

## Report On The Ophiurans Of Yaeyama, Ryukyu

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## REPORT ON THE OPHIURANS OF YAEYAMA, RYUKYU<sup>1)</sup>

Shiro MURAKAMI

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### INTRODUCTION

In 1917, Dr. MATSUMOTO published an elaborate paper on the Japanese Ophiuroidea, in which are reported some Ophiurans from Yaeyama. In 1935, Dr. OHSHIMA wrote an interesting paper on animals of Yaeyama, in which he added further records of Ophiurans from the district. By these two publications, the Ophiuran fauna of Yaeyama has been made clear for the most part. I paid a visit to Isigaki-sima from June to July in 1941, with an intention of studying the Ophiuran fauna of the district more thoroughly. I engaged in a collection of Ophiurans on the reef flat, which projects westwards from the south end of the island, forming an arc. The outer side of the reef faces on the open sea, deepening very rapidly, while the inner side is reverse; here the water is shallow, offering an excellent collecting field. As a result of work on the reef, I was able to get twenty-nine species and one variety, among which two are regarded as new to science and nineteen are recorded from the district for the first time. Though some of them are only known from the Pacific region, mainly Malayan Seas, the greater part of them generally live on shallow bottoms in the Tropical Indo-Pacific region and are widely distributed.

<sup>1)</sup> Contributions from the Zoological Laboratory, Kyūsyū Imperial University, No. 163; Papers from the Amakusa Marine Biological Laboratory, No. 87.

Further, among these Ophiurans, six have their northern limit at Okinawa, one at Amami-Ōsima, one at Kagosima, one at south Izu, two at Misaki and one at Kominato. The Ophiurans in the collection and their known northern limits may be listed as follows:

- |   |                                       |
|---|---------------------------------------|
| 1. <i>Ophiomyxa brevispina</i> <sup>*1)</sup>             | Isigaki-sima                          |
| 2. <i>Ophiothrix propinqua</i> *                          | Isigaki-sima                          |
| 3. <i>Ophiothrix trilineata</i> *                         | Isigaki-sima                          |
| 4. <i>Ophiothrix vicina</i> *                             | Isigaki-sima                          |
| 5. <i>Macrophiothrix hirsuta</i>                          | Senkaku (Pinnacle) Islands            |
| 6. <i>Macrophiothrix longipeda</i> *                      | Kominato                              |
| 7. <i>Macrophiothrix schmidtii</i> *                      | Okinawa                               |
| 8. <i>Ophiolepis annulosa</i>                             | Okinawa                               |
| 9. <i>Ophiolepis cincta</i>                               | Isigaki-sima                          |
| 10. <i>Ophioplocus imbricatus</i>                         | Okinawa                               |
| 11. <i>Ophiarachna incrassata</i>                         | Okinawa; Ogasawara<br>(Bonin) Islands |
| 12. <i>Ophiarachna ohshimai</i> sp. nov.                  |                                       |
| 13. <i>Ophiurodon cupidum</i> *                           | Isigaki-sima                          |
| 14. <i>Ophiopezella spinosa</i> *                         | Isigaki-sima                          |
| 15. <i>Ophiarachnella gorgonia</i> *                      | Misaki                                |
| 16. <i>Ophiarachnella septemspinosa</i> *                 | Isigaki-sima                          |
| 17. <i>Ophionereis aplacophora</i> sp. nov.               |                                       |
| 18. <i>Ophiocoma brevipes</i>                             | South Izu                             |
| 19. <i>Ophiocoma erinaceus</i>                            | Kagosima                              |
| 20. <i>Ophiocoma latilanza</i> *                          | Isigaki-sima                          |
| 21. <i>Ophiocoma pica</i> *                               | Isigaki-sima                          |
| 22. <i>Ophiocoma scolopendrina</i>                        | Amami-Ōsima                           |
| 23. <i>Ophiomastix annulosa</i> *                         | Senkaku (Pinnacle) Islands            |
| 24. <i>Ophiomastix asperula</i> *                         | Isigaki-sima                          |
| 25. <i>Ophiomastix caryophyllata</i> *                    | Isigaki-sima                          |
| 26. <i>Ophiomastix lütkeni</i> *                          | Okinawa                               |
| 27. <i>Ophiomastix mixta</i> *                            | Misaki                                |
| 28. <i>Ophiarthrum elegans</i> *                          | Okinawa                               |
| 28'. <i>Ophiarthrum elegans</i> var.<br><i>unicolor</i> * | Isigaki-sima                          |
| 29. <i>Ophiarthrum pictum</i>                             | Isigaki-sima                          |

<sup>1)</sup> Those marked with an asterisk(\*) are the forms recorded as new to the fauna of Yaeyama.

Before going further, I have to express my gratitude to Professor Dr. H. OHSHIMA for his interest in the work and his guidance given to me throughout the work. To the Japan Society for the Promotion of Scientific Research also I must tender my thanks for giving me the financial aid. Further my thanks are due to Messrs. T. KAWAHARA and T. MASAKI who helped me in many ways during my journey, and to Mr. S. MIYAKE who kindly gave me some worthy specimens he had collected from the same district.

