



RESULTATS DES EXPLORATIONS
ZOOLOGIQUES, BOTANIQUES, Océanographiques ET Géologiques

ENTREPRISES AUX
INDES NÉERLANDAISES ORIENTALES en 1899—1900,
à bord du **SIBOGA**

SOUS LE COMMANDEMENT DE
G. F. TYDEMAN
PUBLIÉS PAR
MAX WEBER
Chef de l'expédition.

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THE DECAPODA BRACHYURA OF THE SIBOGA EXPEDITION

BY

DR. J. J. TESCH

Leiden

I

**HYMENOSOMIDAE, RETROPLUMIDAE, OCYPODIDAE,
GRAPSIDAE AND GECARCINIDAE**

With 6 plates

Monographie XXXIX^c of:

**UITKOMSTEN OP ZOOLOGISCH,
BOTANISCH, Océanographisch EN Géologisch GEBIED**

verzameld in Nederlandsch Oost-Indië 1899—1900

aan boord H. M. Siboga onder commando van
Luitenant ter zee 1^e kl. G. F. TYDEMAN

UITGEGEVEN DOOR

Dr. MAX WEBER

Prof. in Amsterdam, Leider der Expeditie

(met medewerking van de Maatschappij ter bevordering van het Natuurkundig
Onderzoek der Nederlandsche Koloniën)

INVERTEBRATE
ZOOLOGY

Crustacea

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LATE E. J. BRILL
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INTRODUCTION.

"In the vast extension . . . which marine Zoology has for some time past been receiving, some retardation in the stream of discovery may not be unwelcome to the systematist. Familiar forms which would otherwise amply repay a thorough reinvestigation are apt to be thrust on one side, when striking novelties are for ever appealing to be introduced".

TH. R. R. STEBBING, Stalk-eyed Crustacea Malacostraca of the Scottish National Antarctic Expedition. *Transact. Roy. Soc. Edinburg*, v. 50, prt 2, n^o 9, 1914, p. 253.

With Prof. WEBER's kind permission and the ready consent of Dr. IHLE I have been entrusted with the task of working up a part of the Brachygnathous Crustacea Decapoda of the "Siboga" Expedition. The present paper deals with 5 families: Hymenosomidae, Retroplumidae (= Ptenoplacidae), Ocypodidae, Grapsidae and Gecarcinidae, viz. the bulk of the large group commonly known as Catometopous Crabs.

The families enumerated yielded 68 species in all and only 4 of them are new to science. This fact may seem disappointing, in view of the large series of new forms, continuously appearing in almost every larger group of marine Evertibrata secured by the expedition, but is not to be wondered at. Firstly the Ocypodidae, Grapsidae and Gecarcinidae are, as is well-known, inhabitants of the beach, of mouths of rivers and brooks, and of the jungle near the shore, and the "Siboga", devoting most of her labour to deep-sea working, only occasionally collected terrestrial and fresh-water animals. And secondly the scarcity of new species may readily be explained by the very habits of the three families, the species of which are generally largely represented in such collections as are gathered by naturalists of tropical regions, who have no particular means at their disposal of investigating the deeper and more inaccessible regions of the sea; and collectors as BROCK, STORM, SEMPER, KÜKENTHAL a. o. have made us acquainted in more recent years with a rather large number of new species of the said families, so that the chance of discovering novelties in this regard is small.

In the present paper it are not the new forms which are laid stress upon, but rather it is a synopsis of all the known Indo-Pacific species, together with keys to genera and species, that is aimed at. ALCOCK's classical work "Materials for a Carcinological Fauna of India" and eventually n^o 6 in: *Journ. As. Soc. Bengal*, v. 69, prt 2, 1900, only deals strictly with Indian (or rather British-Indian) species, and is only to a limited degree suited to any naturalist who attempts the determination of Catometopous crabs from the East-Indian Archipelago. The literature on the subject is so very much scattered, that a general review on the carcinological

fauna of the whole Indo-Pacific is urgently needed. Accordingly I have not restricted myself to the materials of the "Siboga", but also redescribed some obscure forms from other sources, from the Leyden and Amsterdam Museum, in order to render my work more complete, and I did not content myself to merely citing and recording, but also tried to make any species better known. Proceeding in this way it is astonishing what a multitude of perhaps small, but really important, facts may be detected in many so-called "known" species. Certainly (and I wish this to be clearly understood) this does not mean the slightest blame to my predecessors, not even to those who nowadays live only in old-fashioned books and, for some generations past, played their rôle in the general tragedy of mankind. For it are not only STEBBING's words here chosen as motto, but also those written by this venerable carcinologist on a former occasion, that I cannot refrain from citing, with the utmost approbation: "it can scarcely be regarded as a reproach to the earlier naturalists that they had not prophetic eyes to make them acquainted with the requirements of modern classification. We are perhaps industriously preparing equivalent stumbling-blocks for a future age, which possibly will only care to distinguish species by the internal structure as seen working in the living animal under the Röntgen rays. But for the difficulty of identifying forms described by our predecessors, we ought not to lay all the blame on the imperfection of the original accounts. It should be shared by the naturalists who sometimes in a long succession are content to quote the name of a species, without using the means at their disposal of making it thoroughly well-known. There is a sort of superstition that a new species is worth publishing, but that to deal with one to which some other person's name and some ancient date is attached, is a poor affair, stale and unprofitable". (On Crustaceans from the Falkland Islands. Proc. Zool. Soc. London, 1900, p. 518).

The "Siboga" material here dealt with is distributed over the families in the following way:

	Species	New
Hymenosomidae	2	—
Retroplumidae	1	1
Ocypodidae	18	2
Grapsidae	43	1
Gecarcinidae	4	—

I have to thank heartily my fellow-countryman Dr. J. G. DE MAN, who kindly and readily, in his usual way, assisted me by lending rare memoirs. The help of this excellent carcinologist has been the more appreciated by me, as international scientific intercourse nowadays is reduced to the extreme!

Leiden, July 4, 1917.

HYMENOSOMIDAE.

Since the arguments put forth by ORTMANN¹⁾ and BORRADAILE²⁾, it is now generally agreed, that the present family is to be classed with the Oxyrhyncha, and not with the Catometopous Crabs; indeed, the only character that may justify the latter view, viz. the sternal openings of the ♂ sexual organs, is counterbalanced by a whole series of features showing a close relationship to the Oxyrhyncha and especially to the Maiidae. It is remarkable, that DE HAAN³⁾, as early as 1839, referred his species "*Ocypode (Elamene) unguiformis*" to the "Majacea"; in the atlas the species is called "*Inachus (Elamene) unguiformis*".

The Hymenosomidae are all littoral species; in the very rare instances, that they are found in the open sea, they seem to be clinging to some floating object. The majority of species inhabit the waters of New Zealand and the south and east coast of Australia; from here they radiate towards the Indian Ocean, to China and Japan, to New Caledonia and the west coast of South America, and to South Africa. One species is characteristic of sub-antarctic regions.

It is to be regretted, that most of the species are very insufficiently known, and it has been put forth by several authors, that a thorough revision, especially of the New Zealandian species, is much needed. Even the genera are not well defined, so that it has appeared advisable to some carcinologists to unite all the known forms into one single genus, *Hymenosoma*.

Under these circumstances it is a difficult and ungrateful task to undertake a systematic monograph of the present family. Nevertheless, with the scanty material of the "Siboga" added to some few, but interesting specimens of the Leyden and Amsterdam Museum⁴⁾, I am of opinion that even the description of this small collection, the defining of genera and eventually of species, and the compilation of the literature, incomplete as this modest monograph appears, may be of some use to any one who chances to examine any members of the present family.

1) Zool. Jahrb., Syst., Bd 7, 1894, p. 31.

2) Fauna and Geogr. Maldive and Laccadive Arch., v. 2, 1903, prt 2. Marine Crust. X (Oxyrhyncha) p. 682 (note). — Ann. Mag. Nat. Hist. (7) v. 19, 1907, p. 480.

3) Fauna Japonica, dec. quarta, 1839, p. 75, pl. 29, f. 1.

4) Prof. WEBER has kindly allowed me to insert the descriptions of these specimens from the said Museums, for, though not caught by the "Siboga", they are Indo-Pacific as well.

The following key is proposed to distinguish the genera:

1. Epistome absent; ext. maxillipeds almost in contact with the bases of the antennules. Rostrum prominent, pointed, concave transversely. Dactyli of walking legs very long, styliform, not depressed, almost wholly straight and ending in an acute point, with two longitudinal rows of hairs and without spines at inner side **Hymenosoma** Desmarest
- Epistome present. Dactyli of walking legs with spines at inner side 2
2. Epistome rather long in longitudinal direction. Antennulae and antennae almost completely concealed beneath the rostrum; the latter projecting (as also the lateral borders of the carapace), triangular, truncate or tridentate. The ext. maxillipeds completely close the buccal cavern; merus shorter than ischium 3
- Epistome short in longitudinal direction. Antennulae and antennae only at base concealed by the rostrum, that is triangular, trilobate or trispinose, but marked off posteriorly by a raised rim, that borders the flattened part of the carapace and is continued across the base of the rostrum. Ext. maxillipeds slightly gaping; merus somewhat longer than ischium. Sides of carapace with one or two (very rarely more) teeth at either side, but sometimes unarmed 4
3. Rostrum elongate, triangular. Epistome very long, somewhat convex. Antennulae separated by a mere ridge . . . **Trigonoplax** H. Milne-Edwards
- Rostrum short, triangular, trilobate or truncate. Epistome shorter. Antennulae separated by a more or less prominent septum **Elamena** H. Milne-Edwards
4. Rostrum consisting of three equidistant and equal, obtuse lobes, between the intervals of which the antennulae are visible. Sides of carapace with two teeth on either side. Walking legs rather robust, not much longer than breadth of carapace **Halicarcinus** White
- Rostrum trilobate (the median lobe being inserted beneath the level of the lateral ones), triangular, truncate or trispinose. Sides of carapace unarmed or toothed. Walking legs mostly very slender, spider-like, elongate, but sometimes short and thickly hairy 5
5. Walking legs very thin and slender, much elongate; dactyli falciform, of nearly equal breadth till near tip. Rostrum

prominent, differently shaped. Carapace subcircular, longer than broad. 6

Walking legs short, scarcely longer than breadth of carapace; dactyli straight, conical, gradually tapering to tip. Rostrum triangular, nearly vertically deflexed and fixed. Carapace transversely oval, broader than long; sides unarmed. Sides of carapace and legs covered by thick, club-shaped hairs, particularly long at sloping sides of the former, and on meropodites of legs. Very small species, breadth of carapace 5—6 mm.

Elamenopsis A. Milne-Edwards

6. Rostrum trilobate, triangular or truncate *Hymenicus* Dana

Rostrum trispinose *Rhynchoplax* Stimpson

Hymenosoma Desmarest.

1825. *Hymenosoma* Desmarest. Cons. s.l. Crust. p. 163.

Though this genus has been known since nearly a century, its true characters remained rather insufficiently indicated. H. MILNE-EDWARDS¹⁾ first pointed out the absence of an epistome, but this important feature appears to have been overlooked by HASWELL²⁾, who advocated the view, that all the genera (at least *Hymenosoma*, *Hymenicus* and *Haliscarcinus*) should be united into the original genus that gave its name to the whole group, which he called, however, *Hymenicinae*, following DANA. HASWELL'S opinion has been shared by Australian carcinologists, such as BAKER³⁾, FULTON and GRANT⁴⁾. STEBBING, however, recently⁵⁾ argues, that *Hymenosoma* is distinguished, at least from *Haliscarcinus*, by the much narrower shape of the merus and ischium of the external maxillipeds, and by the long hairs fringing the propodite and dactylus of the walking legs, which joints are spineless.

The absence of an epistome, the characters of the walking legs, and the narrow abdomen of the ♂, that reaches only to the middle of the nearly circular sternum, are all characters, that sharply separate at least the typical species of *Hymenosoma* from *Hymenicus* and *Haliscarcinus*.

Though a rather large number of species has been assigned to *Hymenosoma*, only two species appear to have their proper place here; they may be distinguished thus:

Flattened part of carapace longer than broad (not including the rostrum); external orbital angle sharp; bifid and spine-like; walking legs rather short, about twice the breadth of the carapace. Abdomen of ♂ narrow, reaching up to the middle of the sternum. Species of South Africa. *H. orbiculare* Desmarest

1) Hist. nat. Crust., t. 2, 1837, p. 35—36. Ann. Sc. Nat. (3) t. 20, 1853, p. 222.

2) Cat. Austral. Crust., 1882, p. 114.

3) Transact. R. Soc. South Austr., Adelaide, v. 30, 1906, p. 114.

4) Proc. R. Soc. Victoria, v. 15, 1902, p. 59.

5) Transact. R. Soc. Edinburgh, v. 50, prt 2, 1914, p. 270.

Flattened part of carapace about as long (without rostrum) as broad, nearly circular; external orbital angle a low rim; walking legs long and slender, about 3 times the breadth of the carapace. Abdomen of ♂ short, triangular, "reaching only to the posterior margin of the sternum, corresponding to the fourth pair of legs" (CHILTON). Species of New Zealand *H. depressum* Jacquinet et Lucas

1. *Hymenosoma orbiculare* Desmarest. Pl. 1, Fig. 1.

For synonymy see STEBBING, Ann. S. A. Mus., v. 6, 1910, p. 331—332 and STEBBING, Transact. R. Soc. Edinburgh, v. 50, prt 2, 1914, p. 270.

The following records seem to have been overlooked by STEBBING:

H. MILNE-EDWARDS, Ann. Sc. Nat. (3) t. 20, 1853, p. 222, pl. 11, f. 2.

ORTMANN, Denkschr. d. med.-naturw. Gesellsch. Jena, Bd 8 (Semon's zool. Forschungsreisen, Bd 5, Lief. 1), 1894, p. 37.

LENZ, Abhandl. Senckenb. Gesellsch., Bd 25, 1905, p. 368.

This characteristic South African species was not represented in the "Siboga" collection, but I had the opportunity of studying a ♂ collected by Prof. WEBER in Table Bay near Cape Town, in 1894, 8—12 fathoms, sandy bottom.

I have figured this species again, for none of the figures heretofore published, at least as known to me, convey an exact idea of its outer appearance. The species has been figured in its details by STEBBING (l. c., 1914, pl. 25 A), but clear and exact as these drawings are, I hope not to do injustice to this highly-esteemed carcinologist in pretending that his figure of the habitus of the animal is really insufficient.

The flattened part of the carapace has a longitudinally-oval shape, semicircular posteriorly, somewhat pointed in its anterior part. It is bordered by minute tubercles at the sides and passes gradually into the rostrum, that is marked off behind its base by a feeble, convex rim. The rostrum itself is short, concave at its surface, somewhat deflexed, and pointed at the tip; at either side of the base there is a distinct callose thickening of the border. The eye-stalks are short and thick; the corneas reach beyond the tip of the rostrum. The sides of the carapace are obliquely-sloping outward, so that the total breadth of the carapace is equal to the length, not including the rostrum; these sloping sides are beset with numerous minute tubercles, and unite at the hind margin, between the bases of the hind legs, with the bordering rim of the flattened part; this rim, moreover, consists of two parts, separated off in the middle of its course; the posterior part passes very obliquely forward on the sloping sides of the carapace, thus marking off a hepatic and a branchial region. On the former region there are two obtuse prominences, that are themselves minutely tuberculate, the posterior directed upward, the anterior forward. The external orbital angles are situated beneath the level of the deflexed tip of the rostrum and reach as far forward as this tip; they are sharp, spine-like, and bifid; upper and lower margin of the orbit are practically absent, the orbit itself passing imperceptibly into the buccal cavern, as the epistome is wanting.

The regions of the carapace are defined by very regular grooves; the hexagonal cardiac area is separated by a deep cervical groove from the mesogastric region; the bulging gastric region is divided into two parts by a longitudinal line, and the anterior part is marked by numerous small but sharp granules. The branchial regions are crossed by several furrows, as shown in the figure; these regions are somewhat concave.

The short antennae arise from the outer wall of the open orbit, at the base of the superior fork of the external orbital angle; the basal joint is short and thick, immovable and fused with its surroundings, the second joint is free, slender, and about one and a half times the length of the next joint; the flagellum consists of three joints, diminishing rapidly in size, it does not reach as far forward as the antennulae, that are about 3 times the length of the rostrum. The peduncle of these antennulae consists of three joints of about equal length; the basal joint is by far the broadest, and the rostrum reaches to the middle of the second joint; the flagellum is short and thick (cf. STEBBING, l. c., 1914, pl. 25, A. f. *ai*, *as*).

The external maxillipeds (like also the anterior part of the sternum, between the bases of the chelipeds) are densely hairy, which renders it difficult, to make out their exact shape. They are somewhat converging anteriorly, leaving a triangular gap posteriorly; ischium and merus are of equal length, but both are somewhat broader in my specimen than is shown in STEBBING's figure (pl. 25 A. f. *mxp*. 3): the antero-internal angle of the ischium is more strongly bulging¹⁾ and the base of the merus more narrowed than in the figure quoted; the merus itself is about as long as broad at the distal end, which shows no trace of an auricle, and the carpus, that is broader than the next two joints, is inserted near the external angle of the merus. I have not examined the other maxillipeds in my single specimen; they are however figured by STEBBING (f. *mxp*. 2, *mxp*. 1).

The abdomen of the ♂ does not occupy all the space between the bases of the posterior legs; it is bottle-shaped; only the last 4 joints are free and not fused with the sternum and of these the penultimate segment is the shortest, the other being of about equal length. The tip of the abdomen occupies nearly the centre of the circular sternum and is separated by a wide, hairy space from the posterior margin of the buccal cavern.

STEBBING (1914, l. c. p. 270) describes the chelipeds of the ♂ as much more swollen than those of the ♀; I have not had an opportunity to study these legs in the latter sex, but in my ♂ specimen they are rather short and weak, about as long as the carapace; the meropodite is granular on outer surface, fringed with long hairs along the edges and without subdistal tooth at the upper border; the carpopodite and the palm are likewise granular at upper and outer surface; the internal angle of the former is not at all prominent; the palm is low, about as long as the fingers, fringed with long hairs along upper and lower border, smooth but pitted at inner surface; the fingers are straight, not particularly compressed, longitudinally grooved and of about the same height till quite near the curved and acute tip, the cutting margins are scarcely serrated in my specimen, but, according to STEBBING, the movable finger

¹⁾ In the figure of H. MILNE-EDWARDS (l. c.) this angle is represented as acutely pronounced, which does not agree with STEBBING's finds and mine. DE HAAN (Faun. Jap. pl. H) figures a very long merus, twice as long as the ischium; his specimen unfortunately is not extant.

"has a tooth on the inner margin which appears to vary considerably in its expansion and denticulation".

Of the walking legs the first and fourth pair are slightly shorter than the middle pairs; the meropodites are rather slender, their length being about three times the breadth and as long as the carpo- and propodite together; there are no spines whatever on the legs, but the upper surface is somewhat granular; the whole posterior margin is fringed with long hairs that are arranged in two longitudinal rows on the propodites and dactyli, and the superior row passes from the carpopodite gradually to the upper surface of the propodite; the dactyli are very long, straight, longer than the preceding joints and quite spineless along inner margins.

The specimen that has been in alcohol for more than twenty years has conserved a dark-yellow colour, finely mottled with dark spots, that are arranged in somewhat reticulated figures on the legs; the under side of the carapace and also the long hairs are of a lighter colour.

Dimensions in mm.:

Total length of carapace (including rostrum)	16.75	
Total breadth of carapace.	17.5	
Breadth of flattened part of carapace.	13.5	
Length	} of penultimate segment of abdomen of ♂	1.5
Breadth at base		2.5
Length	} of last segment of abdomen of ♂	2.25
Breadth at base		1.75
Length of cheliped	17.—	
Horizontal length of palm.	4.5	
Length of mobile finger	4.5	
Length of meropodite	} of penultimate pair of legs	8.5
Breadth of meropodite		2.5
Length of carpo- and propodite		10.5
Length of dactylus		8.—

This species is quite characteristic of the South African littoral fauna, and has been caught nearly nowhere else ¹⁾. Though apparently common in shallow waters near the shore it has been also dredged from a depth of 80 metres near Cape Agulhas ²⁾. The hairiness of the legs has induced some authors, rightly, I suppose, to ascribe a swimming faculty to the animal.

2. *Hymenosoma depressum* Jacquinot et Lucas.

The history of this species, that had been obscurely known, was traced ten years ago by CHILTON ³⁾, who gave a renewed description, accompanied by figures. Unfortunately we are not informed about the presence or absence of an epistome, nor about the shape of the external maxillipeds, but the hind margin of the walking legs is fringed with long hairs, and it is this very character that induced STEBBING ⁴⁾ to assume, that the species was placed in the right genus.

1) LENZ records a single specimen from Zanzibar.

2) DOFLEIN, Wiss. Erg. "Valdivia", Bd 6, Brachyura, 1904, p. 88.

3) Ann. Mag. Nat. Hist. (7) v. 19, 1907, p. 146—149, pl. 5.

4) Transact. R. Soc. Edinburg, v. 50, prt 2, 1914, p. 270.

The nearly circular flattened part of the carapace, the absence of a prominent external orbital angle, the short triangular abdomen of the ♂, and especially the very long and slender walking legs are sufficient characteristic features; the walking legs are, according to CHILTON, nearly three times the breadth of the carapace, and CALMAN¹⁾ adds that in specimens of the British Museum the legs are even more slender. The dactyli are, according to CHILTON's figures, distinctly shorter than the preceding joints, though in the text the reverse is stated.

The species inhabit the waters of New Zealand (Greymouth, Sumner, Auckland Islands, Akaroa Heads).

Halicarcinus White.

For synonymy see STEBBING, Proc. Zool. Soc. London, 1900, p. 521.

STEBBING made a detailed bibliographical study of this genus, to which several most obscure species have been referred, most of which most probably enter into the synonymy of *H. planatus* (Fabricius). Both STEBBING and MIERS²⁾ agree in accepting two species, that may be distinguished thus:

Teeth of the tridentate rostrum placed wider apart; dactyli of walking legs narrowing gradually to apex, spines at inner border disposed in two indistinct, longitudinal rows.	<i>H. planatus</i> (Fabricius)
Teeth of the tridentate rostrum placed close together, touching each other at the base; dactyli of walking legs more slender, keeping the same breadth throughout their length till quite near apex, spines at inner border disposed in a single file.	<i>H. ovatus</i> Stimpson

To which of these species the *H. pubescens* Dana³⁾ is to be referred remains uncertain, and I have found no reference to it in more recent literature. It inhabits rather deep water (50 fathoms) at the east coast of Patagonia. Perhaps it is a new species, for the carapace is represented as nearly as broad as long, whereas it is distinctly broader in the two other species.

Some other species, viz. "*Hymenosoma*" *leachi* Guérin⁴⁾, "*Hymenosoma*" *tridentatum* Jacquinet et Lucas⁵⁾, "*Liriopea*" *leachi* Nicolet⁶⁾ and "*Liriopea*" *lucasi* Nicolet⁷⁾ are most incompletely known, and as any attempt to identify them is useless, they are better to be cancelled altogether. *Halicarcinus huttoni* Filhol⁸⁾ seems to be identical with *H. planatus*, as far as can be judged.

1) In a note to CHILTON's article, l. c. p. 149.

2) Rep. "Challenger" Brachyura, 1886, p. 280—281.

3) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 253. U. S. Expl. Exp., Crust., 1852, pl. 24, f. 8.

4) Voy. "Coquille", Crust., 1828, p. 22. Iconogr. Règn. an., Crust. pl. 10, f. 1.

5) Voy. "Astrolabe" Pôle Sud, t. 3, 1853, p. 60, pl. 5, f. 27. *Halicarcinus tridentatus* Filhol, Miss. île Campbell, t. 3, 1885, p. 396. FILHOL's description refers to *Hymenicus* rather than to *Halicarcinus*.

6) In Gay, Hist. d. Chile, t. 3, Zool., 1849, p. 160, pl. 1, f. 1.

7) L. c. p. 160.

8) L. c. p. 398, pl. 47, f. 1.

1. *Halilcarcinus planatus* (Fabricius). Pl. 1, Fig. 2.

Literature: STEBBING, Proc. Zool. Soc. London, 1900, p. 524, pl. 36 B, and Transact. R. Soc. Edinburgh, v. 50 prt 2, 1914, p. 271.

In the collection of the Leiden Museum is an adult specimen (here figured), unfortunately without locality; besides I have examined 3 specimens, belonging to the Amsterdam Museum, collected by the late Dr. J. H. KRUMMEL at Port San Pedro (south of Valdivia, Chile) in April 1909. All these animals are females.

The drawing here given and the detailed account of STEBBING may, I hope, dispense me with a full description. Here I shall only remark the following facts:

- 1^o The carapace is markedly transverse, broader than long; the side walls are obliquely-sloping down to the bases of the walking legs, but anteriorly they are perpendicular; there are two rather sharp but short teeth on either side of the side walls, placed beneath the bordering rim of the flattened part of the carapace and not attached to it. On the carapace there is one distinct groove, viz. the cervical one, and two short, radiating ones, parting from either end; the anterior is continued forward and marks off very feebly the gastric region; from this anterior groove two diverging lines on either side of the carapace are directed, one to the first, the other to the second lateral tooth. Here and there some minute granules are observed on the upper part of the carapace.
- 2^o There is no rostrum proper, but beneath the anterior part of the rim, circumscribing the flattened part of the carapace, there are three exactly alike, obtuse, hairy teeth, the median being placed slightly above the level of the lateral ones; in the wide interspaces of these teeth the antennulae are largely projecting forward.
- 3^o The eye-stalks are short and thick; the orbital margin is continuous, except for a scarcely prominent, obtuse external orbital angle; below the orbit is incompletely closed by the very thick basal joint of the antennae, that is fused with the surrounding parts immediately below the external orbital angle, and is somewhat produced at the antero-external angle. The antennae are short, reaching at most to the end of the penultimate peduncle-joint of the antennulae; the latter are not separated by a median septum at the base¹⁾, the basal joint is very short and thick, freely movable, and reaches as far as the teeth of the rostrum.
- 4^o An epistome is present. The external maxillipeds are rather broad, not gaping (though not completely fitting together), covered with club-shaped hairs at outer surface and fringed with yellow hairs at inner margin; ischium broader than merus, but of equal length; carpus implanted at antero-external angle of the merus. These maxillipeds and other mouth-parts are figured accurately by STEBBING²⁾.
- 5^o Chelipeds (of ♀) rather weak, equal; palm swollen, length equal to that of fingers; the latter straight, finely serrated at inner margin; palm somewhat granular upward and somewhat hairy at outer surface. Ambulatory legs short, first pair being the longest (about twice the length of the carapace), diminishing in length posteriorly, nearly smooth, but which a very

1) STEBBING (l. c., 1900, p. 525) notes a median septum separating the antennules.

2) L. c. pl. 36 B.

short and thin pubescence; upper margin of meropodite ending in an obtuse prominence; dactyli compressed, as long as propodites, slightly tapering and feebly curved; the inner border provided with rather irregularly-placed teeth, rising among a continuous fringe of shorter or longer hairs and ending near the tip into two large diverging teeth. These dactyli have also been figured by STEBBING¹⁾.

Dimensions²⁾ in mm. of Leiden Museum specimen:

Length of carapace (including rostrum)	9.5
Length of median tooth of rostrum	0.6
Total breadth of carapace.	12.7
Total breadth of flattened part of carapace	11.3
Length of cheliped	13.2
Length of first pair of walking legs	18.5
Length of fourth pair of walking legs	15.8

This species is really characteristic of the subantarctic shores, whence it is recorded by numerous authors. MIERS³⁾ observed that it is replaced by *H. ovatus* in the Australian waters, as far as could be traced out.

2. *Halicarcinus ovatus* Stimpson.

1858. *Halicarcinus ovatus* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, p. 109.

1876. *Halicarcinus ovatus* Miers. Cat. New Zealand Crust. p. 49.

1886. *Halicarcinus ovatus* Miers. Rep. "Challenger", Brachyura, p. 282.

1900. *Halicarcinus ovatus* Stebbing. Proc. Zool. Soc. London, p. 525, pl. 36 A.

1907. *Halicarcinus ovatus* Stimpson, Smithson. Inst. Miscell. Coll., v. 49, p. 146.

Hab. Port Jackson, Port Philip, Jervis Bay.

Hymenicus Dana.

1851. *Hymenicus* Dana. Amer. Journ. Sc. (2) v. 12, p. 290.

1852. *Hymenicus* Dana. U. S. Expl. Exp., Crust., p. 387.

The shape of the rostrum, that covers only the bases of the antennules, the rather long merus of the (slightly gaping) external maxillipeds, exceeding the ischium in length, and the slender walking legs make up the principal characters of this genus⁴⁾.

ALCOCK⁵⁾ considers *Rhynchoplax* Stimpson synonymous, but the rostrum is altogether differently shaped, and I have preferred to keep STIMPSON'S genus erect, referring the two species of ALCOCK to *Rhynchoplax* and not to *Hymenicus*. In the former genus the rostrum consists of three spines, directed forward; in *Hymenicus*, however, it is broadly trilobate or triangular. Besides, *Hymenicus* is exclusively New Zealandian; *Rhynchoplax* inhabits the tropical shores of Asia, but two species are Australian.

1) L. c. pl. 36 B.

2) Measured under microscope.

3) Rep. "Challenger", Brachyura, 1886, p. 282.

4) DANA remarks in the diagnosis: "angulo extraorbitali nullo", but in reality the outer border of the orbit is sharp and slightly raised.

5) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 387.

To review the species of *Hymenicus* is very difficult to any one, who has no opportunity of examining the type specimens or a rich material from New Zealandian shores.

Considering the shape of the rostrum, two groups are to be distinguished:

I. Front triangular or slightly truncate:

H. lacustris (Chilton)

H. haasti Filhol

H. edwardsi Filhol

H. pubescens Dana

H. australis Haswell.

II. Front trilobate:

H. varius Dana

H. novae-zealandiae Dana

H. cooki Filhol

H. marmoratus Chilton.

1. *Hymenicus lacustris* (Chilton).

1882. *Elamena* (?) *lacustris* Chilton. Transact. Proc. N. Z. Inst., v. 14, p. 172.

1883. *Hymenosoma lacustre* Chilton. Transact. Proc. N. Z. Inst., v. 15, p. 69.

1902. *Hymenosoma lacustris* Fulton et Grant. Proc. R. Soc. Victoria, N. S. v. 15, p. 59, pl. 8.

This species is remarkable above all others by its inhabiting fresh waters. Judging from the figures of FULTON and GRANT I think the species is to be placed in *Hymenicus* and not in *Hymenosoma*.

The lateral teeth of the carapace are absent in specimens from Norfolk Island; in those from Victoria the posterior teeth are wanting, and in specimens from New Zealand (Lake Pupuke, Auckland) the two pairs are both present, though obsolescent. The rounded, triangular rostrum, the bifid, prominent inner angle of the wrist, the finely-crenulate proximal part of the lower border of the palm, and the elongately-triangular abdomen of the ♂ seem to be the principal features of the species, but there are slight variations in specimens from different localities ¹⁾.

2. *Hymenicus pubescens* Dana.

1851. *Hymenicus pubescens* Dana. Journ. Ac. Nat. Sc. Philadelphia, 1851, p. 254.

1852. *Hymenicus pubescens* Dana. U. S. Expl. Exp., Crust., p. 388, pl. 24, f. 11.

1853. *Elamene quoyi*? H. Milne-Edwards. Ann. Sc. Nat., (3) t. 20, p. 223, pl. 11, f. 3.

1865. *Hymenicus pubescens* Heller. Reise "Novara", Crust., p. 67.

1885. *Elamena quoyi*? Filhol. Miss. ile Campbell, t. 3, prt 2, p. 403.

This species is very little known. I have united *Elamena quoyi* H. Milne-Edwards with it, though with a query; in comparing DANA's figure with that of MILNE-EDWARDS the general appearance, and especially the shape of the rostrum, is unmistakably the same; only the legs

1) In Mem. Austral. Mus., n^o 2, 1889, p. 34 WHITELEGGE mentions a fresh-water species of *Hymenicus* found at Lord Howe Island. Though nothing more is known about this form it is likely to be referred to the present species.

are somewhat stouter and the dactyli broader and more falcate in the figure of the French author. That the latter referred his species to *Elamena* (which by the way is altered into *Elamene*) is no objection to my presumption, for there is much reason to believe, that MILNE-EDWARDS on the same page wrongly regarded a ♂ of *Halicarcinus tridentatus* as representing the type species *Elamena mathaei* Rüppell, and so confused the diagnosis of his own genus. Furthermore in the figure of *E. quoyi* the antennules are not covered by the rostrum and visible from above, the very character, that separates *Hymenicus* from *Elamena*.

Hab. New Zealand (Bay of Islands, Auckland and Cook Strait).

3. *Hymenicus haasti* Filhol.

1885. *Hymenicus* ¹⁾ *haasti* Filhol. Miss. île Campbell, t. 3, prt 2, p. 402, pl. 47, f. 4.

In this species the carapace is broadly triangular, whereas in the preceding species it is nearly circular. The rostrum should be trilobate, the lateral lobes being exceedingly small, according to the text, but in the figure it is triangular and acutely pointed. Another discrepancy between text and figure is that in the former the carapace is stated to be 4.9 mm. long and 4.5 mm. broad, whereas in the figure (that is twice enlarged according to the explanation of plates ²⁾) these dimensions are much larger (16.5 and 15.5 mm. respectively. Carapace and legs are said to be covered with hairs; the ambulatory legs are stouter and shorter than in the preceding species.

Hab. Cook Strait.

4. *Hymenicus australis* (Haswell).

1882. *Hymenosoma australe* Haswell. Cat. Austral. Crust., p. 115, pl. 3, f. 2.

HASWELL, who does not care to distinguish between the different genera of the family (called by him Hymenicinae, notwithstanding his uniting all the genera in *Hymenosoma*), gives but little information about this species, nor is his figure of great use. Contrary to the two preceding species, the sides of the carapace are armed with two obscure teeth, the rostrum is triangular, prominent, somewhat truncate at extremity, and the hands of the ♂ are very high, with a rather sharp border below.

Hab. Williamstown, Port Philip (East Australia).

5. *Hymenicus edwardsi* Filhol. Pl. 1, Fig. 3.

1885. *Hymenicus edwardsi* Filhol. Miss. île Campbell, t. 3, prt 2, p. 400, pl. 48, f. 7.

A specimen of the Leiden Museum, from Auckland, s. n. *Halicarcinus tridentatus*, agrees

1) Except in this and another case the author persists in calling the genus *Hymenicus*, but this error is corrected in the list of errata.

2) There are further discrepancies in FILHOL's paper between text and plates. Thus several figures are not at all referred to, neither in the text nor in the explanation of plates; *Halicarcinus tridentatus* is, according to this explanation, represented on pl. 50, f. 3, but in the text the figure is referred to *Hymenicus cooki*, and that *Elamena whitei* is figured on pl. 47, f. 2—3 is not mentioned in the text (p. 403).

in my opinion with FILHOL'S species. As this is incompletely known, a fresh description and some figures may not be superfluous.

The carapace, as in all Hymenosomidae, is flattened and flexible above; the length, including the rostrum, equals the breadth. The rostrum itself is horizontal, broadly-triangular, but the anterior part is truncate, and in the middle of the anterior margin an obtuse prominence marks the tip of the rostrum; the borders of the latter are hairy, and posteriorly the rostrum is defined by a slightly raised rim, straight in the middle, but curved backward at either end, near the upper orbital margin (fig. 3*a*). The antero-lateral borders of the carapace are somewhat convex, and a very low prominence immediately below the bordering rim of the carapace represents the antero-lateral tooth; the posterior tooth is very acute, pointing forward, and placed below the border, midway between the external orbital margin and the posterior edge of the carapace. Behind the posterior teeth the margins of the carapace are a short way sub-parallel, then converging, and becoming even concave above the implantation of the last pair of legs, towards the posterior angle; the hind margin of the carapace is straight; $\frac{1}{3}$ of the total breadth of the latter. The cervical groove and the two short ones, radiating from either end, are distinct, but otherwise there is no indication of regions; the gastric and cardiac region are somewhat bulging, the hepatic and branchial areas concave; on the mesogastric regions there are two longitudinally-oval, tympana-like structures, each followed behind by a very small spot of the same kind, and with a faint longitudinal line between. The sloping parts of the carapace are nearly perpendicular, and everywhere, especially posteriorly and above the base of the legs, numerous club-shaped hairs are implanted, which on microscopical examination are feathered all round, save the short stalk.

The antennulae are much stouter and longer than the weak antennae; the basal joints of the former are short, though projecting beyond the rostrum; a very slight rim at the under surface of the rostrum separates them; the next joint is about twice as long, but only half as thick; the third joint again is as wide at the base as the preceding joint, but widening distally, and of the length of the basal joint. The antennae are implanted in the outer half of the infra-orbital border; the basal joint is directed obliquely-forward and inward, the two following joints being of the same length, directed straight forward, and gradually diminishing in thickness; the flagellum is very short and reaches at most as far as the second peduncle-joint of the antennules. The eye-stalks are short and thick; seen from above they are wholly exposed (fig. 3*a*); they are placed in shallow sockets, the borders of which are entire; the external orbital angle is a mere rim, sharp, but slightly raised.

The epistome is short, about three times as broad as long, the breadth being equal to the distance between the external orbital angles. The buccal cavity is nearly quadrate, its side margins only slightly diverging backward; from the anterior angle a sharp rim runs backward on the pterygostomial region, disappearing at the base of the anterior walking legs, and most projecting in the middle of its course.

The external maxillipeds are gaping; measured along the outer margin the merus is longer than the ischium and constricted at the base; the inner margin of both joints is fringed with long hairs; the ischium has a broad inner lobe, as is usual in the family, and is about as

broad as the merus; the carpus is inserted near the antero-external angle of the latter. The exognath is wholly exposed in normal position, it does not reach exactly as far forward as the merus.

The sternum is nearly circular, very much vaulted longitudinally, especially posteriorly, and concave in transverse direction; the grooves between the segments do not reach the cavity, in which the abdomen of the ♂ fits. The latter occupies the whole space between the bases of the last pair of legs; the first two segments are apparently fused and fixed, the next is very short, and the abdomen reaches its greatest breadth at the union of the 4th and 5th segment; from here it gradually tapers forward, but enlarges again, though very slightly, near the base of the terminal segment, which is as long as broad at the base and longer than all other segments, the tip is much rounded (fig. 3c) and reaches to the level of the base of the chelipeds.

The chelipeds of the ♂ are very robust, thick and scarcely shorter than the anterior walking legs, viz. $1\frac{2}{3}$ times the length of the carapace. Immediately anterior to the base a thick patch of hairs is observed, which hairs are of the same structure as noted above; similar hairs are scattered all over the chelipeds themselves, and the palms are wholly invested with such hairs, both inside and outside, so that they are looking like little muffs (fig. 3). The meropodite is without sharp borders, spineless, and widening distally; the wrist is rather large, with numerous transverse rugosities above, a patch of hairs in the middle of the under surface, and the inner angle not at all produced; the palm is much inflated (though the soft fur makes it look still thicker and higher), not quite as high as long, about as long as the fingers and quite smooth, as far as could be made out without removing the covering; the borders are rounded, not sharp. The fingers are straight, gaping at the base, finely serrated in the proximal half of the inner margin, and more coarsely so in the distal half, where the serrations fit closely together.

The ambulatory legs are slender and rather long, the penultimate pair being the longest (not quite twice the length of the carapace) and the last pair the shortest; this hind pair is implanted somewhat higher up. At the base, viz. at the margins of the basipodite, especially dorsally, and at the upper margin of the carpopodite, we observe the same curious, club-shaped, feathered hairs as are mentioned above; the meropodite is slender, cylindrical, about 5 times as long as broad, without spines or teeth, but with a tuft of hairs at the distal end, and sparsely beset with feathered hairs, that also occur on the two next joints; the carpo- and propodite together are slightly longer than the meropodite; the dactyli are long, slender, falciform, slightly shorter than the preceding joint, very gradually tapering, so that the breadth near the base only slightly exceeds that near the tip, the tip is acute and curved, and the inner margin of the dactylus is provided, like that of *Halicarcinus*, with a continuous row of denticles, between which are scattered somewhat longer hairs; the two terminal denticles, near the tip of the dactylus, are by far the largest and pointing in different directions.

I have little doubt that the specimen here described belongs to *Hymenicus edwardsi*, but nevertheless it must be noted, that FILHOL mentions two sharp teeth at either side of the carapace and that the rostrum is called trilobate (the lateral lobes being most inconspicuous) in the text, though the figure corresponds quite well with the one here given. The general shape

of the carapace as shown in the figure of FILHOL, and the fur on the sides, the legs and especially on the palms of the chelipeds are features in common between FILHOL's specimen and mine.

Dimensions ¹⁾ in mm.:

Length of flattened part of carapace (including rostrum).	8.75
Breadth of flattened part of carapace	8.5
Posterior margin of penultimate segment of abdomen. .	1.8
Length of penultimate segment of abdomen	0.6
Posterior margin of terminal segment of abdomen . . .	1.1
Length of terminal segment of abdomen	1.2
Horizontal length of chela	7.1
Height of palm	3.5
Length of mobile finger	4.2
Length of first pair of walking legs	13.7
Length of penultimate pair of walking legs	14.9
Length of meropodite of penultimate pair of walking legs	4.2
Breadth of meropodite of penultimate pair of walking legs	0.8
Length of propodite of penultimate pair of walking legs	3.9
Length of dactylus of penultimate pair of walking legs .	3.6

FILHOL obtained this species along the coast of the South Island (New Zealand), from Cook Strait to Stewart Island. My specimen came from Auckland (North Island).

6. *Hymenicus varius* Dana.

1851. *Hymenicus varius* Dana. Journ. Ac. Nat. Sc. Philadelphia, 1851, p. 253.
 1852. *Hymenicus varius* Dana. U. S. Expl. Exp., Crust., p. 387, pl. 24, f. 9—10.
 1865. *Hymenicus varius* Heller. Reise "Novara", Crust., p. 67.
 1876. *Hymenicus varius* Miers. Cat. New Zealand Crust., p. 50.
 1882. *Hymenosoma varium* Haswell. Cat. Austral. Crust., p. 115.
 1885. *Hymenicus varius* Filhol. Miss. île Campbell, t. 3, prt 2, p. 399.

Hab. New Zealand (Bay of Islands, Auckland). North coast of Tasmania. Australia (Port Stephens, Port Jackson, Port Western).

7. *Hymenicus novae-zealandiae* Dana.

1851. *Hymenicus novae-zealandiae* Dana. Journ. Ac. Nat. Sc. Philadelphia, 1851, p. 254.

DANA himself was inclined to regard this species as a variety of the preceding and in his subsequent great work on the Crustacea of WILKES' Expedition it seems indeed to be united with *H. varius*.

Hab. New Zealand (Bay of Islands).

8. *Hymenicus cooki* Filhol.

1885. *Hymenicus cooki* Filhol. Miss. île Campbell, t. 3, p. 401, pl. 50, f. 3²⁾.

Hab. New Zealand (Cook Strait).

¹⁾ Measured under the microscope.

²⁾ As has been noted above (p. 13 note 2), in the explanation of plates of FILHOL's work the figure is said to represent *Halicarcinus tridentatus* (Jacquinot et Lucas). This discrepancy renders both these species all the more obscure.

9. *Hymenicus marmoratus* Chilton.

1881. *Hymenicus marmoratus* Chilton. Transact. Proc. N. Z. Inst., v. 14, p. 172, pl. 8, f. 1
(2^d and 3^d maxilliped, abdomen).

It is to be regretted that CHILTON does not give ample information about this species, said to be common in Lyttelton Harbour (New Zealand). It is closely allied to *H. varius*, but differs in having the carapace subtriangular, not circular, the two pairs of teeth at the antero-lateral margins being conspicuous, not obsolescent.

Rhynchoplax Stimpson.

1858. *Rhynchoplax* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 109.

1900. *Hymenicus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 387.

1907. *Rhynchoplax* Stimpson. Smithson. Inst., Miscell. Coll. vol. 49, p. 147.

The sharp three-spined rostrum distinguishes this genus in my opinion sufficiently from *Hymenicus*, to which it was united by ALCOCK. *Rhynchoplax* is apparently essentially tropical, but at the south-east coast of Australia the genera may occur together.

The following may serve to distinguish the 7 species, referred by me to the present genus:

1. Rostrum consisting of only one long spine between the eyes, and at either side of the base with an obscure tooth; eye-stalks long, reaching as far as the much prominent external orbital angle; penultimate peduncle-joint of the antennules reaching as far as rostrum; antero-lateral margin of carapace with 3 teeth at either side. Wrist of cheliped with 3 short, elevated, longitudinal carinae; palm acute above and below *R. rostrata* (Haswell)
- Rostrum consisting of three spines between the eyes. Wrist of cheliped without ridges 2
2. No teeth (at most a faint prominence) at antero-lateral sides of carapace; median spine of rostrum somewhat longer than lateral ones 3
- Lateral sides of carapace with one or more pairs of teeth 4
3. Length of carapace (including rostrum) equal to breadth; walking legs about twice the breadth of the carapace *R. krefftii* (Hess)
- Length of carapace (including rostrum) much exceeding breadth; walking legs longer than 3 times the breadth of the carapace; median spine of rostrum $\frac{1}{3}$ the length of the rest of the carapace.
- Meropodite of cheliped with a subdistal tooth at outer border . *R. inachoides* (Alcock).
4. Antero-lateral margins of carapace with more than one pair of teeth. ' 1
- Meropodite of cheliped toothed at distal end of outer or upper border 5
- Antero-lateral margins of carapace with only one pair of teeth; rostrum consisting of a long median and two short lateral spines.
- Meropodite of cheliped unarmed *R. coralicola* Rathbun

5. Median tooth of rostrum slender, styliform 6
 Median tooth of rostrum flattened, spatuliform, about $\frac{1}{5}$ the length of the rest of the carapace. Meropodite of cheliped with 4—5 teeth at upper border, carpopodite with 4—5 blunt teeth at upper surface, inner side of palm at base of fingers thickly clothed with hairs. Each joint of ambulatory legs with two teeth at anterior or outer margin, one in the middle, the other near distal end *R. messor* Stimpson
6. Carapace ovate, with two teeth at either side (the anterior scarcely prominent, the posterior sharp); median tooth of rostrum setose. Meropodite of cheliped with one subdistal tooth (at outer border?) *R. setirostris* Stimpson
 Carapace subcircular (without rostrum), with three teeth, all prominent (the posterior, above the base of the cheliped, being the largest) at either side. Meropodite of cheliped with 4 blunt tubercles at upper border and a sharp subdistal tooth at outer border. Chelipeds in ♂ long and bulky, covered with fine hairs *R. wood-masoni* Alcock

1. *Rhynchoplax messor* Stimpson.

1858. *Rhynchoplax messor* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 109.
 1907. *Rhynchoplax messor* Stimpson. Smithson. Inst., Miscell. Coll. v. 49, p. 148.

Hab. Simoda (Japan).

2. *Rhynchoplax setirostris* Stimpson.

1858. *Rhynchoplax setirostris* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 109.
 1907. *Rhynchoplax setirostris* Stimpson. Smithson. Inst., Miscell. Coll. v. 49, p. 148.

Hab. Hongkong.

3. *Rhynchoplax krefftii* (Hess).

1865. *Hymenicus krefftii* Hess. Arch. Naturgesch., Jahrg. 31. 1, p. 141, pl. 6, f. 5.
 1882. *Hymenosoma krefftii* Haswell. Cat. Austral. Crust., p. 115.
 1887. *Hymenicus krefftii* de Man. Zool. Jahrb. Syst., Bd 2, p. 695.

Hab. Sydney.

4. *Rhynchoplax rostrata* (Haswell).

1882. *Hymenosoma rostratum* Haswell. Cat. Austral. Crust., p. 116.
 1906. *Hymenosoma rostratum* Baker. Transact. Proc. R. Soc. South Australia, Adelaide, v. 30, p. 114, pl. 3, f. 2.

Hab. Victoria.

5. *Rhynchoplax wood-masoni* (Alcock).

1900. *Hymenicus wood-masoni* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 388.
 1902. *Hymenicus wood-masoni* Alcock. Ill. Zool. "Investigator", Crust. prt 10, pl. 64, f. 3.

Hab. Port Blair (Andamans), Port Canning (near Calcutta).

6. *Rhynchoplax inachoides* (Alcock).1900. *Hymenicus inachoides* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 388.1902. *Hymenicus inachoides* Alcock. Ill. Zool. "Investigator", Crust. prt 10, pl. 65, f. 1.

Hab. Port Canning (near Calcutta).

7. *Rhynchoplax coralicola* Rathbun.1909. *Rhynchoplax coralicola* Rathbun. Proc. Biol. Soc. Washington, v. 22, p. 108.1910. *Rhynchoplax coralicola* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, p. 316, f. 5.

Hab. Singapore.

Elamena H. Milne-Edwards.1837. *Elamena* H. Milne-Edwards. Hist. nat. Crust., t. 2, p. 33.1853. *Elamene?* H. Milne-Edwards. Ann. Sc. Nat., (3) t. 20, p. 223.

The French author included in his genus only one species, *E. mathaei* (Desmarest), but in 1853 he seems to have mistaken a ♂ of *Halicarcinus planatus* (Fabricius) for the former species¹⁾, besides including at the same time two species in the genus, that are very imperfectly known, but apparently not to be placed here. So there is some confusion about the right interpretation of MILNE-EDWARDS' diagnosis, but we must consider his first description of 1837 reliable. According to this account *Elamena* is characterized by the much flattened and lamellar carapace, by the broad, triangular rostrum, beneath which the antennules and the antennae are hidden; the antennules are separated by a vertical septum²⁾; the orbits are scarcely indicated; the epistome is distinct and long; the merus of the external maxillipeds is quadrate, cut obliquely anteriorly and shorter than the ischium. A good diagnosis of the genus is provided by ALCOCK³⁾. Usually, if not always, the distal end of the mero- and carpopodite of the walking legs is produced upward.

In the following I have attempted to distinguish between the species⁴⁾ of the genus:

1. Front trilobate, the lobules of about equal length and obtuse,
widely separated 2
- Front shortly triangular or truncate 3
2. Palm of cheliped much swollen, apparently as long as fingers.
Median lobe of rostrum placed below the level of the lateral
lobes. Corneae of eyes visible from above *E. minuta* A. Milne-Edwards
- Palm of cheliped not much swollen, longer than fingers. Lobes
of rostrum not horizontal, but pointing obliquely upward.

1) See HASWELL, Cat. Austral. Crust., 1882, p. 114, and STEBBING, Proc. Zool. Soc. London, 1900, p. 520—521.

2) This character seems to be wanting in some species.

3) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 385.

4) I have excluded the following species: *E. quoyi* H. Milne-Edwards (Ann. Sc. Nat. (3) t. 20, 1853, p. 223, pl. 11, f. 3) which, as noted above, is likely to be identical with *Hymenicus pubescens* Dana; *E. mexicana* H. Milne-Edwards (Ibid., p. 224), characterized in a few words by the author and not only doubtful by its imperfect diagnosis but also by its pretended habitat (coast of Mexico); and finally *E. lacustris* Chilton, which in my opinion is a *Hymenicus* (see p. 12).

- A sharp tooth on sloping sides of carapace, on branchial regions; another tooth on pterygostomial regions, on either side of buccal cavern. Eyes, like antennae and antennulae, completely hidden beneath the front *E. filholi* de Man
3. Front truncate. *E. truncata* A. Milne-Edwards
Front shortly triangular 4
4. Front somewhat deflexed; borders of carapace and legs wholly beset with numerous stiff hairs, much resembling spines, but flexible on the legs. *E. pilosa* A. Milne-Edwards
Front horizontal, lamellar; legs naked or sparsely hairy. 5
5. Carapace narrowed into a "neck" anteriorly, upper part of carapace and all the legs more or less hairy 6
Antero-lateral parts of carapace not forming a "neck", carapace and legs wholly hairless (save the dactyli of the latter) 7
6. Carapace somewhat angular, neck very long; rostrum considerably projecting beyond the eyes, not excavated at upper surface *E. longirostris* Filhol
Carapace rounded, neck shorter; rostrum scarcely projecting beyond the eyes, leaving the eye-stalks exposed from above, strongly excavated at upper surface *E. whitei* Miers
7. Carapace rounded, not angular, broadly piriform; front very broad between the eyes. *E. sindensis* Alcock.
Carapace more or less angular 8
8. Posterior lateral sides of carapace and posterior border nearly straight or slightly concave, meeting at distinct angles 9
Posterior lateral sides of carapace and posterior border forming together a semicircle. 10
9. Carapace pentagonal, anterior part triangular, antero-lateral prominence scarcely indicated, posterior angle (above base of cheliped) pronounced. *E. gracilis* Borradaile
Carapace heptagonal, owing to the antero-lateral angle being prominent; sides concave between the posterior and anterior angle¹⁾, and between the latter and the base of the rostrum *E. kirki* Filhol
10. Carapace with one pair of angles; rostrum small, little prominent *E. mathaei* (Desmarest)
Carapace with two pairs of much prominent angles; rostrum broad, much prominent *E. producta* Kirk

1) FILHOL (Miss. ile Campbell, t. 3, 1885, p. 405) calls these sides convex, and mentions this character as a difference between his species and *E. producta* Kirk, but in his figure (pl. 47, f. 6) the reverse is shown. Besides, in the explanation of plates, another specimen (♀) is referred to the present species (pl. 47, f. 8), though only the anterior angle of the carapace is indicated.

The little information given by authors as FILHOL and KIRK renders the separation of the species very uncertain in some cases, and the difficulty is increased by the great variation, not only in the shape of the chelipeds, but also in that of the carapace, between the two sexes of the same species, and even between members of the same sex.

1. *Elamena mathaei* (Desmarest).

1825. *Hymenosoma mathaei* (Latreille M.S.) Desmarest. Cons. s.l. Crust., prt 10, p. 163.
 1830. *Hymenosoma mathei* Rüppell. Besch. u. Abb. 24 Arten kurzschw. Krabben p. 21, pl. 5, f. 1.
 1837. *Elamena mathaei* H. Milne-Edwards. Hist. nat. Crust., t. 2, p. 35.
 (nec *Elamene mathaei* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, 1853, p. 223, pl. 11, f. 4, which is probably *Halicarcinus planatus* (Fabricius)).
 1849. *Elamene mathaei* Krauss. Südafrik. Crust., p. 51.
 1862. *Elamene mathaei* Heller. Beitr. z. Crustaceenfauna d. rothen Meeres, p. 371¹⁾.
 1875. *Elamene mathaei* Paulson. Rech. s.l. Crust. Mer Rouge, p. 71, pl. 9, f. 3—3b¹⁾.
 1906. *Elamena mathaei* Nobili. Ann. Sc. Nat. (9) t. 4, p. 319.

Several authors (see p. 19 of the present paper) have alluded to the discrepancy between MILNE-EDWARDS' description of 1837 and his figure of 1853. I have had no opportunity of examining this species, the type of the genus, neither could I consult the figures of RÜPPELL²⁾ and of PAULSON.

It is recorded from the Red Sea and from Mauritius.

2. *Elamena minuta* A. Milne-Edwards.

1873. *Elamene minuta* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 324, pl. 18, f. 5.

Hab. New-Caledonia.

3. *Elamena pilosa* A. Milne-Edwards.

1873. *Elamene pilosa* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 322, pl. 18, f. 6.

This aberrant species is remarkable not only by its large size, but especially by the spine-bordered carapace and legs; shorter spines or rather stiff hairs are distributed on the upper surface of the carapace, on the pterygostomial regions, and on the much projecting extra-orbital angle. The rostrum is different from that commonly met with in this genus, by being thick, not lamellar, somewhat deflexed; the eye-stalks are wholly exposed, seen from above; the antennules reach largely beyond the rostrum, when extended, and are not separated by a prominent septum at the base. The merus of the external maxillipeds is somewhat longer than the ischium. All these characters warrant the creation of at least a subgenus, but I am loth to do so. At any rate the species is best recognizable among all the species of *Elamena*.

The Leiden Museum contains two specimens (both ♂), co-types of MILNE-EDWARDS, from

1) Cited after NOBILI.

2) RÜPPELL's paper is at my disposal, but unfortunately the plates 4 and 5 are missing.

New Caledonia, whence it has been recorded by the French author. As the latter figured all the details accurately, it is needless to enter into a fresh description. According to MILNE-EDWARDS the species grows to a very large size (breadth of carapace 26 mm., total breadth of animal across expanded legs 116 mm.); my specimens were considerably smaller.

4. *Elamena truncata* (Stimpson). Pl. 1, Fig. 4.

