

## Ophiurans Of Izu, Japan

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## OPHIURANS OF IZU, JAPAN<sup>D</sup>

Shiro MURAKAMI

Although some ophiurans from the district of Izu are dealt with by H. L. CLARK in his admirable paper on the North Pacific ophiurans and by H. MATSUMOTO in his elaborate monograph on the Japanese ophiurans, our knowledge of the ophiuran fauna of the district is still far from being satisfactory. Therefore, it is very desirable to investigate the matter more thoroughly. I was fortunate enough to stay, from May, 1939 to March, 1940, at the Mitsui Institute of Marine Biology near Simoda, south end of the Peninsula Izu, enjoying the membership of that institute, and to make a collection of ophiurans in the adjoining waters of Sagami Sea and Suruga Bay. The species included in the present paper, based on examination of the collection, are no less than sixty-two in number, of which twelve are described here for the first time.

Before proceeding further, I must acknowledge my sincere thanks to Professor Dr. H. OHSHIMA for his kind guidance given me during the study. I also wish to express my hearty indebtedness to Professor Dr. I. AMEMIYA, the director of the Mitsui Institute of Marine Biology, for giving me an opportunity of performing the present investigation.

### SYSTEMATIC

#### Family Ophiacanthidae

##### 1. *Ophiologimus hexactis* CLARK

CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 252, fig. 123. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 99.

<sup>D</sup> Contributions from the Zoological Laboratory, Kyūsyū Imperial University, No. 158. Papers from the Amakusa Marine Biological Laboratory, No. 85.

Locality.—Numerous specimens; off Kawazu, Sagami Sea, 150 fathoms, Jan. 22, 1940.

The specimens at hand are all of small size and do not exceed 5 mm in the disk diameter. Unlike CLARK's type, the imbricating scales are found on the interbrachial ventral surfaces and sometimes there are four arm spines on some joints near the disk. Moreover, the radial shields are externally invisible in the larger specimens as CLARK already described, but they are recognizable in the smaller ones, though very small. In spite of these differences, I do not find any reason for separating these specimens from *O. hexactis*.

### 2. *Ophiophrura liodisca* CLARK

CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 249, fig. 121. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 100.

Locality.—One specimen; off Ito, Sagami Sea, 500 fathoms, March 18, 1940.

Close examination of the present specimen reveals that there are some slight differences from CLARK's type. The under arm plates are somewhat broader than, the tentacle scales are not so sharp as, and the oral papillae are more numerous than, in the type. However, I believe that these differences are within the range of variation. The specimen at hand measures 5 mm across the disk. It is very interesting to find such a rare species here.

### 3. *Ophiolimna diastata* (CLARK)

*Ophioconis diastata*: CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 27, fig. 3.

*Ophiolimna diastata*: MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 102.

Locality.—Five specimens; off Kawazu, Sagami Sea, 150 fathoms, Jan. 22, 1940.

### 4. *Ophiomitrella stellifera* MATSUMOTO

MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 103, fig. 27.

Localities.—Three specimens; off Kawazu, Sagami Sea, 150 fathoms, Jan. 22, 1940. One specimen; off Kawazu, Sagami Sea, 200 fathoms, Feb. 16, 1940.

5. *Ophiophthalmus cataleimmoidus* (CLARK)

*Ophiacantha cataleimmoida*: CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 217, fig. 100.

*Ophiophthalmus cataleimmoidus*: MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 108, fig. 28.

Localities.—Two specimens; Suruga Bay, May 18, 1939. Five specimens; Suruga Bay, May 18, 1939. Two specimens; Suruga Bay, May 20, 1939.

6. *Ophiophthalmus normani* (LYMAN)

*Ophiacantha normani*: LYMAN, 1879, Bull. Mus. Comp. Zoöl., VI, 2, p. 58, pl. XV, figs. 414-416.

*Ophiomitra normani*: LYMAN, 1882, Rep. Challenger, V, p. 208, pl. XXVI, figs. 9-11.

*Ophiophthalmus normani*: MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 109.

Localities.—Numerous specimens; off Manazuru, Sagami Sea, 200 fathoms, May 20, 1939. Two specimens; off Manazuru, Sagami Sea, 400 fathoms, June 20, 1939.

7. *Ophiacantha acanthinotata* CLARK

CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 203, fig. 94. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 117.

Locality.—One specimen; off Manazuru, Sagami Sea, 200 fathoms, June 18, 1939.

8. *Ophiacantha adiaphora* CLARK

CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 199, fig. 91. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 117.

Locality.—One specimen; Suruga Bay, May 18, 1939.

9. *Ophiacantha inutilis* KOEHLER

KOEHLER, 1904, Exp. Siboga, XLV, 1, p. 111, pl. XXI, figs. 6-8. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 117.

Locality.—Four specimens; off Toi, Suruga Bay, 200 fathoms, Nov. 13-19, 1939.

10. *Ophiacantha mitsuui*, sp. nov.

(Fig. 1)

Disk 6.5 mm in diameter; arms about 20 mm in length. Disk

rounded pentagonal, thickly covered with slender spinelets terminating in two or three extremely fine and slightly divergent spinules of uniform lengths, under which small thin, rounded scales are present. Radial shields invisible. Interbrachial spaces below covered with a close coating of smooth scales, but without spines except near the disk margin.

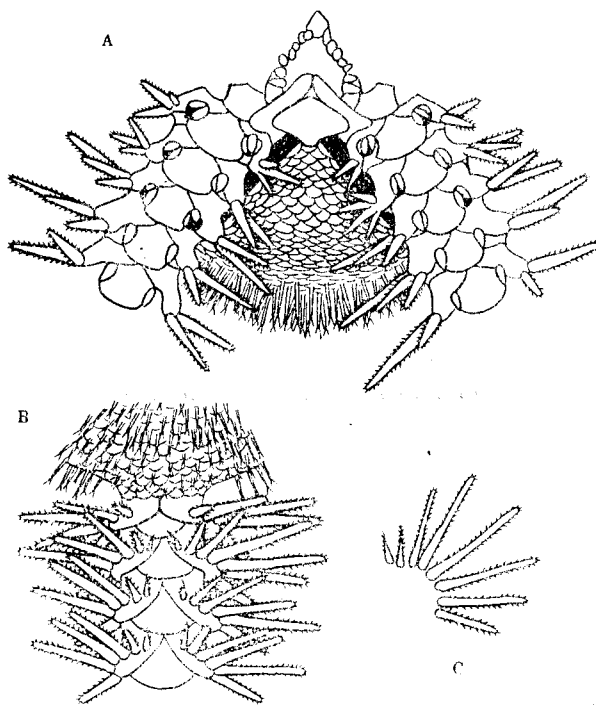


Fig. 1.—*Ophiacantha mitsui*.  $\times 11$  A. From below. B. From above.  
C. Arm spines of one side of an arm joint near disk.

Oral shields of medium size, somewhat triangular, about twice as broad as long, with a strongly produced outer lobe and rounded lateral angles. Adoral shields large, much longer than broad, broadly in contact within; their longer borders are more or less parallel with each other. Oral plates large, triangular, much higher than broad, but rather inconspicuous. Oral papillae seven on a side of an oral angle, of which the outer two are large and flat, serving as oral tentacle scales, while the remaining five are small,

thick and conical. Teeth large, somewhat triangular, about as broad as long, with a rounded end.

Upper arm plate triangular, about as long as broad or a little longer than broad, with an acute proximal angle and a convex distal border, separated from the adjoining fellows except the first two plates, which are barely in contact. First under arm plates moderate in size, hexagonal, a little broader than long, with a concave proximal border. Succeeding plates pentagonal, with concave lateral sides and the distal margin slightly curved. The proximal ones broader than long, and are in contact with each other, but distally they become longer than broad, and are separated from each other. Side arm plates prominent, meeting above, but not so below except terminal part of arm. There are eight arm spines near the disk, but six or seven at middle of arm. They are flat and strongly serrated; among them the middle one is the largest, being about twice as long as a joint, while the uppermost one or two are smallest and sharply pointed. Tentacle scales large, leaf-shaped; near the base of the arm there are two scales to each pore, but beyond the fourth joint the scale is single.

Colour in alcohol, yellowish-brown.

Locality.—One specimen; off Kawazu, Sagami Sea, 200 fathoms, Feb. 16, 1940.

The present species is closely related to *O. vestita*, but can easily be distinguished from it by the broad triangular oral shields, the presence of two tentacle scales in proximal arm joints, and by the spinelets of disk with a crown of two or three spinules. The new species is dedicated to Mr. Takanaga MITSUI, the founder of the institute.