## SYSTEMATICS

### Family Ophiomyxidae

#### 1. *Ophiomyxa brevispina* MARTENS<sup>1)</sup>

MARTENS, 1870, Arch. f. Nat., p. 249. BROCK, 1888, Zeit. f. wiss. Zool., XLVII, 3, p. 530. DÖDERLEIN, 1896, SEMON-Zool. Forschungsr., V, p. 298, pl. XVII, figs. 27-27a.

Localities.—One specimen; Isigaki-sima, Yaéyama, littoral, June 28, 1941. Two specimens; same locality, littoral, July 2, 1941. One specimen; same locality, littoral, July 9, 1941.

Distribution.—Amboina.

The specimens at hand are about 15 mm across the disk, with the arms being five times as long as the disk diameter. The disk is pentagonal and is covered with naked skin, but the inter-radial border is ornamented by a series of oblong scales. The radial shields are moderate in size and broader than long. There are four oral papillae on a side of an oral angle, among which the distal one is rudimentary, while the others are very large and have a transparent, strongly serrated border. The terminal unpaired papilla resembles the latter. The arm spines are four to five in number in some specimens, while in others there are five to six; they are small and less than the segment in length. The colour is deep brownish red and the arms are faintly annulated.

### Family Ophiotrichidae

#### 2. *Ophiotrix propinqua* LYMAN

LYMAN, 1816, Proc. Boston Soc. Nat. Hist., VIII, p. 83.<sup>2)</sup>

<sup>1)</sup> The specimens are preserved at the Amakusa Marine Biological Laboratory of Kyūsyū Imperial University.

<sup>2)</sup> Not accessible to me.

—1865, Ill. Cat. Mus. Comp. Zool., I, p. 174. KEHLER, 1898, Bull. Sci., XXXI, p. 97, pl. III, figs. 20–22. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 277. KEHLER, 1922, U. S. Nat. Mus., Bull. 100, V, p. 256, pl. XXXVIII, figs. 1–2, pl. CI, fig. 4.

Locality.—Three specimens; Isigaki-sima, Yaéyama, littoral, June 28, 1941.

Distribution.—Zanzibar; Mauritius; Philippine Islands; off Timor; Torres Strait; Gilbert Islands.

The specimens at hand measure 2.0 to 5.5 mm across the disk. The arms of the largest specimen are all regenerating, while those of the smaller ones are very long. The dorsal side of disk is almost unarmed, but a few scales have granules. The spines of interbranchial areas are very small. The dorsal arm plates are trapezoid and wider than long, having the distal border almost straight. The colour is variegated with purple on a gray background; arms are annulated by a similar coloration. The ventral side is gray.

### 3. *Ophiothrix trilineata* LÜTKEN

LÜTKEN, 1869, Add. Hist. Oph., III, pp. 58, 100. BROCK, 1888, Zeit. f. wiss. Zool., XLVII, 3, p. 508. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 279. KEHLER, 1922, U. S. Nat. Mus., Bull. 100, V, p. 279, pl. XLVI, figs. 1–3, pl. CII, fig. 4.

Localities.—One specimen; Isigaki-sima, Yaéyama, littoral, June 28, 1941. Five specimens; same locality, littoral, July 9, 1941. One specimen; same locality, littoral, July 10, 1941.

Distribution.—Mozambique; Mauritius; East Indies; Torres Strait; Palao Islands; Samoa.

All the specimens bear three light, well-marked lines, running along the dorsal side of arm, the constant character of this species. This is one of the forms widely distributed in the Indo-Pacific region.

### 4. *Ophiothrix vicina* KEHLER

KEHLER, 1930, Vidensk. Medd. fra naturh. Foren., LXXXIX, p. 182, pl. XI, figs. 7–9.

Locality.—Three specimens; Isigaki-sima, Yaéyama, littoral, July 9, 1941.

Distribution.—Banda.

The specimens are different from the type in having denticulated spines of disk and in having the radial shields separated by

only one series of scales along the radial area, not by two or three series of them. But in the other characters they are quite in agreement with the type specimen.

5. *Macrophiothrix hirsuta* (MÜLLER et TROSCHER)

*Ophiothrix hirsuta*: MÜLLER et TROSCHER, 1842, Sys. Ast., p. 111. MARKTANNER-TURNERET-SCHER, 1887, Ann. k. k. naturh. Hofmus., II, p. 311, pl. XIII, figs. 34-35. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 272. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 225, fig. 63. KÖHLER, 1922, U. S. Nat. Mus., Bull. 100, V, p. 234, pl. XXXI, figs. 1-2, pl. XXXIII, fig. 13, pl. XCIX, fig. 2.

*Macrophiothrix hirsuta*: CLARK, 1938, Mem. Mus. Comp. Zool., LV, pp. 282, 283.

Locality.—One specimen; Isigaki-sima, Yaéyama, littoral, June 28, 1941.