1858. *Trigonoplax truncata* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 109.
 1873. *Elamene truncata* ¹⁾ A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 323.
 1893. *Elamene truncata* Henderson. Transact. Linn. Soc. London (2) v. 5, p. 395.
 1900. *Elamene truncata* Borradaile. Proc. Zool. Soc. London, 1900, p. 575.
 1900. *Elamena truncata* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 386.
 1905. *Elamene truncata* Lenz. Abhandl. Senckenb. Gesellsch., Bd 27, p. 367, pl. 48, f. 15—15a.
 1906. *Elamene truncata* Baker. Transact. Proc. R. Soc. South Australia, v. 30, p. 112, pl. 2, f. 2.
 1906. *Elamena truncata* Laurie. Rep. Pearl Oyster Fish. Ceylon, prt 5, p. 428.
 1907. *Trigonoplax truncata* Stimpson. Smithson. Inst., Miscell. Coll. v. 49, p. 146.

Stat. 172. Gisser, east of Ceram. On coral reef. 2 egg-bearing ♀.

Stat. 181. Ambon. On coral reef. 2 ♂, 2 egg-bearing ♀.

LENZ mentions the variation of the carapace, even among individuals of the same sex. In my specimens, the 4 ♀ have the carapace more distinctly angular than the ♂, especially in the case of the ♀ from Gisser (cf. fig. 4 and 4b); the posterior angle is here prominent and hooked, the anterior at least indicated. Besides, the walking legs of the ♀ are much shorter, scarcely $1\frac{1}{2}$ times the breadth of the carapace; in the ♂ they are more than twice this breadth. Only the smallest ♀ from Ambon has the legs relatively as much elongate as the ♂ and the dactyli are as long, and nearly straight, as in the latter sex. Thirdly, the corneae of the eyes project beyond the carapace in the ♂, but are not visible from above in the other sex.

The truncation of the carapace is different and apparently independent from the sex. Both LENZ and LAURIE allude to this, and the former has figured the difference in his two specimens. The anterior border may be either somewhat produced in the middle, or quite straight, or even slightly concave, and both angles may be prominent; yet in all cases there is no doubt about its truncation.

The carapace is very thin, lamellar, with scarcely any indication of regions, smooth and naked; the border projects as a sharp rim horizontally. The antennae, the second peduncle-joint of which is the longest, arise beneath the eye-stalks and are not much shorter than the antennules, that are folded up beneath the lamellar front and separated by a very marked, thick and high septum, extending forward up to the anterior border of the rostrum (fig. 4a). Epistome short, though distinct, deeply sunk. There are no proper orbits, but the eye leans against a very small postocular tooth, the existence of which is denied by ALCOCK. On the pterygostomial regions is a very prominent, waved, sharp

1) MILNE-EDWARDS described it as a new species, apparently in ignorance of STIMPSON's diagnosis; it is remarkable, that he chose the same specific name as his predecessor. Most subsequent authors regard MILNE-EDWARDS as the original describer.

rim, obliquely running from the anterior angle of the quadrate buccal cavern to the base of the cheliped; this rim is cut into three lobules, the anterior of which, near the angle of the buccal cavern, being the smallest, and the next the largest; the inferior part of the pterygostomial region, like the rim itself, and the upper surface of the external maxillipeds are beset with short hairs. The external maxillipeds completely close the buccal cavern; the merus is roughly triangular, shorter than the ischium, with the carpus inserted near the antero-external angle; the exognath is wholly exposed¹⁾, reaching nearly as far as the merus.

The abdomen of the ♂ is broadly triangular, reaching forward nearly to the anterior margin of the sternum, the penultimate segment is somewhat shorter than the two preceding segments and the terminal segment; the latter is triangular, about as long as broad at the base, and with the tip rounded.

The chelipeds of the ♂ are much longer than those of the ♀ and twice the length of the carapace; the meropodite is slender, widening distally, rounded, and the upper border is somewhat produced above the carpal joint; the palm is much swollen, quite smooth and hairless, about $1\frac{1}{2}$ times the length of the fingers; the latter are straight, acute at apex, not gaping, with the inner margins finely serrated and a quadrangular tooth quite near the base of the mobile finger. In the ♀ the whole cheliped is shorter and weaker; the fingers are much longer, nearly equalling the length of the palm, finely serrated at inner margin and without larger tooth; the tips are slightly spooned, and this difference between the two sexes seems to be characteristic of the genus.

The ambulatory legs of the ♂ are very slender and elongate, the second pair, which is the longest, being $2\frac{1}{2}$ times the length of the carapace, smooth and hairless, except the dactyli; the anterior margin of the mero- and carpopodite is produced distally, and the long, falcate, slightly curved dactyli are nearly as long as the preceding joints; the inner margin of the dactyli is hairy all along and near the tip are two diverging denticles. In the ♀ (save in the smallest specimen) the legs are much shorter, the dactyli are broader, more strongly curved, especially so in the case of the posterior legs²⁾, but armed in the same way (fig. 4c).

It is remarkable, that all the ♀, though the largest is twice as broad as the smallest, are egg-bearing.

Dimensions in mm.:

	1 ♂	2 ♀	3 ♀
Length of carapace	5.75	6.75	4.25
Breadth of carapace	6.75	8.75	5.25
Length of cheliped	9.5	7.5	7.—
Length of palm	3.5	1.75	1.5
Length of mobile finger	2.25	1.75	1.5
Length of penultimate pair of legs . .	18.—	12.—	11.5

N^o 1 and 3 are from Ambon, n^o 2 is from Gisser (east of Ceram).

1) ALCOCK (l. c. p. 385) says that this exognath is completely hidden both in the genera *Elamena* and *Trigonoplax*.

2) Whether these dactyli are also more curved in the ♂ I could not make out, as in both my ♂ specimens the posterior pair of legs is wanting.

The species is widely distributed throughout the Indo-Pacific region and seems to be the commonest of all the species of *Elamena*. It was found at Ousima (Japan), at the Loo-Choo Islands, New Caledonia, Rotuma (Pacific), Nicobars, Ceylon, Zanzibar, and even at the coast of South Australia. It has now proved to inhabit also the East Indian Archipelago.

5. *Elamena filholi* de Man.

1888. *Elamene filholi* de Man. Arch. Naturgesch., Jahrg. 53, 1. p. 386, pl. 17, f. 3.

Hab. Noordwachter Island near Batavia.

6. *Elamena sindensis* Alcock.

1900. *Elamena sindensis* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 386.

1902. *Elamena sindensis* Alcock. Ill. Zool. "Investigator", Crust. prt 10, pl. 64, f. 4.

Hab. Karachi (British India).

7. *Elamena gracilis* Borradaile.

1903. *Elamena gracilis* Borradaile. Fauna and Geogr. Maldive and Laccadive Arch., v. 2, prt 2 (Mar. Crust. prt X), p. 684, f. 122.

1911. *Elamena gracilis* Rathbun. Transact. Linn. Soc. London (2) v. 14, p. 242.

Hab. Indian Ocean: Minikoi and Hulule (Male Atoll), on reef; Coetivy.

8. *Elamena producta* Kirk.

1878. *Elamena producta* Kirk. Transact. Proc. N. Z. Inst., v. 11, p. 395 (with textfig.).

1885. *Elamena producta* Filhol. Miss. île Campbell, t. 3, prt 2, p. 404, pl. 50, f. 1—2 (mere reproduction of KIRK's description and figures).

Hab. Wellington (New Zealand).

9. *Elamena kirki* Filhol.

1885. *Elamena kirki* Filhol. Miss. île Campbell, t. 3, prt 2, p. 405, pl. 47, f. 6.

Hab. Port Chalmers, South Island (New Zealand).

10. *Elamena longirostris* Filhol.

1885. *Elamena longirostris* Filhol. Miss. île Campbell, t. 3, prt 2, p. 403, pl. 46, f. 7.

1916. *Elamena longirostris* Borradaile. Brit. Antarctic ("Terra Nova") Expedition, 1910, Zool., v. 3, prt 2, p. 101.

Hab. East coast of Stewart Island, near South Island (New Zealand), and planctonic (probably clinging to some floating object) at 34° 15' S., 172° 0' E.

11. *Elamena whitei* Miers.

1846. *Haliscarcinus depressus* White. Ann. Mag. Nat. Hist., (1) v. 18, p. 178. (Nec *Hymenosoma depressum* Jacquinet et Lucas).

1876. *Elamene whitei* Miers. Cat. Crust. New Zealand, p. 52, pl. 1, f. 4.
 1876. *Elamene whitei* Miers. Ann. Mag. Nat. Hist. (4) v. 17, p. 221.
 1885. *Elamena whitei* Filhol. Miss. ile Campbell, t. 3, prt 2, p. 403, pl. 47, f. 2—3.

Hab. East coast of Stewart Island, near South Island (New Zealand).

Trigonoplax H. Milne-Edwards.

1853. *Trigonoplax* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 224. (Nec *Trigonoplax* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 109, and Smithson. Inst., Miscell. Coll. v. 49, 1907, p. 146 (= *Elamena*.)

The pentagonal carapace, with the postero-lateral margins very short, and the long antero-lateral margins straight or concave and passing anteriorly into the triangular rostrum, the very long, bulging epistome and the absence of a septum between the antennulae are the characteristic features of the genus. ALCOCK¹⁾ regards it as merely a subgenus of *Elamena*.

There is only one species known, with a subspecies in Australian waters. The two forms are to be distinguished thus:

Length of carapace exceeding breadth, front short;

dactyli of walking legs falcate, broadest at base . *T. unguiformis* (de Haan)

Length of carapace equal to breadth, front more

elongate; dactyli of walking legs broadest at middle *T. ung.* subsp. *longirostris* Mc Culloch

1. *Trigonoplax unguiformis* (de Haan).

1839. *Ocypode (Elamene) unguiformis* de Haan. Faun. Japon. Crust. p. 75, pl. 29, f. 1 and pl. H (s. n. *Inachus (Elamene) unguiformis*).
 1853. *Trigonoplax unguiformis* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 224.
 1893. *Elamene unguiformis* Henderson. Transact. Linn. Soc. London (2) v. 5, p. 394.
 1894. *Trigonoplax unguiformis* Ortman. Zool. Jahrb. Syst., Bd 7, p. 31.
 1900. *Elamena (Trigonoplax) unguiformis* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 387.
 1900. *Elamene unguiformis* Lanchester. Proc. Zool. Soc. London, 1900, p. 761.
 1902. *Trigonoplax sp.* de Man. Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, p. 500.
 1907. *Trigonoplax unguiformis* de Man. Transact. Linn. Soc. London (2) v. 9, prt 11, p. 396.

In the Leiden Museum I found 7 of the original specimens of DE HAAN, dried and in a very bad state. As DE MAN'S specimen (1902) did not wholly agree with DE HAAN'S and ALCOCK'S statements, and the former author was somewhat doubtful about the identity, the following remarks may be of use:

- 1^o The dividing line between merus and ischium of the external maxillipeds is angular in DE HAAN'S figure (pl. H), straight in DE MAN'S specimen. In the original specimens it is indeed straight, only in one or two cases with a faint angulation.
 2^o The shape of the rostrum on pl. H of DE HAAN corresponds better with the facts than that of pl. 29: it is somewhat more rounded off and agrees with the rostrum of DE MAN'S specimen.

1) Journ. As. Soc. Bengal, v. 69, prt. 2, 1900, p. 386.

- 3 The terminal segment of the abdomen of the ♂ is indeed rounded (DE MAN), not truncate (DE HAAN, pl. 29).
- 4 The fingers of the cheliped are in both sexes somewhat shorter than the palm (DE MAN), but not half the length of the latter (DE HAAN, pl. 29). They are spooned at the tip.
- 5 In the length of the walking legs there is much variation between the specimens: in one large ♀ (breadth of carapace about 17 mm.) the walking legs of the first and second pair are only twice the breadth of the carapace, and the legs are rather robust; in another ♀ (breadth of carapace 13.5 mm.) they are $2\frac{1}{2}$ times this breadth and more slender, which agrees with DE HAAN's figure (pl. 29). In a small ♂ (breadth of carapace 9 mm.) the penultimate pair (first and second pair wanting) is 3 times the breadth and $4\frac{1}{2}$ times the length of the carapace (including rostrum); the last legs are only slightly shorter. Judging from this we should conclude, that in the ♂ the legs are relatively longer and more slender than in the ♀, but DE MAN found legs with this "male" character in a young ♀, and, as this author presumes, it is perhaps better to regard this relative length of the legs as dependent of age.
- 6 AS DE HAAN (pl. 29) and ALCOCK stated, the meropodites of the legs end at the upper border in a small prominence. In DE MAN's specimen this prominence is very large, about half as long as the next carpopodite. This character may suggest, that DE MAN's specimen is indeed a subspecies, but we cannot regard it as such, as long as only one single specimen is available.

The chief habitat of the species seems to be Japan, but it has also been found at the Andamans, in the Gulf of Martaban, at Singapore and Ternaté.

2. *Trigonoplax unguiformis* subsp. *longirostris* Mc Culloch.

1906. *Elamena (Trigonoplax) unguiformis* Fulton and Grant. Proc. R. Soc. Victoria, v. 19, p. 10 (with textfig.).

1908. *Trigonoplax unguiformis* var. *longirostris* Mc Culloch. Rec. Austral. Mus. v. 7, p. 59, pl. 12, f. 3.

Hab. Port Philip (Victoria).

Elamenopsis A. Milne-Edwards.

1873. *Elamenopsis* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 324.

This genus was regarded by MILNE-EDWARDS as a transition between *Pinnotheres* and *Elamena* and, though we know that the Hymenosomidae have nothing to do with the Pinnotheridae, the general appearance of *Elamenopsis* with its short legs doubtless resembles that of *Pinnotheres*. Only one species is known.

1. *Elamenopsis lineata* A. Milne-Edwards. Pl. 1, Fig. 5.

1873. *Elamenopsis lineatus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 324, pl. 18, f. 4. Stat. 127. Great Sangir Island (between Menado and Mindanao). On reef. 1 ♂.

This aberrant species discovered by A. MILNE-EDWARDS has been never found again since 1873.

The carapace is perfectly flattened, transversely oval, broader than long, with the sides regularly convex and unarmed; the posterior margin is straight; the anterior margin faintly convex, but beyond the latter the carapace slopes obliquely-forward and ends in a short and broad, triangular, obtuse rostrum, not visible in a dorsal view of the carapace, as it is nearly perpendicularly deflexed. The regions are defined by narrow but distinct sulci, the course of which in my specimen nearly corresponds with the figure of MILNE-EDWARDS: gastric and cardiac regions are distinct, and the bordering sulci as well as the deep cervical groove are situated in somewhat sunk and concave parts of the carapace, hepatic and branchial regions are also indicated, and the latter area is again divided by a transverse bifurcating sulcus in my specimen, parting from the end of the cervical groove, but simple and originating somewhat more anteriorly in MILNE-EDWARDS' figure. The lateral parts of the carapace are nearly perpendicular. The whole carapace, also the sternum, save the abdomen, is covered by a close, but very short, fur of a dark-brown colour; the hairs are somewhat longer at the sides and here club-shaped; a group of such hairs is placed immediately anterior to the bases of the chelipeds. The sternum is straight or somewhat concave transversely, but much convex, especially posteriorly, in a longitudinal direction. The abdomen of the ♂ is broadly triangular, but not occupying all the space between the posterior pair of legs; the third segment is very short, almost linear; the next segment the broadest of all, with convex lateral margins, much longer laterally than in the median line, as the anterior margin is curved rather abruptly backward in the middle (fig. 5c); the fifth segment is shorter than the next or penultimate segment, which is the longest, and twice as long as the very short, broadly triangular terminal joint, that is rounded at the tip. The general shape of the abdomen and the small last joint have been perfectly recognized by MILNE-EDWARDS. This terminal joint reaches forward to the level of a line connecting the posterior part of the bases of the chelipeds, but there is a rather great distance between the tip of the abdomen and the posterior margin of the buccal cavity.

The short eye-stalks are placed in shallow sockets, but there is no projecting external orbital angle; the antennae arise below the eye-stalks, and the peduncle reaches only as far forward as the eye; the antennulae are much stouter; with the basal joints close together and partly overlapped by the somewhat projecting lateral parts of the rostrum, the two next peduncle-joints of equal length, longer than the basal joint, and bent rectangularly to each other.

The epistome is distinct, projecting in the median line both anteriorly and posteriorly. Pterygostomial regions not longitudinally grooved or crested. Buccal cavern with the lateral borders slightly diverging backward. External maxillipeds gaping, especially posteriorly, hairy at outer surface, and closely fringed at inner margins; ischium somewhat shorter than merus, narrowing towards the base; both merus and ischium longer than broad, the latter not auriculated anteriorly; palp very thick, but long, inserted near antero-internal angle of merus; exognath partly concealed in normal position, slender, reaching nearly to anterior margin of merus (fig. 5d).

The chelipeds and walking legs are remarkably stout and shortened,

and wholly covered (save the fingers of the chelipeds) with a dense fur of similar hairs as are found on the lateral sides of the carapace. All the legs are only $1\frac{1}{2}$ times the breadth of the carapace, with exception of the posterior pair, that is somewhat shorter than the preceding pairs. The short meropodite of the chelipeds is three-faceted, with rather sharp borders, but wholly unarmed; the wrist has a rounded inner angle; the palm is much inflated, smooth, with the horizontal length exceeding the height and also longer than the fingers; the latter are of a white colour, with the greater part naked, but provided with some ordinary, slender hairs, gaping at base and meeting at tip, which is acute, not spooned; the fixed finger has a very small tooth quite near the base of the inner margin and beyond this some minute serrations; the mobile finger is serrated in the same way, very high at the base, but tapering to tip, and the inner margin has a quadrangular tooth at about $\frac{1}{3}$ of the distance between the base of the inner margin to the tip of the finger (fig. 5a).

The stout walking legs differ little in length, only the last pair is distinctly shorter than the preceding pairs and about $1\frac{1}{3}$ times the breadth of the carapace, the penultimate pair measuring $1\frac{1}{2}$ times this breadth. They are wholly covered with hairs, even to the tip of the dactyli, that are straight, pointed and longest in the case of the second pair of ambulatory legs, where they equal the preceding joint in length. All the joints are completely unarmed; the meropodites are 3 times as long as broad, somewhat narrowing distally.

Dimensions in mm.:

Length of carapace (seen from above and not including the rostrum).	2.8	
Breadth of carapace	3.3	
Length of carapace	4.9	
Length of meropodite	} of penultimate pair of legs }	1.9
Breadth of meropodite		0.6
Length of propodite		1.0
Breadth of propodite in the middle		0.4
Length of dactylus		0.8
Length of posterior pair of legs		4.5
Horizontal length of chela	2.1	
Height of palm	1.0	
Length of mobile finger	0.9	

The original habitat of this species is New Caledonia, in brackish water. The "Siboga"-Expedition found it on the coral reefs, at Sangir, north of Celebes.

Species incertae sedis:

Hymenosoma gaudichaudii Guérin. Voy. "Coquille", 1828, pl. 2, f. 12, and H. MILNE-EDWARDS, Ann. Sc. Nat. (3) t. 20, 1853, p. 222.

Hymenosoma laeve Targioni-Tozzetti. Viag. "Magenta", Crost., 1877, p. 177, pl. 11, f. 3.

RETROPLUMIDAE.

This family was instituted by GILL¹⁾ to receive the genus *Archaeoplax*, established by ALCOCK and ANDERSON²⁾ in the previous year for an aberrant deep sea Crab. Becoming aware that this name *Archaeoplax* was praeoccupied, the latter authors changed the name into *Ptenoplax*³⁾, but already GILL had changed the generic name into *Retropluma*, and accordingly the term Retroplumidae has priority above Ptenoplacidae. Nevertheless, such competent authors as BORRADAILE⁴⁾ retain ALCOCK's nomenclature, and so does MAC GILCHRIST⁵⁾. Only DOFLEIN⁶⁾, in describing a new species, has followed GILL.

As to the generic affinities, ample information has been given by ALCOCK (l. c. 1899) and BORRADAILE. Only a single genus is known, the species of which inhabit the deeper parts of the sublittoral zone and may be called almost abyssal.

Retropluma Gill.

Literature: DOFLEIN l. c. ALCOCK has excellently characterized this genus (l. c. 1899). Two species have been described, but the "Siboga" Expedition has yielded a third one.

1. Side margins of carapace with only one tooth (or rather angulation) behind ext. orb. angle. Rostrum expanded and bilobed at tip. Superior orbital border with a small projection in the middle . . . *R. notopus* (Alcock)
- Side margins of carapace with two teeth (or angulations) behind ext. orbital angle. Rostrum regularly tapering to tip, not expanded or bilobed. Superior orbital border either without any prominence or with a strong tooth 2
2. Sides of carapace strongly toothed. Supra-orbital tooth spiniform, directed forward and half as long as rostrum. Transverse sutures

1) Americ. Naturalist, v. 28, 1894, p. 1043.
2) Journ. As. Soc. Bengal, v. 63, prt 2, 1895, p. 180.
3) Ill. Zool. "Investigator", Crust., 1895, pl. 15. Cf. ALCOCK, Account Deep-Sea Brachyura "Investigator", Calcutta, 1899, p. 78.
4) Ann. Mag. Nat. Hist. (7) v. 19, 1907, p. 479.
5) Ann. Mag. Nat. Hist. (7) v. 15, 1905, p. 266.
6) Wiss. Erg. "Valdivia"-Exp. Bd 6 (Brachyura), 1904, p. 131.

on carapace (which is covered by a short fur) absent *R. chuni* Doflein (= *R. dentata* Mac Gilchrist)

Sides of carapace angular, not toothed, but everywhere finely serrated.

Supra-orbital tooth absent. Two transverse sutures on carapace, which is almost hairless *R. plumosa* n. sp.

1. *Retropluma plumosa* n. sp. Pl. 2, Fig. 1.

Stat. 254. 5°40' S., 132°26' E. Near Kei Islands. Depth 310 metres. Fine, grey mud. 1 ♂.

In some respects this species agrees either with the type species of ALCOCK or with the species of DOFLEIN and of MAC GILCHRIST. With *R. notopus* it shares the angular shape of the carapace (though in the new species there is one additional angulation behind the external orbital angle), the two transverse sutures, and the faint development or absence of a supra-orbital tooth; on the other hand the "Siboga" species agrees with *R. chuni* and *dentata* in the shape of the rostrum, in the granulation of the meropodites of the walking legs (as in *R. dentata*), in the 4 longitudinal sharp ridges on the dactyli (as in *R. chuni*) and in the shape of the abdomen of the ♂ (as in *R. dentata*), but as the descriptions of the different species either in this or in another point are not quite complete, several characters may be called generic rather than specific.

The carapace is wholly flattened, very slightly granular and naked, except for some short hairs at the margins. Two transverse sutures divide the surface into three parts; the anterior of which slopes obliquely-forward and terminates in the median line into a small, slender, somewhat deflexed rostrum, tapering to tip, reaching as far as the basal joints of the antennulae and beyond the line connecting the external orbital angles; the posterior part of the carapace is likewise somewhat, though less, oblique, and the convex posterior margin passes with a distinct angle into the subparallel lateral margins. The distance between the external orbital angle is $\frac{5}{8}$ of the whole breadth of the carapace, and the supra-orbital border is long, concave, and without any trace of a tooth, but showing a re-entering angle at the place where such a tooth exists in *R. chuni* and *dentata*¹⁾. Parting from this point, the superior orbital border passes obliquely forward to the rectangular external orbital angle, which is finely crenulate, the crenulations being directed outward at the anterior and forward at the outer border; the outer border (the antero-lateral border of the carapace) slopes obliquely-outward towards the next angulation (anterior lateral tooth), which is little prominent, finely crenulate, and connected with the angulation of the other side by the anterior, somewhat convex, transverse suture of the carapace. Behind this angulation the lateral margins of the carapace are subparallel or slightly converging posteriorly, but there is a second indentation (posterior lateral tooth) about at the level of the bases of the chelipeds. Behind these posterior teeth, and a little way

1) There is some confusion regarding the external orbital angle, among the authors. DOFLEIN expressly states that he regards the supra-orbital tooth, to which the eye extends, as the real orbital angle and he consequently calls the next tooth, which is on the same level with this supra-orbital one, the antero-lateral tooth; hence his statement that the borders of the carapace are armed with three pairs of teeth. I have followed ALCOCK in regarding this latter tooth as the real orbital angle, as to this point the incomplete orbito-antennary fossa is continued outward.

behind the middle of the distance between the posterior tooth and the hinder angle of the carapace, the latter is crossed by the second transverse suture, which is nearly straight, but somewhat produced in its median part. The length of the carapace (not including the rostrum) is distinctly shorter than the breadth; the hinder margin is longer than the distance between the external orbital angles.

There are scarcely fossae for the orbits; the eye-stalks are free, directed obliquely-outward and forward, granular at upper surface, thick and rather long ($\frac{1}{3}$ breadth of carapace); the cornea is small, occupying the tip of the stalk and semilunar in shape, if viewed from above. Laterally of the bases of the eye-peduncles is an incomplete transverse fossa, scarcely extending to external orbital angle, and incompletely closed ventrally by the inflated basal joint of the antennule, the peduncle of the antenna and the infra-orbital spine, an arrangement that is characteristic for the genus.

The infra-orbital spine is prominent, straight, directed forward and finely crenulate at the borders; it reaches beyond the basal joint of the antenna, which is quadrate, not inflated and nearly as long as the third joint; the next joint is twice as long; the flagellum consists of about 25 joints, each of which has two short hairs; the whole flagellum is half the length of the carapace. The basal joint of the antennules is globular, inflated, granular (as in *R. dentata*), freely movable (fig. 1a), with the antero-internal angle somewhat projecting and giving rise to the two next joints, that are cylindrical and of about equal length (as long as the transverse diameter of the basal joint); they are much stouter and longer than the peduncle-joints of the antenna. Antennulae, antennae and infra-orbital spine arise all at the same level¹⁾, on the inferior border of the orbito-antennular fossa; the eyes reach farther outward than the basal antennular joint and may touch the infra-orbital spine²⁾.

The chelipeds are unequal in size, the right being the stouter, quite as in *R. dentata* and apparently also as in *R. notopus*³⁾; yet the difference between the chelipeds is especially shown by the relative development of the palm and the fingers. The description given by MAC GILCHRIST is wholly applicable to my specimen: the right cheliped is thicker in all its joints, and, though the hands are of equal length, the right hand has a higher and more inflated palm, that is granular at outer surface, and as long as the fingers, whereas in the left hand the palm is much weaker and lower, and shorter than the fingers. Both palms are serrated along the upper border and the proximal half of the inferior border, and parallel to this latter border a continuous row of small granules is continued to quite near the tip of the fixed finger (fig. 1b, 1c). The fingers are high at the base, greatly compressed, not gaping and tapering to the acute tip; on the right side (fig. 1b) the cutting margins of the fingers are provided with 3—4 very large, interlocking, obtuse but sharp-edged teeth, but on the left there are only a number of very small denticles on the fixed finger, the opposite margin of the movable finger being unarmed.

1) According to ALCOCK the antennae arise just below the infra-orbital spine, in *R. notopus*.

2) MAC GILCHRIST notes that in *R. dentata* the eye-stalks reach as far outward as the basal antennule-joint; my specimen on the other hand agrees in this respect with what is found in *R. notopus*.

3) In DOFLEIN's specimen of *R. chuni* only the right cheliped was present.

All the legs are fringed with very characteristic hairs of the same kind: they are long and flexible, and feathered. Many of these hairs, especially on the posterior legs are modified in a most peculiar way: the tip is likewise plumose, but the rest of the hair is transformed into a long, membranous structure, that is inflated, closed all round and narrowing towards the base of the hair. Although gills, six in number, are present at either side of the thorax, it may be assumed that the transformed hairs are adopted to oxygen-breathing purposes, and as such hairs are especially numerous on the hinder legs, these should not only prevent the animal from sinking into the soft mud upon which it lives, a supposition made by ALCOCK¹⁾, but also perform the function of gills. Neither in the descriptions, nor in the drawings, of ALCOCK, DOFLEIN or MAC GILCHRIST did I find similar hairs, so that I believe they are characteristic for my species.

The ambulatory legs are extremely long and slender, the second pair, which is the longest, being more than 3 times the breadth of the carapace. The meropodites are 5 times as long as broad, granular at upper and under surface, serrated and hairy along the borders; in the case of the second pair the meropodite is nearly as long as the carpo- and propodite together. The propodite especially is fringed with very long hairs, that are twice or three times as long as the breadth of the joint to which they are inserted; the longest hairs are found at the under or inner border. The dactyli are very long, nearly straight, ending acutely and provided with four sharp ridges (also noted by DOFLEIN in *R. chuni*); the length of the dactyli is variable; in the first pair of legs they are relatively short, at least shorter than the propodite, and almost naked; in the second pair they are excessively long, equalling in length the likewise much elongated propodite, and again sparsely hairy; in the third pair they seem to be as long, but on the left side of the animal this dactylus is partly broken off, and on the right it is wanting altogether, its outer border is fringed with long hairs.

The posterior legs are modified in the characteristic way of the genus: they are slender and weak, much shorter than the preceding pairs, reaching somewhat beyond the middle of the length of the meropodite of the preceding legs (in the figure they are represented unfortunately slightly too long), rising almost on the back of the animal, apparently, in normal position, carried above the plane of the preceding legs and directed straight forward. The last five joints are, however, not equal in length, as stated by ALCOCK and DOFLEIN, but the carpopodite is distinctly shorter in my specimen.

The abdomen of the ♂ occupies all the space between the bases of the posterior legs; its general shape is triangular, with the 3^d to 6th joint of nearly equal length; as in the other species the 3^d—5th joint are fused, but all the segments are distinctly defined by rather deep notches at the margins of the abdomen; the 6th segment, as in *R. notopus* and *R. dentata*, bears a crescentic ridge near the anterior margin, which ridge projects at either side into a sharp prominence; the terminal segment is longer than the preceding ones and somewhat longer than broad at the base, with rounded tip (fig. 1 a).

1) A Naturalist in Indian Seas, Calcutta, 1902, f. 55, opposite p. 252.

The outer surface of the abdomen, like the pentagonal sternum, is granular.

Dimensions in mm.:

Total length of carapace (including rostrum)	7.—	
Length of rostrum	0.6	
Breadth of carapace	7.9	
Distance between ext. orb. angles	5.—	
Length of chela	6.—	
Length of first pair of ambulatory legs.	21.—	
Total length	} of second pair of ambulatory legs {	27.—
Length of meropodite		9.25
Breadth of meropodite		1.75
Length of carpopodite ¹⁾		3.75
Length of propodite ¹⁾		6.—
Breadth of propodite		1.—
Length of dactylus		6.—
Length of posterior pair of legs	8.—	

The incrustation of the animal is apparently very weak: the integument is thin, flexible and transparent.

The species of this genus have been caught at different localities of the Eastern Indian Ocean. "*Ptenoplax*" *notopus* Alcock ²⁾, the typical species, has been dredged near the Coromandel coast and the Andamans, in depths of 180—450 metres; DOFLEIN ³⁾ records his species, *R. chuni*, caught at a depth of 614 metres, from the coast of West Sumatra, south of Nias; and finally MAC GILCHRIST ⁴⁾ obtained his "*Ptenoplax*" *dentata* south-east of South Andaman Island, in a depth of 502 metres. In comparing the descriptions and figures of DOFLEIN and MAC GILCHRIST it seems to be more and more probable, that their species are really identical. Indeed, the shape of the carapace, with the conspicuous supra-orbital tooth (which is called by DOFLEIN the external orbital angle) and the teeth at the lateral margins are exactly alike; both authors agree in the description of the rostrum, of the furry coating of the carapace, and of the much longer hairs at the front and antero-lateral borders. Again, there is no difference between the figures with respect to the walking legs: the dactyli are relatively short, at least shorter than the propodites, and the four longitudinal ridges, with which the dactyli, according to DOFLEIN, are provided, are also shown in MAC GILCHRIST'S figure. DOFLEIN'S name being published a few months earlier than MAC GILCHRIST'S should, then, have priority.

The new species of the "Siboga" was dredged in a depth of 310 metres near the Kei Islands, and so the genus *Retropluma* (= *Ptenoplax*) may be included in the Indo-Malayan fauna.

1) Measured along anterior margin.

2) ALCOCK and ANDERSON, Journ. As. Soc. Bengal, v. 63, prt 2, 1894, p. 181, pl. 9, f. 3—3a—b. Ill. Zool. "Investigator", Crust. pl. 15, 1895, f. 2—2a—b. ALCOCK, Account Deep-Sea Brachyura "Investigator", 1899, p. 79.

3) Wiss. Erg. "Valdivia" Exp., Bd 6, Brachyura, 1904, p. 131, pl. 37, f. 1—2.

4) Ann. Mag. Nat. Hist. (7) v. 15, 1905, p. 266. Ill. Zool. "Investigator", Crust. prt 11, 1905, pl. 74, f. 1.

OCYPODIDAE.

To this family belong some well known and widespread tropical genera of Crabs, that are mostly characterized by their slender, often greatly elongate eye-stalks, and the narrow front, and in some cases by the enormous development of one of the chelipeds in the ♂. All the species keep strictly to the shore and live on sandy and muddy beaches, between flood- and ebblines; the majority has burrowing habits, each individual boasting of a separate hole to itself, to which it rapidly retreats when danger is approaching. Such genera as *Ocypoda* and *Uca* (= *Gelasimus*), that live in countless numbers in suitable localities, do not fail to attract the attention of even the layman. There is in this family a clearly-pronounced tendency to estuaries, mangrove-swamps and even to fresh water, though no species may be called strictly fluviatile.

Recent writers have distinguished three subfamilies: *Ocypodinae*, *Mictyrinae* and *Macrophthalminae*, that are well defined by ALCOCK¹⁾ and BORRADAILE²⁾.

Subfam. OCYPODINAE.

The subfamily comprises the best known and most conspicuous representants of the family, viz. the genera *Ocypoda* and *Uca*, and, besides, only the genus *Heloecius*³⁾.

- | | | |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1. | Abdomen of ♂ almost as broad at base as the sternum; chelipeds subequal.
Epibranchial regions much inflated | Heloecius |
| | Abdomen of ♂ much narrower at base than the sternum; chelipeds always unequal | 2 |
| 2. | Corneae of eyes very much bulging, occupying nearly the whole ventral part of the eye-stalks; the latter club-shaped. Chelipeds of ♂ not very unequal | Ocypoda |
| | Corneae of eyes small, at end of eye-stalks; the latter slender and thin.
Chelipeds of ♂ very unlike, one being enormously developed | Uca |

1) Journ. As. Soc. Bengal, v. 69, 1900, prt 2, p. 342—343.

2) Ann. Mag. Nat. Hist. (7) v. 19, 1907, p. 485—486.

3) The genus *Acanthoplax* of H. MILNE-EDWARDS, with only one species (inhabiting the coast of Chile) is now fused into *Uca*.

The genus *Heloeccius* Dana ¹⁾ being not represented in the "Siboga" collection, we may pass directly to *Ocypoda*.

Ocypoda Fabricius.

1798. *Ocypoda* Fabricius. Suppl. Entom. Syst., p. 347.

The members of this genus frequent sandy beaches, where they inhabit long burrows near high-water mark, into which they dart back when alarmed. The speed with which they dash to their burrows or to the sea is remarkable and has been especially noticed by the earliest pre-Linnean authors. The majority of the species is in the possession of a stridulating ridge, at the inner surface of the palm of the larger cheliped; this ridge is rubbed against a longitudinal rim on the ischiopodite of this cheliped, and so a squeaking sound is produced. On the habits of *Ocypoda* and the use of the stridulating ridge ALCOCK ²⁾ has published an interesting account.

An attempt to review the species has been made in earlier years by KINGSLEY ³⁾ and by MIERS ⁴⁾, but better by ORTMANN ⁵⁾. After the last revision only a few new species have been described, viz.:

O. nobilii de Man. Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 478, pl. 19, f. 2—3, from the Baram river (Borneo) ⁶⁾.

O. jousseaumei Nobili. Bull. Mus. d'Hist. Nat., 1905, n^o 4, p. 233, f. 2, and: Ann. Sc. Nat. (9) t. 4, 1906, p. 310, from the Red Sea.

and a new subspecies:

O. rotundata Miers subsp. *arabica* Nobili. Bull. Sc. France et Belgique, t. 40, 1906, p. 152, pl. 5, f. 26, from the Persian Gulf.

Besides, Miss RATHBUN remarks ⁷⁾, after examination of DANA's original specimen of *O. laevis*, that this species has always been wrongly considered identical with *O. cordimana* Desmarest, but the difference between the two species is not indicated.

The "Siboga" collected only three widely-distributed species.

1. *Ocypoda cordimana* Desmarest.

Literature: ORTMANN, Zool. Jahrb., Syst., Bd 10, 1897, p. 362 and ALCOCK, l. c. p. 349.

Stat. 40. Pulu Kawassang, Paternoster Islands. 1 ♀.

Stat. 50. Labuan Badjo, west coast of Flores. 1 ♂.

Stat. 179. Kawa Bay, west coast of Ceram. 1 ♀.

1) For synonymy and literature see HASWELL, Cat. Austral. Crust., 1882, p. 91. Cf. also DE MAN, Zool. Jahrb. Syst., Bd 2, 1887, p. 696.

2) Ann. Mag. Nat. Hist. (6) v. 10, 1892, p. 336.

3) Proc. Acad. Nat. Sc. Philadelphia, 1880, p. 179.

4) Ann. Mag. Nat. Hist. (5) v. 10, 1882, p. 378.

5) Zool. Jahrb., Syst., Bd 7, 1894, p. 761 and *ibid.*, Bd 10, 1897, p. 359.

6) The author discusses at the same time the characteristic features of *O. simpsoni* Ortmann (= *O. convexa* Stimpson nec Quoy et Gaimard).

7) Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 834, pl. 7, f. 2.

The ♀ from Stat. 40 is very small (distance between ext. orbital angles 15.5 mm.); nevertheless, it is bearing eggs.

According to STIMPSON¹⁾ *O. laevis* Dana should be distinguished from this species by the more prominent orbital angles and by the smoothness of the edges of the hand.

O. cordimana seems to be more terrestrial in its habits than any other species of the genus; according to HENDERSON²⁾ it lives on sandy bottom, far from the shore. DE MAN³⁾ records a specimen from fresh water.

2. *Ocypoda ceratophthalma* Pallas.

Literature: ORTMANN, l. c. p. 364 and ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 345.

- Stat. 40. Pulu Kawassang, Paternoster Islands. 1 ♂.
- Stat. 50. Labuan Badjo, west coast of Flores. 1 ♂, 1 ♀.
- Stat. 61. Lamakera, Solor Island, reef. 2 ♂, 1 ♀.
- Stat. 71. Makassar. 6 ♂ (aet. div.).
- Stat. 89. Pulu Kaniungan, east of Borneo. 3 ♂ (juv.).
- Stat. 93. Sanguisiapo, Sulu Archip. 1 ♂.
- Stat. 131. Karakelang, Talaut Islands. 2 ♂, 1 ♀.
- Stat. 133. Lirung, Talaut Islands. 2 (juv.).
- Stat. 179. Kawa Bay, west coast of Ceram. 2 (juv.).
- Stat. 263. Great Kei Island. 3 ♂.

There is a considerable variation in the number of ridges, composing the stridulating organ. From the dorsal part of the hand downwards there are firstly some tubercles, followed by a series of thicker ridges, that are again succeeded by a series of narrower ridges, with much narrower interspaces between them. DE MAN⁴⁾ describes a specimen, in which these latter ridges are not so closely crowded as usually; besides, the number of these two kinds of ridges is not at all constant. I also found a specimen, in which the narrow ridges were rather widely separated from each other, and the thicker ridges were obsolete and scarcely indicated.

As is well known, the horny prolongation of the eye-stalks is likewise subject to much variation, even between individuals of the same size and sex. And thirdly, the epibranchial angles may reach sideways beyond the external orbital angles or not.

3. *Ocypoda kuhli* de Haan.

Synonymy and literature: ORTMANN, Zool. Jahrb., Syst., Bd 10, 1897, p. 364.

- Stat. 51. Bay of Madura. 1 ♂.
- Stat. 61. Lamakera, Solor Island, reef. 1 ♂.

This widely-distributed, but apparently not very common species, is distinguished by the stridulating organ being composed of transverse tubercles or short ridges, usually few in

1) Smithsonian Inst., Miscell. Coll., v. 49, 1907, p. 111.

2) Transact. Linn. Soc. London, (2) v. 5, 1893, p. 328.

3) Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 483.

4) Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 478, pl. 19, f. 1.

number (8—9). In the specimen from Madura there are only 6—7 transverse tubercles, widely separated, and placed irregularly in the ventral part of the organ.

DE MAN¹⁾ already notes the much pronounced tubercles on the first sternal joint, at either side of the terminal segment of the abdomen of the ♂.

Uca Leach.

1815. *Uca* Leach. Transact. Linn. Soc. London, v. 11, p. 309.

1820. *Gelasimus* Latreille. Dict. Sc. Nat., t. 18, p. 286.

Description: ALCOCK, l. c. p. 350.

The species of *Uca* are yet more frequently met with than those of *Ocypoda* on all tropical shores, where they live in great swarms, as is generally known; they prefer, however, muddy, not sandy, beaches. ALCOCK²⁾ and, in recent years, PEARSE³⁾ have given a fascinating account of their peculiar habits.

Earlier writers (H. MILNE-EDWARDS, S. J. SMITH, KINGSLEY) have reviewed the genus, but the best synopsis of the Indo-Pacific species has been given by DE MAN⁴⁾. ORTMANN prepared a key for all the species. Yet there has remained some confusion in the broad-fronted species, and ORTMANN⁵⁾ is inclined to unite these species all in one species, *Uca gaimardi* H. Milne-Edwards.

The following new species have been described after the revision of DE MAN in 1891:

U. zamboangana Rathbun. Proc. U. S. Nat. Mus., v. 44, 1913, p. 615, pl. 74, from the Philippines.

U. mearnsi Rathbun. l. c. p. 616, pl. 75, f. 1—2, also from the Philippines; only the ♀ is known.

U. novae-guineae Rathbun. l. c. p. 617, pl. 76, from New Guinea.

U. rathbunae Pearse. Philippine Journ. Sc., v. 7, sect. D, 1912, p. 91, textfig. 1, from Manila (Philippines).

Two new subspecies have been added:

U. inversa (Hoffmann) subsp. *sindensis* Alcock, l. c. p. 356.

U. annulipes (Latreille) subsp. *orientalis* Nobili. Boll. Mus. Torino, t. 16, n^o 397, 1901, p. 13, f. A.

Besides, the following alterations in the nomenclature have been made:

U. vocans H. Milne-Edwards should be called *U. marionis* Desmarest.

U. forcipata (Adams et White) de Man cannot retain its name, as the species described by the monographers of the "Samarang" is wholly unrecognizable; ORTMANN (l. c., 1897, p. 350) proposes therefore to name DE MAN'S species (l. c., 1891, p. 32, pl. 3, f. 9) *Uca demani*. I cannot make out, whether Miss RATHBUN'S specimens⁷⁾ from Monte Bello Islands, western Australia, are either the true *forcipata* or *demani*.

1) Notes Leyden Mus., v. 3, 1881, p. 251.

2) Ann. Mag. Nat. Hist. (6) v. 10, 1892, p. 415.

3) Philippine Journ. Sc., v. 7, sect. D, 1912, p. 113. Also reprinted in: Smithsonian. Rep. 1913, 1914, p. 415.

4) Notes Leyden Mus., v. 13, 1891, p. 20.

5) Zool. Jahrb., Syst., Bd 7, 1894, p. 749.

6) Zool. Jahrb., Syst., Bd 10, 1897, p. 354.

7) Proc. Zool. Soc. London, 1914, p. 661, pl. 2, f. 8.

U. acuta (Stimpson) has been shown by Miss RATHBUN to be identical with *U. dussumieri* H. Milne-Edwards, and she has altered¹⁾ accordingly DE MAN's "*Gelasimus*" *acutus*²⁾ into *Uca manii*, but I am doubtful about the admissibility of this latter name, two species within the same genus now having been called after Dr. J. G. DE MAN.

The new species, save *U. novaeguinea*, belong to the narrow-fronted species. With regard to *U. rathbunae*, I am inclined to regard it, after careful study of PEARSE's description and figures, identical with *U. coarctata* (H. Milne-Edwards)³⁾. Both species agree exactly, not only in the shape of the larger chela and the row of tubercles on the lower wall of the orbit, but also with respect to the relative length of the carapace, as in both species this length is 60% of the distance between the external orbital angles⁴⁾. PEARSE says, that, on his request, Miss RATHBUN herself has carefully compared his specimens with specimens of 13 narrow-fronted species from the Indo-Pacific region in the United States National Museum (perhaps *U. coarctata* was not among the latter), and as the result of this study the specimens were declared to represent a new species, most nearly related to *U. urvillei* (H. Milne-Edwards).

1. *Uca marionis* Desmarest.

Synonymy and description: DE MAN, Abhandl. Senckenb. Ges., Bd 25, Heft 3, 1902, p. 487 and Notes Leyden Mus., v. 13, 1891, p. 23, pl. 2, f. 5—5a; THALLWITZ, Abhandl. Mus. Dresden, Bd 3, n^o 3, 1890/91, p. 42.

Stat. 86. Dongala, west coast of Celebes. 4 ♂, 2 ♀.

Stat. 115. Kwandang Bay, north coast of Celebes. 3 ♂.

Stat. 131. Karakelang, Talaut Islands. 5 ♂.

The considerable variation shown in the larger chela of the ♂ has induced earlier authors to discriminate several species that, however, are now all united into one. In the most common form the immovable finger bears two large, triangular and compressed teeth in the distal half. This is the subsp. *excisa* Nobili⁵⁾, formerly called *Gelasimus nitidus* by DANA⁶⁾, but the latter name had been used by DESMAREST already for a fossil species. A good figure of the chela is given by DE MAN (l. c., 1891, pl. 2, f. 5).

In another modification the triangular tooth near the middle of the fixed finger becomes lower and lower; the finger itself is less curved upward and more straight than in *excisa*. This subspecies is the *cultrimana* White⁷⁾, the chela of which has been well figured by H. MILNE-EDWARDS (Ann. Sc. Nat. (3) t. 18, 1852, pl. 3, f. 4a), by KINGSLEY (Proc. Ac. Nat. Sc. Philadelphia, 1880, pl. 9, f. 7) and especially by DE MAN (l. c. pl. 2, f. 5a).

1) Proc. Biol. Soc. Washington, v. 22, 1909, p. 114.

2) Journ. Linn. Soc. London, v. 22, 1888, p. 113, pl. 7, f. 8—9, pl. 8, f. 1—4.

3) Ann. Sc. Nat. (3) t. 18, 1852, p. 146, pl. 3, f. 6. It is true, that this species has been originally recorded from Odessa on the Black Sea, but this locality seems, to say the least, most doubtful. Besides, I had an opportunity to examine undoubted specimens of *U. coarctata* from Nias, that belong to the Amsterdam Zoological Museum and were collected by Dr. P. J. KLEIWEIG DE ZWAAN in 1910, and to compare these with the very specimens of DE MAN (l. c. 1891).

4) 55% in *U. urvillei*.

5) Ann. Sc. Nat. (9) t. 4, 1906, p. 315.

6) Crust. U. S. Expl. Exp., 1852, p. 316, pl. 19, f. 5.

7) Proc. Zool. Soc. London, 1847, p. 84.

Thirdly the cutting margin of the immobile finger may be devoid of larger teeth, but only finely serrated and elegantly curved; the convex portion represents the proximal larger tooth. This is the typical *marionis* of DESMAREST¹⁾ and the chela has been figured again in the papers of H. MILNE-EDWARDS (l. c., pl. 3, f. 5) and KINGSLEY (l. c., pl. 9, f. 8).

All these forms grade into one another, so that a sharp demarcation is impossible, the less so because the shape of the carapace and of the walking legs in the different subspecies is the same (DE MAN, l. c., 1902, p. 489).

The species has often been designated under the name of "*Gelasimus*" *vocans* Linné, but, as KINGSLEY (l. c. p. 141) explains, it is impossible to identify LINNÉ's species²⁾. We should, then, prefer the earlier name *marionis* to *cultrimana*.

The forms *excisa*, *cultrimana* and *marionis* all occur in the "Siboga"-material.

2. *Uca tetragonon* (Herbst).

Synonymy and description: DE MAN, Notes Leyden Mus., v. 13, 1891, p. 24, pl. 2, f. 6, and ALCOCK, l. c. p. 357.

Stat. 47. Bay of Bima, Sumbawa. 1 ♂.

Stat. 131. Karakelang, Talaut Islands. 4 ♂, 4 ♀.

Stat. 250. Kur Island, west of Kei Islands. 3 ♂,

All specimens, save one, have a reddish-brown carapace, marbled with light green, as shown in the figure of DE MAN.

3. *Uca dussumieri* H. Milne-Edwards.

Synonymy and description: DE MAN, Journ. Linn. Soc. London, v. 22, 1888, p. 108, pl. 7, f. 2—7, and ALCOCK, l. c. p. 361.

Stat. 19. Labuan Tring, west coast of Lombok, 1 ♂.

Stat. 50. Labuan Badjo, west coast of Flores. 3 ♂.

The colour pattern of the carapace sometimes resembles that of the preceding species.

4. *Uca lactea* (de Haan).

Synonymy and description: ALCOCK, l. c. p. 355.

Stat. 19. Labuan Tring, west coast of Lombok. 1 ♂.

Stat. 47. Bay of Bima, Sumbawa. 2 ♂, 1 ♀.

Stat. 50. Labuan Badjo, west coast of Flores. 1 ♂.

Stat. 86. Dongala, west coast of Celebes. 8 ♂, 3 ♀.

5. *Uca gaimardi* (H. Milne-Edwards).

1852. *Gelasimus gaimardi* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 18, pl. 4, f. 17.

1891. *Gelasimus gaimardi* de Man. Notes Leyden Mus., v. 13, p. 39.

1913. *Uca gaimardi* Pesta. Denkschr. Ak. Wiss. Wien, Bd 88, p. 55, pl. 3, f. 3 and textfig. 2.

1) Cons. s.l. Crust., 1825, p. 124, pl. 13, f. 1.

2) H. MILNE-EDWARDS in 1837 (Hist. nat. Crust., t. 2, p. 54) described under *vocans* an American species, and afterwards (Ann. Sc. Nat. (3) t. 18, 1852, p. 145, pl. 3, f. 4) under the same name the true *cultrimana*.

Stat. 50. Labuan Badjo, west coast of Flores. 1 ♂.

This is one of the broad-fronted species, like the preceding. With *U. chlorophthalma* (H. Milne-Edwards), *U. latreillei* of the same author and *U. triangularis* (A. Milne-Edwards) it forms a distinct sub-group within the genus. The latter species is undoubtedly distinct, as shown by DE MAN¹⁾ but with respect to the other species, it is not unlikely, that they are all identical. *U. latreillei* is the least known, but according to DE MAN²⁾ it is distinguished by broader meropodites, these being in the last pair of legs twice as long as broad. According to PESTA (l.c.) this *U. latreillei* should probably be the young stage of *U. gaimardi*, as ORTMANN³⁾ has already suggested.

Whether *U. chlorophthalma* is really distinct, remains in my opinion uncertain. The larger hand of the ♂ is higher and shorter than in *U. gaimardi*⁴⁾, and the fingers are only slightly longer than the palm, which latter is as long as high. But it is well known, that these proportions are variable among individuals of the same species; besides, in my specimen, which agrees wholly with the Leiden Museum specimens, determined by DE MAN himself, and with that of PESTA, the large chela resembles in its dimensions *U. chlorophthalma*, as it is only 2,5 times, not 3 times as long as high, but the fingers are nearly exactly as long as the palm, and the latter is longer than high, which agrees better with *U. gaimardi*.

The pretty colour pattern of this species has been well represented by PESTA. The rosy hue of the larger hand is characteristic and seems to remain even after prolonged preservation in alcohol. In my specimen it is remarkable, that the walking legs on the left exhibit nearly the same colour (rosy-yellow) as the large hand, which is on this side, but on the right the small chela, the second and fourth walking legs are dark violet, like the general colour of the carapace, whereas the first and third walking legs are coloured like those on the left.

I only once find mentioned⁵⁾ in the literature, that the outer surface of the palm of the large chela bears, near the base of the fixed finger a small, well-defined, short-hairy depression, both in *U. gaimardi* and in *U. chlorophthalma*; of the latter species I examined the ♂, mentioned by DE MAN (l.c., 1891), in the Leiden Museum.

Subfam. MICTYRINAE.

The genus *Mictyris* has often been regarded as constituting a distinct family of its own, whereas other closely related genera were included in another family or subfamily: Dotillidae or Scopimerinae. Though the genus is standing somewhat apart there is no need for such an isolation of *Mictyris*.

Among the other genera *Ilyoplax* Stimpson⁶⁾ is undoubtedly the least known; its single

1) Journ. Linn. Soc. London, v. 22, 1888, p. 119, pl. 8, f. 8—11.

2) Notes Leyden Mus., v. 13, 1891, p. 41.

3) Zool. Jahrb., Syst., Bd 7, 1894, p. 752.

4) DE MAN, l.c., 1891, p. 42. See also Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 484, pl. 19, f. 4.

5) MIERS. Rep. "Challenger" Brachyura, 1886, p. 245, note.

6) Proc. Acad. Nat. Sc. Philadelphia, 1858, p. 98. Smithsonian. Inst., Miscell. Coll., v. 49, 1907, p. 100.

species has not been figured, and neither, as far as I know, been found again, since it was caught at Whampoa (China) living in holes of the mud, along the banks of the Canton River. Its external maxillipeds seem to resemble mostly those of *Dotilla* and *Tympanomerus*, and, like these genera, it has tympana on the legs, but the abdomen of the ♂ is said to be like that of *Macrophthalmus*, viz. regularly and slightly tapering, not constricted in the middle.

The genera of this subfamily have apparently all the same habits as those of the preceding group: they indulge in digging burrows on sandy or muddy flats along the beach, below the flood-line; occasionally some species are met with in fresh water.

The following key is meant to discriminate the genera, save *Ilyoplax*:

1. Body much globose, longer than broad. Posterior margin of carapace with a row of stiff bristles. Abdomen in both sexes widening to tip, that is broadly truncate. No tympana on the legs **Mictyris** Latreille
- Carapace more quadrate, with elongate eye-stalks; posterior margin without a row of stiff bristles. Abdomen of ♂ normal, tapering, often constricted in the middle. Mostly tympana on the legs 2
2. External maxillipeds of moderate size, not bulging, merus longer than ischium. Chelipeds of both sexes (especially of ♂) stouter than walking legs. Tympana absent or present *Ilyoplax* Stimpson
Tympanomerus Rathbun
- External maxillipeds very large, with a strong, almost hemispherical bulge forward. Tympana on the legs always distinct 3
3. Merus of external maxillipeds longer than ischium. The distal end of the 4th abdominal segment of the ♂ is fringed with bristles, that overlap the next segment. **Dotilla** Stimpson
- Merus of external maxillipeds shorter than ischium. 4th abdominal segment of the ♂ of normal size, but the next is more or less constricted near the base **Scopimera** de Haan

Mictyris Latreille.

1806. *Mictyris* Latreille. Gen. Crust. et Insect., t. 1, p. 40.

1837. *Myctiris* H. Milne-Edwards. Hist. nat. Crust., t. 2, p. 36.

As far as I am aware, H. MILNE-EDWARDS was the first to replace, apparently by error, *Mictyris* by *Myctiris*, and this latter spelling has been adopted by most subsequent authors.

The two species, one with a wide Indo-Pacific range, the other only found at the coast of East-Australia, Tasmania and New-Zealand, may be discriminated thus:

Gastric region of carapace nearly smooth. Postorbital spine prominent. Chelipeds long, fingers about twice as long as palm, upper and lower margin of palm carinate. Propodites of walking legs not much depressed. *M. longicarpus* Latreille

Gastric region of carapace with small granular points, few in number and prominent. Postorbital spine absent, only a granulate projection. Chelipeds short and bulky. Propodites of walking legs much depressed, broader than carpopodites *M. platycheles* H. Milne-Edwards¹⁾

1. *Mictyris longicarpus* Latreille.

Synonymy and description: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900.

Stat. 131. Karakelang, Talaut Islands. Reef. 8 sp.

Stat. 231. Ambon, reef. 3 sp.

Stat. 323. Bawean Island, Java Sea. Reef. 1 sp.

ALCOCK's description agrees exactly with all the specimens from different localities, in the Leiden Museum.

On examining DE HAAN's original specimens of *M. deflexifrons*²⁾ I came to the conclusion, just like DE MAN³⁾, that this species is identical with *M. longicarpus*, the only difference consisting in the occasional very faint development of the postorbital spine. That the strong spine at the inner margin of the ischiopodite is nearly obliterated or wholly absent in the ♀ has been noticed already by ALCOCK. To complete the description of the latter I only remark, that the inner surface of the palm of the cheliped is provided with a short, longitudinal ridge.

We may safely assume that STIMPSON founded his *M. brevidactylus*⁴⁾ on specimens that really were nothing than the common *M. longicarpus*.

The name of LATREILLE's species has been sometimes spelled *longicarpus* and *longicarpis*, but LATREILLE in his first description used the orthography *longicarpus*.