#### 11. *Ophiacantha pentagona* KOEHLER

KOEHLER, 1897, Ann. Sci. Nat. Zool., Sér. 8, IV, p. 342, pl. VIII, figs. 56-57.—1899, Ech. Indian Mus., Deep-Sea Oph., p. 53, pl. IV, figs. 27-29. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 116.

Localities.—Four specimens; off Toi, Suruga Bay, 200 fathoms, Nov. 13-19, 1939. One specimen; off Kawazu, Sagami Sea, 120 fathoms, Feb. 24, 1940.

#### 12. *Ophiacantha rhachophora* CLARK

CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 201, fig. 92. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 119, fig. 30.

Localities.—Numerous specimens; off Manazuru, Sagami Sea, 200 fathoms, June 18, 1939. Nine specimens; off Manazuru, Sagami Sea, 200 fathoms, June 18, 1939. Five specimens; off Toi, Suruga Bay, 200 fathoms, Nov. 13-19, 1939. Numerous specimens; off Kawazu, Sagami Sea, 150 fathoms, Jan. 22, 1940. Numerous specimens; off Kawazu, Sagami Sea, 200 fathoms, Feb. 16, 1940. Numerous specimens; off Kawazu, Sagami Sea, 120 fathoms, Feb. 24, 1940.

### 13. *Ophiothamnus venustus* MATSUMOTO

MATSUMOTO, 1915, Proc. Acad. Nat. Sci., Philadelphia, p. 63. —1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 126, fig. 32.

Localities.—Six specimens; off Kawazu, Sagami Sea, 150 fathoms, Jan. 22, 1940. Twenty specimens; off Kawazu, Sagami Sea, 120 fathoms, Feb. 24, 1940.

### Family Amphilepididae

#### 14. *Amphilepis diastata*, sp. nov.<sup>1)</sup>

(Fig. 2)

Disk 7 mm in diameter; arms 20 mm in length. Disk somewhat pentagonal, covered with rather coarse, thin, imbricating scales, among which the primary plates are scarcely distinct. Radial shields elongate, more than twice as long as broad, about half the disk radius in length. They are pointed within, rounded distally, and completely separated from each other by four intervening wedge-shaped scales. Adradial border almost straight, somewhat convex abradially. Interbrachial spaces below covered with numerous small scales.

Oral shields somewhat pentagonal, about as long as broad, with rounded angles and a very convex distal border. Adoral shields large, slightly tapering within, where they are broadly in contact with each other. Oral plates rather large, triangular, higher than broad. Oral papillae two on a side; the proximal one small, thick and pointed, the distal one large, much broader than long.

Upper arm plates large, much broader than long, with a wide proximal angle and a very convex distal border; first two plates

<sup>1)</sup> Διάστατος, signifying *separated*, in reference to the separated radial shields.

broadly in contact with each other, but gradually becoming separated from each other by a narrow space. First under arm plates pentagonal, with an angle turned proximally, about as broad as

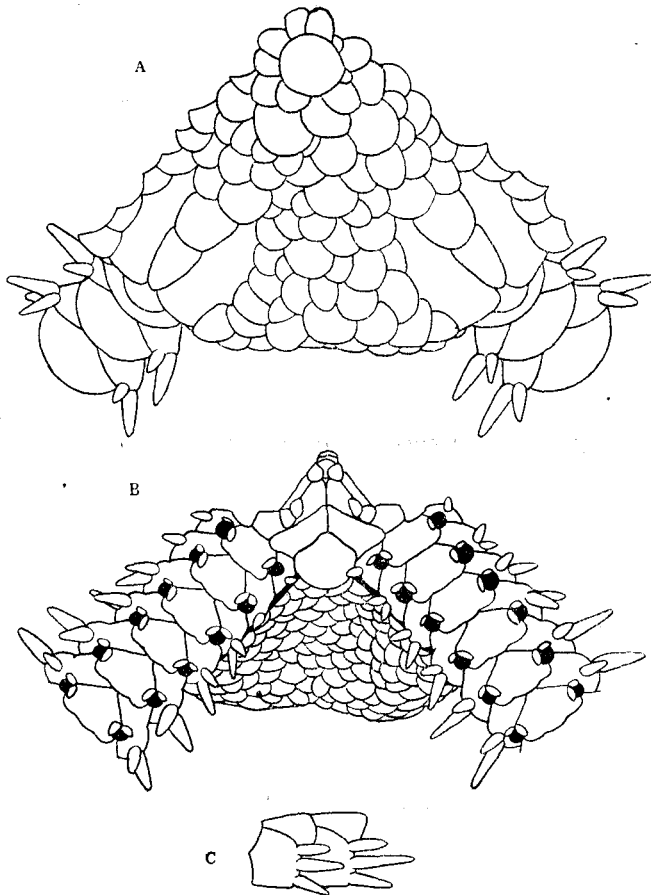


Fig. 2. *Amphilepis diastata*.  $\times 11$ . A. From above. B. From below.  
C. Side view of two arm joints near disk.

long or a little broader than long. Following plates also pentagonal, with a wide proximal angle and a distal margin slightly lobed at the middle; first three or four plates broadly in contact with each other, but succeeding ones are separated from each other; proximal ones are distinctly broader than long, but distally becoming longer than broad. Side arm plates large, prominent,



widely separated above, but less so below, except near tip of arm; each plate carries three arm spines, which are nearly of equal size, though the middle one is the largest, slightly exceeding a joint. Oral tentacle pores furnished with two large blunt scales. Tentacle pores of arm also guarded by two small, subequal scales set at right angles to each other. Genital slits inconspicuous.

Colour in alcohol, nearly white.

Locality.—One specimen; off Toi, Suruga Bay, 200 fathoms, Nov. 13-19, 1939.

The specimen is in a good state of preservation and it seems quite safe to regard it as representing a new species. It agrees with *A. remittens* and *A. protecta* in possession of two tentacle scales to each pore, but differs from them in having the narrow and divergent radial shields, the pentagonal oral shields and the under arm plates with an outer lobe slightly produced.

#### Family Amphiuroidae

##### 15. *Ophiactis macrolepidota* MARKTANNER

MARKTANNER-TURNERETSCHER, 1887, Ann. K. K. Naturhist. Hofmus., Wien, II, 4, p. 298, pl. XII, figs. 12-13. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 155, fig. 37.

Localities.—Several specimens; Sakune, off the Mitsui Institute of Marine Biology, 15 fathoms, June 16, 1939. One specimen; same locality as above, 15 fathoms, Feb. 19, 1940.

##### 16. *Ophiactis plana* LYMAN

*Ophiactis plana*: LYMAN, 1869, Bull. Mus. Comp. Zoöl., I, p. 330.<sup>1)</sup> CLARK, 1918, Bull. Mus. Comp. Zoöl., LXII, 6, p. 301.

*Ophiactis brachygenys*: CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 135, fig. 51.

Locality.—Numerous specimens; off Kawazu, Sagami Sea, 150 fathoms, Jan. 22, 1940.

##### 17. *Ophiactis savignyi* (MÜLLER & TROSCHER)

*Ophiolepis savignyi*: MÜLLER & TROSCHER, 1842, Sys. Ast., p. 95.

*Ophiactis savignyi*: LYMAN, 1882, Rep. Challenger, V, p. 115. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 158, fig. 39.

One specimen; locality unknown.

<sup>1)</sup> Not accessible to me.

18. *Ophiopholis aculeata* var. *japonica* (LYMAN)

*Ophiopholis japonica*: LYMAN, 1879, Bull. Mus. Comp. Zoöl., VI, 2, p. 42, pl. XIII, figs. 374-376.

*Ophiopholis aculeata* var. *japonica*: CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 123, fig. 47. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 162, fig. 41.

Localities.—One specimen; Suruga Bay, May 18, 1939. One specimen; off Hasima, Sagami Sea, 150 fathoms, June 17, 1939.

19. *Ophiopholis brachyactis* CLARK

CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 117, fig. 44. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 163, fig. 42.

Localities.—Five specimens; off Manazuru, Sagami Sea, 200 fathoms, June 18, 1939. Two specimens; off Kawazu, Sagami Sea, Feb. 16, 1940. One specimen; off Kawazu, Sagami Sea, 120 fathoms, Feb. 14, 1940.

20. *Amphioplus ancistrotus* (CLARK)

*Amphiodia ancistrota*: CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 161, fig. 69.

