

ECHINODERMATA.—By *Edgar A. Smith, F.Z.S.*

(Plate LI., figs. 1–3.)

The collection of Sea-urchins and Starfishes from the island of Rodriguez, although comprising but few species, contains some of considerable interest, among which may be mentioned a very remarkable new *Comatula*, two apparently undescribed species of *Ophiocoma*, and the fine *Ophiomastix venosa*, described by Dr. Peters from Mozambique.

The rest of the forms are well-known inhabitants of the Indian Ocean, certain of them being also common in the Pacific.

Crinoida.*Comatula indica.*

(Plate LI., figs. 3–3b.)

Ann. and Mag. Nat. Hist., 1876, xvii., p. 406.

Rays 30; dorsal disk, small, convex, subpentagonal, sculptured with little contiguous and well-defined pits which are the sockets of the cirri; these are about 45 in number; radial joints two, the axillary without a syzygium; between this and the next bifurcation are two articulations; after two more joints the two outermost arms bifurcate; none of the brachial axillaries with a syzygium; each third segment above an axillary has a syzygium, and on the arms the next joints with syzygia are at very unequal distances, the most proximate being separated by as many as 20 joints, but usually by about 14; then nearer the extremity of the rays, they are rather closer together, the interlying joints varying in number from 6 to 10.

The second pinnulæ are very long and composed of much elongated joints. The colour of the specimen is pale purplish brown, with the sutures of the ray-articulations blackish brown. Diameter of disk 6 mill., length of rays about 6 inches (153 millim.).

The only example of this interesting species was collected by Mr. Slater. Unfortunately it is imperfect, all the dorsal cirri being wanting.* The remarkable elongate second pinnulæ (17 mill. in length) are situated on the first and second segments above those joints which always have a syzygium, and which are the third joints above the last brachial axillaries, or in other words, they rest upon the fourth and fifth joints above these axillaries. They consist of about 17 joints,

* The figured dorsal cirrus was found among *débris* at the bottom of the bottle containing the *Comatula*, but it is not absolutely certain that it belongs to the present species, although the evidence points to that conclusion.

which are elongate, cylindrical, those at the middle being the longest, and the two or three basal ones the shortest.

In the short diagnosis given in the "Annals and Magazine of Natural History," May 1876, p. 406, by an oversight it is stated that "the two *innermost* arms bifurcate;" it should be *outermost* or *exterior*.

Ophiuroida.

Ophiomastix venosa.

Peters, Wieg. Arch. Naturgesch., 1852, p. 83; Von Martens, in Von der Decken's Reisen in Ost-Afrika, p. 130; Lyman, Ophiuridæ, p. 92.

Three fine examples of this remarkable species were collected by Mr. Gulliver. It has also been previously found at Mozambique and Zanzibar.

Ophiocoma erinaceus.

Müller and Troschel, System der Asteriden, p. 98; Dujardin and Hupé, Echinodermes, p. 260; Lütken, Additamenta ad Hist. Ophiurid, p. 164; Von Martens, in Von der Decken's Reisen in Ost-Afrika, III., p. 129; Lyman, Ophiuridæ, p. 83.

Seven specimens were obtained by Mr. Gulliver.

This species has a wide geographical range, having been met with in the Red Sea, at Mozambique, Zanzibar, Natal, Seychelles, Mauritius, Sandwich Islands, Kingsmills and Society Islands.

Ophiocoma variegata.

(Plate LI., figs. 2-2d.)

Ann. & Mag. Nat. Hist., 1876, vol. xviii., p. 39.

Disk circular, finely granulated above and beneath; oral shields rather longer than broad, slightly octangular, with the sides rectilinear; adoral shields narrow, extending along the lateral margins of the orals; three mouth-papillæ on each side of each oral angle, the outermost being the largest and somewhat squarish; above the teeth at the apex of the angle is an irregular cluster of about 12 smaller papillæ; teeth four, strong, arcuate at the tips. Arms rather stout, about four times as long as the diameter of the disk; upper plates transversely narrowly oval, with the outer margin faintly angulated in the centre, about twice as broad as long; lower plates squarish, the aboral angles rounded, the side margins excavated; arm-spines four, subequal, the uppermost a trifle the shortest and stout and the lowest but one a little the longest, about as long as the width of the dorsal arm-plates (the tenth); ambulacral scales two in number to the extremity of the arms, short and compressed.

Colour of a specimen in alcohol:—disk above and beneath uniformly purplish brown; upper arm-plates dirty brown, at intervals varied with three or four contiguous pale ones, which are marked with the dark outline of a subquadrate figure, particularly observable towards the *outer* ends of the arms; lower arm-plates pale,

blotched with dirty brown, especially towards the outer extremity of the rays; arm-spines of a uniform colour, but lighter than the upper arm-plates; oral shields pale, mottled with dirty brown.

Diameter of disk 38 mill., length of rays 105; width of broadest upper arm-plates 4.

The nearest ally of this species is *O. scolopendrina*, Lamarek, from which it differs in coloration, form of the arm-shields, oral shields and the brachial spines. The dark subquadrate outline on the pale upper arm-plates is very characteristic, as also is the dirty brownish mottling on the oral and lower brachial shields.

