

MARINE CRUSTACEANS.

XIII. THE HIPPIDEA, THALASSINIDEA AND SCYLLARIDEA.

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(With Plate LVIII.)

FOURTEEN species belonging to various groups of reptant decapods are enumerated in the following lists. Two of them are new. All the rest have already been recorded from the Indopacific region, with the exception of a species of *Callinassa* which I am unable to distinguish from a Martinique form.

Suborder ANOMURA. Tribe HIPPIDEA.

The members of this group are all shallow water forms which live buried in the sand. They are particularly plentiful at the very edge of the water on beaches of loose sand, retreating with the outgoing tide and burrowing with extraordinary rapidity by means of their flat legs with sickle-shaped ends. Garstang has described¹ the way in which the antennules of *Albunea* are adapted to this habitat, forming a filter to keep the sand out of the breathing stream. In the case of most species of *Remipes* a sort of chamber is formed by the long hairs on the short antennae and inner flagella of the antennules². The animal lies in the sand with the eyes just showing and this chamber at the surface to filter the water. It may easily be caught by a bait of crab at the end of a line, pouncing on it with its sharp maxillipeds and allowing itself to be flicked out of the sand if the rod be sharply lifted.

Quite a number of the peculiarities of other sand Decapoda are repeated independently in the Hippidea. The so-called subchelate hands of *Albunea* are found, as we have seen (p. 683), in various Oxystomes and Parthenopidae and in *Kraussia*, and the flattened legs of all Hippidea in *Ranina*, *Matuta* and *Kraussia*. The overlapping carapace of *Remipes* is also common among Oxystomes and Parthenopidae. The outward channel from the gill-chamber is carried, in Hippidea as in Oxystomata, by the endopodite of the first maxilliped. The antennules of *Albunea* are analogous to the antennae of the Corystidae. And the smooth surface

¹ *Q. J. M. S.* xl. p. 224. I regret the accidental omission of a reference to this paper from the article on the Oxystomata, in the course of which some interesting suggestions of

Mr Garstang were confirmed.

² This is not conspicuous in the species figured below.

of the back of most Hippidea, marked with fine transverse ridges, is repeated in *Kraussia* and, more coarsely, in some species of *Calappa*. It is such striking and quite independently evolved likenesses as these which lend strength to the view that the resemblances between Hippidea and Oxystomes are due to convergence only, and not genetic.

Family **Albuneidae**¹. Genus *Albunea* Fabr., 1798.

1. *Albunea microps* Miers, 1879. *J. Linn. Soc.* XII. p. 328.

Dredged in Mahlosmadulu Atoll in 20 fathoms of water.

2. ? *Albunea speciosa* Dana, 1852. *U.S. Expl. Expd. Crust.* I. p. 405.

The telson in my specimen is more oval than in Dana's figure, and is pointed. This, however, may be only a sexual difference (Dana does not state the sex of his specimens; mine is a male) or the species may be variable or varietal in this respect. Dana refers to and figures the eye-scales as one triangular plate between the eyes.

The *Blepharipoda fauriana* of Bouvier (*Ann. Soc. Ent. France*, 1898) seems to be allied to this species. Probably the genera *Albunea* and *Blepharipoda* meet near here.

Taken at Hulule, Male Atoll.

Family **Hippidae**. Genus *Remipes* Latr., 1806.

3. *Remipes testudinarius* Latr., 1806. De Man, *Zool. Jahrb.* VI. *Syst.* p. 476.

Taken at Hulule, Male Atoll, between tide-marks.

4. *Remipes pacificus* Dana, 1852. De Man, *loc. cit.*

Taken between tide-marks in Male and Minikoi Atolls, and dredged in Hulule Velu and Mahlosmadulu Atoll in 7 and 6 fathoms respectively.

5. *Remipes granulatus* n. sp. (Pl. LVIII. fig. 1.)