Distribution.—Red Sea; Zanzibar; Philippine Islands; West Australia; Torres Strait; Senkaku (Pinnacle) Islands.

Our specimen is small, being about 8 mm across the disk, but agrees very well with MARKTANNER's specimen, especially in possession of a few granules on the radial shields.

6. *Macrophiothrix longipeda* (LAMARCK)

*Ophiura longipeda*: LAMARCK, 1816, Anim. sans Vert., II, p. 544.

*Ophiothrix longipeda*: MÜLLER et TROSCHER, 1842, Sys. Ast., p. 113. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 274. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 227, fig. 65. CLARK, 1921, Dept. Mar. Biol. Carnegie Inst., X, p. 110, pl. XV, fig. 5, pl. XXXIII, fig. 1. KÖHLER, 1922, U. S. Nat. Mus., Bull. 100, V, p. 235, pl. XXXI, figs. 3-4, pl. XXXIII, figs. 9-10, pl. C, fig. 2.

*Macrophiothrix longipeda*: CLARK, 1938, Mem. Mus. Comp. Zool., LV, pp. 282, 288.

Localities.—One specimen; Isigaki-sima, Yaéyama, littoral, June 28, 1941. Three specimens; same locality, littoral, July 2, 1941. Three specimens; same locality, littoral, July 3, 1941. Three specimens; same locality, littoral, July 9, 1941.

Distribution.—Persian Gulf; Zanzibar; Mauritius; Kominato; Philippine Islands; Amboina; Java; New Guinea; Torres Strait; Queensland; Palao Islands; Marshall Islands; Fiji Islands; Society Islands.

7. *Macrophiothrix schmidtii* (DIAKONOV)

*Ophiothrix schmidtii*: DIAKONOV, 1930, Zool. Jahrb., Syst., LIX, 2/3, p. 237, pl. XII, figs. 1-2.

Locality.—Two specimens; Isigaki-sima, Yaéyama, littoral, June 1940 (MIYAKE).

Distribution.—Okinawa.

The specimens at hand are about 8 to 11 mm across the disk, with the arms being ten times as long as the disk diameter. The disk is somewhat pentagonal in shape and is covered with many granules with several short points, which become true spines towards the periphery. The radial shields are large and entirely naked, having a few purplish flecks on the surface. I think that the present species must be transferred to the genus *Macrophiothrix* because of its having the long arms and horizontally directed arm spines.

#### Family Ophiolepididae

##### 8. *Ophiolepis annulosa* MÜLLER et TROSCHEL

*Ophiura annulosa*: BLAINVILLE, 1843, Manu. Act., p. 244, pl. XXIV, figs. 1-4. <sup>D</sup>

*Ophiolepis annulosa*: MÜLLER et TROSCHEL, 1840, Arch. Naturg., VI, p. 328. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 300, fig. 82. MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 181.

*Ophiolepis superba*: CLARK, 1915, Spolia Zeylanica, X, p. 89.—1915, Mem. Mus. Comp. Zool., XXV, 4, p. 343. OHSHIMA, 1935, Bot. Zool., III, 3, p. 64, fig. 28, f-h.

Localities.—One specimen; Isigaki-sima, Yaéyama, littoral, June 25, 1941. One specimen; same locality, littoral, July 2, 1941. One specimen; same locality, littoral, July 10, 1941.

Distribution.—Zanzibar; Philippine Islands; Ryukyu; West Australia; New Guinea; Torres Strait; Solomon Islands; Caroline Islands; Marshall Islands.

##### 9. *Ophiolepis cincta* MÜLLER et TROSCHEL

MÜLLER et TROSCHEL, 1842, Sys. Ast., p. 90. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 342. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 299, fig. 81. OHSHIMA, 1935, Bot. Zool., III, 3, p. 63. MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 183.

Localities.—One specimen; Isigaki-sima, Yaéyama, littoral, June 25, 1941. Two specimens; same locality, littoral, July 2, 1941. Four specimens; same locality, littoral, July 9, 1941. One specimen; same locality, littoral, July 10, 1941.

<sup>D</sup> Not accessible to me.

Distribution.—Zanzibar; Mozambique; Red Sea; Yaéyama; Philippine Islands; Amboina; Torres Strait; New South Wales; Caroline Islands; Society Islands.

10. *Ophioplocus imbricatus* (MÜLLER et TROSCHEL)

*Ophioplocus imbricatus*: MÜLLER et TROSCHEL, 1842, Sys. Ast., p. 93.

*Ophioplocus imbricatus*: LYMAN, 1865, Ill. Cat. Mus. Comp. Zool., I, p. 69. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 344. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 301, fig. 83. OHSHIMA, 1935, Bot. Zool., III, 3, p. 64, fig. 28, d-e. MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 183.

Localities.—One specimen; Isigaki-sima, Yaéyama, littoral, June 1940 (MIYAKE). Five specimens; same locality, littoral, June 25, 1941. One specimen; same locality, littoral, July 10, 1941.

