

Report of the Biological Survey of Mutsu Bay.

13. Echinoidea.

By

TH. MORTENSEN, Copenhagen.

(With Pl. XIX).

The material of Echinoids from the Mutsu Bay, sent me for examination by Professor SANJI HÔZAWA, comprises the following 10 species.

1. *Glyptocidaris crenularis* A. AGASSIZ.

(Pl. XIX, Fig. 1; Text-fig. 4).

A. AGASSIZ. Revision of the Echini. 1872-74. p. 487. Pl. VII. a; figs. 6, 8, 9. (here named *Phymosoma crenulare*).

YOSHIWARA. Japanese Echini. Zoological Magazine. Tokyo. XVIII. 1906. Pl. VII. figs. 1-6. (here named *Coptosoma crenulare*).

L. DÖDERLEIN. Die polyporen Echinoiden von Japan. Zoologischer Anzeiger. XXX. 1906. p. 520.

H. L. CLARK. Hawaiian and other Pacific Echini. Pedinidae...Echinometridae. Mem. Mus. Comp. Zool. XXXIV. 1912. p. 228. Pl. 90. 5-10; 92. 1-11; 106. 1-2.

Station 2 (I); 29. VII. 1926; off Asamushi; coll. S. TAKATSUKI; Spec. No. 1120.

Station 2; 10. VIII. 1927; off Asamushi; coll. S. TAKATSUKI; Spec. No. 1947.

Station 67; 11. VIII. 1926; off Sumichigai; coll. S. HÔZAWA; Spec. No. 1118.

The specimens are rather small, from 11 to 34 mm horizontal diameter, the species being known to grow to a much larger size, at least 75 mm horizontal diameter.

2. *Temnopleurus Hardwickii* (GRAY).

(Pl. XIX, Fig. 3).

A. AGASSIZ. Revision of the Echini. p. 460; Pl. VIII. a. 1-3.

TH. MORTENSEN. Echinoidea; Danish Expedition to Siam. Mem. Ac. Sc. Copen-

hague. 7. Ser. I. 1904. p. 61, 65. Pl. VI. 32, 34; VII. 21.

H. L. CLARK. Hawaiian and other Pacific Echini. Pedinidae....Echinometridae; p. 312.

Station 41 (II); 31. VII. 1926; coll. S. S. Soyo Maru, off Okunai. Spec. No. 1110.

3. *Temnotrema sculpta* A. AGASSIZ.

TH. MORTENSEN. Echinoidea. Danish Exp. to Siam; p. 84. Pl. I. 5-6, 8, 19; II. 6. (under the name of *Pleurechinus variegatus*).

H. L. CLARK. Hawaiian and other Pacific Echini. Pedinidae....Echinometridae; p. 321. Pl. 112. 1-2.

Station 94; 24. VII. 1927; off Tairadate; coll. S. TAKATSUKI. Spec. No. 1783.

(Together with a young *Strongylocentrotus nudus* (?)).

4. *Strongylocentrotus nudus* (A. AGASSIZ).

(Pl. XIX, Fig. 2; Text-fig. 1).

A. AGASSIZ. Revision of the Echini, p. 448.

L. DÖDERLEIN. Die polyporen Echinoiden von Japan. Zool. Anz. XXX. 1906. p. 518. (under the name of *Strongyloc. hokkaidensis*).

YOSHIWARA. Japanese Echini, Pl. XII. 1-2.