That the species has much the same habits as *Uca* and is likewise gregarious at suitable localities appears from the following interesting passage in R. SEMON's fascinating book⁵⁾: "On sauntering about the sandy beach before my house, I often perceived, that during ebb-tide the sand was by no means smooth, but covered with millions of tiny star-shaped heaps of sand. In the centre of each little heap I remarked a small canal, leading into the ground and serving as a lodging to a tiny crab *Mictyris longicarpus*. While the water covers the beach, the crab remains below the surface. Hardly, however, has the shore become dry, than it will pop up, throwing out the sand above its hole and chewing it to infinitesimal particles in search of tiny organisms imbedded in it. As thousands and millions of little crabs pursue this occupation at the same time, the coast soon has the appearance of being prettily and carefully raked, like a well-kept garden". As to the manner of feeding it is remarkable that the fingers of *Mictyris* end acutely and are apparently not so well adapted to the purpose as is the case in genera

1) Ann. Sc. Nat. (3) t. 18, 1852, p. 154. TARGIONI-TOZZETTI, Crost. Viag. "Magenta", 1877, p. 186, pl. 11, fig. 6. STIMPSON, Smithsonian. Inst., Miscell. Coll., v. 49, 1907, p. 103, pl. 13, f. 5.

2) Faun. Japon., Crust., 1835, p. 25 (sine descriptione).

3) Notes Leyden Mus., v. 12, 1890, p. 83.

4) Proc. Acad. Nat. Sc. Philadelphia, 1858, p. 99. Smithsonian. Inst., Miscell. Coll., v. 49, 1907, p. 103, pl. 13, f. 4. See also ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 748. It must be noted, however, that ZEHNTNER (Rev. suisse zool., t. 2, 1894, p. 177, pl. 8, f. 21—22) maintains the distinctness of *M. brevidactylus*, but his arguments seem to me to be of little importance. The "Siboga" specimens at least could, by a mixture of characters, be referred as well to either of the two species.

5) In the Australian Bush, Engl. transl., London, 1899, p. 491. The observation was made during the writer's stay at Amboyna.

with similar feeding habits (*Uca*, *Macrophthalmus*, *Euplax* a. o.), where the fingers are spooned and ornamented with stiff hairs at the tip.

Dotilla (de Haan) Stimpson emend.

1833. *Doto* de Haan. Faun. Japon., Crust., 1833, p. 24 (praeocc.).

1858. *Dotilla* Stimpson. Proc. Acad. Nat. Sc. Philadelphia, 1858, p. 98.

The genus is widely distributed throughout the Indian region, from the Red Sea and the east coast of Africa to the Moluccas. It does not seem, however, to be represented in the Pacific Ocean. Each species is somewhat restricted in its range, so *D. fenestrata* is characteristic to the east coast of Africa, ranging from Zanzibar and Moçambique to the Cape of Good Hope, *D. sulcata* inhabits the Red Sea and neighbouring coasts, *D. blanfordi*, *brevitarsis*, *clepsydrodactylus*, *intermedia* and especially *D. myctiroides* occur on the coasts of British India etc. One single species has been caught by the "Siboga".

I prepared the following key to the rather numerous (11) species:

1. Tympana present on the sternum 2
 - No tympana on the sternum 3
2. Carapace at least as long as broad. Chelipeds 3—4 times as long as the carapace and much longer than the walking legs, carpopodite of cheliped very much elongated, about as long as the carapace. Species of British India *D. myctiroides* H. Milne-Edwards¹⁾
 - Chelipeds about twice the length of the carapace. Fingers longer than palm, both with a larger tooth in the middle. Species of East Africa *D. fenestrata* Hilgendorf²⁾
3. Meropodites of walking legs dilated, only little more than twice as long as broad. 4
 - Meropodites of walking legs not dilated; distinctly more than twice as long as broad 6
4. Dactyli of walking legs as long as, or shorter than, propodites 5
 - Dactyli of walking legs distinctly longer than propodites. Tympana on the legs strongly marked, occupying the entire width and about three-fourths the length of the meropodites. Carapace very thick, about as high as long. Epistome reduced. Merus of external maxillipeds very large, broader than long, and about three times as large as the ischium *D. sigillorum* Rathbun³⁾

1) Ann. Sc. Nat. (3) t. 18, 1852, p. 152, pl. 4, f. 24. Synonymy and description: ALCOCK, l. c. p. 368. Both HENDERSON (Transact. Linn. Soc. London (2) v. 5, 1893, p. 390) and LANCHESTER (Proc. Zool. Soc. London, 1900, p. 760, pl. 47, f. 14) refer this species to the genus *Scopimera*, but the abdomen of both sexes, as figured by the latter author, is absolutely *Dotilla*-like.

2) V. D. DECKEN'S Reisen in Ost-Afrika, Bd 3, 1., 1869, p. 85, pl. 3, f. 5. Synonymy: STEBBING, Ann. S. Afr. Mus., v. 6, prt 4, 1910, p. 329.

3) Proc. U. S. Nat. Mus., v. 47, 1914, p. 83. One single specimen (♀) was found at Sandakan Bay (Borneo).

5. Carapace granulate, with a broad, longitudinal, median groove, extending backward to the intestinal region. Palm of cheliped at outer and inner surface with a longitudinal piliferous line, close to the under margin of the palm and continued on both surfaces of the immobile finger; a similar line is observed at both surfaces of the dactylus. Tympana on the legs very large *D. brevitarsis* de Man¹⁾
- Carapace finely punctate, not granulate; the longitudinal median groove extends only to the gastric region. Palm of cheliped without longitudinal piliferous lines, neither are there any on the fingers; only the dactylus has two crests. Tympana on the legs indistinct; carpo-propodite and dactylus densely tomentose *D. profuga* Nobili²⁾
6. Nearly the whole outer surface of the merus of the external maxillipeds occupied by a convoluted sulcus, in such a way that the elevated parts of the surface constitute a W-shaped figure. Surface of carapace grooved, the sulci constituting roughly a five-rayed star, the anterior ray directed forward on to the front, the antero-lateral rays passing on to the external orbital angles, the posterior rays directed obliquely-backward and triple *D. sulcata* Forskål³⁾
- Convoluted groove at outer surface of merus of external maxillipeds confined to lateral part of this surface 7
7. A large quadrangular tooth in the middle of the inner margin of each finger of the chela *D. clepsydrodactylus* Alcock⁴⁾
- Fingers of chela without large teeth 8
8. A transverse groove on the carapace, close and parallel to the posterior border 9
- No transverse groove on the carapace; the latter strongly areolated, cardiac and intestinal region circular, undivided by a longitudinal sulcus, quite smooth and non-granular. Last pair of legs without tympana on the dorsal surface of the meropodites *D. malabarica* Nobili⁵⁾
9. Merus of external maxillipeds about twice as large as ischium, granular. Fingers of chela not very much longer than palm 10

1) Journ. Linn. Soc. London, v. 22, 1888, p. 130, pl. 9, f. 1—3. ALCOCK, l. c. p. 367. It occurs in the Mergui Archipelago.

2) Boll. Mus. Torino, t. 18, n° 447, 1903, p. 22. Some specimens were found in fresh water in the Upper Sadong River (Borneo).

3) Literature: NOBILI, Ann. Sc. Nat. (9) t. 4, 1906, p. 315. The author is inclined to unite this well-known species of the Red Sea with *D. affinis* Alcock (l. c. p. 365, Ill. Zool. "Investigator", Crust. prt 10, 1902, pl. 63, f. 1) for the differences enumerated by ALCOCK do not prove to be constant in examining a large material. LAURIE (Journ. Linn. Soc. London, v. 31, n° 209, 1915, p. 468—469) likewise supports NOBILI's opinion in an even more elaborate way.

4) L. c. p. 367, Ill. Zool. "Investigator", Crust. prt 10, 1902, pl. 63, f. 2. Found on the shore of the Mahanaddi Delta.

5) Boll. Mus. Torino, t. 18, n° 452, 1903, p. 20, f. 6. Common at Mahé (Seychelles).

- Merus of external maxillipeds not much superior in size to ischium, internal half of the former smooth. Fingers of chela about $2\frac{1}{2}$ —3 times as long as palm, the former finely serrated at inner margins. *D. intermedia* de Man¹⁾.
10. Mesogastric region of carapace divided into five large tubercles and with two narrow, crossing sulci, one transverse, the other longitudinal, the latter continued backward on to the broad transverse sulcus of the carapace *D. blanfordi* Alcock²⁾
- Mesogastric and cardiac region of carapace not subdivided, granulate; transverse, posterior sulcus interrupted in the middle, between the posterior ends of the branchio-cardiac grooves. Outer surface of meropodite of cheliped with two tympana, the proximal one the larger, near under border of arm, the distal one rounded, situated in the angle between the carpal and superior border. *D. wichmanni* de Man

1. *Dotilla wichmanni* de Man.

1892. *Dotilla wichmanni* de Man. Weber's Zool. Erg. Reise niederl. Ost-Indien, Bd 2, p. 308, pl. 18, f. 8.

1895. *Dotilla wichmanni* de Man. Zool. Jahrb., Syst., Bd 8, p. 577.

1910. *Dotilla wichmanni* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, p. 324.

Stat. 131. Karakelang; Talaut Islands. Reef. 1 ♂.

My specimen is distinctly larger than the largest specimen of DE MAN, as the length of the carapace is 7.75 mm.; nevertheless, it agrees perfectly with DE MAN's elaborate description. In specimens from Atjeh, described by DE MAN in 1895, the movable finger of the chela scarcely shows a trace of the longitudinal, granulate ridge in the middle of the cutting margin; my specimen agrees, however, with DE MAN's original specimens from Celebes, in which this ridge-like teeth is distinct. Miss RATHBUN, who records this species from several localities in the Gulf of Siam, adds the following remark (on authority of the collector Dr. TH. MORTENSEN): "these small crabs make small balls of sand, thrown out from their holes".

Scopimera de Haan.

1833. *Scopimera* de Haan. Faun. Japon., Crust., p. 24.

DE MAN³⁾ proposes to unite this genus with *Dotilla*, and indeed the two genera resemble each other closely in outer appearance, but ALCOCK has enumerated several characters by which the present genus is distinguished. Besides, in the typical species, the only one I could examine, there is an opening between the bases of the first and second walking legs,

1) Journ. Linn. Soc. London, v. 22, 1888, p. 135, pl. 9, f. 4—6. ALCOCK, l. c. p. 365. Plentiful on Sullivan Island (Mergui Archip.).

2) L. c. p. 366. Ill. Zool. "Investigator", Crust. prt. 10, 1902, pl. 63, f. 3. Observed on the coasts of Sind and Baluchistan.

3) Journ. Linn. Soc. London, v. 22, 1888, p. 129.

bordered by stiff bristles and leading into the branchial cavity, in the same way as occurs in *Ocypoda* and *Uca*, where, however, this opening is found between the bases of the second and third ambulatory legs.

The four known species of the genus, none of which are found in the Indo-Malayan region, may be distinguished by means of the following key:

1. Carapace obscurely sculptured, slightly granulate or hairy on branchial regions. Fifth segment of abdomen of ♂ constricted at base, but not linear 2
 Carapace at inner branchial region sculptured on a petaloid pattern. Fifth segment of abdomen of ♂ much constricted, linear. Dactyli of walking legs in the 1st to 3^d pair of walking legs a little longer than, in the last pair twice as long as, the propodites *Sc. crabricauda* Alcock¹⁾
2. Side walls of body covered with setiferous granules; carapace granular, the granules partly arranged on irregular tubercles. Side borders of carapace diverging backward, external orbital angle with an emargination immediately behind. Tympana on meropodites of walking legs not subdivided 3
 Carapace irregularly granular; side borders parallel; external orbital angle not followed by an emargination. Eye-stalks very thick, club-like (as in *Ocypoda*). Tympana on meropodites of walking legs subdivided by a longitudinal ridge *Sc. investigatoris* Alcock²⁾
3. Meropodite of cheliped very short, not projecting beyond carapace; carpopodite (wrist) with a spine at inner border; movable finger near base of cutting margin with a large, quadrangular tooth *Sc. inflata* A. Milne-Edwards³⁾
 Meropodite of cheliped elongate, nearly equalling length of carapace and projecting beyond the latter; carpopodite and movable finger unarmed *Sc. globosa* de Haan

1. *Scopimera globosa* de Haan. Pl. 3, Fig. 3.

1835. *Ocypode (Scopimera) globosa* de Haan. Faun. Japon., Crust., p. 53, pl. 11, f. 3, pl. C.
 1852. *Scopimera globosa* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 18, p. 153.
 1858. *Scopimera tuberculata* Stimpson. Proc. Acad. Nat. Sc. Philadelphia, 1858, p. 98.
 1890. *Scopimera globosa* F. Müller. Verhandl. naturforsch. Gesellsch. Basel, Bd 8, p. 475.
 1894. *Scopimera globosa* Ortmann. Zool. Jahrb., Syst., Bd 7, p. 747.
 1898. *Scopimera globosa* Koelbel. Wiss. Erg. Reise Béla Széchenyi in Ost-Asien, Bd 2, p. 572.
 1907. *Scopimera tuberculata* Stimpson. Smithsonian Inst., Miscell. Coll., v. 49, p. 102.

This Japanese species, that has been recorded also from Ceylon by F. MÜLLER, was not

1) L. c. p. 370. Ill. Zool. "Investigator", Crust. prt 10, 1902, pl. 63, f. 5. Found at Karachi.

2) L. c. p. 369. Ill. Zool. "Investigator", Crust. prt 10, 1902, pl. 63, f. 4. Collected at Diamond Island (Burma).

3) Journ. Mus. Godeffroy, t. 4, 1873, p. 83. The locality is only given as: "Mers des Indes".

found by the "Siboga", but the original specimens of DE HAAN being still preserved in the Leiden Museum I had an opportunity of affording some few informations about them.

STIMPSON seems to have been led astray by DE HAAN's description and figure, from which the former author concluded, that the carapace in *Sc. globosa* is smooth, and the suture between ischium and merus of the external maxillipeds is transverse, not oblique, and therefore the species *Sc. tuberculata* was established by the American author. In reality, however, in *Sc. globosa* the carapace is by no means smooth, but studded with granules, and the ischium-merus suture of the external maxillipeds is oblique. KOELBEL already supposed the two species to be identical.

The body is very thick, convex, *Dotilla*-like; the carapace is narrower than the diameter of the body above the bases of the legs, so that the side walls are sloping outward. The external orbital angles are defined posteriorly by an emargination; the distance between these angles is only slightly more than the length of the carapace, but seems to be much greater, owing to the very oblique supra-orbital margins. The front is obliquely bent downward, elongate, spatuliform, rounded at anterior margin, with a shallow longitudinal groove, that is not continued backward on the mesogastric region; at either side of this sulcus the front is somewhat rugose. The grooves defining the gastric and cardiac regions are present, though faint; the cervical groove is interrupted in the middle, and each half is curved somewhat backward; hepatic and branchial regions are crossed by irregular and short, transverse grooves, the regions themselves are very declivous and everywhere studded with little prominent, granular tubercles, widely apart, and most crowded on the hepatic regions. Some of these tubercles are setiferous. KOELBEL remarked, that in young specimens, as might be expected, the granulation of the gastric area is scarcely indicated, but becomes more pronounced with advancing age, when also the cardiac region becomes granular. The lateral margins of the carapace are ciliated and diverging backward; they are accompanied along their course by a sulcus, that immediately behind the emargination following the external orbital angle is concealed in upper view of the animal by the bulging lateral part of the hepatic region. Immediately beneath the lateral margin of the carapace, there is another longitudinal sulcus, disappearing backward, but distinct anteriorly and continued as a narrow groove below the infra-orbital margin, which itself is finely granulate. The pterygostomial and subbranchial region are entirely covered with large, setiferous granules, and the former region is defined posteriorly by a vertical sulcus. Epistome distinct. Basal joint of antennulae, at either side of the front, clypeiform, somewhat inflated and partly concealing the bases of the eye-stalks, which latter are rather short and thick, gradually widening distally. The borders of the buccal cavity are much arcuate, and the lateral part, that is defined anteriorly by a deep emargination, is curved upward and accompanied by a deep parallel groove. External maxillipeds strongly bulging, as in *Dotilla*, but merus shortly triangular, with the sides arcuate, and somewhat shorter than the ischium; suture between them oblique, not transverse, as DE HAAN depicts it; both ischium and merus very broad, operculiform; exognath short and weak; ischium with a longitudinally-oblique row of hairs near outer margin, and with a patch of hairs below it; three last joints of maxilliped covered with hairs, carpus the longest and most bulky, with a brush of stiff, feathered hairs

near the distal end, that nearly wholly conceal the next segment; terminal segment slender, tapering. Inner margin of ischium and merus thickly fringed with feathered hairs (fig. 3a).

The abdomen of the ♂ has been well figured by DE HAAN, but his figure being too small, details are difficult to detect. The first segment is the broadest of all, but very short; the next is narrower and again shorter; the third and fourth segment retain the same breadth, and the former is longer than the next, that is waved at the anterior margin; the fifth segment is much narrower at the base, it gradually widens distally to nearly the breadth of the second segment and is as long as the preceding segments taken together; the penultimate segment has somewhat convex side margins and is shorter than the preceding; the terminal segment finally is semi-circular.

The chelipeds are elongate and slender, twice as long as the carapace, but outreached by the anterior pair of walking legs by the length of the dactylus. All the segments are granular; the meropodite is long and widening distally, sharply-edged above, with some few stiff hairs, but spineless; tympanum at outer surface much smaller than the opposite one; the wrist is elongate, likewise unarmed, but with a brush of hairs near the proximal end of the inner margin; the palm is as long as the fingers, low, and rounded at the borders; the fingers are elongate, not gaping, and pointed at tip; outer and inner surfaces of both fingers are marked by a longitudinal row of granules, and the under border of the fixed finger is provided, like the back of the movable finger, with two similar rows; the cutting margins of the fingers are finely crenulate, and in some cases there is a faint prominence, resembling a tooth, in the proximal half of the movable finger.

Of the walking legs the length gradually diminishes from before backward; the meropodites are narrowing distally and unarmed; the dactyli are somewhat curved and as long as the propodites, save in the last pair of legs, where the dactylus is quite straight, even curved backward and distinctly longer than the preceding joint. The hairy-edged pouch leading into the branchial cavity and situated between the first and second pair of walking legs has been already mentioned. Whether such a structure exists also in the other species of this genus is unknown to me, as I have, neither with regard to *Sc. globosa* nor to the other species, found anything in the literature concerning this.

Tympanomerus Rathbun.

1835. *Cleistostoma* (part.) de Haan. Fauna Japon., Crust., p. 26.

1888. *Dioxippe* de Man. Journ. Linn. Soc. London, v. 22, p. 137 (praeocc.).

1897. *Tympanomerus* Rathbun. Proc. Biol. Soc. Washington, v. 11, p. 164.

The genus, of which "*Cleistostoma*" *pusilla* de Haan is the type, comprises some small crabs, which, though sometimes resembling *Dotilla* and the like by the presence of tympana on the legs, in their general appearance approach *Macrophthalmus*, for the body is less cubical than in *Dotilla* and the carapace is decidedly broader than long. By the shape of the abdomen of the ♂ and of the external maxillipeds they are decidedly related to *Scopimera*, but the ischium of the external maxillipeds is shorter than the merus. The ♂ sex especially is remarkable by the bulky size of the chelipeds, that are much stouter than the ambulatory legs.

The "Siboga" collected, besides one already known species, another, that is apparently new.

Key to the species:

1. Tympana on meropodites of walking legs present 2
 Tympana on meropodites of walking legs absent 5
2. Upper orbital margin transverse, not sloping. Lateral borders of carapace arcuate, convex; carapace itself with short, transverse, setiferous rugosities *T. deschampsii* Rathbun ¹⁾
 Upper orbital margin much sloping backward. Lateral borders of carapace concave or straight, but markedly converging backward; carapace itself nearly smooth 3
3. Eye-stalk continued beyond the cornea into a long, cylindrical horn, somewhat resembling that of *Ocypoda ceratophthalma* (Pallas). A tooth behind external orbital angle *T. ceratophorus* (Koelbel)
 Eye-stalk not continued beyond the cornea 4
4. External orbital angle produced, defined posteriorly by an emargination. Both fingers of chela longitudinally carinate. Abdomen of ♂ not constricted in the middle *T. pusillus* (de Haan) ²⁾
 External orbital angle directed forward, not followed posteriorly by an emargination. Fingers of chela not carinate. Abdomen of ♂ constricted in the middle *T. integer* n. sp.
5. Lateral margins of carapace diverging backward. Carpopodite of cheliped much elongate, with an obtuse prominence near proximal end of inner margin, meropodite very short, scarcely projecting beyond carapace *T. orientalis* (de Man) ³⁾
 Lateral margins of carapace subparallel (convex) or converging backward. Carpopodite of cheliped of ordinary shape and unarmed 6
6. Upper orbital margin transverse. Palm of chela with a reticulating pattern, immovable finger on a level with lower border of palm. Walking legs short and rather thick. *T. stapletoni* de Man ⁴⁾
 Upper orbital margin sloping. Palm of chela granular, not reticulate, immovable finger bent downward. Walking legs long and narrow *T. philippinensis* Rathbun ⁵⁾

1) Proc. U.S. Nat. Mus., v. 46, 1914, p. 356, pl. 32, pl. 33, f. 1. It has been recorded from Shanghai and Korea. Notwithstanding the tympana on the legs, save the last pair, this species exhibits an unmistakable resemblance to *T. stapletoni* de Man, but the front is rounded, not angled, the palm has a longitudinal ridge close to and parallel with the under border, and the shape of the abdomen of the ♂ is somewhat different (RATHBUN).

2) *Ocypode (Cleistostoma) pusilla* de Haan. Faun. Japon., 1835, p. 56, pl. 16, f. 1. Hab. Japan.

3) *Dioxippe orientalis* de Man. Journ. Linn. Soc. London, v. 22, 1888, p. 138, pl. 9, f. 8-10. Hab. Mergui Arch.

4) Rec. Ind. Museum, v. 2, prt 3, 1908, p. 212, pl. 18, f. 1. In brackish water of the Dacca District (Eastern Bengal).

5) Proc. U.S. Nat. Mus., v. 47, 1914, p. 84. Hab. Philippines.

1. *Tympanomercus ceratophorus* (Koelbel). Pl. 2, Fig. 2.

1898. *Dioxippe ceratophora* Koelbel. Wiss. Erg. Reise Béla Széchenyi in Ost-Asien, Bd 2, p. 573, Pl. 1, f. 8—12.

Stat. 33. River near Pidjot, Lombok. 1 ♂.

Though KOELBEL has given a most accurate description and an excellent figure of this species, the paper cited above appears to be very rare¹⁾ and I presume, that it is therefore not superfluous to give a new description.

As in *Tympanomercus pusillus* the carapace is rather flattened, roughly pentagonal, and with the regions very obscurely defined. The gastric area is broad, smooth, with a short longitudinal sulcus on the anterior part, which sulcus is sharply defined posteriorly, but gradually disappears proximally. Hepatical regions scarcely distinct from gastric area, sloping laterally and forward, towards the orbit. Cervical groove, dividing gastric and cardiac area, rather distinct, short and concave. Cardiac area small, hexagonal²⁾. Intestinal region occupying the entire posterior part of the carapace, and defined anteriorly, as is usual in this genus, by a ridge, which in our species is curved, with the concavity turned backward; the region presents so a narrow, crescent-shaped outline. Branchial regions somewhat roughened and sloping like the hepatical regions, but not at all separated from the latter; only the inner branchial areas are somewhat defined and faintly bulging.

Front, as KOELBEL remarks, at base about $\frac{1}{3}$ the distance between the external orbital angles, with slightly converging side borders that pass with very much rounded angles into to somewhat convex anterior border, which latter is almost imperceptibly produced in the middle; the front is almost perpendicularly deflexed and exhibits two stiff hairs implanted near the anterior angles and also shown in the figure 2. Supra-orbital borders wavy, much sloping backward, especially in their outer half, but almost transverse near the outer angle, microscopically beaded. The distance between these angles is about $1\frac{1}{2}$ times the length of the carapace; the angle itself (fig. 2a) is peculiar, it is short, directed straight outward and very obtuse³⁾, below the lateral margin there are some few feathered hairs projecting beyond the margin; posteriorly the angle is followed by a deep, almost semi-circular notch, ending posteriorly in a very small tubercle (epibranchial angle); the distance between these angles is very slightly less than that between the anterior angles of the carapace⁴⁾. Behind the epibranchial angle the lateral margin of the carapace describes a sigmoid curve, which is finely granulate, with a row of curious, club-shaped, short hairs (auditory or sensory) in its anterior part, and sloping almost perpendicularly towards the base of the penultimate leg. Dorsally this lateral margin is accompanied by a less curved and not continuous ridge at either side of the carapace, thus separating off a strip of the carapace, that is roughly granulate; in dorsal view we remark the bulging sub-branchial region projecting beyond the sigmoid lateral margin, the distance between the posterior

1) Thanks to the kindness of Dr. DE MAN I have been enabled to consult it.

2) KOELBEL mentions a very faint longitudinal groove on this region, which I have not been able to detect.

3) According to KOELBEL's figure the lateral margin is serrulate; in my specimen I observed likewise three small prominences, that were, however, much less conspicuous.

4) KOELBEL's measurements indicate, that in his specimen the reverse is the case.

ends of which latter is somewhat less than that between the epibranchial angles. The hind margin of the carapace is straight and only $\frac{2}{3}$ of the distance between the anterior angles.

The abdomen, as KOELBEL remarks, is almost wholly similar to that of *Scopimera globosa* (fig. 2c), but the fourth segment has less produced anterior angles and is about as long as the preceding segment; the fifth segment is narrower at the base, not longer than the next, and the terminal segment is not semi-circular, but semi-elliptical. It is curious to note, that in the type species, *T. pusillus*, the abdomen of the ♂ is of the ordinary shape, and is not constricted at all in the middle.

The infra-orbital border projects much forward beyond the supra-orbital one and presents a number of remarkable features, the principal one being that is divided into two parts, which induced KOELBEL to make this species the type of a new subgenus, which he called *Tmethypocoelis*. The inner part is the longest, twice as long as the outer part, concave in front view, and straight, somewhat sloping in dorsal view; it is somewhat granular, the granules alternating with very short hairs, that resemble those on the lateral border of the epibranchial angle, and is separated from the outer part of the border by a very deep notch, resembling that between the external orbital angle and the epibranchial tooth. The outer part of the border is more sloping and meets the carapace at the level of the epibranchial tooth (so that the external orbital angle is wholly free at its under surface), but before joining the carapace it is deeply concave; this outer part of the border is ornamented in the same way as the inner part. As to the latter is must be added, that immediately below the border, at the ventral wall of the orbit a row of granules, parallel with the border itself, is running, and that somewhat lower (in upper view apparently parallel to the inner part of the border, but in reality straightly) a row of long hairs is found, running from the base of the eye-stalk to near the deep notch dividing the infra-orbital border; these hairs increase in length towards the outward and the terminal hairs are directed dorsally.

The side walls of the body are perpendicular in the fore parts, but somewhat sloping outward at the subbranchial regions; they are everywhere covered with setiferous tubercles. Pterygostomial regions not longitudinally grooved and not defined from the subhepatal regions, that again pass imperceptibly into the subbranchial parts; these latter are faintly divided into two parts by a somewhat raised rim, running obliquely from the epibranchial tooth to the base of the penultimate leg, but gradually disappearing in the terminal half, as KOELBEL already mentions, but the development of this rim seems to vary individually.

The eye-stalks are widening somewhat distally and the cornea, that does not exactly reach as far as the external orbital angle, is bulging. The eye-stalk is continued beyond the cornea and projects as a cylindrical horn considerably beyond the eye, as this horn is $\frac{2}{3}$ of the length of the eye-stalk itself; the end is provided with some short, stiff hairs, disposed in single file, but deciduous (according to KOELBEL). This remarkable feature of the species, that makes it look like *Ocyropa ceratophthalma* (Pallas), distinguishes it at once among all other species of this and the next subfamily.

The lateral margins of the buccal frame are somewhat concave, accompanied by a sulcus

on the pterygostomial regions and marked off anteriorly by a projecting acute tooth; the anterior margin of the frame projects obtusely (KOELBEL ascribes to it a triangular shape). An epistome is distinct. The basal joint of the peduncle of the antennulae is globular, inflated, partly covered by the front, and resembles that of *Scopimera globosa*. KOELBEL pretends that the flagellum of the antennae reaches about to the middle of the eye-stalk, but in my specimen it is not quite so long.

The external maxillipeds in my specimen do not completely close the buccal cavern, though they do so, according to KOELBEL; they are vaulted, but not quite so broad and operculiform as in *Scopimera globosa*. The ischium is nearly quadrate, with parallel margins (fig. 2*b*) and near the anterior margin, that is transverse and slightly concave, there is a row of cilia in single file across the ischium, which cilia are longest in the outer half. The merus, as KOELBEL rightly remarks, is only very slightly longer than the ischium; the lateral margins are convex, especially the inner, where in the middle a bunch of long, flexible and feathered hairs projects. The flagellum again resembles that of *Scopimera globosa*: the thick carpus occupies the whole, though very short, anterior margin of the merus, and bears a tuft of long, feathered hairs near the distal end, so as to conceal almost wholly the next joint; similar feathered hairs are inserted at the under margin of the carpus; the terminal joint is twice the length of the preceding, slender and gradually tapering. Both ischium and merus are covered with widely separated and very short hairs at their outer surface.

The chelipeds of the ♂ are remarkably long, owing to the great elongation of the arm and wrist and to the bulky size of the palm. KOELBEL mentions one specimen in which the right chela is somewhat larger than the left, but in my specimen the chelae are equal in size. The ischiopodite is unarmed, but the meropodite (arm) is sharply three-faced, with serrulate borders and concave surfaces; the tympanum on the inner surface is, as KOELBEL says, broadly-oval and surrounded by a few long hairs; the outer tympanum is longer, half as long as the meropodite, but narrower and less distinctly marked. The space not occupied by the tympana is largely beset with granules, especially in the distal half of the inner surface, and the whole arm is equal in length to the carapace. The carpopodite (wrist) is two-thirds the length of the meropodite, flattened at inner and convex at outer surface, unarmed, except for the fine serrulation of the borders, smooth, but granulate at outer surface, and the granules are arranged in a more or less distinct, oblique row, near the proximal half of the inner margin of the wrist; this inner margin projects distally in a long prominence (before which a subdistal, low tooth is present), articulating with a triangular tooth at the proximal end of the upper border of the palm. The chela is very bulky, nearly equalling in length the distance between the anterior angles of the carapace; the height of the palm is three-fourths its horizontal length, which latter is about twice the length of the immobile finger. The outer surface of the palm is somewhat flattened, the inner convex, both are very finely granulate, upper and under border are sharp and crenulate, and the lower border passes straight to that of the immobile finger; the upper part of the inner surface is more roughly granulate and these granules extend upward as far as to the somewhat raised, sharply-cut superior edge, that terminates proximally in a prominent, triangular tooth, with which the distal and superior tooth of the wrist articulates. The fingers are very much gaping at their base, the fixed finger is perfectly

straight, and both margins are parallel, but the terminal fourth of the inner margin, that is, crenulate throughout, abruptly slopes towards the slightly spooned and hairy tip; the movable finger is much curved, broadest at base, and as long as the upper border of the palm, the back of the finger, though generally rounded, is nevertheless slightly carinate and crenulate in the middle, and the proximal three-fourths of the back is enlarged by a peculiar expansion, widening distally and at its broadest part freely projecting, but only present on the outer part of the finger; the outer surface of the latter has an irregular row of very fine granules; the inner margin, like that of the antagonist, is roughly crenulate, but most of the proximal half is occupied by a large prominence, the tip is likewise spooned and hairy. KOELBEL already accurately describes the chela, but according to this author, the height of the palm is less in proportion to its length and the inner margin of the dactylus has no large, obtuse prominence, but only a triangular tooth, that corresponds with a broad sinus on the opposite margin; most likely individual variations in this respect will be frequently met with.

The Austrian author calls attention to the peculiar articulation of the cheliped, which articulation, when the limb is extended, causes the chela to be nearly horizontal and not oblique, as is the usual case; even if the cheliped be folded together, the plane of the chela is not vertical but directed obliquely forward from the upper to the lower border, though this is more conspicuous in the left than in the right chela. This articulation is due to the fact, that the inner margin of the wrist is greatly elongated and its distal articulation with the palm is situated rather on the outer surface of the latter (which surface in the outstretched condition of the cheliped becomes the upper or dorsal side) than at the beginning of the superior border. KOELBEL's description is to my mind somewhat confuse, however, and even wrong, for he pretends, that the surface of the palm, that in the folded condition is the outer surface, becomes the inner surface if the limb be outstretched, and the formerly inner surface changes its position so as to become the outer side, so that the fixed finger is lying above the dactylus! Such an extreme contortion does not take place and would be most unnatural.

The meropodites of all the ambulatory legs are about $2\frac{1}{2}$ times as long as broad, as long as the two next joints together, narrowing towards both ends, hairy along the margins, but otherwise unarmed, and provided at both sides with oval tympana, that occupy the greater part of the surface, save in the case of the last pair of legs, where the tympana are only half the lengths of the meropodites. The anterior pair of these legs is the longest, longer than the carapace and equalling the distance between the external orbital angles, distally the legs decrease gradually in length. Both margins of carpo- and propodite are likewise provided with some long hairs. The dactyli are hairy, nearly straight, finely pointed and shorter than the propodites. Between the bases of the first and second, and again between those of the second and third walking leg there is an hairy-edged pouch, as in *Sc. globosa*.

The general colour of the animal is a chestnut-brown, lighter on the legs; the chelae are ivory-white.

This apparently rare species has been originally collected near Hongkong; the "Siboga" caught it in a river at the Bay of Pidjot (Lombok).

Dimensions in mm.:

	1 ♂	2 ♂
Distance between external orbital angles . . .	8.—	7.—
Length of carapace	5.1	4.5
Total length of left cheliped.	—	11.5
Horizontal length of chela	8.8	6.75
Height of palm	—	3.—
Length of immobile finger	—	1.75
Length of anterior pair of walking legs. . .	—	7.—
Length of posterior pair of walking legs . .	—	6.25

N^o 1 is a specimen measured by KOELBEL, n^o 2 is the "Siboga" specimen.

2. *Tympanomerus integer* n. sp. Pl. 3, Fig. 1,

Stat. 250. Kur Island, west of Kei Islands. 1 ♂.

The carapace is much convex in longitudinal direction, but much less so transversely, it has a pentagonal shape, with the side margins converging backward, and is nearly wholly smooth and polished. The regions are scarcely distinct, the gastric-hepatic and cardiac-branchial sulci slightly indicated, but even the cervical groove, though discernible halfway between the level of the external orbital angles and the posterior margin of the carapace, is very faint. Hepatic regions faintly bulging and, like the branchial regions, regularly sloping down laterally; the latter areas are somewhat roughened. Intestinal region very short, but extending along the whole posterior border of the carapace, and transversely striated; a transverse ridge separating this area from the cardiac region is scarcely indicated.

The base of the perpendicularly-deflexed front measures less than one-fourth the distance between the external-orbital angles; the surface is flattened, not excavated; the lateral margins converge forward and pass with obtuse angles into the perfectly straight anterior margin. The supra-orbital border is much sloping, much convex in its middle part, and entire, not beaded; the external orbital angle projects very little, is small and acute and passes nearly rectangularly into the side margins, that in the anterior fourth part converge very little, than more strongly so towards the base of the last legs, so that the somewhat concave posterior margin of the carapace is much shorter than the distance between the external orbital angles. These side margins are unarmed, without any trace of an epibranchial tooth, and there are a few feathered hairs projecting beyond the external orbital angle and inserted on its ventral surface, but none of the club-shaped, sensory (or auditory?) hairs along the anterior part of the side margins, as noted in the preceding species.

The abdomen of the ♂ (fig. 1c) occupies at its base only half the distance between the bases of the posterior legs. The third segment has convex lateral margins and is about twice as long as the two preceding segments together; the fourth segment narrows forward and the fifth is, as usual, much constricted, quadrangular, and less than half as broad as the fourth segment at its base, but both segments are completely fused and I have not found the slightest trace of a suture between them; the length of the two segments together is $1\frac{1}{2}$ times

the length of the preceding segment. Contrary to what is found in *Scopinera globosa* and *Tympanomerus ceratophorus*, the lateral margins of the fifth and sixth segment are not diverging, but subparallel; the sixth (penultimate) segment is almost quadrate, as long as broad, and equal in length to the terminal segment, that is semi-circular. The fusing of the fourth and fifth segment, the parallel lateral margins of the constricted part of the abdomen, and the length of this constricted part exceeding that of the proximal enlarged portion, are characters which seem peculiar to this species and are not found in other species of the genus.

The infra-orbital border projects somewhat beyond the supra-orbital one; it is regularly curved, much sloping backward in its outer portion and regularly crenulate throughout, without any notches; parting from the middle of the border a row of similar crenulations runs obliquely towards the antero-lateral angles of the buccal frame, and on the lower wall of the orbit there are a few hairs, irregularly disposed.

The side walls of the body are perpendicular, not sloping outward, wholly covered with large, setiferous tubercles; on the subbranchial regions an oblique groove runs from the base of the posterior leg forward and ventrally to the base of the cheliped.

The eye-stalks are rather elongate, and the bulging cornea reaches beyond the external orbital angle.

As to the antennulae, the antennae, the epistome and the buccal frame I observed no particular difference between the present and the preceding species. The external maxillipeds, (fig. 1 *b*), are similar, but the ischium is not quadrate, but widens distally and is distinctly shorter than the merus, the oblique row of hairs near the anterior margin, which latter is transverse, is better developed; the merus has a broadly-triangular shape, owing to the fact, that both lateral margins are nearly straight and much converging forward; the flagellum is wholly like that of *T. ceratophorus* and there are the same feathered hairs both on the flagellum and at the inner margin of the merus.

The chelipeds are slightly unequal (the left being the larger), and bulky, owing to the size of the chela, that alone in the left cheliped exceeds the length of the carapace, but the meropodite is very short, scarcely projecting beyond the carapace, somewhat convex at its outer surface, but flattened at the under and inner face, and provided with a nearly circular, small tympanum, half as long as the length of the meropodite, only at the inner side; the edges are crenulate, and the upper edge, which is much convex, has a small notch at its subdistal end, whereas the outer border ends distally in a prominent tooth, that is itself crenulate. The wrist is short, unarmed, only crenulate along the inner margin, the under surface presents a tuft of hairs near the proximal end of the inner margin and another larger one near the articulation with the palm; the convex upper surface is provided with scale-like rugosities. The palm (fig. 1 *a*) is much inflated, about as high as long, and longer than the fingers; the under border is somewhat convex, curving upward towards the tip of the fixed finger, compressed and crenulate in the middle of its course; the upper border is rounded in its distal portion, but carinate near the carpal articulation; the whole inner surface of the palm is covered with squamiform structures; similar to those on the wrist; along the upper margin the outer surface is very finely granular and the rest of this surface is characteristically sculptured and divided into two

portions, separated by an oblique line, running from the base of the movable finger diagonally downward to the carpal articulation: the upper portion presents the same squamiform, though less regular, markings as already mentioned, the under portion is smooth, ivory-white, continued on the outer surface of the fingers and broken up in its proximal parts into reticulating lines. By this character and also by the general shape of the palm, the chela resembles much that of *T. stapletoni* de Man, but here the reticulation is reduced to dark, not elevated lines and spreads over the entire surface. The fingers are shorter than the palm, thick, conical, gaping at the base, somewhat spooned and hairy at the tip; the fixed finger is straight, very high proximally, but rapidly tapering to the tip, rather sharp-edged at under border, and provided with 6—8 indentations at the cutting margin, but whereas in the right (smaller) chela these indentations are regular, the 3 proximal ones being slightly larger than the 4 that follow, in the left chela there is, parting from the base, firstly an elevated tooth with sloping sides, followed by some 6—7 very small indentations between the larger tooth and the tip; the movable finger is curved, and the proximal two-thirds of its back are covered with the same fine granules that accompany the upper border of the palm, the cutting margin is likewise toothed, but on the finger at the right side there are 12—13 very minute indentations, not differing appreciably in size, whereas the finger of the left cheliped has firstly three rather large, semi-circular indentations, followed by five much smaller ones.

Between the bases of the first and second and also between those of the second and third walking leg there are tufts of silky hairs, that apparently mark two openings into the branchial cavity at either side of the carapace, as has been noted already in the description of the preceding species. All the ambulatory legs are nearly equally long, measuring about the distance between the anterior angles of the carapace, but much shorter than the chelipeds. The meropodites are $2\frac{1}{2}$ times as long as broad, narrowing distally, with the anterior distal angle projecting freely and rectangularly, and provided at both surfaces with rather large, oval tympana; carpo- and propodite are together somewhat longer than the meropodite, hairy at both margins; the dactyli finally are conical, acutely pointed, slightly curved and shorter than the propodites.

Like the preceding species, the colour is a chestnut-brown; the chelipeds are lighter coloured.

In the general appearance and in the presence of tympana this species approaches *T. pusillus* (de Haan), but the carapace is comparatively narrower, more convex and not notched behind the external orbital angles, the shape of the abdomen is altogether different, the eye-stalks are longer, the maxillipeds much less operculiform and narrower, and the chelae are much more bulky and differently sculptured.

Dimensions in mm.:

Distance between external orbital angles	5.5
Length of carapace	4.—
Total length of abdomen	4.25
Length of constricted part of abdomen	3.—
Horizontal length of left chela	4.75
Height of palm	3.25
Length of posterior pair of legs	6.75

I presume, that this small specimen, taken at Kur Island near the Kei Islands, has been living in the brook (that is said to be strong in the rainy season¹) at the west coast of the island, for the species of *Tympanomerus* seem to prefer brackish and fresh water, as far as is known to me, and cannot be called strictly marine.

Subfam. MACROPHTHALMINAE

The members of this group differ widely in outer appearance: the carapace may be very broad, sometimes even twice as broad as long, and the eye-stalks are in some cases greatly elongate, whereas in other instances the carapace is nearly quadrate and the ocular peduncles are shorter than the front, which characters approach those of the Grapsidae. Yet the present subfamily belongs to the Ocypodidae on account of the external maxillipeds being slightly or not at all gaping, and among this latter family they are distinguished by the depressed, generally not globose cephalothorax, the carapace being broader than long, the antennulae transverse and separated by a narrow septum.

Key to the genera:

1. Merus of external maxilliped shorter than ischium; flagellum thick, articulating at antero-external angle of merus. Front deflexed. Eye-stalks generally very long, sometimes reaching far beyond the external orbital angles 2
 Merus of external maxilliped as long as, or longer than, ischium, flagellum more slender, at least the two terminal joints. Front deflexed or horizontal 4
2. A small gap between external maxillipeds, meri broader than long **Macrophthalmus** Latreille
 A somewhat wider gap between external maxillipeds, meri about as broad as long 3
3. Front at anterior margin measuring more than one-third of the distance between the external orbital angles, eyes reaching to these outer angles. Merus of external maxilliped with a deep, diagonal sulcus. **Hemiplax** Heller²⁾
 Front at anterior margin measuring less than one-third of the distance between the external orbital angles, eyes not reaching to these outer angles. Eye-stalks longer than front. . . . **Euplax** H. Milne-Edwards
4. Lateral margins of carapace strongly divergent backward till the level of the bases of the penultimate pair of legs. Chelipeds, even of ♂, extremely weak and small, much shorter than walking legs. Merus of external maxilliped auriculate at its

1) MAX WEBER. Introd. et descr. de l'exp. du "Siboga", 1902, p. 117 and p. 29 (with textfig.).

2) This genus contains but a single species, *H. hirtipes* Heller (Reise "Novara", Crust., 1865, p. 40, pl. 4, f. 3) that occurs at New Zealand.

- antero-external angle, broader than ischium; exognath not concealed. **Tylodiplax** de Man
- Lateral margins of carapace convex, sometimes toothed. Chelipeds, at least of ♂, stronger. Merus of external maxilliped not auriculate, but regularly arched at outer margin, and strongly notched anteriorly for the reception of the carpus; exognath concealed in outer view 5
5. Carapace more or less strongly vaulted. Lateral angles of front rounded **Cleistostoma** de Haan 61
- Carapace flattened. Lateral angles of front produced 6
6. Two obtuse teeth behind external orbital angle; carapace sub-hexagonal, with a prominent transverse ridge across the cardiac region and running from side to side **Camptandrium** Stimpson 65
- Lateral margins of carapace mostly entire or with one tooth, convex; carapace subcircular or roughly transversely-oval. **Paracleistostoma** de Man 62

Macrophthalmus Latreille.

1829. *Macrophthalmus* Latreille. Règne an., ed. 2, t. 4, p. 44.

In a recent paper¹⁾ I have given a synopsis of all the known species of this genus, so that a profound treatment would be useless.

1. *Macrophthalmus telescopicus* (Owen).

Stat. 258. Kei Islands. 1 ♂ juv.

The following records in the literature had previously been overlooked by me:

Macrophthalmus telescopicus Ortmann. Denkschr. med.-naturwiss. Gesellsch. Jena, Bd 8, 1894, p. 58 (Thursday Island).

Macrophthalmus podophthalmus Lanchester. Proc. Zool. Soc. London, 1900, p. 760 (Singapore).

Macrophthalmus telescopicus Rathbun. Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 834 (Honolulu).

2. *Macrophthalmus graeffei* A. Milne-Edwards.

Stat. 47. Bay of Bima, Sumbawa. 1 ♀.

Stat. 64. Tanah Djampeah, Flores Sea. 1 ♀.

This small species which now must be considered distinct from *M. convexus* Stimpson is represented by two specimens, and one of these has nearly all the legs detached.

1) Zool. Mededeel. Mus. Leiden, v. 1, 1915, p. 149. I regret to say that, besides some omissions in the full literature upon the subject, I had overlooked a subspecies of *M. dilatatus* viz. *carens* Lanchester (Proc. Zool. Soc. London, 1900, p. 759, pl. 47, f. 11) from Singapore and Malacca. Shortly after the publication of my paper I became acquainted with *M. sandakani* Rathbun (Proc. U. S. Nat. Mus., v. 47, 1914, p. 82) from Sandakan (Borneo), allied to *M. grandidieri* A. Milne-Edwards.

3. *Macrophthalmus convexus* Stimpson.

Stat. 86. Dongala, west coast of Celebes. 1 ♂, 1 ♀.

4. *Macrophthalmus latreillei* Desmarest.

Stat. 47. Bay of Bima, Sumbawa. 1 ♂.

5. *Macrophthalmus definitus* Adams et White.

Stat. 71. Macassar. 1 ♂.

The under surface of the arm of the cheliped is not naked, as I formerly stated¹⁾ after the description and figure of Miss RATHBUN²⁾, but, like the inner and outer face, clad with short, black hairs. The tooth at the cutting margin of the mobile finger is wholly absent in my specimen, and that on the opposite finger is very low, scarcely prominent. The chelae are coloured a reddish-brown and a somewhat darker colour is observed on the polished portions of the carapace. Both margins of the much compressed dactyli of the ambulatory legs are fringed with red hairs.

Euplax H. Milne-Edwards.1852. *Euplax* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 18, p. 160.1858. *Chaenostoma* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, p. 97.

Besides the well known *E. boscii* another species, "*Cleistostoma*" *tridentatum* A. Milne-Edwards seems to belong to this genus, but the shape of the front is altogether different, and the original specimen turned out to be so much injured at the time of its examination by DE MAN that its proper place remains doubtful.

The two species may be distinguished thus:

Front truncate anteriorly. Ischium of external maxilliped without an obliquely-transverse row of hairs. Epibranchial tooth separated from outer orbital angle by a deep emargination. Inner surface of palm and fingers of cheliped clothed with a thick fur of hairs; movable finger with a large quadrangular tooth at the cutting margin.

E. boscii (Audouin)

Front triangular anteriorly. Ischium of external maxilliped with an obliquely-transverse row of hairs. Inner surface of palm naked, but gap of fingers filled up with hairs; movable finger without larger tooth at the inner margin, but furnished on the back with a longitudinal row of small tubercles

E. tridentata (A. Milne Edw.)³⁾

1) L. c. p. 199.

2) Bull. Mus. comp. Zool. Harvard Coll., Cambridge, Mass., v. 52, 1910, p. 307, pl. 2, f. 1.

3) Journ. Mus. Godeffroy, t. 4, 1873, p. 82. The author includes into the short diagnosis the presence of three acutely-pointed teeth (including outer angle of the orbit) at either side of the carapace. Afterwards DE MAN (Mitt. naturh. Mus. Hamburg, n^o 13, 1896, p. 93, pl. 3, f. 5) examined the original specimen (which according to MILNE-EDWARDS was found at Upolu) and placed it, though with hesitation, in the neighbourhood of "*Chaenostoma*" (= *Euplax*).

In later years GRANT and MC CULLOCH (Proc. Linn. Soc. N. S. Wales, v. 31, 1906, p. 21, pl. 1, f. 3) described a new species,

1. *Euplax boscii* (Audouin).

1825. *Macrophthalmus boscii* (Savigny) Audouin. Expl. planches Crust. d. l'Egypte, pl. 2, f. 1.
 1843. *Macrophthalmus boscii* Krauss. Südafr. Crust., p. 40, pl. 2, f. 5.
 1852. *Euplax boscii* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 18, p. 160.
 1852. *Cleistostoma boscii* Dana. U. S. Expl. Exp., Crust., p. 313, pl. 19, f. 3.
 1858. *Chaenostoma orientale* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, p. 97.
 1858. *Chaenostoma crassimanus?* Stimpson. Ibid. p. 97.
 1873. *Euplax (Chaenostoma) boscii* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 281.
 1880. *Euplax boscii* de Man. Notes Leyden Mus., v. 2, p. 71.
 1884. *Euplax boscii* Miers. Zool. Voy. "Alert", Crust., p. 540.
 1886. *Euplax (Chaenostoma) boscii* Miers. Rep. "Challenger", Brachyura, p. 252.
 1888. *Euplax boscii* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 357.
 1894. *Euplax boscii* Ortmann. Denkschr. med.-naturw. Gesellsch. Jena, Bd 8, p. 58.
 1905. *Euplax boscii* Lenz. Abhandl. Senckenb. Gesellsch., Bd 27, p. 367.
 1906. *Euplax (Chaenostoma) boscii* Nobili. Ann. Sc. Nat., (9) t. 4, p. 319.
 1907. *Chaenostoma orientale* Stimpson, Smithson. Inst., Miscell., Coll., v. 49, p. 98.
 1907. *Chaenostoma crassimanus?* Stimpson. Ibid. p. 98.
 1910. *Euplax boscii* Stebbing, Ann. S. A. Mus., v. 6, prt 4, p. 329.

Stat. 86. Dongala, west coast of Celebes. 6 ♂, 7 ♀.

Stat. 131. Karakelang, Talaut Islands. 1 ♂, 3 ♀ (one of the latter with a parasitic Isopod in its left branchial cavity).

Stat. 133. Lirung, Talaut Islands. 3 ♂, 2 ♀ (all juv.).

Stat. 225^c. Lucipara Islands, Banda Sea. 2 ♂, 1 ♀ (all juv.).

Stat. 231. Ambon. 2 ♀.

Stat. 250. Kur Island. 2 ♂ juv.

On account of some discrepancy between the original descriptions of H. MILNE-EDWARDS and DANA, STIMPSON founded the genus *Chaenostoma* for the reception of DANA'S species, which he believed to be distinct from the true "*Macrophthalmus*" *boscii*; for this reason the name *Chaenostoma orientale* was proposed. It is now generally agreed, that in reality this latter is identical with *Euplax boscii*, for the differences in the shape of the external maxillipeds are variable, so that in some specimens the merus is much more distinctly shorter than the ischium than is the case in others.

I am inclined to regard "*Chaenostoma*" *crassimanus* Stimpson likewise as a synonym of the present species. The author does not precisely enumerate its specific characters, but in comparing his description with what may be observed in adult specimens of *Euplax boscii*, the principal differences are, that there is only a slight emargination behind the outer orbital angle, and that the eyes outreach these angles in *E. crassimana*. STIMPSON'S specimen is very small (only 6—7 mm. across the carapace) and in specimens of this and of smaller size I observed exactly the very differences here enumerated. It was collected, moreover, at the same locality as *E. boscii* (Loo-Choo Islands).

DE MAN (1888) remarks, that this species attains a breadth of 15 mm. across the carapace, but that a ♀ of only 9 mm. breadth was bearing eggs. The "Siboga"-material

Metaplax hirsutimana, which was afterwards by the latter author (Rec. Austral. Mus., v. 9, n^o 3, 1913, p. 321), on Miss RATHBUN'S authority, recognized to be the same as *E. tridentata*. The specimens were taken by the Australian authors in rather great quantities on the mud-flats of Auckland Creek (Queensland) and of the mouth of the Paramatta River (New South Wales).

contains specimens of all size, and among them is one very large ♀ (egg-bearing), the carapace of which measures 21 mm. in maximum breadth, the length being 14.5 mm.

There seem to be two principal colour variations, one being greyish-blue on the carapace and the upper parts of the walking legs, and another in which these parts are chestnut-brown with occasional faint transverse stripes of this colour on the legs. These variations are independent of age and sex. The chelae of the ♂ are always white at the outer surface.

This common species is apparently widely distributed throughout the Indo-Pacific region: it ranges from the Red Sea along the coast of Africa down to the Cape region (Natal), and it occurs in the Indo-Malayan Archipelago, at the Pacific Islands and in the Loo-Choo Archipelago. It is curious, that it seems absent in British India; at least I am not aware of any locality in these regions.

Cleistostoma de Haan.

1835. *Cleistostoma* de Haan (part.). Faun. Japon., Crust. p. 26.

1900. *Clistostoma* Alcock. L. c. p. 372.

In the convex lateral margins of the carapace and in the operculiform external maxillipeds, the merus of which is longer than the ischium (the latter produced at its antero-internal angle) the genus agrees with *Paracleistostoma*, but the anterior margin of the front passes with a regular curve into the lateral margins, and the carapace is much convex in both directions.

Only three species¹⁾ seem to belong to the genus.

Key to the species:

1. Lateral margins of carapace regularly rounded. Exognath of external maxilliped partly visible in outer view. Meropodites of walking legs very broad, flattened at upper surface . . . 2
Lateral margins of carapace projecting in an obtuse angle at the end of the anterior third of their course. Exognath of external maxilliped entirely concealed in outer view. Meropodites of walking legs slender, not flattened; 2nd and 3^d pair each with two hairy tubercles on their anterior margin, 1st and 4th pair with only one *Cl. lingulatum* Rathbun²⁾
2. Carapace near lateral margins tomentose, as are also the meropodites of the walking legs; margins of meropodites entire . . . *Cl. dilatatum* de Haan
Carapace and legs almost naked, meropodites of the latter serrulate at their anterior, spinulous at their posterior margin . . . *Cl. dotilliforme* Alcock³⁾

1) *Cleistostoma leachi* (Audouin) from the Red Sea seems to have, according to DE MAN, its proper place in *Paracleistostoma*. The latter author refers, though hesitatingly, *Cleistostoma tridentatum* A. Milne-Edwards to *Euplax* (see p. 59).

As to *Cleistostoma hirtipes* Jacquinet et Lucas (Voy. "l'Astrolabe" et "la Zélée", t. 6, p. 68, pl. 6, f. 3), it is an obscure species, the generic position of which is doubtful (see also my paper on *Macrophthalmus*, Zool. Med., v. 1, 1915, p. 151, note) and the same may be said of *Cleisto(s)toma edwardsi* Mac Leay (Smith's Ill. Zool. S. Africa, 1838, p. 64).

2) Proc. Biol. Soc. Washington, v. 22, 1909, p. 108. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 323, textfig. 7 and 8. Hab. Gulf of Siam.

3) L. c. p. 373. Ill. Zool. "Investigator", Crust., prt 10, 1902, pl. 64, f. 1. Hab. Karachi.

1. *Cleistostoma dilatatum* de Haan.

1835. *Ocyrode (Cleistostoma) dilatata* de Haan. Faun. Japon., Crust. p. 55, pl. 7, f. 3.
 1852. *Cleistostoma dilatata* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 18, p. 160.
 1895. *Cleistostoma dilatatum* de Man. Zool. Jahrb., Syst., Bd 8, p. 595 (note).

In comparing the only specimen of DE HAAN in the Leiden Museum with the original figure it is evident that this is the very specimen from which DE HAAN took his observations and consequently his drawing is wrong in representing the carapace too long and the front too broad, whereby I only affirm DE MAN's statements; this latter author has furnished us with measurements. DE HAAN is also wrong in stating that the lateral margins of the carapace are entire, not granulate; in reality they are finely and regularly beaded throughout.