Definition: "A *Remipes* with the carapace finely granular all over and raised into little irregular lumps; the front notched but without a middle tooth in the notch; the outer teeth of the fore edge not quite so long as those of the front and passing evenly into the side edge of the carapace without an angle; the post-frontal groove fairly distinct, behind this a low irregular hollow on each side of the middle line, about a third of the length of the carapace from its fore edge, and behind these again two half-moon shaped cracks in the same position; about 35 pits along each side of the carapace; the eyestalks short; the 'flagellum' of the 2nd antenna of one joint only; the end-joint of the first leg as long as the propodite, slightly compressed, smooth on the inside, tufted with hairs here and there on the outside, fringed above, below, and at the end; and the last joint in the 2nd and 3rd legs short, broad, bent at an obtuse angle."

¹ *Key to the families of the Hippidea.*

I. First pair of legs subchelate. Carapace flattened, without wings to cover the legs. 3rd maxilliped narrow, with exopodite. *Albuneidae*.

II. First pair of legs simple. Carapace subcylindrical, with wings which cover the legs. 3rd maxilliped broad, without exopodite. *Hippidae*.

Length of single specimen: 9 mm. Colour in spirit: dead white. Differs from all other species in the granular surface of the back.

One female, taken between tide-marks at Hulule, Male Atoll.

Tribe THALASSINIDEA.

With the exception of a few Axiidae¹ which hide in weed, and such species as *Callianassa lignicola*, taken from the hollow of a submerged twig, all the members of this tribe are either burrowers, making galleries, which are often long and deep, in sandy or muddy bottoms, or at least live in burrows made by other animals. Those which burrow between tide-marks usually retire to the bottom of their holes when the tide is out, but they can sometimes be seen just within the opening, when it is almost covered by the water. At such times some at least of them may often be made to seize a bait but are very wary and hard to catch. In spite of certain primitive characters which really remove them from the Nephropsidea, they are at first sight very lobster-like in habit of body, but the abdomen, which is usually softened, the compressed carapace and last pair or more of legs carried close against the sides, and the reduced eyes are easily seen to be consequences of their peculiar mode of life.

Family **Axiidae**. Genus *Axiopsis* Borradaile, 1903.

For a definition of this genus see *Ann. Mag. Nat. Hist.* (7) XII. p. 538.

1. *Axiopsis affinis* (de Man), 1887. *Arch. Naturges.* LIII. i. p. 469.

A specimen was taken between tide-marks at Hulule, Male Atoll. It was of a purple colour and lived in a purple weed.

Family **Callianassidae**. Subfamily **Gebiinae**.

Genus *Upogebia* Leach, 1814.

2. *Upogebia* sp.

A damaged specimen of a *Upogebia* allied to *U. major* (de Haan), but differing from it in having no row of small teeth on the outside of the hand, was dredged in Mulaku Atoll in 30 fathoms of water.

Subfamily **Callianassinae**. Genus *Callianidea* H. M.-Edw., 1837.

3. *Callianidea typa* H. M.-Edw., 1837. *H. Nat. Crust.* II. p. 320.

Taken between tide-marks at Goidu, Goifurfehendu Atoll.

Genus *Callianassa* Leach, 1814.

4. ?*Callianassa* (*Callichirus*) *longiventris* A. M.-Edw., 1870. (Pl. LVIII. fig. 2.) *Nov. Arch. Mus.* VI. p. 92.

¹ For a key to the families, etc. of the Thalassinidea see *Ann. Mag. Nat. Hist.* (7) XII. p. 549.

This species is recorded by Milne-Edwards from Martinique, but I am unable to find any difference between our Maldive specimen and his description. Milne-Edwards gives no figure, but a comparison will be made more easy by that in the accompanying plate.

Taken between tide-marks at Goidu, Goifurfehendu Atoll.

5. *Callianassa (Callichirus) novae-britanniae* Borradaile, 1900. Willey's *Zool. Results* IV. p. 419.

The specimen is small and the carapace very soft, so that the lines on it are not easily seen. Fig. 125, on p. 691 above, is from the New Britain specimen, and shows well the two longitudinal lines—*linea thalassinica* and *linea anomurica*—which, by a very rare exception, are here found together.

Taken between tide-marks at Goidu, Goifurfehendu Atoll.

6. *Callianassa (Trypaea) maldivensis* n. sp. (Pl. LVIII, fig. 3.)