H. L. CLARK. Hawaiian and other Pacific Echini. Pedinidae....Echinometridae; p. 363. Pl. 94. 17-23.

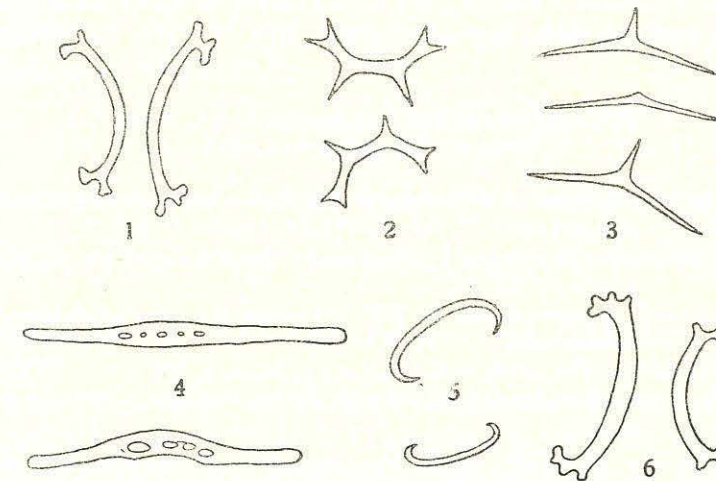
Station 26; 29. VIII. 1927. Futagojima; coll. S. TAKATSUKI; spec. No. 2313.

Station 104; 17. VIII. 1927. Sai; coll. S. HÖZOWA; spec. No. 2089.

Station 94; 24. VII. 1927; off Tairadate; coll. S. TAKATSUKI. Spec. No. 1783. (One very young specimen, 6 mm horizontal diameter, together with *Temnotrema sculpta*; identification not beyond doubt).

Mediumsized specimens of this species (which grows to a large size, up to ca. 85 mm horizontal diameter) have on account of their long dark coloured spines a very considerable general likeness with *Anthocidaris crassispina* (A. Ag.), the littoral Echinoid so very common in the more southern parts of Japan, for instance at Misaki; quite young specimens again may also bear a great resemblance to *Pseudocentrotus depressus* (A. Ag.), likewise a very common littoral species in the southern parts of Japan, when their spines are brown,

as is the case in young specimens which I have seen. (Whether the young specimens have always the spines more light coloured I cannot tell; the little material available does not allow any definite conclusions as to this). A careful study of the oral side of the test will lead to distinguish the three forms, but this requires a good deal of special knowledge and is by no means an easy task. Fortunately it is possible to distinguish the three forms much more easily and with full certainty by means of the spicules of their tubefeet. In *Strongylocentrotus nudus* (text-fig. 1) the spicules are arc-shaped, with the ends somewhat irregularly branched; in *Pseudoc. depressus* (text-fig. 2) they are arc-shaped with bifid ends and with a pair of spines on the outer side; in *Anthocid. crassispina* (text-fig. 3) they are "biacerate", slightly curved rods with a spine in the middle. It may be added that in *Glyptocidaris crenularis* (text-fig. 4) the spicules are straight rods, usually with some holes in the middle. Further, in *Strongyloc. pulcherrimus* (text-fig. 5) they are C-shaped ("bihamate"), while in *Strongyloc. intermedius* (text-fig. 6) they are in the main like those of *Strongyloc. nudus*. Thus all these polyporous Echinoids are distinguished very



Text-figures 1-6. Spicules from tubefeet of *Strongylocentrotus nudus* (A. AGASSIZ) (1), *Pseudocentrotus depressus* (A. AGASSIZ) (2), *Anthocidaris crassispina* (A. AGASSIZ) (3), *Glyptocidaris crenularis* A. AGASSIZ (4), *Strongylocentrotus pulcherrimus* (A. AGASSIZ) (5), and *Strongylocentrotus intermedius* (A. AGASSIZ) (6). All $\times 125$.

easily, and with full certainty, even when quite young, merely by examining the spicules of their tubefeet. Only *Str. intermedius* and *nudus* cannot be distinguished with certainty by their spicules, but the much shorter and more numerous spines of the former distinguish it very well from *Str. nudus* with its longer and less numerous spines.

5. *Strongylocentrotus intermedius* (A. AGASSIZ).

(Pl. XIX, Fig. 4; Text-fig. 6).

- A. AGASSIZ. Revision of the Echini. p. 445.
 L. DÖDERLEIN. Die polyporen Echinoiden von Japan. Zool. Anz. XXX. p. 517.
 H. L. CLARK. Hawaiian and other Pacific Echini. Pedinidae...Echinometridae, p. 353.

