of 168 m.

The sponge forms irregularly-shaped lobose masses, conspicuously flattened from side to side, and attached by root-like processes to foreign objects. Judging by its general appearance, as well as by the existence of two pseudoscula, it seems to have consisted originally of two colonies

fused at two points in the basal parts. The greatest breadth of the entire specimen is about 30 mm., and the greatest height about 20 mm. while the thickness is about 3 mm. The pseudopores are thickly and fairly evenly distributed in the pseudoderm, varying in size up to about 0.3 mm. in diameter, and mostly of oval shape.

The second specimen (Spec. No. P. 186), which came from the same station as the first, is represented by only a fragment measuring 15 mm. long and about 6 mm. broad.

The third specimen (Spec. No. P. 193) was obtained at Station 61 (Lat. N. 40° 03′ 24″, long E. 142° 11′ 33″) at a depth of 170 m.

It is irregularly ovoid in shape, and is more or less laterally compressed. The surface is not even, showing ridges and depressions. The lower parts which seem to be attached to the substratum are torn off in this case. The specimen is about 15 mm. long and about 13 mm. broad, while its greatest thickness is about 5 mm.

A single pseudosculum which opens at the top of the sponge is very irregularly formed, and is surrounded by a thin membranous margin. It measures about 3 mm. in maximum diameter.

The pseudoderm, which covers the general surface of the sponge, is perforated by numerous thickly distributed pseudopores of oval or circular shape with a diameter of 0.15–0.4 mm. The following description is based on the first specimen, which is taken as the type.

Structure.—The canal system belongs to DENDY's type D[1], though it may not be quite typical.

The pseudogaster opening above by the pseudosculum is very capacious spreading into the interior of the entire specimen.

The membrane which lines the pseudogaster is penetrated by the exhalant openings of the Ascon-tubes, each of these openings leading either into the gastral cavity of a single Ascon-tube, or into two or three of these tubes.

The pseudopores distributed on the pseudoderm lead into interspaces between the Ascon-tubes. These interspaces are wide and nearly straight, and continue right up to the lining membrane of the pseudogaster almost without diminishing in size.

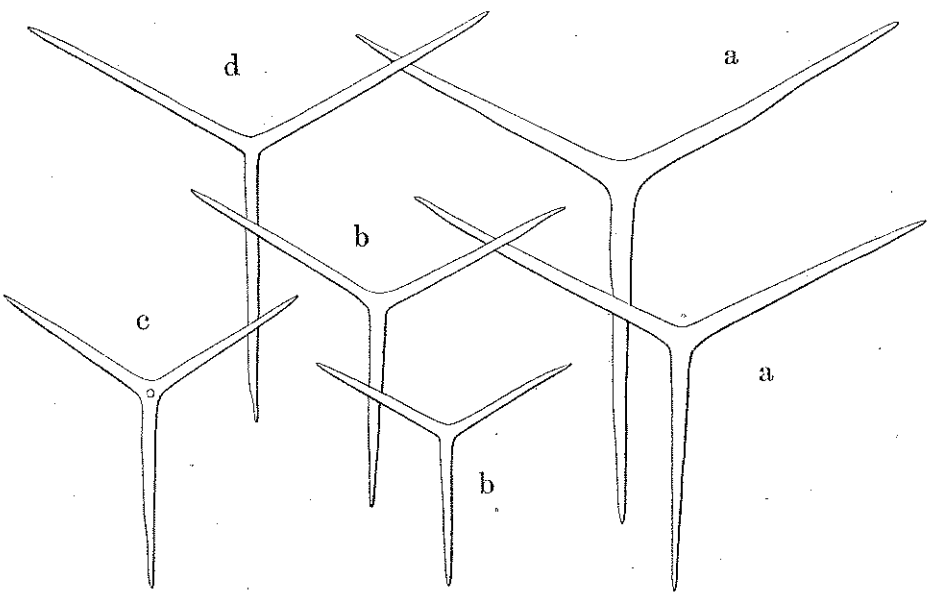
The Ascon-tubes are said to be arranged radially round the central pseudogaster though not in a regular manner and lie close to one another, but the anastomosis does not seem to occur. Proximally they communicate

[1] DENDY, 1891, pp. 27, 30–32.

with the pseudogaster and terminate distally and blindly. Thus, they form the wall of the sponge and their blind ends are set in contact with one another, and are protected by special spicules, forming the outer surface of the sponge.

The skeleton of the pseudoderm consists of large triradiates, which are densely arranged in a few layers leaving spaces of angular outline for pseudopores. The walls of the Ascon-tubes are made up of an admixture of triradiates and quadriradiats. They are arranged in a thin confused layer, and the apical rays of the latter kind of spicule project into the gastral cavity. Triradiates are more numerous than quadriradiates. The lining membrane of the pseudogaster is composed mainly of triradiates disposed in a thin confused layer, and there may be added a small number of quadriradiates with their apical rays protruding into the pseudogaster.

Spicules (Text-fig. 1).—Triradiates of the pseudoderm (a) regular or subregular. All rays are generally straight, but are some-times more or less irregular in outline, being 160–190 μ long and 14–18 μ thick at the base.



