

pedicels and dorsal papillae in longitudinal series and confined to the ambulacra. On the ventral face, three zones, simple or otherwise, of pedicels. Genital tubes in two bundles (a right and a left). Anus not lodged in a vertical furrow and without any calcareous teeth. Calcareous bodies present in the perisome, of the ground form of a table. The disk consists of three- or four-armed figures, the distal ends of which have a larger or smaller number of perforations, and often laterally send out processes which may unite with similar processes of other arms and produce open circular lattice-work. The spire consists of a single pillar* which may be divided or perforated, or both, at the upper end. There are supporting rods in the ambulacral appendages.

3. *Synallactes triradiata*, sp. n.

(Textfig. 2).

Specimens examined:—

Sci. Coll., Spec. No.	Number of indi- viduals	Preser- vation.	Size. Length in cm.	Locality	Depth in <i>hiro</i>	Collector	Date
1065	6	Alc.	9—11	Maye-no-Yodomi, Ike-line, Sagami Bay.	600	Aoki	Jan. 17, 1896
1445	1	..	10	Merasé, Sagami Sea.	400	..	Jan. 9, 1899
1446	2	..	10.6—11	Okinosé outer edge, Iwado-line, Sagami Sea.	400
1447	4	..	7.5—11	Okinosé and Yodo- mi, Sagami Sea.	400	..	April, 1897
1448	1	..	11	Sagami Bay.	400	..	Spring of 1896

* *S. reticulatus* SLUTTER is said to possess four pillars or knobs, which fact makes it seem doubtful to me whether the species belongs to this genus.

Sci. Coll., Spec. No.	Number of indi- viduals	Preser- vation	Size, Length in cm.	Locality	Depth in <i>hiro</i>	Collector	Date
1449	2	Alc.	9—9.7	Okinosé outer edge, Iwado-line, Yawata Hills and Sunosaki in line, Sagami Sea.	400	Aoki	Jan. 9, 1897
1451	1	"	4.5	Sengenzuka-line, Sagami Sea.	400	" (?)	Feb. 26, 1897
1452	2	Formalin		Okinosé, Sagami Sea.	400	"	March, 1901

All the specimens are more or less contracted.

Description:—Tentacles 20, may be reduced to 19 or to 16. Color in alcohol, lighter or darker shades of brown. Some with decided purple tinge, others appear bleached and white. Young specimen translucent without color. Tentacles light yellow, in young specimen of a decided orange color.

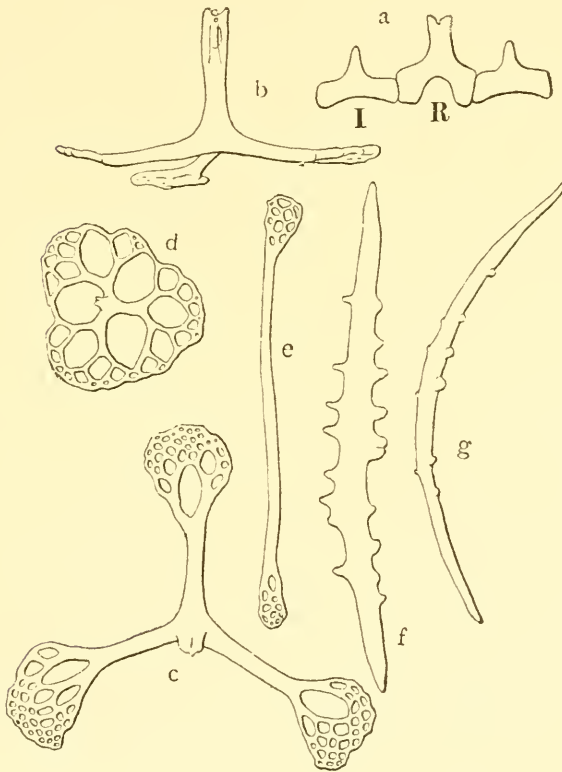
Body cylindrical or subcylindrical, without any marginal border between the ventrum and the dorsum. Tapers much more toward the posterior end than toward the anterior. Mouth ventral, anus terminal.

