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THE LINNEAN SOCIETY OF LONDON.

ON A COLLECTION OF BRACHYURA FROM TORRES STRAITS.

BY

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(Communicated by Prof. D'ARCY W. THOMPSON, C.B., F.L.S.)



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I. *On a Collection of Brachyura from Torres Straits.* By W. T. CALMAN, D.Sc.,  
University College, Dundee. (Communicated by Prof. D'ARCY W. THOMPSON, C.B.,  
F.L.S.)

(Plates 1-3.)

Read 16th November, 1899.

INTRODUCTORY.

THIS paper deals with the Brachyurous Crustacea collected by Prof. A. C. Haddon during his first expedition, to Torres Straits in 1888. The collection comprises about 87 species, three of which are described as new. Owing probably to the fact that attention was given to collecting the smaller and less conspicuous forms, a number of interesting and little-known species were obtained, some of which I have redescribed and figured. From the same cause, however, the determination of many of the specimens proved to be a matter of no little difficulty, and the identification of one or two of the more obscure species is at best provisional.

Of the three species here described as new, *Cryptocnemus Haddoni* belongs to a genus hitherto comprising only four species, all of which are known only from single specimens. *Pilumnus cristipes* is apparently very distinct from any known species, and its title to inclusion in the extensive genus *Pilumnus* may perhaps be disputed. *Lambrus confragosus* belongs to a genus already overburdened with species, but, so far as the means at my disposal enable me to judge, it seems to deserve the distinction of a specific name.



Among the species already known, concerning which I am able to furnish fresh details, the most interesting is the parasitic *Hapalocarcinus marsupialis*. Briefly described forty years ago by Stimpson, it appears to have escaped re-examination by carcinologists, though the curious gall-like growths to which it gives rise on corals are well known.

The occurrence of the three known Indo-Pacific species of *Palicus* (*Cymopolia*), two of which have been recorded hitherto only from widely distant localities, has afforded an opportunity for a detailed examination of their distinctive characters.

In the case of certain species described by Adams and White and by Miers, I have been able, from an examination of the type specimens in the British Museum (Natural History), to supplement the original accounts and to make one or two alterations in the matter of nomenclature.

I am much indebted to Prof. F. Jeffrey Bell and to Mr. R. I. Pocock for their courtesies and kindness in facilitating my work among the collections under their charge. My thanks are also due to Prof. E. L. Bouvier and Dr. J. G. de Man for giving me information and advice on various points, and to Dr. Chas. Chilton for the loan of literature relating to Australasian Crustacea\*.

As regards nomenclature and classification, I have followed, where possible, the important work of Dr. A. Alcock, 'Materials for a Carcinological Fauna of India,' now in course of publication. The extensive collections upon which his revision of the Indian species is based, and the exhaustive way in which the bibliography of the subject is treated, render this work indispensable for the student of the Indo-Pacific Crustacea.

*List of the Species.*

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|---|---|
| <p>Tribe CYCLOMETOPA.<br/>Family XANTHIDÆ.</p> <p>*<i>Carpilius convexus</i> (Forsk.).<br/><i>Carpilodes</i> sp.<br/><i>Liomera cinclimana</i> (White).<br/>*<i>Atergatis floridus</i> (L.).<br/>*<i>Lophactæa granulosa</i> (Rüpp.).<br/>*<i>Lophozozymus octodentatus</i> (M.-E.).<br/>— <i>dodone</i> (Herbst).<br/>*<i>Xantho</i> (<i>Leptodius</i>) <i>exaratus</i> (M.-E.).<br/>*<i>Etisus lavimanus</i>, Rand.<br/>*<i>Etisodes frontalis</i>, Dana.<br/>*— <i>electra</i> (Herbst).<br/>*<i>Actæa Rüppellii</i>, Krauss.<br/>*— <i>calculosa</i> (M.-E.).<br/>— <i>granulata</i>, var. <i>carcharias</i>, White.<br/>— <i>Peronii</i>, var. <i>squamosa</i>, Hend. (?).<br/>*— <i>hystrix</i>, Miers.<br/><i>Xanthodes Lamarckii</i> (M.-E.).</p> | <p>*<i>Chlorodius niger</i> (Forsk.).<br/>*<i>Phymodius unguatus</i> (M.-E.).<br/>— <i>sculptus</i> (A. M.-E.).<br/><i>Chlorodopsis melanodactylus</i>, A. M.-E.<br/>— <i>spinipes</i>, A. M.-E.<br/><i>Cymo Andreossyi</i> (Aud.).<br/>— <i>melanodactylus</i>, De Haan.<br/>*<i>Ozius guttatus</i> (M.-E.).<br/><i>Pseudozius dispar</i>, Dana.<br/>*<i>Pilumnus cursor</i>, A. M.-E.<br/>*— <i>pulcher</i>, Miers.<br/>*— <i>seminudus</i>, Miers.<br/>*— <i>lanatus</i> (Latr. ?), Miers.<br/>— <i>longicornis</i>, Hilg., var.<br/>— <i>crispipes</i>, n. sp.<br/>*<i>Actumnus setifer</i> (De Haan).<br/><i>Trapezia ferruginea</i>, var. <i>areolata</i>, Dana.<br/>*— <i>cymodoc</i> (Herbst).<br/><i>Tetralia glaberrima</i> (Herbst).</p> |
|---|---|

\* Since this paper was read I have been enabled, by the kindness of Mr. T. R. R. Stebbing, to consult Paulson's little-known work on the Crustacea of the Red Sea. Prof. Walker, of this College, has been good enough to translate for me several passages to which reference will be made.

## Family PORTUNIDÆ.

- Lissocarcinus orbicularis*, Dana.  
*Caphyra rotundifrons*, A. M.-E.  
 \**Neptunus sanguinolentus* (Herbst).  
 \*— *pelagicus* (L.).  
 \*— (*Achelous*) *granulatus* (M.-E.).  
 \*— (—) —, var. *unispinosus*, Miers.  
 \**Thalamita prymna* (Herbst).  
 \*— *admete* (Herbst).  
 \*— *sima*, M.-E.

## Family CANCRIDÆ.

- \**Kraussia nitida*, Stimpson.

## Tribe CATOMETOPA.

## Family GRAPSIDÆ.

- \**Metopograpsus messor* (Forsk.).  
 \**Varuna litterata* (Fabr.).

## Family OCYPODIDÆ.

- \**Ocyropa ceratophthalma* (Pallas).  
*Uca* (= *Gelasimus*) *tetragonon* (Herbst).  
*Ceratoplax* sp. ○

## Tribe OXYSTOMA.

## Family CALAPPIDÆ.

- \**Calappa hepatica* (L.).

## Family LEUCOSIIDÆ.

- Cryptocnemus Haddoni*, n. sp.  
 \**Oreophorus frontalis*, Miers.  
 \**Myra fugax* (Fabr.).  
 \*— *australis*, Hasw. (?).  
 \**Leucosia longifrons*, var. *pulcherrima*, Miers.  
 \*— *Haswelli*, Miers.  
*Pseudophilyra tridentata*, Miers.  
*Arcania gracilipes*, Bell (?).

## Family DORIPPIDÆ (?).

- \**Palicus Jukesii* (White).  
 — *Whitei* (Miers).  
 — *serripes* (Alcock & Anderson).

## Tribe OXYRHYNCHA.

## Family MAIIDÆ.

- \**Achæus affinis*, Miers.  
 \**Paratymolus sexspinosus*, Miers.  
 \**Oncinopus aranea*, De Haan.  
 \**Xenocarcinus tuberculatus*, White.  
 \**Huenia proteus*, De Haan.  
 \**Menæthius monoceros*, Latr.  
*Hyastenus spinosus*, A. M.-E.  
 \*— *oryx*, A. M.-E.  
 \*— *convexus*, Miers.  
 — *verrucosipes* (Adams & White).  
 — *Brockii*, De Man.  
 \**Naxia serpulifera* (Guér.).  
 \*— *taurus*, Pocock.  
*Tylocarcinus styx* (Herbst).  
 \**Paramithrax (Chlorinooides) Coppingeri*, Hasw.  
 \*— (—) *aculeatus* (M.-E.).  
 \**Schizophrys aspera* (M.-E.).  
*Cyclax suborbicularis* (Stimpson).  
 \**Pseudomicippa varians*, Miers.  
 \**Micippa philyra* (Herbst).  
 \**Tiarinia angusta*, Dana.

## Family PARTHENOPIDÆ.

[var. ?]

- \**Lambrus (Aulacolambrus) hoplonotus*, Ad. & Wh.,  
 \*— (*Parthenolambrus*) *calappoides*, Ad. & Wh.  
 — (—) *confragosus*, n. sp.

## Incertæ sedis.

## Family HAPALOCARCINIDÆ (nom. nov.).

- Hapalocarcinus marsupialis*, Stimpson.

In the above list I have marked with an asterisk those species which have been already recorded from the North or North-east of Australia. Of the species not so recorded the majority are known to have a wide distribution within the Indo-Pacific region, and the few cases where the range of a species is considerably extended (e. g., *Palicus Whitei*) merely help to emphasize the uniformity of the crustacean fauna, whose range is coterminous with that of the coral-reefs over this extensive area.

## CARPILIUS CONVEXUS (Forsk.).

*Carpilius convexus*, H. Milne-Edwards, Hist. Nat. Crust. i. p. 382, pl. xvi. figs. 9-10; Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 80 (1898).

Three females and two males. One labelled "Found within hollow in *Tubipora*."

*Locality*. "Mer."

## CARPILODES sp.

A number of very small specimens belonging to this genus do not agree satisfactorily with any of the described species, but in the absence of a larger series for comparison I do not venture to describe them as new. They are identical with certain small specimens in the British Museum determined as *C. rugatus*, Latr., but differ from larger specimens of that species and from the figure given by A. Milne-Edwards (N. Arch. Mus. Paris, i. pl. xii. figs. 3, 3 a-b) in the fact that the lobulations on the surface of the carapace, and especially on the branchial regions, are more numerous and do not have the regularly transverse direction so marked in *C. rugatus*.

The *C. cariosus* of Alcock (Journ. Asiatic Soc. Bengal, lxvii. (2) 1898, p. 86, and Illustr. Zool. 'Investigator,' Crust. pl. xxxvi. fig. 7, 1899) \* resembles our specimens rather closely; but in that species the carapace is not quite so broad, the antero-lateral borders less convex, and the lobules on the lateral regions of the carapace are arranged in a slightly different manner.

*Locality*. "Murray Island, 15-30 fms."

## LIOMERA CINCTIMANA (White).

*Carpilius cinctimanus*, White, in Jukes's Voy. 'Fly,' ii. Appendix, p. 336, pl. ii. fig. 3 (1847); Adams & White, Voy. 'Samarang,' Crust. p. 37, pl. vii. fig. 4.

*Liomera lata*, Dana, U.S. Expl. Exp., Crust. i. p. 161, pl. vii. figs. 6 a-d.

*L. cinctimana*, Dana, op. cit. p. 161.

*L. lata* and *L. cinctimana*, A. Milne-Edwards, N. Arch. Mus. Paris, i. pp. 219-220 (1865).

*L. cinctimana*, A. Milne-Edwards, N. Arch. Mus. Paris, ix. p. 176, pl. v. fig. 4 (1873).

*Carpilodes cinctimanus*, Miers, Ann. & Mag. Nat. Hist. (5) v. p. 234 (1880); Henderson, Tr. Linn. Soc., (2) Zool. v. p. 354 (1893).

*L. cinctimana*, Ortmann, Zool. Jahrb. Syst. vii. p. 450 (1893); Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 88 (1898).

Two male and two female specimens.

*Locality*. "Murray Island."

*Distribution*. Zanzibar to Tahiti.

The synonymy of this species and of the genus of which it is the type give striking evidence of the intangible nature of the characters on which we are forced to rely in the classification of the Xanthoid crabs. As defined by Dana, *Liomera* is stated to resemble *Carpilius* in the disposition of the antennæ (that is to say, the basal antennal joint enters into the inner orbital hiatus), and the genus is separated from *Carpilodes* only by the fact that the fingers are said to be sharp-pointed instead of spoon-shaped at the tip.

\* Cf. also Nobili, Ann. Mus. Genova, (2) xx. p. 256 (1899).

A. Milne-Edwards in his monograph of the Cancridæ (*l. c.* 1865) abandoned the use of the character drawn from the shape of the finger-tips as a generic distinction, but he retained the genus *Liomera*, placing it in the group of genera having the basal antennal joint "s'unissant seulement au front par son angle interne," and separating it thus from *Carpilodes* by a character in direct contradiction to the original definition of the genus. Miers in 1880 (*l. c.*) referred our species to *Carpilodes*, accepting that genus in Milne-Edwards's sense as having the basal joint of the antenna "produced along the exterior margin of the infero-lateral frontal process so as to enter partly within the interior orbital hiatus" (Chall. Rep., Brachyura, p. 133, 1886). Although thus deprived of its type species, the genus *Liomera* was retained by Miers, who defines it (Rep. Voy. 'Alert,' Crust. p. 528) very much as Milne-Edwards had done, and refers to it certain species which he later included (Chall. Rep. p. 125) in the genus *Xantho*. Ortmann and Alcock return to Milne-Edwards's position, including this species in *Liomera* and defining it as having the basal antennal joint not entering the orbital hiatus, and the first-named author gives a figure of *L. cinctimana* to illustrate this very point. It will thus be seen that of the authors who have examined this species Dana and Miers regard the basal antennal joint as entering the inner orbital hiatus, while Milne-Edwards, Ortmann, and Alcock state explicitly that it does not. As a matter of fact, *Liomera* occupies in this respect an intermediate position between two extremes, which are connected by a continuous series of gradations. On the one hand, we have forms where the basal joint lies nearly longitudinally and meets the posterior process of the front at its tip, so that the short line of junction between the two is transverse to the axis of the joint; on the other hand, we may have the basal joint lying very obliquely to the axis of the body, meeting the frontal process with its inner edge, so that the prolonged line of junction is approximately parallel to the axis of the joint, which thus lies more or less completely in the hiatus between the frontal process and the lower wall of the orbit. In the present species, however, the short trapezoidal basal joint meets the frontal process at its tip, but the short line of junction between the two is obliquely placed with reference to the long axis of the joint, so that a small portion of the latter may be regarded as lying in the orbital hiatus between the frontal process and the suborbital wall. Moreover, some individual variation in this respect is observed when a series of specimens is examined, and, if we may judge by the analogous case of *Actæa calculosa* referred to below, it would seem that this character is liable to change with the growth of the individual.

*ATERGATIS FLORIDUS* (L.).

*Atergatis floridus*, Alcock, Journ. Asiatic Soc. Bengal, lxxvii. (2) p. 98 (1898).

Two small specimens of this widely distributed and common Indo-Pacific species. The carapace of the larger is 10 mm. long and 16 mm. broad, the relative breadth being somewhat greater than in larger specimens.

*Locality*. "Murray Island, reef."

**LOPHIACTÆA GRANULOSA (Rüpp.).**

*Cancer limbatus*, H. Milne-Edwards, Hist. Nat. Crust. i. p. 377, pl. xvi. figs. 1-3.

*Lophactæa granulosa*, A. Milne-Edwards, N. Arch. Mus. Paris, i. p. 247; Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 101 (1898).

A female specimen.

*Locality.* "Torres Straits."

**LOPHOZOZYMUS OCTODENTATUS (Milne-Edwards).**

*Xantho octodentatus*, H. Milne-Edwards, Hist. Nat. Crust. i. p. 398.

*Lophozozymus octodentatus*, Haswell, Cat. Austr. Crust. p. 58.

*L. epheliticus* (L.), Miers, Crust. Voy. 'Alert,' p. 207; De Man, Zool. Jahrb. Syst. viii. p. 518.

*L. octodentatus*, Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 106 (1898).

Three male and three female specimens. The largest, a male, has the carapace 75 mm. broad, and in it, as in the other smaller specimens of both sexes, the chelæ are about equal in size. The difference between the sexes in the prominence of the last two pairs of antero-lateral teeth noted by De Man (*l. c.* p. 519) does not hold good for our specimens.

*Locality.* "Fringing reef, Mabuiag."

**LOPHOZOZYMUS DODONE (Herbst).**

*Lophozozymus dodone* (Hbst.), De Man, Arch. Naturg. liii. (1) p. 270, pl. x. figs. 2, 2 a (1887); Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 108 (1898).

Two female specimens, about 13 mm. broad, agreeing perfectly with the figures and short description given by De Man. The grooves on the outer and inner surfaces of the dactylus of the chelipeds are very broad, and the upper margin between them is reduced to a thin sharp crest. De Man notes that these grooves are deeper in young individuals.

*Locality.* "Channels between reefs, Mer."

*Distribution.* Mozambique to Tahiti.

**XANTHO (LEPTODIUS) EXARATUS (Milne-Edwards).**

*Chlorodius exaratus*, H. Milne-Edwards, Hist. Nat. Crust. i. p. 402.

*Leptodius exaratus*, A. Milne-Edwards, N. Arch. Mus. Paris, ix. p. 222 (1873); De Man, Arch. Naturg. lii. (1) p. 285 (1887).

*Xantho (Leptodius) exaratus*, Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 118 (1898).

A single small female specimen of this common and variable species. It appears to differ from the typical form, as described by the authors quoted above, only in the fact that the wrist and hand of the chelipeds are rugose above and the outer face of the hand is granulated.

*Locality.* "Cockburn group (N. Queensland), shore."

## ETISUS LEVIMANUS, Rand.

*Etisus levimanus*, Rand., Dana, U.S. Expl. Exp., Crust. i. p. 185, pl. x. fig. 1; Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 131 (1898).

A single small specimen (17.5 mm. long) agreeing in general shape and proportions of carapace with the still smaller specimens figured by Dana (*l. c.* fig. 1, *f*), the breadth-ratio of the carapace being the same (1.46) as that given by him. In full-grown specimens the carapace is much more transverse, the breadth-ratio being about 1.6.

*Locality.* "Fringing reef, Mabuiag."

## ETISODES FRONTALIS, Dana.

*Etisodes frontalis*, Dana, U.S. Expl. Exp., Crust. i. p. 187, pl. ix. fig. 3; De Man, Notes Leyden Mus. xii. p. 8, pl. 1. fig. 2.

Our two specimens (about 11.5 mm. long by 17.25 mm. broad) agree more closely with De Man's figure than with Dana's, which is taken from a very small specimen only 8 mm. broad. The slight emargination of the frontal lobes is even less marked than in De Man's figure, these lobes being nearly transversely truncate. The posterior teeth of the antero-lateral margin are rather less spiniform, and some other slight differences are to be gathered from De Man's detailed description.

*Locality.* "Fringing reef, Mabuiag."

## ETISODES ELECTRA (Herbst).

*Etisodes sculptilis*, Heller, SB. Ak. Wien, xliii. p. 333 (1861); A. Milne-Edwards, N. Arch. Mus. Paris, ix. p. 236, pl. ix. fig. 2 (1873).

*E. electra* (Hbst.), De Man, Arch. Naturg. liii. (1) p. 290 (1887).

Two specimens, agreeing well with Heller's description and Milne-Edwards's figure. The larger, a female, measures 7 mm. in length by 10 mm. in breadth (breadth-ratio 1.42), and is thus somewhat broader than is indicated by either of the authors named, whose measurements give the breadth-ratio as 1.36 and 1.38 respectively. The smaller specimen is a male 4 mm. long by 5.25 mm. broad, giving a ratio of about 1.31.

*Locality.* "Murray Island, reef."

## ACTÆA RÜPPELLII, Krauss.

*Actæa Rüppellii* (Kr.), De Man, Zool. Jahrb. Syst. viii. p. 499 (1895); Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 144 (1898).

Our specimens agree in most points with the description of this species as given by De Man (*l. c.* and earlier papers there referred to). They show some variation in the hairiness of the body and in the prominence of the regional divisions of the carapace. One specimen, considerably larger than the others, differs from them in the greater length of the hairs on the carapace and in the scantiness of the short down which in the other specimens covers the carapace below the long hairs. In this specimen the fingertips are slightly excavate. All our specimens can be matched from the series referred



to *A. Rüppellii* in the British Museum collections, but in none of the latter are the hairs quite so long as in our largest individual.