Text-fig. 1. *Leucosolenia soyo*, n. sp.
a, Triradiates of the pseudoderm. b, Triradiates of Ascon-tubes. c, Quadriradiate of the same. d, Triradiate of the lining membrane of pseudogaster. (All ×200).

Triradiates of Ascon-tubes (b) regular or subregular with rays straight

and gradually sharply pointed, 100–120 μ long and 8–10 μ thick at the base.

Quadriradiates of Ascon-tubes (c) exactly the same as triradiates of the same save for the presence of an apical ray. The apical ray is slightly shorter and much thinner than the facial rays. It is almost straight, and stands vertically at the centre of the facial rays, being about 80 μ long by 4 μ thick.

Triradiates of the lining membrane of pseudogaster (d) regular. They are nearly similar to triradiates of the Ascon-tubes but on the whole larger, the rays reaching as much as 160 μ in length.

Quadriradiates of the lining membrane of the pseudogaster are exactly similar to triradiates of the same membrane, except for the presence of a fine apical ray.

Localities.—Off Fudai, Rikuchiu (St. 61, Lat. N. 40° 3′ 24″, long. E. 142° 11′ 33″); Near Sado Island (St. 600, Lat. N. 38° 33′ 37″, long. E. 138° 21′ 50″).

Remarks.—In the external features and canal system, this species closely resembles *Leucosolenia amitsbo* HÔZAWA[1] obtained from the Sagami Sea, Japan, but it may be easily distinguished from the latter by the character of the spicules. In the present species the triradiates forming the skeleton of the pseudoderm are much smaller than those of *L. amitsbo*, and are more thickly distributed. The meshes which are formed by these spicules for inhalant water are circular or oval with a smooth margin, while in *L. amitsbo* they are surrounded by an angular margin. The tri- and quadriradiates of the lining membrane of the pseudogaster have their rays distinctly shorter than those of the same membrane in *L. amitsbo*.

The difference in size between the pseudodermal triradiates and triradiates of Ascon-tubes is not so marked in the present species as in the case of *L. amitsbo*.

Family **Heteropiidae** DENDY.

Genus GRANTESSA VON LENDENFELD.

3. **Grantessa intusarticulata** (CARTER).

(Pl. I, fig. 3).

Hypograntia intusarticulata, CARTER 1886, p. 45.
Hypograntia medioarticulata, CARTER 1886, p. 46.
Grantessa intusarticulata, DENDY, 1892, p. 108; 1893, pp. 181, 201, Pl. XIII, fig. 18;

[1] *Leucosolenia amitsbo*, HÔZAWA, 1929, pp. 283–285, Pl. XII, figs. 3, 4; Text-fig. 2.

DENDY and ROW, 1913, p. 753; HÔZAWA, 1916, p. 14, Pl. I, figs. 4, 5; Pl. II fig. 13, Text-fig. 3; 1929 p. 318; BRØNDSTED, 1926, p. 308; ROW and HÔZAWA, 1932, p. 775.

Grantia intusarticulata, BREITFUSS, 1897, p. 219.

This species is represented in the collection by a single specimen (Spec. No. P. 184; Pl. I, fig. 3) obtained from the Sagami Sea at Station 271 (Lat. N. 34° 58′ 3″, long. E. 139° 35′ 20″; depth 82 m.).

It is a solitary tubular individual more or less irregular in contour, being broad near the attachment base and gradually narrowing towards the terminal osculum. It measures about 30 mm. in total length and 15 mm. in the greatest breadth. The thickness of the wall is about 1 mm. and the osculum measures about 5 mm. in maximum diameter.

With respect to the minor structure, i.e. canal system, skeleton and spiculation, it has been fully recorded by CARTER, DENDY, BRØNDSTED and myself, and thus it may be considered that no further details are needed here.

Localities.—Near Port Phillip Heads (CARTER, DENDY); Watson's Bay, Port Jackson (DENDY); Island Bay, Wellington, N. Z. (BRØNDSTED); Geraldton District, S. W. Australia (ROW and HÔZAWA); Misaki, Dôketsba (HÔZAWA); off Sunosaki, Sagami Sea.

Remarks.—This species was first described by CARTER (1886) as found in Australia, and, afterwards, it has been reported by DENDY (1892) and by ROW and HÔZAWA (1931) as found in the same locality and by BRØNDSTED as found in New Zealand (1926).

In 1916 I reported this species from Misaki and Dôketsba in the Sagami Sea, and this is the second case of the species being recorded as found in the sea of Japan. The specimen dealt with in the present paper was obtained off Sunosaki in the Sagami Sea.

Judging from its occurrence in Australia, New Zealand, and Japan, this species seems to be widely distributed.

Genus AMPHIUTE HANITSCH.

4. Amphiute ijimai HÔZAWA.

(Pl. I, fig. 4)

Amphiute ijimai, HÔZAWA, 1916, pp. 33–38, Pl. I, fig. 9; Pl. II, fig. 17; Text-fig. 7; 1929, p. 313.

In the collection there is only a single specimen (Spec. No. P. 189, Pl. I, fig. 4) which was secured at Seno-umi in Suruga Bay (Station 278, Lat. N. 32° 42′ 50″, long. E. 138° 30′ 30″; Depth 79 m.)