*Amphioplus ancistrotus*: MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 171, fig. 43.

Locality.—Two specimens; off Aziro, Sagami Sea, 200 fathoms, Dec. 4, 1939.

21. *Amphioplus macraspis* (CLARK)

*Amphiodia macraspis*: CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 157, fig. 66.

*Amphioplus macraspis*: MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 173, fig. 44.

Localities.—One specimen; Suruga Bay, May 20, 1939. Two specimens; Suruga Bay, May 22, 1939. Two specimens; off Aziro, Sagami Sea, 200 fathoms, Dec. 4, 1939. Several specimens; Aziro Bay, 250 fathoms, March 20, 1940.

22. *Amphioplus rhadinobrachiis* CLARK

CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 167, fig. 74. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 171.

Localities.—One specimen; off Aziro, Sagami Sea, 200 fathoms,

Dec. 4, 1939. Several specimens; Aziro Bay, 250 fathoms, March 20, 1940.

### 23. *Amphiacantha acanthina* (CLARK)

*Amphioplus acanthinus*: CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 168, fig. 75.

*Amphiacantha acanthina*: MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 179, fig. 46.

Locality.—One specimen; off Toi, Suruga Bay, 200 fathoms, Nov. 13–19, 1939.

Our specimen is of small size, measuring 5 mm across the disk. Different from CLARK's type, the radial shields are somewhat larger, and many of the under arm plates have no sharp projection at the middle of the distal margin. Moreover, the arm spines are usually three in number, but sometimes four near the disk. However, as it agrees with *A. acanthina* in other features, I believe that it is permissible to identify it to the species named.

### 24. *Amphipholis japonica* MATSUMOTO

MATSUMOTO, 1915, Proc. Acad. Nat. Sci., Philadelphia, p. 71. —1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 186, fig. 49.

Localities.—Numerous specimens; Sitaru, south end of the Peninsula Izu, littoral. Five specimens; Sakune, off the Mitsui Institute of Marine Biology, 10 fathoms.

### 25. *Amphipholis kochii* LÜTKEN

LÜTKEN, 1872, Oph. Nov., p. 10, pls. I-II, fig. 6. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 192, fig. 52.

Localities.—One specimen; Sitaru, south end of the Peninsula Izu, littoral, June 16, 1939. Two specimens; same locality as above, littoral, July 17, 1939.

### 26. *Amphipholis sobrina* MATSUMOTO

MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 189, fig. 50.

Localities.—Three specimens; off Manazuru, Sagami Sea, 200 fathoms, June 18, 1939. Two specimens; off Toi, Suruga Bay, 200 fathoms, Nov. 13–19, 1939. Two specimens; off Kawazu, Sagami Sea, 150 fathoms, Jan. 22, 1940.

27. *Amphiura acrystata* CLARK

CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 145, fig. 58. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 203.

Locality.—Six specimens; off Toi, Suruga Bay, 200 fathoms, Nov. 13-19, 1939.

28. *Amphiura kandai*, sp. nov.

(Fig. 3)

Disk 2.5 mm in diameter; arms six in number, 11 mm in length. Disk circular, slightly swollen, covered with many coarse, thin, imbricating scales. Primary plates indistinguishable. Radial shields rather small, more than twice as long as broad, perfectly separated from each other by two or three intervening scales.

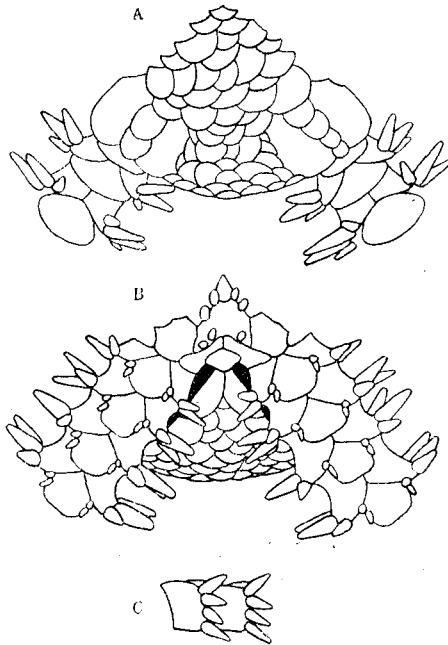


Fig. 3.—*Amphiura kandai*. × 20. A. From above. B. From below. C. Side view of two arm joints near disk.

Interbranchial spaces below covered with the same covering as that of the dorsal side of disk. Genital slits inconspicuous.

Oral shields rhomboidal or triangular, about as long as broad,

with rounded angles. Adoral shields long and narrow, in contact within, somewhat enlarged distally. Oral plates indistinct. Oral papillae usually two, but sometimes three, on a side; the one at the apex of jaw thin and pointed, the distal ones are rather thick and blunt. Scales of the oral tentacle pores thin and pointed, or sometimes wide and flat, meeting each other across the mouth slits so as to close the mouth tightly.

Upper arm plates transversely oval or somewhat triangular with rounded angles, much wider than long, not in contact with each other longitudinally. First under arm plates large, hexagonal, much longer than broad. Following plates pentagonal, a little longer than broad, with an acute proximal angle, separated from each other by a narrow interval except the first two or three plates, which are in close contact with each other. Side arm plates well developed, meeting both above and below; each carries three or four thick, conical, subequal arm spines, the length of which is about equal to a joint. Tentacle scales two to each pore, very small; the inner one is slightly larger than the outer.

Colour in life, light pinkish.

Locality.—Numerous specimens; Sakune, off the Mitsui Institute of Marine Biology, 15 fathoms, June 2, 1939.

Though the specimens before me are of very small size, they are easily recognizable chiefly by the very peculiar mouth parts. When a few drops of hydrogen peroxide are poured into a dish containing some specimens, placed in a dark room, the animals will be seen to shine very faintly. This fact was first noticed by the late Dr. S. KANDA who was known to be a veteran investigator of luminous creatures, but he was unable to study it more thoroughly. The new species is dedicated to him.

29. *Amphiura leptobrachia*, sp. nov.<sup>1)</sup>

(Fig. 4)

Disk 5 mm in diameter; arms all torn away, but very long. Disk five-lobed, concave at the base of arm, covered with a smooth coat of numerous, small, thin scales. Primary plates inconspicuous. Radial shields rather small, somewhat crescentic, more than twice

<sup>1)</sup> Λεπτός, signifying *slender*, and βραχίον, signifying *arm*, in reference to the slender arm.

as long as broad, completely separated from each other by several intervening elongate scales. Interbrachial spaces below closely covered with minute scales.

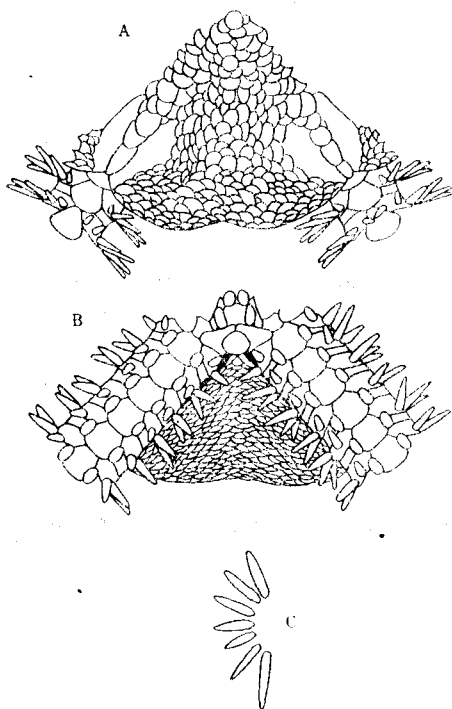


Fig. 4.—*Amphiura leptobrachia*.  $\times 11$ . A. From above.  
B. From below. C. Arm spines of one side of an arm  
joint near disk.

Oral shields small, transversely oval, about as long as broad. Adoral shields moderate, roughly triangular, narrow within where they meet or not, enlarged distally. Oral plates inconspicuous. Oral papillae two on a side; the one at the apex of jaw thick and rounded, the distal one elongate, thick and blunt. Oral tentacle scales distinct and pointed. Genital slits rather large. Genital scales inconspicuous.

Upper arm plates transversely elliptical, broadly in contact with each other; near the base of the arm they are rather small and about as broad as long, but at the middle of arm becoming

large and about twice as wide as long. First under arm plates small, hexagonal, broader within than without. Following plates tetragonal, a little longer than broad, with rounded corners, broadly in contact with each other. Side arm plates narrow, not meeting both above and below; each carries seven cylindrical, hollow arm spines, of which the lowest is a little the longest, while the others are subequal, somewhat longer than a joint. Tentacle pores guarded by a single large, elongate oval scale.