Station 14; 22. VI. 1927. Futagojima; coll. S. TAKATSUKI; Spec. No. 1596.

Station 103; 14. VIII. 1927. Ōma; coll. S. HÔZAWA. Spec. No. 2065.

Station 104; 18. VIII. 1927. Ōma; coll. S. HÔZAWA; Spec. No. 2079.

Station 105; 18. VIII. 1927. Ōma; coll. S. HÔZAWA; Spec. No. 2190.

The specimens from the three latter stations are very young, only 3-6 mm horizontal diameter; the identification of them as *Str. intermedius* however seems beyond doubt.

6. *Strongylocentrotus pulcherrimus* (A. AGASSIZ).

(Text-fig. 5).

- A. AGASSIZ. Revision of the Echini; p. 453. (under the name of *Sphaerechinus pulcherrimus*).
 TH. MORTENSEN. Echinoidea. I. The Danish "Ingolf" Expedition. IV. 1. 1903. p. 121. Pl. XX. 10.
 YOSHIWARA. Japanese Echini. Pl. XIII. 1-4 (under the name of *Sphaerechinus pulcherrimus*).
 L. DÖDERLEIN. Die polyporen Echinoiden von Japan, p. 516.
 H. L. CLARK. Hawaiian and other Pacific Echini. Pedinidae...Echinometridae, p. 353.

Station 1; 11. VIII. 1927. Yunoshima; coll. S. HÔZAWA. Spec. No. 1949.

Station 16; 7. VII. 1916. Coast of Tsuchiya; coll. S. HÔZAWA & S. TAKATSUKI. Spec. No. 1119.

Station 101; 19. VIII. 1927. Sai; coll. S. HÔZAWA; Spec. No. 2011.

7. *Peronella rubra* DÖDERLEIN.

- L. DÖDERLEIN. Seeigel von Japan u. d. Liu-Kiu-Inseln. Arch. f. Naturgeschichte. LI. 1885. p. 106.
 H. L. CLARK. Hawaiian and other Pacific Echini. Clypeastridae. Mem. Mus. Comp. Zool. 46. 1914. p. 54. Pl. 124. 18-20; 142. 5-7.

Station 103; 17. VIII. 1927. Sai; coll. S. HÔZAWA. Spec. No. 2064.

The single specimen at hand is a young one, 18 mm long, with the genital openings not yet developed. The position of the periproct almost halfway between the mouth and the test margin, and the presence of spines on the periproctal plates, however, show rather certainly that it must be the above named species.

8. *Echinarachnius mirabilis* (A. AGASSIZ).

- A. AGASSIZ. Revision of the Echini, p. 526. Pl. XIII. a. 5-6.
 YOSHIWARA. Japanese Echini, Pl. XVI. 9-10.
 H. L. CLARK. Hawaiian and other Pacific Echini. Clypeastridae, p. 69, Pl. 125. 6.

Station 6; 5. VII. 1926. Asamushi; coll. S. TAKATSUKI. Spec. No. 1130. a.

Station 53 (II); 7. VIII. 1926. Coast of Aburakawa; coll. S. HÔZAWA. Spec. No. 1130. b.

9. *Echinarachnius griseus* MORTSEN.

- TH. MORTENSEN. A new species of the genus *Echinarachnius* from Japan. Annot. Zool. Japonenses. XI. 1927. p. 195. Pl. I.

Station 23 (I); 16. VIII. 1926. Moura; coll. S. HÔZAWA. Spec. No. 1124.

Station 109; 19. VIII. 1927. Fukuura; coll. S. HÔZAWA. Spec. No. 2220.

In his Catalogue of the Recent Sea-Urchins in the collection of the British Museum (1925) H. L. CLARK states (p. 168) that the young specimens of *Echinarachnius mirabilis* "are remarkable for their very delicate, usually white or very light-coloured tests, while adults are fairly stout and are deep violet in colour." He has, however, found some young specimens as dark as the adult, but he supposes that this is due to these dark specimens being, in spite of their small size,

older than the more light coloured specimens; or the difference in colour "may possibly be correlated with locality and habitat".