This species has much in common with ALCOCK's *Cl. dotilliforme*, but is relatively much broader (maximum breadth of carapace 1,53 times the length in the former and 1.32 in the latter species). In both species the shape of the meropodites of the ambulatory legs is equally foliaceous, and in both the anterior margin of the perfectly flattened and naked upper surface of the meropodites is marked by a granulate row, at least in the case of the first to third pair of legs. From the point where the carapace reaches its maximum breadth in *Cl. dilatatum* a granulate and hairy row runs obliquely backward on the subbranchial region to the bases of the second pair of walking legs, thus marking off dorsally a triangular facet, as MISS RATHBUN describes in *Cl. lingulatum*. The pterygostomial regions are much like that of ALCOCK's species, but in *Cl. dilatatum* there is an additional sulcus, running transversely, immediately below the infra-orbital border, which latter is finely and regularly crenulate, not in the coarse way as represented in *Cl. dotilliforme*. The external maxillipeds (figured by DE HAAN on pl. B) again closely agree with those of the latter species: the merus is large, quadrate, not narrowing anteriorly (as in *Cl. lingulatum*); the sulci on the surface are perfectly alike in both species; the ischium has an obliquely-transverse, very narrow groove close to the anterior margin and the antero-internal angle is produced into an obtuse prominence; the exognath is only partly exposed in outer view. The eye-stalks are thick, slightly shorter than the breadth of the front between the bases of these eye-stalks.

Paracleistostoma de Man.

1895. *Paracleistostoma* de Man. Zool. Jahrb., Syst., Bd 8, p. 580.

Four species belong to this genus, and a fifth one has been added by the "Siboga" expedition.

Key to the species:

1. Palm of cheliped of ♂ with a superior and an inferior longitudinal granulate crest. Ambulatory legs covered with a close fur of long, yellow hairs. *P. eriophorum* Nobili¹⁾
 Palm of cheliped smooth, without crests. Ambulatory legs normally hairy. 2

1) Boll. Mus. Torino, t. 18, 1903, n° 447, p. 23. Hab. Buntal (Borneo).

2. Branchial and anterior cardiac region with a continuous, transverse ridge across the carapace. Epigastric lobes distinct, sharp . . . *P. cristatum* de Man¹
 Carapace smooth, without transverse ridge. Epigastric lobes indistinct, not sharp 3
3. Lateral margins of carapace with a prominent tooth, a little anterior to the middle of their course, anterior part concave, external orbital angle produced. Walking legs long, meropodites of 2^d and 3^d pair very much elongate. *P. dentatum* n. sp.
 Lateral margins of carapace regularly arched, not toothed. Walking legs not elongate 4
4. Anterior margin of front 0.3 of maximum breadth of carapace. 5th segment of abdomen of ♂ about as broad as long, with parallel lateral margins. Movable finger of cheliped curved . . . *P. leachii* (Audouin)²
 Anterior margin of front 0.2 of maximum breadth of carapace. 5th segment of abdomen of ♂ fused with the preceding and with convergent lateral margins. Movable finger of cheliped straight, fingers widely gaping *P. depressum* de Man³)

1. *Paracleistostoma dentatum* n. sp. Pl. 3, Fig. 2.

Stat. 66. Saleyer Island, near south point of Celebes. Depth varying from 9—34 M. 1 ♀.

This small species is at once distinguished by the prominent tooth on the sides of the carapace, and by the elongate shape of the meropodites of the walking legs, especially in the case of the third pair.

The carapace is not so much flattened as in *P. depressum* (the only species with which I could compare it), uneven in the middle parts and sloping towards the sides, especially on the outer parts of the branchial regions; in longitudinal direction it is rather much vaulted. The various regions are not very distinct, and the whole surface is hairless, with scattered punctae (only visible by a rather strong magnification), except on the gastric and cardiac area. The cervical groove, which is found anterior to a line connecting the lateral teeth of the carapace and so lying nearer to the supra-orbital border than to the posterior margin of the carapace, is short, concave forward; the gastric region is faintly or not at all defined laterally, but, so far as can be observed, much narrower than the very broad cardiac region. At the base of the front the two epigastric lobes are visible as sharp, transverse ridges, scarcely separated one from another, and immediately behind the lateral part of each there is a small and shallow depression on the epigastric region. The cardiac area is much broader than the gastric region, owing to its lateral parts being auriculate in their posterior half; its length in

1) *Cleistostoma dilatatum* Ortmann nec de Haan. Zool. Jahrb., Syst., Bd 7, 1894, p. 733. Hab. Japan. DE MAN (Zool. Jahrb., Syst., Bd 8, 1895, p. 590) afterwards studied the very specimens of ORTMANN.

2) For literature on this Red Sea species see NOBILI: Ann. Sc. Nat. (9) t. 4, 1906, p. 316, for description: DE MAN, Mitt. naturhist. Mus. Hamburg, n^o 13, 1896, p. 90.

3) DE MAN, Zool. Jahrb., Syst., Bd 8, 1895, p. 581, pl. 14, f. 13. Hab. Penang and Pontianak.

the median line is only one-third of its maximum breadth, and anterior and posterior groove are concave, with the convexity turned towards each other. An intestinal region is wanting. Hepatic and branchial regions are not separated one from another, on the hepatic region there is a small tubercle, near the lateral margin of the carapace and behind the external orbital angle, and on the branchial regions there is a pair of similar tubercles, one behind the other, and situated posterior to the level of the lateral teeth; parting from these tubercles the carapace is strongly declivous towards the margins. Quite near the branchio-cardiac sulci a small depression is found on either side of the carapace.

The front is narrow, measuring between the bases of the eye-stalks only one-fifth of the distance between the external orbital angles, vertically deflexed; the anterior margin is convex, but concave near the lateral angles, which are produced into rather long points, and it is this character that decides the systematic place of the new species (fig. 2a); the upper surface of the front, before the epigastric lobes, is excavated; the lateral margins are decidedly concave, somewhat turned upward and thickened, and continued without transition into the sigmoid-shaped, wholly transverse, and finely beaded supra-orbital borders, that terminate in rather long, triangular external orbital angles; the distance between these angles is $1\frac{1}{2}$ times the total length of the carapace. Behind the anterior angles the lateral margins are strongly concave in upper view all along the anterior half of their course, finally terminating in a strong, triangular tooth at either side of the carapace; this tooth is obtuse and directed outward. The posterior halves of the lateral margins of the carapace are converging distally and the perfectly straight posterior margin is nearly as long as the distance between the anterior angles, and much shorter than that between the lateral teeth.

The eye-stalks are $1\frac{3}{4}$ times the breadth of the front and do not reach the outer angle of the orbit; the lower border of the latter is visible in dorsal view and entire, not notched, but finely crenulate throughout, the crenulations being intermingled with short hairs; the outer portion much slopes backward and disappears beneath the external orbital angle.

The antennulae are lodged immediately beneath the anterior margin of the front; the angles of the latter nearly touch the antero-internal angle of the basal joint of the antennae.

Epistome rather short, but inferior border produced into a triangular tooth. Pterygostomial regions separated from subhepatic ones by a shallow sulcus and crossed by a hairy ridge that is continued backward as far as the bases of the penultimate pair of legs.

The buccal frame is somewhat wider posteriorly than anteriorly. The external maxillipeds (fig. 2c) are quadrate, completely closing the buccal cavern, as in *Cleistostoma*. Ischium shorter than merus, with perfectly parallel lateral margins; posterior and anterior margin are somewhat oblique and likewise parallel; the internal angle of the latter is slightly produced, though not quite so distinct as in the preceding genus; breadth of ischium decidedly exceeding its length. Merus likewise broader than long; the posterior portion of the external margin is straight, in a line with that of the ischium, but the anterior part strongly curves inwards to meet the carpus; the internal margin is very short, convex, and excavated for the reception of the carpus, which latter is as long as, and twice as broad as, the two next segments. Flagellum very little hairy. The surface of both ischium and merus is perfectly smooth, without

hairs or grooves, and even the transverse row near the suture, on the ischium, is entirely wanting. The exognath is very little exposed.

The very broad abdomen of the ♀ consists of 7 separate segments; it entirely covers the sternum and the numerous eggs concealed under it measure about 0.2 mm.

The chelipeds of the ♀ (fig. 2*b*) are as long as the distance between the external orbital angles, but exceedingly weak, rod-like; the meropodite projects beyond the carapace, is about as long as the chela and twice as long as the carpopodite; both arm and wrist are covered with small granules, but otherwise quite unarmed; the palm is very low, its height being only one-third of its length, and somewhat longer than the straight, slender fingers, the inner margins of which are entire; fingers and palm are fringed at both margins with long hairs.

Of the walking legs the penultimate pair is the longest, nearly twice the distance between the anterior angles of the carapace; the last pair is the shortest. Half the length of the legs is due to the great elongation of the slender meropodite, which at its maximum breadth (in its anterior third) is only one-fourth as broad as long, quite unarmed, not depressed and of a frosted appearance owing to the presence of minute, squamiform granules. Carpo- and propodite are smooth, fringed with long hairs. The dactyli are straight, much compressed, shorter than the propodites and likewise fringed; those of the last pair are slightly curved backward.

The animal is of a uniform ivory-white colour.

Dimensions in mm.:

Distance between external orbital angles	5.—
Length of carapace	3.25
Distance between lateral teeth of carapace	6.25
Posterior margin of carapace	4.5
Length } of meropodite of penultimate pair of legs }	4.5
Breadth }	1.—
Breadth of front between eye-stalks	1.—
Length of eye-stalk	1.75
Length of cheliped	5.—

Camptandrium Stimpson.

1858. *Camptandrium* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 107.

1. *Camptandrium sexdentatum* Stimpson. Pl. 5, Fig. 3.

1858. *Camptandrium sexdentatum* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 107.

1907. *Camptandrium sexdentatum* Stimpson. Smithson. Inst., Miscell. Coll., v. 49, p. 138, pl. 17, f. 4.

Among the undetermined material of Crustacea in the Leiden Museum I found to my great surprise a ♂ of this remarkable and apparently extremely rare species, that has never been found again, since its having been dredged by STIMPSON from a depth of a few fathoms in bays near Hongkong. My specimen had been brought home by Dr. BUITENDIJK from the Bay of Batavia, in 1909. STIMPSON'S figure is very good and enables one at once to recognize the animal, but not all the details are shown, neither are these exhaustively spoken of in the description.

The carapace is markedly hexagonal, flattened, but divided into a large anterior portion and a much smaller posterior one by way of a prominent transverse crest, extending nearly from side to side, most conspicuous across the cardiac region and gradually disappearing laterally. On either side of this obtuse crest¹⁾ the surface slopes forward or backward, but is rather uneven; the external branchial regions are, as usual, strongly declivous, and the whole surface of the carapace shows a very short fur, which, if rubbed off, turns out to conceal a minute granulation. A short cervical groove, concave forward, separates the small gastric region from the cardiac area; the latter itself is not defined posteriorly but passes into the somewhat bulging intestinal region. The mesogastric region presents some lobules anteriorly, and laterally, on the hepatic regions, there are on either side two obliquely-disposed verrucosities, forming a kind of interrupted row from the mesogastric region towards the posterior lateral tooth of the carapace; similar, but rounded and longitudinally-arranged structures are found at either side of the gastric region, and in the angle of the branchio-cardiac grooves. Hepatic regions depressed; postfrontal lobes two in number, prominent, but not sharpened anteriorly, placed on the level of the supra-orbital margin.

The front is remarkably narrow, about one-third of the distance between the orbital angles, obliquely-deflexed, with the margins thickened and granular; the anterior border is divided into two lobules by the same longitudinal groove that separates the post-frontal lobes; the lateral margins are concave, converging forward, and the anterior angles are pronounced, acuminate. The supra-orbital border is perfectly transverse, save the external third part, that is deeply excavate and rises towards the subrectangular outer orbital tooth. The eye-stalks are comparatively long and slender, but somewhat shorter than the width of the front, and the cornea does not reach to the outer orbital angle. The lateral margins of the carapace are separable into two parts, the anterior ones being somewhat the shorter, markedly diverging backward and divided into three obtuse teeth, including the external orbital angle, the anterior two teeth directed forward and of nearly the same shape and size, the posterior tooth being shorter and directed straightly outward; between the tips of these posterior teeth the carapace reaches its maximum breadth and posteriorly the lateral margins are somewhat convex but rapidly converging backward, so that the thickened posterior margin is distinctly shorter than the distance between the outer orbital angles.

The antennulae are folded obliquely beneath the front and separated by a triangular, narrow plate (fig. 3a); the antennae are placed in the orbital hiatus, as the inner suborbital tooth does not join the front, the basal joint of the antenna is broad and quadrate, the two following much narrower but of the same length, and the flagellum is rather long, outreaching the eye-stalk. Suborbital border convex and minutely crenulate in its inner two-thirds, concave and finely granular in its external part, that is very little marked; pterygostomial regions granular, with a longitudinal hairy groove; side walls of the body perpendicular and hairy. Epistome short, but distinct; anterior margin of buccal cavern with a strongly prominent ridge

1) STIMPSON speaks in his diagnosis of the genus of three or four interrupted transverse ridges on the carapace, but his drawing does not essentially differ from the figure here given.

in the median line, lateral margins raised, convex, but not diverging distally. External maxillipeds markedly operculate, scarcely gaping; ischium with the lateral margins somewhat concave and the anterior inner angle produced, surface smooth, except for a row of very small granules immediately behind the suture between ischium and merus; this suture is slightly oblique and somewhat concave forward, but may still be called transverse; merus longer and broader than ischium, inner margin short and straight, anterior margin deeply notched in the middle for the insertion of the carpus, the outer part of this margin reaching farther forward than the inner portion and passing with a much convex outline into the long external margin of the merus, the surface is naked, but provided with a few scattered granules in the middle. Sternum broad; its anterior margin between the bases of the chelipeds rising into a sharp ridge, forming the posterior boundary of the buccal cavern.

Abdomen of ♂ (fig. 3c) by far not filling up the space between the bases of the posterior legs; second segment longer than, but as broad as, the preceding, third, fourth and fifth segment fused, so as to leave scarcely any trace of sutures, but the sinuses in the margins still provide indications of separation; third segment narrower than the second, and fourth again narrower than the preceding; between the fourth and fifth segment the abdomen is markedly constricted and then widens again towards the sixth or penultimate segment, the lateral margins of which are convex and slightly converging forward, so that the base of the segment is somewhat longer than the anterior margin; the terminal segment finally is semi-circular, the width at the base slightly exceeding the length, which latter is somewhat larger than that of the preceding segment. All the still existing sutures between the segments are peculiarly wavy, and the abdomen reaches upward till nearly the elevated ridge, that anteriorly defines the sternum.

The chelipeds (fig. 3b) are equal; their length equals the maximum breadth of the carapace; meropodite short, slightly projecting beyond the carapace, unarmed, but granular; outer surface with transverse rugosities, upper and especially outer border fringed with rather long hairs; carpopodite small, with the upper surface granular and the inner angle rounded, between this inner angle and the palmar joint with a row of hairs; chela elongate, palm about $1\frac{1}{2}$ times the length of the fingers and longer than high, with the upper margin rounded, and the whole surface naked and minutely granular; fingers gaping, not compressed, spooned¹⁾ and somewhat hairy at the tip, cutting margins finely crenulate, but the movable finger presents near the base a large, oblique tooth, increasing in height distally and itself finely crenulate at the free margin.

The ambulatory legs are rather slender; the second pair is the longest and about $1\frac{1}{2}$ times the greatest breadth of the carapace, the third pair is only very slightly shorter, and the first and fourth pairs are again shorter and subequal in length. All the legs are hairy at the surface, especially towards the margins, and the latter themselves are heavily fringed with long hairs; the meropodites are $3\frac{1}{2}$ times as long as broad and there is a rectangular prominence near the distal end of the anterior margin, which projection is even acuminate in

1) This character is, according to STIMPSON, still more pronounced in the ♀, in which the chelae resemble those of the same sex in *Uca*.

the case of the second pair of legs; carpo- and propodite are more slender than the meropodite and together as long as this meropodite; the dactylus is markedly compressed, in the same way as in *Ocyroda*, and fringed with hairs, that rapidly decrease in length from base to tip, in all the legs the dactyli are about two-thirds of the length of the propodite and slightly curved, but in the case of the posterior pair the dactyli are perfectly straight.

STIMPSON established a new family Camptandriidae for the reception of his genus, as he observed quite well, that the latter could not be included into the Grapsidae, though apparently allied to *Cyrtograpsus* Dana. ALCOCK¹⁾, though with a query, referred *Camptandrium* to the Goneplacidae. I am of opinion, that the genus does not belong to either of these families, but that it evidently is one of the Ocyrodidae and that its natural place is among the *Macrophthalminae*. This view is corroborated by the relative narrowness of the front, by the slender eye-stalks, and especially by the plate-like, scarcely gaping external maxillipeds, the merus of which is as large as, or even slightly larger than, the ischium; the much compressed shape of the dactyli of the ambulatory legs likewise points to the Ocyrodidae. The affinity to the *Macrophthalminae* is proved by the absence of hairy tufts between the bases of the walking legs, by the narrow nasal plate separating the oblique antennulae, and by the width of the front, that is broader than in *Ocyrodinae* or *Mictyrinae*. Its nearest ally is undoubtedly the genus *Paracleistostoma* de Man, as the lateral angles of the front are produced, and the abdomen of the ♂ is likewise constricted between the fourth and fifth segment, and these segments, together with the third, are completely fused²⁾; besides, the abdomen only occupies slightly more than two-thirds of the interspace between the bases of the posterior legs and reaches upward till nearly the posterior boundary of the buccal cavern, and the movable finger of the chela bears a subquadrate tooth near the base: all these facts point in the same direction. *Camptandrium* even bears a distant resemblance to the new species *P. dentatum* (see p. 63, pl. 3, f. 2) in the tothing of the carapace, but it is needless here to enumerate the many points of difference that warrant the maintaining of *Camptandrium* as quite a distinct genus.

As to Miss RATHBUN's new species, *C. paludicola*³⁾, it is very difficult to decide anything about its true systematic position, as only one young ♀ has been obtained. After the information we now possess about *Camptandrium* it is, however, evident, that it does not belong to this genus and I venture to suggest, that it really is to be referred to *Cyrtograpsus* Dana⁴⁾, which view is supported by the peculiar tothing of the carapace⁵⁾ and by the shape of the external maxillipeds, the merus of which is distinctly shorter and smaller than the ischium and auriculate at its antero-external angle. In any case this species certainly belongs to the Grapsidae.

1) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 292.

2) Compare the details of *Paracleistostoma depressum* de Man in Zool. Jahrb. Syst., Bd 8, 1895, pl. 14, f. 13c—d.

3) Proc. Biol. Soc. Washington, v. 22, 1909, p. 109. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, p. 326, textfig. 9. Hab. Gulf of Siam, in mangrove swamps.

4) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 250.

5) Compare the figures of *C. angulatus* Dana in U. S. Expl. Exp., Crust., 1852, p. 352, pl. 22, f. 6. Hab. Rio Negro (Patagonia).

Dimensions in mm. ¹⁾:

Distance between external orbital angles	6.9
Width between posterior epibranchial teeth	10.1
Width of front between eye-stalks	2.4
Length of carapace	8.0
Length of posterior margin of carapace	5.1
Length of cheliped	10.25
Horizontal length of chela	4.75
Length of palm	3.0
Height of palm	2.15
Breadth of abdomen at base	3.1
Breadth of posterior margin } of penultimate segment of abdomen }	1.8
Length }	1.1
Breadth of posterior margin } of terminal segment of abdomen }	1.5
Length }	1.3
Length of 2 ^d pair of walking legs	15.3
Length } of meropodite of 2 ^d pair }	6.1
Breadth }	1.8
Length of carpo- and propodite } of 2 ^d pair }	6.3
Length of dactylus }	2.0

The largest specimen measured by STIMPSON (a ♀) was of about the size of the animal now described.

Tylodiplax de Man.

1895. *Tylodiplax* de Man. Zool. Jahrb., Syst., Bd 8, p. 598.

The lateral margins of the carapace are strongly divergent backward and unarmed, the chelipeds, even in the ♂, exceedingly small and weak, and the maxillipeds, the exognath of which is wholly exposed, are auriculate at the antero-external angle of the merus ²⁾).

Two species are contained in the genus, but the systematic place of one of these is doubtful.

Key to the species:

- Front obliquely-deflexed. Carapace with two prominent tubercles on the cardiac region, and two less prominent ones at the anterior angles of the intestinal region. Chelipeds of ♂ excessively small and weak *T. tetratylophorus* de Man ³⁾
- Front not deflexed. Carapace somewhat hairy at the margins, but without the prominent tubercles. Chelipeds of ♂ somewhat larger, but shorter than most of the walking legs *T. indica* Alcock ⁴⁾

1) Measured under microscope.

2) DE MAN states that this genus is distinguished from *Cleistostoma* by having the merus of the external maxilliped larger (longer) than the ischium, but this character is observed quite as well in the latter genus.

3) Zool. Jahrb., Syst., Bd 8, 1895, p. 599, pl. 14, f. 15. Hab. Penang.

4) L. c. p. 374. Ill. Zool. "Investigator", Crust. prt 10, pl. 64, f. 2. ALCOCK doubts whether *Tylodiplax* should not be united with *Paracleistostoma* or *Cleistostoma*. The development of the chelipeds in the immature ♂ (found at Karachi) renders it uncertain whether in the adult form the cheliped should not attain the normal size of that the other named genera, but I am of opinion, that even then the shape of the external maxillipeds would justify the maintenance of *Tylodiplax*.

GRAPSIDAE.

This large family contains some widely spread genera and above all the true *Grapsi*, that are most conspicuous on all sandy and rocky beaches in the tropics. The carapace is squarish, the front broad and much exceeding the length of the short and thick eye-stalks, the external maxillipeds are widely gaping, the chelae are very often provided with a tuft of hairs on the palm or in the cleft of the fingers.

Like the Ocypodidae all species are essentially littoral, keeping quite close to the shore, in shallow water, or haunting the beach, where they are found running about with marvellous speed and throwing themselves headlong into the water when pursued. As a rule they do not burrow but shelter themselves under stones. Some species keep to estuaries, to the mouth of rivers or even to entirely fresh water; one genus (*Geograpsus*) may be called almost terrestrial; on the other hand such genera as *Planes* and *Varuna* (especially the former) are wont to cling to floating objects and may be carried along all throughout tropical and subtropical seas: as is well known *Planes* is even a common inhabitant of the Sargassum weed.

The family is subdivided into four subfamilies: *Grapsinae*, *Sesarminae*, *Varuninae* and *Plagusinae*, for the discrimination of which a reference to ALCOCK'S¹⁾ or BORRADAILE'S²⁾ paper is sufficient.

Subfam. GRAPSINAE.

The four Indo-Pacific genera are well discriminated by ALCOCK'S most useful memoir and there is no need to repeat his key to *Grapsus*, *Geograpsus*, *Metopograpsus* and *Pachygrapsus*³⁾.

Grapsus Lamarck.

1801. *Grapsus* Lamarck. Syst. An. sans vert., p. 150.

Subsequent writers frequently have included into *Grapsus* several species which really are to be referred to other genera. The true *Grapsi* are separable into only a few species, two of which are again subdivided into subspecies.

1) Journ. As. Soc. Bengal, v. 69, prt. 2, 1900, p. 389—390.

2) Ann. Mag. Nat. Hist. (7) v. 19, 1907, p. 485. KINGSLEY (Proc. Acad. Nat. Sc. Philadelphia, 1880, p. 187) has given most useful key to the genera then known; his analytical tables of the genera are unfortunately often unreliable.

3) *Leptograpsus* H. Milne-Edwards with apparently one species only, *L. variegatus* (Fabricius) (KINGSLEY, l. c. p. 196, ORTMANN Zool. Jahrb., Syst., Bd 7, 1894 p. 707) is not included; for the species, though occasionally recorded from Australia, Tasmania and China is chiefly a West American one.

Key to the species:

1. Lateral margins of carapace arched. 2
 Lateral margins of carapace subparallel *Gr. intermedius* de Man¹⁾
2. Front much deflexed and high (height half the breadth between eye-stalks). Epistome long. Tooth at inner angle of orbit obtuse.
 Walking legs, at least propodites, elongate *Gr. maculatus* Catesby²⁾
- Front less deflexed and less high (height always less than half the breadth between eye-stalks). Epistome shorter. Tooth at inner angle of orbit subacute, keeled. Walking legs shorter. *G. strigosus* (Herbst)

1. *Grapsus strigosus* Herbst. Pl. 4, Fig. 1 and 4.

Literature and description: ALCOCK: l. c. p. 393³⁾.

Stat. 34. Labuan Pandan, Lombok. 2 ♂ (1 juv.), 1 ♀.

Stat. 51. Madura Bay, Molo Strait. 1 ♀.

Stat. 60. Haingsisi, Samau Island near Timor. 1 ♂.

Stat. 61^a. Adonare Island, east of Flores. 1 ♀.

Stat. 231. Ambon. 2 ♀.

The specimens are of moderate or small size.

Though the differences between the present species and *Grapsus maculatus* are well enumerated by ALCOCK, the examination of a large series of specimens of the Leiden Museum induced me to sum up the following points, for the help of those who have no opportunity to compare both species.

	<i>Grapsus maculatus.</i>	<i>Grapsus strigosus.</i>
Breadth of front	36—37% of distance betw. ext. orb. angles	39—40% of the said distance
Height of front	One-half of its breadth betw. eye-stalk	Less than one-half of its breadth betw. eye-stalks
Surface of front	With two symmetrically-placed larger tubercles	Without such tubercles
Inner suborbital tooth	Obtuse	Subacute, keeled
Length of epistome	One-third of its breadth	Scarcely one-fourth of its breadth
Meropodites of walking legs	More than twice as long as broad	Twice as long as broad
Length of carpo- + propodite of penultimate pair of legs	Distinctly longer than meropodite of this leg ⁴⁾	Equal to or slightly exceeding length of meropodite ⁵⁾
Length of first pair of walking legs	Much shorter than that of last pair	About equal to that of last pair
Distal part of posterior margin of meropodite of last pair	Usually not dentate, obscurely so in very large individuals	Dentate as in the preceding legs

1) Arch. Naturgesch., Jahrg. 53, 1. p. 365, pl. 16, f. 1. Hab. Noordwachter Island (Bay of Batavia). Though this species is indeed closely related to *Gr. strigosus* it is apparently a distinct species, that does not at all attain the large size of HERBST's species (breadth of carapace at most about 20 mm.).

2) Literature and description: ALCOCK, l. c. p. 392. This species has often been called *Grapsus grapsus* owing to its having been designated by LINNÉ under the name *Cancer grapsus*. Distributed throughout all tropical regions, but chiefly Atlantic.

3) To the synonyms enumerated by ALCOCK *Grapsus longipes* Stimpson should be added (Miss RATHBUN in footnote of STIMPSON's memoir (Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 119). This species is wholly Indo-Pacific.

4) See Pl. 4, Fig. 2.

5) See Pl. 4, Fig. 1.

As to some other points of difference (branchial grooves on carapace, shape of tooth at inner angle of wrist, absence or presence of longitudinal median ridge on palm of cheliped), I cannot find them really constant.

Each of the two species were split up by H. MILNE-EDWARDS¹⁾ into a number of "species", that seem to have been founded on merely individual variations and have been withdrawn by subsequent authors. Yet each of both species seems to offer constant varieties.

As to *Grapsus maculatus*, that is cosmopolitically distributed throughout the warmer regions, Miss. RATHBUN remarks²⁾: "The common rock crab of the tropics, *Grapsus grapsus*, is separable into two forms, one in which the lobe on the wrist is very broad and terminates in a short point (*G. grapsus* typical), and one in which the same lobe is narrow and terminates in a long narrow spine (*tenuicristatus* Herbst). The former inhabits the coasts of America, including the outlying islands, such as the Galapagos, and also the eastern shores and islands of the Atlantic Ocean; the latter is restricted to the oriental region". I can confirm this statement, though it must be owned, that the difference in shape of the inner angle of the wrist is scarcely perceptible in some cases, where specimens of either Atlantic or oriental origin are compared.

It seems to be of more importance, that both *Gr. maculatus* and *Gr. strigosus* possess a slender-legged form, named resp. *Gr. gracilipes* H. Milne-Edwards and *Gr. longitarsis* Dana, that have been given the rank of separate species.

In order to elucidate the difference between *Gr. maculatus* and its subspecies *gracilipes*, the penultimate leg of both is figured on Pl. 4, Fig. 2 and 3. Both are represented natural size; the breadth of the carapace in the specimen of *Gr. maculatus* is 46 mm., that of *Gr. gracilipes*³⁾ is much less, 37 mm. Nevertheless we may remark, that the length of the carpo- and propodite together is nearly the same in both specimens, and that in *Gr. gracilipes* the breadth of the propodite is one-fifth its length measured in the median line, in typical *Gr. maculatus* more than one-fourth its length.

As to *Gr. longitarsis*, Miss RATHBUN who had occasion to examine the typical specimen of DANA, first regarded⁴⁾ it as a subspecies of *Gr. strigosus*, that differs in somewhat more elongate propodites, in meropodites narrowing more distinctly, in the more enlarged abdomen of the ♀ (in the ♂ the abdomen is equilaterally triangular) and in the front being less advanced. Afterwards⁵⁾ this author raised the subspecies to the rank of a separate species and added some more characters, the most important of these being that the front is wider than in *Grapsus strigosus*.

1) Ann. Sc. Nat. (3) t. 20, 1853, p. 167—170.

2) Bull. U. S. Fish Comm. for 1903, v. 23 prt 3, 1906, p. 838.

3) This is the very specimen mentioned by DE MAN (Notes Leyden Mus., v. 5, 1883, p. 159). This author afterwards had the opportunity to examine another specimen from Ternate and to compare it with the typical *gracilipes* of MILNE-EDWARDS (Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 502). From the measurements taken (the Ternate specimen is only 1 mm. broader than that of the Leiden Museum) we must conclude, that the length of the propodite of the penultimate pair of legs varies somewhat individually, for in the Ternate specimen it is 25 mm., in my specimen 23.5 mm.).

4) L. c. p. 838, textfig. 4, pl. 8, f. 1. *Grapsus subquadratus* Stimpson (Proc. Acad. Nat. Sc. Philadelphia, 1858, p. 103; Smithsonian Inst., Misc. Coll., v. 49, 1907, p. 119, pl. 16, f. 4) is added as a synonym.

5) Mem. Mus. comp. Zool. Harvard Coll., v. 35, n^o 2, 1907, p. 28.

There are two small *Grapsi* in the "Siboga"-collection, both ♂, one collected at Stat. 19 (Labuan Tring, west coast of Lombok), the other at Stat. 277 (Dammer Island, Banda Sea). The first named, though the smaller one, is more perfect and has been figured on Pl. 4. Fig. 4. I regard, though with some doubt, these specimens as *Grapsus longitarsis*. In the original specimen of DANA the legs are apparently wrongly figured¹⁾, the dactyli being represented stunted and as long as the short propodites.

The lateral margins of the carapace in my specimens are nearly parallel, especially in the smaller individual. By this character they approach *Grapsus intermedius*, in which, according to DE MAN, the ambulatory legs are comparatively much shorter. On the whole the carapace and especially the breadth and shape of the front is wholly like that of *Grapsus strigosus*, but the walking legs are much more elongate; the difference in size between the first and fourth pair is distinctly pronounced, and the meropodites are $2\frac{1}{2}$ times as long as broad and narrowing distally. The length of the penultimate pair of legs is more than $2\frac{1}{2}$ times the length of the carapace (twice its maximum breadth), whereas in typical specimens (of slightly larger size) of *Grapsus strigosus* this pair of legs is scarcely twice the said length; the carpo- and propodite together are nearly equal to the maximum breadth of the carapace, and the propodite is slender, $4-4\frac{1}{2}$ times as long as broad, and distinctly longer than the dactylus. The upper margins of the meropodites in the first to third pair present a few movable spines, which I do not observe in somewhat larger individuals of *Grapsus strigosus*. Mero-, carpo- and propodite of the legs are crossed by more or less distinct transverse stripes of a brown colour; in the smaller individual each joint has two of these stripes, in the larger they are broader, almost confluent, and the meropodites are irregularly marbled. The abdomen of the ♂ has the broad, equilaterally-triangular shape, described by Miss RATHBUN, but the same is observed in young specimens of genuine *Grapsus strigosus*. A hairy-edged cavity between the bases of the second and third ambulatory leg is distinctly seen.

The specimens may be characterized by having the carapace of *Grapsus strigosus* and the legs of *Grapsus maculatus* and for this reason I refer them to *Grapsus longitarsis*. Miss RATHBUN states, that in this species (which I prefer to maintain as a subspecies of *Grapsus strigosus*) the front is wider, though she does not give us exact measurements to verify this²⁾, and in my larger specimen the breadth of the front is 40%, in the smaller individual even 43% of the maximum breadth of the carapace (in typical *Grapsus strigosus* 39—40%).

Dimensions in mm.:

	1	2
Breadth of carapace	17.3	9.7
Distance between external orbital angles.	14.1	8.8
Length of carapace	14.75	8.1
Breadth of front between eye-stalks.	7.—	4.2
Length of meropodite of penultimate pair of legs	12.3	7.7
Breadth of meropodite of penultimate pair of legs	5.7	3.1

1) U. S. Expl. Exp., Crust., 1852, pl. 21, f. 4a.

2) Neither are such measurements given of the large specimen from the Indian Ocean (Egmont Reef) in her paper on the marine Brachyura of the Percy Sladen Trust Expedition (Transact. Linn. Soc. London (2) v. 14, 1911, p. 241.

	1	2
Length of carpo- and propodite together	15.4	9.5
Length of propodite in the median line	8.8	5.5
Breadth of propodite	2.2	1.3
Length of dactylus	6.—	3.3

In typical *Grapsus strigosus* and in *Grapsus longitarsis* the length of the carapace exceeds the distance between the outer orbital angles, but in the smaller "Siboga"-specimen the reverse is the case, owing to the carapace being scarcely narrowed anteriorly.

Geograpsus Stimpson.

1858. *Geograpsus* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 101.

The genus is distinguished from *Grapsus* by straight or nearly straight lateral margins of the carapace, by a much less defined epistome, and by more bulky chelipeds, the fingers of which are not spoon-shaped but acute at the tip.

The habits of the members of *Geograpsus* are almost like those of the true landcrabs (Gecarcinidae).

Thanks to DE MAN's researches, it is now easy to discriminate the Indo-Pacific species by means of the following key¹⁾:

1. Lateral margins of carapace distinctly converging backward behind epibranchial teeth, and obtuse, not keeled in their posterior half. Inferior orbital border, between external angle and fissure, entire, not dentate. *G. grayi* (H. Milne-Edwards)²⁾
- Lateral margins of carapace parallel or feebly diverging backward, sharply keeled throughout 2
2. Cardiac and intestinal regions of carapace nearly wholly smooth, with only a few transverse lines immediately behind cervical groove. Breadth of meropodites of last pair of legs more than half their length; posterior margin of preceding ambulatory legs distinctly dentate at distal extremity *G. lividus* (H. Milne-Edwards) subsp. *stormi* de Man
- Cardiac and intestinal regions of carapace covered with irregular transverse lines; grooves on branchial regions deeply cut and long. Breadth of meropodites of last pair of legs not more than half their length; posterior margin of preceding ambulatory legs not at all, or very indistinctly, dentate at distal extremity *G. crinipes* Dana³⁾

1) I have not been able of including one species into this key, *Geograpsus minikoiensis* Borradaile (Faun. Geogr. Maldives etc., v. 1, 1901, p. 66, f. 12 and Transact. Linn. Soc. London (2) v. 12, 1907, p. 64 from Minikoi and the Seychelles; this species is much too little known.

2) Literature and description: DE MAN, Zool. Jahrb., Syst., Bd 9, 1895, p. 80 and ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 395. Throughout Indo-Pacific region.

3) Literature and description: DE MAN, Zool. Jahrb., Syst., Bd 9, 1895, p. 83, Bd 10, 1898, pl. 28, f. 17. ALCOCK's description (l. c. p. 396) seems to be applied equally well to *G. crinipes* as to *G. lividus* subsp. *stormi*, for the transverse markings on the carapace

1. *Geograpsus lividus* (H. Milne-Edwards) subsp. *stormi* de Man.

1895. *Geograpsus lividus* (H. Milne-Edwards) var. *stormi* de Man. Zool. Jahrb., Syst., Bd 9, p. 88, Bd 10, 1898, pl. 28, f. 18a, c.

Stat. 64. Tanah Djampea, Flores Sea. 1 ♂.

The specimen, which is larger than those measured by DE MAN, agrees wholly with the description of this author, also with regard to its colour. Both chelipeds are wanting.

From the typical *G. lividus* the subspecies is only distinguished by the sharp keel originating from the antero-lateral angles of the buccal cavern being convex, whereas in the typical Atlantic specimens it is straight or slightly sigmoid.

G. lividus has been also recorded by Miss RATHBUN¹⁾ from the Hawaiian Islands, but the subspecies, which has been originally found at Atjeh, inhabits²⁾ likewise the eastern tropical Pacific (Marquesas, etc.).

Dimensions in mm.:

Distance between external orbital angles	28.5
Breadth of carapace	35.25
Posterior margin of carapace	11.—
Breadth of front between eye-stalks	14.75
Length of carapace	29.—
Length of meropodite } of 2 nd pair of walking legs {	25.—
Breadth of meropodite } of 2 nd pair of walking legs {	12.5
Length of meropodite } of 3 ^d pair of walking legs {	22.—
Breadth of meropodite } of 3 ^d pair of walking legs {	11.5

Comparing these measurements with those of DE MAN we may state, that in my specimen the posterior margin of the carapace is relatively shorter as compared with the maximum breadth; the length on the other hand is somewhat greater.

Pachygrapsus Randall.

1839. *Pachygrapsus* Randall. Proc. Ac. Nat. Sc. Philadelphia, 1839, p. 126.

From the two preceding genera *Pachygrapsus* is distinguished by its broader front, that occupies more than half the greatest breadth of the carapace, from *Metopograpsus* by the antennae not being excluded from the orbit.

Key to the species:

1. No tooth behind external orbital angle. 2
- One tooth behind external orbital angle 7
2. Lateral margins of carapace very strongly convergent backward; external orbital angle acute; transverse folds extending across mesogastric region. Propodites of walking legs short *P. minutus* A. Milne-Edwards

are stated to be "distinct and nearly straight" (as in the former species), whereas the fissure in the lower orbital border is deep and the meropodites of the last 3 pairs of legs are broader than half their length, which agrees with what is found in the latter form. The distribution agrees with that of the preceding species.

1) Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 839.

2) RATHBUN, Mem. Mus. comp. Zool. Harvard Coll., v. 35, n^o 2, 1907, p. 29.

- Lateral margins of carapace subparallel or feebly convergent backward; in the latter case mesogastric region smooth 3
3. Carapace with very strong transverse folds across the whole breadth, the anterior folds fringed with hairs lying flatly on the carapace and averaging in length half the space between the folds 4
- Carapace with feeble transverse striae, that do not extend across the median parts of the carapace 5
4. Lateral margins of carapace faintly convergent backward. *P. plicatus* (H. Milne-Edw.)
Lateral margins of carapace subparallel; striation coarse *P. fakaravensis* Rathbun¹⁾
5. Front scarcely declivous, wholly visible from above. Lateral margins of carapace scarcely convergent backward, concave. Meropodites of two last pairs of legs with only one subdistal spine at posterior margin. Propodites of penultimate pair of legs four times as long as broad *P. planifrons* de Man
- Front distinctly declivous. Lateral margins of carapace somewhat convergent backward, straight. Meropodites of all the walking legs with 2—3 subdistal spines at posterior margin. Propodites of penultimate pair of legs only three times (or less) as long as broad 6
6. Distance between external orbital angles $1\frac{1}{3}$ times the length of carapace. Postfrontal lobes four in number. Inner margin of ischium of external maxilliped straight; inner angle of merus obtuse, less produced. *P. propinquus* de Man²⁾
- Distance between external orbital angles $1\frac{1}{2}$ times the length of carapace. Postfrontal lobes seven in number, the median one very small, triangular. Inner margin of ischium of external maxilliped concave; inner angle of merus more produced *P. laevis* Borradaile³⁾
7. Distal posterior angle of meropodites of last pair of legs rounded. Front with a prominent tooth at angle. *P. crassipes* Randall⁴⁾
- Distal posterior angle of meropodites of last pair of legs dentate. Fingers of cheliped with a reddish-brown patch in the middle of the outer surface *P. transversus* (Gibbes)⁵⁾

1) Mem. Mus. comp. Zool. Harvard Coll., v. 35, n^o 2, 1907, p. 29, pl. 5, f. 1, pl. 9, f. 6—6a. Hab. Faumotus.

2) Rec. Ind. Mus. Calcutta, v. 2, prt 3, 1908, p. 216, pl. 18, f. 2. Hab. brackish water at Port Canning (Lower Bengal).

3) Proc. Zool. Soc. London, 1900, p. 592, pl. 42, f. 7. Hab. Funafuti.

4) Literature: KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 199. Description: DE MAN, Notes Leiden Mus., v. 12, 1890, p. 86, pl. 5, f. 11. Hab. Pacific region.

5) Literature and description: DE MAN, Mém. Soc. Zool. France, 1900, p. 52, pl. 2, f. 9. Throughout all tropical regions, but chiefly Atlantic.

1. *Pachygrapsus plicatus* (H. Milne-Edwards).

1837. *Grapsus plicatus* H. Milne-Edwards. Hist. nat. Crust., t. 2, p. 89.
 1843. *Grapsus plicatus* ¹⁾ Krauss. Südafr. Crust., p. 43, pl. 3, f. 1.
 1852. *Goniograpsus plicatus* Dana. U. S. Expl. Exp., Crust., p. 343.
 1853. *Grapsus plicatus* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 170.
 1858. *Pachygrapsus plicatus* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 102.
 1873. *Pachygrapsus striatus* A. Milne-Edwards. Journ. Mus. Godeffroy, t. 4, p. 82.
 1873. *Pachygrapsus plicatus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 292, pl. 14, f. 1.
 1880. *Pachygrapsus plicatus* Kingsley. Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 200.
 1894. *Pachygrapsus plicatus* Ortmann. Zool. Jahrb., Syst., Bd 7, p. 708.
 1903. *Pachygrapsus plicatus* Borradaile. Faun. Geogr. Maldives etc., v. 1, p. 432.
 1906. *Pachygrapsus plicatus* Rathbun. Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, p. 839.
 1907. *Pachygrapsus plicatus* Stimpson. Smithson. Inst., Miscell. Coll., v. 49, p. 117.
 1907. *Pachygrapsus plicatus* Rathbun. Mem. Mus. comp. Zool. Harvard Coll., v. 35, n^o 2, p. 29.
 1911. *Pachygrapsus plicatus* Rathbun. Transact. Linn. Soc. London (2) v. 14, p. 241.

Stat. 34. Labuan Pandan, Lombok. 1 ♀ (with eggs).

This well marked species is rather common in the Pacific region; the records from the Indian region are scanty (BORRADAILE, RATHBUN, 1911).

2. *Pachygrapsus minutus* A. Milne-Edwards.

1873. *Pachygrapsus minutus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 292, pl. 14, f. 2.
 1880. *Pachygrapsus minutus* Kingsley. Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 201.
 1883. *Pachygrapsus minutus* de Man. Notes Leyden Mus., vol. 5, p. 158.
 1888. *Pachygrapsus minutus* de Man. Journ. Linn. Soc. London, v. 22, p. 148.
 1888. *Pachygrapsus minutus* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 368.
 1889. *Pachygrapsus minutus* Cano. Boll. Soc. Nat. Napoli, t. 3, p. 240.
 1900. *Pachygrapsus minutus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 399.
 1900. *Pachygrapsus minutus* Borradaile. Proc. Zool. Soc. London, 1900, p. 592.
 1903. *Pachygrapsus minutus* Borradaile. Faun. Geogr. Maldives etc., v. 1, p. 432.
 1905. *Pachygrapsus minutus* Lenz. Abhandl. Senckenb. Gesellsch., Bd 27, p. 370.
 1906. *Pachygrapsus minutus* Rathbun. Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, p. 840.
 1907. *Pachygrapsus minutus* Rathbun. Mem. Mus. comp. Zool. Harvard Coll., v. 35, n^o 2, p. 30.
 1911. *Pachygrapsus minutus* Rathbun. Transact. Linn. Soc. London (2) v. 14, p. 242.
 1913. *Pachygrapsus minutus* Pesta. Denkschr. Ak. Wiss. Wien, Bd 88, p. 61.

Stat. 129. Karkaralong Islands, south of Mindanao. 1 ♂.

This small species that is distributed throughout the whole Indo-Pacific region, presents at the hind margin of the meropodites of the posterior walking legs, besides the large spine near the distal end, that is followed by a much smaller one, also a small, obtuse prominence at the end of the proximal third part of this margin, and this prominence is marked by a long hair.

3. *Pachygrapsus planifrons* de Man.

1888. *Pachygrapsus planifrons* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 368, pl. 16, f. 2.
 1893. ? *Pachygrapsus longipes* Rathbun. Proc. U. S. Nat. Mus., v. 16, p. 247.

1) According to DANA, however, the specimens of KRAUSS belong to an independent species, which is called *Goniograpsus kraussi*, distinguished by having numerous teeth along the posterior margin of the meropodites of the last pair of legs. H. MILNE-EDWARDS (1853) followed DANA, but persisted in referring the species to *Grapsus*.

1903. *Pachygrapsus planifrons* Borradaile. Faun. Geogr. Maldives etc., v. 1, p. 432.
 1905. *Pachygrapsus planifrons* Lenz. Abhandl. Senckenb. Gesellsch., Bd 27, p. 370.
 1906. ? *Pachygrapsus longipes* Rathbun. Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, p. 840,
 pl. 8, f. 7.
 1907. ? *Pachygrapsus longipes* Rathbun. Mem. Mus. comp. Zool. Harvard Coll., v. 35, n^o 2, p. 30.
 1911. ? *Pachygrapsus longipes* Rathbun. Transact. Linn. Soc. London (2) v. 14, p. 242.
 Stat. 34. Labuan Pandan, Lombok. 1 ♀.

DE MAN¹⁾ observed, that *P. longipes* is most nearly related to, if not identical with, his *P. planifrons*, and indeed, both descriptions and figures agree very well. My specimen, anyhow, is certainly *P. planifrons*, though in some points there is some disagreement. Firstly the front is not nearly horizontal, but obliquely deflexed, and secondly the merus of the external maxilliped is not nearly circular, as depicted by DE MAN, but agrees with that of *P. propinquus*; the inner margin of the ischium is concave, as in *P. laevis*. The infra-orbital border is entire, not dentate, as in *P. plicatus*, and strongly sloping backward in its outer half. The propodites of the penultimate pair of legs (which are the most elongate) are five times as long as broad, which agrees with *P. longipes*; the propodites of all the legs are not unarmed, as DE MAN says, but there are two movable spines at the distal end of the inner or posterior margin, besides the usual stiff hairs of these joints.

Metopograpsus H. Milne-Edwards.

1853. *Metopograpsus* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 164.

The genus has been sometimes confounded with *Pachygrapsus*, but the antennae are always excluded from the orbit by means of the broad inner orbital lobe, that joins the front. In the literature, nevertheless, some cases are mentioned where there is a more or less wide gap between the orbital lobe and the front.

DE MAN²⁾ was the first to discriminate exactly the species, but up to recent times some authors continue to regard some species as identical with, or at most varieties of, others. Yet KINGSLEY³⁾ undoubtedly goes too far in admitting only three species.

Key to the species:

1. Antero-lateral margins of carapace without tooth behind
 external orbital angle 2
- Antero-lateral margins of carapace with one tooth behind
 external orbital angle 6
2. Walking legs short, dactyli nearly as long as propodites . 3
 Walking legs longer, dactyli distinctly shorter than propodites 5
3. Carapace less widened proximally (lateral margins scarcely
 convergent backward). Inner orbital lobe coalesced with
 the front over a short distance, rounded, not keeled . 4

1) Rec. Ind. Mus. Calcutta, v. 2, prt 3, 1908, p. 218.

2) Arch. Naturgesch., Jahrg. 53. 1., 1888, p. 359—360.

3) Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 190—191.

- Carapace widened proximally (lateral margins distinctly convergent backward). Inner orbital lobe coalesced with the front over nearly the whole inner margin, sharp and keeled *M. messor* Forskål
4. Front broader, orbits small *M. eydouxi* H. Milne-Edwards¹⁾
 Front narrower, orbits wide *M. thukuhar* (Owen)
5. Lateral margins of carapace much convergent backward; distance between external orbital angles to length of carapace as 100:84—87% in small and medium-sized and 100:89—92% in large specimens *M. latifrons* (White)
- Lateral margins of carapace less convergent backward; distance between external orbital angles to length of carapace as 100:±80% *M. maculatus* H. Milne-Edwards
6. Postfrontal lobes little prominent; front not strongly declivous; internal orbital lobe broad and rounded at tip, coalesced with the front along a short distance (as in *M. thukuhar*). Dactyli of walking legs only slightly shorter than propodites *M. quadridentatus* Stimpson²⁾
- Postfrontal lobes more distinct and sharply separated; front strongly deflexed; internal orbital lobe narrow and acute at tip, coalesced with the front along greater distance (as in *M. messor*). Dactyli of walking legs much shorter than propodites *M. oceanicus* (Jacquinot et Lucas)

1. *Metopograpsus messor* (Forskål).

Literature: ALCOCK, l. c. p. 397. Description: DE MAN, Journ. Linn. Soc. London, v. 22, 1888, p. 144, pl. 9, f. 11; Arch. Naturg., Jahrg. 53, 1., p. 361, pl. 15, f. 6.

*Grapsus (Pachygrapsus) aethiopicus*³⁾ Hilgendorf. v. d. Decken's Reis. Ost-Afrika, Bd 3, 1., Crust., 1869, p. 88, pl. 4, f. 2.

Stat. 47. Bay of Bima, Sumbawa. 12 ♂ (mostly juv.), 1 ♀ with eggs.

Stat. 71. Macassar. 1 ♂.

MIERS⁴⁾ described a subsp. *frontalis* from Macassar and other localities, which seems to be an individual variation and has not been maintained by subsequent authors,

Another subspecies (*gracilipes*) has been founded by DE MAN⁵⁾, originally from the

1) Ann. Sc. Nat. (3) t. 20, 1853, p. 165. It must be admitted, that the differences between this species and *M. thukuhar* are insignificant, and KINGSLEY already identified both species with *M. messor*; the same has been done in recent years by Miss RATHBUN (Bull. U.S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 839) in dealing with the marine Brachyura and Macrura of the Hawaiian Islands. It is from this very locality that both *M. eydouxi* and *M. thukuhar* originate.

2) Description: DE MAN, Zool. Jahrb., Syst., Bd 9, 1895, p. 76, Bd 10, 1898, pl. 28, f. 16.

3) Even in recent days the species has been referred to under this name by DOFLEIN (Wiss. Erg. Tiefsec-Exp. "Valdivia", Bd 6 (Crust.), 1904, p. 130, and implicitly ranged with *Pachygrapsus*. With the name *Metopograpsus messor* the author is apparently unacquainted.

4) Ann. Mag. Nat. Hist. (5) v. 5, p. 311; Rep. "Challenger", Brachyura, 1886, p. 258.

5) Notes Leiden Mus., v. 13, 1891, p. 49, pl. 4, f. 14.

Pacific, but afterwards¹⁾ also from Borneo and Malacca; the author in his later paper expressed the opinion, that this subspecies, characterized by slender and more elongate propodites of the penultimate pair of legs, which are nearly 3 times as long (in the median line) as broad, in the Indo-Malayan waters most likely replaces the typical form of the Red Sea.

On comparing the figures serving to illustrate the differences between the typical form²⁾ and the subspecies³⁾ we indeed observe the slightly more elongate shape of the said propodites. All the "Siboga" specimens belong to the subsp. of DE MAN.

2. *Metopograpsus thukuhar* (Owen).

1839. *Grapsus thukuhar* Owen. Zool. capt. Beechey's Voy. "Blossom" p. 80, pl. 24, f. 3.
 1839. *Grapsus parallelus* Randall. Journ. Ac. Nat. Sc. Philadelphia, v. 8, p. 127.
 1852. *Goniograpsus thukujar* Dana. U. S. Expl. Exp., Crust., p. 344.
 1853. *Metopograpsus thukuhar* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 165.
 1865. *Metopograpsus thukuhar* Heller. Reise "Novara", Crust., p. 43.
 1873. *Metopograpsus thukuhar* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 290.
 1880. *Metopograpsus messor* (part.) Kingsley. Proc. Acad. Nat. Sc. Philadelphia, 1880, p. 190.
 1882. *Goniograpsus thukujar* Haswell. Cat. Austral. Crust., p. 99.
 1888. *Metopograpsus thukuhar* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 362, pl. 15, f. 5.
 1894. *Metopograpsus messor* var. *thukuhar* Ortmann. Zool. Jahrb., Syst., Bd 7, p. 702.
 1895. *Metopograpsus thukuhar* de Man. Zool. Jahrb., Syst., Bd 9, p. 76.
 1906. *Metopograpsus messor* (part.) Rathbun. Bull. U. S. Fish Comm. for 1903, v. 23, prt 2, p. 839.
- Stat. 50. Labuan Badjo, west coast of Flores. 1 ♂ juv.
 Stat. 142. Obi Major, south of Halmahera. 1 ♂.
 Stat. 181. Ambon. 1 ♀ juv.
 Stat. 323. Bawean Island, Java Sea. 1 ♀ juv.

All the specimens, save one of medium size, are very minute and measure only a few millimetres across the carapace.

According to ORTMANN this species does not live in the Indian Ocean, but only in the Pacific; here it lives together with the genuine *M. messor* and may replace this species entirely towards the eastern parts. Its occurrence in the Indo-Malayan Archipelago has been already noted by DE MAN. Notwithstanding the careful researches of this author, who clearly separated the two named species, on account of the more or less convergence of the lateral margins of the carapace and the shape of the inner orbital lobe, Miss RATHBUN seems to unite the species altogether.

3. *Metopograpsus maculatus* H. Milne-Edwards.

Literature: ALCOCK, l. c. p. 398. Description: DE MAN, Journ. Linn. Soc. London, v. 22, 1888, p. 145, pl. 10, f. 1—3.

Stat. 47. Bay of Bima, Sumbawa. 1 ♀.

1) Zool. Jahrb., Syst., Bd 9, 1895, p. 75; Notes Leiden Mus., v. 21, 1899, p. 132.

2) Arch. Naturgesch., Jahrg. 53, 1., 1888, pl. 15, f. 6.

3) Notes etc., 1891, pl. 4, f. 14.

4. *Metopograpsus latifrons* (White).

1847. *Grapsus latifrons* White. Jukes' Voy. "Fly", v. 2, p. 337, pl. 2, f. 2.
 1853. *Metopograpsus latifrons* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 166.
 1867. *Metopograpsus pictus* A. Milne-Edwards. Ann. Soc. Entom. France, t. 7, p. 283.
 1873. *Metopograpsus pictus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 289, pl. 13, f. 2.
 1879. *Metopograpsus pictus* de Man. Notes Leiden Mus., v. 1, p. 68.
 1880. *Metopograpsus latifrons* Kingsley. Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 191.
 1888. *Metopograpsus latifrons* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 360.
 1888. *Metopograpsus pictus* de Man. Ibid., p. 363.
 1892. *Metopograpsus latifrons* de Man. Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, p. 314.
 1894. *Metopograpsus latifrons* Ortmann. Zool. Jahrb., Syst., Bd 7, p. 703.
 1910. *Metopograpsus latifrons* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, p. 325.
- Stat. 47. Bay of Bima, Sumbawa. 2 ♂, 3 ♀ (one with eggs).
 Stat. 86. Dongala, west coast of Celebes. 1 ♀ with eggs.
 Stat. 200. Bay of Bara, Buru, 1 ♂ juv.

In 1888 DE MAN was inclined to unite *M. latifrons* and *M. maculatus*, but in 1892 he clearly discriminated these species and *M. pictus*. It is a matter of some disappointment, that in 1910 MISS RATHBUN again takes *M. maculatus* as a synonym of *M. latifrons*, quite as ALCOCK has done before, with absolute disregard of DE MAN's painstaking researches on this subject.

With the aid of the Leiden Museum material I again undertook the task of comparing *M. latifrons* and *M. maculatus* and found that in the latter species the greatest breadth of the carapace (distance between external orbital angles) to the length is 100:77—80, but in *M. latifrons* the proportion is 100:84—91, according to age, viz.: in young and medium-sized specimens of both species the carapace is proportionally broader than in old individuals. According to DE MAN (1892) the proportion is 30:23 in *M. maculatus*, but 30:26 in *M. latifrons*.

Although the longer carapace of *M. latifrons* enables us to distinguish both species, the same cannot be said of *M. latifrons* and *M. pictus*. I have measured 19 specimens that I take to be *M. latifrons*, and among them the type of "*Grapsus*" *dilatatus* de Haan, which was declared by DE MAN (1879) to be identical with *M. pictus*, in which the ratio of the maximum breadth of the carapace to the length varies from 100:84—85 in the smaller individuals (breadth of carapace 16.5—± 25 mm.) to 100:86—91 in older specimens (breadth of carapace up to 35.5 mm.; in the largest specimens only the length is 90% or more of the maximum breadth). It is true, that in MILNE-EDWARDS' original description of *M. pictus* the maximum breadth is said to be equal to the length of the carapace (37 mm.), but in the figure the latter dimension is less (92% of the maximum breadth). Conform to ORTMANN's opinion (1894) I presume, then, that indeed *M. latifrons* and *M. pictus* are identical and that the latter species has been founded on a very large individual.