*Localities.* "Murray Island"; "Thursday Island, fringing reef and shore"; "Albany Passage, 10 fath."

*ACTÆA CALCULOSA* (Milne-Edwards).

*Cancer calculosus*, H. Milne-Edwards, Hist. Nat. Crust. i. p. 378 (1834).

*Actæa calculosa*, A. Milne-Edwards, N. Arch. Mus. Paris, i. p. 276, pl. xviii. fig. 3 (1865); Haswell, Cat. Austr. Crust. p. 45 (1882).

*Euxanthus tuberculosus*, Miers, Crust. 'Alert,' p. 205, p. xix. fig. A (1884).

*Actæa calculosa*, Henderson, Tr. Linn. Soc. London, (2) Zool. v. p. 356 (1893); Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 152 (1898).

Five specimens of this species are in the collection. Prof. E. L. Bouvier has very kindly taken the trouble to compare one of our specimens, sent to him for the purpose, with the original type specimen of H. Milne-Edwards's *Cancer calculosus* in the Paris Museum. He writes as follows:—

"J'ai comparé minutieusement votre Crabe avec le type d'*Actæa calculosa*, Edw. Il appartient évidemment à la même espèce. Les tubercules du test y sont beaucoup plus saillants, mais ils sont partout disposés dans le même ordre et sont entourés aussi d'une auréole périphérique de ponctuations. . . . je vous le répète, on ne saurait douter de l'identification."

The identification of our specimens being vouched for on such excellent authority, it may be useful to give in some detail their characters as compared with *Actæa granulata* (Aud.), since it appears that recent writers have not always successfully distinguished the two species.

The breadth-ratio of the carapace varies from 1.33 to 1.4 without apparent relation to the actual size. The three posterior lobes of the antero-lateral margin are prominent and well-defined, and in front of these the first lobe is represented by a single tubercle. In *Actæa granulata* \* the lobes are low, rounded, and indistinctly separated. The regions of the carapace are much more distinct in *A. calculosa*, being separated by rather deep grooves, which are in part smooth and free from granules. There is a marked and generally smooth groove parallel to the hinder margin of the carapace and separated from it by two or, in one case, three rows of granules. The posterior margin is defined at each end by a small spiniform tubercle which is not distinct in *A. granulata*. The cardiac area is of a rather different shape from that shown in the figure given by A. Milne-Edwards, being produced and much narrowed anteriorly. The tubercles on the surface of the carapace are rounded, smooth, and surrounded each by radiating punctations. On the posterior part of the carapace in some specimens they become depressed and confluent. In *A. granulata* the tubercles are more pointed and the radiating

\* I have used for comparison two specimens of *A. granulata* from Japan in the Museum of University College. These differ slightly from Savigny's figure (Descr. de l'Égypte, Crust. pl. vi. fig. 2) in the rougher appearance of the carapace, but they seem to agree in all essential points with this as well as with the descriptions of later writers.

punctations mark off more or less prominent accessory tubercles which surround the base of each large tubercle. The frontal lobes in *A. calculosa* are smooth or indistinctly granulated on the edge, while in *A. granulata* they are edged with pointed granules. In *A. calculosa* the outer surface of the hands bears smooth, bluntly conical tubercles arranged in longitudinal rows; in *A. granulata* the tubercles are lower, surrounded by prominent and pointed accessory tubercles, and the arrangement in rows is less regular. The walking-legs are covered with tubercles rounded at the tip, smooth, and larger in size than in *A. granulata*, where they are low, pointed, and more numerous. The merus joint of the last pair of legs is strongly serrate above, the serrations increasing in height towards the distal end, and its posterior face is nearly smooth. In *A. granulata* the serrations of the upper edge are small and irregular, and the posterior surface is covered with granulations. The sternum and abdomen, especially in the male, are smooth, with scattered punctations, while in *A. granulata* the same regions are usually much granulated, at least posteriorly.

In his report on the Crustacea collected by H.M.S. 'Alert,' Mr. Miers has described and figured, under the name of *Euxanthus tuberculosus*, a species which I believe, after examination of his type specimens, to be identical with the present. Mr. Miers writes, "As the basal antennal joint enters well within the inner orbital hiatus, this species must, I think, be referred to the genus *Euxanthus*." In his specific description the account of the basal antennal joint is qualified by the words "in the adult," and certainly the difference in this respect between the largest and the smallest of the specimens he was describing is conspicuous enough to have suggested a doubt as to the validity of a generic distinction resting on this point alone. As a matter of fact it is easy to find specimens both of the present species and of *A. granulata* in which the basal antennal joint enters quite as far into the orbital hiatus as in any but the largest of Miers's specimens\*. The individual which he figures, and from which his description is mainly drawn, is a large male, 23 mm. in length. The carapace is rather wider than in smaller specimens, the breadth-ratio being about 1.43, and the tuberculation of the carapace is very strongly developed. The smaller specimens associated with this by Mr. Miers, and obtained by the 'Alert' in the vicinity of Torres Straits, are all but identical with the specimens in the present collection from the same locality. Mr. Miers further states that the smaller specimens "have much the aspect of certain *Actææ*, e. g., *A. granulata* (Aud.) and *A. carcharias*, White; from both of which species they may be distinguished upon the most superficial examination by the smoothness of the sternum and post-abdomen." In spite of the emphasis of the last sentence, I find in the British Museum collections specimens determined by Mr. Miers as *A. granulata* (among others the one referred to in his 'Challenger' Report, p. 120) which resemble in every respect the smaller types of his "*Euxanthus tuberculosus*." The few specimens referred to *A. calculosa* in the British Museum collection are rather different in appearance from our Torres Straits specimens,

\* Paulson (whose work Mr. Miers had not seen) had already established a new genus *Euxanthodes* for the reception of *Actæa granulata* on account of the structure of its antennal region, which he figures ('Crustacea of the Red Sea' (Russian), Kiev, 1875, p. 33, pl. vi. figs. 3 & 3 a).

the tubercles on the carapace being very much depressed, confluent, and smooth. I believe, however, that they must be referred to the same species.

*Localities.* "Thursday Island"; "S. of Orman's reef, 5-7 fath."; "Channels between reefs, Mabuiag"; "Channels between reefs, Mer and Dara" (5 specimens).

*ACTÆA GRANULATA*, var. *CARCHARIAS* (White).

*Actæa carcharias*, White, Proc. Zool. Soc. London, 1847, p. 224; A. Milne-Edwards, N. Arch. Mus. Paris, i. p. 276 (1865).

A single female specimen, perhaps sterile, the abdomen appearing unusually narrow. It agrees perfectly with White's type specimen in the British Museum, save that the under surface is rather smoother. I have no doubt that Miers is right in regarding this as merely a variety of *A. granulata* (Chall. Rep., Brachyura, p. 122). The Japanese specimens of *A. granulata* referred to above show a tendency towards this variety in the rougher aspect of the carapace as compared with Savigny's figure.

*Locality.* "S. of Orman's reef."

*Distribution.* Swan River, W. Australia (*White*).

*ACTÆA PERONII*, var. *SQUAMOSA*, Henderson (?).

*Actæa Peronii*, var. *squamosa*, Henderson, Tr. Linn. Soc. London, (2) Zool. v. p. 357.

A male specimen, 10 mm. in length and 14 mm. in breadth. It differs much in appearance from the few specimens of *A. Peronii* (all of smaller size) available for comparison, but it agrees closely with the short description given by Prof. Henderson of his var. *squamosa*. The tubercles of the antero-lateral margin are replaced by sharp spines, of which there are five on each side behind the external orbital tooth. In the typical *A. Peronii* there are only four tubercles on the antero-lateral margin.

*Locality.* "Torres Straits."

*Distribution.* India (*Henderson*).

*ACTÆA HYSTRIX*, Miers.

*Actæa hystrix*, Miers, Rep. 'Challenger' Brachyura, p. 121, pl. xi. fig. 3.

Four female specimens having the following dimensions:—

Length.	Breadth.	Breadth-ratio.
4.5 mm.	5.5 mm.	1.22
5.0 "	6.5 "	1.3
5.5 "	7.5 "	1.36
7.0 "	10.0 "	1.43

The measurements given by Miers are:—

6.0 mm.	8.0 mm.	1.33
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Our smaller specimens agree very closely with the single type specimen. The measurements given above show a regular increase in the relative breadth of the carapace with increasing age. In the largest specimen the antero-lateral borders are more curved, the front is narrower, and the carapace departs from the hexagonal outline which it presents in the smaller specimens as in Miers's figure. The surface of the carapace is

more closely granulated than is shown in the figure, the granules being of different sizes, smooth and rounded on the posterior part of the carapace, and becoming spiniform in front and at the sides. The spinules on the hand are more thickly set and those on the legs are longer than in Miers's figure.

*Locality.* "Torres Straits."

With the above I may associate provisionally two specimens which I cannot identify with certainty. The smaller (length 5 mm., breadth 7 mm.) resembles somewhat closely the specimens of *A. hystrix*, differing chiefly in the blunter armature of the body and legs. The granules of the carapace are less closely packed and are rounded, not spiniform in any part; on the chelipeds they are conical, and on the legs they have the form of bluntly truncated spines. In the larger specimen (length 9 mm., breadth 12.5 mm.) the granules of the carapace are still more depressed and smoother, and the tubercles on the limbs are less prominent. These specimens differ from *Actaea nodulosa*, Ad. & White, in the much narrower carapace, the breadth-ratio of which is about 1.4 as compared with 1.56 in the last-named species. The *Chlorodius fragifer* of Adams and White, referred to *Acteodes* by Miers, is apparently a somewhat similar species, but the carapace is still narrower (breadth-ratio 1.19) than in our specimens and the lobes of the antero-lateral margins are indistinct and spined. I think it not improbable that a larger series would connect these specimens with *A. hystrix* and possibly with some of the older species.

#### XANTHODES LAMARCKII (Milne-Edwards).

*Xantho Lamarckii*, H. Milne-Edwards, Hist. Nat. Crust. i. p. 391.

*Xanthodes granosomanus*, Dana, U.S. Expl. Exp., Crust. i. p. 175, pl. viii. figs 10 a-c.

*Xanthodes Lamarckii*, A. Milne-Edwards, N. Arch. Mus. Paris, ix. p. 200, pl. vii. fig. 3; De Man, Arch. Naturg. liii. (1) p. 263; Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 157.

A male specimen, 10.5 mm. in length by 15.5 mm. in breadth. The carapace is relatively narrower than in other specimens of this species in the Museum of University College.

*Locality.* "Torres Straits."

#### CHLORODIUS NIGER (Forsk.).

*Chlorodius niger*, Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 160 (1898).

Eleven specimens, four males and seven females, showing some variation in the relative prominence of the lobules on the carapace and in the acuteness of the antero-lateral teeth. Some of the specimens show very distinctly the spinulation of the upper edge of the merus of the ambulatory legs which De Man finds in the type specimens (Zool. Jahrb. Syst. viii. p. 520).

*Localities.* "Fringing reef and shore, Thursday Island"; "Reef, Wyer."

#### PHYMODIUS UNGULATUS (Milne-Edwards).

*Chlorodius unguatus*, H. Milne-Edwards, Hist. Nat. Crust. i. p. 400, pl. xvi. figs. 5-8; Dana, U.S. Expl. Exp., Crust. i. p. 205, pl. xi. figs. 8 a-b.

*Phymodius unguatus*, A. Milne-Edwards, N. Arch. Mus. Paris, ix. p. 218; Miers, Rep. 'Chall.'

Brachyura, p. 139; Ortmann, Zool. Jahrb. Syst. vii. p. 464; De Man, Zool. Jahrb. Syst. vii. p. 524; Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 162 (1898).

Three female specimens.

Ortmann (*l. c.*) unites Dana's *P. monticulosus* with this species, but Alcock (*l. c.*) retains it as distinct. The characters chosen by Alcock as diagnostic do not seem quite consistent with the descriptions of former writers and do not enable me to discriminate between the species in a series of eleven specimens from Samoa and Japan in our Museum. The three specimens in Prof. Haddon's collection agree with the original description of *P. monticulosus* in having the chelipeds "armed with very small pointed tubercles"; but as these tubercles beset the whole outer surface of the hand, the specimens would by Alcock's definition be referred to *P. ungulatus*. As regards the sculpture of the carapace, I can observe no constant difference between these and specimens from Samoa, in which the chelipeds are distinctly of Alcock's *monticulosus*-type.

*Locality.* "Torres Straits."

PHYMODIUS SCULPTUS (A. Milne-Edwards).

*Chlorodius sculptus*, A. Milne-Edwards, N. Arch. Mus. Paris, ix. 1873, p. 217, pl. viii. fig. 4.  
*Phymodius sculptus*, Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 164 (1898).

Two male specimens, the larger measuring 10.5 mm. in length by 16.5 mm. in breadth. They agree very closely with the figures and descriptions quoted above.

*Locality.* "Torres Straits."

*Distribution.* Red Sea to Samoa.

CHLORODOPSIS MELANODACTYLUS, A. Milne-Edwards.

*Chlorodopsis melanodactylus*, A. Milne-Edwards, N. Arch. Mus. Paris, ix. p. 229, pl. viii. fig. 7 (1873).

Two male specimens, agreeing well with Milne-Edwards's description and figures, save that the hands, and especially the fingers, are rather longer and the tubercles on the fingers are more numerous. The series of specimens in the British Museum shows some variation in these respects, but in none are the hands so elongated as in our specimens.

*Locality.* "Murray Island, reef."

*Distribution.* New Caledonia.

CHLORODOPSIS SPINIPES (Heller).

*Pilodius spinipes*, Heller, SB. Ak. Wien, xliii. p. 340, pl. ii. fig. 22 (1861).

*Chlorodopsis spinipes*, A. Milne-Edwards, N. Arch. Mus. Paris, ix. p. 230, pl. viii. fig. 6 (1873);  
De Man, Arch. Naturg. liii. (1) p. 282 (1887); Alcock, Journ. As. Soc. Bengal, lxvii. (2) p. 169 (1898).

A male and a female specimen are in the collection. De Man has given a redescription of the antero-lateral teeth, finding the descriptions of Heller and Milne-Edwards obscure. Heller's account, however, is quite applicable at least to the larger of the two specimens before me. He mentions (1) two teeth at the outer end of the upper and lower margins of the orbit respectively, enclosing between them a deep notch, the external orbital hiatus; (2) the three spiniform teeth of the antero-lateral margin;



(3) in front of the first of these latter, "zwei ähnlich gestaltete Zähne über und unter dem Rande unmittelbar hinter der Augenhöhle." The figure which he gives shows clearly that the upper tooth of the last-mentioned pair (3) is simply the most anterior of a row of spiniform tubercles running parallel to the antero-lateral margin on the upper surface of the carapace. In the figure this tooth is acute and much larger than the others; in our specimens it is much less prominent and less acute, but still considerably larger than the succeeding tubercles. It is directly over the "sub-hepatic" tubercle or tooth, which is evidently the second tooth of (3), and, looking at the carapace from the front or the side, the two are naturally associated as in Heller's description. Milne-Edwards's account is briefer, and does not mention the double extra-orbital spine. The row of tubercles parallel to the antero-lateral margin is described, and *four* antero-lateral teeth are counted, that which we have called "sub-hepatic" being reckoned as the first. The figure given by Milne-Edwards resembles very closely the larger of our two specimens. The smaller specimen differs in the fact that the sub-hepatic tooth (the first antero-lateral of Milne-Edwards) is nearly obsolete, being represented only by a minute granule. This seems to have been the case with the single specimen examined by De Man, who was thus unable to reconcile the apparently conflicting statements of Heller and Milne-Edwards.

*Locality.* "Murray Island, reef."

*Distribution.* Red Sea to New Caledonia.

#### CYMO ANDREOSSYI (Aud.).

*Cymo Andreossyi*, Dana, U.S. Expl. Exp., Crust. i. p. 225, pl. xiii. figs. 2 *a-b*; Alcock, Journ. Asiatic Soc. Bengal, lxxvii. (2) p. 173 (1898).

One male specimen.

*Locality.* "Murray Island, reef."

*Distribution.* Red Sea to Tahiti.

#### CYMO MELANODACTYLUS, De Haan.

*Cymo melanodactylus*, Dana, U.S. Expl. Exp., Crust. i. p. 225, pl. xii. fig. 1; Alcock, Journ. Asiatic Soc. Bengal, lxxvii. (2) p. 174 (1898).

A male specimen.

*Locality.* "Torres Straits."

*Distribution.* Ceylon to Fiji and Japan.

#### OZIUS GUTTATUS (Milne-Edwards).

*Ozius guttatus*, H. Milne-Edwards, Hist. Nat. Crust. i. p. 406; A. Milne-Edwards, N. Arch. Mus. Paris, ix. 1873, p. 239, pl. xi. fig. 1; Miers, Rep. Voy. 'Alert,' Crust. p. 228; De Man, Arch. Naturg. liii. (1) 1887, p. 291; Ortmann, Zool. Jahrb. Syst. vii. 1893, p. 476.

A female specimen, measuring 32 mm. in length by 48.5 mm. in breadth. The frontal teeth are considerably more prominent than in Milne-Edwards's figure.

*Locality.* "Torres Straits."

## PSEUDOZIUS DISPAR, Dana.

*Pseudozius dispar*, Dana, U.S. Expl. Exp., Crust. i. p. 235, pl. xiii. fig. 9.

*Sphærozius dispar*, Stimpson, Proc. Acad. Philad. 1858 (1859), p. 35.

*Pilumnus nitidus*, A. Milne-Edwards, N. Arch. Mus. Paris, ix. p. 249, pl. x. fig. 2 (1873); De Man, Arch. Naturg. liii. (1) p. 305 (1887).

*Pseudozius dispar*, Ortmann, Zool. Jahrb. Syst. vii. p. 433 (1893).

Two specimens, the larger of which, an ovigerous female, differs somewhat from Milne-Edwards's figure as regards the outline of the carapace. The antero-lateral margin is considerably shorter than the postero-lateral. The greatest width is in the line of the penultimate antero-lateral teeth and well in front of the middle of the length. In the figure the greatest width is at about the middle at the level of the last pair of antero-lateral teeth. The description given by De Man applies accurately, in most points, to our specimen, except as regards the supposed sexual differences. He found the carapace narrower in a male specimen, the breadth-ratio being only 1.25 as against 1.37 in the female; and in the male the outer surface of the large hand was smooth with only a few granules near the proximal end, while in the female the whole surface was covered with granules as in the smaller chela. The latter difference between the sexes was also found by Ortmann. As regards the breadth of the carapace, our specimen is intermediate between the two examined by De Man, the ratio being 1.31. The measurements given by Milne-Edwards have evidently suffered from some misprint, but measurements taken from his figure of an adult male give a breadth-ratio of 1.41, considerably greater than that given by De Man for the female. As regards the granulation of the large cheliped, our specimen presents exactly the condition figured by Milne-Edwards and described by De Man as characterizing the male, the outer surface being smooth with a few granules grouped near the proximal end. Our second specimen, a minute and immature female, has more numerous granules on the large chela, which, however, is still much smoother than the small chela. In both cases the right cheliped is the larger.

De Man suggested the possible identity of Milne-Edwards's species with the *Pseudozius dispar* of Dana, and this suggestion has been accepted by Ortmann. Dana's figure is very similar to our specimens, and his description, though lacking in detail, applies perfectly, save in the one point that the finger of the large hand is said to be "smooth and round, and not channeled." In our specimens, as in De Man's account, the fingers of both hands are grooved. Dana gives the breadth-ratio of the carapace as 1.21, rather less than the narrowest individual examined by De Man. The table of generic characters given by Dana (*l. c.* p. 229) states that the carapace in this genus is "fere planus"; but that this does not apply to the species in question may be gathered from the fact that Stimpson refers it to his genus *Sphærozius*, which is defined as having the body subglobose. Stimpson, however, gives as a generic character "Margo frontalis et supra-orbitalis continuæ nec sinu nec incisura separatae." In our specimens, as in De Man's description, the frontal lobes are separated from the supraorbital margin by a slight but

distinct notch. Ortmann retains the species in the original genus "weil die Antero-lateralzähne undeutlich sind."