Although not having examined the small specimens mentioned by CLARK I cannot help suggesting that the difference in colour between these young specimens is due, not to various age or habitat, but to their representing two different species, the dark ones *Echinarachnius mirabilis*, the light coloured ones *Ech. griseus*. (The latter species had not yet been described when CLARK wrote the work quoted). As for the young specimens from Mutsu Bay there is, at least, no doubt that the dark and light coloured specimens represent two distinct species, the dark ones *Ech. mirabilis*, the light coloured ones *Ech. griseus*.

Besides by their dark colour, which I find to be equally dark in the young and the adult specimens, the young *Ech. mirabilis* also differs from *Ech. griseus* in the usually more marginal position of the periproct; in *Ech. griseus* this is usually more distinctly supramarginal. In general *Ech. mirabilis* is a more robust form than *Ech. griseus*, as also the coat of spines is more dense than in *Ech. griseus*; in the microscopical structure of spines and pedicellariae there is no very tangible difference between the two species. It would appear that in *Ech. griseus* the genital pores are generally formed somewhat earlier than in *Ech. mirabilis*. I have found them already at a size of 10 mm length in *Ech. griseus*, but not until a size of 22 mm in *Ech. mirabilis*; but, on the other hand, they are not formed either in a specimen of 14 mm length of *Ech. griseus*. This accordingly is no reliable difference.

10. *Echinocardium cordatum* (PENNANT).

A. AGASSIZ. Revision of the Echini, p. 349. Pl. XX. 5-7.

TH. MORTENSEN. Echinoidea. II. The Danish "Ingolf" Expedition. IV. 2. 1907. p. 145. Pl. XVI. 21; XVII. 15, 21-23, 30, 34, 37-38, 43, 48-49.

H. L. CLARK. Hawaiian and other Pacific Echini. Spatangidae. Mem. Mus. Comp. Zool. 46. 1917. p. 262.

Station 8; 1. VI. 1926. Off Aomori; coll. S. TAKATSUKI. Spec. No. 1113.

Station 17 (I); 17. VII. 1926. Namiuchi; coll. S. HÔZAWA. Spec. No. 1129.

Station 22 (I); 20. VII. 1926. Off Moura-Kojima; coll. S. HÔZAWA. Spec. No. 1123.

Station 26 (I); 2. VII. 1926. Off Futagojima; coll. S. TAKATSUKI. Spec. No. 1122.

Station 27 (I); 22. VII. 1926. Off Asamushi; coll. S. HÔZAWA. Spec. No. 1126.

Station 30 (I); 24. VII. 1927. Off Itanosaki; coll. S. HÔZAWA. Spec. No. 1128.

Station 60; 9. VIII. 1926. Off Kusodomari; coll. S. HÔZAWA. Spec. No. 1117.

Station 68; 2. VIII. 1927. Off Jogasawa; coll. S. HÔZAWA. Spec. No. 1125.

Station 69. (V); 11. VIII. 1926. Off Oniuata; coll. S. HÔZAWA. Spec. No. 1121.

Station 107; 19. VIII. 1927. Fukuura; coll. S. HÔZAWA. Spec. No. 2208.

Station 98; 25. VII. 1927. Noheji; coll. S. TAKATSUKI. Spec. No. 1826.

Station 99; 25. VII. 1927. Off Asadokora; coll. S. TAKATSUKI. Spec. No. 1838.