1. *Metopograpsus oceanicus* (Jacquinot et Lucas).

1842. *Grapsus oceanicus* Jacquinot et Lucas. Voy. "Astrolabe" et "Zélée", Crust., p. 73, pl. 6, f. 9.

1853. *Metopograpsus oceanicus* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 166.
 1865. *Metopograpsus oceanicus* Heller. Reise "Novara", Crust., p. 44.
 1883. *Metopograpsus oceanicus* de Man. Notes Leiden Mus., v. 5, p. 158.
 1888. *Metopograpsus oceanicus* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 364.
 1894. *Metopograpsus oceanicus* Ortmann. Denkschr. med.-naturw. Gesellsch. Jena, Bd 8, p. 55.
 1899. *Metopograpsus oceanicus* Nobili. Ann. mus. civ. stor. nat. Genova (2) t. 20, p. 265.
 1900. *Metopograpsus oceanicus* Lanchester. Proc. Zool. Soc. London, 1900, p. 755.
 1902. *Metopograpsus oceanicus* de Man. Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, p. 503.
- Stat. 16. Kangeang Island, east of Madura. 1 ♀ juv.
 Stat. 47. Bay of Bima, Sumbawa. 1 ♂ juv., with parasitic Isopod in left branchial cavity.
 Stat. 86. Dongala, west coast of Celebes. 2 ♂ juv., 3 ♀ (1 juv., 1 with eggs).
 Stat. 115. Bay of Kwandang, north coast of Celebes. 1 ♂ juv.
 Stat. 163. Seget, west coast New Guinea. 1 ♂.

LANCHESTER supposes *Pachygrapsus transversus* (Gibbes) to be a variety of *Metopograpsus oceanicus* (not of *M. messor* as WALKER¹) had presumed some years before) on account of the inner orbital lobe being reduced in such a way as to make the antenna extend freely into the orbit. It is true, that the acute orbital lobe in some specimens leaves a rather large distance between the tip of the lobe and the rounded external angle of the front but yet the antenna does never enter the orbit, neither in my specimens nor in those examined by DE MAN, for the upper margin of the lobe is always in contact with the front along a large distance. Besides, as far as I can see, *M. oceanicus* grows to a much larger size and never presents the characteristic transverse ridges on the carapace, so conspicuous in *P. transversus*.

With *M. quadridentatus* Stimpson the present species shares the presence of an epibranchial tooth behind the external orbital angle; the differences between both species have been discussed by DE MAN (1883). Save for this character *M. oceanicus* is more closely related to *M. messor* (Forskål), whereas *M. quadridentatus* is nearest to *M. thukuhar* (Owen).

The present species seems to attain a larger size than any of the other species. One egg-bearing ♀ of the Leiden Museum, from the east coast of Atjeh (mouth of Arakundur River), has a maximum breadth of carapace of exactly 40 mm., the length is 32 mm. This is by far the largest specimen I know of.

Subfam. VARUNINAE.

This subfamily contains a number of littoral crabs, the carapace of which is somewhat vaulted, and mostly with arched lateral margins; the front is not strongly deflexed and may even be entirely horizontal; the gap between the external maxillipeds is rarely wide and does not present the lozenge-shape of the *Grapsinae*; the abdomen of the ♂ rarely occupies all the space between the last pair of legs and the chelae of the ♂ are very often clothed with hairs.

Key to the genera:

1. Palp of ext. maxillipeds articulating with middle of anterior margin of merus. 2

¹) Journ. Linn. Soc. London, v. 20, 1887, p. 113.

- Palp of ext. maxillipeds articulating with outer angle of anterior margin of merus 11
2. Exognath of ext. maxillipeds broader than, or at least as broad as, ischium. Dactyli of legs not flattened . . . 3
 Exognath of ext. maxillipeds narrower than ischium . . . 4
3. Carapace flat, depressed **Ptychognathus** Stimpson
 Carapace convex in both directions. Meropodites of walking legs with spines along posterior margin **Pyxidognathus** A. Milne-Edw.
4. Lateral margins of carapace entire, without teeth. Front about one-third width of carapace. Ischium and merus of ext. maxillipeds distinctly wider than long. Very small species **Acmaeopleura** Stimpson¹⁾
 Lateral margin of carapace dentate 5
5. Breadth of carapace equal to of slightly less than length; one obscure tooth behind ext. orbital angle. Merus of ext. maxillipeds broader than long, scarcely auriculate. Legs flattened, heavily fringed with hairs at outer margin. . . **Planes** Leach²⁾
 Carapace always wider than long 6
6. Merus of ext. maxillipeds auriculate at distal outer angle . 7
 Merus of ext. maxillipeds not expanded at distal outer angle, nearly quadrate 9
7. Propodites of walking legs cylindrical, dactyli styliform. . 8
 Propodites of walking legs flattened, natatorial, as also are the dactyli. Front horizontal, anterior margin perfectly straight. **Varuna** H. Milne-Edwards
8. Very aberrant species, Xanthoid-like; lateral margins of carapace diverging considerably backward in their anterior half, with two epibranchial teeth behind ext. orbital angle; the latter and the first epibranchial tooth serrulate at outer margin and separated by a very wide sinus. Merus and ischium of ext. maxillipeds both wider than long (as in *Acmaeopleura*); ischium shorter than merus; suture between them angular. Chelipeds of ♂ very bulky, much

1) Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 105; Smithsonian Inst., Miscell. Coll., v. 49, 1907, p. 130. The genus is founded on *A. parvula* Stimpson (l. c., 1907, p. 130, pl. 11, f. 4), found at Ousima, and recently Miss RATHBUN added a second species, *A. rotunda* (K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 327, textfig. 10) from the Gulf of Siam.

2) Former authors have distinguished several species within this genus, but now it is generally believed, that there are only two. The type species is *Planes minutus* (Linné), that was originally referred to *Cancer* by LINNÉ and HERBST, to *Grapsus* by LATREILLE. As is well known, this is the common and very variable Gulf Stream crab, occurring in great numbers on the floating Sargassum, but also on turtles, on floating timber etc. It has been met with in all the warmer seas but is essentially Atlantic. The second species is *Planes marinus* Rathbun (Proc. U. S. Nat. Mus., v. 47, 1914, p. 120) from Lower California.

BELL (Hist. Brit. stalk-eyed Crust., 1853, p. 134), KINGSLEY (Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 201—202, note) and STEBBING (S. A. Crust., prt 5, 1910, p. 320) all agree in stating that *Planes* is a manuscript name of LEACH, and that it was first published by BOWDICH in 1825 (Exc. to Madeira and Porto Santo, p. 15, f. 2a, 2b).

- larger than walking legs; fingers widely gaping. Joints of walking legs cylindrical; first pair with unequal teeth at inner (hind) margin of meropodites **Baruna Stebbing**¹⁾
- Teeth at lateral margins of carapace not serrulate, flattened and separated by very narrow notches; carapace sub-circular. Merus of ext. maxillipeds about as broad as long, and shorter than ischium **Pseudograpsus H. Milne-Edw.**
9. Merus of ext. maxillipeds broader than long and shorter than ischium **Utica White**
- Merus of ext. maxillipeds as long as, or longer than, broad 10
10. Front nearly half as wide as carapace; lateral margins three-toothed on either side **Brachynotus de Haan** 102
- Front not more than one-third the breadth of carapace; lateral margins usually four-toothed on either side . . **Eriocheir de Haan**
11. One tooth behind ext. orbital angle. Suture between ischium and merus of ext. maxillipeds horizontal **Perigrapsus Heller**²⁾
- Two teeth behind ext. orbital angle. Suture between ischium and merus of ext. maxillipeds very oblique **Gaetice Gistel**³⁾

Varuna H. Milne-Edwards.

1830. *Varuna* H. Milne-Edwards. Dict. cl. d'Hist. nat., t. 16, p. 511.

1835. *Trichopus* de Haan. Faun. Japon., p. 32.

Carapace depressed, flattened; front horizontal, at least in adult individuals, but apparently somewhat oblique in young specimens, with the anterior margin quite straight. The merus of the external maxillipeds is strongly auriculate, and the exognath is much narrower than the ischium. The last three joints of the walking legs are much flattened, and heavily fringed at both margins.

Key to the species:

- Carapace perfectly hairless. Upper orbital margin fissured. Epibranchial teeth well defined. ***V. litterata* (Fabricius)**
- Carapace and legs thickly covered with a hairy fur. Upper orbital fissure scarcely present. Epibranchial teeth separated by an indistinct notch ***V. tomentosa* Pfeffer**⁴⁾

1) *Spolia zeylanica*, v. 2, prt 5, 1904, p. 3, with the single species *B. socialis* (p. 3, pl. 1A), found in brackish water (Lake Negombo) at Ceylon.

2) Verhandl. Zool. Bot. Gesellsch. Wien, 1862, p. 522; Reise "Novara", Crust., 1865, p. 50. There is only one species, *P. excelsus* Heller ("Novara", p. 50, pl. 5, f. 1) occurring at Tahiti.

3) The name *Gaetice* Gistel has been substituted by Miss RATHBUN (Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 128, note to STIMPSON's memoir on North Pacific crabs), the original names *Platynotus* de Haan (Faun. Jap., 1835, p. 34 and *Platygrapsus* Stimpson (Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 104) being both preoccupied. There is probably only one species *G. depressus* (de Haan) (Faun. Jap., 1835, p. 63, pl. 8, f. 2) from Japan, another species, *G. convexiusculus* (Stimpson) (see Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 128, pl. 17, f. 3) from the Loo-Choo Islands, being most likely not distinct.

4) Jahrb. Hamb. wiss. Anst., Jahrg. 6, 2., 1889, p. 30. In fresh water near Zanzibar.

1. *Varuna litterata* (Fabricius).

Literature and description: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, p. 401.

- Stat. 4. Djangkar, north-east coast of Java. 7 ♂, 1 ♀.
 Stat. 19. Labuan Tring, west coast of Lombok. 3 ♂ juv.
 Stat. 33. Bay of Pidjot, east coast of Lombok. 2 ♂ juv.
 Stat. 50. Labuan Badjo, west coast of Flores. 2 ♂ juv.
 Stat. 58. Seba, Savu Island, west of Timor. 7 ♂ (1 ad., 6 juv.).
 Stat. 234. Nusa Laut, east of Ambon. 1 ♀ juv.

This well known species is found everywhere throughout the Indo-Pacific region, and, as ALCOCK remarks, it ascends estuaries even into freshwater, though also commonly met with at sea on floating timber. The "Siboga" specimens were all caught in rivers.

The terminal segment of the abdomen of the very young ♂ is about as long as broad, not of the elongate shape that is observed in the adult.

Ptychognathus Stimpson.

1858. *Ptychognathus* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 104.
 1868. *Gnathograpsus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 4, p. 180.
 1880. *Coelochirus* Nauck. Zeitschr. wiss. Zool., Bd 34, p. 66.

DE MAN¹⁾ has been the first to recognize the identity of *Ptychognathus* and *Gnathograpsus* and the same author has stated²⁾, that *Coelochirus* has been founded likewise on a species of the present genus.

The genus contains a rather great number of species, some of which have a perfectly horizontal and straight front, resembling that of *Varuna*, while in others it is obliquely deflexed. Now MISS RATHBUN³⁾ recently proposes to include those species with a *Varuna*-like front, with the epibranchial teeth acute and well separated, and the wrist of the chelipeds armed at the inner angle with a tooth, into the genus *Varuna*. I have preferred, however, to maintain *Ptychognathus* in its original conception, according to which the genus is characterized by the broad exognath, that is at least as broad as, generally, especially in the ♂, much broader than, the ischium of the external maxillipeds, whereas in *Varuna* the exognath is much narrower than the ischium. Besides, in *Varuna* the exognath is thin, lamellar and hairy at the outer surface, in both sexes, but in the ♂ of *Ptychognathus* it is convex, thick and wholly glabrous.

The discrimination of the species is rendered difficult by the rather considerable differences between the two sexes of the same species. The best key to all the Indo-Pacific species is that recently given by DE MAN⁴⁾, for ♂ and ♀ separately. After the publication of his key no less than 4 new specimens have been described by MISS RATHBUN (one of these referred to *Varuna*) viz.:

1) Notes Leiden Mus., v. 5, 1883, p. 161.
 2) Zool. Jahrb., Syst., Bd 2, 1887, p. 719.
 3) Proc. U. S. Nat. Mus., v. 47, 1914, p. 69.
 4) Proc. Zool. Soc. London, 1905, p. 543—544.

Pt. casterana, Mem. Mus. comp. Zool. Harvard Coll., v. 35, n^o 2, 1907, p. 31, pl. 2, f. 4, pl. 7, f. 4—4a. Easter Island (eastern Pacific)

Pt. johannae, Proc. U. S. Nat. Mus., v. 46, 1914, p. 354, pl. 30, f. 1—3: Johanna Island (western Indian Ocean)

Pt. altimanus (*Varuna altimana*), Proc. U. S. Nat. Mus., v. 47, 1914, p. 70. Luzon (Philippines)

Pt. guijulugani, Proc. U. S. Nat. Mus., v. 47, 1914, p. 71. Negros (Philippines)

Though the "Siboga" expedition has not added any new species to the list, one of Miss RATHBUN's new species has been collected.

Key to the species (based on the characters of the ♂)¹⁾:

1. Carapace with antero-lateral teeth sharp and salient; regions distinct; front laminar, straight. Inner angle of arm nearly always armed with a more or less long spine. Meropodites of ambulatory legs with a subdistal spine at anterior margin 2
- Carapace with antero-lateral teeth not very acute; regions generally indistinct; front more or less sinuous at anterior margin. Inner angle of wrist subrectangular or slightly pronounced, but never spiniform. Meropodites of ambulatory legs near distal end of anterior margin with a blunt prominence or unarmed 7
2. Inner angle of wrist of cheliped with a small tooth (no spine); inner surface of palm hairy *Pt. dentatus* de Man²⁾
- Inner angle of wrist of cheliped spiniform; inner surface of palm not hairy 3
3. A tuft of hair in the finger-cleft, extending along the fixed finger *Pt. onyx* Alcock³⁾
- Chelae entirely without hairs 4
4. Upper border of palm transformed into a compressed keel; inner angle of wrist with a long spine 5
- Upper border of palm simply rounded; inner angle of wrist with a short spine 6
5. Exognath of ext. maxillipeds twice as broad as ischium *Pt. spinicarpus* Ortmann⁴⁾
- Exognath of ext. maxillipeds about 1½ times as broad as ischium *Pt. altimanus* (Rathbun)
6. Ext. orbital angle and anterior epibranchial tooth separated by a narrow sinus; distance betw. ext. orbital angles much

1) In preparing this key I have based myself on the division of the genus into three sections that were distinguished by DE MAN (l. c. p. 542).

2) Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, 1892, p. 318, pl. 18, f. 9; ALCOCK, l. c. p. 403. Hab. Celebes, Bay of Bengal and Upper Tenasserim.

3) L. c. p. 404. Hab. Tavoy. Ill. Zool. "Investigator", Crust. prt. 10, 1902, pl. 65, f. 4.

4) See DE MAN, Zool. Jahrb., Syst., Bd 9, 1895, p. 91, Bd 10, 1898, pl. 28, f. 19. Hab. Atjeh.

- shorter than length of carapace. Exognath of ext. maxillipeds $1\frac{2}{3}$ times as broad as ischium *Pt. polleni* de Man¹⁾
- Ext. orbital angle and anterior epibranchial tooth separated by a broad sinus; distance betw. ext. orbital angles equal to length of carapace. Exognath of ext. maxillipeds exactly as broad as ischium. *Pt. affinis* de Man
7. Regions on carapace hardly indicated; no epigastric lobes; front prominent. 8
- Regions on carapace (that is decidedly broader than long) more or less distinct, as also the epigastric lobes; front not prominent, sinuous 9
8. Only one tooth behind ext. orbital angle; carapace distinctly broader than long. Outer surface of palm smooth, not hairy. Exognath of ext. maxillipeds scarcely broader than ischium *Pt. glaber* Stimpson²⁾
- Two teeth behind ext. orbital angle; carapace scarcely broader than long. A brush of stiff hairs at tip of fixed finger. Exognath of ext. maxillipeds twice as broad as ischium *Pt. riedelii* (A. Milne-Edw.)
9. Fingers with a tuft of hairs at base of outer surface. 10
- No tuft of hairs on the fingers 13
10. Surface of carapace granulate near the antero-lateral margins; epibranchial teeth scarcely indicated; epigastric lobes distinct. Freshwater species *Pt. pusillus* Heller
- Surface of carapace punctate or smooth near the antero-lateral margins 11
11. Anterior margin of front with a double row of granules, confluent in the middle. Merus of ext. maxillipeds moderately auriculate, so that the greatest breadth is only slightly larger than the length, with the outer portion of the anterior margin convex; exognath $1\frac{1}{3}$ times as broad as ischium. Most likely a marine species *Pt. barbatus* (A. Milne-Edw.)³⁾
- Anterior margin of front either simple or bimarginate. Merus of ext. maxillipeds with a very large auricle, extended laterally, so that the greatest breadth much exceeds the length. 12

1) *Pt. pusillus* de Man (nec Heller), Notes Leiden Mus., v. 5, (1883) p. 161; *Pt. polleni* de Man, Zool. Jahrb., Syst., Bd 9, 1895, p. 94, Bd 10, 1898, pl. 28, f. 20. Hab. Pasandava Bay (Madagascar).

2) See DE MAN, Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, 1892, p. 324, pl. 19, f. 11; STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 129, pl. 17, f. 5—5 a. Hab. Bonin Islands and Flores.

3) *Gnathograpsus barbatus* A. Milne-Edwards, Nouv. Arch. Mus. Paris, t. 9, 1873, p. 316, pl. 17, f. 4; *Pt. barbata* Alcock, l.c. p. 406; *Pt. barbatus* de Man, Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 505; *Pt. barbata* Pesta, Denkschr. Ak. Wiss. Wien, Bd 88, 1913, p. 63. Widely spread, but apparently local, throughout Indo-Pacific region.

12. Antero-lateral teeth of carapace not well separated; anterior margin of front bimarginate, sinuous, but nearly straight in dorsal view. Exognath of ext. maxillipeds as broad as ischium, the latter increasing in width distally . . . *Pt. johannae* Rathbun¹⁾
 Antero-lateral teeth of carapace separated by triangular incisions; anterior margin of front deeply sinuous in dorsal view. Exognath of ext. maxillipeds somewhat broader than ischium, the latter with subparallel sides. . . *Pt. guijulugani* Rathbun.
13. Outer surface of palm granulate. Exognath of ext. maxillipeds $1\frac{1}{2}$ —2 times as broad as ischium. 14
 Outer surface of palm smooth. Exognath of ext. maxillipeds as broad as ischium *Pt. pilipes* (A. Milne-Edw.)²⁾
14. Distance betw. ext. orbital angles much shorter than length of carapace. Chelae coarsely granulate. Hind margins of propodites of walking legs thickly fringed, *Varuna*-like . . . *Pt. intermedius* de Man³⁾
 Distance betw. ext. orbital angles very slightly longer than length of carapace. Chelae finely granulate at outer surface; immobile finger with a deep longitudinal groove. Propodites of walking legs with very short setae . . . *Pt. easteranus* Rathbun⁴⁾

1. *Ptychognathus altimanus* (Rathbun). Pl. 4, Fig. 5.

1914. *Varuna altimana* Rathbun. Proc. U. S. Nat. Mus., v. 47, p. 70.

Though this species has not been collected by the "Siboga", I had an opportunity of examining 3 specimens, belonging to the Amsterdam Zoological Museum, and brought home from Nias by Dr. KLEIWEG DE ZWAAN. Only one of the two ♂ is quite perfect; the other, much smaller one, lacks both chelipeds and some walking legs, while the ♀, that is egg-bearing, has lost all its limbs. The original specimen came from a river at Luzon (Philippines).

The carapace is much flattened, not granulate, but very minutely punctate. The various regions are not well defined, but some, viz. mesogastric, cardiac, intestinal and inner branchial regions, are inflated, while others (epigastric and hepatic regions) are slightly depressed. The only deep sulcus is the nearly semi-circular cervical groove, situated behind the middle of the carapace, shallower in its median part; from either end parts backward a very short groove, concave outward, and another yet shorter groove runs transversely. The branchial regions are scarcely defined from the obtusely-triangular intestinal area, and laterally they are strongly

1) Proc. U. S. Nat. Mus., v. 46, 1914, p. 354, pl. 30, f. 1—3. Hab. Comoro Islands (north of Madagascar).

2) *Gnathograpsus pilipes* A. Milne-Edwards, Nouv. Arch. Mus. Paris, t. 4, 1868, p. 184, pl. 27, f. 6—10; *Pt. pilipes* Miers, Ann. Mag. Nat. Hist. (5) v. 5, 1880, p. 311; *Coelochirus crinipus* Nauck, Zeitschr. wiss. Zool., Bd 34, 1880, p. 66 (f. DE MAN, Zool. Jahrb., Syst., Bd 2, 1887, p. 719); *Pt. pilipes?* de Man, Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, 1892, p. 325. Hab. Philippines, Batjan and Timor.

3) DE MAN, Notes Leiden Mus., v. 1, 1879, p. 69; Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, 1892, p. 322, pl. 19, . 10. Hab. Moluccas and Tahiti (ORTMANN, Zool. Jahrb., Syst., Bd 7, p. 711).

4) Mem. Mus. comp. Zool. Harvard Coll., v. 35, n° 2, 1907, p. 31, pl. 2, f. 4, pl. 7, f. 4—4a. Hab. Easter Island.

declivous towards the bases of the second to fourth walking legs; the sloping portions are defined superiorly by a sharp line, somewhat curved anteriorly and nearly continued till the margin of the carapace. There are two pairs of very indistinct transverse depressions, one on the level of the cervical groove and one running inward at the level of the posterior lateral teeth. The epigastric lobes are present, but very indistinct, and anteriorly to these the front is perfectly flat, laminar and horizontal, with a straight anterior margin¹⁾, that passes with obtuse angles into the lateral margins. The upper orbital margin is strongly S-shaped and separated from the lateral margin of the front by a closed incision, beginning with a triangular sinus. The distance between the external orbital angles is less than the length of the carapace; the angles are prominent, but obtuse at tip, and their lateral margins are markedly diverging backward; the epibranchial teeth are acute, with the lateral margins subparallel, and separated by deep sinuses; the anterior pair of these teeth is larger and more depressed than the posterior pair; distance between tips of posterior pair of teeth is equal to length of carapace. Posterolateral margins slightly converging backward²⁾; posterior margin nearly equal to anterior breadth of front. The front projects a considerable way beyond the bases of the antennules, that are quite concealed in dorsal view, and the bases of which are separated by a triangular "nasal lobe". The epistome is narrow, $6\frac{1}{2}$ times as broad as long, excavated, and the posterior margin, between the ridges of the endostome, is somewhat crenulate. The antennae fill the gap between the front and the blunt inner orbital lobe. Pterygostomial regions granular and somewhat hairy; a granulated ridge runs obliquely backward from the anterior angles of the buccal cavern, disappearing distally. In the ♂ the breadth of the exognath of the external maxillipeds measures, according to Miss RATHBUN, $1\frac{3}{5}$ times the width of the ischium; in my specimen this exognath is $1\frac{2}{5}$ times as broad as the ischium and is much swollen, smooth and entirely glabrous, as is usual in the ♂ of this genus, reaching nearly as far forward as the large auricle of the merus; outer surface of both ischium (the lateral margins of which are subparallel) and merus likewise hairless. In the ♀ the exognath is flattened; it reaches as far forward as in the ♂, but it is much narrower, not attaining even the width of the rather broad ischium³⁾; the outer surface of the whole maxilliped is covered with very short hairs (Figs. 5*b* and *c*).

The abdomen of the ♂ is of the usual shape (Fig. 5*d*), with the lateral margins slightly converging forward, the terminal segment being narrow, longer than broad at the base, and the penultimate segment shorter and three-fourths of the width at the base. The eggs of the ♀ are very small and most numerous.

The chelipeds of the ♂ are equal in size, very stout and bulky. The edges of the meropodite are somewhat roughened by granules; upper and inner margins provided with some hairs; there is, besides, a small patch of hairs on the inner surface; the upper margin has no subdistal projection. The wrist is globular, with some very minute transverse granulated rows on the upper surface; the inner surface is flattened, bordered above and below by a granulated

1) Miss RATHBUN states that it is feebly bilobed, but in all my specimens it is perfectly straight.

2) Subparallel and sinuous according to Miss RATHBUN.

3) Miss RATHBUN states the same for the ♀, but at the beginning of her diagnosis she says that only one specimen (♂) has been caught.

row and ending anteriorly into a rather long, triangular, depressed spine, with the tip acuminate. The chela is as long as the anterior margin of the front; the palm is smooth, but covered with very minute granules when examined under some magnification, shorter than the fingers; the granules are arranged in some oblique rows near the carpal joint, and the upper margin is elevated into a depressed lobe, which occupies, as Miss RATHBUN remarks, the proximal two-thirds of the margin; the outer surface of the palm is somewhat prominent near the carpal joint; a very indistinct horizontal line runs from the carpal joint to the tip of the fixed finger, and a trace of a second (oblique) line is visible above it on the palm; the fingers are very high at the base, largely compressed, very slightly spooned at the tip; the back of the mobile finger is covered with minute granules, and the cutting margin is provided with about 13 obtuse teeth, that are largest in the middle; that of the fixed finger has proximally 6 teeth, increasing gradually in size, so that the two terminal ones are very large, then follow two small teeth and at last a much larger tooth at the beginning of the horny extremity of the finger.

Walking legs long and slender, the penultimate pair being $1\frac{1}{2}$ times the maximum breadth of the carapace. Meropodites about $3\frac{1}{2}$ times as long as broad, with a sharp subdistal tooth at the anterior margin, except in the case of the terminal pair of legs; both anterior and posterior margins with short hairs, intermingled with longer hairs; above the bases of the legs clusters of club-shaped hairs are observed. Carpo- and propodite together are as long as the meropodite; both margins are fringed with hairs, especially at the hind margin of the much flattened propodite, that is paddle-shaped, and longitudinally-oval in the posterior legs. Dactyli falciform, depressed, as long as the hind margin of the preceding joints, and likewise fringed.

Certainly this species is nearest to *Pt. spinicarpus* Ortmann, with which also Miss RATHBUN compares it; the carapaces of both species seem to resemble each other very much, but the exognath of ORTMANN'S species is twice as broad as the ischium of the external maxillipeds, whereas it is only $1\frac{1}{2}$ times of the width of the latter in the present species. In other respects there is a very great resemblance, for the spine at the wrist of the cheliped is exactly alike, and even the small tubercle at the base of this spine and at the anterior margin of the wrist occurs in both species; again, the fingers of the chelae are likewise much depressed and the teeth at the cutting margin of the fixed finger show much the same disposition; the upper border of the palm is in *Pt. spinicarpus* likewise transformed into a compressed, rather sharp lobe¹⁾. There seems to be some difference in the abdomen of the ♂, which is generally of a more narrow shape in *Pt. altimanus*; that of *Pt. spinicarpus* as depicted by ORTMANN²⁾ is probably inexact, as the terminal segment presents an unnaturally elongated and asymmetrical shape, but DE MAN states, that it resembles that of *Pt. dentatus* and the abdomen of the latter³⁾ is decidedly much broader, with the lateral margins more

1) Miss RATHBUN quotes the absence of this lobe in ORTMANN'S species as a difference between the two species, but both ORTMANN and afterwards DE MAN state, that the palm is compressed above.

2) Zool. Jahrb., Syst., Bd 7, 1894, pl. 23, f. 132.

3) Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, 1892, pl. 18, f. 96.

strongly convergent forward, the terminal segment is more triangular, and the penultimate segment longer than the preceding one.

The measurements of the ♂ given below nearly exactly agree with those of a specimen of *Pt. spinicarpus* measured by DE MAN¹⁾.

Dimensions in mm.:

	♂	♀
Distance between external orbital angles	16.75	14.75
Distance between tips of postero-lateral teeth	20.25	17.5
Length of carapace	19.5	17.—
Breadth of anterior margin of front.	8.5	7.25
Length of chela.	17.—	—
Height of palm	9.—	—
Breadth of ischium of ext. maxillipeds.	1.8 ²⁾	1.8 ²⁾
Breadth of exognath of ext. maxillipeds	2.5 ²⁾	1.7 ²⁾
Breadth of base of abdomen	8.25	—
Breadth of base } of penultimate segment of abdomen . . .	4.4 ²⁾	—
Length } of penultimate segment of abdomen . . .	2.6 ²⁾	—
Length of terminal segment of abdomen	3.3 ²⁾	—
Length of meropodite	11.—	—
Breadth of meropodite	3.25	—
Length of carpo- + propodite } of penultimate pair of legs	11.5	—
Length of dactylus	7.5	—

2. *Ptychognathus affinis* de Man.

1895. *Ptychognathus affinis* de Man. Zool. Jahrb., Syst., Bd 9, p. 97, Bd 10, 1898, pl. 28, f. 21.

Stat. 115. Kwandang Bay, north coast of Celebes. 11 sp. juv. (all ♂), in river.

Stat. 179. Kawa Bay, west coast of Ceram. 1 ♂.

The original specimen from Atjeh was not full-grown, and this circumstance induced DE MAN to presume, that perhaps this species was only a young stage of *Pt. spinicarpus*, with which it shows the nearest affinity; though the exognath of the external maxilliped in *Pt. affinis* is only slightly broader than the ischium, but twice as broad as the ischium in *Pt. spinicarpus*, this difference might be perhaps accounted for by the well-known fact that the exognath in species of *Ptychognathus* is proportionally narrower in young individuals than in the adult ones. A large specimen of the present species, even exceeding the Atjeh-specimen of DE MAN, was caught by the "Siboga" and distinctly demonstrates, that *Pt. affinis* is a valid species, for the width of the exognath of the external maxilliped is only slightly more than that of the ischium and much less than in *Pt. spinicarpus*. Besides, in DE MAN'S species the tooth at the inner angle of the wrist of the cheliped is proportionally shorter and somewhat falciform, and the horizontal line near the under border of the palm is much more distinct.

1) Zool. Jahrb., Syst., Bd 9, 1895, p. 93.

2) Measured under microscope.

Dimensions in mm. of the adult ♂:

Distance between ext. orbital angles	18.—
Distance between postero-lateral teeth of carapace	21.25
Length of carapace	19.25
Breadth of anterior margin of front.	9.5
Length of chela.	11.—
Height of palm	5.75
Breadth of ischium of ext. maxillipeds.	1.9 ¹⁾
Breadth of exognath of ext. maxillipeds	2.2 ¹⁾
Breadth of base } of penultimate segment of abdomen }	5.1 ¹⁾
Length }	2.4 ¹⁾
Length of terminal segment of abdomen	3.4 ¹⁾

As DE MAN rightly remarks, the chelae of the ♂ are remarkably feebly developed and present in this respect female characters.

3. *Ptychognathus riedelii* (A. Milne-Edwards).

1868. *Gnathograpsus riedelii* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 4, p. 182, pl. 27, f. 1—5.

1892. *Ptychognathus riedelii* de Man. Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, p. 321.

1895. *Ptychognathus riedelii* de Man. Zool. Jahrb., Syst., Bd 9, p. 91.

1900. *Ptychognathus andamanica*? Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 404.

1902. *Ptychognathus andamanica*? Alcock. Ill. Zool. "Investigator", Crust., prt 10, pl. 65, f. 3.

Subsp. *pilosus* de Man.

1892. *Ptychognathus riedelii* var. *pilosa* de Man. Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, p. 323.

Stat. 33. Bay of Pidjot, east coast of Lombok. 1 ♂ (entirely broken into fragments).

Stat. 131. Karakelang, Talaut Islands. Reef. 2 ♂.

Pt. riedelii is at once distinguished from all other species of the genus by the brush of stiff hairs at the under face of the tip of the fixed finger. On account of this character DE MAN considers ²⁾ *Pt. andamanicus* Alcock to be identical with the species of MILNE-EDWARDS, though ALCOCK does not mention a tuft of hairs at the outer angle of the wrist of the chelipeds, which tuft is observed by DE MAN (1892). But this tuft is very inconspicuous, especially in the ♀, the only sex ALCOCK could examine, and even in the ♂ of the "Siboga" collection it is scarcely indicated, and may be completely wanting at one side in some cases.

The "Siboga" specimens belong to the subsp. *pilosus*, in which the outer surface of the fingers of the cheliped bears a tuft of very long hairs, whereas the chelae are glabrous in the typical species. The latter has been found at Celebes, the Andamans, Flores and Atjeh, the subspecies at Flores, where it occurred together with the typical species, in freshwater.

The flattened, compressed shape of the chelae, that are very high in the ♂, and the remarkably broad exognath of the external maxillipeds (twice as broad at least as the ischium) are additional characters of this species.

1) Measured under microscope.

2) Proc. Zool. Soc. London, 1905, p. 543, note.

4. *Ptychognathus pusillus* Heller.

1865. *Ptychognathus pusillus* Heller. Reise "Novara", Crust., p. 60.
 1889. *Ptychognathus pusillus* de Man. Zool. Jahrb. Syst., Bd 4, p. 440.
 1892. *Ptychognathus pusillus* de Man. Weber's zool. Erg. Reise niederl. Ost.-Indien, Bd 2, p. 325.
 1894. *Ptychognathus pusillus* Ortmann. Zool. Jahrb. Syst., Bd 7, p. 712.
 1895. *Ptychognathus pusillus* de Man. Zool. Jahrb., Syst., Bd 9, p. 99, Bd 10, 1898, pl. 28, f. 22.
 1900. *Ptychognathus pusilla* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 405.
 1905. *Ptychognathus pusillus* de Man. Proc. Zool. Soc. London, 1905, p. 537, pl. 17, f. 1-5.
 nec *Ptychognathus pusillus* de Man. Notes Leiden Mus., v. 5, 1883, p. 161, (= *Pt. polleni* de Man).
 nec *Ptychognathus pusillus* de Man. Archiv. Naturgesch., Jahrg. 53, 1., 1888, p. 383 (= *Pt. barbatus* A. Milne-Edwards).

Stat. 33. Bay of Pidjot, east coast of Lombok. 1 ♂, in river.

This species has been obscurely known till 1895, when DE MAN redescribed the type specimen. Only in 1905 DE MAN made known the ♂ and his very detailed diagnosis renders a fresh description useless.

Pt. pusillus is, according to DE MAN, very nearly related to *Pt. barbatus*, but in the former species the exognath of the external maxillipeds is narrower and in the ♀ does not even attain the width of the ischium; the carapace is more narrowed anteriorly and is somewhat more granular; the anterior margin of the front is bordered by a double row of granules in both species, but this row is confluent in the middle in the case of *Pt. barbatus*, whereas in HELLER'S species both rows are separated throughout¹⁾.

The present species ranges from the Nicobars to Christmas Island, Flores and even to Fiji.

The only specimen is not adult. The distance between the external orbital angles (8 mm.) somewhat exceeds the length of the carapace (7.5 mm.), which is contrary to DE MAN'S measurements (1905, p. 541); the maximum breadth is 9.25 mm.

5. *Ptychognathus guijulugani* Rathbun. Pl. 4, Fig. 6.

1914. *Ptychognathus guijulugani* Rathbun. Proc. U. S. Nat. Mus., v. 47, p. 71.

Stat. 131. Karakelang, Talaut Islands. 1 ♂.

This small species, recently described by Miss RATHBUN, has a much flattened, smooth carapace, the various regions of which are scarcely separated one from another and none of them inflated. The cervical groove is concave forward, scarcely distinct in the middle; cardiac, intestinal and branchial regions are not separated off, the latter regions, as usual, declivous, towards the postero-lateral angles of the carapace, but these sloping portions are not very well defined above and bordered by a somewhat sharp ridge only in their posterior part. Mesogastric area of a triangular shape; epigastric region divided by a faint but broad longitudinal sulcus, parting from the interspace between the epigastric lobes; hepatic and branchial

¹⁾ KINGSLEY (Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 204) declares the two species to be identical and records *Pt. pusillus* from Mauritius.

regions not separated. The whole surface is not granular, but everywhere punctate, with some larger pits symmetrically distributed. Front somewhat deflexed, resembling that of *Pt. barbatus* and *Pt. pusillus*, but the anterior margin is still more sinuous (fig. 6a), with the median lobes broader and more prominent, and a single, but rather thick row of granules¹⁾, looking as if it consists of two entirely contiguous rows; lateral lobes subrectangular, obtuse; the width of the front, as Miss RATHBUN remarks, is half the greatest breadth of the carapace, lying between the tips of the first or second pair of epibranchial teeth. Upper orbital margin slightly oblique, granular, without fissure marking the transition to lateral margin of the front. External orbital angles slightly prominent, acute, with the lateral margins (that are as long as those of the following teeth) diverging backward and ending posteriorly in a triangular, distinct sinus; anterior epibranchial teeth somewhat pointed, lateral margins subparallel, followed at either side of the carapace by a very minute tooth, behind which the lateral margins are converging backward.

Bases of antennules separated by a very broadly-triangular nasal lobe; epistome very short, almost linear, crenulate at posterior margin; inner suborbital lobe obtusely-triangular; peduncles of antennae contiguous to, but not coalesced with, the lateral angles of the front.

Miss RATHBUN already states, that the exognath of the external maxillipeds is somewhat broader than the ischium, more so in the ♂ than in the ♀; the ischium does not increase in width towards its anterior margin, and the auricle of the merus is very large (fig. 6c).

The chelipeds of the ♂ are equal in size and unusually stout and bulky. Arm unarmed, granular at outer surface, and hairy along upper and inner edge. Wrist flattened above, with inner margin somewhat sharpened and bent rectangularly towards the palmar joint. Palm much inflated; length of chela equal to distance between external orbital angles; fixed finger straight, with five teeth at the cutting margin: two very small ones near the somewhat spooned extremity, preceded by two much larger, conical ones and one smaller tooth; movable finger much curved, so that a wide gap is left between the bases of the fingers, cutting margin irregularly crenulate, but none of the teeth attaining the size of the two large ones on the opposite finger; palm higher than long, smooth, but marked on the outer surface with numerous white patches, that are narrower and longitudinally disposed near the superior border, which is rounded, not keeled. The gap between the fingers is filled at the outer surface by a thick patch of hairs, as occurs in many other species of *Ptychognathus*; these hairs extend halfway on the fingers (fig. 6b).

The walking legs are nearly hairless, only some hairs being observed at the posterior border of the slightly flattened propodites and on the dactyli. Meropodites unarmed, with a subdistal rectangular prominence at anterior margin, and $3\frac{1}{2}$ times as long as broad, as long as carpo- and propodite together, save in the last pair of legs, in which, as is usual, the propodite is very short and subcircular; the dactyli present nothing remarkable.

The "Siboga" collected this specimen not far from the original locality (Guijulugan, Negros, Philippines).

1) Miss RATHBUN on the contrary denies the existence of a granulate row.

Dimensions in mm. ¹⁾:

Distance between external orbital angles	9.3
Maximum breadth of carapace	10.8
Length of carapace	8.8
Width of anterior margin of front	5.3
Horizontal length of chela	9.9
Height of palm	5.5
Breadth of exognath of external maxillipeds.	1.4
Breadth of ischium of external maxillipeds	1.1
Breadth of base } of penultimate segment of abdomen. . . }	2.2
Length }	1.1
Length of terminal segment of abdomen	1.7
Length of meropodite } of penultimate pair of legs }	6.2
Breadth of meropodite }	1.7
Length of carpo- + propodite }	6.2
Length of dactylus }	3.3

Pyxidognathus A. Milne-Edwards.

A detailed discussion of this genus, together with the description of a new species, is now under press and will be published in the "Zool. Meded. Mus. Leiden". *IV, 1918, pp. 161-170, 171*
 No representatives were collected by the "Siboga" expedition.

Utica White.

1847. *Utica* White. Proc. Zool. Soc. London, 1847, p. 86.

In the shape of the much flattened carapace and of the prominent front the genus much resembles *Ptychognathus*, but the merus of the external maxillipeds is not at all auriculate at outer angle and the exognath is much narrower than the ischium.

WHITE knew only a single species; two species were added by A. MILNE-EDWARDS (1873), two by HASWELL (1882) and two by DE MAN (1895). With exception of both species of HASWELL all are living in freshwater.

Key to the species:

1. Two sharp epigastric ridges ("lobes protogastriques" A. MILNE-EDWARDS) 2
- No epigastric ridges present 3
2. Antero-lateral teeth of carapace acute; external orbital angle as long as following tooth *U. barbimana* A. Milne-Edw. ²⁾
- Antero-lateral teeth of carapace rectangular; external orbital angle somewhat longer than following tooth and directed somewhat inward *U. borneensis* de Man ³⁾

1) Measured under microscope.

2) Nouv. Arch. Mus. Paris, t. 9, 1873, p. 297, pl. 14, f. 4. Hab. New Caledonia.

3) Zool. Jahrb., Syst., Bd 9, 1895, p. 118, Bd 10, 1898, pl. 28, f. 25. Hab. Pontianak (Borneo). DE MAN himself admitted

3. Protogastric and mesogastric region inflated, with a large, cup-shaped ridge (the ridge being broad and longitudinal on the mesogastric region and anteriorly bifurcating into two narrower, somewhat wavy ridges, directed towards the orbits); across the cardiac and the branchial regions there runs a thick, prominent, transverse ridge. Chelipeds (of ♂) much hairy; outer surface of palm with a thick tuft of hairs, and without a longitudinal ridge near under border of palm *U. nausithoe* de Man
- Carapace without prominent ridges. Cheliped of ♂ with a longitudinal ridge near under border of palm 4
4. Angles of front rounded. Meropodites of walking legs (2^d and 3^d pair) about 3 times as long as broad *U. glabra* A. Milne-Edwards¹⁾
- Angles of front acute. Meropodites of walking legs (2^d and 3^d pair) about 5 times as long as broad *U. gracilipes* White²⁾.

1. *Utica nausithoe* de Man.

1895. *Utica nausithoe* de Man. Zool. Jahrb., Syst., Bd 9, p. 113, Bd 10, 1898, pl. 28, f. 24.

Stat. 131. Karakelang, Talaut Islands. 1 ♂, 1 ♀.

The ♂ is quite perfect and entirely agrees with DE MAN'S diagnosis; the ♀ is unfortunately much damaged, like DE MAN'S, as nearly all the limbs are wanting. There remains only the left cheliped, which is very small and weak, without a longitudinal ridge on the palm; and entirely covered by a short pubescence; the fingers are as long as the upper border of the palm and finely toothed at the cutting margins. The velvety pubescence on the prominent ridges of the carapace, which renders them so conspicuous in the case of the ♂, is entirely wanting in the ♀, though here the ridges themselves are quite as strongly developed.

Both specimens attain about the size of the ♂ measured by DE MAN. The original specimens came from Atjeh. Most likely the species is fluviatile, like the majority of its congeners.

that his species might be identical with *U. barbimana* or *U. setosipes* Haswell, but the descriptions of both A. MILNE-EDWARDS and HASWELL (Cat. Austral. Crust., 1882, p. 101, pl. 2, f. 2) are too fragmentary and insufficient. In comparing the figures of HASWELL and of DE MAN it may be observed that the dactyli in the last pair of legs are as long as the propodites in the case of *U. setosipes*, but very much shorter in *U. borneensis*. Besides, *U. setosipes* is a marine species, found at the sea-shore of Port Denison (Queensland); *U. borneensis* most likely lives in freshwater. Of *U. barbimana* only the ♂, of both other species here named only the ♀ is known, so that the chelipeds, that are widely different in the two sexes, do not offer us distinctive characters.

1) Nouv. Arch. Mus. Paris, t. 9, 1873, p. 296, pl. 14, f. 3. Hab. New Caledonia.

2) Proc. Zool. Soc. London, 1847, p. 86; ADAMS and WHITE, Voy. "Samarang", Crust., 1850, p. 53, pl. 13, f. 6; H. MILNE-EDWARDS, Ann. Sc. Nat. (3) t. 20, 1853, p. 177, pl. 7, f. 4—4a. Hab. Philippines.

There remains one species, *U. crassimana* Haswell (Cat. Austral. Crust., 1882, p. 102, pl. 2, f. 3) which I am unable of including in this key. Epigastric ridges are not mentioned, and carapace and chelipeds are smooth, but there is a tuft of hair filling up the gap of the fingers and a longitudinal ridge on the fixed finger, not continued on the palm. The hairiness of the palm excludes the identity of this species with *U. glabra* (of both species ♂ are known); besides, *U. crassimana* is a marine species, like *U. setosipes*, and found at the same locality in Queensland; neither is HASWELL'S species identical with *U. gracilipes*, on account of the much shorter legs. HASWELL himself compares his species with *U. barbimana*, but the carapace of the Australian species is much broader (the width distinctly exceeding the length), the chelae are larger and the fingers more curved than in *U. barbimana*.

Pseudograpsus H. Milne-Edwards.

1837. *Pseudograpsus* (part.) H. Milne-Edwards. Hist. Nat. Crust., t. 2, p. 81.
nec *Pseudograpsus* Dana. Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 248 (= *Brachynotus*).

Pseudograpsus is nearly related to *Ptychognathus* and to *Brachynotus* (= *Heterograpsus*). From the former genus it is distinguished by the exognath of the external maxillipeds being, even in the ♂, much narrower than the ischium; from *Brachynotus* by the merus of these maxillipeds being slightly auricular, not subquadrate. Besides, the antero-lateral teeth of the carapace are separated by partly closed fissures, not open sinuses, in *Pseudograpsus*, but nearly always defined by triangular, sometimes even very deep, incisions in the two other genera.

Notwithstanding the said difference between the meri of the external maxillipeds of *Pseudograpsus* and *Brachynotus*, it remains a matter of difficulty to separate the genera. Comparing f. i. the external maxilliped of *Ps. erythraeus* Kossmann¹⁾, which has been referred by the author himself and by NOBILI²⁾ to *Pseudograpsus*, but by KINGSLEY³⁾ to *Heterograpsus* (= *Brachynotus*) we may observe, that in this species the merus is even less auriculate than in the case of *Brach. elongatus* A. Milne-Edwards as depicted by Miss RATHBUN⁴⁾, whereas we should expect the reverse to be the case. For the rest it is not unlikely, that, notwithstanding the localities are widely distant from each other (Red Sea and Pacific Islands) the two species are identical, as they agree in all important particulars; in MILNE-EDWARDS' species only the carapace is more narrowed posteriorly.

The "Siboga" collected a small species of *Pseudograpsus*, that I am not able to refer to any of the known species, besides two already known ones of the genus.

Key to the species:

1. Large species (carapace attaining a breadth of 40 mm. and even more) of a chestnut colour. Cervical groove very deep, semi-circular. Three last joints of walking legs thickly clothed with a short, velvety fur of black hairs 2
- Small species (carapace attaining a breadth of about 15 mm.) of a white colour. Cervical groove indistinct, nearly straight. Three last joints of walking legs naked. 3
2. Postero-lateral margins of carapace not sharp, disappearing backward. Outer surface of chela (of ♂) near base of fingers with a tuft of very long, black hairs. Anterior margins of walking legs heavily fringed. *Ps. setosus* (Fabricius)⁵⁾

1) Zool. Erg. Reise Küstengeb. d. Roten Meeres, Bd 1, 1877, pl. 3, f. 15.

2) Ann. Sc. Nat. (9) t. 4, 1906, p. 321.

3) Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 209.

4) *Hemigrapsus elongatus*, Mem. Mus. comp. Zool. Harvard Coll., v. 35, n^o 2, 1907, pl. 7, f. 2.

5) Literature: KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 205. RUMPHIUS already knew this species, designating it as "*Cancer barbatus*" (Amboinsche Rariteitkamer, 1705, p. 26, pl. 10, n^o 2) and it has been generally referred to under the latter name, but this name is inadmissible, being pre-Linnean. Distinct localities of this apparently fluviatile species are given by HELLER (Reise "Novara", Crust., 1865, p. 52, Nicobars) and DE MAN (Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, 1892, p. 317, Flores, and Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 506, Ternate). The Leiden Museum possesses a fine ♂ collected at Amboyna by LUDEKING (1864).

- Postero-lateral margins of carapace keeled and granulate, continued till bases of penultimate pair of legs. Chela (of ♂) smooth and naked, movable finger compressed. Meropodites of walking legs not at all or slightly fringed *Ps. crassus* A. Milne-Edwards
- Lateral margins of carapace subparallel in their posterior half. Two distinct epigastric lobes behind the front. Chela (of ♂) with a small tuft of hairs filling the gap between the fingers, inner surface naked *Ps. albus* Stimpson
- Lateral margins of carapace distinctly converging backward in their posterior half. No epigastric lobes. Chela (of ♂) with a tuft of hairs at inner surface. 4
4. Antero-lateral teeth of carapace rather distinct, flattened. Front not prominent *Ps. erythraeus* Kossmann¹⁾
- Antero-lateral teeth of carapace scarcely indicated. Front laminar, prominent *Ps. laniger* n. sp.

1. *Pseudograpsus crassus* A Milne-Edwards.

1868. *Pseudograpsus crassus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 4, p. 176, pl. 26, f. 6—10.

1892. *Pseudograpsus crassus* de Man. Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, p. 317.

1902. *Pseudograpsus crassus* de Man. Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, p. 506.

Stat. 131. Karakelang, Talaut Islands. 5 ♂, 3 ♀.

Of this species a sufficient description is given by MILNE-EDWARDS, but a few additional remarks may not be superfluous. The carapace is punctate, but the lateral and anterior margins are granulate; these granules are large and disposed in a single row along the sharply-keeled lateral margins, behind the epibranchial teeth, but for the rest they form a narrow stripe of irregularly-arranged and smaller granules; the anterior border of the front and the supra-orbital borders are much thickened. Infra-orbital border deeply fissured, but the orbit is closed beneath by a long crenulate crest, parting inwardly from the epistome, as in *Ps. setosus*. The auricle at the external angle of the merus of the external maxillipeds is distinctly present, but does not extend much sideways, the anterior margin has a deep notch in the middle, at the outer part of which the carpus is inserted; the exognath is somewhat narrower than half the width of the ischium.

The meropodites of the chelipeds, that are very stout and subequal in the ♂, are entirely unarmed, somewhat granulate at the inner margin, near which a deep fissure runs alongside in which long hairs are implanted; the wrist is broader than long in dorsal view, with the inner angle subrectangular and slightly depressed; the palm is very high, longer than

¹⁾ L. c. p. 61, pl. 1, f. 5, pl. 3, f. 14—15; *Heterograpsus erythraeus* Ortmann, Denkschr. med.-naturw. Gesellsch. Jena, Bd 8, 1894, p. 55.

the fingers; the latter are compressed, especially in the ♂, somewhat spooned at the tip, and armed with obtuse, conical teeth at the inner margins, these teeth being equal at the movable finger, but very unequal in size at the opposite side. As is usual in the genus, the young ♂ and the ♀ present a longitudinal ridge on the outer surface of the chela, running from the carpal joint to the tip of the fixed finger, but this ridge nearly entirely disappears in the adult ♂.

The species has been first collected in Celebes and afterwards at Flores and Halmaheira, but, as far as could be made out, only in freshwater; at Halmaheira it was met with even at a height of 2500 feet. The specimens of the "Siboga" apparently lived on the reef and are consequently marine.

Among the dried Crustacea of the Leiden Museum I found 5 adult ♀ of this species, collected by v. SIEBOLD in Japan, but not mentioned by DE HAAN in his Fauna Japonica; they were labelled *Heterograpsus* sp. I am not aware, that this species has ever been recorded from this locality so distant from the Moluccas.

2. *Pseudograpsus albus* Stimpson.

1858. *Pseudograpsus albus* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 104.
 1873. *Pseudograpsus albus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 314, pl. 18, f. 2.
 1880. *Pachystomum philippinense* Nauck. Zeitschr. wiss. Zool., Bd 34, p. 67 (f. DE MAN, Zool. Jahrb. Syst., Bd 2, 1887, p. 719).
 1886. *Pseudograpsus albus* Miers. Rep. "Challenger", Brachyura, p. 262.
 1888. *Pseudograpsus albus* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 382.
 1889. *Pseudograpsus albus* de Man. Zool. Jahrb., Syst., Bd 4, p. 440.
 1895. *Pseudograpsus albus* de Man. Zool. Jahrb., Syst., Bd 9, p. 111.
 1907. *Pseudograpsus albus* Stimpson. Smithson. Inst., Miscell. Coll., v. 49, p. 127.
 1907. *Pseudograpsus albus* Rathbun. Mem. Mus. comp. Zool. Harvard Coll., v. 35, n^o 2, p. 32.

Stat. 64. Tanah Djampeah, Flores Sea. 1 ♀.

Stat. 172. Gisser Island, south-east of Ceram. 1 ♂.

As DE MAN observed (1889, under the head of *Ptychognathus pusillus*) the ♀ of this species may be easily confused with the same sex of HELLER's species, but the carapace is proportionally broader, the antero-lateral teeth are more pronounced and the maxillipeds are rather widely different in *Ptychognathus pusillus*.

Pseudograpsus albus ranges from Japan through the East-Indian Archipelago to New Caledonia and Fiji. It seems to be entirely a marine species.

3. *Pseudograpsus laniger* n. sp. Pl. 5, Fig. 1.

Stat. 64. Tanah Djampeah, Flores Sea. 1 ♂.

Stat. 127. Taruna Bay, Great Sangir Island. 1 ♀.

This new species much resembles *Ps. erythraeus* Kossmann, but the antero-lateral teeth of the carapace are scarcely indicated and the front is laminar, prominent.

The length of the carapace is about exactly equal to the width between the anterior epibranchial teeth. The surface is evenly and regularly vaulted in both directions, but the postero-lateral regions of the carapace are somewhat more sloping near the margin. The

cervical groove is nearly straight, and from either end parts a very short branchio-cardiac furrow; these are the only sulci of the carapace, which is everywhere finely punctate and does not show distinct regions; at the level of the branchio-hepatic grooves we may observe a very slightly inflated portion of an oval shape. Epigastric lobes, so easily to be detected in the large species and also in the small *Ps. albus*, are wholly absent, and the front, that is exactly half as wide at the anterior margin as the maximum breadth of the carapace, passes without any demarcation into the epigastric region; it is laminar and prominent, projecting some way beyond the bases of the antennulae (fig. 1a), slightly sinuous in the middle of the fore margin and with rounded lateral angles; the side margins are concave, and the transition between them and the supra-orbital margin, which latter is directed straightly outward but somewhat sinuous, is marked by a very shallow and inconspicuous notch. External orbital angle very slightly projecting, directed inward, with the lateral margin straight, and about $1\frac{1}{2}$ times as long as that of the following tooth; anterior epibranchial tooth very little prominent, only marked by a sudden alteration of the direction of the lateral margins of the carapace, as these are diverging backward anteriorly, but behind the anterior epibranchial teeth the margins are converging backward, so that at the level of these teeth the carapace attains its maximum breadth; a second epibranchial tooth is most inconspicuous, and behind it the margins are even somewhat concave, the posterior margin of the carapace is shorter than the width of the anterior margin of the front. Antennules and antennae do not present anything remarkable; the infra-orbital margin is deeply fissured and beneath it a suborbital crest runs obliquely backward, this crest proves to be microscopically striated at strong magnification. Pterygostomial regions with an oblique ridge on either side; the dorsal part of the region finely reticulate. Nasal plate triangular; epistome distinct, but very short. External maxillipeds essentially resembling those of *Ps. albus*: merus with a large and distinct auricle at the outer margin and a deep notch at the anterior border, exognath two-thirds of the width of the ischium (fig. 1a).

The abdomen of the σ is somewhat narrower than that of the other species: whereas in *Ps. setosus*, *crassus* and *albus* the lateral margins only slightly converge towards the terminal segment and the penultimate segment is abruptly narrowed anteriorly, the abdomen of *Ps. laniger* presents more distinctly converging, even somewhat concave, side margins, that are not convex at the anterior part of the penultimate segment. The terminal joint is oblong, with the tip much rounded, longer than broad at the base and longer than the penultimate segment, which itself is again longer than the antepenultimate one (fig. 1d).

The chelipeds are unequal, the left being slightly the larger. Meropodite short and thick, scarcely projecting beyond the carapace, unarmed, with rounded margins, but the inner margin fringed with a row of woolly hairs, increasing in length distally. Wrist globular at upper surface, with inner angle subrectangular; immediately beneath inner margin, especially anteriorly, a tuft of similar woolly hairs is found, and, if the cheliped be folded, these hairs cover the proximal naked portion of the inner surface of the palm. Chela bulky, palm longer than fingers and rather high; upper border rounded; a large tuft of woolly hairs covers the distal portion of the inner surface

of the palm, but is scarcely visible in the gap between the fingers; at the outer surface of the chela a white line, no ridge, runs along from the carpal joint to the tip of the fixed finger; fingers conical, not compressed, somewhat gaping at the base, tips slightly spooned, cutting margins finely and irregularly toothed; movable finger much curved, fixed finger straight. The outer surface of the arm, the upper side of the wrist and the whole chela are covered with a fine reticulated sculpture, resembling a multitude of minute scales (fig. 1*b* and *c*).