*Locality.* "Murray Island, reef."

*Distribution.* Sulu Sea to New Caledonia.

PILUMNUS CURSOR, A. Milne-Edwards.

*Pilumnus cursor*, A. Milne-Edwards, N. Arch. Mus. ix. p. 244, pl. ix. fig. 4 (1873); Miers, Rep. Voy. 'Alert,' Crust. p. 223; De Man, Arch. Naturg. liii. (1) p. 299 (1887); Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 195 (1898).

Three of our four specimens agree pretty closely with the descriptions of the authors cited above. They show some variation in the hairiness of the carapace: in two male specimens the body is covered with a scanty short pubescence, with which, near the front margin, a few longer hairs are intermixed; in a female individual, however, the long hairs are much more numerous and extend further back on the carapace. The hands are ornamented with rows of tubercles, not quite so thickly set as in Milne-Edwards's figure, interspersed with short hairs. The legs are a little longer than in the figure, and the merus of the first three pairs has a few spinules on its upper margin.

One specimen, a male infested by a Rhizocephalan parasite, differs in certain points from the others, but cannot, I think, be specifically separated from them. The outer surface of the larger (right) chela is here for the most part quite smooth, with only a few granules and hairs near the proximal end and along the upper margin, the groove on the dactylus is represented by a line of punctations, the sub-hepatic tubercle is wanting, and the ambulatory legs are even longer than in the more typical specimens. In the armature of the cheliped this specimen resembles *P. Andersoni*, De Man (Journ. Linn. Soc., Zool. xvii. p. 59, pl. iii. figs. 5, 6), from which, however, it is distinguished by the shape of the carapace, the antero-lateral margins being much shorter and the postero-lateral more nearly parallel than in that species.

*Localities.* "Murray Island, reef"; "Channel between reefs, Mer."

PILUMNUS PULCHER, Miers.

*Pilumnus pulcher*, Miers, Rep. Voy. 'Alert,' Crust. p. 219, pl. xxii. fig. A.

*Actumnus pulcher*, Ortmann, Semon's Forsch. Reise Austr., Crust. p. 52 (1894).

The larger of our two specimens is only 6 mm. long, but it agrees pretty closely with Miers's description and figure and with the much larger type specimens with which I have compared it. The chief difference is the somewhat greater length of the legs; in Miers's specimens the penultimate leg is about as long as the greatest breadth of the carapace, while in our larger specimen the carapace measures 6.5 mm. in breadth, and the corresponding leg nearly 8 mm. in length. Ortmann has referred this species to *Actumnus*, but the characters which he adduces hardly seem to justify its removal to that genus.

*Locality.* "Murray Island."

*PILUMNUS SEMINUDUS*, Miers.

*Pilumnus seminudus*, Miers, Rep. Voy. 'Alert,' Crust. p. 222, pl. xxi. fig. C.

Two female specimens, measuring about 6.25 mm. in length. Though little more than half the size of Miers's type specimen they agree very closely with it. In one individual the antero-lateral teeth are much less prominent than in the type, and the middle tooth of the right side is wanting. In both specimens the pubescence on the front part of the carapace is less developed, and there are a few longer hairs in a transverse row in front of the protogastric region. The species bears a considerable resemblance to the *Pseudozius dispar* referred to above, and perhaps the two should not be generically separated.

*Locality*. "Mabuiag."

*PILUMNUS LANATUS* (Latr. ?), Miers.

*Pilumnus lanatus* (Latr.), Miers, Rep. Voy. 'Alert,' Crust. p. 220, pl. xxi. fig. A.

A number of small and probably immature specimens are all but identical with the 'Alert' specimens described under this name by Mr. Miers. The close pubescence covering the body and limbs ends abruptly on the outer surface of the larger chela along a diagonal line drawn from the base of the dactylus above to the proximal angle below, the rest of the surface being smooth and polished. The antero-lateral teeth are smaller than in Miers's figure, the last tooth in particular being much reduced. A small, but distinct, sub-hepatic tubercle is present, the upper surface of the carapace is slightly uneven in front, and there is a well-marked tubercle on the hepatic region above. The chelæ are rather shorter, the lower finger is not hooked at the tip as in Miers's figure, and I cannot detect the spinules which he describes on the carpus of the ambulatory legs.

*Locality*. "Torres Straits."

*PILUMNUS LONGICORNIS*, Hilgd.

*Pilumnus longicornis*, Hilgendorf, Monatsb. Akad. Berlin, 1878, p. 794, pl. i. figs. 8, 9; var., Miers, Rep. 'Challenger' Brachyura, p. 157; Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 193 (1898).

A male specimen is referred with some doubt to this species. The carapace measures 17 mm. in length and 23 mm. in breadth (exactly the dimensions of Hilgendorf's specimen), is strongly arched in the front part in an antero-posterior direction and slightly so from side to side. The three antero-lateral teeth are very prominent and conical, the second and third with spiniform points curved forwards. The acute sub-hepatic tubercle, though small, is visible from above, causing the antero-lateral margin to appear four-toothed. The external orbital angle is produced into a small triangular tooth. The postero-lateral margin is longer than the antero-lateral, and is slightly concave owing to the prominence of the last pair of antero-lateral teeth. The whole surface of the carapace bears scattered and rather coarse granules, only some of the broad, shallow, inter-regional grooves being smooth. The setæ covering the carapace are rather thick-set and moderately long, springing in pencils of four or five, of which one

is generally much longer than the rest. The front is much deflexed, the inner lobes broadly rounded, the outer small and spiniform. The upper orbital margin has two hardly visible fissures, and is, like the lower margin, only faintly granulated. The internal angle of the lower margin is acutely rounded. The sub-hepatic region bears a few granules near the outer margin besides the sub-hepatic tooth. The merus of the chelipeds has a stout blunt tooth near the distal end of its upper margin. The carpus has a number of granules on its outer surface, which is clothed with long setæ, and there is a sharp tooth at its inner angle. In the hand of the larger cheliped the greatest breadth is about equal to the length of the palm measured in the middle line, and the dactylus is about three-fourths of this length. The whole outer surface of the palm bears longitudinal rows of acute granules, with one or two smaller granules scattered in the rather wide interspaces between the rows. On the upper margin some of the granules become spiniform, and the whole surface bears numerous rather long setæ, which extend with the granulation on to the bases of both fingers. The fingers are slightly furrowed. The merus of the ambulatory legs has the upper edge terminating distally in a spine, behind which there is a notch running down on both faces of the joint as a short groove.

From Hilgendorf's account our specimen differs in the rather more concave postero-lateral margins; in the more prominent sub-hepatic tooth ("nur angedeutet"); in the much less distinct granulation of the orbital margins; and in having the whole outer surface of the hand covered with granules and setæ. The granules on the surface of the carapace also appear to be more numerous. Unfortunately both antennal flagella are wanting in our specimen. The regions of the carapace are not so distinctly marked as in Hilgendorf's figure, but they appear to be similarly disposed. The tooth on the distal end of the merus of the ambulatory legs is not indicated by Hilgendorf.

The 'Challenger' specimen described by Miers, and regarded by him as a variety of this species, differs from the type and agrees with our specimen in the characters of the orbital margin, of the larger cheliped, and of the ambulatory legs. The sub-hepatic tooth, however, is said to be deficient and the chelipeds are nearly equal in size.

*P. Sluiteri* of De Man (Weber, Reise Niederl. O.-Ind. ii. p. 283, pl. i. fig. 2, and (as *P. Forskalii*, M.-E.), Arch. Naturg. liii. (1) p. 295, pl. xii. fig. 1) is a closely allied species, but differs in the less prominent antero-lateral teeth and more granulated carapace, and in the absence of the notch and tooth on the merus of the ambulatory legs. *P. scabriusculus*, Ad. & Wh. (Zool. Voy. 'Samarang,' Crust. p. 44, pl. ix. fig. 5) has the antero-lateral teeth less prominent, wide, and denticulated.

*Locality.* "Fringing reef, Mer, Murray Island."

*Distribution.* E. Africa (Inhambane, *Hilgendorf*), to Tongatabu (*Miers*).

PILUMNUS CRISTIPES, n. sp. (Plate 1. figs. 1-3.)

Carapace closely covered with a short fur, which does not conceal the rather prominent regional areolæ. On removing the fur, a few scattered granules are seen, each bearing a tuft of short hairs. The front part of the carapace is strongly convex in an antero-



posterior direction, while the posterior part is flat. From side to side, in the line of the lateral teeth, the surface is only slightly convex. The strongly deflexed front is divided by a rather deep incision into two rounded lobes, and the outer angles form sharp downwardly directed teeth, not visible from above, separated by a groove from the supra-orbital angle. The upper margin of the orbit is interrupted by two short open fissures, and a third is present on the lower margin just below the external angle. The external angle of the orbit is not very prominent, rounded, and produced backwards for a short distance as a slight ridge above the level of the first antero-lateral tooth. The antero-lateral margin is equal in length to the postero-lateral, and is cut into four thick, bluntly rounded teeth, increasing in length from before backwards, covered with fur interspersed with granules.

The flagellum of the antenna is nearly one fourth the length of the carapace.

The ridges of the palate are distinct but not very prominent, and become obsolete before reaching the front margin of the buccal frame.

The chelipeds are very unequal; the merus is short, trigonous, the upper margin carrying a large rounded tooth separated by a narrow incision from the projecting rounded distal angle; the carpus has on its convex outer face scattered granules, partly arranged in oblique lines and interspersed with fur, and a transverse groove runs parallel to the distal margin; the hand of the larger cheliped (the right) has the palm but little longer than broad, with longitudinal rows of granules nearly hidden by the fur on its outer face; the fingers are stout, about one-half the length of the palm, with blunt rounded teeth on the inner edges; the dactylus has a patch of granules and hairs at its base, and both fingers are slightly grooved. In the smaller hand the granules on the outer face are less regularly arranged in rows.

The ambulatory legs have the merus with a sharp crest on its upper edge, rising gradually with a straight edge towards the distal end, where a narrow notch separates it from the prominent rounded distal tooth. In the first three pairs the anterior and posterior faces of the merus are smooth and nearly free from hair. In the last pair of legs the posterior face of the merus is closely furred. The carpus and propodus of all the legs are considerably expanded and flattened, covered with fur rather longer than that on the carapace, and the carpus has a deep longitudinal groove on the anterior and posterior faces. The dactylus of all the legs is stout and nearly cylindrical. The abdomen (female) has all seven joints free.

The form described above differs from all the species of *Pilumnus* known to me in the crested merus of the ambulatory legs, the feebly developed endostomial ridges, and the blunt teeth of the antero-lateral margin. In the first two of these characters it approaches the *P. dilatipes* of Adams & White (Zool. Voy. 'Samarang,' Crust. p. 44, pl. ix. fig. 4), for which Miers has proposed to constitute a separate genus *Lophopilumnus* (Rep. Chall. Brachyura, p. 148); but in that species the antero-lateral teeth are broad and denticulated and the meral crests are of very different shape and are not divided by a notch near the distal end. In the great convexity of the anterior portion of the carapace the species has some resemblance to an *Actumnus*, in which genus, however, the carapace is not

flattened posteriorly and is usually strongly arched from side to side. Dr. De Man has suggested to me a possible relationship with the genus *Lophoxanthus*. In that genus, however, the carapace is usually depressed and glabrous, and though Miss Rathbun has recently described a species *L. frontalis* (Proc. U.S. Nat. Mus. xvi. 1893, p. 236) forming an exception in both these respects, it does not appear to draw appreciably nearer to the present form. The whole aspect of our species, the shape of the front, and many other small points are so suggestive of *Pilumnus* that it seems best, for the present at any rate, to include it in that genus, though it certainly diverges considerably from the more typical species.

Length of carapace .....	20 mm.	Length of chela .....	18 mm.
Breadth        " .....	28 "	" dactylus .....	8 "
Length of larger cheliped .....	31 "	" last leg .....	30 "

*Locality.* "Fringing reef, Mabuiag."

#### ACTUMNUS SETIFER (De Haan).

*Pilumnus setifer*, De Haan, Faun. Japon., Crust. p. 50, pl. iii. fig. 3.

*Actumnus setifer*, A. Milne-Edwards, N. Arch. Mus. Paris, i. p. 287, pl. xv. figs. 5-5b (1865);

Alcock, Journ. Asiatic Soc. Bengal, lxxvii. (2) p. 202 (1898).

Our four specimens show considerable variation in several points, but must all, I think, be referred to this common and widely distributed species. The smallest specimen is a female, and, although only 6.25 mm. in length, carries eggs. In this individual the lobulation of the carapace is not very pronounced, and the antero-lateral teeth are prominent and tipped with spiniform tubercles. In some of the larger specimens the lobules of the carapace are more prominent, the carapace is more convex, and the antero-lateral teeth are reduced to low, rounded lobes, on which the minute spiniform points are completely hidden by the dense pubescence covering the whole carapace. These differences, as well as slight variations in the relative breadth of the carapace, appear to be independent of age or sex. In a very large male, 17.5 mm. in length, from Sagami Bay, Japan, in the Museum of University College, the antero-lateral spines are very distinct, and the lobulation of the carapace is less pronounced than in a specimen only 7 mm. long in Prof. Haddon's collection.

*Localities.* "Flinders Entrance, near Mer, 20-30 fath."; "S. of Orman's reef, 5-7 fath."

#### TRAPEZIA FERRUGINEA, var. AREOLATA (Dana).

*Trapezia ferruginea areolata*, Ortmann, Zool. Jahrb. Syst. x. p. 206 (with synonymy); Alcock, Journ. Asiatic Soc. Bengal, lxxvii. (2) p. 221 (1898).

One specimen, an ovigerous female about 10 mm. in length, having the lateral teeth of the carapace acute. De Man has pointed out (Arch. Naturg. liii. (1) p. 317) that this juvenile character is occasionally retained in adult individuals, though as a rule these teeth become obtuse (var. *inermis*, A. M.-E., N. Arch. Mus. Paris, ix. p. 259, pl. x. fig. 6).

The reticulations on the carapace of our specimen are rather larger and more symmetrically disposed than in Milne-Edwards's figure.

*Locality.* "Murray Island."

*Distribution.* Ceylon to Tahiti.

TRAPEZIA CYMODOCE (Herbst).

*Trapezia cymodoce*, Ortmann, Zool. Jahrb. Syst. x. p. 203 (with synonymy); Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 219 (1898).

Three specimens are referable to this species as defined by Ortmann. The pubescence on the outer surface of the chela is rather scanty and not conspicuous in dried specimens, and the lower margin of the chela is faintly granular. The carpus of the chelipeds bears internally an acute spiniform tooth; only in one detached cheliped is this tooth blunt (*cf.* De Man, Arch. Naturg. liii. (1) p. 316).

*Locality.* "Murray Island, channels between reefs, 15-20 fath."

TETRALIA GLABERRIMA (Herbst).

*Tetralia glaberrima*, Ortmann, Zool. Jahrb. Syst. x. p. 209 (with synonymy); Alcock, Journ. Asiatic Soc. Bengal, lxvii. (2) p. 223 (1898).

Two specimens, one of which resembles the form named *T. nigrifrons* by Dana (U.S. Expl. Exp., Crust. i. p. 262, pl. xvi. fig. 2). The dark marginal band extends across the whole front edge of the carapace and halfway down the sides.

*Locality.* "Reef, Wyer."

*Distribution.* Red Sea to Marquesas.

LISSOCARCINUS ORBICULARIS, Dana.

*Lissocarcinus orbicularis*, Dana, U.S. Expl. Exp., Crust. i. p. 288, pl. xviii. figs. 1 a-e; A. Milne-Edwards, Arch. Mus. Paris, x. p. 418 (1861); Alcock, Journ. Asiatic Soc. Bengal, lxviii. (2) p. 20 (1899).

Six specimens presenting all the characters of Dana's species, but showing some slight variation in the distinctness of the antero-lateral teeth and in the concavity of the postero-lateral borders and consequent prominence of the lateral angles.

*Locality.* "Murray Island, reef."

*Distribution.* Mauritius to Fiji.

CAPHYRA ROTUNDIFRONS, A. Milne-Edwards.

*Camptonyx rotundifrons*, A. Milne-Edwards, N. Arch. Mus. Paris, v. 1869, p. 156, pl. vii. figs. 11-12.  
*Caphyra rotundifrons*, A. Milne-Edwards, N. Arch. Mus. Paris, ix. 1873, p. 174.

Two female specimens of this very rare species are in the collection. They agree very exactly with Milne-Edwards's description and figure, the only observable differences being that the frontal lobes are slightly more prominent in the middle and are separated from the supra-orbital margin on either side by a shallow notch; the anterior margin of the merus of the chelipeds bears three teeth, and the merus of the second legs has no

spine on its upper border. The carapace of our larger specimen measures 12.25 mm. in length by 15.5 mm. in breadth.

*Locality.* "Torres Straits."

*Distribution.* New Caledonia and Samoa (*Milne-Edwards*).

NEPTUNUS SANGUINOLENTUS (Herbst).

*Lupa sanguinolenta*, Milne-Edwards, Hist. Nat. Crust. i. p. 451, & in Règne Anim., Crust. pl. x. fig. 1.

*Neptunus sanguinolentus*, A. Milne-Edwards, Arch. Mus. Paris, x. p. 319 (1861); Alcock, Journ.

Asiatic Soc. Bengal, lxxviii. (2) p. 32 (1899).

Two small and imperfect specimens, the larger only 15 mm. in length, belong apparently to this common species, though the characteristic "ocelli" are very faintly indicated on the carapace.

*Locality.* "Torres Straits."

NEPTUNUS PELAGICUS (L.).

*Lupa pelagica*, Milne-Edwards, Hist. Nat. Crust. i. p. 450.

*Neptunus pelagicus*, De Haan, Faun. Jap., Crust. p. 37, pls. ix., x.; A. Milne-Edwards, Arch. Mus.

Paris, x. p. 320 (1861); Alcock, Journ. Asiatic Soc. Bengal, lxxviii. (2) p. 34 (1899).

Two specimens, about 22 mm. in length, are no doubt referable to this common species, though they differ in some slight details from large specimens. In general shape and in the character of the antero-lateral teeth they approach the *N. armatus* of A. Milne-Edwards (*l. c.* p. 322, pl. xxxiii. fig. 2), but the external frontal teeth are not in our specimens obtuse, and the spine on the median supra-orbital lobe is indicated, though not so large as in full-grown specimens of *N. pelagicus*. As Ortmann has pointed out (*Zool. Jahrb. Syst.* viii. p. 75), it is very doubtful whether *N. armatus* is a distinct species. Milne-Edwards says of it: "Cette espèce est de tous les *Neptunus* connus la plus élargie"; while Miers, referring to the very specimen described by Milne-Edwards, states that "the carapace is relatively somewhat narrower . . . than in *N. pelagicus* of about the same size" (*Rep. Voy. 'Alert,' Crust.* p. 229).

*Locality.* "Fringing reef, Mabuiag."

NEPTUNUS (ACHELOUS) GRANULATUS (Milne-Edwards).

*Lupa granulata*, Milne-Edwards, Hist. Nat. Crust. i. p. 454.

*Amphitrite gladiator*, De Haan, Faun. Jap., Crust. p. 65, pl. xviii. fig. 1 (*not* pl. i. fig. 5).

*Achelous granulatus*, A. Milne-Edwards, Arch. Mus. Paris, x. p. 344 (1861).

*Neptunus (Achelous) granulatus*, Alcock, Journ. Asiatic Soc. Bengal, lxxviii. (2) p. 45 (1899).

A female specimen, 12 mm. long, agrees well with De Haan's figure, except that, as in all young specimens, the lateral spines are more elongated.

*Locality.* "Murray Island."

NEPTUNUS (ACHELOUS) GRANULATUS, var. UNISPINOSUS, Miers.

*Achelous granulatus*, var. *unispinosus*, Miers, *Rep. Voy. 'Alert,' Crust.* p. 230, pl. xxiii. fig. B.