Colour in alcohol, whitish.

Locality.—Twelve specimens; Sakune, off the Mitsui Institute of Marine Biology, 15 fathoms, June 5, 1939.

The present species is closely related to *A. micraspis*, but is easily distinguished from it by the larger radial shields, by the non-fanshaped distal oral papillae, by the broader oral shields and by the larger arm spines.

30. *Amphiura macraspis*, sp. nov.<sup>1)</sup>

(Fig. 5)

Disk 5 mm in diameter; arms about 20 mm in length. Disk flat, somewhat pentagonal, slightly concave at the interradiial border, covered with small, thin, imbricating scales, among which those around the radial shields are larger than the rest. Dorsocentral plate conspicuous, rounded, while the other primary plates are indistinct. Radial shields large, about twice or more than twice as long as broad, separated from each other; the adradial side nearly straight, the abradial one strongly convex. Interbrachial spaces below covered with a fine scaling.

Oral shields very large, much broader than long, with a wide proximal angle and rounded lateral sides. Adoral shields long and narrow, slightly enlarged without, meeting proximally or not. Oral plates moderate, higher than broad. Oral papillae two on each side of an oral angle, of which the inner one is rather squarish, thick and stout, while the outer one is somewhat longer, thick and conical, but blunt at the tip. Genital slits inconspicuous.

Upper arm plates transversely elliptical or somewhat triangular, with rounded lateral angles and a convex distal border

<sup>1)</sup> Μακρός, signifying *large*, and ἀσπίς, signifying *shield*, in reference to the large radial shields.

except first three or four plates which are rather rhombic, broadly in contact with each other at the base of arm; the plates are at first broader than long, but becoming longer than broad near tip

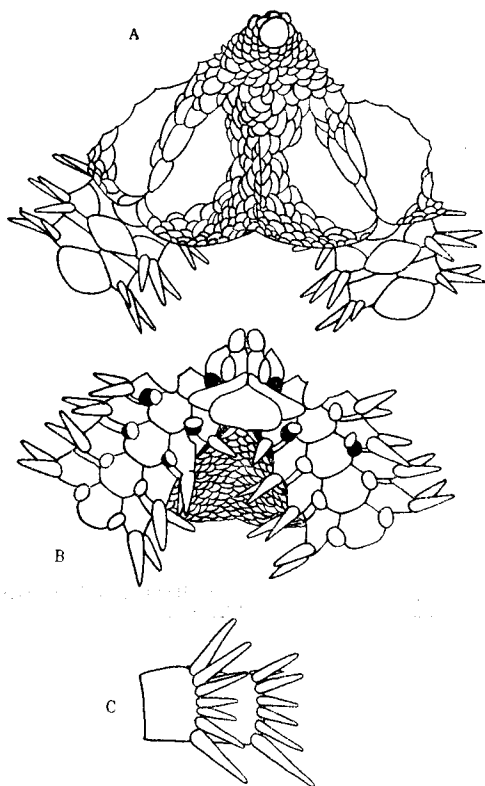


Fig. 5.—*Amphiura macraspis*.  $\times 11$  A. From above. B. From below. C. Side view of two arm joints near disk.

of arm. First under arm plates pentagonal, a little longer than broad. Following plates tetragonal or hexagonal, with a curved distal border, longer than broad except the second which is about as broad as long, broadly in contact with each other. Side arm plates moderate, broadly separated below, but less so above proximally; each carries six or seven slender, blunt, hollowed, cylindrical arm spines, of which the undermost is longest, about twice as long as a joint, while the middle ones are shortest and conical; the uppermost is again large, longer than a joint. Tentacle pores protected by one large, oval scale.



Colour in alcohol, whitish.

Locality.—One specimen; Suruga Bay, May 21, 1939.

The present species is very near to *A. argentea*, but can at once be distinguished from it by the presence of the large radial shields, the broad upper arm plates and the broad oral shields.

31. *Amphiura megapoma*, sp. nov.<sup>1)</sup>

(Fig. 6)

Disk 3.5 mm in diameter; arms six in number, all broken off in the specimen examined, but the longest portion remained measures 9 mm in length. Disk hexagonal, slightly concave at the interradial border, covered with rather coarse, thin, imbricating scales. No primary plates distinct. Radial shields comparatively small, about one third as long as the disk radius, a little longer than broad, pointed within, rounded distally, and completely separated by a few scales except one pair which are fully joined together. Interbranchial spaces below covered with scaling similar to that of the dorsal side of disk.

Oral shields rather large, pentagonal or tetragonal, as long as broad, with rounded lateral and distal angles; madreporite largest of all, roughly triangular. Adoral shields long and narrow, wider without than within, broadly in contact with each other on the interradial line. Oral papillae three on each side of an oral angle; the proximal one small and conical, the distal two large and rounded. One small infra-dental papilla present. Oral tentacle scales are indistinguishable from the oral papillae.

Upper arm plates of moderate size, longer than broad, with an

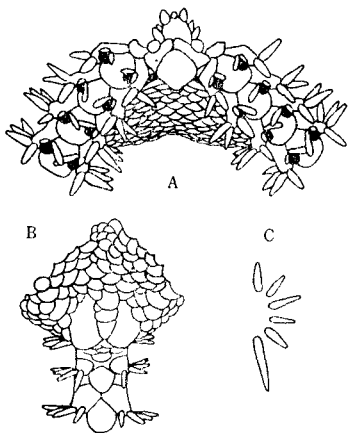


Fig. 6.—*Amphiura megapoma*.  
× 11. A. From below. B.  
From above. C. Arm spines  
of one side of an arm joint  
near disk.

<sup>1)</sup> Μέγας, signifying *big*, and πώμα, signifying *lid*, in reference to the large tentacle scales.

acute proximal angle and a strongly rounded distal border, in contact with each other. First under arm plates small, broader than long. Following plates pentagonal or hexagonal, longer than broad, with a curved distal border, broadly in contact with each other throughout the length. Side arm plates moderate, as high as a joint, separated from each other by a narrow naked skin; each carries six or seven cylindrical arm spines, among which the undermost is largest and longer than a joint, while the remaining ones are subequal, about as long as, or a little shorter than, a joint. Tentacle pores very large, guarded by two scales, of which the inner one is markedly large and longer than the breadth of under arm plate in length except at the base of arm; the outer one is very small, somewhat longer than broad.

Colour in alcohol, dirty gray.

Locality.—One specimen; off Kawazu, Sagami Sea, 150 fathoms, Jan. 22, 1940.

The specimen before me is of very small size and unique in the collection, but its features are so remarkable that it well deserves to get a name as new species. The new species is easily distinguished from the other Amphiuroid species chiefly by the extraordinary size of the inner tentacle scales.

32. *Amphiura pachybactra*, sp. nov.<sup>1)</sup>

(Fig. 7)

Disk 8 mm in diameter; arms about 35 mm in length. Disk five-lobed, closely covered with numerous fine, imbricating scales, among which those near the centre and around the radial shields are larger than the rest. Radial shields large, about one half as long as the disk radius, more than twice as long as broad, completely separated from each other by elongate intervening scales; the proximal end rather pointed, the distal one somewhat rounded. Interbrachial spaces below covered with a fine scaling,

Oral shields rhomboidal, longer than broad or broader than long, with rounded angles; madreporite largest, somewhat pentagonal. Adoral shields large, roughly triangular, either in contact with, or separated from, each other along the median interradial

<sup>1)</sup> Πάχης, signifying *thick*, and βάρητος, signifying *club*, in reference to the thick arm spines.

line as the case may be, and producing a narrow lobe distally so as to separate the oral shield from the first under arm plate. Oral papillae two on a side; the one at the apex of jaw thick and squarish, the distal one large, thick, elongate, with a rounded end.