Distribution.—Zanzibar; Madagascar; Mauritius; West Australia; Okinawa; Philippine Islands; Java; Amboina; Halmahera; Torres Strait; Palao Islands; Gilbert Islands.

Family Ophiodermatidae

11. *Ophiarachna incrassata* LAMARCK

*Ophiura incrassata*: LAMARCK, 1816, Anim. sans Vert., II, p. 542.

*Ophiarachna incrassata*: MÜLLER et TROSCHEL, 1842, Sys. Ast., p. 104. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 299. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 318, fig. 88, pl. VI, fig. 4. KOEHLER, 1922, U.S. Nat. Mus., Bull. 100, V, pl. IV, figs. 6-7. OHSHIMA, 1935, Bot. Zool., III, 3, p. 63. MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 186.

Localities.—Four specimens; Isigaki-sima, Yaéyama, littoral, June 21, and July 14, 1941. One specimen; same locality, littoral, July 9, 1941.

Distribution.—Ryukyu; Ogasawara (Bonin) Islands; Philippine Islands; Amboina; Torres Strait; Caroline Islands.

12. *Ophiarachna ohshimai* sp. nov.

(Text-fig. 1)

Disk about 16 mm in diameter (measured in a broken state); arms 60 mm long. Disk very fragile, rounded, covered with numerous fine granules both above and below, under which many small delicate imbricating scales are concealed. Radial shields naked, small and oval, widely separated from each other.

Oral shields large, about as long as broad, proximal border very rounded, which is continuous to the lateral sides. Supplementary oral shields small, lunar. Adoral shields also small, triangular, longer than broad, limited to the side of oral shield, broadly separated from each other at the interradiar area. Oral plates covered with a number of granules, which are coarser than those of disk. Oral papillae seven or rarely eight on a side; distal one terminating upwards; the penultimate largest of all, tetragonal, somewhat broader than long; others rather flat, longer than broad, but blunt at the tip. Teeth five on a jaw, broader than long, stout and rounded at the free end. Genital slits large.

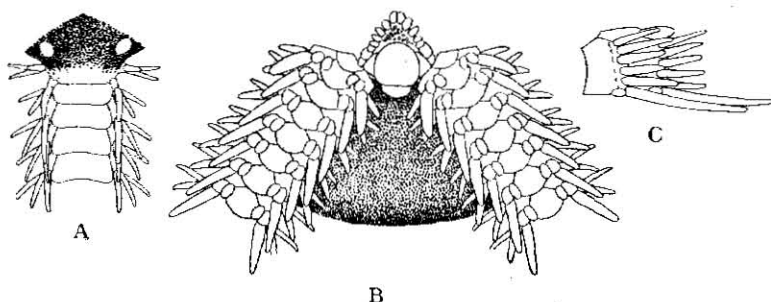


Fig. 1. *Ophiarachna ohshimai*.

A. From above. B. From below. C. Side view of two arm joints near disk.  $\times 3.5$ .

Arms very stout, tapering slowly. Dorsal arm plates well developed, covering the whole dorsal surface of arm, quadrangular, more than twice as wide as long, slightly broader without than within, disto-lateral angles rounded, aboral margin gently curved, broadly in contact with each other till near the tip of arm. First ventral arm plate moderate, much broader than long, distal border rounded. Following plates at first slightly broader than, or as broad as, long, but distally becoming longer than broad; proximal margin three-sided, distal one very convex, lateral sides somewhat reentering; they are in contact with each other. Two pairs of pores are present in one specimen between proximal three plates, but in the other they are inconspicuous. Side arm plates broad, in contact with each other antero-posteriorly, as high as an arm joint, but not meeting both above and below. Arm spines six in number near the disk, but gradually falling to five, four or three

distally, flat and robust; the undermost one largest, more than three times as long as a joint at some distance from the disk, but those of the other part of arm less than the foregoing in length; the others subequal, much longer than a joint. Tentacle scales two to each pore, large, flat, oval; the abradial larger than the adradial.

Colour (dried from alcohol): disk deep grayish olive; but under the microscope variegated with grayish white and dark olive; radial shields dark olive. Dorsal surface of arm deep grayish olive; each plate spotted with white; eight or nine yellowish white narrow bands present on the arm. Ventral side much lighter; mouth parts bearing a small number of blackish olive spots; the ventral arm plates dirty white, bearing a broad transverse stripe of blackish olive. Arm spines annulated alternately with dirty white and blackish olive.

Localities.—One specimen; Isigaki-sima, Yaéyama, littoral, July 9, 1941. One specimen; same locality, littoral, July 10, 1941.

The species belonging to the genus *Ophiarachna* are five in number, namely *O. incrassata* LAMARCK, *O. affinis* LÜTKEN, *O. mauritiensis* LORIO, *O. robillardi* LORIO and *O. quinquespinosa* KÖHLER. *Ophiarachna ohshimai* differs from *O. incrassata*, *O. affinis* and *O. mauritiensis* in possession of naked radial shields. *O. robillardi* which has the radial shields equally naked, but the oral shields are elongate. *O. quinquespinosa* shows no supplementary oral shields, which are present in *O. ohshimai*. This Ophiuran is beautiful and delicate, and the disk is easily broken when it is taken out from among corals. The species is dedicated to Professor Dr. H. OHSHIMA who is one of the pioneers of the district in faunistic researches.