This single sponge is tubular, forcibly compressed laterally and with the basal parts torn off. The total length is about 55 mm. and the breadth near the lower end is about 27 mm. The breadth gradually diminishes towards the upper end, where an oval osculum of about 10 mm. maximum diameter opens. The wall is about 1 mm. thick in the lower parts but, becomes gradually thinner towards the osculum which is surrounded by a thin margin. The gastral cavity is very capacious, extending through the entire specimen.

The colour of the specimen under consideration is grey and looks very dirty owing to the fine sand attached to the sponge-surface.

In the other external features as well as in the minor structure of the interior the present specimen conforms very well to the type. Hence, it is considered that no further details need to be added here.

Localities.—Dôketsba, Sagami Sea (HÔZAWA); Seno-umi, Suruga Bay (St. 278. Lat. N. 34° 42′ 50″; long E. 138° 30′ 30″).

Remarks.—The genus *Amphiute* is characterized by the possession of colossal longitudinal oxea in both dermal and gastral cortices, in addition to the presence of subdermal pseudosagittal triradiates. At present this genus is represented by two species only i.e. *A. paulini* and *A. ijimai*. The first species which constitutes the type of the genus was described by HANITSCH having been obtained on the west coast of Portugal, while *A. ijimai* from Japan, was described and figured by myself the specimen having been secured at Dôketsba in the Sagami Sea.

The present record reports the occurrence of *A. ijimai* in Japan for the second time and on this occasion the specimen was obtained at Seno-umi in Suruga Bay, which lies west of Sagami Sea, being separated from the latter by the Izu Peninsula.

Family **Grantiidae** DENDY.

Genus GRANTIA FLEMING.

5. **Grantia glabra**, n. sp.

(Pl. I, fig. 5; text-fig. 2).

Three specimens of this species exist in the collection.

The first (Spec. No. P. 191; Pl. I, fig. 5), which is the largest, was obtained off Tsuchizaki, Ugo (St. 630. Lat. N. 39° 52′ 45″, long. E. 139° 34′) at a depth of 150 m.

The sponge represents a single type of a slightly laterally compressed tubular form, gradually narrowing towards the attachment base and showing

at the upper end an oval osculum, which is surrounded by a feebly developed collar. The dermal surface is smooth without any projecting oxea, while the gastral is distinctly echinated by the projecting apical ray of the gastral quadriradiates. It is 21 mm. long, and about 4 mm. broad near the distal end. The sponge wall is about 0.7 mm. thick. The osculum is about 1 mm. in maximum diameter.

The colour is greyish white, and the texture is fairly rigid.

The second and third specimens (Spec. Nos. 78 and 192) secured off Shioyazaki, Iwaki (St. 122. Lat. N. 36° 54′ 30″, long. E. 141° 17′; depth 161 m.) are much smaller than the first but as regards the microscopical structure they are absolutely identical.

As the subject of further description I select the first specimen.

Structure.—The canal system is of the syconoid type. The flagellate chambers are of an elongated sac-like shape, measuring about 500 μ in length and about 150 μ in diameter. They are usually simple without giving off any branches.

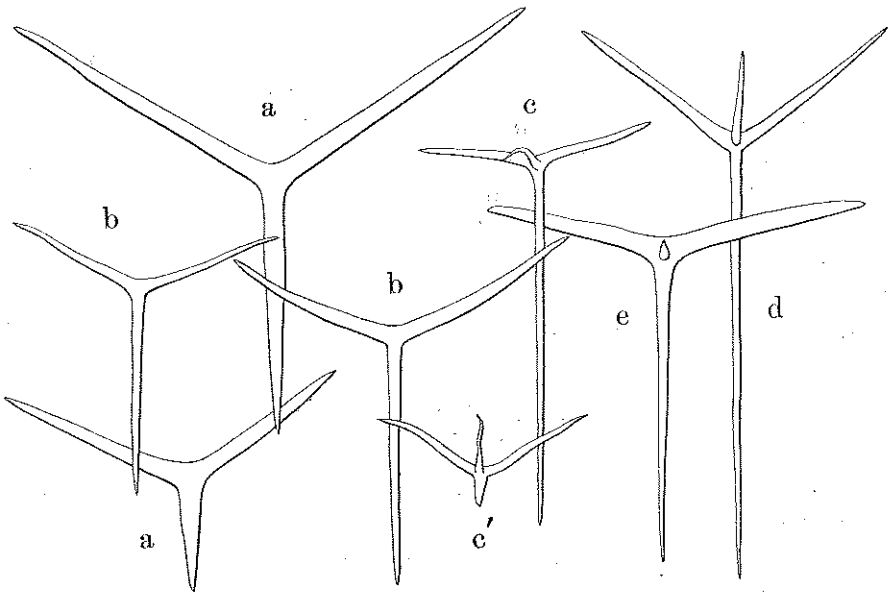
The dermal skeleton is composed of triradiates, which are tangentially but confusedly arranged in several layers. The tubar skeleton which is made up chiefly of triradiates is of the many-jointed articulate type. Here may be added the basal rays of the subgastral quadriradiates with apical rays projecting into the apopyle. The gastral skeleton forms a thin layer consisting mainly of gastral quadriradiates, of which the basal ray generally points towards the base, and the apical ray projects into the gastral cavity in oblique inclination towards the osculum. The oscular margin is composed chiefly of quadriradiates, with their basal ray running longitudinally and parallel with one another and the paired rays very strongly diverging. The apical ray is much shorter than that of the gastral quadriradiates.