*Neptunus (Achelous) unispinosus*, Miers, *Rep. Voy. 'Challenger,' Brachyura*, p. 180; De Man, *Zool.*

*Jahrb. Syst.* viii. p. 558.

Two males, 7.5 and 11 mm. long respectively, agree with Miers's type specimen in the shape of the frontal lobes and in having only one spine on the posterior edge of the arm. The antero-lateral teeth, however, are not distinctly more spiniform, nor is the last tooth longer than in specimens of *A. granulatus* of similar size. The second spine of the posterior edge of the arm is represented by a slight rudiment, as it is, indeed, in the type specimen. I do not think that the form can be ranked as more than a variety of *A. granulatus*, as it was originally regarded by Miers.

*Localities.* "Sabai Channel"; "Murray Island."

*THALAMITA PRYMNA* (Herbst).

The forms of *Thalamita* in which the front is divided into eight lobes were distributed by A. Milne-Edwards among seven species and reunited by Kossmann into one, while more recent writers have expressed various views intermediate between these two extremes. Alcock has recently affirmed his belief in the correctness of Kossmann's view, while retaining, for the sake of convenience, separate specific names for some of the forms. Ten specimens collected by Prof. Haddon belong to this section of the genus and fall into three groups, not one of which agrees in all points with any of the described species:—

(a) A large male, the carapace of which measures 37 mm. in length by 59 mm. in breadth, agrees best on the whole with the descriptions of the typical *Th. prymna*, but presents certain points of difference. Comparing the frontal lobes with the figure given by De Man (Journ. Linn. Soc., Zool. xxii. pl. iv. fig. 5), the outer or fourth pair are much more strongly arcuate and resemble the figure of *Th. spinimana* (*l. c.* fig. 7); the third pair of frontal lobes are separated by an open fissure from the second or submedian, as in Dana's figure of *Th. crassimana* (U.S. Expl. Exp., Crust. pl. xvii. fig. 9a); the submedian are slightly less prominent than the median lobes, which they distinctly overlap above, an arrangement which, according to A. Milne-Edwards (Arch. Mus. Paris, x. p. 362), "ne se voit jamais chez le *Th. prymna*." De Man's description and figure of *Th. caeruleipes* (Zool. Jahrb. Syst. viii. p. 568, pl. xiv. fig. 12a) fits this specimen well as regards the third and fourth frontal lobes, but the median pair are stated to be wider than the submedian, while in the present instance the reverse is the case. The basal antennal joint carries a row of about four sharp spines besides some smaller granules. Milne-Edwards assigns to it only two or three spines, while Dana figures an irregularly toothed crest. The fourth antero-lateral tooth is very small, and the greatest breadth of the carapace is measured between the third pair of teeth. The cheliped differs from all descriptions of *Th. prymna* in having three spines instead of two on the upper margin of the hand, the additional spine being smaller than the other two and close to the proximal end.

(b) A male specimen, 21 mm. long by 33 mm. broad, has a row of granules on the basal antennal joint and a minute fourth antero-lateral tooth, and would therefore be referred by Milne-Edwards's table (*l. c.* p. 367) to *Th. Stimpsoni*, which De Man regards as a variety of *Th. Danae* (Journ. Linn. Soc., Zool. xxii. p. 78). With De Man's figure of *Th. Danae* (*l. c.* pl. iv. fig. 8) our specimen agrees in the nearly straight anterior edge



of the outer frontal lobes, but it differs in having the other three pairs of lobes separated only by slight notches. The abdomen does not present the peculiar outline figured by De Man (*l. c.* fig. 9), but he has since stated that this character is not constant (Notes Leyden Mus. xv. p. 285). In most other points this individual agrees closely with the above described specimen *a*, lacking, however, the third spine on the upper edge of the hand. A larger female specimen (31 mm. long) agrees with this, except that the fourth antero-lateral tooth is a little larger.

(c) Eight specimens, all of small size, including two ovigerous females of 8 mm. and 7 mm. in length respectively. The outer frontal lobes have a well-curved margin; the third lobes are narrow, rounded, and separated from the second by an open notch; the second or submedian lobes are very broad, about half as broad again as the median pair, which they distinctly overlap; the three inner pairs of lobes reach to about the same level. The fourth antero-lateral tooth is very minute or absent. The ridges of the hand have the same arrangement as in *Th. prymna*, but on the lower half of the outer face the ridges and the intervening spaces are quite smooth. The basal joint of the antenna is markedly shorter than in the other specimens described above.

These small specimens depart more widely from the typical *Th. prymna* than do the other specimens, but I have failed to identify them with any of the described species.

*Localities.* "Flinders Entrance, near Mer, 20-30 fath."; "Channels between reefs, Murray Island, 15-20 fath."

#### THALAMITA ADMETE (Herbst).

*Thalamita admete*, Milne-Edwards, Hist. Nat. Crust. i. p. 459; Dana, U.S. Expl. Exp., Crust. i. p. 281, pl. xvii. figs. 5 *a-c*; A. Milne-Edwards, Arch. Mus. Paris, x. 1861, p. 356.

*T. Savignyi*, A. Milne-Edwards, *l. c.* p. 357.

*T. admete*, Alcock, Journ. Asiatic Soc. Bengal, lxxviii. (2) p. 82 (1899).

Three female specimens, the largest 10.5 mm. long by 14.5 mm. broad, carrying ova. They appear to agree with the descriptions of *Th. Savignyi*, and are very similar to specimens so labelled in the British Museum. There appears, however, to be little doubt that this form is only a variety of *Th. admete*.

*Locality.* "Channel between reefs, Mer."

#### THALAMITA SIMA, Milne-Edwards.

*Thalamita sima*, Milne-Edwards, Hist. Nat. Crust. i. p. 460.

*Portunus (Thalamita) arcuatus*, De Haan, Faun. Jap., Crust. p. 43, pl. ii. fig. 2.

*Thalamita sima*, A. Milne-Edwards, Arch. Mus. Paris, x. p. 359 (1861); De Man, Zool. Jahrb. Syst. viii. p. 564 (1896); Alcock, Journ. Asiatic Soc. Bengal, lxxviii. (2) p. 81 (1899).

Six specimens, including an ovigerous female only 8.5 mm. in length, are referred to this species. In the larger specimens (20 mm. long) the antennal crest is smooth or nearly so, but in the smaller it is minutely granulated. In none are the margins of the median frontal lobes concave as described by De Man.

*Localities.* "Fringing reef and shore, Thursday Island"; "Channel between reefs, Murray Island."

**KRAUSSIA NITIDA**, Stimpson.

*Kraussia nitida*, Stimpson, Pr. Acad. Philad. 1858, p. 40; Miers, Rep. Voy. 'Alert,' Crust. p. 235; Henderson, Tr. Linn. Soc., (2) Zool. v. p. 379, pl. xxxvii. fig. 9 (1893); Alcock, Journ. Asiatic Soc. Bengal, lxxviii. (2) p. 98 (1899).

A single male specimen appears to agree well with this species as briefly characterized by Stimpson and Miers and more fully by Henderson and Alcock. The frontal lobes are rather less deeply subdivided than in the figure given by Henderson. The whole surface of the carapace is covered with very minute granulations in short transverse rows. The outer surface of the hand is faintly granulated distally and near the upper edge.

*Locality.* "Channel between reefs, Murray Island."

**METOPOGRAPSUS MESSOR** (Forsk.).

*Metopograpsus messor*, Kingsley, Proc. Acad. Nat. Sci. Philad. 1880, p. 190; Ortmann, Zool. Jahrb. Syst. vii. 1894, p. 701.

A small specimen (8.5 mm. long) appears to belong to this widely distributed species. In the relative length of the propodus of the ambulatory legs it approaches the variety *gracilipes* of De Man (Notes Leyden Mus. xiii. p. 49), but the specimen is too immature for precise determination.

*Locality.* "Cockburn group (N. Queensland), shore."

**VARUNA LITTERATA** (Fabr.).

*Varuna litterata*, Kingsley, Proc. Acad. Nat. Sci. Philad. 1880, p. 205; Ortmann, Zool. Jahrb. Syst. vii. 1894, p. 713; De Man, Zool. Jahrb. Syst. ix. 1897, p. 112.

One female specimen.

*Locality.* "Torres Straits."

**OCYPODA CERATOPHTHALMA** (Pallas).

*Ocyroda ceratophthalma*, Ortmann, Zool. Jahrb. Syst. x. 1897, p. 364 (with synonymy).

Five full-grown males and one female and a number of immature individuals are in the collection.

*Localities.* "Reef, Murray Island"; "Mer"; "Mabuiag."

**UCA TETRAGONON** (Herbst).

*Gelasimus tetragonon*, Kingsley, Proc. Acad. Nat. Sci. Philad. 1880, p. 143, pl. ix. fig. 11 (with synonymy); De Man, Notes Leyden Mus. xiii. 1891, p. 24, pl. ii. fig. 6; Ortmann, Zool. Jahrb. Syst. vii. 1894, p. 754.

*Uca tetragona*, Ortmann, Zool. Jahrb. Syst. x. 1897, p. 348.

A male specimen, in which the carapace measures 13 mm. in length, is referred to this species. In the armature of the fingers the large chela agrees precisely with Kingsley's figure (*l. c.*), but the fingers themselves are much shorter, not equalling the palm in length, and the outline of the chela therefore resembles the figure of *G. variatus* which Kingsley (*l. c.* pl. x. fig. 32) copies from Hess. The last-named species is regarded by

De Man and Ortmann as synonymous with the present. De Man's description and figure (*l. c.*) agree closely with our specimen, save that the orbits are more oblique and the fingers of the chela much longer in the figure.

*Locality.* "Torres Straits."

*Distribution.* Red Sea to Sandwich Islands.

CERATOPLAX (?) sp.

An imperfect dried specimen resembles rather closely in general shape the *Ceratoplax ciliata* of Stimpson, as figured by Miers (Chall. Rep., Brachyura, p. 234, pl. xix. fig. 3). It differs, however, in the broader meral and carpal joints of the walking-legs (Miers states that in his specimen the legs "are rather more slender than in the description of Dr. Stimpson") and in the rather stouter fingers of the chelipeds. It differs, moreover, not only from Miers's figure, but also from the generic diagnosis in the fact that the antero-external angle of the merus of the third maxillipeds is rounded off and not distinctly produced.

*Locality.* "Torres Straits."

CALAPPA HEPATICA (L.).

*Calappa hepatica* (L.), Alcock, Journ. Asiatic Soc. Bengal, lxx. (2) p. 142 (1896).

Three female specimens, the carapace of the largest measuring 40 mm. in length by 60 mm. in breadth.

*Locality.* "Murray Island."

CRYPTOCNEMUS HADDONI, n. sp. (Plate 1. figs. 4-8.)

*Description.* The margins of the lateral wings of the carapace are convex, presenting no salient lateral angle such as is present in *C. pentagonus*, Stps., and passing, with scarcely an indication of a postero-lateral angle, into the posterior margin, where the curve meets its fellow in the middle line in a slight re-entrant angle. The lateral margin is continued on to the dorsal surface of the carapace behind the hepatic region on either side as a faintly marked ridge which soon dies out. The front is obtusely triangular and slightly reflexed, the straight line of each side being continued beyond the orbit to the prominent hepatic angle. On the flat dorsal surface a low longitudinal keel runs from the tip of the rostrum to near the posterior edge of the carapace, being most prominent on the cardiac region, and the branchial regions are very slightly inflated. The surface of the carapace is perfectly smooth; the posterior and lateral margins, as well as the faint ridges on the hepatic regions, are microscopically beaded. The antennular fossæ are transverse. The third maxillipeds have the merus equal in length to the ischium, acutely triangular and projecting well beyond the margin of the buccal area, though not so far as to be visible from above. The exopod is equal in breadth to the ischium; its outer edge is convex, the tip truncate and very slightly concave. The chelipeds have the merus trigonous, with two minutely granular lines on its lower margin; the carpus has a slight keel exteriorly; the hand is compressed, the edges acute, the palm being one and a half times

as long as broad; the fingers are grooved and one-third the length of the palm. The walking-legs have the merus compressed and crested above and below, the carpus and propodus with a double keel on the upper edge and the dactylus styliform. The abdomen of the female is very nearly circular in outline, and the first, second, and last somites are free. The whole of the under surface is quite smooth.

Length 5.5 mm.; breadth 7.25 mm.

Of the four described species of *Cryptocnemus* our new form approaches most closely to the type, *C. pentagonus* of Stimpson (Pr. Acad. Philad. 1858, p. 161), figured by Miers (Proc. Zool. Soc. 1879, p. 43, pl. ii. fig. 5), whose imperfect specimen I have examined. In that species, however, the wings of the carapace are produced into acute lateral angles, and the straight postero-lateral and posterior margins meet at an obtuse angle; the front is more strongly reflexed and more acute, the branchial regions are more convex, the lateral margins are not continued on to the dorsal surface in front, and the granulation of the posterior and lateral margins is more pronounced than in the present species; the antennular fossæ are oblique and the palp of the external maxillipeds is rounded, not distinctly truncate, at the tip. In *C. Holdsworthi*, Miers (Tr. Linn. Soc., (2) Zool. i. p. 241, pl. xxxviii. figs. 30-32, 1878), the lateral margins are at right angles to the posterior margin, and there are two oblique carinæ running from the cardiac region to the posterior corners on the dorsal surface of the carapace. *C. Grandidieri*, A. Milne-Edwards (Ann. Soc. Ent. France, (4) v. p. 155, pl. vi. fig. 4, 1865), resembles *C. Holdsworthi* in general shape, but has a broadly truncate front, the posterior border is notched in the middle, and the surface of the carapace has three granulated carinæ diverging from the centre to the rostrum and the two posterior corners respectively. Finally, *C. obolus*, Ortmann (Zool. Jahrb. Syst. vi. p. 576, pl. xxvi. fig. 12, 1892), has a nearly circular outline, the rostrum is bifid, and the hepatic prominences are acute, almost spiniform, teeth.

*Locality*. "Channel between reefs, Mer."

#### OREOPHORUS FRONTALIS, Miers.

*Oreophorus frontalis*, Miers, Rep. Voy. 'Alert,' p. 254, pl. xxvi. fig. B.

A comparison of our eight individuals with the unique type specimen leaves no doubt as to their identity. Miers's figure does not represent quite accurately the proportions of the carapace, the relative length, and especially the prominence of the whole frontal region, being considerably exaggerated.

*Localities*. "Flinders Entrance, near Mer"; "Channels between reefs, Murray Island."

#### MYRA FUGAX (Fabr.).

*Myra fugax* (Fabr.), Alcock, Journ. Asiatic Soc. Bengal, lxxv. (2) p. 202 (1896) (and synonyms).

*M. pentacantha*?, Alcock, l. c. p. 204.

Two male specimens, of small size and therefore difficult to determine with certainty, are probably young forms of this common and variable species. The smaller of the two possesses five spines on the posterior margin of the carapace and a well-marked tubercle

on the intestinal region. It agrees closely with the type specimens of *M. dubia*, Miers (Proc. Zool. Soc. 1879, p. 42), from Japan, which Miers subsequently (Rep. 'Challenger' Brachyura, p. 314) identified with the *M. coalita* of Hilgendorf (Monatsber. Akad. Berlin, 1878, p. 812, pl. i. figs. 6, 7), ranking it as a variety of *M. fugax*. The *M. pentacantha* of Alcock, of which I have examined specimens, differs chiefly in the pubescence of the frontal region. This provisional species is regarded by its author as being probably the young form of *M. fugax*.

*Locality.* "Channels between reefs, Murray Island."

MYRA AUSTRALIS, Haswell (?).

*Myra australis*, Haswell, Proc. Linn. Soc. N. S. Wales, iv. p. 50, pl. v. fig. 3 (1879); Haswell, Cat. Austr. Crust. p. 122; Miers, Rep. 'Challenger' Brachyura, p. 315.

A female specimen, 20 mm. in length, is provisionally referred to this species on account of its general resemblance to specimens so named in the collections of the British Museum. From these and from Haswell's account, however, it differs in the shorter neck-region, in the finer and closer granulation of the surface, and in the absence of any distinct group of granules on the intestinal region.

*Locality.* "Channel between reefs, Mer."

LEUCOSIA LONGIFRONS, var. PULCHERRIMA, Miers.

*Leucosia pulcherrima*, Miers, Tr. Linn. Soc., (2) Zool. i. p. 236, pl. xxxviii. figs. 4-6 (1877); Haswell, Proc. Linn. Soc. N. S. Wales, iv. p. 46 (1879).

*L. splendida*, Haswell, l. c. p. 47, pl. v. fig. 1.

*L. longifrons*, var. *pulcherrima*, Alcock, Journ. Asiatic Soc. Bengal, lxxv. (2) p. 219 (1896).

A male specimen, agreeing minutely with Miers's type specimen, save that the "thoracic sinus" is rather more contracted. Apart from the colour-markings, Alcock states that this variety is distinguished from the typical *L. longifrons* by having the surface of the carapace slightly punctate instead of perfectly smooth, and by the stronger dorsal and ventral keels on the propodites of the ambulatory legs. Neither of these characters is so well marked in the Torres Straits specimen as in some specimens from Yokohama which I refer to *L. longifrons*. The carapace of the present specimen is much distorted, being swollen on one side, probably by the presence of an epicarid parasite in the branchial chamber.

*Locality.* "Channel between reefs, Murray Island, 15-20 fath."

LEUCOSIA HASWELLI, Miers.

*Leucosia Haswelli*, Miers, Rep. 'Challenger' Brachyura, p. 324, pl. xxvii. fig. 2; Alcock, Journ. Asiatic Soc. Bengal, lxxv. (2) p. 222 (1896).

Our specimen shows an almost precise agreement with the descriptions of Miers and Alcock and with the type specimens in the British Museum. The inner (or lower) margin of the hand is defined by two distinct rows of fine granules, the lower replacing the row of punctations of Alcock's description.

*Locality.* "Fringing reef and shore, Thursday Island."



*PSEUDOPHILYRA TRIDENTATA*, Miers.

*Pseudophilyra tridentata*, Miers, Proc. Zool. Soc. 1879, p. 41, pl. ii. fig. 4; Alcock, Journ. Asiatic Soc. Bengal, lxxv. (2) p. 250 (1896).

Our specimen, a male, agrees closely with Miers's type specimen, which, though described as a male, is apparently a sterile female. The inferior hepatic prominences are in our specimen placed a little further forward, so that they are visible from above in front of the superior prominences. The figure which accompanies Miers's description is a very indifferent representation of the type specimen, the whole frontal region, for instance, appearing relatively much too broad. The following are the approximate dimensions of the type and of our specimen:—

	Type specimen.	Torres Straits specimen.
Length of carapace .....	10 mm.	13.5 mm.
Breadth „ .....	8.5 „	11.5 „
Height „ .....	5.5 „	7.0 „
Width of front between external orbital teeth ...	2.35 „	2.75 „
Length of cheliped .....	.....	21.0 „
„ palm .....	.....	7.0 „
Width of palm .....	.....	3.5 „
Length of fingers .....	.....	3.0 „

Alcock's description applies very well to the specimen before me, except that he states the hand to be about "half as long again as broad." As will be seen from the figures given above, the palm alone, exclusive of the fingers, is twice as long as broad. Each finger carries a low obtuse tooth on the inner edge about the middle of its length.

*Locality.* "Torres Straits."

*Distribution.* Persian Gulf (*Alcock*); S. Japan (*Miers*).

*ARCANIA GRACILIPES*, Bell (?).

*Arcania gracilipes*, Bell, Trans. Linn. Soc. xxi. p. 310, pl. xxxiv. fig. 9 (1855); Alcock, Journ. Asiatic Soc. Bengal, lxxv. (2) p. 270 (1896).

A male specimen, the carapace of which measures about 7 mm. in length and in breadth, with chelipeds about 15 mm. long, is referred with some doubt to this species. Compared with Bell's type specimen, it differs in the greater excavation of the hepatic regions above and the consequent greater prominence of the neck-region. The front (between the orbits) is also more prominent at the outer corners, so that the orbits have a more lateral position. The carapace, as a whole, appears much less inflated, and the inter-regional grooves, especially the branchio-cardiac grooves, are deeper. The marginal tubercles are less prominent, and the whole surface is covered with closely-set depressed and smooth granules. In the type the granules are more widely spaced and more or less distinctly capitate or fungiform. Some phrases of Alcock's description, the "sunken" hepatic region and the carapace "closely covered with flat discoidal granules," are more suggestive of our specimen than of the type.