### 13. *Ophiurodon cupidum* (KÖHLER)

*Ophioconis cupida*: KÖHLER, 1905, Siboga-Exp., Oph. litt., p. 15, pl. I, figs. 19-20.

CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 219.

*Ophiurodon cupidum*: MATSUMOTO, 1915, Proc. Acad. Nat. Sci. Philadelphia, p. 84.

MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 186.

Locality.—One specimen; Isigaki-sima, Yaéyama, littoral, July 9, 1941.

Distribution.—Moluccas; Sulu Archipelago; Palao Islands.

14. *Ophiopezella spinosa* (LJUNGMAN)

- Ophiarachna spinosa*: LJUNGMAN, 1867, Öfv. Kongl. Vet.-Akad. Förh., XXIII, p. 305.<sup>1)</sup>  
*Pectinura spinosa*: LYMAN, 1874, Bull. Mus. Comp. Zoöl., III, 10, p. 221.  
*Ophiopezella spinosa*: LYMAN, 1882, Challenger Oph., p. 17. CLARK, 1909, Bull. Mus. Comp. Zoöl., LII, 7, p. 120.—1915, Mem. Mus. Comp. Zoöl., XXV, 4, p. 304. KÄHLER, 1922, U. S. Nat. Mus., Bull. 100, V, p. 338. MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 186.

Localities.—One specimen; Isigaki-sima, Yaéyama, littoral, June 28, 1941. Two specimens; same locality, littoral, July 2, 1941. Two specimens; same locality, littoral, July 9, 1941. One specimen; same locality, littoral, July 10, 1941.

Distribution.—Tonga Islands; Fiji Islands; Amboina; Society Islands; Island of Nusa Laut; Philippine Islands; Zamboanga; Kei Islands; Palao Islands; Torres Strait.

15. *Ophiarachnella gorgonia* MÜLLER et TROSCHEL

- Ophiarachna gorgonia*: MÜLLER et TROSCHEL, 1842, Sys. Ast., p. 105.  
*Pectinura gorgonia*: LÜTKEN, 1869, Add. Hist. Oph., III, p. 33.  
*Ophiarachnella gorgonia*: CLARK, 1909, Bull. Mus. Comp. Zoöl., LII, 7, p. 117.—1915, Mem. Mus. Comp. Zoöl., XXV, 4, p. 305. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 323, pl. VI, fig. 7. MURAKAMI, 1942, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 1, p. 33.—1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 187, fig. 9.

Localities.—Two specimens; Isigaki-sima, Yaéyama, littoral, June 28, 1941. Three specimens; same locality, littoral, July 2, 1941. Four specimens; same locality, littoral, July 9, 1941.

Distribution.—Indo-Pacific.

16. *Ophiarachnella septemspinosa* (MÜLLER et TROSCHEL)

- Ophiarachna septemspinosa*: MÜLLER et TROSCHEL, 1842, Sys. Ast., p. 105.  
*Pectinura septemspinosa*: LÜTKEN, 1869, Add. Hist. Oph., III, p. 33.  
*Ophiarachnella septemspinosa*: CLARK, 1909, Bull. Mus. Comp. Zoöl., LII, 7, p. 126.—1915, Mem. Mus. Comp. Zoöl., XXV, 4, p. 305.—1921, Dept. Mar. Biol. Carnegie Inst., X, p. 142, pl. XII, fig. 7.

Localities.—Three specimens; Isigaki-sima, Yaéyama, littoral, July 2, 1941. One specimen; same locality, littoral, July 9, 1941.

Distribution.—Zanzibar; Mauritius; Zamboanga; Ceylon; Moluccas; Amboina; off Borneo; Torres Strait; Fiji Islands.

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

This large beautiful Ophiuran has not yet been reported north of the Philippine Islands. But at Isigaki-sima this was found to be one of the most common Ophiurans, inhabiting the reef flat.

Family Ophiochitonidae

17. *Ophionereis aplacophora* sp. nov.<sup>1)</sup>

(Text-fig. 2)

Disk 10.5 mm in diameter; arms about seven times as long as the disk diameter. Breadth of arm 1.5 mm near the disk, but becoming 2.5 mm at the middle of arm.