The walking legs much resemble those of *Pseudograpsus albus*: the meropodites are likewise slender, cylindrical, unarmed at the anterior margin, but provided with a few hairs at the base; for the rest the legs are completely hairless, even at the propodites and the dactyli; the latter are falciform, longitudinally grooved and with horny tips, they are as long as the preceding propodites, even in the case of the posterior legs, whereas they are considerably shorter in *Ps. albus*.

This species is certainly nearest to *Ps. erythraeus*, which also presents a woolly fur at the inner surface of the chela, but the lateral teeth of the carapace are distinctly separated by fissures, which are entirely absent in *Ps. laniger*; the front of KOSSMANN's species is deflexed, and the anterior margin does not project; of the external maxillipeds the merus is less distinctly auriculate, the ischium more rapidly narrows towards the base and is proportionally broader than the narrow exognath.

Heterograpsus elongatus A Milne-Edwards¹⁾, a cotype of which, received from the author himself in 1878, is in the Leiden Museum, at once reveals the very great resemblance between this and the present species. The general shape of the carapace, the antero-lateral teeth and the prominent front are entirely the same; besides, the dimensions of the carapace of *Pseudograpsus laniger* completely correspond with those of *Hemigrapsus elongatus* measured by Miss RATHBUN²⁾. Unfortunately the New-Caledonian specimen of MILNE-EDWARDS is very much damaged, none of the legs being entire, nearly all of them detached, and the chelae completely wanting. Nevertheless, what is left of the right cheliped presents the same squamiform, meandrian sculpture as in the new species; the inner and upper border of the meropodite is likewise fringed with long hairs, and even the tuft of hairs at the inner angle of the carpopodite is present in the same way. The maxillipeds again are exactly alike, and I should not hesitate to declare the two specimens absolutely identical, were it not for some slight differences: 1^o the general colour of *Heterograpsus elongatus* is a chestnut-brown, with numerous rounded patches of a somewhat lighter colour on the carapace; that of *Pseudograpsus laniger* is entirely ivory-white; 2^o the suborbital ridge is distinctly and roughly granular in the former, but only microscopically striate in the latter species; and 3^o the walking legs are fringed with rather long hairs along the margins in the species of MILNE-EDWARDS, but entirely hairless in the new species (save for some few bearded hairs quite near the base, and along the proximal part of the anterior border, of the meropodite).

In concluding I am disposed to consider *Heterograpsus elongatus* and *Pseudo-*

1) Nouv. Arch. Mus. Paris, t. 9, 1873, p. 317, pl. 17, f. 5.

2) See note 4 p. 97.

grapsus laniger very nearly related, but not identical species. As to the former species, the auriculate shape of the merus of the external maxillipeds, which peculiar shape is even more strongly pronounced than in *Pseudograpsus erythraeus*, forbids in my opinion its being included in *Heterograpsus* and points on the contrary to *Pseudograpsus*. In genuine *Heterograpsus* (or better *Brachynotus*) the external margin of this merus is regularly convex.

Dimensions ¹⁾ in mm. of *Pseudograpsus laniger*:

Distance between external orbital angles		♂
Distance between tips of anterior epibranchial teeth		7.6
Width of front at anterior margin		8.9
Length of carapace		4.4
Posterior margin of carapace		8.3
Length of terminal segment	} of abdomen of ♂	3.75
Width at base of terminal segment		1.2
Length of penultimate segment		1.—
Width at base of penultimate segment		1.—
Length of antepenultimate segment		1.4
		0.8

Brachynotus de Haan.

1835. *Brachynotus* de Haan. Fauna Japon., Crust., p. 34.
 1837. *Cyclograpsus* (part.) H. Milne-Edwards. Hist. nat. Crust., t. 2, p. 79.
 1849. *Heterograpsus* Lucas. An. art. de l'Algérie, t. 1, p. 18.
 1851. *Hemigrapsus* Dana. Amer. Journ. Sc. (2) v. 12, p. 288.
 1851. *Pseudograpsus* (part.). Dana. Proc. Ac. Nat. Sc. Philadelphia, p. 248.

DE HAAN founded *Brachynotus* (subgenus of *Grapsus*) on "*Gonoplax*" *sexdentatus*, described in the beginning of the nineteenth century by RISSO ²⁾. This *Brachynotus* was described afterwards by H. MILNE-EDWARDS ³⁾ and by HELLER ⁴⁾ under the same name, but HILGENDORF ⁵⁾ in 1882 tried to prove, that the type of the genus *Brachynotus* was identical with that of *Heterograpsus*, which was described by LUCAS in 1849 under the same specific name, and DE MAN ⁶⁾ afterwards, by examining the typical specimens of DE HAAN from the Mediterranean, could confirm this hypothesis. So both generic names being founded on the same species should be considered synonyms.

The confusion is considerably increased by the fact, that H. MILNE-EDWARDS in 1853 added ⁷⁾ a species, "*Heterograpsus sexdentatus*", from New Zealand to the genus, and accordingly changed the name of LUCAS' species into *H. lucasi*, under which latter designation the Mediterranean species has been described by HELLER ⁸⁾ in 1863. But HILGENDORF ⁹⁾ is undoubtedly

1) Measured under the microscope.

2) Hist. nat. de l'Eur. mér., t. 5, 1826, p. 13.

3) Ann. Sc. Nat. (3) t. 18, 1852, p. 161, pl. 4, f. 26.

4) Crust. d. südl. Eur., 1863, p. 101—102.

5) Sitzungsber. Gesellsch. naturforsch. Freunde Berlin, 1882, p. 68.

6) Zool. Jahrb., Syst., Bd 9, 1895, p. 121.

7) Ann. Sc. Nat. (3) t. 20, 1853, p. 192, pl. 7, f. 7. This is the species, formerly (1837) referred by the author to *Cyclograpsus*.

8) Crust. d. südl. Eur., 1863, p. 105, pl. 3, f. 5—6.

9) Sitzungsber. Gesellsch. naturforsch. Freunde Berlin, 1882, p. 70.

right in retaining the name *Brachynotus sexdentatus* for the Mediterranean species and in altering consequently "*Heterograpsus sexdentatus*" of H. MILNE-EDWARDS from New Zealand into *Brachynotus edwardsii*.

MIERS¹⁾ in 1886 proposes to retain a subgenus *Heterograpsus* for the Indo-Pacific species, on account of the H-shaped cervical groove distinguishing these species as a whole from the single Mediterranean species; DE MAN²⁾, however, proves this difference to be unstable and is disposed rather to take the shape of the front (quadrilobate in the Mediterranean, simple in the Indo-Pacific species) as the base of distinction between *Brachynotus* and *Heterograpsus*. But this latter criterium again turns out to be unreliable, for in the Japanese *B. sanguineus* DE HAAN the front is strongly quadrilobate, at least in adult specimens.

As to *Hemigrapsus*, the only difference pointed out by DANA is the more or less distinct notching of the inner margin of the external maxillipeds, and this indeed seems to be of doubtful value. STIMPSON³⁾ referred DANA's two new species of *Hemigrapsus* to the genus *Cyrtograpsus* Dana, but A. MILNE-EDWARDS⁴⁾, KINGSLEY⁵⁾ and HASWELL⁶⁾ all agree in declaring *Hemigrapsus* absolutely identical with *Heterograpsus*. For some unknown reason Miss RATHBUN in several publications persists in using DANA's name *Hemigrapsus*.

The sharply-defined and pointed antero-lateral teeth of the carapace and the non-auriculate shape of the merus of the external maxillipeds distinguish this genus from *Pseudograpsus*.

It is remarkable, that this Pacific genus has one solitary species in the Mediterranean, whereas it is wholly absent in the Atlantic. It is represented at the coasts of Japan and China, of California and Chile, in Indonesia, but chiefly in Australian and New Zealandian waters. The Malay Archipelago affords only one single species (*B. harpax* Hilgendorf), for another species, as has been remarked a few pages before (under the head of *Pseudograpsus laniger*), viz. *Heterograpsus elongatus* H. Milne-Edwards, recorded by NOBILI⁷⁾ from Borneo, should in my opinion be included in *Pseudograpsus* (see p. 101—102). Not a single species, as far as I know, has been found in the Indian Ocean, but *B. harpax* is again found in the Red Sea.

The rather numerous species of *Brachynotus* may be divided into two distinct groups: one, very small, in which three minute teeth, behind the external orbital angle, are observed and another, much larger, with only two very large and usually depressed teeth behind this angle. H. MILNE-EDWARDS' attempts to subdivide the species of the latter group on account of the presence or absence of longitudinal crests on the palm of the chela have remained unsuccessful.

Though no species of this genus were collected by the "Siboga", I have taken this occasion to review shortly the various species, for the collection of the Leiden Museum is rather rich in this regard. I believe the best discrimination of the species is to be found in the

- 1) Rep. "Challenger", Brachyura, 1886, p. 264.
- 2) Zool. Jahrb., Syst., Bd 9, 1895, p. 123.
- 3) Smithsonian. Inst., Miscell. Coll., v. 49, 1907, p. 125.
- 4) Nouv. Arch. Mus. Paris, t. 4, 1868, p. 177.
- 5) Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 207—209.
- 6) Cat. Austral. Crust., 1882, p. 100—101.
- 7) Boll. Mus. Torino, t. 18, n^o 447, 1903, p. 25.

shape of the suborbital ridge, characters of the chelae being largely dependent on sexual differences, and consequently only of secondary importance.

Key to the Indo-Pacific species¹⁾:

1. Two teeth behind external orbital angle, large, generally depressed and acute. 2
 - Three teeth behind external orbital angle, small, conical 9
2. Outer surface of palm with four prominent longitudinal crests. *B. pallipes* (H. Milne-Edwards)²⁾
 - Outer surface of palm with a single crest or smooth 3
3. Suborbital ridge³⁾ with a few (2—6) tubercles, at least in ♂ 4
 - Suborbital ridge finely or coarsely serrulate or striate 6
4. Outer margins of ext. orbital angles diverging backward 5
 - Outer margins of ext. orbital angles converging backward; epigastric ridges sharp; ant. margin of front notched in the middle; epibranchial teeth very acute, narrow, not flattened; suborbital ridge four-lobed in ♂, regularly granular in ♀. Ischium of ext. maxilliped with a fine longitudinal sulcus immediately near inner margin; merus nearly quadrate, with outer margin straight. *B. harpax* Hilgendorf⁴⁾
5. Suborbital ridge notched beneath cornea of the eye, and thickened at either end of this notch; a third tubercle placed farther back. Palm of cheliped in ♂ thickly clothed with hairs at inner surface and between bases of fingers *B. penicillatus* (de Haan)⁵⁾
 - Suborbital ridge with 4 low tubercles, directed forward. Palm of cheliped of ♂ with a sharply circumscribed patch of hairs at inner surface, no hairs between bases of fingers *B. oregonensis* (Dana)⁶⁾

1) I am unable to include *B. longitarsis* (*Heterograpsus l.* Miers, Proc. Zool. Soc. London, 1879, p. 37, pl. 2, f. 3; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 715) here, as the infra-orbital ridge is not described. The species is recorded from Japanese and Korean waters.

2) *Pseudograpsus pallipes* H. Milne-Edwards, Hist. nat. Crust., t. 2, 1837, p. 82; *Heterograpsus pallipes* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 194; HASWELL, Cat. Austral. Crust., 1882, p. 100. Hab. Australia. The character of the chela here noted is also observed in the ♀ of *B. sexdentatus* from the Mediterranean.

3) This ridge is apparently used in the same way as in *Macrophthalmus* and *Metaplex*; according to KOELBEL (Wiss. Erg. Reise Széchenyi in Ost-Asien 1877—1880, Bd 2, 1898, p. 571), the ridge produces a stridulating sound when being rubbed against a horny crest on the inner surface of the arm of the cheliped.

4) Sitzungsber. Gesellsch. naturforsch. Freunde Berlin, 1892, n^o 4, p. 38; DE MAN, Zool. Jahrb., Syst., Bd 9, 1895, p. 124, Bd 10, 1898, pl. 29, f. 26; NOBILI, Ann. Sc. Nat. (9) t. 4, 1906, p. 320; PESTA, Denkschr. Ak. Wiss. Wien, Bd 88, 1912, p. 62, textfig. 5. Hab. Red Sea, Atjeh and Upolu (Sāmoah).

5) *Grapsus* (*Eriochelir*) *penicillatus* de Haan, Faun. Japon., 1835, p. 60, pl. 11, f. 6; *Heterograpsus p.* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 104; DE MAN, Notes Leiden Mus., v. 1, 1879, p. 71; KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 209; *Brachynotus* (*Heterograpsus*) *p.* Miers, Rep. "Challenger", Brachyura, 1886, p. 264; *Heterograpsus p.* Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 714; *Brachynotus p.* Koelbel, Wiss. Erg. Reise Széchenyi 1877—1880, Bd. 2, 1898, p. 570, pl. 1, f. 5—6; STIMPSON, Smithsonian. Inst., Miscell. Coll., v. 49, 1907, p. 126. Hab. Japan and Hongkong.

6) *Pseudograpsus oregonensis* Dana, Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 248; DANA, U. S. Expl. Exp., Crust., 1852, p. 334, pl. 20, f. 6; *Heterograpsus o.* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 104; KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 209; STIMPSON, Smithsonian. Inst., Miscell. Coll., v. 49, 1907, p. 126. Hab. west coast of North America.

6. Suborbital ridge very minutely transversely striate, to the naked eye apparently quite smooth; anterior margin of front sinuous. Carapace and legs covered with minute red spots. Chelipeds of ♂ quite naked *B. sanguineus* (de Haan) ¹⁾
 Suborbital ridge granulate or finely serrate 7
7. Suborbital ridge entirely serrate, the serrations being directed forward; anterior parts of carapace covered with small and numerous tubercles. Whole animal covered with minute red spots. Upper margins of meropodites of walking legs thickly fringed with long hairs *B. crenulatus* (H. Milne-Edwards) ²⁾
 Suborbital ridge with obtuse granules. Carapace with the regions indistinct, smooth and glabrous. Walking legs entirely naked or with widely separated hairs . . . 8
8. Chela of ♂ naked at inner surface. Meropodites of ambulatory legs with a rectangular prominence near distal end of anterior margins; dactyli conical, not depressed *B. edwardsii* Hilgendorf ³⁾
 Chela of ♂ with a patch of hairs at inner surface of fixed finger. Meropodites of ambulatory legs unarmed at anterior margins; dactyli much flattened *B. nudus* (Dana) ⁴⁾
9. Ambulatory legs almost hairless, at least the meropodites 10
 Ambulatory legs fringed with hairs, especially last pair . *B. affinis* (Dana) ⁵⁾

1) *Grapsus* (*Grapsus*) *sanguineus* de Haan, Faun. Japon., 1835, p. 58, pl. 16, f. 3; *Heterograpsus* s. H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 193; *Heterograpsus maculatus* H. Milne-Edwards, ibid., p. 193; *Hemigrapsus crassimanus* Dana, Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 250; DANA, U. S. Expl. Exp., Crust., 1852, p. 349, pl. 22, f. 4; *Heterograpsus sanguineus* de Man, Notes Leiden Mus., v. 1, 1879, p. 70; KINGSLEY (part.), Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 208; THALLWITZ, Abhandl. Mus. Dresden, Bd 3, n° 3, 1891, p. 41; *Brachynotus* s. Koelbel, Wiss. Erg. Reise Széchenyi 1877—1880, Bd. 2, 1898, p. 571, pl. 1, f. 7; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 714; *Hemigrapsus* s. Rathbun, Proc. U. S. Nat. Mus., v. 26, 1903, p. 24; *Hemigrapsus crassimanus* Rathbun, Bull. U. S. Fish Comm. for 1903, v. 23, 1906, p. 839; *Heterograpsus sanguineus* Stimpson, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 126. Hab. Japan and Hawaii.

2) *Cyclograpsus crenulatus* H. Milne-Edwards, Hist. nat. Crust., t. 2, 1837, p. 80; *Grapsus* c. Guérin, Voy. "Coquille", Crust., t. 2, 1838, p. 15; *Hemigrapsus* c. Dana, U. S. Expl. Exp., Crust., 1852, p. 349, pl. 22, f. 3; *Heterograpsus* c. H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 193; *Heterograpsus barbigerus* Heller, Verhandl. zool.-bot. Gesellsch. Wien, 1862, p. 522; *Heterograpsus barbimanus* Heller, Reise "Novara", Crust., 1865, p. 53, pl. 4, f. 5; *Heterograpsus crenulatus* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 208; FILHOL, Miss. ile Campbell, t. 3, 1885, p. 389; DE MAN, Notes Leiden Mus., v. 13, p. 53; *Hemigrapsus* c. Rathbun, Proc. U. S. Nat. Mus., v. 38, 1910, p. 589. Hab. Australia, New Zealand and Chile.

3) *Cyclograpsus sexdentatus* H. Milne-Edwards, Hist. nat. Crust., t. 2, 1837, p. 79; *Heterograpsus sexdentatus* H. Milne-Edwards (nec LUCAS, 1849 = *Gonoplax sexdentatus* Risso 1826), Ann. Sc. Nat. (3) t. 20, 1853, p. 192, pl. 7, f. 7; *Hemigrapsus* s. Dana, U. S. Expl. Exp., Crust., 1852, p. 348, pl. 22, f. 2; *Heterograpsus sanguineus* Heller (nec *Grapsus sanguineus* de Haan), Reise "Novara", Crust., 1865, p. 52; *Heterograpsus sexdentatus* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 207; *Brachynotus Edwardsii* Hilgendorf, Sitzungsber. Gesellsch. naturforsch. Freunde Berlin, 1882, p. 70; *Heterograpsus sexdentatus* Haswell, Cat. Austral. Crust., 1882, p. 100. Hab. Australia and New Zealand.

4) *Pseudograpsus nudus* Dana, Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 249; Dana, U. S. Expl. Exp., Crust., 1852, p. 335, pl. 20, f. 7; *Heterograpsus marmoratus* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 193; *Heterograpsus nudus* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 104; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 715. Hab. west coast of North America.

5) *Hemigrapsus affinis* Dana, Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 250; DANA, U. S. Expl. Exp., Crust., 1852, p. 350, pl. 22, f. 5; TARGIONI-TOZZETTI, Viaggio "Magenta", Crost., 1877, p. 117, pl. 7, f. 5; *Heterograpsus a.* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 209; *Hemigrapsus a.* Nobili, Boll. Mus. Torino, t. 16, n° 402, 1901, p. 12. Hab. Patagonia and Argentina.

10. Anterior part of carapace strongly granulate. front little deflexed, anterior margin straight; postfrontal lobes four. Meropodites of walking legs with subrectangular prominence near distal end of anterior margin; hind margin of propodites and dactyli subspinulose. . . . *B. octodentatus* (H. Milne-Edw.)¹⁾
- Anterior part of carapace finely granulate; front strongly deflexed, anterior margin nearly straight; postfrontal lobes two. Meropodites of walking legs with acute spine near distal end of anterior margin *B. spinosus* (H. Milne-Edwards)²⁾

Acmaeopleura Stimpson.

1858. *Acmaeopleura* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 105.

This genus is very little known; the carapace is subcircular, unarmed at the margins and resembling that of *Cyclograpsus*, but the external maxillipeds are widely different, merus and ischium being subequal in length, and broader than long. Two very minute species, the carapaces of which attain only a length of a few millimetres, belong to this genus.

Key to the species:

- Carapace widest near the antero-lateral angles; suborbital crest 3- or 4-lobed. Chelipeds smooth externally, hands with some strong granules at the inner surface, and the gap between the fingers filled with hairs externally. *A. parvula* Stimpson³⁾
- Carapace widest at the middle. Chelipeds granulate *A. rotunda* Rathbun⁴⁾

Eriocheir de Haan.

1835. *Eriocheir* (part.) de Haan. Faun. Japon., Crust., p. 32.

1853. *Eriocheirus* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 176.

This genus much resembles *Brachynotus*, but the breadth of the front is only one-third of the maximum width of the carapace, there are usually three teeth behind the external orbital angle, and the front is usually strongly 4-lobed. The genus only inhabits Japan and China.

Key to the species:

1. Anterior margin of front 4-lobed; surface of carapace uneven.
Chelae thickly clothed with hairs 2

1) *Cyclograpsus octodentatus* H. Milne-Edwards, Hist. nat. Crust., t. 2, 1837, p. 80; *Heterograpsus o.* H. Milne-Edwards, Ann. Sc. Nat., (3) t. 20, 1853, p. 194; *Grapsus inornatus* Hess, Arch. Naturgesch., Jahrg. 31, 1, p. 148, pl. 6, f. 11 (f. DE MAN, Zool. Jahrb., Syst., Bd 2, 1887, p. 699); *Heterograpsus o.* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 209; HASWELL, Cat. Austral. Crust., 1882, p. 101; *Grapsus inornatus* Haswell, Ibid., p. 98. Hab. Tasmania, King Island, Sydney.

2) *Heterograpsus spinosus* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 194; A. MILNE-EDWARDS, Journ. Mus. Godeffroy, t. 3, 1874, p. 82; KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 210; DE MAN, Notes Leiden Mus., v. 13, 1891, p. 56, pl. 4, f. 15; ORTMANN, Zool. Jahrb., Syst., Bd. 7, 1894, p. 715. Hab. Vanikoro Island, Upolu and East Australia.

3) Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 105; Smithsonian Inst., Miscell. Coll., v. 49, 1917, p. 130, pl. 11, f. 4. Hab. Ousima (Japan).

4) Proc. Biol. Soc. Washington, v. 22, 1909, p. 409; K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 327, textf. 10. Hab. Gulf of Siam.

- Front short, anterior margin with only two minute notches, near external angles, median lobe broad and straight; surface of carapace little uneven; a granulate ridge runs inward from the third lateral tooth; external maxillipeds strongly gaping, ischium and merus narrow and long, the latter auriculate *E. leptognathus* Rathbun ¹⁾
2. Lateral margins of carapace nearly straight; anterior margin of front indistinctly four-lobed, median sinus very shallow Antero-lateral margins of carapace diverging backward; anterior margin of front distinctly four-lobed 3 *E. rectus* Stimpson ²⁾
3. Carapace flattened; anterior margin of front divided into four lobules, the external ones of which are sharply angular; posterior (4th) antero-lateral tooth of carapace very minute. Chelae (of ♂) wrapped in a thick hairy muff *E. japonicus* de Haan ³⁾
- Carapace vaulted, with four sharply-edged epigastric lobes; anterior margin of front with four acute teeth; posterior (4th) antero-lateral tooth of carapace not much smaller than the preceding one. Chelae (of ♂) much less clothed with hairs *E. sinensis* H. Milne-Edwards ⁴⁾

Subfam. SESARMINAE.

This subfamily is characterized by the front being nearly always strongly deflexed, so that the postfrontal lobes are sharply-ridged anteriorly, and by the external maxillipeds being provided by an obliquely-longitudinal hairy ridge on the ischium and especially on the merus, which latter is generally not auriculate and mostly of an oval shape. In the typical representatives of this subfamily (*Sesarma*, *Metasesarma*, *Sarmatium*) the pterygostomial regions and side-walls of the carapace are covered with a fine reticulation of hairy lines and the terminal segment of the abdomen of the ♀ is strongly pushed into the preceding segment.

Key to the Indo-Pacific genera:

1. Pterygostomial regions and side walls of carapace covered with a fine reticulation of intercrossing hairy lines 2

1) Proc. U. S. Nat. Mus., v. 46, 1913, p. 353, pl. 33, f. 2—3. Hab. Shanghai.

2) *Eriochirus rectus* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 103; *Eriochair r.* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 210; *Eriochirus r.* Stimpson, Smithsonian Inst., Miscell. Coll., v. 49, 1907, p. 125. Hab. Macao (China).

3) Faun. Japon., Crust., 1835, p. 59, pl. 17; *Eriochirus j.* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 176; *Eriochair j.* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 210; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 716; *Eriochair j.* Rathbun, Proc. U. S. Nat. Mus., v. 26, 1903, p. 24; *Eriochirus j.* Stimpson, Smithsonian Inst., Miscell. Coll., v. 49, 1907, p. 124. Hab. Japan.

4) *Eriochirus sinensis* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 177; Arch. Mus. Paris, t. 7, 1853, p. 146, pl. 9, f. 1; HELLER, Reise "Novara", Crust., 1865, p. 52; *Eriochair s.* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 210; *Eriochirus s.* Koelbel, Wiss. Erg. Reise Széchenyi 1877—1880, Bd 2, 1898, p. 572. Hab. Shanghai.

- Pterygostomian regions and side of carapace not presenting reticulating lines 5
2. Antennae entering the orbits 3
 Antennae excluded from the orbit; if the inner suborbital lobe does not meet the front, the postfrontal lobes are scarcely separated one from another. 4
3. Front nearly always sharply deflexed; carapace flattened, often covered with numerous tufts of hairs *Sesarma* Say
 Front obliquely deflexed, postfrontal lobes rounded anteriorly; carapace vaulted, naked *Sarmatium* Dana
4. Carapace naked, with subregions scarcely indicated; antero-lateral margins not toothed. *Metascesarma* H. Milne-Edwards
 Carapace covered with a short fur; antero-lateral margins twice emarginated behind external orbital angle. *Clistocoeloma* A. Milne-Edwards
5. Distance between external orbital angles decidedly exceeding length of carapace; antero-lateral margins with two distinct teeth behind external orbital angle. Eye-stalks rather long, about as long as the width of the front, which latter rapidly narrows anteriorly. Suborbital crest in ♂ divided into obtuse lobules and extending far behind the orbit. Ambulatory legs long and slender *Metaplax* H. Milne-Edwards
 Distance between external orbital angles not much exceeding length of carapace; antero-lateral margins entire or toothed. Eye-stalks much shorter than the width of the front. Ambulatory legs not particularly slender. 6
6. Lateral margins of carapace arched, very feebly toothed or entire *Cyclograpsus* H. Milne-Edwards
 Lateral margins of carapace always distinctly toothed. 7
7. Width of fronth between eye-stalks much less than half the distance between external orbital angles, with the anterior margin passing imperceptibly into the much oblique inner margins of the orbits. Abdomen of ♂ broadest at 3^d segment 8
 Width of front half the distance between external orbital angles, with the lateral angles of the anterior margin distinct. Abdomen of ♂ regularly tapering from base to tip *Paragrapsus* H. Milne-Edwards
8. Lateral margins of carapace much convex in their entire course *Chasmagnathus* de Haan
 Lateral margins of carapace subparallel in posterior half *Helice* de Haan

Metasesarma H. Milne-Edwards.

1853. *Metasesarma* H. Milne-Edwards. Arch. Mus. Paris. t. 7, p. 158.

A detailed account of all the species of this genus and of *Sesarma*, *Sarmatium* and *Clistocoeloma* has been given by me in "Zool. Med. Mus. Leiden, v. 3, 1917, p. 127—260, so that a rapid glance over the species belonging to the said genera may be sufficient and no key is needed.

1. *Metasesarma rousseauxi* H. Milne-Edwards.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 212.

Stat. 19. Labuan Tring, west coast of Lombok. 1 ♀ with eggs and 3 very young ♂.

Stat. 61^a. Añonara Island, east of Flores. 1 ♀ with eggs and a ♂ juv.

The ♀ apparently attain maturity at very different age or they will pass through several breeding periods: the ♀ from Stat. 19 has a length of carapace of about 15 mm., that from Stat. 61^a is only 10 mm. long. The carapace is yellowish, with some scarlet-red markings and the front darkish-red; the chelae are whitish.

2. *Metasesarma aubryi* A. Milne-Edwards.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 211.

Stat. 133. Lirung, Talaut Islands. 2 ♂, 1 ♀ with eggs.

Stat. 180. Pulu Kelang, between Ceram and Buru, 1 ♀ not ad., in river.

The carapace of the adult ♂ is of a beautiful violet colour and the chelae are brightly red, with the fingers whitish.

Sesarma Say.

1817. *Sesarma* Say. Journ. Ac. Nat. Sc. Philadelphia, 1817, p. 442.

This genus is distributed through all tropical seas and contains more species than all the remaining genera of Grapsidae taken together. Four subgenera are accepted: *Holometopus* H. Milne-Edwards, *Sesarma* Say, *Parasesarma* de Man and *Chirromantes* Gistel (= *Perisesarma* de Man).

1. *Sesarma (Holometopus) elongata* A. Milne-Edwards. Pl. 5, Fig. 2.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917; p. 149.

Stat. 169. Atjatuning, west coast of New Guinea. 1 ♂ juv., on reef.

Stat. 174. Bay of Waru, north-east coast of Ceram. 1 ♀ ad., on reef.

The apparently very rare species is at once distinguished by the remarkably foliaceous meropodites of the walking legs, by the very short dactyli and by the row of transverse tubercles on the back of the movable finger of the chela. DE MAN¹⁾ has examined the original

1) Notes Leiden Mus., v. 14, 1892, p. 256.

specimen (σ) of the Paris Museum. It is a pity, that my only adult specimen is a ♀ , in which the specific characters, especially with regard to the chelipeds, are less distinct than in the σ .

The carapace is much flattened and the regions are tolerably distinct; the four postfrontal lobes are sharply defined, and the groove between the median lobes, that are $1\frac{1}{3}$ times as broad as the lateral ones, is very deep; there is an indistinct posterior lobe on each lateral postfrontal lobe, which latter is separated from the inner orbital border by a furrow; the mesogastric region is somewhat inflated, small and rounded posteriorly, anteriorly it extends with an elongated process into the groove between the median postfrontal lobes; the cardiac region is short, of the same breadth as the mesogastric area; the intestinal region rather indistinctly defined laterally by the branchio-intestinal furrows; the hepatic regions are flattened, somewhat roughened, the outer branchial areas provided with a few oblique lines, the largest of which is situated posteriorly and passes above the bases of the last walking legs. The whole carapace is punctate, and nearly all of the pits are beset with a small tuft of hairs; these tufts are largest on the anterior margin of the postfrontal lobes and on the protogastric region, very minute on the branchial regions, where they are arranged in oblique rows, following the usual branchial lines; on the intestinal area they are elongated-transverse.

The front is vertically deflexed and not visible from above; it is four times as high as broad, roughened by tubercles, of which a transverse row of 3—4 large ones is placed immediately beneath the median postfrontal lobes; the lateral margins are somewhat convergent anteriorly and the anterior margin presents a large, shallow sinus in the middle, somewhat less broad than the lateral lobes, that slope obliquely backward to the subrectangular lateral angles of the front. The front between the eye-stalks occupies nearly 60% of the distance between the external orbital angles, and the latter distance is slightly less than the length of the carapace in the median line¹⁾. The supra-orbital border is straight and oblique in its inner, concave in its outer part and the external orbital angle is acute, prominent, directed straight forward. The lateral margins of the carapace, that present two very indistinct thickenings or traces of epibranchial teeth behind the external orbital angle, are not exactly parallel, but very slightly concave in the middle of their course and diverging backward towards the bases of the second pair of walking legs, so that the greatest breadth of the carapace exceeds its length. The posterior margin is (in the ♀) distinctly less broad than the front.

The epistome is of the usual shape in *Sesarma*, but there is a quadrate depression in the middle of the surface and the posterior margin projects in the median line, where a ridge parts backward on the palate.

The abdomen of both sexes presents nothing remarkable.

The chelipeds are equal in size, both in the young σ and in the ♀ . In the latter sex they are short, equal in length to the greatest width of the carapace. Meropodite in ♀ short, margins sharp, upper border convex, with a small, subrectangular prominence near the distal end,

1) In the young σ , however, the reverse is the case.

outer surface with transverse rugosities, external margin crenulate, ending in a sharp tooth at the carpal articulation, under and inner surface smooth, but the latter with two longitudinal rows of hairs, inner margin concave in its greater part, but in the distal third armed with a triangular tooth, followed by two much smaller ones. Carpopodite roughened above, outer margin regularly arched, inner angle rectangular, not rounded, between this angle and the articulation with the palm the margin is crenulate. Chelae small, palm much shorter than the fingers and higher than long; outer surface covered with sharpened granules which at the proximal under part of the surface are obliquely-longitudinal; upper margin marked by a finely-striated line¹⁾; the proximal half of which is convex, the distal half straight and ending above the base of the movable finger into a sharp tooth, inner surface of palm with a few widely-scattered granules but dorsally there are two short and indistinct rows running parallel with the transversely-grooved line along the upper margin; fingers not flattened, longer than palm, not gaping, distinctly spooned at the tips, and nearly straight, with some conspicuous pits, in each of which a short hair is placed; back of movable finger with a longitudinal row of more than 30 transverse tubercles, the proximal 10—12 of which, however, present the shape of the usual sharp granules and gradually pass into short, transverse ridges, that run along nearly the whole length of the finger, but disappear on the distal third²⁾; cutting margin of this finger with four rather distant, large teeth and in the interspaces between the second and third and between the third and fourth 2—4 much smaller ones; on the opposite border there are proximally two or three rounded teeth, then follows a large subdivided tooth, that is again followed by two acute teeth alternating with two very minute ones.

The ambulatory legs are not particularly elongate, but remarkable by their very bulky and broadened meropodites. First and fourth pair of legs not much unequal in length, but much shorter than the median pairs. Meropodites somewhat less than twice as long as broad, with sharp and crenulate margins; greatest width found near the distal end, upper surface transversely rugose, anterior margin convex, ending in a sharp subdistal tooth, posterior margin perfectly straight. Carpo- and propodite together as long as the meropodite, flattened, somewhat roughened, but quite hairless, like the meropodite, except at the hind end of the propodite, where, especially in the case of the first pair of legs short hairs are found; propodite longer than the carpopodite; dactyli very short, about one-third of the length of the preceding segment, slightly curved, with six longitudinal rows of hairs.

The general colour of this species is a reddish-yellow; the legs of the young ♂ bear traces of darker cross-bands.

In my paper on *Sesarma* I have treated separately of *S. elongata* and *S. latifemur* Alcock, but I am almost convinced, that ALCOCK's species is not specifically distinct. In comparing the figure in the Ill. Zool. "Investigator"³⁾ with mine, there is such a complete agreement in

1) According to DE MAN there is a pectinated crest on the palm of the adult ♂.

2) It is of course to be expected, that this character of the chela is much more pronounced in the adult ♂; DE MAN mentions 40 of them in the type specimen but in the young ♂ at my disposal scarcely any trace of these tubercles is found.

3) Crust., prt 10, 1902, pl. 66, f. 2.

all the essential points, that scarcely any doubt about the identity of the two species is justified. ALCOCK in his description states, that his *S. latifemur* is "closely related" to *S. elongata*, but he gives no points of difference and compares his species only with *S. taeniolata* White. From his too short diagnosis we infer that the ♂ has a short transverse beaded crest on the inner surface of the palm, and that the back of the movable finger bears a "milled crest" consisting of about 40 transverse ridges; the finely-striated upper margin of the palm is not mentioned, but something like it is indicated in his figure.

This species has been first recorded by A. MILNE-EDWARDS from the west coast of Madagascar. ORTMANN afterwards collected it near Dar-es-Salaam and gave some specific characters. ALCOCK mentioned his *S. latifemur* from the Andamans. The discovery of this species by the "Siboga" on the coast of Ceram and of New Guinea considerably extends its known distribution. It seems to be entirely a marine species.

From the measurements taken by DE MAN, ORTMANN and ALCOCK it appears, that the ratio by which the length of the carapace surpasses the distance between the external orbital angles increases with advancing age, and this is corroborated by my material: in the very young ♂ the latter dimension even exceeds the former.

Dimensions in mm.:

	♂ ¹⁾	♀		
Distance between external orbital angles	9.7	26.5		
Maximum breadth of carapace	10.4	30.—		
Length of carapace in the median line	9.1	27.—		
Width of front between eye-stalks	5.3	15.25		
Posterior margin of carapace	4.6	12.—		
Length of cheliped.	—	31.—		
Length of penultimate pair of walking legs	—	55.—		
Length of meropodite	} of penultimate pair of legs	}		
Breadth of meropodite			8.8	22.—
Length of carpopodite in the median line			4.2	11.5
Length of propodite in the median line			—	11.—
Length of dactylus			—	16.5
	—	7.—		

2. *Sesarma (Holomctopus) villosa* A. Milne-Edwards.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 208, pl. 17, f. 2.

Stat. 64. Tanah Djampea, Flores Sea. 2 ♀ juv.

3. *Sesarma (Sesarma) amphinome* de Man.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 129.

Stat. 179. Bay of Kawa, west coast of Ceram. 1 ♂ juv. on shore.

4. *Sesarma (Sesarma) gracilipes* H. Milne-Edwards.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 154.

Stat. 180. Pulu Kelang, between Ceram and Buru. 1 ♂, in river.

1) Measured under the microscope.

5. *Sesarma (Sesarma) impressa* H. Milne-Edwards.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 158.

Stat. 53. Bay of Nangamessi, north coast of Sumba. 1 ♂ juv., in river.

Stat. 131. Karakelang, Talaut Islands. 1 ♀ with eggs.

6. *Sesarma (Sesarma) atrorubens* Hess.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 131.

Stat. 180. Pulu Kelang, between Ceram and Buru. 1 ♂ juv., in river.

7. *Sesarma (Sesarma) lafondi* Jacquinet et Lucas.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 164, pl. 15, f. 1.

Stat. 131. Karakelang, Talaut Islands. 1 ♀.

8. *Sesarma (Sesarma) modesta* de Man.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 175, pl. 16, f. 1.

Stat. 131. Karakelang, Talaut Islands. 1 ♀.

9. *Sesarma (Sesarma) palawanensis* Rathbun.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 183, pl. 16, f. 2.

Stat. 4. Djangkar, north-east coast of Java. 2 ♀.

10. *Sesarma (Sesarma) rotundata* Hess.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 193.

Stat. 133. Lirung, Talaut Islands. 2 ♂, 2 ♀ (one of these with eggs).

11. *Sesarma (Parasesarma) calypso* de Man.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 140.

Stat. 19. Labuan Tring, west coast of Lombok. 1 ♂ juv.

Stat. 33. Bay of Pidjot, east coast of Lombok. 1 ♂ juv. in river.

Stat. 131. Karakelang, Talaut Islands. 1 ♂, 1 ♀ with eggs.

Stat. 133. Lirung, Talaut Islands. 1 ♂.

DE MAN described a subspecies *kükenthali* of this species, the ♂ of which is distinguished by the following features:

- 1^o the length of the penultimate segment of the abdomen is distinctly less than half the width at the posterior margin.
- 2^o the tubercles on the back of the movable finger are less in number (9), larger and more elongated longitudinally; on the proximal slope of each tubercle there are not 3—4, but 5—6, transverse lines.

- 3° the pectinated crest nearest to the base of the movable finger consists of 19—20, not 25, horny teeth.
- 4° the transverse crest on the inner surface of the palm is absent.

The subspecies was obtained at Halmaheira, while the typical specimens came from Atjeh. In agreement with this distribution the two large ♂ from the Talaut Islands wholly answer to the description of the Moluccan subspecies, but the young ♂ from Lombok belongs to the typical form.

On a greenish or greyish-blue ground colour the adult animal is mottled by numerous blotches and specks of a reddish-violet hue, especially the inner branchial regions. The chelae are violet in their proximal part, but the distal part of the palm and the fingers are yellowish. The numerous specimens from Nias, formerly examined by me, had the chelae always brightly red, and the same has been stated by DE MAN about his Atjeh specimens.

12. *Sesarma (Chiromantes) livida* A. Milne-Edwards.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 169.

Stat. 86. Dongala, west coast of Celebes. 1 ♂, 1 ♀ with eggs.

13. *Sesarma (Chiromantes) lenzii* de Man.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 168.

Stat. 64. Tanah Djampeah, Flores Sea. 1 ♂ juv.

This small specimen does not wholly agree with DE MAN's description, neither that of 1895, nor that of 1902, especially with regard to the chelipeds. Firstly there is a transverse crest, consisting of 4—5 granules, on the inner surface of the palm, near the articulation of the movable finger. Secondly the back of this finger presents a greater number (18) of transverse tubercles, whereas in typical specimens only 13—14 are observed, but in the figure of DE MAN showing the chela in dorsal view¹⁾ we may count as many as 16 tubercles. The pectinated crests on the palm are shorter, the foremost of them consisting of 8 horny teeth, followed by another row of only 5—6 teeth, but it is probable, that these teeth increase in number with advancing age.

The walking legs of my specimens are somewhat more slender than depicted by DE MAN; the propodites of the penultimate pair are, according to the figure, only $2\frac{1}{2}$ times as long as broad, but in the text it is stated, that they are more slender and this agrees with my finds. Besides, these propodites appear to become more slender with advancing age, for in larger specimens (length of carapace 13—10 mm.) they are four times (or nearly so) as long as broad, but in smaller individuals (length of carapace 8.5 mm.) only three times²⁾. In the "Siboga" specimen the length of carapace is 9.5 mm. and the said propodites are $3\frac{1}{2}$ times as long as broad.

1) Zool. Jahrb., Syst., Bd 10, 1898, pl. 30, f. 35 d.

2) DE MAN, Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 537.

14. *Sesarma (Chiromantes) bidens* (de Haan).

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 132.

Stat. 131. Karakelang, Talaut Islands. 4 ♂, 1 ♀ with eggs.

The two egg-bearing ♀ are of very different size, one being 17 mm., the other only 12.5 mm. long. The carapace of all the specimens is of a nearly uniform bluish-violet colour, the legs are mottled with blotches of the same hue on a greenish ground colour and the chelae are scarlet-red.

Sarmatium Dana.

1851. *Sarmatium* Dana. Amer. Journ. Sc., v. 12, p. 288.

1853. *Metagrapsus* H. Milne-Edwards. Arch. Mus. Paris, t. 7, p. 160.

1. *Sarmatium punctatum* (A. Milne-Edwards).

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 221.

Stat. 131. Karakelang, Talaut Islands. 1 ♂.

In colour this species much resembles *Sesarma bidens* (from which of course it widely differs in many respects); the walking legs are, however, mottled with much larger and rounded reddish-violet blotches.

Clistocoeloma A. Milne-Edwards.

1873. *Clistocoeloma* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 310.

1. *Clistocoeloma tectum* (Rathbun).

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 222, pl. 17, f. 3.

Stat. 131. Karakelang, Talaut Islands. 1 ♂, 3 ♀ (one of these with eggs).

Though the 3 ♀ are all apparently adult, only one of them is bearing eggs. The characteristic black colour of the animal renders it very distinct.

Metaplax H. Milne-Edwards.

1852. *Metaplax* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 18, p. 161.

1856. *Rhaconotus* Gerstaecker. Arch. Naturgesch., Jahrg. 21, p. 142.

The oblique piliferous ridge running diagonally across the merus and ischium of the external maxillipeds certainly places this genus among the *Sesarminae*, though MILNE-EDWARDS himself has preferred to regard *Metaplax* as closely related to his section "Gonoplacés vigils" containing such genera as *Macrophthalmus*, *Cleistostoma* etc. Consequently some subsequent authors ranged the genus among the Ocypodidae. DE MAN in 1888 was the first to recognize the identity of *Rhaconotus* to *Metaplax*, which former genus had been rightly referred by its author to the *Sesarminae*.

The species are in the possession of a "musical ridge" on the arm of the cheliped (in the ♂) and of a peculiarly-transformed infra-orbital margin, the mode of crenulation of which is of great systematic value; these characters, though not so constantly observed, are also shared by the genera *Helice* and *Chasmagnathus*, both established by DE HAAN, to which *Metaplex* is closely related.

The majority of the species inhabit mud-flats near the mouths of rivers in British India and the neighbouring islands, where they seem to be most numerous in individuals. One species inhabits China (Hongkong); it is aberrant by having the anterior margin of the meropodites of the walking legs not spinulose, but at most granulate. Towards the Indo-Malayan Archipelago only one species extends (*M. elegans* de Man), that has been observed at the coasts of Atjeh, of Borneo (Pontianak and Samarinda) and at Macassar. The "Siboga" collection did not contain a single representative of the genus.

Key to the species:

1. Carpo- and propodite of the walking legs spinulose along the anterior margin *M. crenulata* (Gerstaecker)¹⁾
 Carpo- and propodite of the walking legs not spinulose along the anterior margin 2
2. Number of lobules or teeth of the infra-orbital ridge of the ♂ 7—9 3
 Number of lobules of the infra-orbital ridge numerous, more than 20 4
3. Infra-orbital ridge with three large lobules in the orbital part. Abdomen of ♂ consisting of 7 free segments *M. longipes* Stimpson²⁾
 Infra-orbital ridge beginning near the epistome with 4—5 very small teeth, followed by two larger, rounded lobules, that are separated by a large interspace from three very small tubercles in the lateral or hind part of the ridge. 3th—5th segment of abdomen of ♂ partly fused *M. indica* H. Milne-Edwards³⁾
4. Lobules of infra-orbital ridge amounting to 25—30 5
 Lobules of infra-orbital ridge amounting to 40—60 (about 35 in ♀) 6
5. Lobules of orbital portion very large (6 in the adult ♂), rapidly decreasing in size laterally and backward.

1) *Rhaconotus crenulatus* Gerstaecker, Arch. Naturgesch., Jahrg. 21, 1856, p. 142, pl. 5, f. 5; *Metaplex c.* de Man, Journ. Linn. Soc. London, v. 22, 1888, p. 156; Zool. Jahrb., Syst., Bd 4, 1889, p. 439; *M. crenulata* Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 435. Hab. Bay of Bengal.

2) Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 97; KOELBEL, Wiss. Erg. Reise Széchenyi in Ost-Asien 1877—1880, Bd 2, 1898, p. 569, pl. 1, f. 1—4; STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 99. Hab. Hongkong.

3) Ann. Sc. Nat. (3) t. 18, 1852, p. 161; Arch. Mus. Paris, t. 7, 1855, pl. 11, f. 2; *M. indica* Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 432. Hab. Karachi (British India).

- Arm of cheliped of ♂ short *M. dentipes* (Heller)¹⁾
 Lobules of orbital portion small (10—12 in number),
 gradually decreasing in size. Arm of cheliped of ♂
 long, largely projecting beyond carapace *M. distincta* H. Milne-Edwards²⁾
 6. Palm of the chela of the ♂ longer than high, large
 conical tooth of movable finger placed in the middle
 of the cutting margin. Meropodites of walking legs
 with several spines along upper margin. Meropo-
 dites of penultimate pair of legs in ♂ $3\frac{1}{2}$ times,
 in ♀ $2\frac{1}{2}$ times as long as broad. *M. elegans* de Man³⁾
 Palm of the chela of the ♂ as long as high,
 quadrangular tooth of movable finger placed near
 articulation. Meropodites of walking legs with only
 one subdistal tooth at upper margin. *M. intermedia* de Man⁴⁾

Helice de Haan.

1835. *Helice* de Haan. Fauna Japon., Crust., p. 28.

The genus *Helice* is certainly closely related to *Metaplex*, but the cephalothorax in the former genus is more convex, thicker; the chelae are stouter and the horizontal length of the palm is surpassed by its height; the meropodites of the walking legs, moreover, never carry a series of teeth along their upper margin, as is so frequently observed in *Metaplex*. The general appearance of the latter genus with its long eye-stalks, its rather narrow front, the anterior margin of which is not rounded, its regularly tapering abdomen, that is not broadened at the third segment, and its carapace usually narrowing backward is sufficiently different from that of *Helice*.

There is, on the other hand, still a great deal of confusion in the conception of the genera *Helice*, *Chasmagnathus* and *Paragrapsus*. ORTMANN⁵⁾ is inclined to unite the two first named genera, and KINGSLEY⁶⁾ declares *Paragrapsus* to be completely identical with *Chas-*

1) *Helice dentipes* Heller, Reise "Novara", Crust., 1865, p. 62, pl. 5, f. 5; *Metaplex d.* de Man, Journ. Linn. Soc. London, v. 22, p. 162, pl. 11, f. 1—3; ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 433; DE MAN, Rec. Ind. Mus., v. 2, prt 3, 1908, p. 219; RATHBUN, K. Dansk. Vid. Selsk. Skr. 7: Raekke, Afd. 5, n^o 4, 1910, p. 329. Hab. Ceylon, Mergui Archipelago and several localities on the continent of British India, also in the Gulf of Siam.

2) Ann. Sc. Nat. (3) t. 18, 1852, p. 162, pl. 4, f. 27; DE MAN, Journ. Linn. Soc. London, v. 22, 1888, p. 158, pl. 10, f. 7—9; HENDERSON, Transact. Linn. Soc. London (2) v. 5, 1893, p. 391; *M. distincta* Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 432; *M. distinctus* Nobili, Boll. Mus. Torino, t. 18, n^o 452, 1903, p. 23. Hab. Bombay, Madras, Pondichéry, Coconada, Nicobars and Mergui Archipelago.

3) Journ. Linn. Soc. London, v. 22, 1888, p. 164, pl. 11, f. 4—6; *M. crassipes* (= ♀) de Man, WEBER's Zool. Erg. Reise niederl. Ost-Indien, Bd 2, 1892, p. 325, pl. 19, f. 12; *M. elegans* de Man, Zool. Jahrb., Syst., Bd 8, p. 596, pl. 14, f. 14 (abdomen); ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 434; NOBILI, Boll. Mus. Torino, t. 18, n^o 447, 1903, p. 28; RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 329. Hab. Mergui Archipelago, Godavari Delta (British India), Penang, Malacca, Atjeh, Pontianak, Samarinda, Macassar.

4) Journ. Linn. Soc. London, v. 22, 1888, p. 166, pl. 11, f. 7—9; *M. intermedia* Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 435. Hab. Mergui Archipelago, and Deltas of Godavari and Ganges.

5) Zool. Jahrb., Syst., Bd 7, 1894, p. 727.

6) Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 221.

magnathus. From this we should infer, that all three genera are really synonymous, but on comparing the type species of each genus it at once becomes obvious, that *Paragrapsus* H. Milne-Edwards, on account of the different shape of the front and of the abdomen of the ♂, is certainly distinct from *Chasmagnathus* de Haan. As to the differences between the two genera of DE HAAN, it may be said, that in *Helice* the lateral margins of the carapace are subparallel and sometimes slightly concave, but in *Chasmagnathus* convergent backward; for the rest, however, they nearly exactly agree in the shape of the front and in the tothing of the carapace, though there are some differences in the abdomen of the ♂, the relative length of the palm in proportion to its height and the shape of the external maxillipeds (see p. 123 under the head of *Helice subquadrata*).

Most of the species of the three genera are most obscurely known; and in some cases it is still impossible, without examining the typical specimens, to which of the genera they should be referred. As far as I can trace out, the genus *Helice* includes the following species¹⁾:

- H. tridens* de Haan
- H. latreilli* H. Milne-Edwards
- H. gaudichaudi* H. Milne-Edwards
- H. lucasi* H. Milne-Edwards²⁾
- H. spinicarpa* H. Milne-Edwards
- H. crassa* Dana
- Chasmagnathus subquadratus* Dana
- Paragrapsus urvillei* H. Milne-Edwards³⁾
- Paragrapsus gaimardi* H. Milne-Edwards
- H. leachi* Hess (= *H. pilimana* A. Milne-Edwards).

As to *H. latreilli* and *H. lucasi* I am quite at a loss how to discriminate these species, and DE MAN, who gave an excellent description of the former, has neither been able to separate the two species, though their habitats are widely apart, which would warrant specific distinctness. *Paragrapsus urvillei* is so insufficiently known, that I cannot include it into the following key:

1. Lateral margins of carapace nearly perfectly parallel, maximum breadth lying at external orbital angle, the side margins of which are parallel or even slightly converging backward and longer than those of anterior epibranchial teeth. Musical crest on arm of cheliped absent in both sexes *H. crassa* Dana⁴⁾

1) KINGSLEY (l. c. p. 219) still mentions a species "*H. gibba*" without mentioning the author's name and I have not succeeded in getting more information about it.

2) Ann. Sc. Nat. (3) t. 20, 1853, p. 190; FILHOL, Miss. ile Campbell, t. 3, prt 2, 1885, p. 391; KINGSLEY (l. c. p. 220) identifies this species with *H. crassa*, Hab. New Zealand.

3) Ann. Sc. Nat. (3) t. 20, 1853, p. 196. Hab. Vanikoro Island.

4) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 252; U. S. Expl. Exp., Crust., 1852, p. 367, pl. 23, f. 8; HELLER, Reise "Novara", Crust., 1865, p. 61; MIERS, Cat. Crust. New Zealand, 1876, p. 43; KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 220; HASWELL, Cat. Austral. Crust., 1882, p. 107; MIERS, Rep. "Challenger", Brachyura, 1886, p. 269. Hab. New Zealand and Australia (Queensland and New South Wales).

- Greatest breadth of carapace lying between tips of anterior or posterior epibranchial teeth 2
2. Infra-orbital ridge modified into 16—18 large, transversely-striated tubercles. Musical crest on arm of cheliped in both sexes. From the notch between first and second epibranchial teeth a short granulate line runs inward. Large species from Japan *H. tridens* de Haan ¹⁾
- Infra-orbital ridge, at least in ♂, consisting of a few elongate tubercles or finely and regularly serrulate 3
3. Inner margin of wrist of cheliped with a longitudinal series of large spiniform teeth *H. spinicarpa* H. Milne-Edw. ²⁾
- Inner margin of wrist of cheliped with a longitudinal row of 7—8 sharp granules, increasing in size distally 4
4. Carapace and chelae strongly granulate. Infra-orbital ridge finely transversely striate *H. gaudichaudi* H. Milne-Edw. ³⁾
- Chelae nearly smooth, finely granulate or punctate 5
5. Breadth of carapace nearly equal to length. *H. gaimardi* (H. Milne-Edw.) ⁴⁾
- Breadth of carapace distinctly exceeding length 6
6. Anterior part of sternum, between abdomen and base of external maxillipeds hirsute. Some hairs between bases of fingers, externally 7
- Anterior part of sternum smooth, not hairy. No hairs between bases of fingers *H. latreilli* (H. Milne-Edw.) ⁵⁾
7. ♂ with a rather large tuft of short hairs filling up the gap between the fingers and extending on proximal part of inner margins; palm longitudinally carinate on proximal part of outer surface *H. leachi* Hess corrected
- ♂ with some few hairs only between bases of fingers, externally; a somewhat larger tuft on palm, quite near articulation with wrist; palm not carinate *H. subquadrata* (Dana)

1) *Ocyrode (Helice) tridens* de Haan, Faun. Japon., Crust., 1835, p. 57, pl. 11, f. 2, pl. 15, f. 6; *Helice t.* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 189; TARGIONI-TOZZETTI, Viaggio "Magenta", Crost., 1877, p. 155, pl. 10, f. 2; MIERS, Proc. Zool. Soc. London, 1879, p. 38; KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 219; ORTMANN, Zool. Jahrb., Syst., Bd. 7, 1894, p. 727; KOELBEL, Wiss. Erg. Reise Széchenyi 1877—1880, Bd 2, 1898, p. 570; STIMPSON, Smithsonian Inst., Miscell. Coll., v. 49, 1907, p. 133. Hab. Japan, Hongkong and Loo-Choo Islands.

2) Ann. Sc. Nat. (3) t. 20, 1853, p. 190. Hab. unknown.

3) Ann. Sc. Nat. (3) t. 20, 1853, p. 190. Hab. Sumatra. This species in its strong granulation of carapace and chelae resembles *Chasmagnathus granulatus* Dana (U. S. Expl. Exp., Crust., 1852, p. 364, pl. 23, f. 6), but this is an Atlantic (Brazilian) species.

4) *Cyclograpsus g.* H. Milne-Edwards, Hist. nat. Crust., t. 2, 1837, p. 79; *Paragrapsus g.* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 196; HASWELL, Cat. Austral. Crust., 1882, p. 105, pl. 2, f. 4. Hab. Australia and Tasmania.

5) *Cyclograpsus latreilli* H. Milne-Edwards, Hist. nat. Crust., t. 2, 1837, p. 80; *Helice l.* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 190; MIERS, Rep. "Challenger", Brachyura, 1886, p. 268, pl. 21, f. 2; DE MAN, Zool. Jahrb., Syst., Bd. 9, 1896, p. 343, Bd 10, 1898, pl. 31, f. 41. Hab. Mauritius, Philippines and Fiji Islands, Atjeh.

1. *Helice leachi* Hess.1865. *Helice leachii* Hess. Arch. Naturgesch., Jahrg. 31, 1., p. 153.1873. *Helice pilimana* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 313, pl. 18, f. 1.1882. *Helice leachi* Haswell. Cat. Austral. Crust., p. 107.1887. *Helice leachi* de Man. Zool. Jahrb., Syst., Bd 2, p. 702.1894. *Helice leachi* Ortmann. Denkschr. med.-naturw. Gesellsch. Jena, Bd 8, p. 57.1907. *Helice leachii* Rathbun. Mem. Mus. comp. Zool. Harvard Coll., v. 35, n^o 2, p. 36.

Stat. 33. Bay of Pidjot, Lombok. 1 ♂ juv., in river.

Stat. 200. Bay of Bara, north coast of Buru. 1 ♂ juv.