EXPLANATION OF THE PLATE

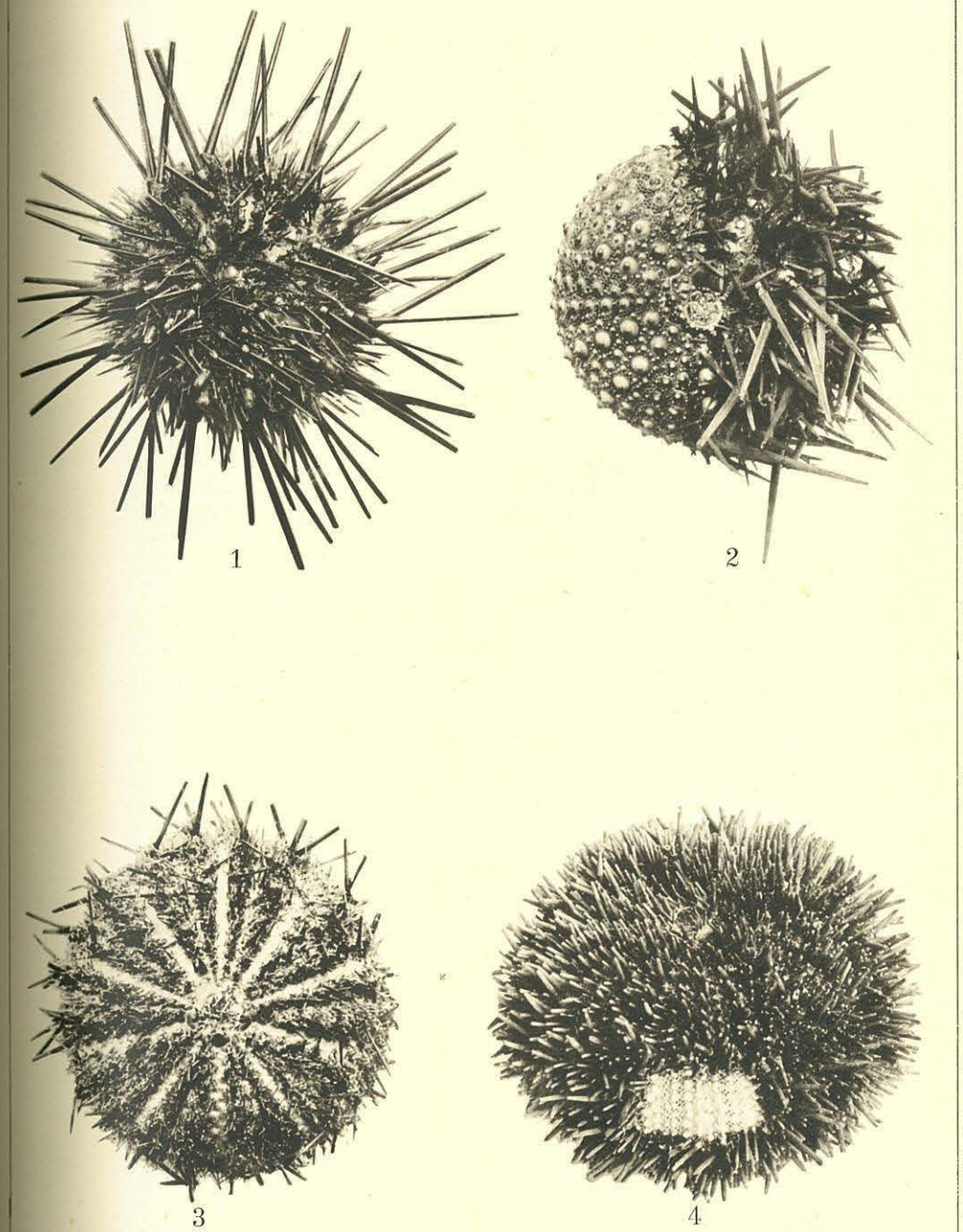
Fig. 1. *Glyptocidaris crenularis* A. AGASSIZ.

Fig. 2. *Strongylocentrotus nudus* (A. AGASSIZ.)

Fig. 3. *Temnopleurus Hardwickii* (GRAY.)

Fig. 4. *Strongylocentrotus intermedius* (A. AGASSIZ.)

(All figures natural size.)



TH. MORTENSEN: Echinoidea of Mutsu Bay.