In the specimens which show the arrangement of the ambulacral appendages best, dorsal papillae are in six longitudinal rows: one on each side at the boundary between the dorsum and the ventrum and belonging to each lateral ambulacrum, and two belonging to each of the two dorsal ambulacra. Each papilla has a large wart-like conical base, from the top of which a much more slender papilla arises. In a specimen which shows this best, the whole dorsum appears as if it were covered entirely by these conical warts, although in fresh specimens there must have been some space between and around their bases. The slender terminal papilla-like part is short in the posterior parts but becomes as long as 8 mm. in the anterior region. The papillae on the dorsal side of the mouth have small bases, but are especially

long and overhang the mouth, being 1 cm. or more long. In a specimen 9.7 cm. long, I am able to count about 27 and 31 conical warts respectively in each of the longitudinal series immediately on both sides of the median line. The ventral pedicels are numerous and are arranged in three longitudinal zones, two lateral and one median. In each lateral zone the pedicels stand alternately in two rows. The middle zone has also numerous pedicels. In the middle portion of the body, they seem in all specimens to be in from three to four zigzag rows, which arrangement seems to be kept up in some specimens to both extremities; but in some others, they are gradually reduced to two rows in the anteriormost and posteriormost parts. In most specimens, the pedicels of the two lateral zones are left protruding, while those of the middle zone are strongly contracted. Moreover, the former seem to be slightly greater both in length and diameter, than the latter. This arrangement is more or less obscured in contracted specimens, and even dorsal conical warts become not very apparent. In the young specimen 4.5 cm. long, the arrangement of ambulacral appendages is very clearly brought out, as there is a great deal of space between their bases. The dorsal papillae are in six distinct rows, although the basal conical warts present are not prominent. In the ventrum, the median zone of pedicels is clearly in two rows, although they show a tendency to be disturbed in this by becoming zigzag, especially in the middle third.

Excepting the supporting rods, the calcareous deposits are of one fundamental type. They nearly all consist of a triradiate basal part, the arms of which stand 120° apart. The distal ends of the arms are more or less enlarged and perforated. The perforation may be single or there may be several. Sometimes

one or more of the arms may be branched, the branching always taking place dichotomously. Only very rarely, and then mostly on ambulacral appendages, there may exist four-armed spicules, the arms being at right angles with one another. From the centre of the triradiate basal disk, there arises a single pillar. The base never shows a trace of four pillars, but the pillar arises as a single monolith. It hardly tapers at all. Sometimes it becomes slightly thicker toward the upper end.



Textfig. 2.

Synallactes triradiata :

a—Calcareous ring ; b, c
—Table-like bodies of
dorsal perisome ; d—Same
of ventral perisome ; e—
Supporting rod of dorsal
papilla ; f, g—Same of
ventral pedicels. (b—g
× 160). I—Interradialia ;
R—Radialia.

At the upper end, the pillar terminates after first becoming divided into several points ; or these points may be united by cross-junctions, leaving perforations between them. These table-like deposits

are of different sizes in different parts of the body. Those in the dorsal perisome (textfig. 2 *b, c*) are as a whole larger than those in the ventral perisome; the largest are found in the basal conical warts of the dorsal papillae (length of the arm measuring from 0.12 to 0.23 mm.). The dorsal surface between the basal conical warts of the papillae is strewn much more sparsely than in the warts with smaller and generally simple triradiate spicules (length of the arm measuring from 0.07 to 0.08 mm.). The calcareous spicules in the ventral perisome (*d*) are on the whole much smaller than those in the dorsal perisome and are also much more sparse (with arms 0.02—0.05 mm. long). Quadriradiate spicules are found in the dorsal papilla above the basal conical warts, but never in any considerable number. In papillae which are drawn out to a fine point there is no terminal disk. In those which are only somewhat contracted at the top, calcareous deposits are crowded and give an appearance as if they formed "a sort of a terminal disc" (THÉEL); but there probably exists no actual disk. In ventral pedicels triradiate spicules are sparse and a terminal disk is distinct. The supporting rods (*f, g*) in them have both ends pointed (0.43—0.65 mm. long). In dorsal papillae (*e*) their ends are enlarged and perforated, not pointed (about 0.5 mm. long). Spicules in the tentacles are somewhat like those in the dorsal papillae but smaller (0.11—0.22 mm. long).