Spicules (Text-fig. 2). Dermal triradiates (a) slightly sagittal with paired rays slightly longer than basal ray. All rays are of equal thickness and taper from base to sharp point. Basal ray straight, being 70–150 μ long by 14–20 μ thick. Paired rays slightly curved forwards, being 110–170 μ long by 14–20 μ thick.

Tubar triradiates (b) sagittal. Basal ray quite straight, longer and slightly thinner than paired rays, gradually tapering and sharply pointed, being about 170 μ long by 12 μ thick at the base. Paired rays widely divergent, and curved round the flagellate chamber, rather irregular in outline, and about 120 μ long by 12 μ thick.

Subgastral quadriradiates (c) strongly sagittal. Basal ray straight, standing vertically to the plain formed by the apical and paired rays, and

much longer than these rays, being about 210 μ long and about 10 μ thick at the base. Paired rays widely diverging and slightly curved, and about 70 μ long by 10 μ thick. Apical ray short slightly curved and, moreover, in most cases crooked, broad at the base, and very finely pointed at the end, being about 30 μ long and about 6 μ thick at the base.



Text-fig. 2. *Grantia glabra*, n. sp.
a, Dermal triradiates. b, Tubar triradiates. c, Subgastral quadriradiate. c', The same, facial view. d, Gastral quadriradiate. e, Quadriradiate of the oscular margin. (All ×200).

Gastral quadriradiates (d) sagittal. Basal ray much longer than paired rays, quite straight, tapering from base to the sharp point, being about 250 μ long and about 8 μ thick at the base. Paired rays almost straight, nearly equal or slightly differentiated in length, somewhat thicker than the basal ray, gradually tapering, sharply pointed, being about 120 μ long and about 10 μ thick at the base. Apical ray fairly well developed, longer than paired rays, slightly curved upwards and sharply pointed, measuring up to 150 μ in length by about 8 μ thick at the base.

Quadriradiates of oscular margin strongly sagittal. Basal ray straight, nearly uniformly thick for the greater part of its length, sharply pointed, being about 200 μ long and 10 μ thick at the base. Paired rays distinctly shorter and thicker than basal ray, slightly curved backwards, very strongly diverging, nearly uniformly thick for the greater part of their length, and

ending in an obtuse point. Apical ray much shorter than either basal or paired rays, being slightly curved and very sharply pointed and directed upwards.

Localities.—Off Tsuchizaki, Ugo (St. 630. Lat. N. 39° 52′ 45″, long. E. 139° 34′); off Shioyazaki, Iwaki (St. 122. Lat. N. 36° 54′ 30″, long. E. 141° 17′).

Remarks.—This species may be easily distinguished from most members of the genus *Grantia* by the absence of oxeote spicules of any kind. It is closley related to *Grantia invenusuta* LAMBE[1] from Davis Strait between Canada and Greenland. The present species corresponds with that species in external form and general anatomy, and in the absence of oxea of any kind, but it can be distinguished from the latter chiefly by the absence of gastral triradiates, by the presence of subgastral quadriradiates, by the character of the dermal triradiates, which have greater dimensions in comparison with the other spicules.

6. **Grantia kujiensis**, n. sp.

(Pl. I, fig. 6; text-fig. 3)

Only a single specimen of this species is found in the collection (Spec. No. P. 52, Pl. I, fig. 6).

It was obtained at Station 64 (Lat. N. 40° 14′ 50″, long. E. 142° 5′ 10″) at a depth of 150 m.

The sponge represents a solitary person of an oval form, narrowing towards the attachment base, and showing near the upper end an irregularly oval osculum about 2 mm. in diameter. The dermal surface is fairly hispid on account of the projecting oxea. The gastral surface looks nearly smooth to the naked eye, though it is punctated by minute exhalant apertures uniformly distributed. The gastral cavity is fairly large, but is traversed by the ingrowth of the gastral layer which forms an irregular meshwork.

The colour in alcohol is greyish white and the texture is fairly firm and elastic.

The specimen is about 12 mm. in length and 8 mm. broad in the broadest part. The sponge wall is about 1 mm. thick.

Structure.—The canal system is syconoid. The flagellated chambers are cylindrical, and usually not branched, measuring about 500 μ long by 150 μ thick. The dermal skeleton is weakly developed, and is scarcely distinguishable from the tubar skeleton. It is composed of triradiates

[1] *Grantia invenusuta*, LAMBE, 1900, p. 32, Pl. VI, figs. 14, 14 a–f.

disposed irregularly in a small number of layers. The large oxea are placed at varying angles to the dermal surface, with their distal ends freely projecting on it, and with their proximal ends deeply intruding into the chamber layer. The tubar skeleton is of an articulate, though not very typical type, and is composed of triradiates in several rather confused layers. In the subgastral position there sometimes occur a small number of quadriradiates with their basal ray intruding into the chamber layer and with the apical ray projecting into the apopyle.

The gastral skeleton is made up of triradiates and quadriradiates, which are arranged tangentially in several but not numerous layers with the apical rays of the quadriradiates projecting into the gastral cavity. The skeleton of the meshwork, which is formed by the ingrowth of the gastral layer, and traverses the gastral cavity is composed of triradiates and quadriradiates exactly like those of the gastral skeleton. As regards the skeleton of the oscular margin, we have not noticed any peculiarities to be mentioned.