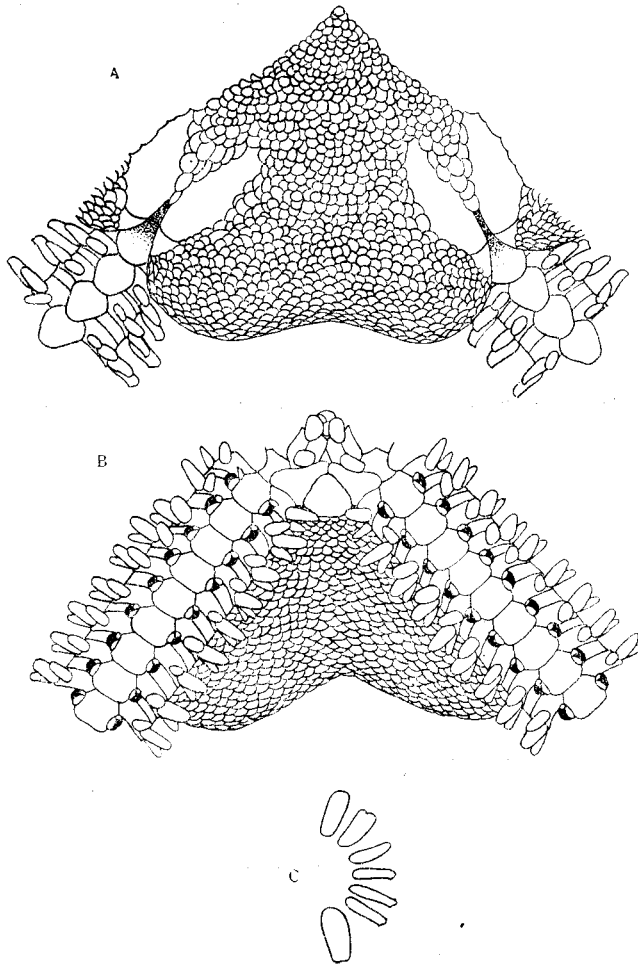


Fig. 7.—*Amphiura pachybaëtra*.  $\times 14$ . A. From above. B. From below. C. Arm spines of one side of an arm joint near disk.

Upper arm plates well developed, more or less broadly in contact with each other throughout the length; the proximal members are oval in shape and about as broad as long, but distally they become transversely elliptical and much broader than long. First

under arm plates small, hexagonal or trapezoid, longer than broad, narrow without than within. Following plates tetragonal, with rounded corners, fully in contact with each other; the second one is a little longer than broad, but further distally becoming broader than long. Side arm plates narrow, separated from each other by a naked skin, not meeting both above and below; each carries seven thick, squarish, flat arm spines, which are longer than a joint; the most ventrally situated is the largest; the second, third, fourth and fifth from below are thorny at the end. The arm spines diminish in number as it proceeds distally, and finally become reduced to only two near tip of arm. Tentacle pores protected by two large, subequal scales.

Colour in alcohol, dirty gray.

Localities.—Four specimens; Sitaru, south end of the Peninsula Izu, littoral, June 3, 1939. Five specimens; same locality as above, littoral, July 17, 1939.

The present species is so similar to *A. rapida* that it made me hesitate to take it as a type of a new species. However, it differs from the latter in having the larger radial shields, the somewhat broader oral shields and some thorny arm spines.

### 33. *Amphiura trachydisca* CLARK

CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 149, fig. 60. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 201.

Localities.—Two specimens; off Aziro, Sagami Sea, 200 fathoms. Two specimens; off Toi, Suruga Bay, 200 fathoms, Nov. 13-19, 1939.

### 34. *Ophionephthys octacantha* CLARK

CLARK, 1915, Mem. Mus. Comp. Zoöl., XXV, 4, p. 239, pl. IX, figs. 9-10.

Localities.—Three specimens; Sakune, off the Mitsui Institute of Marine Biology, 15 fathoms, Feb. 19, 1940. One specimen; Sakune, 15 fathoms, Feb. 29, 1940.

It is very remarkable that *O. octacantha* which was described by CLARK from Torres Strait (1915) should have been found from the district of Izu. However, as the result of close examination of our specimens, not a single character was found to be satis-

factory to distinguish them from *O. octacantha*. The largest specimen measures about 5 mm across the disk.

### 35. *Ophiocentrus verticillatus* (DÖDERLEIN)

*Ophiocnida verticillata*: DÖDERLEIN, 1896, Semon-Zool. Forschungr. Austr. u. Malay Arch., p. 287, pl. XIV, figs. 2a-b, pl. XV, figs. 7-7a.

*Ophiocentrus verticillatus*: MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 213, fig. 59.

One specimen; locality unknown.

## Family Ophiotrichidae

### 36. *Ophiothrix koreana* DUNCAN

DUNCAN, 1879, Journ. Linn. Soc., London, XIV, p. 473, pl. XI, figs. 28-32. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 220.

Localities.—Two specimens; off Manazuru, Sagami Sea, 200 fathoms, June 18, 1939. Numerous specimens; off Heda, Suruga Bay, 200 fathoms, Nov. 4, 1939. Three specimens; off Toi, Suruga Bay, 200 fathoms, Nov. 13-19, 1939.

### 37. *Ophiogymna elegans* LJUNGMAN

LJUNGMAN, 1866, Öfv. K. Vet. Akad. Förh., XXIII, p. 163.<sup>1)</sup> KOEHLER, 1922, U. S. Nat. Mus., Bull. 100, V, p. 281, pl. XLIII, figs. 3-8, pl. CIII, fig. 7.

Locality.—One specimen; off Tumekezaki, Sagami Sea, 10 fathoms, Aug. 13, 1939.

The specimen is of small size, and measures only 5 mm across the disk. However, on the other hand, I was able to collect several large specimens, 7 to 9 mm across the disk, at Tomioka, Amakusa. They agree with KOEHLER's description and photographs. The colour in life was white with red markings on the dorsal surface of disk, and the arms were ordinarily annulated with small red spots. They are usually found clinging to a colony of *Dendronephthya* sp.

### 38. *Ophiothela danæ* VERRILL

VERRILL, 1869, Proc. Boston Soc. Nat., Hist., XII, p. 391. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 230, fig. 67.

Locality.—Three specimens; Sakune, off the Mitsui Institute of Marine Biology, 15 fathoms.

<sup>1)</sup> Not accessible to me.

## Family Ophiolepididae

39. *Aspidophiura uniumbonata*, sp. nov.<sup>1)</sup>

(Fig. 8)

Disk 4.5 mm in diameter; arms broken off in all the specimens available, but more than 10 mm in length. Disk circular or rounded pentagonal, thin, flat, covered with twenty-six large stout plates, namely six primary plates, ten radial shields and ten inter-radial plates. Dorsocentral plate pentagonal, with a small central boss, directly surrounded by the radial plates; the latter hexagonal, much broader than long, a little larger than the former. Radial shields about of the same size as the radials, roughly triangular, as long as broad, with the adradial side convex, overlapping each other on the radial line. Inner interradials a little smaller than the radials, pentagonal, about as long as broad, broader within than without, distal border slightly concave; outer interradials quadrangular, broader without than within. Besides these, ten small convex, stout scales are found on the periphery of disk between the radial shield and outer inter-radial plate. Interbrachial spaces below covered with one very large plate and two large genital scales with a marginal series of minute papillae which form a conspicuous arm-comb visible from above. Genital slits small, distinct within, but inconspicuous distally.

Oral shields very large, about as broad as long, narrow within, much enlarged distally,

<sup>1)</sup> *Uni*, signifying *single*, and *umbo*, signifying *boss*, in reference to single central boss on the dorsal side of disk.

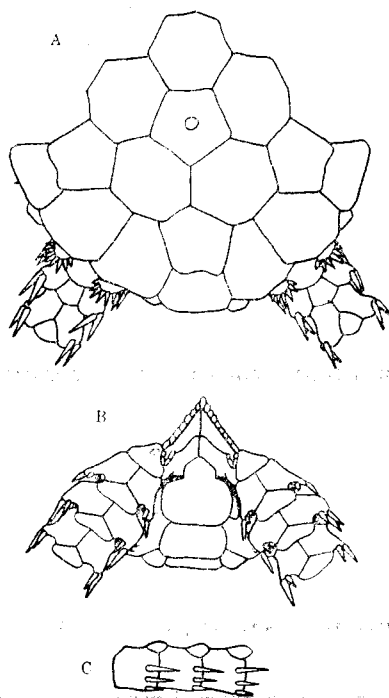


Fig. 8.—*Aspidophiura uniumbonata*.  $\times 11$ .  
A. From above. B. From below. C. Side view of three arm joints near disk.

having a distinct notch on the lateral side at the end of genital slit. Adoral shields long and narrow, more than twice as long as broad, broadly in contact with each other proximally. Six or seven oral papillae on a side, squarish, broader than long, soldered together. Teeth stout, rather triangular.