Ophiocoma brevispinosa.

(Plate LI., figs. 1-1f.)

Ann. Mag. Nat. Hist., 1876, vol. xviii., p. 40.

Disk sub-circular, flat above, minutely granulated above and beneath; oral shields heart-shaped, broader than long; adoral plates small, crescentiform, bordering the sides of the orals; three or four mouth-papillæ on each side of an oral angle, and a group of about twelve at the apex; teeth four, the two intermediate ones larger than the two exterior. Arms a trifle more than three times as long as the diameter of the disk; upper plates transversely oval, about twice as broad as long; lower plates (twelfth from the base) a little longer than broad; aboral margins arched and a little pointed in the middle, lateral edges rather deeply concave; oral margins somewhat convergently sloping and interrupted by the outer margin of the adjacent preceding plate; tentacle-scales two, short, and compressed; brachial spines short, four (sometimes five on a few plates just beyond the disk), the two upper ones shorter than the others, broad and flattened; the two inferior ones (of which the second or upper is rather the larger) are slightly conical, and not so long as the width of the broadest dorsal arm-shield.

Colour of a specimen in alcohol:—disk dirty white, irregularly mottled with green above and beneath; arms of the same colour as the disk, with a narrow green line above, more or less distinct, down the centre; lower shields, ambulacral scales (and two lower series of arm-spines for the most part) uniformly dirty white, and the two upper series of spines ornamented with one or two narrow greenish rings and dots; oral shields spotted with green. Diameter of disk 17 millim.; length of rays 54. This species is well distinguished by its peculiarity of colouring and the character of the short brachial spines.

Asteroida.

Scytaster variolatus, Retzius.

A single fine large specimen collected by Mr. Slater.

Other localities where this species has been met with are the Red Sea, Réunion, Mauritius, Zanzibar, Bourbon.

Linckia multifora, Lamarck.

All four examples collected by Mr. Gulliver have five rays in different stages of development.

This common starfish also inhabits the Red Sea, the shores of Mozambique, Réunion, Bourbon, Seychelles, Mauritius, New Caledonia, and the Sandwich Islands.

Echinoida.

Phyllacanthus imperialis, Lamarck.

Of this species a fine large example with the ends of the primary spines well fluted, was collected by Mr. Gulliver.

This species is also recorded from the Red Sea, Zanzibar, Aru and Molucca Islands, Sulu Sea, New Holland and Tonga.

Hipponoe variegata, Leske.

The single specimen of this polymorphous and widely-distributed species is of a depressed form, roundly pentagonal, of a brownish colour, and clothed with white spines. It was collected by Mr. Gulliver.

This species appears to be found in all parts of the Indian Ocean, at Zanzibar, Mauritius, Seychelles, Nicobar Islands, in the Red Sea, the Pacific, and at the Philippines, Moluccas, Fiji Islands, &c.

Heterocentrotus mammillatus, Klein.

There are two varieties of this most variable sea-urchin brought home from Rodriguez, one with pale brown spines with dark tips and one or more pale rings, and the other with the primaries of a rich chocolate their entire length, and also having pale annulations near the extremities. Mr. Gulliver reports that this species is "very abundant."

The geographical range of this species is like that of the preceding.

Echinometra lucunter, Leske.

Of this extremely variable species two varieties were met with at Rodriguez; one with almost uniformly violet spines, but palish towards the base, and the other with light greenish-olive spines.

The geographical range of this species extends over the Red Sea, Indian Ocean, Chinese and Japanese Seas, and several parts of the Pacific.

Echinoneus cyclostomus, Leske.

A single example of this species, about an inch in length, was collected by Mr. Slater.

Other localities for the species are Mozambique, Zanzibar, Réunion, Bourbon, Australia, Amboina, Flores, Manila, Hood's Island, and the Kingsmills Islands.

EXPLANATION OF PLATE LI. (Figs. 1 to 3).

Fig. 1. *Ophicoma brevispinosa*, enlarged view of upper side.

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| 1a. | " | " | " | " | of lower side. |
| 1b. | " | " | " | " | of an oral shield. |
| 1c. | " | " | " | " | of the madreporic shield. |
| 1d. | " | " | " | " | of two upper arm-plates. |
| 1e. | " | " | " | " | of a lower arm-plate. |
| 1f. | " | " | " | " | of an arm-segment (seen from the exterior side and showing the relative length of the spines). |

2. *Ophicoma variegata* view of upper side, natural size.

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| 2a. | " | " | " | lower side | " |
| 2b. | " | " | " | enlarged view of an oral angle. | |
| 2c. | " | " | " | of a lower arm-plate and ambulacral papillæ. | |
| 2d. | " | " | " | of an arm-segment (seen from the exterior side and showing the relative size of the spines). | |

3. *Comatula indica*, enlarged view of the disk and a portion of the rays showing the manner of furcation.

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| 3a. | " | " | " | of a dorsal cirrus (probably belonging to this species). |
| 3b. | " | " | " | lateral view of an outer arm, showing the position and form of the pinnulæ. |