Spicules (Text-fig. 3).—Dermal triradiates (a) slightly sagittal, and the oral angle is slightly wider than the paired angles. Basal ray nearly straight, slightly longer than paired rays, being 100–130 μ long and 12–16 μ thick at the base. Paired rays subequal in length, generally straight with the exception on of a slight curvature near the base, gradually tapering and sharply pointed, being 80–110 μ long and 12–16 μ thick at the base.

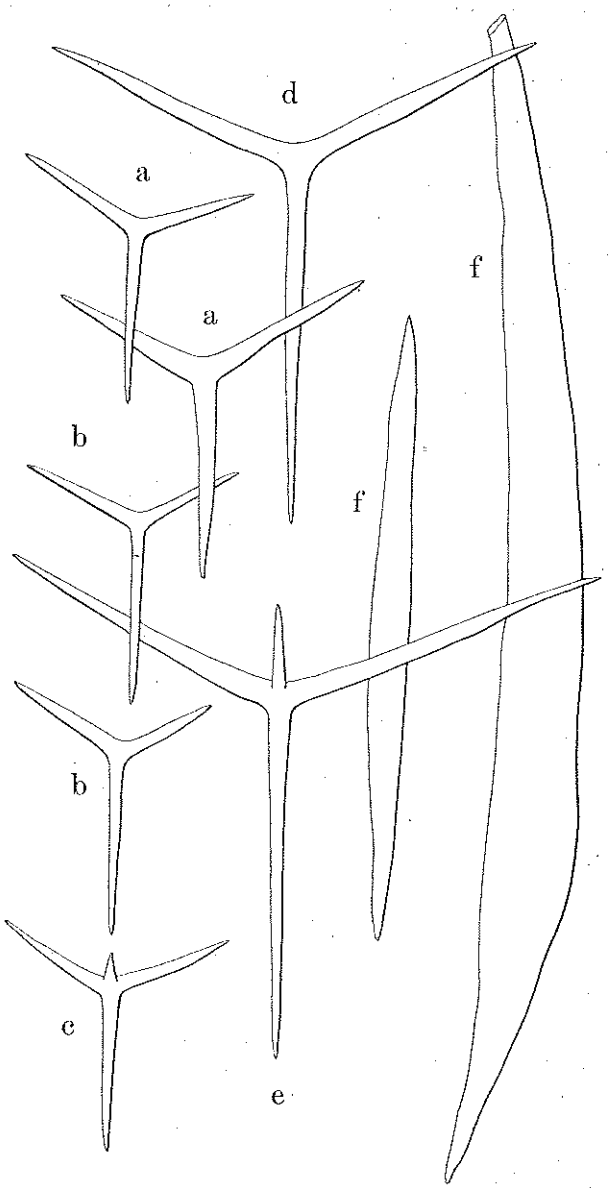
Tubar triradiates (b) almost like the dermal triradiates, but, on the whole, they have a wider oral angle and more slender rays than the latter. Basal ray is 110–130 μ long by 10–12 μ thick, and the paired rays are 70–90 μ long and 10–12 μ thick at the base.

Subgastral quadriradiates (c) nearly similar to the tubar triradiates with addition of an apical ray. This ray is much shorter than the facial rays, broad at the base but becoming thinner rather suddenly and ending in a very sharp point; it is about 30 μ long and 6–8 μ thick at the base.

Gastral triradiates (d) sagittal. Basal ray straight slightly longer than paired rays, gradually and sharply pointed, being about 180 μ long and about 16 μ thick at the base. Paired rays slightly curved at the base, and nearly straight in the remaining part, gradually and sharply pointed; is about 150 μ long and about 16 μ thick at the base.

Gastral quadriradiates (e) similar to gastral triradiates, differing only in the presence of apical ray. Apical ray distinctly shorter than facial rays, being slightly curved upwards, broad at base and narrowing distally

to terminate in a sharp point; is about 70 μ long and about 12 μ thick at the base.



Text-fig. 3. *Grantia kujiensis*, n. sp.
a, Dermal triradiates. b, Tubar triradiates. c, Subgastral quadriradiate. d, Gastral triradiate. e, Gastral quadriradiate. f, Large oxea projecting from dermal surface. (All ×200).

Triradiates and quadriradiates which sustain the ingrowth from the gastral layer are almost the same as those forming the gastral skeleton.

Large oxea projecting from dermal surface (f) spindle-shaped, a little irregular in outline, generally broadest at a point nearer proximal than distal end, and tapering towards both pointed ends. They are more or less curved, and are of very variable length, 0.4–1.5 mm. long and 25–70 μ thick.

Locality.—Off Kuji, Rikuchiu (St. 64. Lat. N. 40° 14′ 50″, long. E. 142° 5′ 10″).

Remarks.—I could not identify this form with any species already known, and, thus regarded, it represents a distinct species. Among the characteristic features above-mentioned the existence of the ingrowth from gastral layer into gastral cavity is most noticeable.

Genus LEUCANDRA HAECKEL.

7. Leucandra dura HÔZAWA.

(Pl. I, fig. 7).