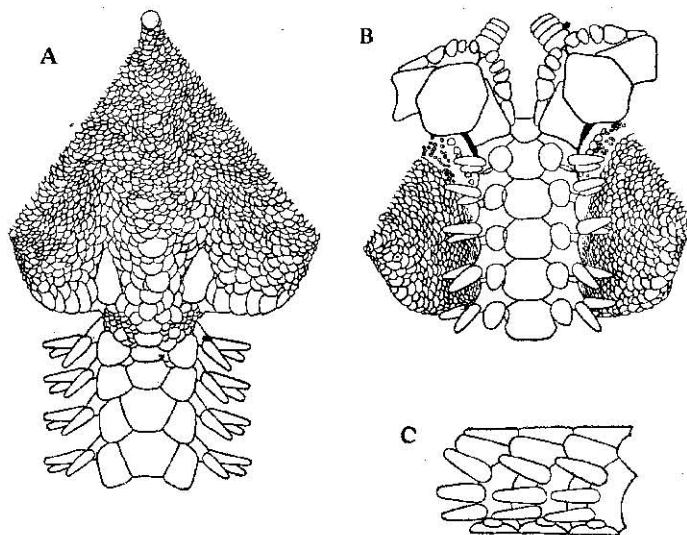


Fig. 2. *Ophionereis aplacophora*.

A. From above. B. From below. C. Side view of three arm joints near disk.  $\times 7$ .

Disk flat, five-lobed, concave at the interradiat border, covered with numerous small, firm scales, among which those around the radial shields are larger. On the interradiat border is a row of conspicuous scales, which starts from the radial shield and reaches near the middle. Radial shields small, broadly separated from each other, pear-seed shaped. Interbrachial spaces below covered with the same sort of scaling as that of the disk and furnished with a

<sup>1)</sup> A, signifying *absence*, ἀλάξ, signifying *plate*, and φερά, signifying *carrying*, in reference to having no scale-like supplementary plates between the side arm plates.

number of granules near the oral shield. Genital slit long, but inconspicuous, provided with papillae.

Oral shields moderate, hexagonal, longer than broad, slightly broader without than within, with angles rounded. Adoral shields conspicuous, tetragonal, broader within than without, not meeting on the interr radial line, widely separating the first side arm plate from the oral shield. Oral plates indistinct. Oral papillae five on a side of an oral angle, thick and stout; distal one small, bluntly pointed at the tip; the penultimate largest of all, squarish, broader than long; following two longer than broad; the proximal one rounded. Teeth five on a jaw, squarish thick and stout; the undermost one smallest.

Dorsal arm plates well developed, trapezoid, much broader than long, broader within than without, proximal border more or less three-sided, distal border slightly concave at the middle, fully in contact with each other till the tip of arm. At the base of arm they are small and scale-like. Supplementary dorsal arm plates rather large, triangular, with a disto-lateral angle rounded. First ventral arm plate small, broader than long, distal border very rounded. Following plates tetragonal, slightly wider without than within, proximal border three-sided, lateral side reentering, distal one gently curved, in contact with each other along the whole length; basal one or two longer than broad, but soon becoming broader than long distally. Side arm plates not meeting both above and below; each carries three arm spines, which are subequal, slightly longer than a joint, blunt, stout and flat. Tentacle scale one to each pore, large, oval.

Colour (dried from alcohol): disk light gray, ornamented with narrow chocolate lines irregularly. Arms also light gray, with imperfect chocolate bands at each two or three arm joints. The ventral side also light gray. Ventral side of arm furnished with light olive flecks.

Locality.—One specimen; Isigaki-sima, Yaeyama, littoral, July 10, 1941.

The present species is closely related to *O. eurybrachyplax* CLARK, *O. porrecta* LYMAN, *O. reticulata* (SAY) and *O. sophiae* BROCK. It is easily distinguished from *O. eurybrachyplax* by the hexagonal oral shields and by the trapezoid dorsal arm plates. It is also different from *O. porrecta* in having no scale-like supple-

mentary plates between the side arm plates. Further, it differs from *O. reticulata* in subequal arm spines, and from *O. sophiae* in non-granulated arms.

### Family Ophiocomidae

#### 18. *Ophiocoma brevipes* PETERS

PETERS, 1852, Arch. Naturg., p. 85.<sup>D</sup> CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 291. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 343, fig. 85. KÖHLER, 1922, U. S. Nat. Mus., Bull. 100, V, p. 319, pl. LXXII, figs. 6-9. CLARK, 1921, Dept. Mar. Biol. Carnegie Inst., X, p. 129, pl. XIII, fig. 7, pl. XXXIV, figs. 3-4. MURAKAMI, 1942, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 1, p. 34.—1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 193.

Localities.—One specimen; Isigaki-sima, Yaéyama, littoral, June 24, 1941. Three specimens; same locality, littoral, June 25, 1941. Two specimens; same locality, littoral, July 2, 1941. One specimen; same locality, littoral, July 9, 1941. Four specimens; same locality, littoral, July 10, 1941.

Distribution.—Zanzibar; Mauritius; Southern Nippon; Philippine Islands; Amboina; New Guinea; Torres Strait; Queensland; Lord Howe Island; Palao Islands; Ponape; Gilbert Islands; Fiji Islands; Hawaii.