*Locality.* "Flinders Entrance, Mer, 20-30 fath."

## Genus PALICUS, Philippi.

( = *Cymopolia*, Roux.)

The most diverse opinions have been expressed as to the systematic position of this genus, and although it retains its place among the Dorippidæ in Bouvier's recent revision of that family (Bull. Soc. Philomath. Paris, (8) ix. 1898), there appears to be considerable reason to doubt the correctness of this view. Without attempting to enter on a discussion of the question, I may note that the penial appendages of the male are (in the single specimen I have examined as to this point) distinctly exerted from the sternum at some distance from the bases of the last pair of legs. With regard to the disposition of these parts in the Dorippidæ, the statements of authors are conflicting. Miers, for instance, writes: "The sexual appendages in the male are exerted from the sternum" (Rep. 'Challenger' Brachyura, p. 326), while Ortmann has "männliche Genitalöffnung stets coxal gelegen" (Bronn, Thier-Reich, Crust. ii. p. 1157). I find that in *Dorippe* the latter statement is the more correct, although the penial tube lies, at its base, between two processes of the sternum, which may in (*D. sima*) meet above and form a complete ring. The greater separation of the place of emergence of the penes from the bases of the legs in *Palicus* tends to support the view of those authors who would ally this genus with the Catometopa.

The description and figures of *Pleurophricus spinipes* given by De Man (Arch. Naturg. liii. (1) p. 344, pl. xv. fig. 1, 1887) are strongly suggestive of close affinity between that genus and the present. The general outline of the carapace, the relative length of the four pairs of ambulatory legs, the shape of the third maxillipeds, and the very broad sternum are among the points of resemblance between the two. *Pleurophricus cristatipes*, A. M.-E., the type and only other species of the genus, appears, from Milne-Edwards's figure (Journ. Mus. Godeffroy, Heft iv. pl. xii. fig. 6), to have less resemblance to *Palicus*, the ambulatory legs being all of about the same length. De Man considers *Pleurophricus* to be more nearly allied to Corystoidea than to any other group of Brachyura. Milne-Edwards had placed it among the Oxystomata, while Miers suggests that its place is with the Schizophrysinæ among the Oxyrhyncha (Journ. Linn. Soc., Zool. xiv. p. 660).

## PALICUS JUKESII (White). (Plate 1. figs. 9-13.)

*Cymopolia Jukesii*, White, Jukes's Voy. 'Fly,' ii. App. p. 338, pl. ii. fig. 1 (1847); Miers, Zool. Voy. 'Erebus' and 'Terror,' vol. ii. no. xx. Crust. p. 3, pl. iii. figs. 4 a-c (1875) (1874?); Miers, Rep. 'Challenger' Brachyura, p. 335 (1886).

*C. carinipes*, Paulson, Crustacea of the Red Sea (Russian), Kiev, 1875, p. 73, pl. ix. figs. 4-4 a.

*Palicus Jukesii*, Bouvier, Bull. Soc. Philomath. Paris, (8) ix. p. 12 (sep. copy) (1898).

*Description of male.* The carapace is subquadrate in outline, with the lateral margins slightly convergent anteriorly. The surface is very uneven, being thrown into rounded transverse ridges, of which two, crossing the carapace at the level of the gastric and cardiac regions respectively, are the most conspicuous. The prominent regions are coarsely granulated and the whole surface is nearly free from hairs. The front is divided into two rounded lobes defined from the orbital margin on either side by a

distinct notch. The upper margin of the orbit presents two fissures, of which the inner is a V-shaped notch, while the outer is closed and inconspicuous. The external orbital tooth is blunt, and behind it on the lateral margin are two well-marked teeth, with a slight indication of a third. The two lobes of the lower orbital margin are sharply triangular, the inner being the more prominent, and have the edges hardly or not at all granulated. On the sub-hepatic region just behind the lower orbital margin there is a blunt transversely elongated tubercle or short ridge.

The eye-stalk carries about three tubercles, the largest of which, close to the corneal region on the anterior edge, is in the form of a flattened lobe with a rounded distal edge. The basal joint of the antenna has a very prominent longitudinal keel on its ventral surface, and externally a blunt laterally compressed lobe springs from near the base of the joint and is directed forwards and outwards. The two succeeding joints of the peduncle are narrow and cylindrical. The ischium of the third maxillipeds has two marked diagonal ridges on its ventral surface. The merus is produced distally external to the insertion of the carpus as a conspicuous rounded lobe extending to more than half the length of the carpus.

The chelipeds in the single male specimen examined are rather feeble and are perhaps not fully developed. The palm is subcylindrical and has faint longitudinal ridges on its outer surface.

The ambulatory legs of the second and third pairs have the upper (or anterior) edge of the merus cut into four teeth. The crest on the anterior margin of the carpus has no distinct proximal lobe, but the distal lobe is a sharp tooth set a little way back from the end of the joint. The propodus is much expanded, being three and a half times as long as broad, and the anterior edge is strongly convex. In the second pair of ambulatory legs (but in none of the others) there is, on the ventral surface of the merus at its proximal end, a short longitudinal ridge, which is minutely and regularly granulated. The abdomen of the male has all the somites free and each is crossed about the middle of its length by a transverse ridge. The lateral margins are slightly concave and form a distinct angle at the sixth somite. The sternum and abdomen are finely granulated. The first abdominal appendages of the male are stout and the two lobes of the tip are closely approximated, the outer extending a little beyond the inner.

The specimen from which my description and figures are taken agrees minutely with the specimens in the British Museum with which I have compared it. According to Miers's figure, the abdomen of the female is subcircular in outline, with all the somites distinct and transversely ridged as in the male.

*Cymopolia carinipes* of Paulson is very likely identical with the present species. His figures show the general shape of the carapace to be very similar, though the lateral margins are more nearly parallel. The transverse grooves and ridges of the surface and the granulation of the more prominent parts correspond with the specimen here described and figured. Paulson's figure of the entire animal (*l. c.* fig. 4) is, apparently, inaccurate as regards the shape of the frontal lobes, which his enlarged figure (fig. 4*a*) shows to differ but slightly from the present form. The outer of the two fissures in the

supra-orbital margin is represented as open and V-shaped. The lower orbital margin, the tubercles on the eye-stalk, the basal joint of the antenna, and the external maxillipeds are all figured almost exactly as in our specimen. The first pair of walking-legs are rather stouter. The most marked difference, however, is that the tubercle on the underside of the hepatic region is more strongly developed, being represented by a curved transverse ridge, from the outer end of which a row of granules (not found in our specimen) runs backwards for a short distance parallel to the lateral margin of the carapace.

*Locality.* "Torres Straits."

*Distribution.* Sir C. Hardy Island (Torres Straits) (*White*); Port Denison (*Haswell*); Celebes Sea (*Miers*); Red Sea (*Paulson*).

PALICUS WHITEI (Miers). (Plate 2. figs. 14-19.)

*Cymopolia Whitei*, Miers, Rep. Voy. 'Alert,' Crust. p. 551, pl. xlix. fig. C (1884).

*Palicus Whitei*, Bouvier, Bull. Soc. Philomath. Paris, (8) ix. p. 12 (sep. copy) (1898).

The lateral margins of the carapace are more nearly parallel than in *P. Jukesii*. The surface is less uneven, the transverse ridges being less marked, but the regions are fairly prominent and well-defined, though there is some variation in these respects among our specimens. The granulation of the surface is much finer and there is a scanty short pubescence interspersed among the granules. The frontal lobes are separated from the upper orbital margin on each side by a shallow concavity. Both the fissures of the upper orbital margin are open and V-shaped, while a third, present in some members of the genus, is slightly indicated by a notch at the base of the outer orbital tooth. This tooth is generally more acuté than in *P. Jukesii*, but the two succeeding teeth on the lateral margin are less prominent than in that species. The lobes of the lower margin of the orbit are low and rounded, and the edge is finely granulated. There is no tubercle on the sub-hepatic region behind the orbital margin. The basal joint of the antenna bears a slight longitudinal ridge on its ventral face and is produced externally into a broad rounded lobe, flattened dorso-ventrally and projecting into the orbit. The two succeeding joints are robust, the third joint especially being expanded and compressed.

The large prominence on the eye-stalk has a peculiar and characteristic form. It is a crescentic or sickle-shaped blade, springing from a narrow base near the distal end of the anterior edge of the eye-stalk, and curving over, close to but free from the corneal surface, terminating externally in an acute point.

The ischium of the third maxillipeds is only faintly ridged on its ventral face, and the antero-external process of the merus is very small, not reaching to one-half the length of the carpus. The chelipeds are feeble in both sexes, the palm cylindrical, without ridges, but faintly granular and pubescent. The second and third pairs of walking-legs have the merus pubescent and faintly granulated, but without teeth on the margins. The anterior crest of the carpus has rounded proximal and distal elevations, the latter close to the end of the joint. The propodus is considerably narrower than in *P. Jukesii*,

being nearly four times as long as broad, and the anterior edge is only slightly convex. The granulated ridge on the underside of the merus of the second pair is present as in *P. Jukesii*.

The abdomen of both sexes is smooth, beset with small scattered setæ. The fourth, fifth, and sixth somites are fused together, but the sutures are faintly visible. In the male the sides of the abdomen are straight, convergent, and curve gently inwards from the base of the last somite to the tip without any distinct angle.

The first abdominal appendages of the male are slender, and the terminal lobes are divergent, the outer lobe being twice as long as the inner.

Our specimens differ from Miers's type specimens in the greater robustness of the second and third pairs of ambulatory legs, the merus and, to a less extent, the propodus being distinctly broader. In all other characters, however, the agreement is complete.

*Locality.* "Torres Straits."

*Distribution.* Seychelles, 4-12 fath. (*Miers*).

*PALICUS SERRIPES* (Alcock & Anderson). (Plate 2. figs. 20-22.)

*Cymopolia serripes*, Alcock & Anderson, Journ. Asiatic Soc. Bengal, lxiii. pt. 2 (1895) (? 1894), p. 208; Illustr. Zool. 'Investigator,' Crust. pl. xxiv. fig. 7 (1896).

*Palicus serripes*, Bouvier, Bull. Soc. Philomath. Paris, (8) ix. p. 12 (sep. copy) (1898).

Carapace with lateral margins convergent anteriorly, the surface leaving the regional areas well-defined but not very prominent, beset with rather coarse granulations on the more prominent parts. Posteriorly the granulations tend to become squamiform, and there is a line of conspicuous scale-like elevations just within the posterior and posterolateral margins. Scattered hairs occur among the granules, more numerous on the depressed portions of the surface. The front is four-lobed; the inner lobes are acutely rounded and depressed, and extend beyond the outer lobes, which are low, rounded, slightly recurved, and hardly defined from the orbital margin. The upper margin of the orbit has two deep V-shaped fissures separated by an acute tooth, and a shallower notch at the base of the outer orbital tooth. The latter is acute, and is separated by a short interval from the first of the four subequal antero-lateral teeth. The lower margin of the orbit is convex in its outer part, concave internally, and terminates in a sharp internal orbital tooth. Just behind and parallel to the infra-orbital margin is a curved granulated ridge terminating internally in a small tubercle close to the tubercle which forms the anterior corner of the buccal frame. The basal joint of the antenna is produced externally into a flattened lobe, similar to, but smaller than, that found in *P. Whitei*, while the ventral face of the joint bears a row of three or four small tubercles in place of the longitudinal ridge found in that species. The two succeeding joints are rather elongated and cylindrical. The flagellum extends well beyond the outer angle of the orbit. The eye-stalk bears numerous, low, rounded tubercles, two of these on the anterior margin being larger than the others. The ischium of the third maxillipeds is nearly smooth on its ventral surface, and the merus has a well-developed antero-external

process with a small acute tooth at its tip. The exopod is broader than in the two preceding species. The cheliped of our single imperfect specimen is rather short and stout, the palm compressed, with rows of granules on its upper edge and outer face. The first pair of legs have the merus granulated and with a stout tooth at the distal extremity of its upper (or anterior) edge. The propodus and dactylus have each a few serrations on the lower edge. The merus of the second and third pairs is granulated, the granules becoming stout teeth on the upper and lower margins. The anterior crest of the carpus has two prominent teeth, with smaller serrations between. The propodus is about two and a half times as long as broad, the upper edge nearly straight, the lower edge serrate. The dactylus is broad and has three or four coarse and somewhat irregular teeth on its lower edge. There is no granulated ridge on the underside of the merus of the second pair.

The single, much injured, female specimen from which the above description is taken agrees well with the description of Alcock and Anderson. The figure which they give, however (taken from a larger specimen), differs in some details. The outer lobes of the front are much less prominent, so that the front appears two-lobed; the first lateral tooth follows close upon the extra-orbital and is separated by a slight interval from the second; the granulation of the carapace appears to be less coarse, and more restricted to the prominent lobules.

*Locality.* "Torres Straits."

*Distribution.* "Madras coast, shallow" (*Alcock & Anderson*).

#### ACHÆUS AFFINIS, Miers.

*Achæus affinis*, Miers, Rep. Voy. 'Alert,' Crust. p. 188; De Man, Arch. Naturg. liii. (1) p. 218 (1887); Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 172 (1895).

A male specimen 5.5 mm. long is referred to this species. It is much smaller than any of the specimens of *A. affinis* with which I have compared it, but it agrees with them in the characteristic points of the tuberculated eye-stalks and the bilobed cardiac tubercle. As De Man points out, the eye-stalk carries a small tubercle near the tip in addition to the large one at the middle of its length, and a small tubercle also lies behind the bilobed eminence on the cardiac region. Our specimen has four granules on the gastric region, two median and two lateral. The free part of the antenna is only a little shorter than the carapace. The neck is rather longer than in the type specimen, and the carapace as a whole is a little narrower. As in Miers's account, the merus of the chelipeds is "somewhat trigonous," rather than "fast cylindrisch" as De Man describes it.

*Locality.* "Channel between reefs, Murray Island, 15-20 fath."

#### PARATYMBOLUS SEXSPINOSUS, Miers.

*Paratymolus sexspinus*, Miers, Rep. Voy. 'Alert,' Crust. p. 261, pl. xxvii. fig. B; Henderson, Trans. Linn. Soc., (2) Zool. v. p. 352 (1893).

In our single perfect specimen, which I have compared with Miers's type, the rostrum

is hardly emarginate and the second antero-lateral tooth is less prominent than in Miers's figure.

This species is recorded from India (Tuticorin) by Prof. Henderson, though it is omitted (probably through inadvertence) from Alcock's revision of the Indian Oxyrhyncha.

*Localities.* "Channel between reefs, Mer"; "Mabuiag" (fragmentary specimen).

#### ONCINOPUS ARANEA, De Haan.

*Inachus (Oncinopus) aranea*, De Haan, Faun. Japon., Crust. p. 100, pl. xxxix. fig. 2.

*Oncinopus aranea*, Adams & White, Zool. Voy. 'Samarang,' Crust. p. 3.

*O. neptunus*, Adams & White, *l. c.* p. 1, pl. ii. fig. 1.

*O. aranea*, Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 183 (1895).

Five female specimens, showing considerable variation in the relative prominence of the frontal lobes and in some other details. Alcock describes the antennæ as "extremely short, reaching only just beyond the tip of the rostrum": in our specimens, however, as in the figure of Adams & White, the flagella of the antennæ reach far beyond the tip of the rostrum.

*Locality.* "Channel between reefs, Mer."

#### XENOCARCINUS TUBERCULATUS, White.

*Xenocarcinus tuberculatus*, White, Proc. Zool. Soc. 1847, p. 119; A. Milne-Edwards, N. Arch. Mus.

Paris, viii. p. 253, pl. xii. figs. 1 *a-g* (1872); Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 192 (1895); Alcock & Anderson, Illust. Zool. 'Investigator,' Crust. pl. xxxiii. figs. 3, 3 *a* (1898).

A single, much damaged, male specimen, agreeing fairly well with Milne-Edwards's fig. 1, save that the carapace is much narrower.

*Locality.* "Murray Island."

#### HUENIA PROTEUS, De Haan.

*Maia (Huenia) proteus*, De Haan, Fauna Japon., Crust. p. 95, pl. xxiii. figs. 4-6.

*Huenia proteus*, Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 195 (1895).

The series of this well-known species comprises two young males, an adult and a young female, and a "sterile" female in which only the 5th and 6th somites of the abdomen are fused.

*Localities.* "Channel between reefs, Mer"; "South of Orman's reef, 5-7 fath."

#### MENAETHIUS MONOCEROS, Latr.

*Menaethius monoceros*, Latr., Milne-Edwards, Hist. Nat. Crust. i. p. 339.

*M. angustus*, Dana, U.S. Expl. Exp., Crust. i. p. 120, pl. iv. figs. 5 *a-b*.

*M. monoceros*, Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 197 (1895).

Two specimens of this very variable species approach most closely to the form named *M. angustus* by Dana, but the rostrum is rather shorter.

*Localities.* "Murray Island"; "Sabai Channel."



## HYASTENUS SPINOSUS, A. Milne-Edwards.

*Hyastenus spinosus*, A. Milne-Edwards, N. Arch. Mus. Paris, viii. p. 250 (1872); Miers, Rep. 'Challenger' Brachyura, p. 56; Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 211 (1895).

A female specimen, about 25 mm. in total length, agrees with the characters of this species as briefly indicated by Milne-Edwards and by Alcock, except that the lateral epibranchial spines appear rather small. It is identical with specimens in the British Museum referred to this species by Mr. Miers. An ovigerous female 20 mm. long differs in possessing a small acute granule on the cardiac region and three small tubercles (besides the epibranchial spine) on each branchial region. The two gastric spines are very small, but in other respects the specimen appears to agree with this species.

*Localities.* "Murray Island"; "South of Orman's reef, 5-7 fath."

## HYASTENUS ORYX, A. Milne-Edwards.

*Hyastenus oryx*, A. Milne-Edwards, N. Arch. Mus. Paris, viii. p. 250, pl. xiv. fig. 1 (1872); De Man, Arch. Naturg. liii. p. 224, pl. vii. fig. 2 (1887); Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 214 (1895).

Of the two specimens which I refer to this species, one, a female about 16 mm. in total length, agrees closely with the example figured by De Man, the rostral spines being rather less than one-fourth of the total length and strongly divergent. In a male specimen about 18 mm. long the rostral spines are more than one-third of the total length and quite parallel, and the whole carapace is rather narrower and not quite so much contracted in front, though still much more so than in Milne-Edwards's figure. The parallel rostral spines of the latter specimen give it a certain resemblance to *H. Seba*, White (Seba, Thesaurus, iii. pl. xviii. fig. 12), in which, however, the distal parts of the much longer spines are divergent. In the specimens of *H. Seba* which I have examined the carapace is much less tuberculated than in the present specimens. The chelipeds of our male specimen resemble Milne-Edwards's figure, but the hands are rather less expanded distally, and the serrated edges of the fingers meet for about half their length instead of only at the tip as Alcock states.

*Locality.* "South of Orman's Reef, 5-7 fath."

## HYASTENUS CONVEXUS, Miers.

*Hyastenus convexus*, Miers, Rep. Voy. 'Alert,' Crust. p. 196, pl. xviii. fig. B; Henderson, Trans. Linn. Soc., (2) Zool. v. p. 344 (1893).

A male specimen of 10 mm. and a female of 13 mm. total length are referred with some doubt to Miers's species, with which they agree in the very convex gastric region and in the absence of spines from the carapace. They differ chiefly in the shorter rostral spines, which in the female are less than one-fourth of the total length. In the male there are minute acute tubercles representing the epibranchial spines as in the specimen described by Henderson.

*Locality.* "Mer."

## HYASTENUS BROCKII, De Man.

*Hyastenus Brockii*, De Man, Arch. Naturg. liii. (1) 1887, p. 221, pl. vii. figs. 1 a-b; Henderson, Trans. Linn. Soc., (2) Zool. v. p. 344 (1893).