Leucandra dura, HÔZAWA, 1929, pp. 371–373, Pl. XXII, figs. 66–68, text-fig. 33.

Only a single specimen of this species exists in the collection (Spec. No. P. 190; Pl. I, fig. 7).

It was collected at Station 376 (Lat. N. 34° 33′ 35″, long. E. 138° 7′ 45″, depth 64 m.) which is situated near Ômae-zaki, Tôtômi. This sponge is in the shape of an irregularly rounded mass with a height of about 35 mm. and a maximum diameter of about 60 mm. It is broadly attached by the under surface, and its upper surface is strongly folded showing many lobose protuberances and furrows of various depths. There are four oscula, distributed on the upper surface. They are bare and vary in size, measuring 1–5 mm. in diameter.

The other characteristics in external features and in internal anatomy are exactly the same as those of the type specimen, and I have already given a detailed account on it in my paper mentioned above.

Localities.—Misaki (HÔZAWA); Off Ômae-zaki, Tôtômi (St. 376. Lat. N. 34° 33′ 35″, long. E. 138° 7′ 45″, depth 64 m.)

Remarks.—This species was first described by myself in 1929, the type specimen being obtained in shallow water in the neighbourhood of the Misaki Marine Biological Station. The present report notes the occurrence of this species in the sea of Japan for the second time. However, this time it was dredged at a depth of 64 m.

8. **Leucandra yuriagensis**, n. sp.

(Pl. I. fig. 8; text-fig. 4)

The single specimen (Spec. No. P. 107; Pl. I, fig. 8), on which this species is based, was dredged at a depth of 115 m. off Yuriage, Rikuzen (St. 102, Lat. N. 35° 10′ 10″, long. E. 140° 36′).

It is in the form of an irregular cylindrical tube. The broader base is provided with a number of globular processes and depressions, while the upper parts become gradually narrower towards the distal end, where an osculum opens. The total length is about 60 mm. and the breadth is 45 mm. in the broadest part. The wall is thickest in the basal part, measuring about 3 mm., and becomes gradually thinner towards the osculum, which is surrounded by a very thin margin. The osculum is irregularly elliptical with the greater diameter of about 10 mm. The dermal surface looks nearly smooth being without any projecting spicules, while the gastral surface is slightly hispid, and is perforated by apertures of exhalant canals of variable sizes, measuring from 0.3 to 0.8 mm. in diameter.

The gastral cavity is very spacious, its form corresponding to that of the specimen.

The colour in alcohol is white. The texture is hard and fairly elastic.

Structure.—The canal system is of the leuconoid type. The flagellate chambers are rather thinly distributed in the chamber layer, and are irregularly scattered. They are generally of an oval shape measuring up to 70 μ in the longer diameter. Underneath the dermal cortex there are subdermal cavities in fairly uniform distribution, and the inhalant canals start from these cavities. The chamber layer is also traversed by exhalant canals varying in thickness.

The wall of the sponge is supported by three distinct skeletal layers, namely, a dermal skeleton, a tubar skeleton, and a gastral skeleton. The dermal skeleton is rather thin, and is composed of large and small triradiates placed tangentially in a small number of confused layers. The tubar skeleton, e.i. the skeleton of the chamber layer consists of triradiates, which are thickly and irregularly set together. The walls of the larger exhalant canals are lined with quadriradiates with the basal ray usually pointing away from the gastral surface, and with the apical ray projecting into the canal. The gastral skeleton is nearly equal to the dermal in thickness, being fairly well distinguished from that of the chamber layer. It is composed of a dense reticulation of tangential tri- and quadriradiates. There may be in addition large tangential triradiates thinly distributed

and microxea, which are fairly thickly distributed, and which are placed tangentially but without any definite orientation. The thin oscular margin contains tri- and quadriradiates, both of which are very closely and regularly set together with the basal ray pointing towards the sponge base, and with strongly divergent paired rays. There also occur sometimes a small number of large triradiates and microxea.

Spicules (Text-fig. 4).—Larger dermal triradiates (a) equiradiate and equiangular. All rays straight, gradually and sharply pointed being 410 μ–1.25 mm. long and 40–130 μ thick at the base.

Smaller dermal triradiates (b) slightly sagittal with rays of equal thickness and disposed slightly convexly towards the outer side. Basal ray straight, not strongly differentiated in length from the paired rays; being 140–400 μ long and 14–30 μ thick at the base; paired rays gently curved forwards in greater part of the basal and nearly straight in the distal part; being 100–270 μ long and 14–30 μ thick at the base.