#### 19. *Ophiocoma erinaceus* MÜLLER et TROSCHEL

*Ophiocoma erinaceus*: MÜLLER et TROSCHEL, 1842, Sys. Ast., p. 98. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 291.—1921, Dept. Mar. Biol. Carnegie Inst., X, p. 127. KÖHLER, 1922, U. S. Nat. Mus., Bull. 100, V, p. 322, pl. LXXIII, fig. 7. MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 194. *Ophiocoma scolopendrina* var. *erinaceus*: MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 345, fig. 96.

Localities.—Two specimens; Isigaki-sima, Yaéyama, littoral, June 23, 1941. Two specimens; same locality, littoral, June 24, 1941. Two specimens; same locality, littoral, June 28, 1941.

Distribution.—Mozambique; Zanzibar; Mauritius; Southern Nippon; Philippine Islands; Amboina; Torres Strait; Palao Islands; Ponape; Gilbert Islands; Marshall Islands; Society Islands; Hawaii Islands.

<sup>D</sup> Not accessible to me.

20. *Ophiocoma latilanza* MURAKAMI

MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 194, fig. 13.

Localities.—Two specimens; Isigaki-sima, Yaéyama, littoral, July 2, 1941. Four specimens; same locality, littoral, July 9, 1941. Four specimens; same locality, littoral, July 10, 1941.

Distribution.—Palao Islands.

21. *Ophiocoma pica* MÜLLER et TROSCHEL

*Ophiocoma pica*: MÜLLER et TROSCHEL, 1842, Sys. Ast., p. 101. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 293.—1921, Dept. Mar. Biol. Carnegie Inst., X, p. 127, pl. XIII, fig. 8. MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 196, fig. 14.

*Ophiocoma lineolata*: MÜLLER et TROSCHEL, 1842, Sys. Ast., p. 102. KÖHLER, 1922, U. S. Nat. Mus., Bull. 100, V, p. 324, pl. LXXIII, figs. 1-4.

Localities.—Two specimens; Isigaki-sima, Yaéyama, littoral, July 2, 1941. One specimen; same locality, littoral, July 3, 1941. Two specimens; same locality, littoral, July 9, 1941.

Distribution.—Zanzibar; Red Sea; Paumotu Islands; Banda; Amboina; Torres Strait; Gilbert Islands; Society Islands; Hawaii Islands.

It is very curious that the present species has not hitherto been known from Yaéyama, for this is one of the most common Ophiurans at the island. I could meet with numerous individuals on the flat. The yellowish stripes of disk are not so marked as those of the specimens got at Tokobei.

22. *Ophiocoma scolopendrina* (LAMARCK)

*Ophiura scolopendrina*: LAMARCK, 1816, Anim. sans Vert., II, p. 544.

*Ophiocoma scolopendrina*: MÜLLER et TROSCHEL, 1842, Sys. Ast., p. 101. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 293, pl. XIV, figs. 10-11.—1921, Dept. Mar. Biol. Carnegie Inst., X, p. 125, pl. XIII, fig. 9. KÖHLER, 1922, U. S. Nat. Mus., Bull. 100, V, p. 325, pl. LXXIII, fig. 5, pl. LXXIV, figs. 1-7. MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 196.

*Ophiocoma scolopendrina* typical: MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 346, pl. VII, figs. 4-5.

Localities.—Five specimens; Isigaki-sima, Yaéyama, littoral, June 1940 (MIYAKE). Six specimens; same locality, littoral, June 23, 1941.

Distribution.—Cape of Good Hope; Mozambique; Zanzibar; Madagascar; Arabian Gulf; Ryukyu; Philippine Islands; Halmahera;

Amboina; New Guinea; Palao Islands; Caroline Islands; Marshall Islands; Gilbert Islands; Fiji Islands; Society Islands.

### 23. *Ophiomastix annulosa* (LAMARCK)

*Ophiura annulosa*: LAMARCK, 1816, Anim. sans Vert., II, p. 543.

*Ophiomastix annulosa*: MÜLLER et TROSCHEL, 1842, Sys. Ast., p. 107. DÖDERLEIN, 1896, SEMON-Zool. Forschungsr., V, p. 289, pl. XVI, fig. 11. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 294. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 350, fig. 99, pl. VII, fig. 6. CLARK, 1921, Dept. Mar. Biol. Carnegie Inst., X, p. 135, pl. XIV, fig. 6. KÖHLER, 1922, U. S. Nat. Mus., Bull. 100, V, p. 329, pl. LXXII, figs. 4-5. MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 197.

Localities.—One specimen; Isigaki-sima, Yaéyama, littoral, June 1940 (MIYAKE). Two specimens; same locality, littoral, June 23, 1941. Two specimens; same locality, littoral, June 24, 1941.

Distribution.—Ceylon; Keeling Islands; Ryukyu; Taiwan (Formosa); Philippine Islands; Amboina; Torres Strait; Palao Islands.

### 24. *Ophiomastix asperula* LÜTKEN

LÜTKEN, 1869, Add. Hist. Oph., III, p. 43. DÖDERLEIN, 1896, SEMON-Zool. Forschungsr., V, p. 290, pl. XV, figs. 9-9a. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 294. —1921, Dept. Mar. Biol. Carnegie Inst., X, p. 134, pl. XIV, fig. 1. MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 197, fig. 15.