DE MAN, who examined the type specimen of HESS, proclaimed the identity of *H. leachi* and *H. pilimana*. The tuft of hairs in the gap of the fingers renders this species very conspicuous, and also the hirsute anterior part of the sternum. On the arm of the cheliped there is (in the ♂ at least) a musical crest, situated quite near the distal fourth part of the inner (anterior) margin, as has been observed by DE MAN. Corresponding to the presence of this crest, the infra-orbital ridge is transformed into an irregular series of tubercles: beginning from the epistome there is firstly a series of small tubercles, gradually increasing in size laterally; beneath the outer orbital angle a much larger, elongate tubercle is placed, that laterally is strongly declivous, and is immediately followed by a somewhat smaller tubercle, the sides of which are strongly and regularly sloping; finally there is a third tubercle, smaller than the preceding and placed vertically beneath the anterior incision of the carapace.

This species has been first recorded from Australia (Sydney) and afterwards from New Caledonia, the Carolines and Japan; the finds of the "Siboga" now prove, that *H. leachi* is also an inhabitant of the Moluccas and Lombok. Already ORTMANN collected the species at Dar-es-Salaam.

Dimensions in mm. of the larger ♂:

Distance between external orbital angles	9.75
Distance between tips of anterior epibranchial teeth. . .	10.5
Length of carapace.	8.75
Horizontal length of chela	9.5
Height of palm	6.—
Breadth of third segment of abdomen	4.75
Breadth of base	} of penultimate segment of abdomen }
Length	

2. *Helice subquadrata* (Dana). Pl. 6, Fig. 1.1851. *Chasmagnathus subquadratus* Dana. Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 251.1852. *Chasmagnathus subquadratus* Dana. U. S. Expl., Exp., Crust., p. 363, pl. 23, f. 5.1865. *Chasmagnathus subquadratus* Hess. Arch. Naturgesch., Jahrg. 31, 1., p. 152.1882. *Chasmagnathus subquadratus* Haswell. Cat. Austral. Crust., p. 106.1894. *Chasmagnathus subquadratus* Ortmann. Zool. Jahrb., Syst., Bd 7, p. 728.

Stat. 19. Bay of Labuan Tring, west coast of Lombok. 1 ♂.

DANA made known three species of "*Chasmagnathus*", but strictly adhering to the limits

assigned to *Helice* and *Chasmagnathus* in the present paper, I prefer to refer two of DANA's species (*subquadratus* and *granulatus*) to *Helice* and his third species (*laevis*) to *Paragrapsus*. Indeed, in the original description of *Helice* and *Chasmagnathus*, as conceived by DE HAAN, the carapace is only little narrowed anteriorly in the former genus, and the postero-lateral margins are subparallel, not distinctly converging backward, and more or less concave; besides, the abdomen of the ♂ is somewhat narrower, the palm of the chela is higher than long, and the merus of the external maxillipeds, though narrowed towards the ischium, is nearly as broad anteriorly as long.

The specimen before me is an apparently not full-grown ♂ and, notwithstanding the brief description of DANA, there are some striking features, that induce me to identify the animal with *H. subquadrata*.

The carapace is little vaulted transversely, somewhat more so in a longitudinal direction, notably anteriorly, so that the front is obliquely deflexed. The maximum breadth is lying between the tips of the posterior epibranchial teeth, and the length is 79—80% of the greatest breadth, as in DE MAN's specimens of *H. latreilli*.

The usual areas of the carapace are rather distinct; the epigastric regions are well defined, bulging, separated one from another by a rather broad medial groove, into which the anterior lobe of the mesogastric regions extends; the cervical furrow is deep at both ends, but interrupted in the middle, so that mesogastric and cardiac region here pass into one another; the latter is smaller and narrower than the former, roughly hexagonal; intestinal region scarcely indicated; hepatic and branchial regions not separated, the latter, as usual, strongly sloping towards the bases of the two last pairs of legs. The whole surface is pitted, the punctae being coarser on the anterior half of the carapace; besides, the epigastric areas and the front present under strong magnification a very minute granulation among the punctae, quite as DE MAN described in *H. latreilli*. On the sloping parts of the branchial regions we observe numerous setiferous granules, that tend to arrange themselves in oblique rows; one of these rows is more continuous than the rest and parts from the middle of the postero-lateral margin of the carapace. Quite behind, above the bases of the last two pair of legs, there is on either side of the carapace a conspicuous folding of the surface, that is somewhat sigmoid, but on the whole parallel with the posterior margin; this folding has been observed by DE MAN in quite the same way (though in the present species it does not reach so far laterally) in *H. latreilli*, and, likewise, the distance of both foldings, that are larger than the oblique granulate lines mentioned above, is about equal to the length of each folding. The posterior margin of the carapace is, as usual, accompanied by a fine line, running parallel and very close to it; above the bases of the posterior pair of legs this line more and more approaches the margin and finally disappears altogether.

In front view the anterior margin of the front turns out to be slightly wavy at either side of the median notch and the lateral angles are more distinct than in the type species of the genus, *H. tridens*: though the angle is rounded and very obtuse (about 135°), it is at least present, whereas in *H. tridens* the anterior margin passes without any transition into the

inner margin of the orbit. For the rest there is no difference in the course of the inner and upper orbital margin between the two species, but the external orbital angle is less acute in *H. subquadrata*, the outer margins of these angles are somewhat diverging backward and as long as the subparallel margins of the anterior epibranchial teeth; the posterior teeth are much smaller, more acuminate and directed obliquely-outward, so that the greatest width of the carapace is found between the tips of these posterior teeth; behind the latter the side margins are parallel, slightly concave. Any trace of additional notches, which in *H. tridens* mark off a third and even a fourth pair of epibranchial teeth on the postero-lateral margins of the carapace, is altogether absent in the present species.

The margins of the front, of the orbits and the antero-lateral borders of the carapace, up to the posterior lateral teeth, are continuously granulate and the whole of the lateral margins is accompanied by a ciliated row immediately beneath the margins. The side walls of the body are vertical and, like the pterygostomian regions, ornamented in the usual way of the *Sesarminae*.

Owing to the inflated under parts of the body the epistome is vertically placed, but not projecting beyond the front in dorsal view. In accordance with the presence of a "musical crest" on the cheliped the infra-orbital border is peculiarly transformed. Beginning from the epistome the whole orbital portion is occupied by a series of about 12 obtuse verrucosities, that are finely transversely striate; the series is interrupted in the middle. Beneath the cornea of the eye and at the end of the orbital portion we observe a large, rounded, elongate tubercle, that laterally and backward tapers into a ridge of about twice the length of the tubercle itself; this ridge at the end again rises into a small tubercle of similar shape as the preceding. The shape of the infra-orbital border is widely different from that of *H. tridens*, but it approaches that of *H. latreilli*: in both species the infra-orbital border reaches backward only to the first notch of the lateral margin of the carapace, and an elongate tubercle is found beneath the cornea of the eye, but laterally and backward this tubercle or thickened ridge is followed in *H. latreilli*, according to DE MAN's description, by 3—4 similar, but smaller tubercles (only one in the present species) and the orbital portion is occupied either by a continuous wavy crest or a series of 3—4 elongate, transversely-striate tubercles, followed by 5 smooth granules towards the epistome.

The part of the sternum between the abdomen and the bases of the external maxillipeds is shortly hirsute. This character has been also figured by DANA in his figure 5*a* and it is indeed one of the chief reasons why I referred my specimen to his "*Chasmagnathus*" *subquadratus*. In *H. leachi* the anterior part of the sternum is also hairy, but here the hairs are much larger. DE MAN in his description of *H. latreilli* does not particularly state, that the hairs of the maxillipeds extend to the sternum, but if they do, we may safely assume, that it would not have escaped to DE MAN's experienced eye.

In comparing my figure 1*d* with DE MAN's figure 4*1c* of *H. latreilli* it at once becomes obvious that the abdomina of the two species are very much alike, but in *H. subquadrata*

the abdomen is generally somewhat broader. The terminal segment is as long as broad at the base (in *H. latreilli* longer), the length of the penultimate segment is two-thirds of its width at the base (four-fifths in *H. latreilli*, so that in this species the segment is longer), the two preceding segments are alike in length and shorter than the sixth segment. As far as can be judged from DANA's figure of the abdomen, it agrees with my drawing.

Contrary to what is found in *H. latreilli* the chelipeds are wholly equal in size; although the meropodite wholly agrees with that of this species, the place of the musical crest is different: it is found quite anteriorly, where the roughly granulate inner or anterior margin curves inward towards the wrist and, though small, it is conspicuous by a deeply-brown colour. Upper surface of wrist very minutely granulate and defined inward by a longitudinal row of somewhat larger granules; at the inner angle a small tooth is found, that is followed backward by a longitudinal row of 6—7 teeth, which successively decrease in size.

The chelae are inflated; the height of the palm is nearly equal to the length of the movable finger; the outer surface is minutely granular, with pits of somewhat larger size; in the ventral half there is, near to the articulation with the wrist, a very short, longitudinal row of granules, that is continued indistinctly towards the fingers by some punctae, but the row is different from the more or less prominent carina on the chela of *H. leachi*. Near the articulation with the wrist a tuft of short hairs is observed, and a row of similar hairs is found at the opposite margin of the wrist; the upper border of the palm is keeled in its proximal third and accompanied by a row of hairs, but rounded distally; the whole margin is roughly granulate and bordered towards the outer surface by a continuous row of very minute granules, that are again defined externally by a row of short hairs; the inner surface is slightly granular, and at the proximal under angle a rounded lobe projects freely and is roughly crenulate at the convex margin. The fingers are short, nearly wholly straight, not flattened, acuminate at the horny tips, not gaping, and provided at the inner margins with 4—5 crenulations in the case of the movable finger, and with a few more on the opposite margin; externally we find a very small patch of short hairs between the bases of the fingers, which hairs also extend to the movable finger; as is well known this patch is much larger in *H. leachi* and even induced A. MILNE-EDWARDS to name this species *H. pilimana*.

The shape of the walking legs presents nothing remarkable, except that the meropodites (that are three times as long as broad) are armed anteriorly with a rectangular prominence, which, like the distal margin of the meropodite, is shortly hirsute; in *H. leachi* and *H. latreilli* the meropodites are unarmed, in *H. tridens* they present a more or less acute spine. The dactyli are as long as the propodites, somewhat curved, compressed, and provided with some rows of hairs. Carpo- and propodite of the first to third pair of ambulatory legs are clothed with a more or less continuous very short fur on the anterior margin and upper and under surface; this clothing is reduced gradually towards the hind pair of legs, which is nearly naked; the hind margins of mero-, carpo- and propodite show some long and scattered hairs. DANA says, that the 5th joint of the first pair of walking legs is tomentose above and on anterior surface, but not below, which does not agree with my finds.

The animal is of a reddish-yellow colour, with irregular, large, reddish blotches on the anterior half of the carapace.

DANA records the species from New South Wales or New Zealand, the exact locality being apparently unknown. ORTMANN mentions two specimens from Tahiti, but unfortunately he gives no description. If my determination be right, the species also occurs at Lombok. From *H. latreilli* it is certainly distinct, though it is closely related to that species.

Dimensions in mm.:

Distance between external orbital angles	12.—	
Maximum breadth of carapace	13.5	
Length of carapace	10.75	
Posterior margin of carapace	7.5	
Length of cheliped	21.—	
Horizontal length of chela	9.5	
Height of palm	6.—	
Length of movable finger	5.5	
Breadth of 3 ^d segment of abdomen	6.7 ¹⁾	
Length	} of 6 th segment of abdomen . . }	2.2 ¹⁾
Breadth at base		
Length	} of terminal segment of abdomen }	1.65 ¹⁾
Breadth at base		

Chasmagnathus de Haan.

1835. *Chasmagnathus* de Haan. Faun. Japon., Crust., p. 27.

This genus is distinct from *Helice* by the postero-lateral margins of the carapace being convergent and the antero-lateral margins divergent backward, by a generally broader shape of the abdomen of the ♂, by the palm of the chelae being longer than high, and by the merus of the external maxillipeds being nearly half as broad anteriorly as long and much more elongate than in *Helice*.

Thus restricted the genus includes only the well-known Japanese species *Ch. convexus* de Haan²⁾. Now HERKLOTS in his *Symbolae carcinologicae*³⁾, that deal with the collection of Crustacea in the Leiden Museum, mentions two new species: *Ch. gibbosus* de Haan M.S. from Java, and one, unnamed, from Abessynia. The latter species I have not found back; *Ch. gibbosus* is represented by three specimens (all ♀, dried), one of which is a new species of *Sarmatium* (*fryatti*), already described in my paper on *Sesarma* etc.⁴⁾ and the remaining specimens undoubtedly belong to *Ch. convexus*. The locality (Java, KÜHL et VAN HASSELT coll.) seems to me to be probably erroneous, and perhaps the two specimens of *Chasmagnathus* have been mislaid.

1) Measured under microscope.

2) *Ocyropsis* (*Chasmagnathus*) *convexus* de Haan, Faun. Japon., Crust., 1835, p. 56, pl. 7, f. 5; ADAMS et WHITE, Zool. Voy. "Samarang" 1850, p. 52; *Chasmagnathus convexus* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 200; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 727; STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 133. Hab. Japan and Loo-Choo Islands. The species described by HASWELL under this name (Cat. Austral. Crust., 1882, p. 106) is, as ORTMANN rightly remarks, certainly different from that of DE HAAN, and it cannot even be traced to which genus it should belong.

3) Tijdschr. Entomol., t. 4, 1861, p. 128.

4) Zool. Med. Mus. Leiden, v. 3, 1917, p. 216, textfig. 6.

Paragrapsus H. Milne-Edwards.

1853. *Paragrapsus* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 195.

This genus has often been considered to be wholly identical with *Chasmagnathus*, but in the type species of *Paragrapsus* (*quadridentatus*) the anterior margin of the front is nearly straight, not rounded in dorsal view, and the lateral angles are distinct and sub-rectangular, the abdomen of the ♂ is not produced laterally at the 3^d segment, and the dactyli of the last pair of legs are not compressed as in *Helice* and *Chasmagnathus*, but conical and short, resembling those of *Cyclograpsus*, to which genus the present one shows much more affinity than to *Chasmagnathus*.

MILNE-EDWARDS described very shortly four species of *Paragrapsus*; of these only one, the type species, is rather well known; of the three remaining species two (*gaimardi* and *urvillei*) are referred by me to *Helice* (see p. 118), though my reasons for doing so are admitted to rest on very unstable ground; the species *P. verreauxi* is identified by KINGSLEY¹⁾ with *Chasmagnathus laevis* Dana, and this latter species of which I could examine two specimens, certainly belongs to the present genus, as HELLER²⁾ already stated, for the shape of the front is distinctly different from that of *Chasmagnathus* and *Helice*, and the abdomen of the ♂ regularly tapers from the base to the tip and is not broadened at the third segment.

It follows, then, that only two species, *quadridentatus* and *laevis*, are admitted.

Key to the species:

- Only one notch behind external orbital angle. Epigastric lobes very little prominent *P. quadridentatus* H. Milne-Edw.³⁾
 Two notches behind external orbital angle. Epigastric lobes distinctly prominent *P. laevis* (Dana)⁴⁾

Cyclograpsus H. Milne-Edwards.

1837. *Cyclograpsus* (part.) H. Milne-Edwards. Hist. nat. Crust., t. 2, p. 77.

1838. *Gnathochasmus* Mc Leay. SMITH'S Ill. Zool. S. Africa, p. 65.

Many species originally referred to *Cyclograpsus* by MILNE-EDWARDS are now classed among other genera, but still it contains at least 9 Indo-Pacific species. It is most closely related to *Paragrapsus*, which it resembles in the shape of the dactyli of the walking legs, but differs by the lateral margins of the carapace being entire or only very obscurely toothed.

1) Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 222, where also the synonymy of this species is recorded. On Pl. 6, fig. 2a and 2b I have figured the propodite and dactylus of the last pair of legs and the abdomen of the ♂, which figures illustrate the evidence of DANA's species to be referred to *Paragrapsus*.

2) Reise "Novara", Crust., 1865, p. 55.

3) Ann. Sc. Nat. (3) t. 20, 1853, p. 195; *Cyclograpsus q.* Hess, Arch. Naturgesch., Jahrg. 31, 1, 1865, p. 26; *Paragrapsus q.* Haswell, Cat. Austral. Crust., 1882, p. 105, pl. 3, f. 1; DE MAN, Zool. Jahrb., Syst., Bd 4, 1889, p. 441; *Chasmagnathus q.* Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 728. Hab. Australia (east coast) and Tasmania.

4) *Chasmagnathus laevis* Dana, Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 252; U. S. Expl. Exp. Crust., 1852, p. 365, pl. 23, f. 7; *Paragrapsus verreauxi* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 195; *P. laevis* Heller, Reise "Novara", Crust., 1865, p. 55; *Chasmagnathus l.* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 222; HASWELL, Cat. Austral. Crust., 1882, p. 106; Bd. 7, 1894, MIERS, Zool. Voy., "Alert", Crust., 1884, p. 246; ORTMANN, Zool. Jahrb., Syst., p. 728. Hab. Australia and New Zealand.

Some species described by MILNE-EDWARDS are very badly known; such are: *C. whitei*, *C. granulatus*, *C. reynaudi* and *C. eydouxi*. Most likely they are synonymous to others.

Key to the Indo-Pacific species:

1. Lateral margins of carapace convex 2
Lateral margins of carapace straight, subparallel or even
divergent backward 5
2. Meropodites of walking legs very broad, foliaceous, wi-
dening distally and sharply keeled *C. lophopus* Nobili¹⁾
Meropodites of walking legs slender, not foliaceous 3
3. Abdomen of ♂ very broad, with the lateral margins
parallel, penultimate segment at base nearly three times
as broad as terminal segment *C. cinereus* Dana²⁾
Abdomen of ♂ with the lateral margins convergent
towards the terminal segment 4
4. Inner surface of palm of chela with a longitudinal row
of sharp granules; palm itself higher than long *C. audouini* H. Milne-Edwards³⁾
Inner surface of palm mostly smooth, but in large indi-
viduals with a longitudinal row of some low granules;
palm itself longer than high *C. punctatus* H. Milne-Edwards⁴⁾
5. Anterior half of carapace rather strongly and closely
punctate. Inner margins of fingers of chela not dentate *C. granulatus* Dana⁵⁾
Carapace smooth or sparsely punctate 6
6. Lateral margins of carapace divergent backward and with
two obscure notches anteriorly. Regions tolerably distinct *C. longipes* Stimpson⁶⁾

1) Bull. Mus. Paris, t. 11, 1905, p. 411; Ann. Sc. Nat. (9) t. 4, 1906, p. 321, pl. 11, f. 4. Hab. Red Sea.

2) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 251; U. S. Expl. Exp., Crust., 1852, p. 360, pl. 23, f. 3; *Cyclograpsus eydouxi*? H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 198; *C. cinereus* Rathbun, Bull. U. S. Fish. Comm. for 1903, v. 23, prt 3, 1906, p. 840; Proc. U. S. Nat. Mus., v. 38, 1911, p. 590. Hab. west coast of America and Hawaiian Islands.

3) Hist. nat. Crust., t. 2, 1837, p. 78; Ann. Sc. Nat. (3) t. 20, 1853, p. 197; DANA, U. S. Expl. Exp., Crust., 1852, p. 359, pl. 23, f. 2; *C. lavauxi* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 197; *C. whitei*? H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 197; *C. laevis* Hess, Arch. Naturgesch., Jahrg. 31, 1., 1865, p. 152; *C. lavauxi* Miers, Cat. Crust. New Zealand, 1879, p. 41; *C. lavauxi* Haswell, Cat. Austral. Crust., 1882, p. 103; FILHOL, Miss. ile Campbell, t. 3, prt 2, 1885, p. 390, pl. 41, f. 6; *C. laevis* de Man, Zool. Jahrb., Syst., Bd 2, 1887, p. 700; *C. punctatus* (part.) Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 729; *C. audouini* Stimpson, Smithsonian. Inst., Miscell. Coll., v. 49, 1907, p. 132. Hab. east coast of Australia, New Guinea and New Zealand. DE MAN stated the identity of *C. laevis* Hess with *C. lavauxi* H. Milne-Edwards and the latter has been usually considered synonymous with *C. audouini* of the same author, though the original specimen of *C. audouini* came from New Guinea, and that of *C. lavauxi* from New Zealand. DE MAN afterwards (Zool. Jahrb., Syst., Bd 9, 1896, p. 352) had the opportunity of examining original specimens both of *C. audouini* and *C. lavauxi*, but he does not expressly state any difference between them. Some authors (HASWELL) deny, that the *C. audouini* of DANA should be identical with that of MILNE-EDWARDS.

4) Hist. nat. Crust., t. 2, 1837, p. 78; *Gnathochasmus barbatus* Mc Leay, SMITH'S Ill. Zool. S. Africa, 1838, p. 65, pl. 3; *Sesarma barbata*? Krauss, Südafr. Crust., 1843, p. 45, pl. 3, f. 3; *Cyclograpsus punctatus* and *C. reynaudi* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 197, pl. 7, f. 9; HASWELL, Cat. Austral. Crust., 1882, p. 104; ORTMANN (part.), Zool. Jahrb., Syst., Bd 7, 1894, p. 729; STIMPSON, Smithsonian. Inst., Miscell. Coll., v. 49, 1907, p. 132; STEBBING, S. A. Crust., prt 5, 1910, p. 318; RATHBUN, Proc. U. S. Nat. Mus., v. 38, 1911, p. 590. Hab. Cape of Good Hope, but also Tasmania, Hongkong, Juan Fernandez and Chile.

5) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 251; U. S. Expl. Exp., Crust., 1852, p. 361, pl. 23, f. 4; RATHBUN, Bull. U. S. Fish. Comm. for 1903, v. 23, prt 3, 1906, p. 840. Hab. Hawaiian Islands.

6) Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 105; DE MAN, Zool. Jahrb., Syst., Bd 9, 1896, p. 355, Bd 10, 1898, pl. 32, f. 43; STIMPSON, Smithsonian. Inst., Miscell. Coll., v. 49, 1907, p. 131; RATHBUN, Mem. Mus. comp. Zool. Harvard Coll., v. 35, n^o 2, 1907, p. 36. Hab. Bonin Islands, Atjeh, Tahiti, Paumotu and Fiji Islands.

- Lateral margins of carapace parallel, except immediately behind external orbital angle. 7
7. Infra-orbital ridge in ♂ regularly crenulate 8
- Infra-orbital ridge in ♂ subdivided into three elongate lobules; the lateral one the longest *C. parvulus* de Man
8. Two obscure notches (sometimes only one) behind each external orbital angle *C. intermedius* Ortman¹⁾
- Lateral margins of carapace entire. *C. henshawi* Rathbun²⁾

1. *Cyclograpsus parvulus* de Man.

1896. *Cyclograpsus parvulus* de Man. Zool. Jahrb., Syst., Bd 9, p. 350, Bd 10, 1898, pl. 32, f. 42.

1907. *Cyclograpsus parvulus* Rathbun. Mem. Mus. comp. Zool. Harvard Coll., v. 35, n^o 2, p. 36.

Stat. 64. Tanah Djampeah, Flores Sea. 1 ♀.

This specimen agrees nearly completely with those of DE MAN, but the inner part of the infra-orbital ridge in my ♀ is not entire, but consists of 5 small lobules, and the lateral portion is likewise subdivided into 3—4 lobules, as DE MAN rightly remarked in the case of the ♀. The original specimens came from Atjeh; afterwards the species has been collected at the Paumotus.

NOBILI has described a subspecies (*unidens*)³⁾ in which one epibranchial tooth is found behind the external orbital angle and the posterior margin of the penultimate segment of the abdomen of the ♂ is not straight, but concave forward.

I retained the name of *parvulus* for this species, but DE MAN himself observed afterwards⁴⁾, that his species should be considered at most a subspecies of the Atlantic *C. occidentalis* A. Milne-Edwards.

Subfam. PLAGUSIINAE.

There are two well known genera belonging to this group: *Plagusia* and *Percnon* (= *Leiolophus*), which are at once characterized by the stout antennulae being lodged in oblique fossae of the front and visible in dorsal view. The middle segments of the abdomen are largely coalesced in both sexes, the carpus of the external maxillipeds articulates near the antero-external angle of the merus, and the lateral margins of the carapace are toothed.

The two genera are at once distinguished by the following characters:

- Carapace thick. Merus of external maxillipeds as broad as ischium *Plagusia* Latreille
- Carapace much flattened. Merus of external maxillipeds much smaller and narrower than ischium *Percnon* Gistel

1) Zool. Jahrb., Syst., Bd 7, 1894, p. 728. Hab. Indian Ocean, Loo-Choo Islands and Japan. Perhaps *C. intermedius* is synonymous to *C. longipes*.

2) Proc. U. S. Nat. Mus., v. 26, 1902, p. 75, textfig. 1—2; Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 840. Hab. Hawaiian Islands.

3) Ann. Mus. Hung., v. 3, 1905, p. 501. Hab. Berlinharbour, German New Guinea.

4) Mém. Soc. Zool. France, 1900, p. 57.

Plagusia Latreille.

1806. *Plagusia* (part.) Latreille. Gen. Crust. et Insect., t. 1, p. 33¹).

ALCOCK²) states, that in *Plagusia* the exognath of the external maxillipeds is destitute of a flagellum, but already DE HAAN has figured one in *P. dentipes*, and both STEBBING and BORRADAILE state the occurrence of a flagellum in *P. capensis*.

ALCOCK also remarks, that the habits of this genus (and of *Percnon*) "to a certain extent resemble (those of) the *Grapsi*, dodging about rocks that are awash at high tide, and hiding in crannies when pursued. They also resemble *Varuna* in being able to make themselves at home on drift timber in the open sea. This will account for the very wide range of some of the species". Indeed, both genera contain an almost cosmopolitical species, occurring everywhere on tropical coasts; in the genus *Plagusia* this widely-spread species is separable into several subspecies, as has been clearly traced out by LAURIE³).

Key to the species:

1. Meropodites of the ambulatory legs with one subterminal tooth on its upper border. 2
 Meropodites of the ambulatory legs with a series of teeth on its upper margin. Carapace almost entirely destitute of tubercles 4
2. Carapace smooth, not squamose. Interantennular fossae with inner margins granulate. Chelipeds of ♂ very short, outer surface of palm smooth, not costate, upper border granulate . . . *P. glabra* Dana⁴
 Carapace always with more or less distinct squamiform tubercles. Chelipeds of ♂ longer, outer surface of palm longitudinally costate 3
3. Three teeth behind external orbital angle *P. depressa* (Fabricius)⁵
 Two teeth behind external orbital angle. Carapace wholly covered with large, squamiform tubercles. Palm of chela at outer surface

1) KINGSLEY (Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 224, footnote) rightly remarked, that in the dismemberment of LATREILLE's genus the name *Plagusia* should have been given to *Percnon*, for the first species mentioned by LATREILLE is *Plagusia clavimana*, which is now generally considered to be identical with *Percnon planissimum* (Herbst).

2) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 437.

3) Rep. Pearl Oyster Fish. Ceylon, pt 5, 1906, p. 429—430.

4) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 252; U. S. Expl. Exp., Crust., 1852, p. 371, pl. 23, f. 10; H. MILNE-EDWARDS, Ann. Sc. Nat. (3) t. 20, 1853, p. 179; MIERS, Ann. Mag. Nat. Hist. (5) v. 1, 1878, p. 152; HASWELL, Cat. Austral. Crust., 1882, p. 111. Hab. New South Wales.

5) The typical *P. depressa*, with squamiform tubercles on the carapace and the lobes (coxal processes) above the bases of the middle pairs of walking legs dentate, is chiefly Atlantic, and even occurs in the Mediterranean. The subspecies are thus divided by LAURIE (l. c.): Carapace covered with numerous — often more or less squamiform — tubercles, each bordered by a fringe of short stiff hairs:

 Posterior coxal process of 2nd and 3rd walking legs entire. *tuberculata* Lamarck

 Posterior coxal process of 2nd and 3rd walking legs dentate *depressa* Fabricius

Carapace tubercles more depressed — those on gastric region obsolescent. Posterior coxal process of 2nd and 3rd walking legs entire. *immaculata* Lamarck

LAURIE, however, points out that there must be a tendency of merging one into another among the subspecies. The *P. squamosa* of HERBST is, according to LAURIE, to be discarded, as there is an essential discrepancy, as regards the shape of the coxal processes, between text and figure.

The literature of this most common species, up to 1900 at least, is gathered by ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, p. 437.

with six longitudinal, impressed lines, fingers short, dactylus much curved *P. speciosa* Dana¹⁾

4. Anterior margin of front granulate, with two short teeth in the middle; carapace smooth. Outer surface of palm of chela with deeply-impressed, longitudinal grooves, interspaces granulate and reticulate. *P. capensis* de Haan²⁾

Anterior margin of front with three teeth at either side and two in the middle of the front; carapace everywhere pubescent; hepatic and especially branchial regions with a few groups of spiniform granules. Outer surface of palm of chela with deeply impressed, longitudinal grooves, in which many short hairs are placed, interspaces strongly tuberculate, not reticulate . . . *P. dentipes* de Haan³⁾

1. *Plagusia depressa tuberculata* Lamarck.

Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 437.

Stat. 33. Bay of Pidjot, east coast of Lombok. 1 ♂.

Stat. 60. Haingsisi, Samau Island, near Timor. 2 ♂, 1 ♀ juv.

Stat. 193. Sanana, Sula Besi, 1 ♂ juv.

The transition between this subspecies and *immaculata* is very gradual, but generally the carapace presents spiniform tubercles, especially on the branchial regions, and is more flattened in the former.

This widely distributed subspecies occurs throughout the whole Indo-Pacific and even on the coast of Chile.

Percnon Gistel.

1835. *Acanthopus* de Haan. Faun. Japon., Crust., p. 29 (praeocc.).

1848. *Percnon* Gistel. Naturgesch. d. Tierreichs, p. VIII.

1876. *Leiolophus* Miers. Cat. Crust. New Zealand. p. 46.

1900. *Liolophus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 439.

1) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 252; U. S. Expl. Exp., Crust., 1852, p. 369, pl. 23, f. 9; H. MILNE-EDWARDS, Ann. Sc. Nat. (3) t. 20, 1853, p. 179; MIERS, Ann. Mag. Nat. Hist. (5) v. 1, 1878, p. 151; KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 223; DE MAN, Notes Leiden Mus., v. 12, 1890, p. 89; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 731; BORRADAILE, Proc. Zool. Soc. London, 1900, p. 591; RATHBUN, Mem. Mus. comp. Zool. Harvard Coll., v. 35, n^o 2, 1907, p. 36. Hab. Paumotu Islands, Tahiti, Funafuti and Rôtuma.

2) *Cancer chabrus*? Linné, Syst. nat., ed. 10, 1758, p. 628; Mus. Lud. Ulrici, 1764, p. 438; Syst. nat., ed. 12, 1766, p. 1044; *Plagusia capensis* de Haan, Faun. Japon., Crust., 1835, p. 58; *P. tomentosa* H. Milne-Edwards, Hist. nat. Crust., t. 2, 1837, p. 92; MC LEAY, Smith's Ill. Zool. S. Africa, 1838, p. 66; KRAUSS, Südafr. Crust., 1843, p. 42, pl. 2, f. 6; *P. chabrus* White, Ann. Mag. Nat. Hist. (1) v. 17, p. 497; List Crust. Brit. Mus., 1847, p. 42; *P. tomentosa* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 178; *P. gaimardi* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 178; *P. chabrus* Miers, Cat. Crust. New Zealand, 1876, p. 45; Ann. Mag. Nat. Hist. (5) v. 1, 1878, p. 152; HASWELL, Cat. Austral. Crust., 1882, p. 111; FILHOL, Miss. ile Campbell, t. 3, prt 2, 1885, p. 393; MIERS, Rep. "Challenger", Brachyura, 1886, p. 273, pl. 22, f. 1d (cheliped); *P. capensis* Stebbing, S. A. Crust., prt 3, 1905, p. 47; *P. tomentosa* Stimpson, Smithsonian. Inst., Miscell. Coll., v. 49, 1907, p. 122; *P. chabrus* Stebbing, S. A. Crust., prt 5, 1910, p. 322; RATHBUN, Proc. U. S. Nat. Mus., v. 38, 1910, p. 591; *P. capensis* Stebbing, Transact. Roy. Soc. Edinburgh, v. 50, prt 2, 1914, p. 267, pl. 26c (maxillipeds); *P. chabrus* Borradaile, Brit. Antarct. ("Terra Nova") Exp., Zool., v. 3, n^o 2, 1916, p. 101. Hab. Cape of Good Hope, Natal, Australia, Tasmania, New Zealand, Tongatabu, Juan Fernandez and Chile.

3) Faun. Japon., Crust., 1835, p. 58, pl. 8, f. 1; H. MILNE-EDWARDS, Ann. Sc. Nat. (3) t. 20, 1853, p. 178; STIMPSON, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 103; ORTMANN, Zool. Jahrb. Syst., Bd 7, 1894, p. 731; RATHBUN, Mem. Mus. comp. Zool. Harvard Coll., v. 35, n^o 2, 1907, p. 36. Hab. Japan and Easter Island.

The time-honoured designation *Leiolophus* has been substituted by *Percnon*¹⁾ in recent times.

Key to the species:

1. Large species, with a tuft of hairs at inner surface of palm of chela. *P. pilimanum* (A. Milne-Edw.)²⁾
 Smaller species, with the chelae hairless. 2
2. Anterior margin of epistome with one large median tooth and two smaller lateral ones; pleural groove, limiting the pterygostomial region dorsally, hairy. Abdomen of ♂ broad, terminal segment triangular. Upper border of chelae entire *P. planissimum* (Herbst)
 Anterior margin of epistome only with one large median tooth, the lateral ones wanting; pleural groove hairless or nearly so. Abdomen of ♂ narrow, terminal segment roughly semi-circular. Upper border of chelae sulcate *P. abbreviatum* (Dana)

1. *Percnon planissimum* (Herbst).

Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 439³⁾.

- Stat. 33. Bay of Pidjot, east coast of Lombok. 1 ♂ juv.
 Stat. 34. Labuan Pandan, west coast of Lombok. 5 ♂ aet. div., 2 ♀ with eggs.
 Stat. 47. Bay of Bima, Sumbawa. 1 ♀.
 Stat. 58. Savu, between Timor and Sumba. 8 ♂ (1 juv.), 7 ♀ (5 with eggs).
 Stat. 125. Siau Island, north-east of Manado. 1 ♀ with eggs.
 Stat. 127. Great Sangir Island. 2 ♂ juv.
 Stat. 129. Karkaralong Islands, between Mindanao and Celebes. 1 ♂, 1 ♀.
 Stat. 131. Karakelang, Talaut Islands. 5 ♀ (one with *Sacculina*).
 Stat. 169. Atjatuning, west coast of New Guinea. 2 ♂.

This species has a world-wide distribution throughout the warmer seas, and is with *Grapsus strigosus* (Herbst) the most common species of the Grapsidae.

2. *Percnon abbreviatum* Dana.

1851. *Acanthopus abbreviatus* Dana. Proc. Acad. Nat. Sc. Philadelphia, 1851, p. 252.
 1852. *Acanthopus abbreviatus* Dana. U. S. Expl. Exp., Crust., p. 373, pl. 23, fig. 11.
 1878. *Leiolophus abbreviatus* Miers. Ann. Mag. Nat. Hist. (5) v. 1, p. 154.
 1880. *Leiolophus abbreviatus* Miers. Ann. Mag. Nat. Hist. (5) v. 5, p. 314.
 1888. *Leiolophus abbreviatus* de Man. Arch. Naturgesch., Jahrg. 53. 1., p. 372.
 1892. *Leiolophus abbreviatus* Thallwitz. Abhandl. Mus. Dresden, Bd 3, n^o 3, pag. 36.
 1894. *Leiolophus abbreviatus* Ortmann. Denkschr. med.-naturw. Ges. Jena, Bd 8, p. 57.

1) RATHBUN, Proc. U. S. Nat. Mus., v. 22, 1900, p. 281.

2) *Plagusia planissima*? Randall, Journ. Ac. Nat. Sc. Philadelphia, 1839, p. 128 (f. RATHBUN, 1906); *Acanthopus pilimanus* A. Milne-Edwards, Nouv. Arch. Mus. Paris, t. 9, 1873, p. 300, pl. 14, f. 5; *Leiolophus p.* Miers, Ann. Mag. Nat. Hist. (5) v. 1, 1878, p. 154; KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 224; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 731; *Percnon pilimanus* Rathbun, Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 842. Hab. New Caledonia, Tahiti, Fiji and Hawaiian Islands.

3) According to DE MAN (Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 544), who examined the original specimens of "*Acanthopus affinis*" and "*A. tenuifrons*", both described by H. MILNE-EDWARDS (Ann. Sc. Nat. (3) t. 20, 1853, p. 180), these specimens should also enter into the synonymy of the present species.

1896. *Leiolophus abbreviatus* de Man. Zool. Jahrb., Syst., Bd 9, p. 359.
 1902. *Leiolophus abbreviatus* de Man. Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, p. 544,
 pl. 20, f. 13.
 1905. *Leiolophus abbreviatus* Lenz. Abhandl. Senckenb. Gesellsch., Bd 27, Heft 4, p. 373.
 1906. *Percnon abbreviatum* Rathbun. Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, p. 842.
 1911. *Percnon abbreviatum* Rathbun. Transact. Linn. Soc. London (2) v. 14, p. 242.
- Stat. 34. Labuan Pandan, west coast of Lombok. 1 ♀.
 Stat. 79^b. Kabalá Dua, Borneo Bank, Macassar Strait. 1 ♂.
 Stat. 131. Karakelang, Talaut Islands. 2 ♂, 1 ♀.
 Stat. 133. Lirung, Talaut Islands. 1 ♂.
 Stat. 220. Binongka Island, south-east of Celebes. 1 ♂.
 Stat. 248. Tiur Island, between Kei Islands and Ceram. 1 ♂.

Thanks to DE MAN's researches (especially those of 1902) there is now no difficulty in distinguishing between the common *P. planissimum* and the present species.

The dorsally sulcate chelae, the absence of lateral teeth on the anterior margin of the epistome, the smoothness of the pleural groove and the shape of the last segment of the abdomen of the ♂ are all important features of *P. abbreviatum*, at least as understood by DE MAN, for the author has at different occasions alluded to the probable incorrectness of DANA's figure.

It is also worth of notice, that the chelae of the adult *P. planissimum* are peculiarly high and compressed, whereas they remain small and not dilated in *P. abbreviatum*.

The species is apparently associated with the preceding throughout the whole Indo-Pacific region, but is generally less abundant.

GECARCINIDAE.

The Gecarcinidae are the true land-crabs, which are mostly characterized by a very thick cephalothorax, with inflated branchial regions, the lateral margins are not defined and keeled only behind the little projecting external orbital angles, the pterygostomial regions are thickly hairy; the orbits are small, the carapace is much vaulted in a longitudinal sense, especially anteriorly, with the regions scarcely or not at all indicated, the penultimate segment of the abdomen of the ♂ is much longer than the preceding, and the dactyli of the walking legs are long, slender and spinous.

The species are scarcely observed to go ever into the water (though the young are probably hatched out in the sea), but spend their lives in hiding during the day among grass, stones, fallen trunks etc., rambling about in the night. PEARSE ¹⁾, who studied with so much success the life of the fiddler crabs (*Uca* = *Gelasimus*), also gave us a pretty account of the habits of *Cardisoma* (*C. guanhumi* Latreille). Like *Uca* it lives on the same mud-flats, and likewise digs burrows, but in digging it makes largely use of its great claws and not of the walking legs. The largely-inflated branchial cavities are lined internally with a thick vascularized membrane, that enables the animal to directly breathing the air, but the same occurs in some species of *Sesarma*, that even climb trees, and in *Geograpsus*. The hairs of the pterygostomial regions retain water a long time, that is continuously oxidized by the air.

The carapace is generally of a bluish, violet or reddish colour, sometimes mottled by yellow patches; the legs are mostly of the latter hue, and the chelipeds are scarlet-red.

The four Indo-Pacific genera, *Cardisoma*, *Gecarcoidea*, *Epigrapsus* and *Grapsodes* are readily to be distinguished by the key of ALCOCK ²⁾.

Epigrapsus Heller.

1862. *Epigrapsus* Heller. Verh. zool.-bot. Ges. Wien, Bd 12, p. 522.

1865. *Nectograpsus* Heller. Reise "Novara", Crust., p. 56.

1865. *Grapsodes* Heller. Reise "Novara", Crust., p. 58.

Epigrapsus and *Nectograpsus* are identical, being based on the same species. As to *Grapsodes*, it has been treated of as an independent genus, but I agree with ALCOCK that it

1) Proc. U. S. Nat. Mus., v. 49, 1915, p. 553—554. See also ORTMANN (Zool. Jahrb., Syst., Bd 10, 1897, p. 338—340), GRAVIER (Bull. Mus. Paris, t. 12, 1906, p. 498) and GARDINER (Transact. Linn. Soc. London (2) v. 12, 1907, p. 47).

2) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 440—441. The author, following MIERS, writes: *Geocarcinidae* and *Cardiosoma*, which is undoubtedly right from an orthographical point of view, but the genus that gave the name to the family has been spelled *Gecarcinus* by LEACH, and LATREILLE writes *Cardisoma*.

is really identical with *Epigrapsus*; all the principal characters: the shape of the orbits and the maxillipeds are wholly the same, and even the minutely and transversely-striated infra-orbital crest, that is as long as the breadth of the orbit, agrees in *Epigrapsus* and *Grapsodes*¹⁾; in both genera the pterygostomial regions are hirsute in the same way and between the bases of the second and third pair of walking legs there is a tuft of hairs, bordering an opening towards the branchial cavity, as in *Ocypoda* and *Geograpsus*.

Key to the species:

Lateral margins of carapace dentate. Walking legs hirsute. *E. notatus* (Heller)
 Lateral margins of carapace entire or nearly so. Walking legs glabrous,
 only the dactyli hirsute. *E. politus* Heller

1. *Epigrapsus politus* Heller.

Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 443.

Stat. 64. Tanah Djampeah, Flores Sea. 1 ♀.

HELLER's figure is not quite exact as regards the outer orbital angle, which is represented acute and rather prominent, and the proportions of the carapace are inexact, for, as MIERS²⁾ remarks, the carapace is broader anteriorly and narrower behind. DE MAN³⁾ observed, that usually one epibranchial tooth, though very obscure, is found behind each external orbital angle, and that in the ♀ even a second epibranchial tooth may occur, in such a way that the length of the preceding tooth is somewhat longer than that of the external orbital angle. In my specimen the lateral margins present only one single notch. The carapace is flattened in a transverse sense and the regions are not indicated, but near the margins and on the sloping branchial regions there are a number of obliquely-elongated, somewhat hairy tubercles. The inner angle of the wrist is more pronounced in the ♀ than in the ♂; in the latter sex the chelipeds should be markedly unequal, according to ALCOCK, but DE MAN, who examined 20 ♂, says that they are usually equal in size. The walking legs are smooth and glabrous or nearly so; the dactyli are hirsute, especially in the case of the last two pairs, so that the spinules are largely hidden beneath the hairs, these dactyli are long, subquadrate or pentagonal in transverse section, and wholly straight, only the horny tip being faintly curved.

The general shape of this species, the carapace of which is of a uniform reddish-yellow colour, much resembles *Cyclograpsus* and indeed it has been generally referred to the Grapsidae. From *Cyclograpsus* it is at once distinguished by the form of the maxillipeds, that do not present the diagonally-directed hairy line across the merus, and by the lateral margins of the carapace disappearing at a few distance behind the external orbital angles and not being keeled. In the latter feature it agrees with one species of *Geograpsus* (*G. grayi* H. Milne-Edwards), but the oblique branchial striae, so characteristic of the *Grapsinae*, are entirely wanting and the merus of the external maxillipeds is of a more rounded shape. ALCOCK was the first to place *Epigrapsus* in its proper place.

1) MIERS (Proc. Zool. Soc. London, 1877, p. 160) already alluded to the close affinity of both genera.

2) Rep. "Challenger", Brachyura, 1886, p. 266.

3) Zool. Jahrb., Syst., Bd 9, 1895, p. 79.

The species inhabits the Andamans and Nicobars, Atjeh, New Guinea, New Hebrides, Fiji Islands, Ponapé (Samoah) and Tahiti. About its habits nothing is known.

2. *Epigrapsus notatus* (Heller). Pl. VI, Fig. 3.

1865. *Grapsodes notatus* Heller. Reise "Novara", Crust., p. 58, pl. 5, f. 2.

Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 442.

Stat. 133. Lirung, Talaut Islands. 13 ♂, 4 ♀.

HELLER'S figure is taken from a young individual, but my specimens attain a larger size than that denoted by ALCOCK, the breadth of the carapace of an adult ♂ being 34 mm., the length 29 mm. The carapace is broader than long, flattened transversely, and also in the posterior two-thirds of the longitudinal line, but the anterior part is regularly and strongly curved, so that the front is much deflexed and even curved backward. The whole surface is very minutely punctate and the regions are scarcely defined, the furrows being represented by very faint wrinkles; the cervical groove is only distinct in its lateral parts and situated at three-fifths of the total length of the carapace; the cardiac region is small and very ill-defined, the intestinal area presents a lateral depression at either side; the branchial regions are perpendicularly declivous in their outer posterior angle, and usually exhibit here some faint granules, but in the specimen figured these granules are very large, arranged in obscure and oblique lines and very shortly hirsute; similar, but rounded and pearly granules, are found in this specimen along the whole lateral margins and behind the supra-orbital border and in some parts render these lateral margins rugose. The gastro-hepatic grooves are more or less distinct, but usually their course is only indicated by two obliquely-longitudinal pits, from each of which a very faint groove runs forward towards the notch between the external orbital angle and the anterior epibranchial tooth, where again a pit is found; a third pair of depressions is found on the mesogastric area, before the cervical groove.

In dorsal view the anterior margin of the front is very faintly concave and entire, the lateral angles are somewhat prominent and not rectangular, passing into the concave side margins. Though there is on the surface of the front a faint indication of two flattened postfrontal lobes, the front passes mostly imperceptibly into the epigastric area, but in the specimen figured the postfrontal lobes are more distinctly marked and their anterior margin is formed by a transverse crest. The orbits are very small, not even half as broad as the front, and the eye-stalks not even reach the little prominent, subrectangular external orbital angle, the lateral margins of which are much diverging backward. A second and even a third lateral tooth are always present, but they are obtuse, not acuminate anteriorly, turned upward; the second tooth is as long as the preceding, the third is usually shorter, but it may be fused with some short, oblique or longitudinal verrucosities, immediately behind the tooth, at which place the lateral margins of the carapace completely disappear, as in *Cardisoma*; in dorsal view the postero-lateral outlines of the carapace are subparallel, so that the greatest breadth of the latter is found immediately behind the last antero-lateral teeth. The hind margin is $1\frac{1}{2}$ times as broad as the front and accompanied by a fine furrow, that is continued on either side and can be traced forward as far as the bases of the second pair of walking legs, where

the groove, separating the subhepatic and pterygostomial regions and continued backward on the subbranchial regions, joints it. The two former of these regions are entirely glabrous, but between the infra-orbital crest and the bases of the chelipeds a very dense toment is found. The peduncle of the antenna touches the front and is partly concealed; there is a wide gap left between the front and the very small triangular infra-orbital tooth, that is directed obliquely-outward. Laterally there is no wall to the orbit, but beneath the latter we observe a well-defined infra-orbital crest, stretching from the basal joint of the antennae laterally and backward beyond the anterior notch of the carapace, so that its total length is twice the breadth of the orbit; on strong magnification this crest proves to be very minutely transversely striated. In *E. politus* the same crest occurs.

The epistome is distinct, hirsute; its length in the median line, where it strongly projects distally is about one-fourth of the width between the bases of the antennae. The lateral margins of the buccal cavern are diverging distally. The external maxillipeds leave a rhombic space between them; the ischium is as long as the merus, but considerably broader, the inner margin of the merus is straight, the outer somewhat convex and the carpus is inserted near the antero-external angle. The exognath is nearly wholly concealed, very hairy and thick, reaching a little way beyond the suture between ischium and merus, and as ALCOCK remarks, destitute of a flagellum.

The abdomen of the ♂ covers all the space between the bases of the posterior legs; it is triangular and all the segments are distinct; the penultimate segment is as long as the terminal one, and the posterior margin of the former is twice as broad as the anterior margin.

The chelipeds are sometimes markedly unequal, but more often they present no difference in size, and they may be called wholly smooth and glabrous; the borders of the meropodite are, however, faintly crenulate, the inner margin of the wrist, immediately before the articulation with the arm, presents some granules, and in the middle of the inner surface of the palm we observe (in the ♂) two indistinct longitudinal rows, each consisting of three or four largely-separated granules. The palm of the ♂ is very high, higher than long, somewhat compressed, but not keeled, below; the fingers are very widely gaping, slightly compressed; the fixed finger is largely excavated in the proximal half of the inner margin, the distal half begins with a crenulate prominence and is crenulate in the same way up to the acute tip; the movable finger is only slightly curved, the proximal third portion of the inner margin is smooth, then follows a quadrangular and crenulate tooth, and the rest of the inner margin is likewise dentate. In the ♀ the chelae are much smaller and lower; the fingers are longer and fitting closely together, with the inner margins regularly toothed, and the rest of the surface furnished with a number of longitudinal striae, that are prominent near the tip, but are dissolved further backward in rows of very small pits. In the cases, where the ♂ presents unequal chelipeds, the smaller one resembles that of the ♀. ALCOCK already observed, that the inner angle of the wrist is obtuse in the ♂, but always distinctly prominent in the ♀.

The middle pairs of walking legs, which are the longest, are about twice the length of the carapace. The meropodites are smooth for their greater part, but the hind margin is crenulate and near the not particularly keeled anterior margin numerous spiniform granules

are scattered about: the breadth of the meropodite is about one-third of its length; a subdistal, rectangular prominence is found at the anterior margin. Carpo- and propodite together are as long as the meropodite, and the dactyli are very long, longer than the preceding joint, quadrangular in transverse section, slightly curved and armed with four rows of spines.

Usually the walking legs are beset with stiff and long bristles, but in the specimen here figured the legs are almost completely hairless. As has been remarked above, this specimen is also remarkable by the numerous granules on the carapace and by the somewhat flattened front. I think these differences, however, to be merely individual and of no particular importance, for I examined a small ♂ in the Leiden Museum, collected at Pulu Weh, in which the carapace is still more extensively studded with granules and the front more distinctly flattened, but the walking legs are hairy in the usual way.

The chelipeds are always of a reddish-yellow colour, like the sternum; the carapace and the legs are of the same violet-bluish tint as occurs in *Cardisoma*, but some specimens have a uniformly-reddish carapace, in others it is of the general ground-colour of the chelipeds, but mottled and marbled by violet blotches. The latter case occurs in the specimen depicted.

This species was first collected at the Nicobars, MIERS recorded it afterwards from Duke-of-York Island (north of Samoa), DE MAN from Morotai (near Halmaheira) and ALCOCK again from the Nicobars. Besides the Morotai specimen there is in the collection of the Leiden Museum a young ♂ from Pulu Weh (north of Sumatra), collected by Mr. BUITENDIJK in January 1911. Its habits are unknown.

Dimensions in mm.:

	♂	♀ ¹⁾
Distance between external orbital angles	20.25	18.—
Greatest width of carapace	32.5	29.—
Length of carapace	28.—	26.—
Width of anterior margin of front	11.—	9.75

Cardisoma Latreille.

1825. *Cardisoma* Latreille. *Encycl. Méth.*, t. 10, p. 685.

1870. *Cardiosoma* S. J. Smith. *Transact. Connecticut Ac.*, v. 2 p. 142.

1886. *Cardiosoma* Miers. *Rep. "Challenger", Brachyura*, p. 219.

This well-known genus is distinguished by the following characters: the carapace is (at least in old specimens) very much inflated, with branchial regions strongly bulging and the lateral margins only distinct in their anterior half; the distance between the external orbital angles is more than half the greatest width of the carapace (as in *Epigrapsus*), but the antennulae are separated by a broad septum, the peduncle of the antenna does not touch the front, the epistome is very short, almost linear; the orbit is defined ventrally and laterally by a finely-crenulated edge and there is no infra-orbital crest beneath it, the cornea of the eye is very large, occupying nearly the whole ventral part of the eye-stalks (as in *Ocypoda*), the merus of the external maxillipeds is as long as the ischium, much narrowed at its base, and the exognath bears a distinct flagellum.

1) This is the specimen here figured.

The genus *Discoplax* A. Milne-Edwards¹⁾ is very nearly allied to (if not identical with) *Cardisoma*, but as DE MAN²⁾ recently pointed out, it is wrong to follow ORTMANN and ALCOCK in simply uniting the only species *D. longipes* with *C. hirtipes* Dana, for there are numerous points of difference.

For the present leaving aside this *D. longipes*, we admit but two species in the Indo-Pacific region, where they represent the typical Atlantic genus *Gecarcinus*.

Key to the species:

- Epibranchial tooth immediately behind external orbital angle; lateral margins of carapace strongly and abruptly bulging behind epibranchial teeth; postfrontal lobes indistinct; regions scarcely indicated, hairy part of pterygostomial regions as broad as base of buccal cavern; infra-orbital border passing rectangularly into the lateral one. Meropodites of walking legs with some few hairs only at hind margin . *C. carnifex* (Herbst)
- Epibranchial tooth at a longer distance behind external orbital angle; lateral margins of carapace less bulging behind epibranchial teeth; postfrontal lobes and regions of carapace much more distinct; hairy part of pterygostomial regions much broader than base of buccal cavern; infra-orbital border passing with an acute angle into the lateral one. Meropodites of walking legs bordered with bristles at hind margin . *C. hirtipes* Dana³⁾

1. *Cardisoma carnifex* (Herbst).

Literature: ALCOCK. Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 445—446.

Stat. 213. Saleyer Island, south of Celebes, 1 ♂ (ad), 2 ♀, with eggs.

Stat. 279. Roma Island, north-east of Timor, 2 ♀.

This well-known species, like the preceding, occurs in the whole Indo-Pacific region.

Gecarcoidea H. Milne-Edwards.

1837. *Gecarcoidea* H. Milne-Edwards. Hist. nat. Crust., t. 2, p. 25.

Literature: ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 738.

The rather insufficient diagnosis of H. MILNE-EDWARDS, who in 1853 changed the name of the genus into *Pelocarcinus*, induced WOOD-MASON and afterwards DE MAN to suppose, that their

1) Nouv. Arch. Mus. Paris, t. 9, 1873, p. 294, pl. 15. Hab. New Caledonia.

2) Abh. Senckenb. Ges., Bd 25, Heft 3, 1902, p. 548—549.

3) Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 447. From the synonymy here given *Discoplax longipes* should be omitted, as has been mentioned, but two other names should be added: firstly *C. frontalis* H. Milne-Edwards from the Loyalty Islands near New Caledonia (Ann. Sc. Nat. (3) t. 20, 1853, p. 204, see DE MAN, Abh. Senckenb. Ges., Bd 25, Heft 3, 1902, p. 548, pl. 20, f. 14), which most likely is at most a subspecies of *C. hirtipes*, and secondly *C. obesum* de Man (nec Dana) (Notes Leiden Mus., v. 2, 1880, p. 35), which certainly belongs to this species.

Miss RATHBUN (Bull. U.S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 838) has recently replaced the name *hirtipes* by *rotundum*, identifying DANA's species with "*Thelphusa*" *rotunda* Quoy et Gaimard (FREYCINET's voy. around the world, t. 3, Zool., 1825, p. 527, pl. 77, f. 1), but, as CALMAN (Proc. Zool. Soc. London, 1909, p. 711) rightly remarks, description and figure of those earlier French authors are equally poor and wholly insufficient to allow of an exact determination.

specimens were really distinct, and again two genera *Hylaeocarcinus* and *Limnocarcinus*, were established. The inner suborbital lobe in some specimens unites with the front, in others, however, a wide space is left, and this variability caused the authors above named to regard their specimens as belonging to a genus different from *Gecarcoidea*. The inner suborbital lobe is separated by a more or less wide fissure from the infra-orbital border.

The genus is most closely related to *Gecarcinus*, with which it agrees in all principal points: in the width of the front and of the orbits together being not quite half the greatest width of the carapace, in the curvature of the lateral margins of the latter, in the course of the grooves on the carapace and in the shape of chelipèds and walking legs. The external maxillipeds, too, are largely equal, but the merus is much shorter and narrower than the ischium, and the very short flagellum is with its carpus partly concealed behind the merus.

ORTMANN already pointed out, that there is only one single species, to which four generic and five specific names have been applied.

1. *Gecarcoidea lalandei* H. Milne-Edwards.

Literature: ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 738; CALMAN, Proc. Zool. Soc. London, 1909, p. 710.

Stat. 133. Lirung, Talaut Islands. 6 ♂.