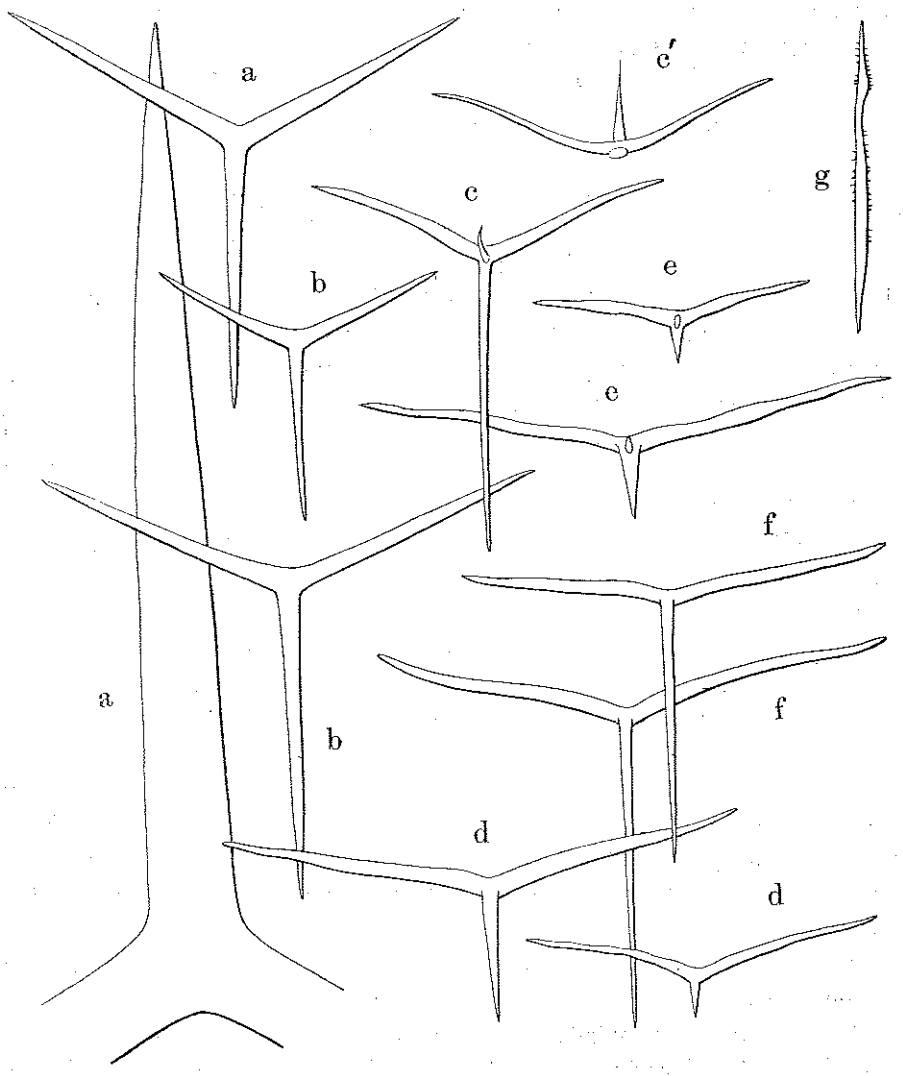
Triradiates of the chamber layer regular or subregular, very large but variable in size. They are exactly similar to the larger triradiates found in the dermal cortex.

Quadriradiates of the larger exhalant canals (c, c′) sagittal. Basal ray straight, sharply pointed, slightly longer and thinner than paired rays; being about 420 μ long and 20 μ thick at the base. Paired rays more or less curved round the exhalant canals, and in facial view, they show a double curvature, forwards in the greater part of the basal and slightly backwards in remaining parts, it is about 240 μ long and 28 μ thick at the base. Apical ray shorter and thinner than facial rays, slightly curved and very finely pointed; it is 50–200 μ long and about 14 μ thick at the base.

Larger gastral triradiates regular or sub-regular, exactly similar to those of the dermal cortex and of the chamber layer.

Smaller gastral triradiates (d) strongly sagittal. Rays lying nearly in one plane. Basal ray much shorter and slightly thinner than paired rays, almost straight and sharply pointed, being 60–180 μ long and 18–20 μ thick at the base. Paired rays very widely divergent, slightly curved backwards in the greater part of the basal, and nearly straight in remaining parts, generally more or less irregular in outline, being 230–370 μ long and 26–30 μ thick at the base.

Gastral quadriradiates (e) exactly similar to the smaller gastral triradiates except in the presence of an apical ray. This is sharply pointed and is slightly curved; it is 50–110 μ long and about 14 μ thick at the base.



Text-fig. 4. *Leucandra yuriagensis*, n. sp.
a, Larger dermal triradiates. b, Smaller dermal triradiates. c, Quadriradiate of the larger exhalant canal. c′, The same, facial view. d, Smaller gastral triradiates. e, Gastral quadriradiates. f, Triradiates of the oscular margin. g, Gastral microxea. (a–f ×100; g ×500).

Triradiates of the oscular margin (f) strongly sagittal. Basal ray straight, finely pointed, generally longer and sometimes shorter than paired rays. Paired rays widely diverging, mostly doubly curved, first backwards then forwards ending in a rather bluntly pointed end. They are nearly

uniformly thick in their greater length. In an example of the spicule the basal ray and paired rays measured respectively 270 μ and 260 μ in length by 14 μ and 20 μ thick at the base.

Quadriradiates of the oscular margin exactly the same as the triradiates of it but with a short apical ray.

Gastral microxea (g) usually slightly curved, broadest in the middle parts, and tapering towards both ends, of which one is sharply pointed and the other forms a hastate point. The sides of the spicule are provided with a number of very fine spines. An example of the spicule measured 90 μ long and 4 μ thick in the broadest parts.

Locality.—Off Yuriage, Rikuzen (St. 102, Lat. N. 35° 10′ 10″, long. E. 140° 36′).