A single very imperfect dried specimen ( $\sigma$ ) appears to agree with De Man's description and figures of this species. The total length is about 15 mm., half of which is taken up by the slender rostral spines. The carapace is narrower and the rostral spines less widely divergent than in the figure. The tubercles on the carapace are only very slightly marked, but the arrangement, so far as can be seen, corresponds with De Man's account. The structure of the orbital region agrees closely with the figure.

*Locality.* "Torres Straits."

*Distribution.* Amboina (*De Man*); Gulf of Martaban (*Henderson*).

## HYASTENUS VERRUCOSIPES (Adams &amp; White). (Plate 2. figs. 23 &amp; 24.)

*Chorinus verrucosipes*, Adams & White, Zool. Voy. 'Samarang,' Crust. p. 13, pl. ii. fig. 3 (1848).

*Hyastenus verrucosipes*, A. Milne-Edwards, N. Arch. Mus. Paris, viii. p. 250 (1852) (name only).

*Paramithrax verrucosipes*, Miers, Ann. Mag. Nat. Hist. (5) iv. 1879, p. 10 (name only).

This species, which does not appear to have been reobserved since its discovery, is represented in the collection by two female specimens agreeing so closely with the original type specimen of Adams and White as to leave no doubt of their identity. The surface of the carapace is rather more uneven than is represented in the figure given by these authors, and it is slightly more contracted behind the orbital region, so that the postorbital processes appear more prominent. The upper hiatus of the orbit is rather more open in our specimens than in the type, and the rostral spines are distinctly knobbed at the tip. The first pair of walking-legs are relatively longer than in the figure, and the dactyls, especially of the last pair, are longer and more slender. The legs in our specimens do not present the "wart-like tubercles" described by Adams and White; but I am inclined to think, after examining the now somewhat imperfect type specimen, that these tubercles are simply tufts of hair agglutinated together by drying.

As regards the systematic position of this species, Prof. A. Milne-Edwards doubtfully includes it in his list of the species of *Hyastenus*, while Miers incidentally refers to it as a *Paramithrax*. The type specimen in the British Museum is now labelled *Acanthophrys verrucosipes*, and I am informed that this name was given to it by Mr. Miers.

It seems plain, however, that this species cannot be referred to *Paramithrax*, since there is only one hiatus instead of two in the upper margin of the orbit, or, in other words, the spine which, in that genus, intervenes between the supra-ocular hood and the postorbital process is here wanting. The condition of the orbital region is most closely paralleled by Dana's figures of his *Lahaina ovata* (U.S. Expl. Exp., Crust. i. p. 93, pl. ii. figs. 1 a-c). The supra-ocular hood is very prominent, having the corners produced and the anterior one acute and curved forwards; the long postocular process is cupped, or rather grooved, along its anterior face for the reception of the eye; the basal antennal joint carries a small spine distally on the ventral surface, and two smaller tubercles in a

line immediately behind it, while a rectangular plate projecting from the outer edge of the joint forms the floor of the orbit. Fairly wide gaps are left between the postocular process and the supra-ocular hood and basal antennal plate in the upper and lower walls of the orbit respectively. Dana's genus is generally regarded as a synonym of *Hyastenus*, and I have accordingly followed Milne-Edwards in adopting that name for the present form, though it differs considerably in the structure of the orbit from those species of *Hyastenus* which I have examined. From *Acanthophrys* it appears to differ in the fact that the inner distal corner of the merus of the third maxillipeds is notched, and the structure of the orbital region is very different from that shown in Milne-Edwards's figure of *A. cristimanus* (Ann. Soc. Ent. France, (4) iv. 1865, pl. v. fig. 3 a).

*Locality.* "Murray Island, channel between reefs, 15-20 fath."

*Distribution.* "Eastern seas" (*Adams & White*).

#### NAXIA SERPULIFERA (Guérin).

*Naxia serpulifera*, Milne-Edwards, Hist. Nat. Crust. i. p. 313; Haswell, Cat. Austr. Crust. p. 21 (1882); Miers, Rep. Voy. 'Alert,' Crust. p. 196 (1884); Pocock, Ann. Mag. Nat. Hist. (6) v. p. 79 (1890); Ortmann, in Semon's Zool. Forsch. Austral. v., Crust. p. 43 (1894).

A large female specimen (83 mm. in length) of this characteristic Australian species is in the collection.

*Locality.* "Torres Straits."

#### NAXIA TAURUS, Pocock.

*Naxia taurus*, Pocock, Ann. Mag. Nat. Hist. (6) v. p. 70 (1890); Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 219 (1895); Alcock & Anderson, Illustr. Zool. 'Investigator,' Crust. pl. xxxiii. figs. 5-5 a (1898).

*N. cerastes*, Ortmann, Semon's Zool. Forsch. Austral., v. Crust. p. 43, pl. iii. fig. 4 (1894); Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 220 (1895); Alcock & Anderson, Illustr. Zool. 'Investigator,' Crust. pl. xxxiii. figs. 2-2 a (1898).

Two male specimens, differing from Pocock's type in the much shorter rostral spines—about 6.5 mm. in a total length of 17 mm.—with the accessory spinules well in front of the middle of their length. The meral spines, large and conspicuous on the first pair of walking-legs, are all but obsolete on the succeeding pairs. In other respects these individuals do not differ materially from the type specimen. Of the two figures given by Alcock and Anderson our specimens resemble most that named *N. cerastes*, without agreeing precisely with either. It can hardly be doubted, however, that, as Alcock has suggested, *N. cerastes* is merely a variety of *N. taurus*.

*Locality.* "Channels between reefs, Mcr, 15-20 fath."

#### TYLOCARCINUS STYX (Herbst).

*Pisa styx*, Milne-Edwards, Hist. Nat. Crust. i. p. 308.

*Microphrys styx*, A. Milne-Edwards, N. Arch. Mus. Paris, viii. p. 247, pl. xi. fig. 4 (1872).

*Tylocarcinus styx*, Miers, Ann. Mag. Nat. Hist. (5) iv. p. 14 (1879); Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 235 (1895).

A single female specimen. The carapace is a little narrower than in Milne-Edwards's figure, but in other respects the specimen agrees perfectly with this and with Alcock's description.

*Locality.* "Murray Island, reef."

*Distribution.* Red Sea to Fiji.

PARAMITHRAX (CHLORINOIDES) COPPINGERI, Haswell.

*Acanthophrys aculeatus*, A. Milne-Edwards, Ann. Soc. Ent. France, (4) v. p. 140, pl. iv. fig. 4 (1865)  
(not *Chorinus aculeatus*, M.-E. Hist. Nat. Crust. i. p. 316).

*Paramithrax Coppingeri*, Haswell, Proc. Linn. Soc. N. S. Wales, vi. p. 750 (1881) \*; Haswell, Cat. Austr. Crust. p. 15.

*Paramithrax (Chlorinoides) Coppingeri*, Miers, Rep. Voy. 'Alert,' p. 192.

*Chlorinoides Coppingeri*, Miers, Rep. 'Challenger' Brachyura, p. 53, pl. vii. fig. 3.

A female specimen, about 6.5 mm. in total length, differs from Miers's figure and from specimens in the British Museum in having the rostral spines short (about one-fourth the length of carapace) and deflexed, and in having the supra-ocular hood deeply cut into three spiniform teeth, the middle one being reflexed at the tip. Miers's figure shows it as obscurely divided into two lobes, but Haswell's original description reads: "upper orbital border with three straight, acute, spinous teeth." Only one spine is present behind the double spines on the cardiac region, as in Miers's description and figure, but a small tubercle represents the second spine which Haswell describes.

The shape of the supra-orbital border in our specimen is very like that shown in Milne-Edwards's figure of *Acanthophrys aculeatus*, which in other respects resembles so closely Miers's figure of *P. Coppingeri* as to leave little room for the doubt which Miers appears to have had as to the identity of the two species. Haswell's name for the species, however, still holds good, since that employed by Milne-Edwards is pre-occupied by the next-mentioned species.

*Locality.* "Torres Straits."

PARAMITHRAX (CHLORINOIDES) ACULEATUS (Milne-Edwards).

*Chorinus aculeatus*, Milne-Edwards, Hist. Nat. Crust. i. p. 316.

*Paramithrax (Chlorinoides) aculeatus*, var. *armatus*, Miers, Rep. Voy. 'Alert,' p. 193, pl. xviii. fig. A.  
*Chlorinoides aculeatus*, Miers, Rep. 'Challenger' Brachyura, p. 53; Henderson †, Tr. Linn. Soc., (2) Zool. v. p. 345 (1893).

*Paramithrax (Chlorinoides) aculeatus*, Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 241 (1895).

A small female specimen appears to find its place among the variations of this species. There are, as usual, five spines on the mid-dorsal line of the carapace, but the spine which in the normal type occupies the middle of the posterior margin appears to be wanting,

\* This reference is given wrongly by Miers in the 'Challenger' Report.

† Henderson's remarks on Miers's variety *armatus* are based on an oversight of the fact that the figure in De Haan's great work, to which he refers, does not represent *P. aculeatus*, though so named on the plate, but De Haan's species *P. longispinus*.

the number being made up by the intercalation of a small spine just in front of the large one on the cardiac region. All the spines of the carapace are distinctly knobbed at the tip. The supra-ocular hood is deeply divided into two teeth, of which the anterior is acute and turned upwards and forwards while the posterior is truncate. The merus of the ambulatory legs bears two spiniform tubercles distally. The rostral spines are strongly divergent and hardly more than one-third of the length of the carapace.

*Locality.* "Torres Straits."

*SCHIZOPHRYS ASPERA* (Milne-Edwards).

*Mithrax asper*, Milne-Edwards, Hist. Nat. Crust. i. p. 320.

*Schizophrys aspera*, A. Milne-Edwards, N. Arch. Mus. Paris, viii. p. 231, pl. x. fig. 1 (1872); Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 243 (1895); Alcock & Anderson, Illustr. Zool. 'Investigator,' Crust. pl. xxxv. figs. 1, 1 a (1898).

One female and three male specimens, belonging to the typical form of this species as described by A. Milne-Edwards, having only one accessory spinule on each of the rostral horns. The largest male, 26 mm. in length, is still immature, the chelipeds being no longer than the succeeding legs. In the other two males, 17 and 12 mm. long respectively, the carapace is relatively narrower, and in the still smaller female the distance between the extra-orbital spines is hardly less than the greatest width of the carapace. In the small specimens the surface of the carapace between the large tubercles is quite smooth.

*Locality.* "Murray Island."

*CYCLAX SUBORBICULARIS* (Stimpson).

*Cyclomaia margaritata*, A. Milne-Edwards, N. Arch. Mus. Paris, viii. p. 236, pl. x. figs. 2-3 (1872).

*Cyclax suborbicularis*, Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 245 (1895).

An ovigerous female, 24 mm. in length.

*Locality.* "Murray Island."

*Distribution.* Red Sea to New Caledonia.

*PSEUDOMICIPPA VARIANS*, Miers. (Plate 2. figs. 25 & 26.)

*Pseudomicippe? varians*, Miers, Ann. Mag. Nat. Hist. (5) iv. p. 12, pl. iv. fig. 8 (1879).

*Pseudomicippe? varians*, Miers, Rep. Voy. 'Alert,' Crust. p. 197; Miers, Rep. 'Challenger' Brachyura, p. 68; Ortmann, in Semon's Forsch. Austr., Crust. p. 40.

Three male specimens, agreeing with Miers's types of this briefly described species, and showing the characters assigned by him to the male sex, the gastric region being but little elevated and the rostral spines not perceptibly deflexed.

The only point indicated by Mr. Miers as distinguishing this species from the *P. tenuipes* of A. Milne-Edwards (Ann. Soc. Ent. France, (4) v. p. 139, pl. v. figs. 2, 2 a, 1865) is the character of the sternal surface, which in the last-named species is stated to be "remarquable par l'existence à la ligne de jonction de chaque anneau de crêtes saillantes et légèrement granuleuses." In addition to this, however, certain small differences in

the arrangement of the tubercles on the carapace are apparent on comparing our specimens with Milne-Edwards's account. He states that the gastric region carries a median row of five tubercles flanked by two lateral pairs, but in the figure only four median tubercles are distinctly seen, and this is the case also in our specimens. Milne-Edwards further describes the cardiac region as "marquée de quatre petits tubercules placés de chaque côté de la ligne médiane," but his figure shows two median and two lateral tubercles. In our specimens there is only a bilobed median tubercle in the centre of the cardiac area. Between the main tubercles, and more especially on the branchial regions, the surface of the carapace is in our specimens rather uneven. The rostral spines are stated by Milne-Edwards to be cylindrical: the figure shows them as rather broad and apparently somewhat flattened and having the inner edge obtusely angled about the middle of its length. In the Torres Straits specimens these spines are more slender and cylindrical, tapering only very slightly to the bluntly rounded tip. In the structure of the orbital region, and in the presence of a large tubercle above the orbit external to the base of each rostral spine, our specimens agree closely with Milne-Edwards's species. In spite of the differences above enumerated, the general resemblance between the two species is so considerable that some doubt must still remain as to their distinctness.

Mr. Miers has indicated a doubt as to whether the present species is correctly referred to the genus *Pseudomicippa*. In the type species, *P. nodosa*, Heller (SB. Akad. Wien, xliii. (1) p. 301, pl. i. fig. 3), the rostrum is very strongly deflexed and the anterior angle of the orbit is produced into a long spine, while the basal antennal joint is shaped rather differently, its distal tooth being directed obliquely forwards instead of outwards as in the present form.

As regards the systematic position of the genus, Ortmann points out that it has been wrongly placed among the Maiidæ and has no affinity with *Micippa*. He would place it among the Inachidæ, either in the subfamily *Inachinæ* or the *Stenocinopinæ*. Miers, followed by Ortmann, had suggested that the form briefly described by Haswell as the type of a new genus under the name of *Microhalimus deflexifrons* (Proc. Linn. Soc. N. S. Wales, iv. p. 435, pl. xxv. fig. 2, 1879) might be identical with the present species. Alcock, in his classification of the Oxyrhyncha (Journ. Asiatic Soc. Bengal, lxiv. (2) pp. 164 & 166), retains *Microhalimus* and *Pseudomicippa* as distinct genera, placing the former in the "Alliance Inachoida" of his subfamily *Inachinæ*, while classing the latter in the "Alliance Stenocionopoida" of the subfamily *Maiinæ*. Alcock does not discuss these genera further, nor does he indicate to which of them the present species should be referred. It seems likely that *P. varians* should be generically separated from *P. nodosa*, and that its most natural position is that which Alcock assigns to *Microhalimus*. Haswell's figure shows, however, that *M. deflexifrons* is at least specifically distinct.

#### MICIPPA PHILYRA (Herbst).

*Micippa mascarenica* (Kossm.), Miers, Ann. Mag. Nat. Hist. xv. p. 7 (1885).

*M. philyra* (Hbst.), Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 249 (1895).

Three specimens agree very closely with Haswell's description and figures of his

*M. superciliosa* from Torres States (Pr. Linn. Soc. N. S. Wales, iv. p. 446, pl. xxvi. fig. 2, 1879), which is ranked by Alcock as a synonym of this variable and widely distributed species.

*Localities.* "Channel between reefs, Mer"; "Reef, Wyer."

TIARINIA ANGUSTA, Dana.

*Tiarinia angusta*, Dana, U.S. Expl. Exp., Crust. i. p. 113, pl. iii. figs. 7 a-b.

*T. spinirostris*, Haswell, Cat. Austr. Crust. p. 28; Ortmann, Zool. Jahrb. Syst. vii. p. 62 (1893).

*T. angusta*, De Man, Zool. Jahrb. Syst. viii. p. 492, pl. xii. fig. 2 (1895).

Our three specimens (2 ♂, 1 ♀) agree closely with Haswell's description of his *T. spinirostris* (which De Man regards as synonymous with Dana's species), save that in the female specimen there are four spines instead of three on the outer margin of each of the rostral horns. De Man figures a specimen with four spines on one side and three on the other, and he describes also a female specimen with only two spines on each side. The carapace of our largest (female) specimen measures 45 mm. in length by 27 mm. in breadth. De Man's largest specimen was 27 mm. long and 14.5 mm. wide. Dana's specimen was only 6 lines long and 2½ lines wide. Haswell gives no dimensions.

*Locality.* "Murray Island."

LAMBRUS (AULACOLAMBRUS) HOPLONOTUS, Adams & White, *var. ?*

*Lambrus hoplonotus*, Adams & White, Voy. 'Samarang,' Crust. p. 35, pl. vii. fig. 3; Miers, Ann. Mag.

Nat. Hist. (5) iv. p. 22 (1879); Miers, Rep. Voy. 'Challenger,' Brachyura, p. 98; Alcock,

Journ. Asiatic Soc. Bengal, lxiv. (2) p. 273 (1895).

A male specimen, 9 mm. in length, is probably to be referred to "this protean species," as Miers calls it. It differs considerably from the figure of Adams and White, the whole anterior part of the carapace being much narrower and more produced, and the rostrum projecting well in front of the orbits. There is a slight postorbital constriction, followed by a sharp hepatic tooth, which is longer than the succeeding spiniform teeth of the lateral margins. The granules on the surface of the carapace are acute and spiniform. Our specimen agrees pretty closely with some referred by Mr. Miers to his variety *longiocularis*, which "is best distinguishable by the subspiniform tubercles of the branchial regions" ('Challenger' Brachyura, p. 99), the greater protrusion of the eyes being, I believe, quite an accidental circumstance.

*Locality.* "Torres Straits."

LAMBRUS (PARTHENOLAMBRUS) CALAPPOIDES, Adams & White.

*Parthenope calappoides*, Adams & White, Rep. Voy. 'Samarang,' Crust. p. 34, pl. v. fig. 5.

*Lambrus (Parthenolambrus) calappoides*, Alcock, Journ. Asiatic Soc. Bengal, lxiv. (2) p. 275 (1895).

Our single specimen, a male, is only about 7.5 mm. in length, and the points of difference from the figure of Adams and White are probably due to its small size. The surface is rather smoother, the incision marking off the hepatic prominence posteriorly is hardly perceptible, and the posterior edge of the carapace is more regularly crenated.

*Locality.* "Channel between reefs, Mer."



LAMBRUS (PARTHENOLAMBRUS) CONFRAGOSUS, n. sp. (Plate 3. figs. 27 & 28.)

*Description of female.* Carapace roughly triangular in outline, about as long as broad. Rostrum truncated and considerably deflexed. Hepatic regions projecting in the form of a vertically compressed, narrow, bluntly pointed tooth. In front this tooth is defined by a deep notch separating it from the postorbital angle, and behind a shallower excavation marks it off from the convex, crenated, lateral margin. The postero-lateral corners are produced into short, blunt spines. The posterior margin is irregularly toothed, with a marked excavation on either side a little way from the outer end and an obtuse median angle, which projects well beyond the line joining the postero-lateral corners. The surface of the carapace is very uneven and irregularly granulated and pitted. The gastric and cardiac regions rise each into a short, blunt spine, and a smaller spine or large tubercle lies between the cardiac spine and the posterior margin. The branchial regions are inflated, topped with oblique crests of granules, and separated from the median regions of the carapace by well-marked grooves, which sink into deep fossæ on either side of the gastric and cardiac regions.

The chelipeds are very heavy, slightly unequal, and about one and a half times the length of the carapace. The merus is irregularly toothed along its anterior and posterior borders. The hand bears on its outer (or upper) margin two thin, rounded, cristiform lobes, of which the larger is close to the proximal end. The upper surface carries an oblique and irregularly toothed crest, and is elsewhere unevenly granulated. The fingers are rather less than half the length of the palm, and the dactylus is toothed and granulated on its outer (or upper) margin near the base. The ambulatory legs are much compressed, with the upper and lower margins of the joints serrate.

Length of carapace 15 mm.

A second specimen, only 8 mm. long, probably belongs to the same species. The carapace is a little longer than broad, the rostrum is tridentate and even more strongly deflexed than in the specimen above described. The hepatic prominences, though very well-marked, are not so much compressed and dentiform. The surface of the carapace is smoother, and the crenations of the lateral margins less numerous. The chelipeds are rather more slender, and there is only one cristiform lobe on the outer edge near the base.