Arms tapering distally, broader than high, strongly knotted. Upper arm plates distinctly swollen; first and second ones squarish, broader without than within, with a convex distal border, broadly in contact with each other; following plates triangular, with an acute proximal angle and a very convex distal border, about as broad as long, widely separated from each other. They diminish in size rapidly, and finally disappear. First under arm plates very large, triangular, with rounded angles, a little broader than long. Second ones which are the largest of all, triangular, with a curved distal border, much broader than long. The remaining ones similar to the foregoing in shape, but constantly diminishing in size toward the end of arm. They are all widely separated from each other. Side arm plates well developed, completely meeting both above and below; each carries three well-spaced, acute, needle-like arm spines, of which the uppermost is longest, about two thirds as long as a joint, while the undermost is smallest. Distally from the eleventh joint, the middle spines assume a hook-shape. Oral tentacle pores not opening into the mouth slit, protected by two or three scales on aboral border and four on adoral one. Tentacle pores of arm about fifteen pairs, very small, wanting the scales except the basal ones which bear a small scale on the abradial side.

Colour in life, dorsal side of disk purplish; each plate bordered with red; distal part of radial shields white; dorsal side of arm pinkish. Interbrachial spaces below purplish proximally, reddish distally. Mouth parts and ventral side of arm yellowish white.

Locality.—Three specimens; off Kawazu, Sagami Sea, 150 fathoms, Jan. 22, 1940.

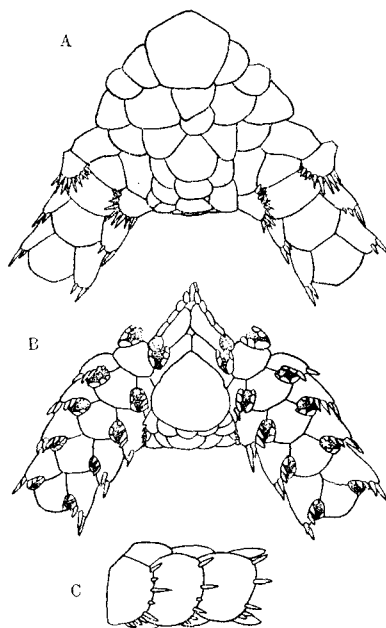
The present species differs from *A. watasei* in the presence of a central boss only on the dorsocentral, in the absence of small intervening scales on the dorsal side of disk, in having more numerous tentacle pores, and in the length of arm spines.

40. *Stegophiura liodisca*, sp. nov.<sup>1)</sup>

(Fig. 9)

Disk 4 mm in diameter; arms torn away, but probably more than 10 mm in length in the intact state. Disk pentagonal, thick, flat, covered with about one hundred rather smooth, flat plates, of which the six primary and five interradial lying on the middle of interradial line are larger than the rest and easily distinguished by the presence of a special marking at the centre. Dorsocentral plate largest of all, pentagonal, with rounded angles, directly surrounded by five radial plates and five small ones. Radial plates rhomboidal, with a rounded distal angle. Interradial plates hexagonal, with rounded disto-lateral angles and a convex distal border, slightly broader than long. Radial shields moderate, tetragonal, slightly curved adradially, longer than broad, more or less in contact with each other at the proximal end. Interbrachial spaces below covered with about ten small scales between the oral shield and disk margin. Genital slits inconspicuous. Genital scales elongate lunar, provided with conspicuous comb papillae which become shorter orally. Beneath this comb on the basal arm plates is a smaller secondary comb.

Oral shields very large, covering the greater part of the interbrachial ventral surfaces, about as broad as long, with an acute proximal angle and rounded distal and lateral sides, having a single notch on the lateral side. Adoral shields

Fig. 9.—*Stegophiura liodisca*. × 11.

A. From above. B. From below.

C. Side view of three arm joints near disk.

<sup>1)</sup> *Λίος*, signifying *smooth*, and *δίσκος*, signifying *disk*, in reference to the smooth disk.



long and narrow, broadly in contact with each other at the proximal end, separating the oral shield from the first side arm plate distally. Oral plates conspicuous, broader than high. Oral papillae four on a side of an oral angle; distal two much broader than the rest; one at the apex of jaw large and conical. Teeth rather small, longer than wide, with an obtuse end.

Arms very stout, cylindrical, more or less compressed, tapering abruptly near the tip. First upper arm plates of moderate size, pentagonal, with an acute proximal angle, as broad as long, embraced by the radial shields. Second ones larger than the foregoing, trapezoid, broader without than within, wider than long. Third and fourth hexagonal; the former is the largest of all, also broader than long, while the latter is about as long as broad. Farther out they diminish gradually in size, becoming longer than broad and rhomboidal or triangular toward the extremity. They are exceedingly thickened and in contact with each other at first, but gradually becoming flat and separated from each other. First under arm plates triangular, slightly broader than long, with a convex distal border and rounded angles. Succeeding plates tetragonal or hexagonal, longer than broad at first, but soon becoming broader than long, widely separated from each other except three basal plates. Side arm plates stout and high, with a rounded distal border, meeting both above and below except near base of arm. Arm spines four or five on each side arm plate, well-spaced, dimorphic; even the first, third and fifth from below which are longer among them, are very small, being only about one third as long as the corresponding joint; the smaller ones disappearing in distal joints. Oral tentacle pores large, provided with six flat, blunt scales, three on each side. The following two pores bear seven scales, among which three lie on the under arm plate and four on the side arm plate; the former are flat, while the latter are spiniform; outer ones of each series are longer than the inner ones. The tentacle scales diminish in number distally, and beyond the sixth joint the adradial scales disappear.

Colour in alcohol, whitish.

Locality.— One specimen; off Kawazu, Sagami Sea, 150 fathoms, Jan. 22, 1940.

Though the specimen representing this species is of small size, I think it deserves to establish a new species because of its

distinct characters. It is closely related to *S. nodosa*, but differs from it in possessing the tetragonal radial shields, the conspicuous comb papillae, in the shape of arm spines and in the short and rounded oral shields.

41. *Stegophiura rhabdotoplax*, sp. nov.<sup>1)</sup>

(Fig. 10)

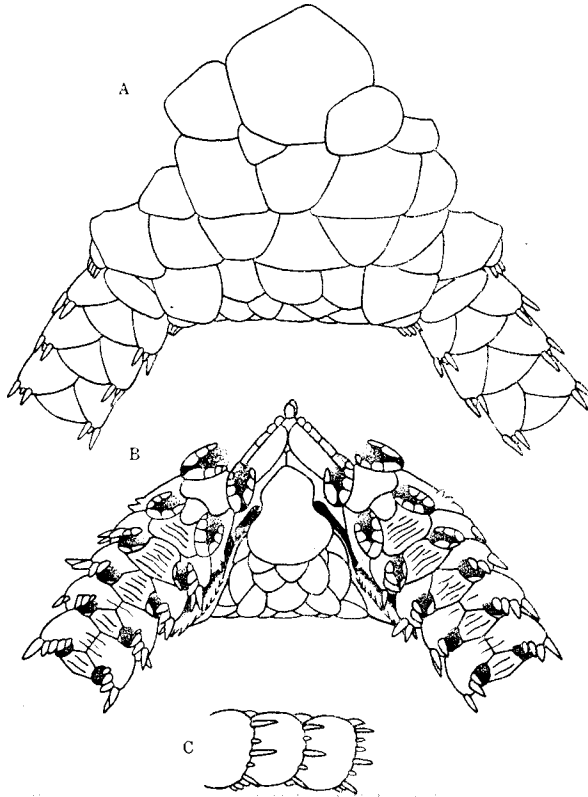


Fig. 10.—*Stegophiura rhabdotoplax*. × 10. A. From above.  
B. From below. C. Side view of three arm joints near disk.

Disk 6 mm in diameter; arms broken, still they are more than twice as long as disk diameter in length. Disk pentagonal, thick and slightly swollen, covered with about ninety large plates, among

<sup>1)</sup> Ραβδωτός, signifying *striped*, and πλάτη, signifying *plate*, in reference to the striped ventral and side arm plates.

which those near the centre are larger than the rest. Six primary plates easily distinguishable from the remaining ones by the possession of special mark on the centre; dorsocentral plate largest of all, generally pentagonal, with rounded angles; radial plates slightly smaller than the former, rhomboidal, broader than long. Radial shields of moderate size, roughly triangular, slightly broader than long or sometimes longer than broad, diverging proximally by intervention of one or two scales, more or less overlapping each other at the distal part. Interbrachial spaces below covered with about twenty-five coarse plates.