Remarks.—In external form as well as in internal features, this new species closely resembles *Leucandra pacifica* HÔZAWA[1] from Dôketsba in Sagami Sea. But there are some peculiarities in spiculation, by which the present species may be easily distinguished from that species. The peculiarities are as follows:

1) The presence in the present species of gastral sagittal triradiates which seem to be entirely wanting in *L. pacifica*.

2) In *L. pacifica* there are slender hair-like oxea projecting from the dermal surface. But they are entirely wanting in the present species.

3) The apical ray of the gastral quadriradiate spicule is more strongly developed in *L. pacifica* than in the present species.

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[1] *Leucandra pacifica*, HÔZAWA, 1929, pp. 368–370 Pl. XXI, figs. 63, 64; text-fig. 32.

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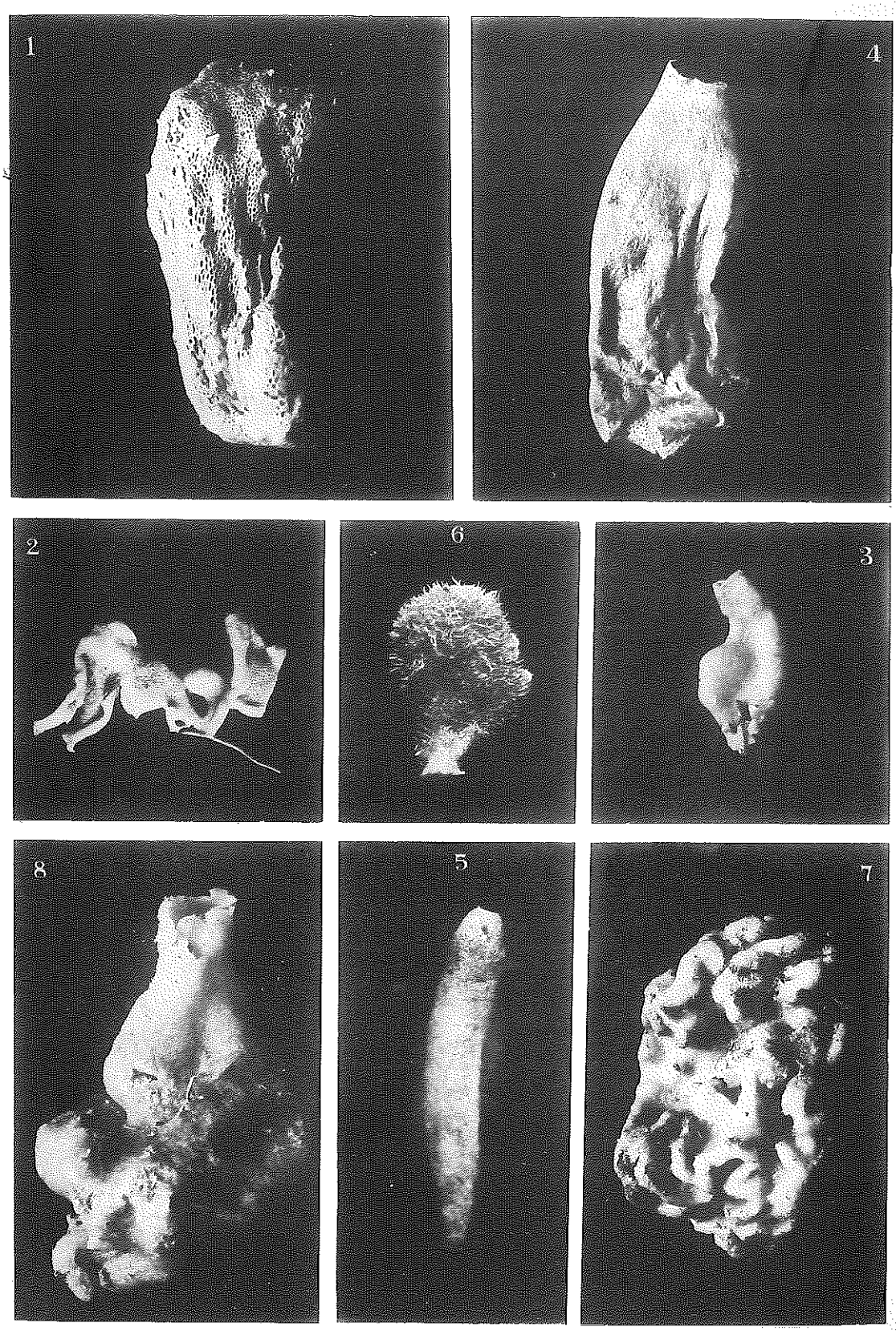
EXPLANATION OF PLATE I.

Fig. 1. *Leucosolenia canariensis* MICHLUCHO-MACLAY. ×1.
Fig. 2. *Leucosolenia soyo*, n. sp. ×1.
Fig. 3. *Grantessa intusarticulata* CARTER. ×1.
Fig. 4. *Amphiute ijimai* HÔZAWA. ×1.
Fig. 5. *Grantia glabra*, n. sp. ×3.
Fig. 6. *Grantia kujiensis*, n. sp. ×3.
Fig. 7. *Leucandra dura* HÔZAWA. ×1.
Fig. 8. *Leucandra yuriagensis*, n sp. ×1.



S. Hôzawa: Calcarea of Japan.