The species described above, which I suppose to be new, resembles in general form the *L. tarpeius* of Adams and White, but differs from it in the much more rugged surface of the carapace, in the compressed dentiform shape of the hepatic prominences, and in the armature of the chelipeds, which in the last-named species lack the flattened cristiform lobes on the outer margin of the hand. Many species, however, of this extensive genus are known to vary within wide limits, and it is possible that a larger series of specimens than has been accessible to me would unite the present form with one or other of the species already described.

*Locality.* "Channel between reefs, Mer."

## HAPALOCARCINUS MARSUPIALIS, Stimpson. (Plate 3. figs. 29-40.)

*Hapalocarcinus marsupialis*, Stimpson, Proc. Boston Soc. Nat. Hist. vi. 1856-59, p. 412; Semper, 'The Natural Conditions of Existence as they affect Animal Life' (London, 1881: Internat. Sci. Series), pp. 216 *et seq.*, fig. 64 c.

*Description of female.* The carapace is soft and membranous, depressed, broadly oval in outline and truncated in front and behind. The breadth is equal to or a little less than the length. The front is slightly deflexed, obscurely tridentate, the median tooth being sharp and separated by a shallow concavity on either side from the rounded lateral corners. There are no true orbits, the space occupied by the eye being quite undefined above and externally, while below the eye rests directly on the everted anterior margin of the buccal frame. The lateral margins of the carapace are rounded off dorso-ventrally and evenly arcuate from before backwards. The posterior margin is concave and is about three-fifths as long as the anterior margin. The surface of the carapace is perfectly even, without any perceptible furrows, and is smooth except for a few minute and widely-scattered setæ.

The abdomen consists of seven distinct segments, of which the first is partly concealed under the posterior margin of the carapace. The first three segments are visible from above, and are hardly more than half the width of the carapace. The remaining four segments are bent under the body, and form a broad oval plate about equal in size to the carapace. The middle part of this plate, formed by the terga of the four segments, is of somewhat firm consistency and is surrounded by a wide membranous border, which at the sides is folded inwards to form the lateral walls of the capacious egg-pouch. The surface of the abdomen, like that of the carapace, is beset with minute scattered setæ.

The ocular peduncles are relatively large, subconical, not lying in distinct orbits. The corneal surface is faceted, but, in our specimens, devoid of pigment. The antennules are large and exserted, there being no fossettes for their reception. The basal joint is produced externally into a large conical process directed obliquely forwards and terminating in a stout spine. The two succeeding joints are stout, cylindrical, and subequal in length, the distal one carrying the two rudimentary flagella, each consisting of a few joints and clothed with numerous long setæ. The antennæ consist of five joints, of which the first is broad and triangular and the succeeding joints narrow, cylindrical, and successively diminishing in diameter, the last being hardly thicker than the long seta which springs from its tip. The buccal area is very large, extending across the whole width of the carapace in front. Its anterior margin is sinuous, curving forwards on either side below the eye, and taking the place usually occupied by the inferior margin of the orbit. The median part of the buccal margin approaches so closely to the base of the antennules that an epistome can hardly be said to exist. The third maxillipeds do not nearly cover the buccal cavity, and are widely separated from each other at the base by a semicircular area of the sternum. The ischium is flattened, subtriangular in shape, widening gradually from a narrow base, and having its antero-internal angle produced forwards, rounded, and fringed with setæ. The merus is articulated at the outer end of the distal

margin of the ischium, and is less than half the width of the latter, hardly wider than the succeeding joints, and but little flattened. The exopod is rudimentary, being a simple lobe about half the length of the ischium. The epipod is well-developed. The second maxillipeds have the basal part of the exopod much expanded. In the first maxillipeds, also, the same part is very stout and much stronger than is usual in this appendage, while the inner lobe or endopod is small and subtriangular. The chelipeds are rather stout, about twice the diameter of the succeeding legs, and smooth save for scattered setæ similar to those on the carapace. The merus has a small spine near the distal end of the inner margin. The hand is not much thicker than the preceding joints. The palm is less than twice as long as broad, nearly twice as long as the fingers. The dactylus has a single tubercle on its inner edge. The walking-legs are not at all concealed by the carapace. The first three pairs are about equal in length to the chelipeds and the last pair is a little shorter. The dactyli are strong and curved, and bear a low tooth on the inner edge near the tip. The legs bear scattered setæ, which are larger and more numerous than are those on the body. The abdominal appendages are reduced to three pairs, corresponding to the second, third, and fourth abdominal somites. They are uniramous with the exception of the first, which carries on the outer side near the base a small unjointed appendage which appears to represent the exopod.

The female generative apertures are crescentic in form, and are situated on the sternum, far apart from each other, close to the bases of the third legs.

The dimensions of our two specimens are as follows:—

Length of carapace .....	2·6 mm.	2·7 mm.
Breadth „ .....	2·4 „	2·7 „
Length of cheliped.....	.....	3·0 „
„ chela .....	.....	1·3 „
„ fingers .....	.....	·5 „
„ last leg .....	.....	2·6 „

Stimpson's brief description applies very well, on the whole, to the specimens examined by me. The most serious discrepancy is that the exopod of the third maxillipeds is described as "slender and palpigerous." It seems quite possible, however, that in examining the entire animal the rudimentary exopod of this appendage may have been overlooked, and the more conspicuous exopod of the second maxilliped may have appeared to belong to the third. The antennules are stated to be "very short and minute," but as they are said to be "placed at the inner angle of the orbit," it seems not unlikely that these epithets should be transferred to the antennæ, to which they are more applicable. Some other less important differences, such as the description of the front as "straight," may reasonably be attributed to imperfect observation. On the other hand, the description of the general shape, the large abdomen, the large buccal area occupying nearly the whole breadth of the carapace, the third maxillipeds with "the ischium large and dilated within, while the merus is very small and slender like the last three joints," and several other details can apply to no other crustacean, and leave no doubt that we are dealing with Stimpson's species.

So far as I can discover, no further description of this remarkable form has been published. Semper gives a figure of it, but it is on too small a scale to be of much use. It represents the carapace as proportionately broader than in our specimens. All the recorded specimens have been females.

The peculiar habitat of this Crab was unknown to Dr. Stimpson, who states that his specimens were found "clinging to the branches of living madrepores at the depth of one fathom in the harbour of Hilo, Hawaii."

Ehrenberg had long before noticed certain deformities on corals caused by the presence of crustacea, and had compared them to the galls formed by plants. In his work on the Corals of the Red Sea he writes of the species *Seriatopora subulata*, Lamk.:—"Paguri parvi (*P. coralliophilos*) domicilia in ramis efflorescentibus sibi parant, et veras gallas fere eliciunt, quales plantæ gerunt" (Beitr. z. Kennt. Korall. roth. Meeres, p. 123). I am not aware that Ehrenberg's "*Pagurus*" has since been recognized, or that any other Pagurid has been found inhabiting coral-galls, so that it is possible that Ehrenberg's remarks may really refer to the present species\*. Be this as it may, Verrill was the first to definitely associate these coral-"galls" with Stimpson's *Hapalocarcinus*. In a paper on "Remarkable Instances of Crustacean Parasitism" (Amer. Journ. Sci. (2) xlv. 1867, p. 126) he writes:—"Another peculiar mode of parasitism I have observed in a singular crustacean (*Hapalocarcinus marsupialis*, Stimpson) from the Sandwich Islands. This creature lodges itself among the slender branches of a coral (*Pocillopora cæspitosa*, Dana), and causes, probably by its incessant motions, the branches to grow up and surround it on both sides by flat expansions of coral terminating in digitations which often interlock above, leaving openings between them suitable for the uses of the parasite but usually too small to allow of egress. Most specimens of the corals of this species sustain one or more and often numerous examples of these curious enlarged bulbs among the branches." In a subsequent paper "On the Parasitic Habits of Crustacea" (Amer. Nat. iii. 1869, p. 239), Prof. Verrill adds that he had "observed similar cavities on *Pocillopora elongata* from Ceylon, which are probably made by another species of the same genus." In his "Synopsis of the Polyps and Corals of the North Pacific Exploring Expedition" (Proc. Essex Inst. vi. (1868) 1870, p. 91), the same writer records the occurrence of galls on most of the specimens of *Pocillopora cæspitosa*, Dana, from the Hawaiian Islands, and he also writes of *P. brevicornis*, Lamk.:—"One specimen has a bulb similar to those made by *Hapalocarcinus marsupialis*, but belonging probably to another species of the same genus, since it differs considerably in form. The aperture is closed except a few small openings above."

In the general account of his researches in the Philippine Islands (Zeit. wiss. Zool. xiii. 1863, p. 560), Semper has a note on a small "*Porcellana*" which he found living in cavities in a "millepore." In his work on "The Natural Conditions of Existence as

\* I learn from Mr. R. Kirkpatrick, who has been kind enough to find the above quotation for me, that Klunzinger refers to Ehrenberg's observations, and gives a figure of the galls on the same species of coral (which he refers to *S. spinosa*, M.-E. & H.) without, however, giving any details as to the parasite (Korall. roth. Meer. ii. p. 72, pl. vii. fig. 15).

they affect Animal Life' (1881) this Crab is identified with the present species, and a fuller account is given of the "galls" formed by it. These were found on the corals *Sideropora digitata* and *S. palmata* and on species of *Seriatopora*. He describes the formation of the gall by the growth of two broad flattened branches, and notes that the shape differs according to the species of the coral. "In the *Seriatopora* both the twigs are leaf-shaped and beset with more or less numerous offshoots terminating in sharp spines. In the more solid *Pocillopora* the twigs also have spines, but they are more massive. Finally, in *Sideropora* spines are wholly absent, and the two twigs between which the crab lives are altogether more massive." He describes the gradual closure of the gall by conrescence of the edges, "till at length only two fissures, more or less wide, are left, which plainly show, by their position opposite to each other, that it is through them that the current for respiration passes: one fissure serves for the influx, the other for the exit, of the water;" and reasons are given for believing that these fissures are kept open owing to the current of water checking the growth of the coral so long as the crab remains alive.

Semper states that a *Hapalocarcinus*, "it would seem identical in species," occurs at Réunion (p. 281), but I can find no other record of its occurrence there. He also mentions (pp. 217 & 453) certain observations by Graeffe, but no reference is given, and I have failed to trace the source from which he quotes\*.

Bassett-Smith † has described galls formed by a crab on *Seriatopora imbricata*, B.-S., from the Tizard Bank in the China Sea. The crab is not described, but it probably belonged to the present species.

Hickson ‡ has described and figured galls on a *Millepora* containing a crab which he assumes to be *Hapalocarcinus*. The galls are unlike those described by the authors quoted above, being inflated bulbs with a single, wide, terminal aperture.

The series of galls examined by me are formed on a species of *Seriatopora* §, and the mode of growth agrees well with the descriptions of Verrill and Semper. The earliest stage is represented by a specimen (fig. 38) in which the gall is beginning to be formed at the point of bifurcation of a branch. A broad palmate process, slightly concave internally,

\* As certain passages from Semper's work have recently been quoted, without correction, by Hickson, it may not be superfluous to point out that the English edition of this work (I have not been able to consult the German edition) abounds in typographical and other errata. Thus, on p. 216, the date of Stimpson's paper is given as 1837 (Stimpson was born in 1832) instead of between 1856 and 1859. On p. 217 it is stated that the present species was "discovered in the Pacific Ocean by Dana in the course of his great voyage under the command of Wilkes." As a matter of fact, the specimens were collected (no doubt by Stimpson himself) during the U.S. North Pacific Surveying Expedition under Capt. John Rodgers. The incidental references to the carrying of the *young* in the brood-pouch (p. 217) and to the course of the respiratory current (p. 219) are our only authority for believing that *Hapalocarcinus* differs in these respects from the majority of the Brachyura. In the explanation of fig. 65 (p. 218) *Sideropora hystrix* should probably read *Seriatopora hystrix*.

† Ann. Mag. Nat. Hist. (6) vi. 1890, p. 364.

‡ Bull. Liverpool Mus. i. nos. 3 & 4, pp. 81-82, plate.

§ Prof. F. Jeffrey Bell, who has kindly examined my specimens, informs me that their fragmentary nature renders an exact determination difficult, but that they seem to approach most closely to *S. elegans*, M.-E., though differing from it in certain characters.

forms one side of the cavity in which the parasite was lodged, the other side being formed by an expansion of the opposed part of the main branch, at the sides of which lobate projections are beginning to develop. A considerably more advanced gall is shown in fig. 39. Here the gall is terminal in position and is roughly lenticular in form, the two digitate lobes which compose it being perforated by fissures and only touching each other here and there at the edges. A still older gall (fig. 40), occupying a lateral position on a branch, is closed except for two or three very small apertures at or near the margin. These apertures are not placed regularly opposite to each other as Semper states. On the outer surface of the gall the calicles are rather smaller than those on the normal branches and are not arranged like them in series, but appear to be otherwise well developed. On the inner surface of the gall the calicles, as Semper states, are small, shallow, and have the septa only feebly developed. They are also in some parts distorted and drawn out to an elliptical outline, but this distortion does not appear to be definitely related to the marginal apertures of the gall as described by Semper, who attributes it to the action of the current of water caused by the crab. Semper also found on the inner surface "very distinct scars, which are evidently produced by continual scratching in one spot," and he concludes that the crab usually remains in one position within the gall. Such scars are not visible in our specimens. In the older galls the outer surface rises into rounded, irregularly placed swellings and short branches, as if the coral were about to resume the normal habit of growth disturbed by the intrusion of the parasite.

From Semper's earlier note we gather the not uninteresting detail that the polypes on the inner surface of the gall are colourless.

As regards the further habits and life-history of *Hapalocarcinus* we have no information. The fact that each gall is inhabited by a solitary female, while the male is as yet unknown, would seem to indicate that both sexes are at first free-living, and that it is only after impregnation that the female becomes imprisoned in a gall. The fact that the youngest gall observed is of ample size to contain a full-grown *Hapalocarcinus* tends to confirm this suggestion.

As regards the systematic position of *Hapalocarcinus*, we have to note in the first place its close affinity with the *Cryptochirus coralliodytes* of Heller ("Beitr. z. Crust. Fauna d. roth. Meeres," SB. Akad. Wien, xliii. (1) 1861, p. 366, pl. ii. figs. 33-39). As Semper has shown ('Animal Life,' pp. 217, 221-223)\*, *Cryptochirus*, like *Hapalocarcinus*, is parasitic on living corals. In this case, however, no closed "galls" are formed, the crab living in massive corals (ex. *Goniastrea*,) at the bottom of a funnel-shaped depression, due to an arrest of the upward growth of the coral. The affinity between the two genera is most clearly shown by the third maxillipeds, which in both cases are peculiar in having the merus-joint very narrow and the exopod rudimentary. The structure of the facial region is somewhat similar in both, the antennules not being retractile into fossettes, while the antennæ are very small and the orbits ill-defined. The abdomen of the female in both genera is much enlarged, but in *Cryptochirus* it lies

\* Semper's figure of *Cryptochirus* differs considerably from those given by Heller. He states, however, that the Philippine form "appears to be in no respect specifically different" from that found in the Red Sea (*op. cit.* p. 281).

wholly behind the carapace, and is bent upon itself so as to form a deep pouch, open only in front, while in *Hapalocarcinus* it is flexed under the body in the manner usual among the Brachyura. Among other differences the orbits of *Cryptochirus* are defined externally by a strong tooth, and the basal joint of the antennules presents a serrate edge anteriorly where that of *Hapalocarcinus* has only a stout dentiform lobe.

In describing *Hapalocarcinus*, Stimpson noted its resemblance to *Pinnotheres* in the large size of the abdomen and the softness of the integument, and he stated that its systematic position was probably between *Pinnotheres* and *Hymenosoma*. Apart from the two points mentioned, there seems to be little in the characters of the species as now described to suggest affinity with the Pinnotheridæ, while the third maxillipeds are widely different in type from anything found in that group.

Heller expressed no opinion as to the systematic place of his *Cryptochirus*.

A. Milne-Edwards, however, has described under the name *Lithoscaptus paradoxus* (in Maillard's 'Notes sur l'Île de la Réunion,' 2<sup>m</sup> éd., 1863, ii. Annexe F, pp. 10-12), a form which, as Paulson has already pointed out, is in all probability identical with, or closely allied to, Heller's species. This genus was regarded by Milne-Edwards as representing a new family, "Lithoscaptes," among the "Brachyures anormaux." He writes, "par sa région céphalothoracique le Lithoscapte se rapproche des Ranines plus que tout autre groupe de Décapodes." Special resemblances to the Raninidæ are said to exist in the structure of the antennal region and in the shape of the thoracic sternal region, which is broad in front but much contracted between the bases of the last two pairs of legs. It is not clear, either from Milne-Edwards's or from Heller's accounts (supposing the two genera to be identical), in what way the antennal region resembles that of the Raninidæ, while the thoracic sternum is not contracted posteriorly, at all events in the female *Hapalocarcinus*. Heller describes the sternum of *Cryptochirus* as "ziemlich breit, länglich oval." The third maxillipeds are said by Milne-Edwards to resemble a little those of *Remipes*, but this resemblance appears to consist merely in the absence of a conspicuous exopod. Milne-Edwards describes the abdominal appendages as uniramous and as existing on the first four somites. According to Heller there are only three pairs, and this agrees with our examination of *Hapalocarcinus*.

Paulson refers *Lithoscaptus* (= *Cryptochirus*) to the Pinnotheridæ, establishing for its reception a new subfamily, which he designates *Crypochirinæ* and defines as follows:—"Cephalothorax convex, almost twice as long as broad. Inner antennæ without fossettes and lying longitudinally. Basal portion of the outer antennæ free. Third joint of the outer maxillipeds considerably shorter than the second. Openings of the female sexual organs on the sternum" ('Crust. Red Sea,' Kiev, 1875, p. 72).

While the characters of *Hapalocarcinus*, as now described, show clearly that it must stand alongside *Cryptochirus*, they give little help towards settling the place of the two genera in the system. The position of the female genital apertures shows that they must be placed among the true Brachyura, although there are some curious resemblances to individual genera of the Anomura. Thus the endopod of the third maxillipeds



resembles somewhat that of *Porcellana*, while the rudimentary exopod suggests a comparison with the *Hippidea*. The number and uniramous condition of the abdominal appendages also agree, except for the absence of the sixth pair, with the last-named group. These resemblances, however, are balanced by numerous important differences, so that even were we to set aside the evidence of the genital openings, it would be impossible to place the genera in any of the groups of Anomura. On the other hand, the characters of the third maxillipeds and of the abdominal appendages and the greatly enlarged buccal area are unlike anything found among the Brachyura. The resemblance to the Pinnotheridæ appears to be quite superficial.

The characters usually relied upon to distinguish the various divisions of the Brachyura have been in this case apparently so profoundly modified by the parasitic habit of life, that we can only regard these two genera as forming a family for the present *incertæ sedis*, for which the name Hapalocarcinidæ will have to replace Milne-Edwards's "Lithoscaptes," the latter being based on a synonym of *Cryptochirus*.

*Locality.* "Torres Straits."

*Distribution.* *Hapalocarcinus* is recorded by name from Hawaii (*Stimpson, Verrill*), the Philippines, and (?) Bourbon (*Semper*). Coral-galls, possibly due to this species, are known from the Red Sea (*Ehrenberg, Klunzinger*), Ceylon (*Verrill*), and the China Sea (*Bassett-Smith*).