Oral shields large, somewhat guitar-shaped, broader without than within, markedly notched on the lateral side at the proximal end of genital slit. Adoral shields long and narrow, in contact with each other at the proximal end. Oral papillae five or six on a side; the distal three large, decidedly wide and short, the proximal ones small, with a somewhat rounded margin. Teeth five in number on each oral angle, rather small, rhomboidal, with an acute proximal end. Genital slits long and very conspicuous. Genital scales narrow, slightly broader distally, rather conspicuous when viewed from above; each carries about twenty short, sharp, crowded papillae, which make up the arm-comb.

Arms very stout at the basal part, as broad as high, tapering abruptly near the tip. First upper arm plates tetragonal, much broader than long. Second ones also tetragonal, broader without than within, with a rounded distal border, broadly in contact with the first one. Following plates triangular, broader than long, with an angle proximally and the distal border convex, well separated from each other. First under arm plates triangular, with rounded disto-lateral angles and a concave distal margin. Second ones quadrangular, longer than broad, broader without than within, with concave lateral and distal borders. Following ones pentagonal or hexagonal, at first as broad as long, but farther distally becoming broader than long; they are rapidly diminishing in size distally and beyond the fourth joint they are widely separated from each other. Except the first under arm plates, they are all strongly striated transversely by grooves. Side arm plates well developed, higher than broad, meeting above and below except near base of arm, provided with five or six dimorphic arm spines, among which three are longer than the rest and about one half as long as the

corresponding joint. Ventral part of side arm plates is also striated like the ventrals. Oral tentacle pores not opening into the mouth slit, furnished with three or four scales on the inner side and two or three on the outer side; the outermost scale in each series is very broad. Tentacle pores of arm very large; first two or three of them protected by four to seven scales, of which two or three lie on the abradial side and one to three on the adradial; the former are spiniform and their number is reduced to only one near tip of arm, while the latter are flat and disappear beyond the fourth joint.

Colour in alcohol, whitish.

Locality.—Fifteen specimens; off Kawazu, Sagami Sea, 150 fathoms, Jan. 22, 1940.

The present species is very near to *S. sterea* and *S. liodisca*, but the coarser plates of disk, the roughly triangular radial shields, the guitar-shaped oral shields, the striated under and side arm plates are the features enough to keep the former separate from the latter.

#### 42. *Stegophiura sculpta* (DUNCAN)

*Ophioglypha sculpta*: DUNCAN, 1879, Journ. Linn. Soc., London, XIV, p. 455, pl. IX, figs. 6-8, pl. XI, fig. 35.

*Ophiura sculpta*: CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 73.

*Stegophiura sculpta*: MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 258.

Locality.—Numerous specimens; Sakune, off the Mitsui Institute of Marine Biology, 15 fathoms.

#### 43. *Stegophiura sterea* (CLARK)

*Ophioglypha sterea*: CLARK, 1908, Bull. Mus. Comp. Zool., LI, p. 243.

*Ophiura sterea*: CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 75, fig. 22.

*Stegophiura sterea*: MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 258, fig. 71.

Localities.—Two specimens; off Manazuru, Sagami Sea, 200 fathoms, June 18, 1939. One specimen; off Heda, Suruga Bay, 200 fathoms, Nov. 4, 1939. One specimen; off Toi, Suruga Bay, 200 fathoms, Nov. 13-19, 1939. One specimen; off Kawazu, Sagami Sea, 150 fathoms, Jan. 22, 1940. Several specimens; off Kawazu, Sagami Sea, 200 fathoms, Feb. 16, 1940.

44. *Stegophiura vivipara* MATSUMOTO

MATSUMOTO, 1915, Proc. Acad. Nat. Sci., Philadelphia, p. 79.-1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 255, fig. 70.

Localities.—Three specimens; off Kawazu, Sagami Sea, 150 fathoms, Jan. 22, 1940. One specimen; off Kawazu, Sagami Sea, 200 fathoms.

45. *Ophiura flagellata* (LYMAN)

*Ophioglypha flagellata*: LYMAN, 1878, Bull. Mus. Comp. Zoöl., V, 7, p. 69, pl. II, figs. 49-51.

*Ophiura flagellata*: CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 60, fig. 15. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 273.

Localities.—Three specimens; Suruga Bay, May 20, 1939. One specimen; Suruga Bay, May 22, 1939. Twelve specimens; off Heda, Suruga Bay, 200 fathoms, Nov. 4, 1939. Numerous specimens; off Toi, Suruga Bay, Nov. 13-19, 1939.

46. *Ophiura kinbergi* (LJUNGMAN)

*Ophioglypha kinbergi*: LJUNGMAN, 1866, Öfv. K. Vet. Akad. Förh., XXVIII, p. 166.<sup>1)</sup>

*Ophiura kinbergi*: CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 37, fig. 9. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 271, fig. 73.

Locality.—Two specimens; Sakune, off the Mitsui Institute of Marine Biology, 15 fathoms, Feb. 19, 1940.

47. *Ophiura micracantha* Clark

CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 47, fig. 10. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 276.

Localities.—One specimen; off Manazuru, Sagami Sea, 200 fathoms, June 18, 1939. Two specimens; off Heda, Suruga Bay, 200 fathoms, Nov. 4, 1939. One specimen; off Kawazu, Sagami Sea, 200 fathoms, Feb. 16, 1940.

48. *Ophiura monostæcha* CLARK

CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 65, fig. 17. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 281.

Localities.—One specimen; Suruga Bay, May 20, 1939. One specimen; off Toi, Suruga Bay, 200 fathoms, Nov. 13-19, 1939.

<sup>1)</sup> Not accessible to me.

49. *Ophiura oöplax* (CLARK)

*Ophiocten oöplax*: CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 99, fig. 37.

*Ophiura oöplax*: MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 275, fig. 75.

Localities.—Three specimens; off Toi, Suruga Bay, 200 fathoms, Nov. 13–19, 1939. Two specimens; off Kawazu, Sagami Sea, 200 fathoms, Feb. 16, 1940.

50. *Ophiomusium cancellatum* LYMAN

LYMAN, 1878, Bull. Mus. Comp. Zoöl., V, 7, p. 111, pl. I, figs. 17–18. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 291.

Localities.—Two specimens; off Aziro, Sagami Sea, 200 fathoms. One specimen; off Toi, Suruga Bay, 200 fathoms, Nov. 13–19, 1939. Numerous specimens; off Kawazu, Sagami Sea, 150 fathoms, Jan. 22, 1940.

51. *Ophiozonella longispina* (CLARK)

*Ophiozona longispina*. CLARK, 1908, Bull. Mus. Comp. Zoöl., LI, p. 290.

*Ophiozonella longispina*: MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 297, fig. 80.

Locality.—One specimen; off Heda, Suruga Bay, 200 fathoms, Nov. 4, 1939.

52. *Ophiozona œdilepis*, sp. nov.<sup>1)</sup>

(Fig. 11)

Disk about 4 mm in diameter; arms 14 mm in length. Disk pentagonal, slightly swollen above, but flat below, covered with six primary plates, ten radial shields and three plates in each interradius, each of which is thickened and surrounded by small scales. Radial shields moderate, ovoid, separated by a series of three plates. Adjoining the distal one of this series is a plate of same size just distal to each radial shield, these three plates together forming a conspicuous band across the base of arm. Interbrachial spaces below covered with a number of small, rounded plates. Genital slits inconspicuous.

Oral shields pentagonal, longer than broad, broader within than without, with angles rounded except the proximal one; prox-

<sup>1)</sup> Οἰδέω, signifying to swell, and λεπίς, signifying scale, in reference to the swollen disk scales.

imal and lateral borders slightly concave, distal border distinctly rounded. Adoral shields long and narrow, curved inwardly, broadly in contact within. Oral plates small, inconspicuous. Oral papillae

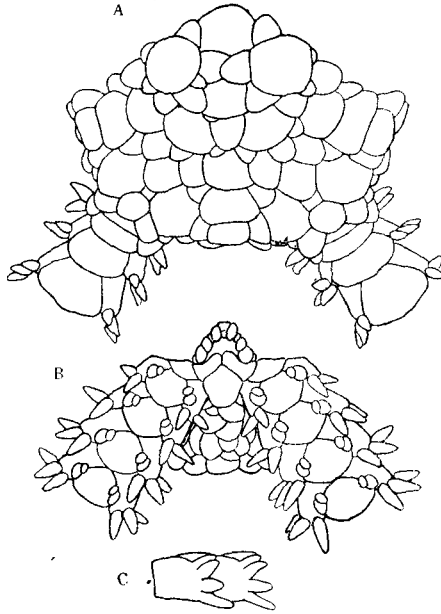


Fig. 11.—*Ophiozona ædilepis*.  $\times 11$ . A. From above.  
B. From below. C. Side view of two arm joints  
near disk.

five on a side; the outermost one slender, tapering, overlapping the next one to it, which is the largest of all; the fourth decidedly small; one at the apex of jaw very thick, stout and blunt. A small infradental papilla present. Teeth squarish, five on an oral angle.