Locality.—Two specimens; Isigaki-sima, Yaéyama, littoral, July 9, 1941.

Distribution.—Zanzibar; Zamboanga; Amboina; East coast of Borneo; Torres Strait; Fiji Islands.

### 25. *Ophiomastix caryophyllata* LÜTKEN

LÜTKEN, 1869, Add. Hist. Oph., III, p. 43. DÖDERLEIN, 1896, SEMON-Zool. Forschungsr., V, p. 290, pl. XV, figs. 10-10a. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 294. —1921, Dept. Mar. Biol. Carnegie Inst., X, p. 137, pl. XIV, fig. 4, pl. XXXVI, fig. 10. MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ. VII, 5, p. 198, fig. 16.

Locality.—Two specimens; Isigaki-sima, Yaéyama, littoral, July 9, 1941.

Distribution.—Amboina; Off east coast of Borneo; Sulu Archipelago; New Caledonia; Torres Strait; Palao Islands; Fiji Islands.

26. *Ophiomastix lütkeni* PFEFFER

PFEFFER, 1900, Abh. Senckenb. Nat. Ges., XXV, p. 83.<sup>1)</sup> CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 296, pl. XVI, figs. 3-4. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 349, fig. 98.

Localities.—One specimen; Isigaki-sima, Yaeyama, littoral, July 2, 1941. One specimen; same locality, littoral, July 3, 1941. Two specimens; same locality, littoral, July 10, 1941.

Distribution.—Ryukyu; Philippine Islands; Ternate.

27. *Ophiomastix mixta* LÜTKEN

LÜTKEN, 1869, Add. Hist. Oph., III, p. 44. KÖHLER, 1905, Siboga-Exp., Oph. litt., p. 68, pl. VI, fig. 15, pl. XV, fig. 1. CLARK, 1911, U. S. Nat. Mus., Bull. 75, p. 256, fig. 126.—1915, Mem. Mus. Comp. Zool., XXV, 4, p. 296. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 348, fig. 97. CLARK, 1921, Dept. Mar. Biol. Carnegie Inst., X, p. 135, pl. XIV, fig. 2. MURAKAMI, 1942, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 1, p. 34.—1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 199.

Localities.—One specimen; Isigaki-sima, Yaeyama, littoral, June 24, 1941. One specimen; same locality, littoral, June 25, 1941.

Distribution.—Southern Nippon; Philippine Islands; Amboina; Timor; Torres Strait; Samoa; Loyalty Islands; Fiji Islands.

28. *Ophiarthrum elegans* PETERS

PETERS, 1851, Monatsb. K. Preuss. Akad. Wiss., p. 453. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 296. MATSUMOTO, 1917, Journ. Coll. Sci., Imp. Univ. Tokyo, XXXVIII, 2, p. 351, fig. 100, pl. VII, fig. 7. CLARK, 1921, Dept. Mar. Biol. Carnegie Inst., X, p. 139, pl. XIII, fig. 1. MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ. VII, 5, p. 201.

Localities.—Four specimens; Isigaki-sima, Yaeyama, littoral, June 28, 1941. Two specimens; same locality, littoral, July 2, 1941. One specimen; same locality, littoral, July 9, 1941.

Distribution.—Mozambique; Zanzibar; Zamboanga; Ryukyu; Philippine Islands; Queensland; Palao Islands; New Guinea; Torres Strait; Caroline Islands; Society Island.

28'. *Ophiarthrum elegans* var. *unicolor* CLARK

CLARK, 1932, Gt. Barrier Reef Exp., IV, 7, p. 208. MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 201.

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

Localities.—Two specimens; Isigaki-sima, Yaéyama, littoral, June 28, 1941. One specimen; same locality, littoral, July 2, 1941. One specimen; same locality, littoral, July 9, 1941.

Distribution.—Great Barrier Reef; Palao Islands.

## 29. *Ophiarthrum pictum* (MÜLLER et TROSCHEL)

*Ophiocoma picta*: MÜLLER et TROSCHEL, 1842, Sys. Ast., p. 102.

*Ophiarthrum pictum*: LYMAN, 1874, Bull. Mus. Comp. Zool., III, 10, p. 225, pl. VII, figs. 2-4. CLARK, 1915, Mem. Mus. Comp. Zool., XXV, 4, p. 297.—1921, Dept. Mar. Biol. Carnegie Inst., X, p. 140, pl. XII, fig. 1. OHSHIMA, 1935, Bot. Zool., III, 3, p. 62, fig. 28, b-c. MURAKAMI, 1943, Journ. Dept. Agric., Kyūsyū Imp. Univ., VII, 5, p. 202.

Locality.—Two specimens; Isigaki-sima, Yaéyama, littoral, July 2, 1941.

Distribution.—Yaéyama; Philippine Islands; Amboina; East Indies; Timor; Torres Strait; Palao Islands; New Guinea.

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