## EXPLANATION OF THE PLATES.

### PLATE 1.

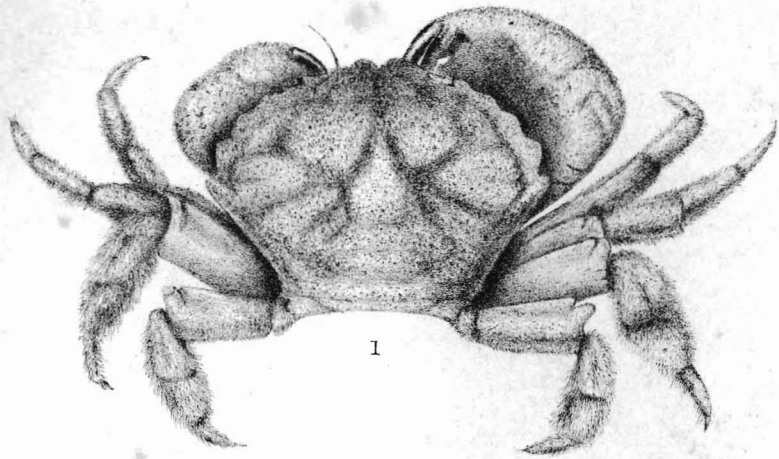
- Fig. 1. *Pilumnus cristipes*, n. sp., ♀ (enlarged).  
 2. " " " Cephalic region from below.  
 3. " " " Right chela.  
 4. *Cryptocnemus Haddoni*, n. sp., ♀. Dorsal view, × 6.  
 5. " " " Ventral view.  
 6. " " " Lateral view.  
 7. " " " Third maxilliped, inner face.  
 8. " " " Chela.  
 9. *Palicus Jukesii* (White), ♂, × 5.  
 10. " " " Cephalic region from below.  
 11. " " " Abdomen.  
 12. " " " Second walking-leg from below.  
 13. " " " First abdominal appendage.

## PLATE 2.

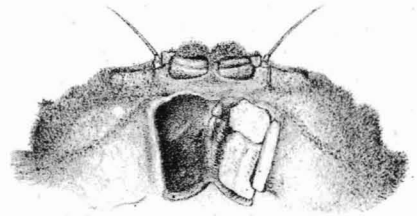
- Fig. 14. *Palicus Whitei* (Miers), ♀, × 3½.  
 15. " " " Cephalic region from below.  
 16. " " " Abdomen, ♀.  
 17. " " " Abdomen, ♂.  
 18. " " " Second walking-leg from below.  
 19. " " " First abdominal appendage, ♂.  
 20. *Palicus serripes* (Alc. & And.), ♀, × 4.  
 21. " " " Cephalic region from below.  
 22. " " " Second walking-leg from below.  
 23. *Hyastenus verrucosipes* (Ad. & Wh.). Dorsal view (setæ omitted), × 5.  
 24. " " " Cephalic region from below.  
 25. *Pseudomicippa varians*, Miers, × 4.  
 26. " " " Cephalic region from below (setæ omitted).

## PLATE 3.

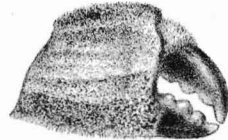
- Fig. 27. *Lambrus confragosus*, n. sp., × 2½.  
 28. " " Outline from side.  
 29. *Hapalocarcinus marsupialis*, Stimpson, ♀. Dorsal view, × 13.  
 30. " " " Ventral view.  
 31. " " " Ventral view of cephalic region.  
 32. " " " Antennæ and antennules.  
 33. " " " First maxilliped.  
 34. " " " Second maxilliped.  
 35. " " " Third maxilliped.  
 36. " " " Chela.  
 37. " " " Dactylus of last walking-leg.  
 38. Branch of *Seriatopora* sp., showing at \* beginning of "gall" formed by *Hapalocarcinus*.  
 39. A more advanced "gall," still widely open at edges.  
 40. A "gall," closed all round except for a few small apertures marked \*.



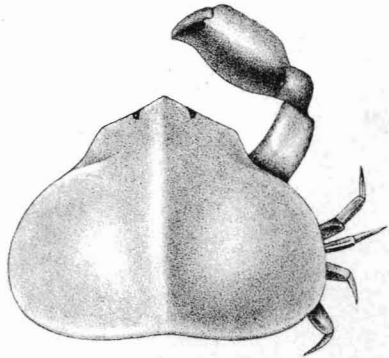
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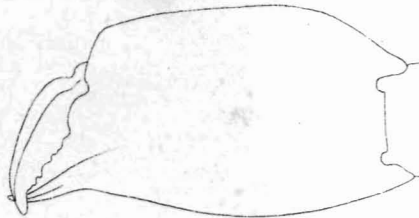
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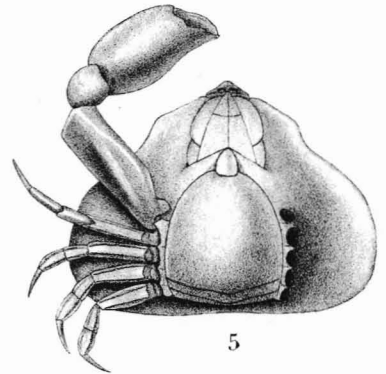
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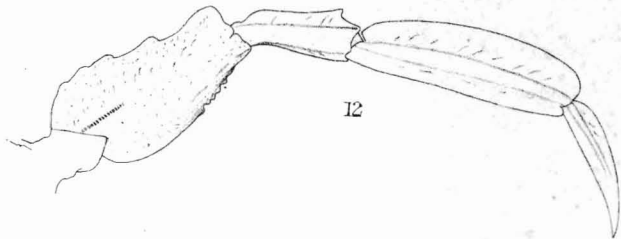
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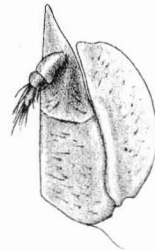
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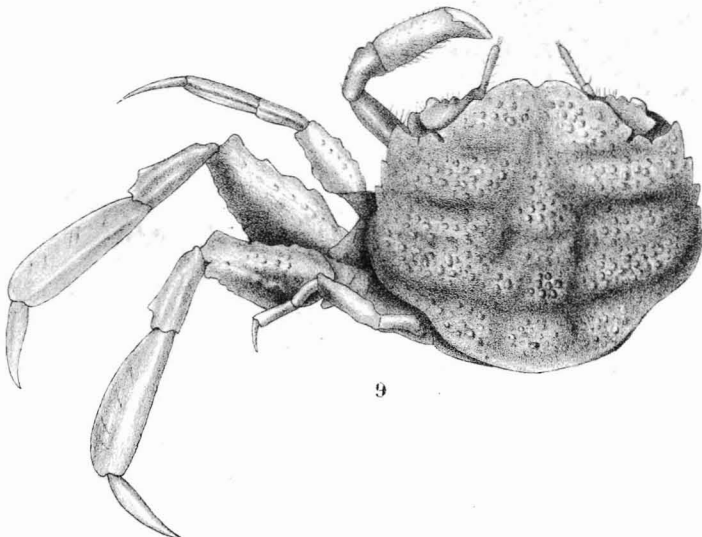
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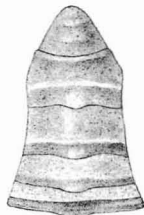
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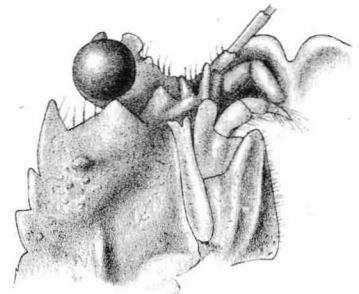
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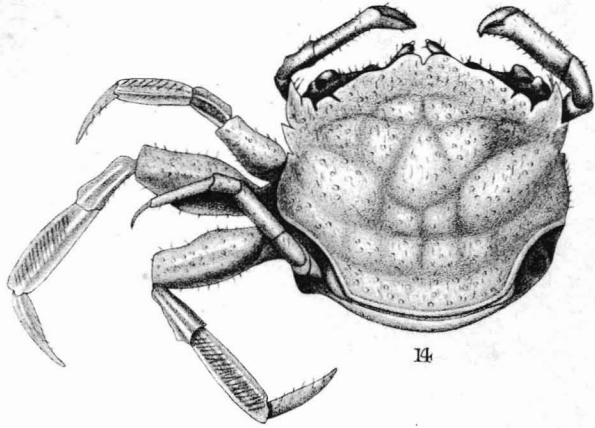


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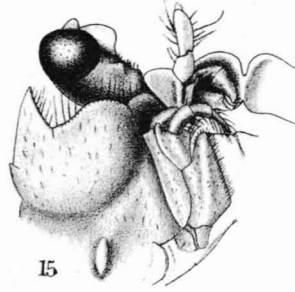


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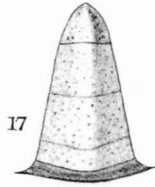
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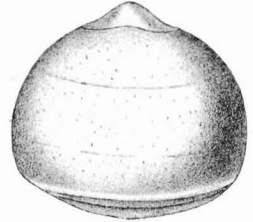
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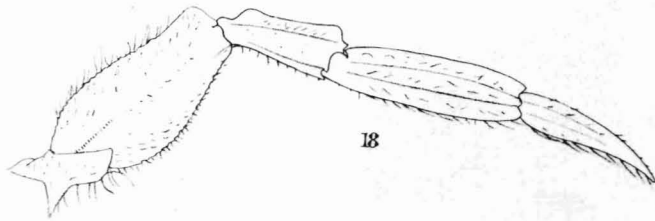
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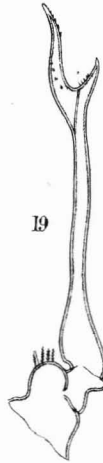
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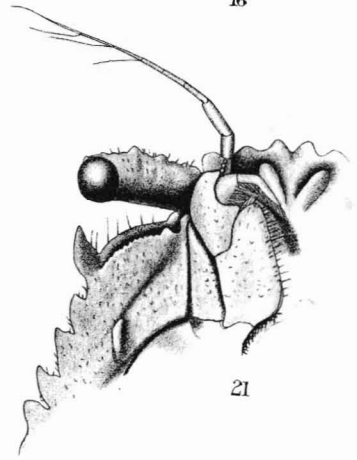
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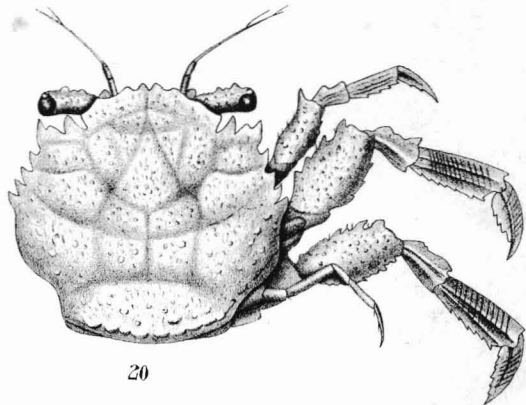
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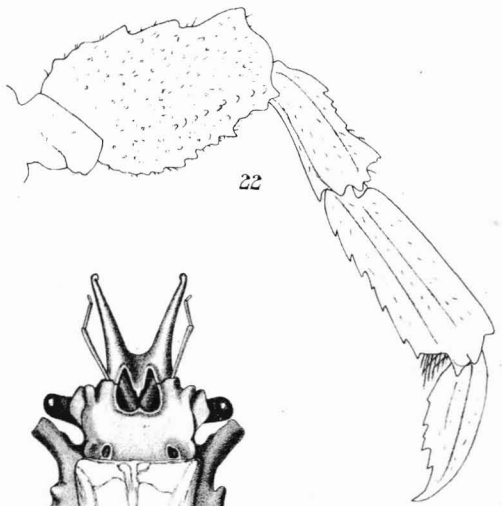
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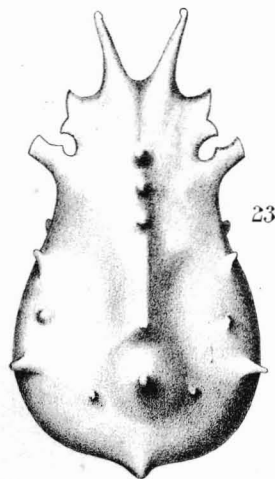
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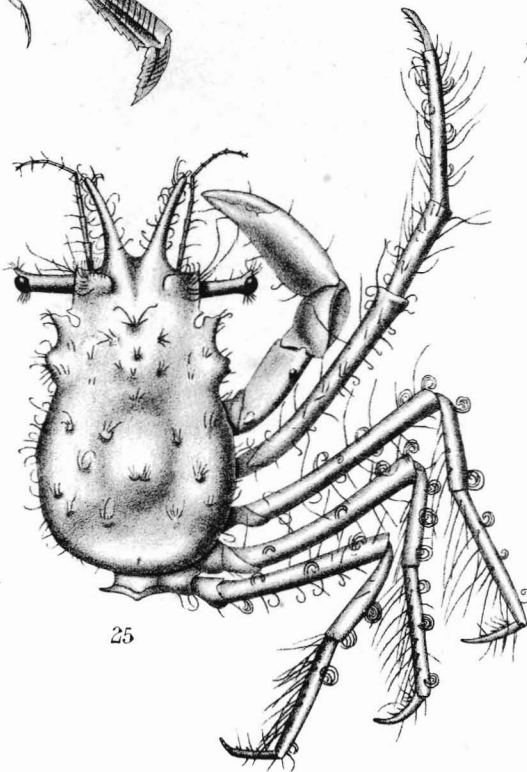
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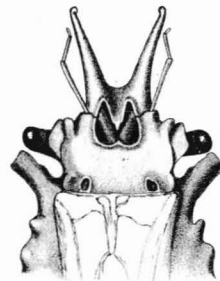
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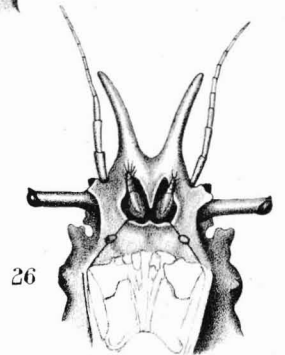
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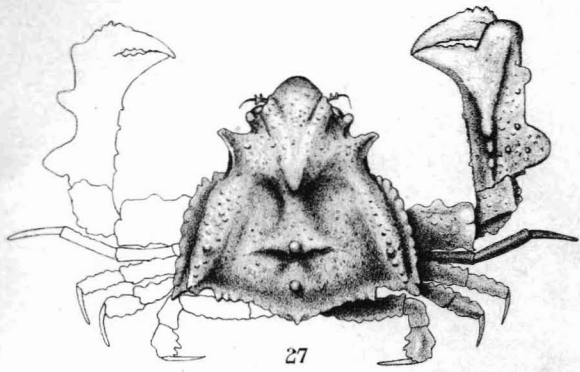


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W.T.C. del.  
M.P. Parker lith.

BRACHYURA FROM TORRES STRAITS.

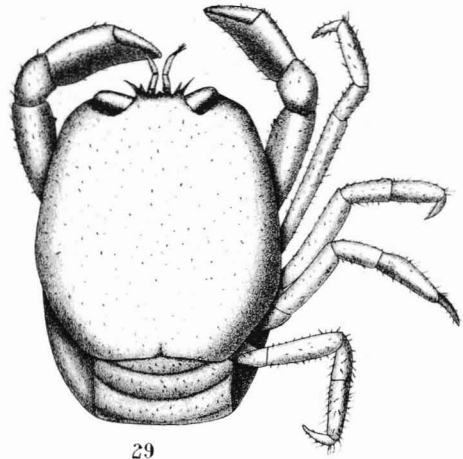
Geo West & Sons imp.



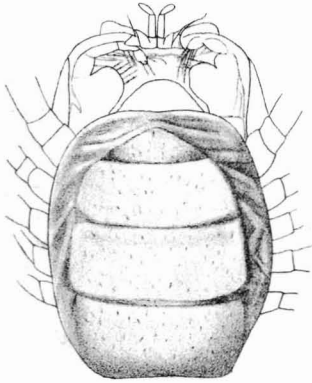
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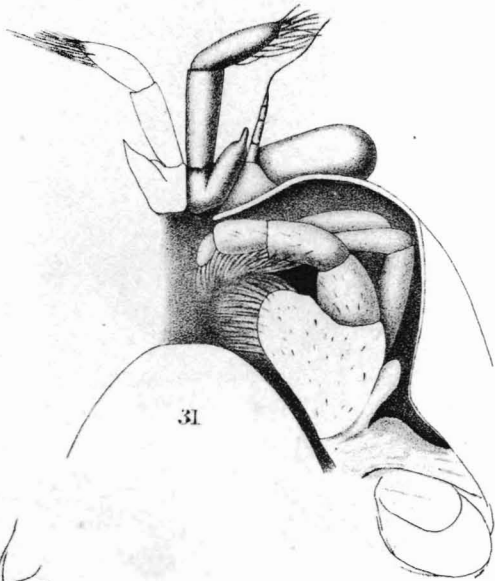
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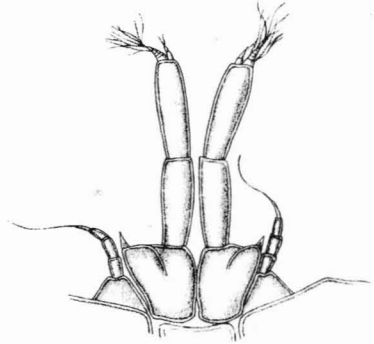
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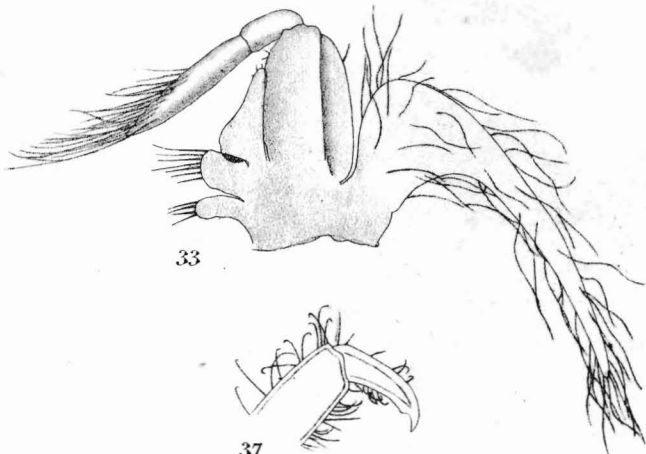
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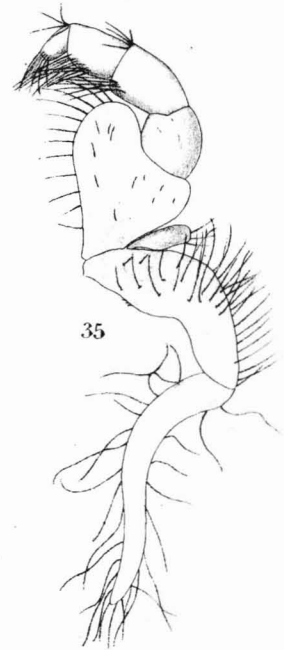
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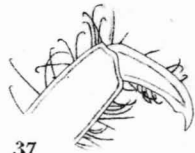
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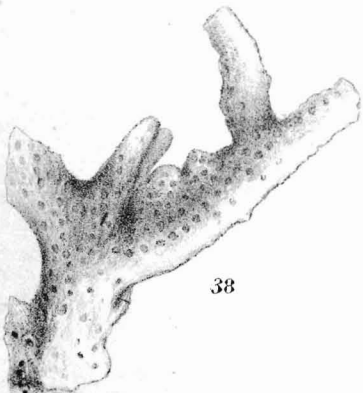
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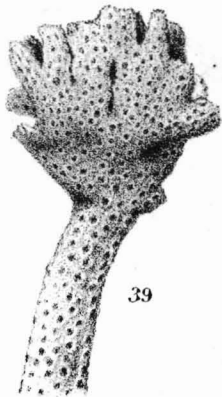
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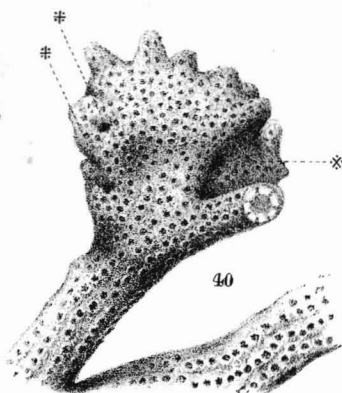
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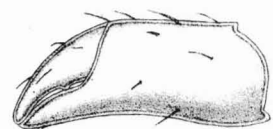
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36

W.T.C. del.  
M.P. Parker lith.