Arms rather stout, broader than high, tapering gradually. Upper arm plates well developed, quadrangular or triangular, broader than long, with disto-lateral angles rounded and the distal border convex; in proximal joints they are broadly in contact with each other, but gradually becoming separated from each other near end of arm. First under arm plates small, rhomboidal or pentagonal, much broader than long. Following plates tetragonal or pentagonal, broader without than within, with convex distal

and strongly reentering lateral sides, at first as long as broad, but gradually becoming longer than broad. Side arm plates meeting above and below except near base of arm; each bears three or four short, blunt arm spines, of which the undermost is largest. Two oval tentacle scales to each pore; the abradial one larger than the adradial. The proximal tentacle pores sometimes provided with three scales.

Colour in alcohol, dorsal side of disk and arms vandyke-brown; some of the plates edged or mottled with white; arms faintly banded with brown. Ventral side much lighter.

Locality.—One specimen; off Tumekizaki, Sagami Sea, 20 fathoms, Dec. 18, 1939.

Although the specimen is of very small size and probably young, it may well deserve to be regarded as a new species. It is rather near to *O. pacifica*, but can easily be distinguished from it by the narrow adoral shields, by the somewhat irregular oral papillae and by the unequal arm spines.

### 53. *Ophioplocus japonicus* CLARK

CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 30, fig. 5. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 302, fig. 84.

Locality.—Two specimens; Sitaru, south end of the Peninsula Izu, littoral.

## Family Ophioleucidae

### 54. *Ophioleuce charischema* (CLARK)

*Ophiocten charischema*: CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 97, fig. 35.

*Ophioleuce charischema*: MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 306, fig. 85.

Locality.—One specimen; off Kawazu, Sagami Sea, 100 fathoms, March 4, 1940.

## Family Ophiidermatidae

### 55. *Ophiurodon acanthophora*, sp. nov.<sup>1)</sup>

(Fig. 12)

Disk 4.5 mm in diameter; arms 15 mm in length. Disk rounded, slightly swollen, closely covered with numerous fine, spherical

<sup>1)</sup> " Ἀκανθῶν, signifying *spine*, and φέρω, signifying *carrying*, in reference to the disk spines.



granules and a small number of scattered spinelets, under which many small, rounded, delicate scales are concealed. Radial shields invisible. Interbrachial spaces below, oral and adoral shields, and

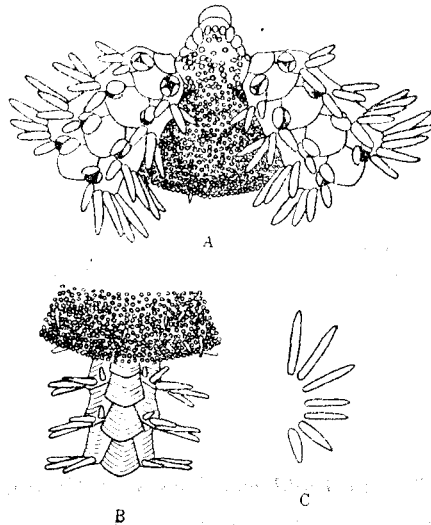


Fig. 12.—*Ophuurodon acanthophora*.  $\times 11$ . A. From below. B. From above. C. Arm spines of one side of an arm joint near disk.

oral plates also covered with a fine granulation like that of the dorsal side of disk, but coarsest on the jaw; the tip of mouth angle is occupied by a group of granules, somewhat apart from the rest, six to seven in number, among which distal two or three are elongate and make a line continuous with the oral papillae. Oral papillae four on a side, overlapping each other; the inner three large, subequal, distinctly flattened, slightly enlarged at the end. Teeth very conspicuous, broad, with a hyaline margin, but not serrated at the proximal end.

Arms not stout, gradually tapering toward the extremity. Upper arm plates tetragonal or pentagonal, longer than broad except first one or two, broader without than within, broadly in contact with each other near the disk. First under arm plates small, broader than long, with very convex distal border. Following plates pentagonal, with the distal angle rounded and lateral

sides concave; a few consecutive ones are about as long as broad, but soon distally becoming longer than broad; they are broadly in contact at first, but become separated in distal half of arm. Side arm plates rather large, not meeting above and below near disk. The dorsal and side arm plates are concentrically striated. Arm spines somewhat flat, smooth and bluntly pointed, seven or eight in number near base of arm, six distally. The uppermost one is largest, about twice as long as a joint. Tentacle scales three or four on the first pair of tentacle pores, two on the following, among which the adradial is larger than the abradial; they are rather large, thin, flat and oval.

Colour in alcohol, dirty gray.

Locality.—One specimen; Sakune, off the Mitsui Institute of Marine Biology, 15 fathoms, Jan. 31, 1940.

The present species is very remarkable in various features. It is easily separated from the other species of *Ophiurodon* chiefly by the combination of the non-serrated teeth, the presence of spinelets on the dorsal side of disk and of two tentacle scales.

#### 56. *Pectinura anchista* CLARK

CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 23, fig. 1. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 322.

Localities.—One specimen; off Tunekizaki, Sagami Sea, 20 fathoms, Dec. 18, 1939. One specimen; Sakune, off the Mitsui Institute of Marine Biology, 15 fathoms.

#### 57. *Ophiarachnella gorgonia* (MÜLLER & TROSCHEL)

*Ophiarachna gorgonia*: MÜLLER & TROSCHEL, 1842, Sys. Ast., p. 105.

*Ophiarachnella gorgonia*: CLARK, 1909, Bull. Mus. Comp. Zoöl., LII, 7, p. 123.

MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 323.

Localities.—One specimen; Tunekizaki, littoral. Two specimens; Sirahama, near the Mitsui Institute of Marine Biology, littoral.

### Family Ophiochitonidae

#### 58. *Ophiochiton fastigatus* LYMAN

LYMAN, 1878, Bull. Mus. Comp. Zoöl., V, 7, p. 132, pl. VII, figs. 182-183. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 328, fig. 91.

Localities.—One specimen; Suruga Bay, May 19, 1939. One specimen; off Hasima, Sagami Sea, 150 fathoms, June 17, 1939. One specimen; off Heda, Suruga Bay, 200 fathoms, Nov. 4, 1939. Numerous specimens; off Toi, Suruga Bay, 200 fathoms, Nov. 13–19, 1939.

59. *Ophionereis porrecta* LYMAN

LYMAN, 1860, Proc. Boston Soc. Nat. Hist., VII, p. 260.<sup>1)</sup> MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 334, fig. 93.

Locality.—One specimen; Sakune, off the Mitsui Institute of Marine Biology, 15 fathoms, Feb. 19, 1940.

60. *Ophiocrasis marktanneri* MATSUMOTO

MATSUMOTO, 1915, Proc. Acad. Nat. Soc., Philadelphia, p. 90. —1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 338, fig. 94.

Localities.—One specimen; Teisijima, off Ito, Sagami Sea, littoral, June 17, 1939. One specimen; Sitaru, south end of the Peninsula Izu, littoral, July 17, 1939.

Family Ophiocomidae

61. *Ophiocoma brevipes* PETERS

PETERS, 1851, Verhandl. Königl. Preuss. Akad. Wiss., Berlin, p. 466. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 343, fig. 95.

Locality.—Two specimens; Nagaturo, south end of the Peninsula Izu, littoral, June 5, 1939.

62. *Ophiomastix mixta* LÜTKEN

LÜTKEN, 1869, Add. Hist. Oph., III, p. 44. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 348, fig. 97.

Localities.—Two specimens; Nagaturo, south end of the Peninsula Izu, littoral, June 5, 1939. One specimen; Itado, near the Mitsui Institute of Marine Biology, littoral, June 7, 1939. One specimen; Teisijima, off Ito, Sagami Sea, littoral, June 17, 1939.

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The Mitsui Institute of Marine Biology)

<sup>1)</sup> Not accessible to me.

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