Genital tubes in two bundles. Stone-canal single, running directly in front of, and along with, the genital duct attached to the dorsal body-wall. Polian vesicles in one specimen three, of which two are slender and tube-like, and one large and vesicle-like. The large vesicle and one of the slender ones were attached in the left ventral interradius, and the remaining slender one in the

right ventral interradius. A low median genital papilla, 1 cm. behind the base of the tentacles, in a specimen 12 cm. long. Respiratory trees two, their branches not long. The common part rather long, being 2.5 cm. long in a specimen of 12 cm. length. No relation with the circulatory system. Tentacular ampullae represented by slight elevations. Calcareous ring constituted as shown in textfig. 2 *a*. No calcareous deposits in genital organs, respiratory trees or cloacal wall.

Remarks :—The specimens described above agree in many respects with that described by THÉEL under the name of *Stichopus challengerii*. The main points of difference are :

1) Dorsal papillae in THÉEL'S specimen are described as scattered over the ambulacra and interambulacra. An arrangement of them in rows is scarcely to be found elsewhere than along the sides of the body, where they evidently belong to the lateral ventral ambulacra ; whereas in my specimens the dorsal papillae are in regular rows as described above. But it must be remembered that THÉEL'S specimen was slightly macerated, and those among my specimens which are not well preserved might easily be described in THÉEL'S words.

2) The commonest form of the calcareous deposits in THÉEL'S specimen is quadriradiate, while in my specimens they are almost without any exception of the triradiate character. There are only a few four-armed exceptions in the walls of papillae and pedicels.

My specimens are also very close to those described by LUDWIG as *Synallactes alexandri*. The only point of difference is that raised as the second point of difference in the above comparison with *Stichopus challengerii*. All other differences are minor.

Now we may regard the specimens of THÉEL and of LUDWIG, as well as my own, as all belonging to one species, in which case my

own specimens may be described as var. *triradiata*. I can detect no difference at all between *St. challengerii* and *Syn. alexandri*, while the points raised by LUDWIG seem to me to be due either to the state of preservation or to the incompleteness of the earlier author's description. If we however put a great deal of weight on the shape of the spicules, the Japanese specimens, which have almost entirely triradiate spicules, might be separated as *Syn. triradiata*. But there are also triradiate spicules in THÉEL'S and LUDWIG'S specimens, only they are much less numerous than the four-armed ones.

The choice between the two courses is almost entirely a matter of fancy. The safest course perhaps is not to disturb THÉEL'S descriptions at all, and to establish my specimens for the present at least as a separate species, leaving the question of identity between the three sets of specimens to be settled by future investigations.

4. *Synallactes discoidalis*, sp. n.

(Textfig. 3).

Specimens examined :—

Sci. Coll., Spec. No.	Number of indi- viduals	Preser- vation	Size in cm.	Locality	Depth in <i>hiro</i>	Collector	Date
1067	1	Ale.	6.2 long	Off Odawara, Saga- mi Bay.	270	Ijima	Aug. 1, 1895
1468	1	„	11 × 1.5 (14 × 2.5 when fresh)	Numa, Sagami Sea.	350	Mitsukuri & Aoki	Aug. 9, 1903
1469	2	„	7 × 1.5	Numa, Sagami Sea.	330	„	Aug. 22, 1903
1518	1	Glyc. mixture		Outside Okinosé, Sa- gami Sea.	400	Aoki	Apr. 25, 1904

Specimen 1468 was observed in the fresh state.