Definition: "A *Callianassa* with the eyestalks short, flattened, pointed, with the cornea on the outside; the rostrum sharp, reaching to the end of the cornea; no antennal tooth on the carapace; the segments of the abdomen about equal, but the first rather shorter, and the second rather longer than the rest; the third joint of the antennular stalk longer than the others, as long as the flagella; the third maxillipeds with the ischiopodite and meropodite broad, but the last three joints narrow; the palm of the great chela as broad as, and about twice as long as, the wrist, both wrist and palm sharp-edged above and below, scantily hairy except on the fingers, the lower edge of the palm saw-like within at the base, that of the ischiopodite and meropodite with strong curved teeth; the telson as long as the sixth abdominal limb."

Length of the single specimen: 19 mm. Colour in spirit: white.

Taken between tide-marks at Hulule, Male Atoll.

Suborder MACRURA. Tribe SCYLLARIDEA.

The members of this group are for the most part large and have heavy, well-armoured bodies which are generally somewhat flattened, at least in the abdomen, and almost, or quite, unprovided with a rostrum. They are distinguished from nearly all other Decapoda by having none of their legs chelate, except sometimes the last pair, but they are not on this account defenceless, for the abdominal segments usually carry at each side a sharp point, and the abdomen thus becomes a powerful weapon which can be used with great effect. They mostly live in water which is at least several fathoms deep, but the rock-lobsters may be taken between tide-marks at night in the tropics, and small specimens are found in the same place in daylight. Of the two families¹, the Scyllaridae or bear crabs are found on sandy bottoms, where they probably use as shovels the broad, flat plates which represent their antennae, but the Palinuridae, or rock-lobsters, like rocky ground, often living on the outer slopes of coral reefs, but never in the lagoons. The antennae of this family have very long, stout, stiff flagella, and generally a special roughened surface on the first free

¹ Key to the families of the Scyllaridea.

I. Carapace cylindrical. Eyes in incomplete orbits. Antennae with long, stiff flagella. *Palinuridae*.

II. Carapace flat. Eyes in complete orbits. Flagellum of antenna represented by a flat plate. *Scyllaridae*.

joint, with which they can make a sound by rubbing it against the head. It would be interesting to know the use of this noise.

Family **Palinuridae**. Genus *Panulirus* White, 1847.

1. *Panulirus penicillatus* (Oliv.), 1791. Ortmann, *Zool. Jahrb.* vi. *Syst.* p. 28.

Dried shells found on the outer beach at Minikoi. These dried shells of rock-lobsters are strangely more common on the beach than those of other Decapoda. Whether this be due, as the natives say, to the creatures coming up to the surface to shed them, or to their getting killed on the reef in some way, is hard to say, but I have never seen one with the soft parts inside.

2. *Panulirus polyphagus* (Hbst.), 1793. Ortmann, *Zool. Jahrb.* x. *Syst.* p. 266.

My specimens have no white band across the abdominal segments, and the white markings on the legs are in stripes running lengthwise, but broken and somewhat wandering. This form would seem to be the one to which Fabricius gave the name of *ornatus* (*Ent. Syst. Suppl.*, p. 400, 1798).

One dried shell from the beach and one very small individual taken alive on the reef at Minikoi. Common in the Maldives.

Family **Scyllaridae**. Genus *Scyllarus* Fabr., 1793.

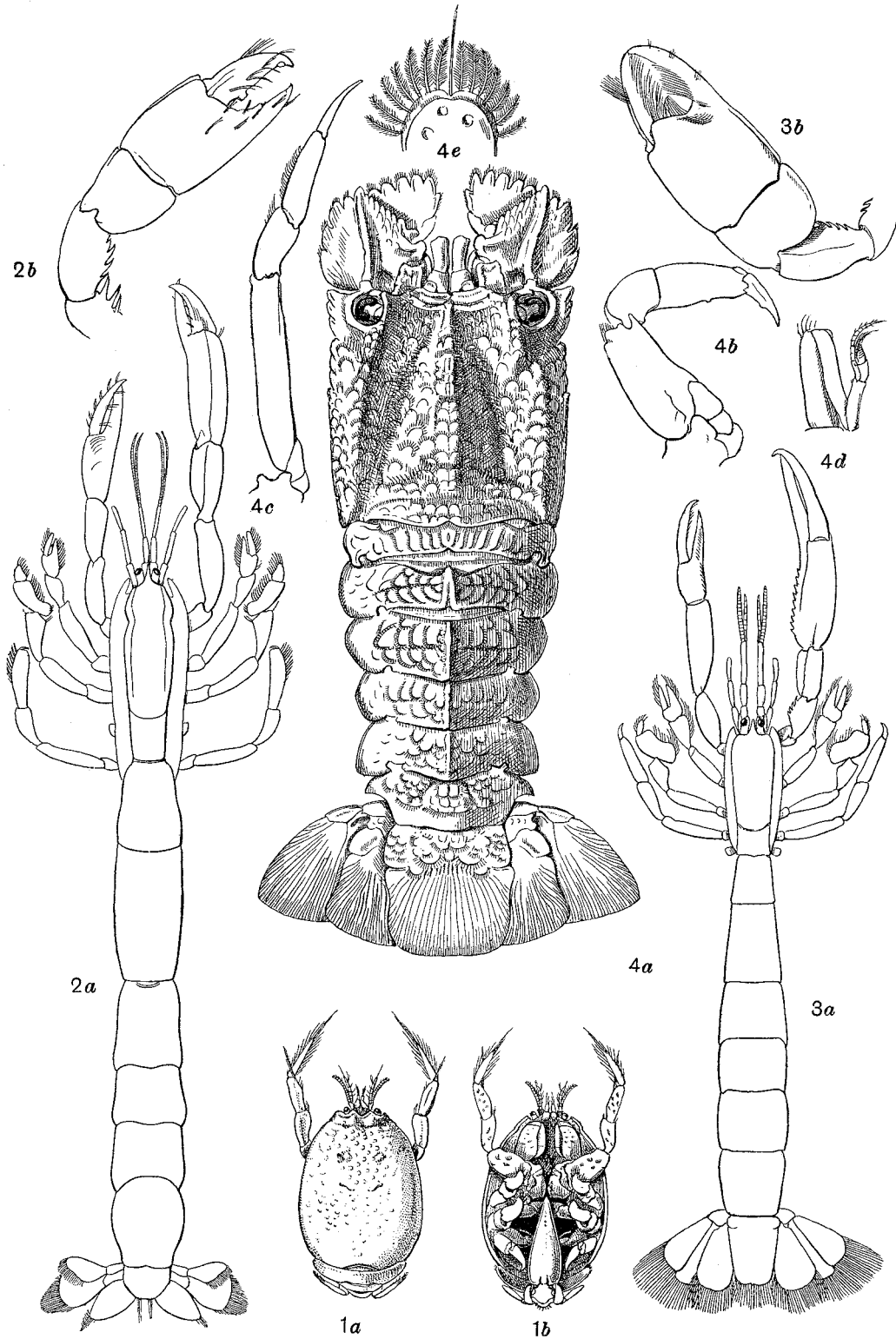
3. *Scyllarus martensi* (Pfeffer), 1881. (Pl. LVIII. fig. 4.) Ortmann, *Zool. Jahrb.* vi. *Syst.* p. 44.

The four or five teeth on the inner edge of the second joint of the antenna in this species are each more or less deeply cleft into two in most of my specimens, so as to give a saw-like edge with twice the number of teeth.

Dredged in Mulaku, Kolumadulu, Mahlosmadulu, and South Nilandu, in depths of 20—40 fathoms, always on a bottom of sand or mud.

EXPLANATION OF PLATE LVIII.

- FIG. 1. *Remipes granulatus* n. sp. *a.* from above, *b.* from beneath.
- FIG. 2. ?*Callianassa longiventris* A. M.-Edw. *a.* whole animal from above, *b.* outside of greater hand. The lash of the antenna and the fourth leg on each side are lost.
- FIG. 3. *Callianassa maldivensis* n. sp. *a.* whole animal from above, *b.* outside of greater hand. The lash of the antenna and the last leg on each side are lost.
- FIG. 4. *Scyllarus martensi* Pfeffer, var. *a.* whole animal from above, *b.* first leg, *c.* third leg, *d.* antennule, folded up, *e.* one of the scales on the back greatly enlarged.



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BORRADAILE—MACRURA AND ANOMURA.