The specimens before me fully illustrate the variability presented by this species in the contact of the inner suborbital lobe with the front and in the width of the suborbital fissure. According to WOOD-MASON (*Hylaeocarcinus humei*)¹⁾ the mesogastric lobe is studded with granules, but probably this character disappears with advancing age; at least they are absent in my adult specimens and DE MAN²⁾ states the same in his *Limnocarcinus intermedius*. From either side of the hairy epistome a crenulated and concave crest runs laterally beneath the orbit; near the epistome it is rather high, but this height soon decreases laterally; its total length is about three times the transverse diameter of the orbit.

With reference to our still limited knowledge of the Gecarcinidae it is worth to note, that ANDREWS³⁾ observed at Christmas Island the migration of numbers of the present species towards the sea, to propagate. This occurred during the rainy season, and in 1908, shortly after the migration, he obtained enormous quantities of *Megalopa*-larvae and of small crabs near the shore, which, according to CALMAN, are most likely the young of this species.

Besides at the locality named the species has been observed at the Nicobars, Andamans Gorontalo (Celebes), Philippines, Loyalty Island, New Guinea and New Britannia. In the Leiden Museum there is still a small specimen from Pulu Weh, collected by Dr. BUITENDIJK.

The original locality (Brazil) of H. MILNE-EDWARDS is scarcely trustworthy.

1) Journ. As. Soc. Bengal, v. 42, prt 2, 1873, p. 260, pl. 14—15.

2) Notes Leiden Museum, v. 2, 1880, p. 65.

3) Monograph of Christmas Island, 1900, p. 163. The author records this species erroneously under the name *Gecarcinus lagostomis*.

LIST OF THE STATIONS,

WHENCE SPECIES OF THE FAMILIES HYMENOSOMIDAE, RETROPLUMIDAE, OCYPODIDAE, GRAPSIDAE AND GECARCINIDAE WERE OBTAINED.

STATION 4. Djangkar, East Java. *Varuna litterata* (Fabricius), *Sesarma* (*Sesarma*) *palawanensis* Rathbun.

STATION 16. Kangeang Island, east of Madura. *Metopograpsus oceanicus* (Jacquinot et Lucas).

STATION 19. Bay of Labuan Tring, west coast of Lombok. *Uca dussumieri* (H. Milne-Edwards), *Uca lactea* (de Haan), *Grapsus strigosus longitarsis* Dana, *Varuna litterata* (Fabricius), *Metasesarma rousseauxi* H. Milne-Edwards, *Sesarma* (*Parasesarma*) *calypso* de Man, *Helice subquadrata* (Dana).

STATION 33. Bay of Pidjot, east coast of Lombok. *Tympanomerus ceratophorus* (Koelbel), *Varuna litterata* (Fabricius), *Ptychognathus riedelii pilosa* de Man, *Ptychognathus pusillus* Heller, *Sesarma* (*Parasesarma*) *calypso* de Man, *Helice leachi* Hess, *Percnon planissimum* (Herbst), *Plagusia depressa tuberculata* Lamarck.

STATION 34. Bay of Labuan Pandan, east coast of Lombok. *Grapsus strigosus* (Herbst), *Pachygrapsus plicatus* H. Milne-Edwards, *Pachygrapsus planifrons* de Man, *Percnon planissimum* (Herbst), *Percnon abbreviatum* (Dana).

STATION 40. Paternoster Islands, north of Sumbawa. *Ocypoda cordimana* Desmarest, *Ocypoda ceratophthalma* (Pallas).

STATION 47. Bay of Bima, north coast of Sumbawa. *Uca tetragonon* (Herbst), *Uca lactea* (de Haan), *Macrophthalmus graeffei* A. Milne-Edwards, *Macrophthalmus latreillei* Desmarest, *Metopograpsus messor gracilipes* de Man, *Metopograpsus maculatus* H. Milne-Edwards, *Metopograpsus latifrons* (White), *Metopograpsus oceanicus* (Jacquinot et Lucas), *Percnon planissimum* (Herbst).

STATION 50. Bay of Badjo, west coast of Flores. *Ocypoda cordimana* Desmarest, *Ocypoda ceratophthalma* (Pallas), *Uca dussumieri* (H. Milne-Edwards), *Uca lactea* (de Haan), *Uca gaimardi* (H. Milne-Edwards), *Metopograpsus thukuhar* (Owen), *Varuna litterata* (Fabricius).

STATION 51. Madura Bay, west coast of Flores. *Ocypoda kuhli* de Haan, *Grapsus strigosus* (Herbst).

STATION 53. Nangamessi Bay, north coast of Sumba. *Sesarma* (*Sesarma*) *impressa* H. Milne-Edwards.

STATION 58. Savu Island, between Sumba and Timor. *Varuna litterata* (Fabricius), *Percnon planissimum* (Herbst).

STATION 60. Haingsisi, Samau Island, near south-west Timor. *Grapsus strigosus* (Herbst), *Plagusia depressa tuberculata* Lamarck.

STATION 61 and 61^a. Islands Solor and Adonare, between Flores and Lombok. *Ocypoda ceratophthalma* (Pallas), *Ocypoda kuhli* de Haan, *Grapsus strigosus* (Herbst), *Metasesama rousseauxi* H. Milne-Edwards.

STATION 64. Tanah Djampeah, Flores Sea. *Macrophthalmus graeffei* A. Milne-Edwards, *Geograpsus lividus stormi* de Man, *Pseudograpsus albus* Stimpson, *Pseudograpsus laniger* n. sp., *Sesarma* (*Holometopus*) *villosa* A. Milne-Edwards, *Sesarma* (*Chirromantes*) *lenzii* de Man, *Cyclograpsus parvulus* de Man, *Epigrapsus politus* Heller.

- STATION 66. Saleyer Island, south of Celebes. *Paracleistostoma dentatum* n. sp.
- STATION 71. Macassar. *Ocypoda ceratophthalma* (Pallas), *Macrophthalmus definitus* Adams et White, *Metopograpsus messor gracilipes* de Man.
- STATION 79b. Pulu Kabala Dua, Borneo Bank. *Percnon planissimum* (Herbst).
- STATION 86. Donggala, west coast of Celebes. *Uca marionis* (Desmarest), *Uca lactea* (de Haan), *Macrophthalmus convexus* Stimpson, *Euplax boscii* H. Milne-Edwards, *Metopograpsus latifrons* (White), *Metopograpsus oceanicus* (Jacquinot et Lucas), *Sesarma (Chiromantes) livida* A. Milne-Edwards.
- STATION 89. Pulu Kaniungan, east coast of Borneo. *Ocypoda ceratophthalma* (Pallas).
- STATION 93. Pulu Sanguisiapo, Sulu Archipelago. *Ocypoda ceratophthalma* (Pallas).
- STATION 115. Kwandang Bay, north coast of Celebes. *Uca marionis* (Desmarest), *Metopograpsus oceanicus* (Jacquinot et Lucas), *Ptychognathus affinis* de Man.
- STATION 125. Siau Island, between Celebes and Sangir Islands. *Percnon planissimum* (Herbst).
- STATION 127. Taruna Bay, Great Sangir Island. *Elamopsis lineata* A. Milne-Edwards, *Pseudograpsus laniger* n. sp., *Percnon planissimum* (Herbst).
- STATION 129. Karkaralong Islands. *Pachygrapsus minutus* A. Milne-Edwards, *Percnon planissimum* (Herbst).
- STATION 131. Karakelang, Talaut Islands. *Ocypoda ceratophthalma* (Pallas), *Uca marionis* (Desmarest), *Uca tetragonon* (Herbst), *Mictyris longicarpus* Latreille, *Dotilla wickhami* de Man, *Euplax boscii* H. Milne-Edwards, *Ptychognathus riedelii pilosa* de Man, *Ptychognathus guijulugani* Rathbun, *Utica nausithoe* de Man, *Pseudograpsus crassus* A. Milne-Edwards, *Sesarma (Sesarma) lafondi* Jacquinot et Lucas, *Sesarma (Sesarma) modesta* de Man, *Sesarma (Sesarma) impressa* H. Milne-Edwards, *Sesarma (Parasesarma) calypso kükenthali* de Man, *Sesarma (Chiromantes) bidens* (de Haan), *Sarmatium punctatum* A. Milne-Edwards, *Clistocoeloma tectum* (Rathbun), *Percnon planissimum* (Herbst), *Percnon abbreviatum* (Dana).
- STATION 133. Lirung, Talaut Islands. *Ocypoda ceratophthalma* (Pallas), *Euplax boscii* H. Milne-Edwards, *Metasesarma aubryi* A. Milne-Edwards, *Sesarma (Sesarma) rotundata* Hess, *Percnon abbreviatum* (Dana), *Epiograpsus notatus* (Heller), *Gecarcoidea lalandei* H. Milne-Edwards.
- STATION 142. Obi Major, south of Halmaheira. *Metopograpsus thukuhar* (Owen).
- STATION 163. Seget, north-west New Guinea. *Metopograpsus oceanicus* (Jacquinot et Lucas).
- STATION 169. Atjatuning, west coast of New Guinea. *Sesarma (Holometopus) elongata* A. Milne-Edwards, *Percnon planissimum* (Herbst).
- STATION 172. Gisser Island, near south-east point of Ceram. *Elamena truncata* (Stimpson), *Pseudograpsus albus* Stimpson.
- STATION 174. Waru Bay, north coast of Ceram. *Sesarma (Holometopus) elongata* A. Milne-Edwards.
- STATION 179. Kawa Bay, west coast of Ceram. *Ocypoda cordimana* Desmarest, *Ocypoda ceratophthalma* (Pallas), *Ptychognathus affinis* de Man, *Sesarma (Sesarma) amphinome* de Man.
- STATION 180. Pulu Kelang, between Ceram and Buru. *Metasesarma aubryi* A. Milne-Edwards, *Sesarma (Sesarma) atrorubens* Hess, *Sesarma (Sesarma) gracilipes* H. Milne-Edwards.
- STATION 181. Ambon. *Elamena truncata* (Stimpson), *Metopograpsus thukuhar* (Owen).
- STATION 193. Sanana Bay, east coast of Sula Besi. *Plagusia depressa tuberculata* Lamarck.
- STATION 200. Bara Bay, north coast of Buru. *Metopograpsus latifrons* (White), *Helice leachi* Hess.
- STATION 213. Saleyer, south of Celebes. *Cardisoma carnifex* (Herbst).
- STATION 220. Binongka Island, south-east of Celebes. *Percnon abbreviatum* (Dana).
- STATION 225c. Lucipara Islands, Banda Sea. *Euplax boscii* H. Milne Edwards.

STATION 231. Ambon. *Mictyris longicarpus* Latreille, *Euplax boscii* H. Milne-Edwards, *Grapsus strigosus* (Herbst).

STATION 234. Nusa-Laut Island, east of Ambon. *Varuna litterata* (Fabricius).

STATION 248. Tiur Island, between Ceram and Kei Islands. *Percnon abbreviatum* (Dana).

STATION 250. Kur Island, near Kei Islands. *Uca tetragonon* (Herbst), *Euplax boscii* H. Milne-Edwards, *Tympanomerus integer* n. sp.

STATION 254. West of Kei Islands, depth 310 metres, bottom: fine, grey mud. *Retropluma plumosa* n. sp.

STATION 258. Kei Islands. *Macrophthalmus telescopicus* (Owen).

STATION 263. Great Kei Island. *Ocypoda ceratophthalma* (Pallas).

STATION 277. Dammer Island, south part of Banda Sea. *Grapsus strigosus longitarsis* Dana.

STATION 279. Roma Island, south part of Banda Sea. *Cardisoma carnifex* (Herbst).

STATION 323. Bawean Island, Java Sea. *Mictyris longicarpus* Latreille, *Metopograpsus thukuhar* (Owen).

APPENDIX.

It is only during press of this paper, that I became acquainted with KEMP's paper on the Brachyura of the Chilka Lake (Rec. Ind. Mus. Calcutta, v. 5, 1913, p. 199—325) in which the interesting species *Camptandrium sexdentatum* Stimpson is again described and figured. On the whole there is a very good agreement between KEMP's statements and mine (p. 65—68); we may only remark, that in young specimens the external orbital angle and the second epibranchial tooth are more acuminate than in the adult, that, judging from KEMP's figure, the ischium of the external maxillipeds present straight, not concave, lateral margins, that the adult female has the meropodites of the walking legs quite unarmed distally, and that in the sex named the dactyli of the ambulatory legs are about equal in length to, not distinctly shorter than, the propodites.

KEMP maintains *Camptandrium* among the *Varuninae*, but still I adhere to my opinion, that all the evidence gathered points to the near affinity of the genus to the Ocypodidae (subfam. *Macrophthalminae*).

KEMP's specimens were obtained in the Chilka Lake (Lower Bengal) at a time, when the water was absolutely fresh. At the same time, however, minute specimens of the present species are recorded from the Ennur backwater, near Madras, "in water of specific gravity 1.0025" (exact salinity not stated). It follows, from the much varying hydrographical conditions of the Chilka Lake, that the species is able to withstand a rather wide range of salinity.

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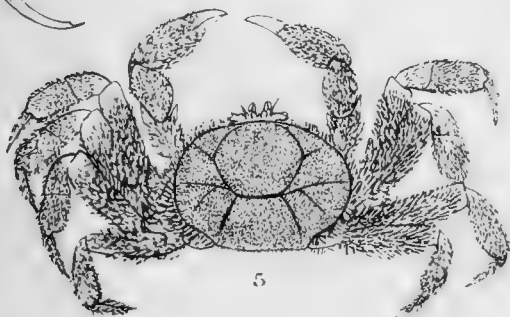
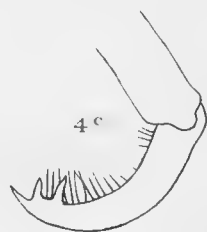
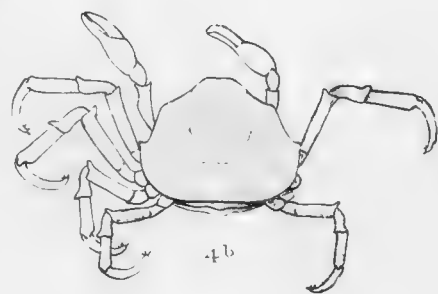
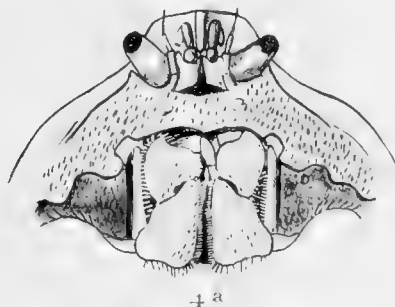
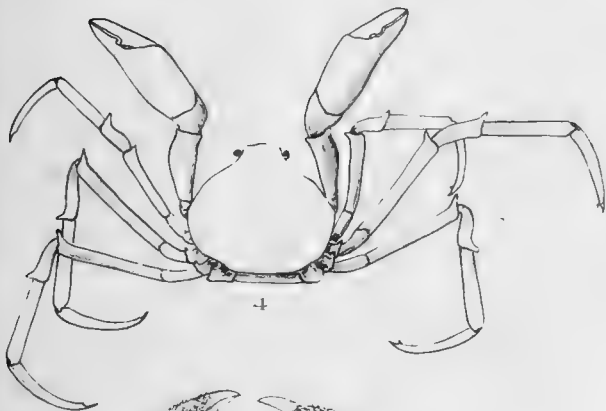
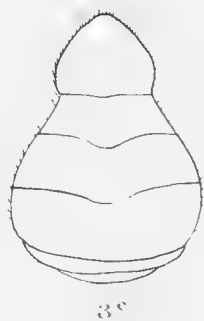
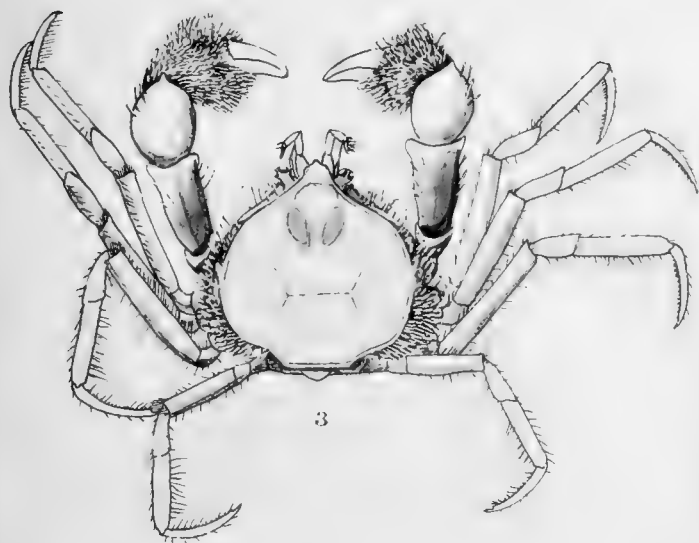
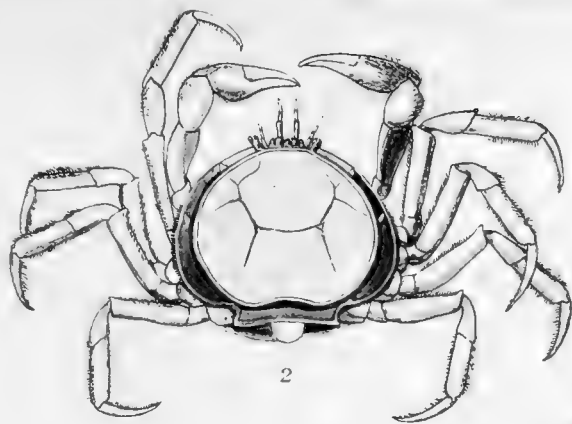
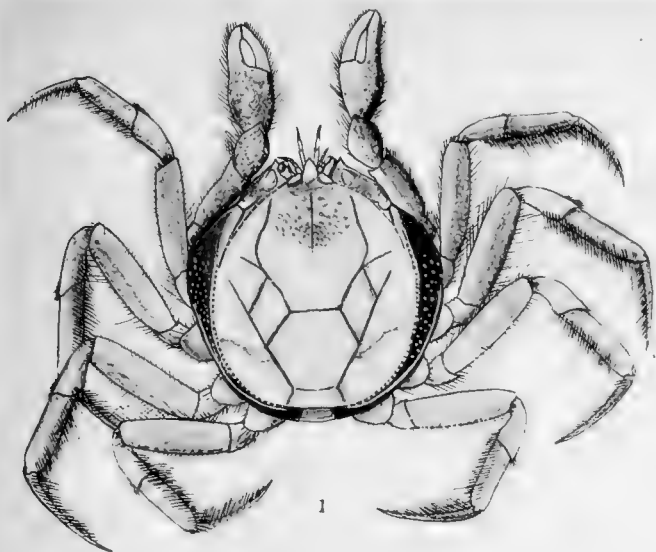
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EXPLANATION OF PLATES.

PLATE I.

- Fig. 1. *Hymenosoma orbiculare* Desmarest, ♂, magn. 2.
Fig. 2. *Halicarcinus planatus* (Fabricius), ♂, magn. 2. Fig. 2*a*, dactylus of last pair of walking legs, magn. 10.
Fig. 3. *Hymenicus edwardsi* Filhol, ♂, magn. 3. Fig. 3*a* anterior part of carapace, magn. 10. Fig. 3*b* external maxilliped, magn. 10. Fig. 3*c* abdomen, magn. 10.
Fig. 4. *Elamena truncata* (Stimpson), ♂, magn. 3. Fig. 4*a* ventral view of anterior part of carapace, magn. 10. Fig. 4*b*, ♀, magn. 3. Fig. 4*c* dactylus of last pair of walking legs of the ♀, magn. 10.
Fig. 5. *Elamenopsis lineata* A. Milne-Edwards, ♂, magn. 7. Fig. 5*a* chela, outer view, magn. 15. Fig. 5*b* external maxilliped, magn. 25. Fig. 5*c* abdomen, magn. 15.

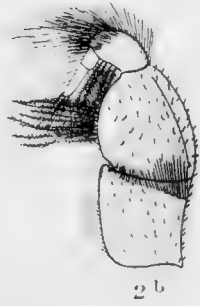
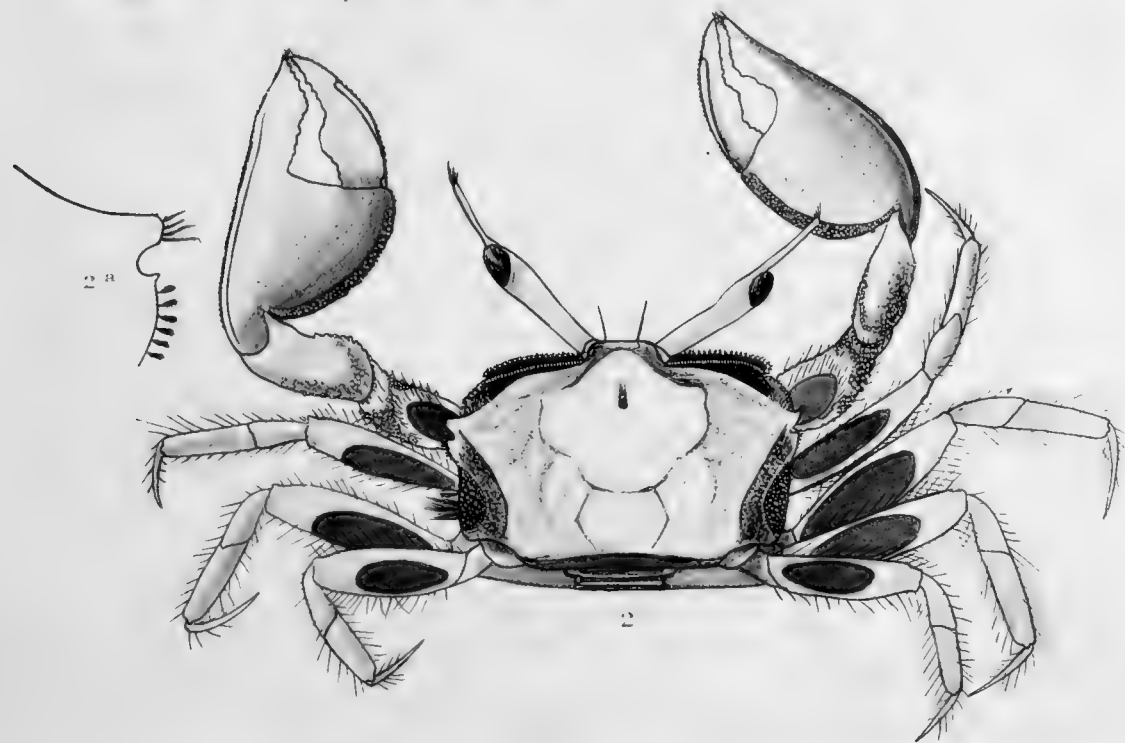
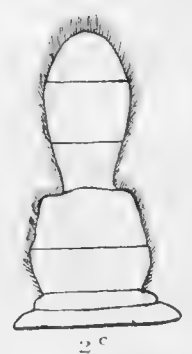
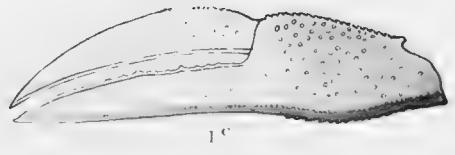
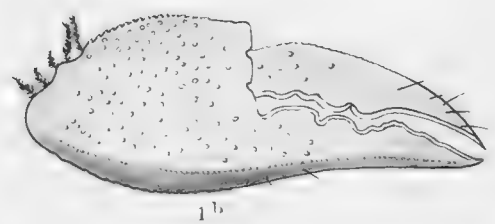
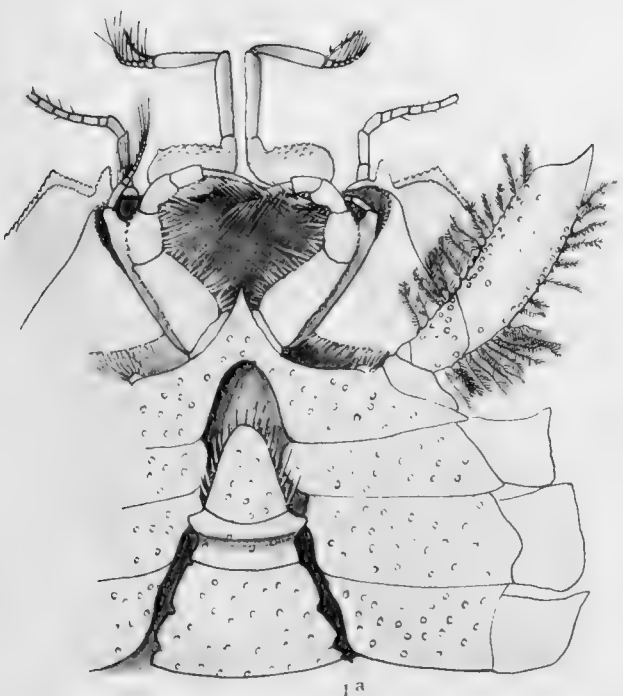
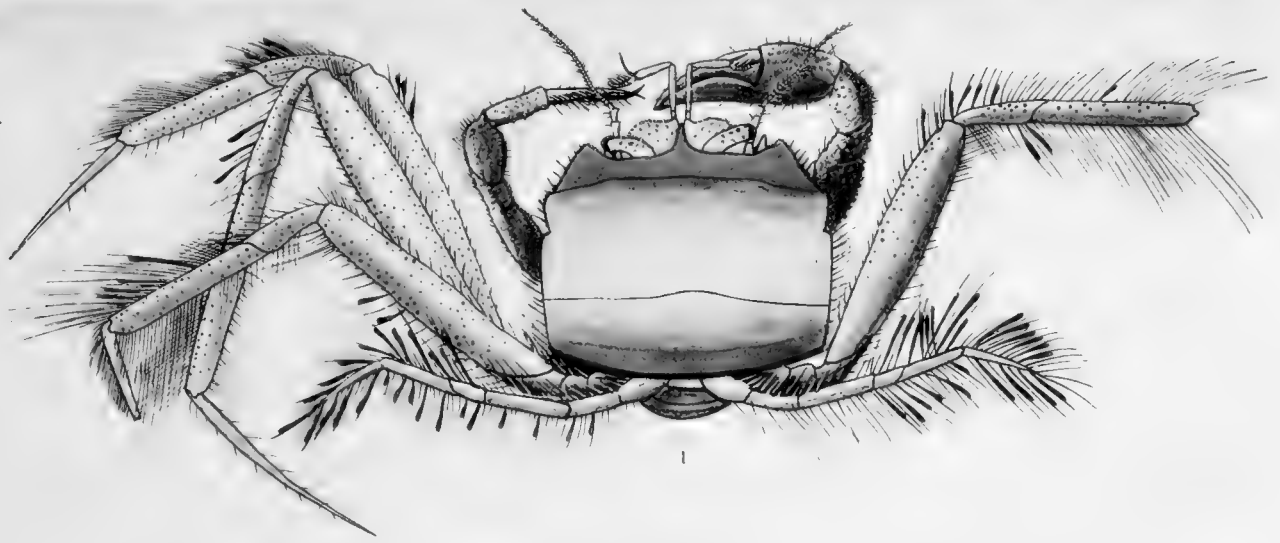


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- 1. *Hymenosoma orbiculare* Desmarest.
- 2. *Halicarcinus planatus* (Fabricius).
- 3. *Hymenicus edwardsi* Filhol.
- 4. *Elamena truncata* (Stimpson).
- 5. *Elamenopsis lineata* A. Milne-Edwards.

PLATE II.

- Fig. 1. *Retropluma plumosa* n. sp., ♂, magn. 5. Fig. 1*a* ventral view of carapace, magn. 10. Fig. 1*b* larger chela, outer view, magn. 10. Fig. 1*c* smaller chela, outer view, magn. 10.
- Fig. 2. *Tympanomerus ceratophorus* (Koelbel), ♂, magn. 7. Fig. 2*a* external orbital angle and epibranchial tooth, magn. 20. Fig. 2*b* external maxilliped, magn. 15. Fig. 2*c* abdomen, magn. 10.



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1. *Retropluma plumosa* n.sp.

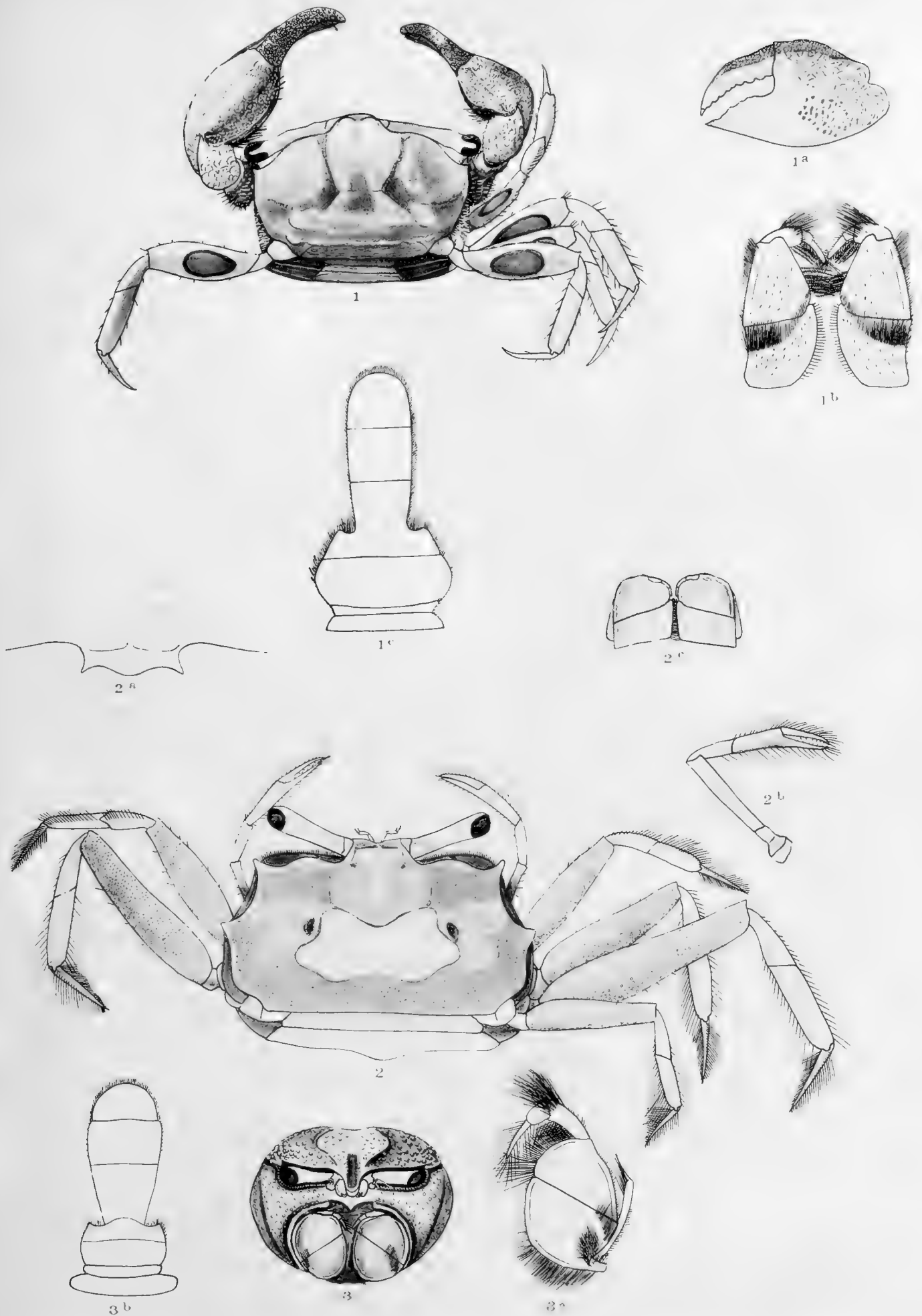
2. *Tympanomerus ceratophorus* (Koelbel).



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PLATE III.

- Fig. 1: *Tympanomèrus integer* n. sp., ♂, magn. 7. Fig. 1a chela, outer view, magn. 7. Fig. 1b external maxillipeds, magn. 15. Fig. 1c abdomen, magn. 10.
- Fig. 2: *Paracleistostoma dentatum* n. sp., ♀, magn. 10. Fig. 2a front, anterior view, magn. 20. Fig. 2b - chela, magn. 10. Fig. 2c external maxillipeds, magn. 10.
- Fig. 3: *Scopimera globosa* de Haan, cephalothorax in front view, magn. 4. Fig. 3a external maxilliped, magn. 7. Fig. 3b abdomen of ♂, magn. 5.



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1. *Tympanomerus integer* n.sp.

2. *Paracleistostoma dentatum* n.sp.

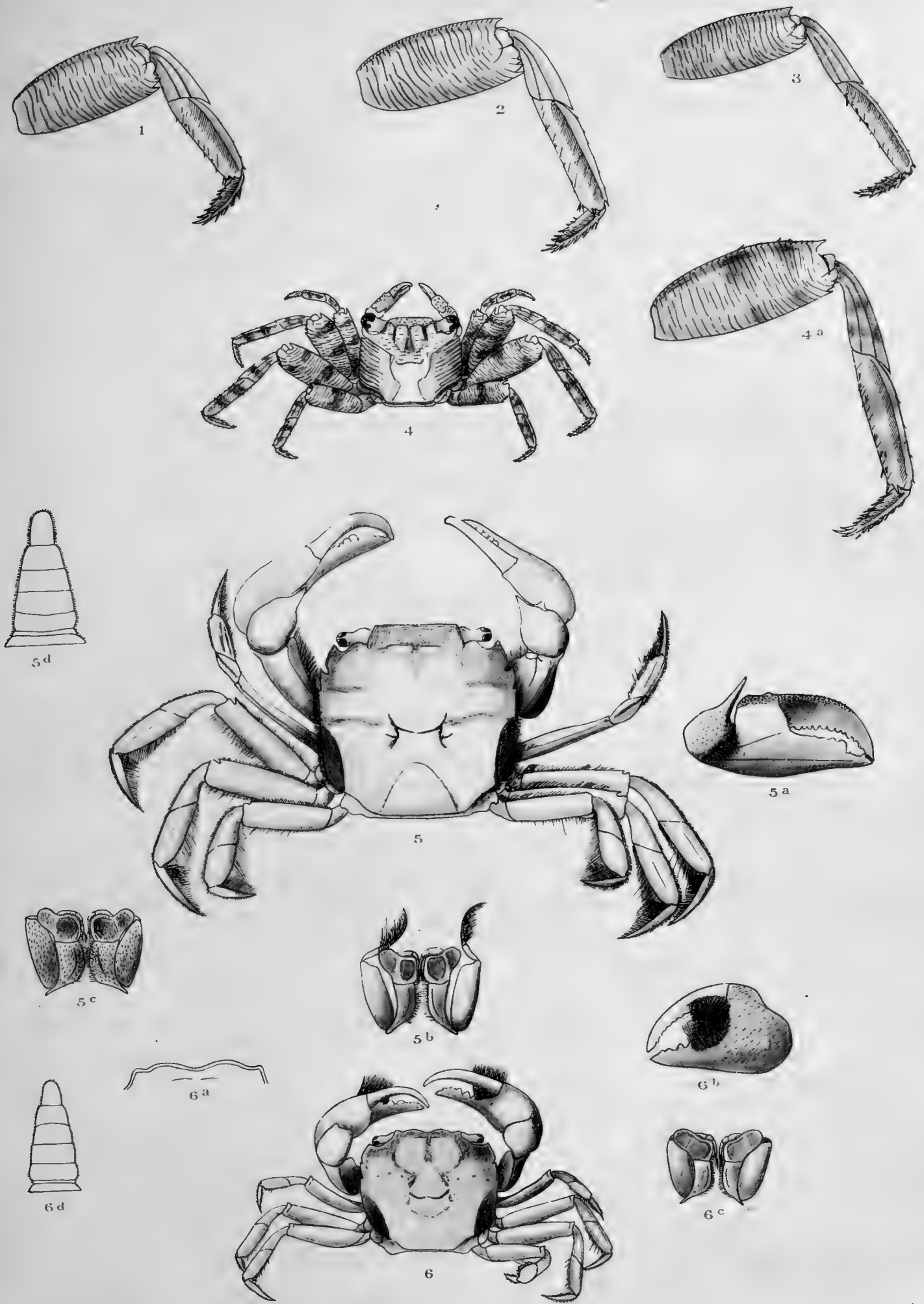
3. *Scopimera globosa* de Haan.





PLATE IV.

- Fig. 1. *Grapsus strigosus* Herbst, penultimate leg (breadth of carapace 45.5 mm.), natural size.
Fig. 2. *Grapsus maculatus* Catesby, penultimate leg (breadth of carapace 46 mm.), natural size.
Fig. 3. *Grapsus maculatus gracilipes* H. Milne-Edwards, penultimate leg (breadth of carapace 37 mm.), nat. size.
Fig. 4. *Grapsus strigosus longitarsis* Dana, young ♂, magn. 2 $\frac{1}{2}$. Fig. 4a penultimate leg, magn. 5.
Fig. 5. *Ptychognathus altimanus* (Rathbun), ♂, magn. 2. Fig. 5a chela, outer view, magn. 2. Fig. 5b external maxillipeds of ♂, magn. 2. Fig. 5c external maxillipeds of ♀, magn. 3. Fig. 5d abdomen of ♂, magn. 2.
Fig. 6. *Ptychognathus guineensis* Rathbun, ♂, magn. 2 $\frac{1}{2}$. Fig. 6a front, dorsal view, magn. 5. Fig. 6b chela, outer view, magn. 3. Fig. 6c external maxillipeds, magn. 3. Fig. 6d abdomen, magn. 3.



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1. *Grapsus strigosus* Herbst, penult. leg.

2. *Grapsus maculatus* Catesby, penult. leg.

3. *Grapsus maculatus gracilines* H. Milne-Edwards, penult. leg.

4. *Grapsus strigosus longitarsis* Dana.

5. *Ptychognathus altimanus* (Rathbun).

6. *Ptychognathus guijulugani* Rathbun.

PLATE V.

- Fig. 1. *Pseudograpsus laniger* n. sp., ♂, magn. 4. Fig. 1*a* ventral view of carapace, magn. $4\frac{1}{2}$. Fig. 1*b* chela, outer view, magn. 7. Fig. 1*c* chela, inner view, magn. 7. Fig. 1*d* abdomen, magn. 5.
- Fig. 2. *Sesarma (Holometopus) elongata* A. Milne-Edwards, ♀, magn. $1\frac{1}{2}$.
- Fig. 3. *Camptandrium sexdentatum* Stimpson, ♂, magn. 3. Fig. 3*a* ventral view of carapace, magn. 5. Fig. 3*b* cheliped, outer view, magn. 5. Fig. 3*c* abdomen, magn. 5.



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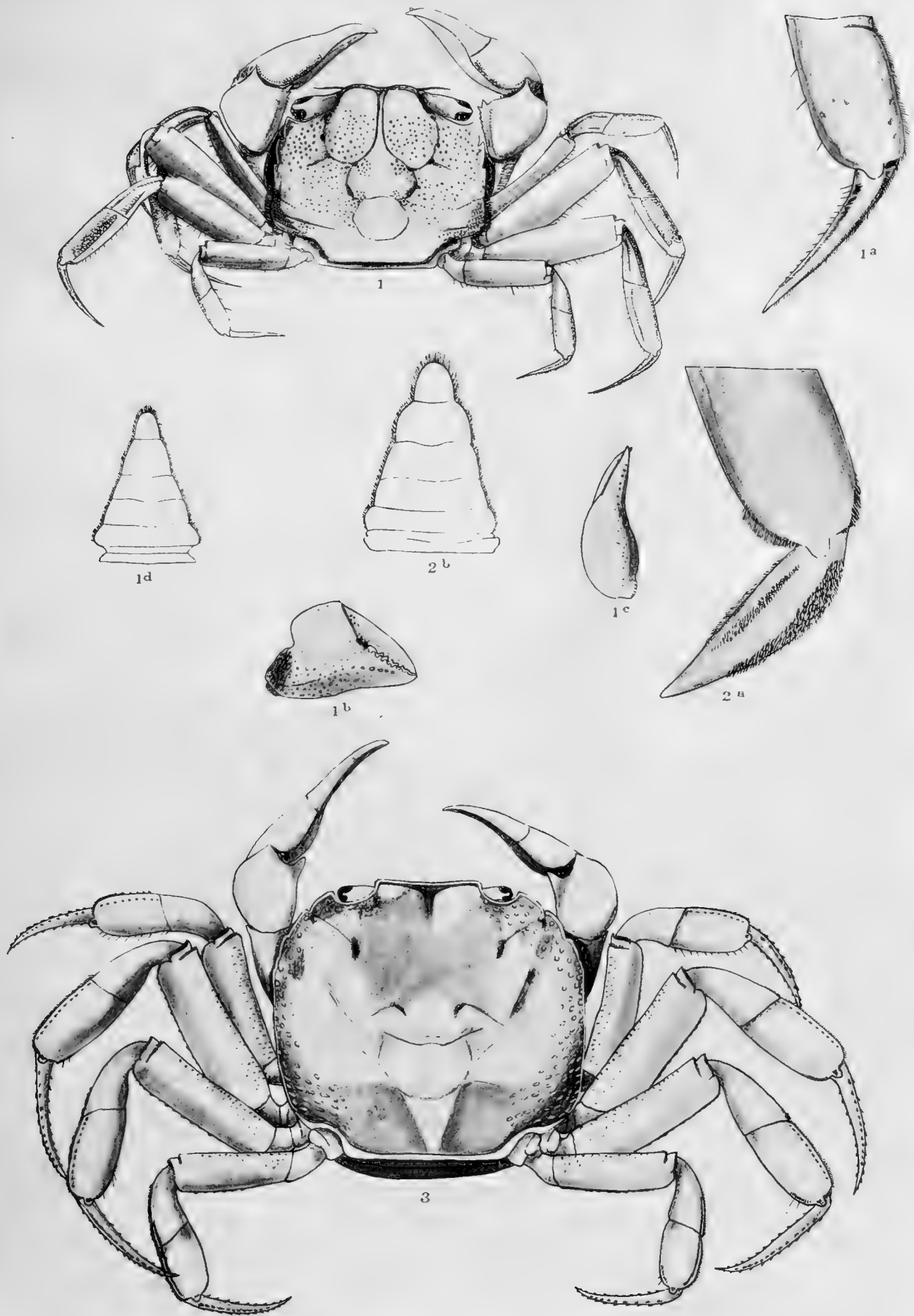
1. *Pseudograpsus laniger* n. sp.

2. *Sesarma (Holometopus) elongata* A. Milne-Edwards.

3. *Camptandrium sexdentatum* Stimpson

PLATE VI.

- Fig. 1. *Helice subquadrata* (Dana), ♂, magn. 3. Fig. 1*a* propodite and dactylus of posterior legs, magn. 10.
Fig. 1*b* chela, outer view, magn. 3. Fig. 1*c* chela, ventral view, magn. 3. Fig. 1*d* abdomen,
magn. 3.
- Fig. 2. *Paragrapsus laevis* (Dana), propodite and dactylus of posterior legs, magn. 10. Fig. 2*b* abdomen,
magn. 3.
- Fig. 3. *Epigraepsus* (= *Grapsodes*) *notatus* Heller, ♀, magn. 2.



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1. *Helice subquadrata* (Dana).

2. *Paragrapsus laevis* (Dana).

3. *Epigrapsus* (= *Grapsodes*) *notatus* Heller.



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ZOOLOGIQUES, BOTANIQUES, Océanographiques ET GEOLOGIQUES

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INDES NÉERLANDAISES ORIENTALES, en 1899—1900.
à bord du **SIBOGA**
SOUS LE COMMANDEMENT DE
G. F. TYDEMAN
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BY

DR. J. J. TESCH

LEIDEN

II

GONEPLACIDAE AND PINNOTHERIDAE

(p. 244)

With 12 plates

Monographie XXXIX^a of:

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verzameld in Nederlandsch Oost-Indië 1899—1900

aan boord H. M. Siboga onder commando van
Luitenant ter zee 1^e kl. G. F. TYDEMAN

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OP

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VERZAMELD IN

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BOEKHANDEL EN DRUKKERIJ

VOORHEEN

E. J. BRILL

LEIDEN

Siboga-Expeditie
XXXIX c¹

THE DECAPODA BRACHYURA OF THE
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BY

DR. J. J. TESCH

LEIDEN

II

GONEPLACIDAE AND PINNOTHERIDAE

With 12 plates



LATE E. J. BRILL
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INTRODUCTION.

In the present paper two families, Goneplacidae and Pinnotheridae, are dealt with, so that now the whole group of the Catometopous Crabs has been worked out.

The members of these families are for the most part little known, partly because of their usually small size and partly on account of the fact, that a great many species have a commensalistic mode of life, with Lamellibranchs in the majority of cases, but also in Holothurians, Echinoids, Ascidians, and in tubes of Annelids. They may be very scantily represented or even entirely absent in large collections, so the "Challenger" and the "Valdivia" obtained each only 11 species, the "Sealark" expedition in the Indian Ocean (1905) a single species.

The materials of the "Siboga" expedition proved to be very rich in this respect, and may easily stand a comparison with the large collection, made by MORTENSEN in the Gulf of Siam and examined by Miss RATHBUN (1910). The two families taken together yielded 50 species, 15 of which turned out to be new, and 3 of these represent as many new genera.

In a rapid glance over the results obtained we first take the Goneplacidae.

These are represented in the collection by 37 species, 12 of which are new to science, while 2 new genera are established. The genus *Litocheira* Kinahan yielded six species, three of which are new. The subfamily *Goneplacinae*, besides by two already known species of *Goneplax*, is represented by a new form of the remarkable New Zealandian genus *Ommatocarcinus* White. Of the subfamily *Prionoplacinae*, which is nearly exclusively American, the little known *Homoioplax haswelli* (Miers) Rathbun was found back; the genus *Speocarcinus* Stimpson, which was known only from the Atlantic and Pacific coasts of America, is represented by a new species; and finally a genus (*Lophoplax*) has been established on a new species. Of the subfamily *Rhizopinae* a whole series of new or little known species were obtained, numbering 18 in all; of these 5 new species (*Typhlocarcinops* Rathbun 2, *Xenophthalmodes* Richters 1, *Typhlocarcinodes* Alcock 1, *Hephthopelta* Alcock 1) belong to already known genera, a 6th species represents a new genus, *Paraselwynia*.

Of the Pinnotheridae (13 species) the rich genus *Pinnotheres* is of course abundantly represented; of the 8 species obtained I am satisfied to refer 6 to already known species, while 2 others are apparently new; the discrimination of the various species is often most troublesome. In the subfamily *Asthenognathinae* a genus, *Aphanodactylus*, is proposed to receive a

new species. Besides I have taken this opportunity to redescribe an old species, "*Malacosoma*" *reticulatum* de Man, which has never been figured, and of which I could examine the only known specimen.

In the following table the results arrived at are arranged.

Family GONEPLACIDAE.

	Species	New
Subfam. <i>Pseudorhombilinae</i>		
<i>Pilumnoplax</i> Stimpson	1	—
<i>Eucrate</i> de Haan	1	—
<i>Psopheticus</i> Wood-Mason	1	—
<i>Litocheira</i> Kinahan	6	3
<i>Catoptrus</i> A. Milne-Edwards	2	—
Subfam. <i>Goneplacinae</i>		
<i>Goneplax</i> Leach.	2	—
<i>Ommatocarcinus</i> White	1	1
Subfam. <i>Prionoplacinae</i>		
<i>Homoioplax</i> Rathbun	1	—
<i>Speocarcinus</i> Stimpson	1	1
<i>Lophoplax</i> n. g.	1	1
Subfam. <i>Rhizopinae</i>		
<i>Ceratoplax</i> Stimpson	2	—
<i>Typhlocarcinus</i> Stimpson.	2	—
<i>Typhlocarcinops</i> Rathbun	3	2
<i>Xenophthalmodes</i> Richters	1	1
<i>Mertonia</i> Laurie	1	—
<i>Notonyx</i> A. Milne-Edwards	2	—
<i>Paraselwynia</i> n. g.	1	1
<i>Scalopidia</i> Stimpson	1	—
<i>Typhlocarcinodes</i> Alcock	3	1
<i>Hephthopelta</i> Alcock	1	1
<i>Camatopsis</i> Alcock	1	—
Subfam. <i>Hexapodinae</i>		
<i>Hexapus</i> de Haan	1	—
<i>Hexaplax</i> Doflein	1	—
Total	37	12

Family PINNOTHERIDAE.

	Species	New
Subfam. <i>Pinnotherinae</i>		
<i>Pinnotheres</i> Latreille	8	2
<i>Ostracotheres</i> H. Milne-Edwards	1	—
Subfam. <i>Pinnotherelinae</i>		
<i>Tetrias</i> Rathbun	1	—
Subfam. <i>Xenophthalminae</i>		
<i>Xenophthalmus</i> White.	1	—
Subfam. <i>Asthenognathinae</i>		
<i>Chasmocarcinops</i> Alcock	1	—
<i>Aphanodactylus</i> n. g.	1	1
Total	13	3

Many of the forms already described are nevertheless little known and my endeavours to fill these gaps of our knowledge, as far as I could, have greatly enlarged the scope of the present work, not only because I tried to arrive at a survey, as complete as possible with the means at my disposal, of all the Indo-Pacific, and partly also of the Atlantic, species, but also because it proved necessary to figure, either for the first time or anew, a large part of the "known" forms.

Again it is a grateful task to me to thank Dr. J. G. DE MAN for some good advice and for the loan of rare papers, which otherwise would be inaccessible to me.

Leiden, March 7, 1918.

GONEPLACIDAE.

This family has until recent years been generally assigned to the Ocypodidae, to which view the elongate eye-stalks of *Goneplax* at first sight afford a great probability. H. MILNE-EDWARDS in 1852 already divided his "tribu principale" *Ocypodinae* into two "agèles": *Ocypodiaceae* and *Gonoplacae*, the latter again was split up into "*Gonoplacés vigils*" (including mostly genera, that are now known to constitute the subfamily *Macrophthalminae*) and "*Gonoplacés cancéroïdes*", with the genera *Goneplax*, *Ommatocarcinus* and *Prionoplax*. Besides, two genera, *Pseudorhombila* and *Carcinoplax* are, under the name *Carcinoplacinae*, designated as "tribu satellite des *Ocypodinae*"¹⁾.

This classification, with slight alterations, has a long time been maintained and the group was, shortly after the publication of MILNE-EDWARDS' paper, greatly increased by STIMPSON²⁾, who, besides adding some new genera to the Carcinoplacidae, established a new family, Rhizopidae, for the reception of several genera, and included both families in his "Ocypodoidea".

MIERS³⁾ in 1886 divided the Ocypodidae into two subfamilies: *Carcinoplacinae* and *Ocypodinae*, one of the subgroups of the latter being the *Gonoplacinae*. Both *Carcinoplacinae* and *Gonoplacinae* were raised to the rank of families by ORTMANN⁴⁾ in 1894 and united in a group CARCINOPLACINI, that is definitely removed from the Ocypodidae, which are included in another subgroup: GRAPSINI. This view, however, is far from having been accepted by subsequent authors⁵⁾ who kept to the older classification, though ALCOCK⁶⁾ in 1900 definitely established ORTMANN'S view, and, by adding to our family the *Hexapodinae*, still enlarged it. In this paper ALCOCK'S classification is followed.

Already by their habits the present family differs widely from the Ocypodidae: none of the species frequents the beach and none is living in fresh or brackish water; on the contrary all the species are strictly marine, showing a preference to deeper layers and some genera inhabit exclusively the deep sea. A great many of the species is very small and among these

1) Ann. Sc. Nat. (3), t. 18, 1852, p. 140—164.

2) Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 93—96.

3) Rep. "Challenger", Brachyura, 1886, p. 222, 236—237.

4) Zool. Jahrb., Syst., Bd 7, 1894, p. 683—685.

5) Even in 1906 Miss RATHBUN (Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, p. 834—835) persists in classing some genera of the present family with the Ocypodidae.

6) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 286—287.

a commensalistic mode of living with Lamellibranchs, in worm-tubes, corals etc. is either proved or rendered most likely.

The monographer's task is greatly impaired by a large number of species, and even of not a few genera, being very incompletely known and especially by the scarcity of good figures. ALCOCK indeed has given a most useful synopsis of British Indian species; he distinguishes the following subfamilies: *Pseudorhombilinae*, *Goneplacinae*, *Prionoplacinae*, *Rhizopinae* and *Hexapodinae*. Miss RATHBUN¹⁾ has afterwards proposed a new subfamily, *Typhlocarcinopsinae*, which for reasons explained further on I have not maintained.

The discrimination of the subfamilies has been given by ALCOCK.

Subfam. PSEUDORHOMBILINAE.

1852. *Carcinoplacinae* H. Milne-Edwards. Ann. Sc. Nat. (3), t. 18, p. 164.

1886. *Carcinoplacinae* Miers. Rep. "Challenger", Brachyura, p. 223.

1900. *Pseudorhombilinae* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 286, 292.

ALCOCK enumerates, though sometimes with a query, fifteen genera of the subfamily, removing at the same time *Geryon* Kröyer and *Camptoplax* Miers, that are referred to the Xanthidae. Of these fifteen genera *Brachygrapsus* Kingsley is almost certainly identical with *Litocheira* Kinahan, *Camptandrium* Stimpson has now turned out to be one of the Ocypodidae (see p. 68 of the first part of the present paper), *Cryptocoeloma* Miers is very little known and has been doubtfully referred by MIERS himself to the *Rhizopinae*, *Heteroplax* Stimpson is most likely synonymous with *Eucrate* de Haan, and *Platypilumnus* Wood-Mason seems to belong to the Xanthidae.

So there remain ten genera, of which two, viz. *Frevillea* A. Milne-Edwards²⁾ (not *Freyvillea* as ALCOCK spells it) with three species, and *Bathyplax* A. Milne-Edwards³⁾ with a single one⁴⁾, are Atlantic and live on the western side of this ocean. Miss RATHBUN afterwards added two new genera, *Tetraplax*⁵⁾, with one species, from the West Indies, and *Trizocarcinus*⁶⁾, likewise with one species, from the Gulf of California. All these American genera, except perhaps the last, are most incompletely known and, except for *Bathyplax* and *Trizocarcinus*, have never been figured.

This subfamily, like the *Prionoplacinae*, has the utmost affinity with such Xanthoid forms like *Eucratodes* A. Milne-Edwards and indeed it is nearly impossible to trace a distinct boundary; on the other hand the genus *Catoptrus* A. Milne-Edwards is perhaps better to be referred to the Portunidae.

I have here, following ALCOCK, retained the name of the subfamily, but the genus

1) K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 345.

2) Bull. Mus. comp. Zool. Harvard Coll., v. 8, 1880, p. 15.

3) L. c., p. 16.

4) MIERS (Rep. "Challenger", Brachyura, 1886, p. 230, pl. 20, f. 3) describes a subspecies.

5) Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 9. The type is *Frevillea quadridentata* Rathbun, Bull. Lab. Nat. Hist. State Un. Iowa, v. 4, 1898, p. 287, p. 8, f. 1.

6) Proc. U. S. Nat. Mus., v. 47, 1914, p. 117, textfig. 1, pl. 1. The type is *Carcinoplax dentata* Rathbun, Proc. U. S. Nat. Mus., v. 16, 1893, p. 243.

Pseudorhombila H. Milne-Edwards is very obscurely known. A long time it contained only a single species, *Ps. quadridentata*¹⁾, known only by a most incomplete description and never figured, and the habitat of which is unknown. In recent years Miss RATHBUN²⁾ described a new West Indian species, *Ps. octodentata*, but again without any figure.

To ALCOCK's useful memoir it may be again allowed to refer for the discrimination of the genera (p. 297—298).

Carcinoplax H. Milne-Edwards.

1833. *Curtonotus* (part.) de Haan. Faun. Japon., Crust., p. 21 (praeocc.).

1852. *Carcinoplax* H. Milne-Edwards. Ann. Sc. Nat. (3), t. 18, p. 164.

The "Siboga" did not secure any representative of this genus, which is the more astonishing, as no less than seven new species have been recently collected by the "Albatross" in Philippine waters and described by Miss RATHBUN. I must restrict myself to the mere enumeration of the species in chronological order.

1835. *C. longimana* (de Haan). Literature: ALCOCK, l. c., p. 303. A new subspecies (*indica*) has been described by DOFLEIN (Wiss. Erg. "Valdivia" Exp., Bd 6, Brachyura, 1904, p. 114, pl. 35, f. 1—2). The Indian specimens appear all to be referable to this subspecies; the typical species inhabits Japanese waters.
1858. *C. cburnea* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 94. Smithsonian Inst., Miscell. Coll., v. 49, 1907, p. 94. Hab. Bonin Islands, in shallow waters.
1891. *C. longipes* (Wood-Mason). Literature: ALCOCK, l. c., p. 303. DOFLEIN, l. c., p. 117. Hab. Travancore coast, Andamans, Nicobars, in depths of 400—785 metres.
1914. *C. bispinosa* Rathbun. Proc. U. S. Nat. Mus., v. 48, 1914, p. 137. Hab. Philippine waters, in 90 fathoms.
1914. *C. spinosissima* Rathbun. Ibid. p. 139. Hab. like the preceding, in 165 fathoms.
1914. *C. confragosa* Rathbun. Ibid. p. 140. Hab. like the preceding, in 127 fathoms.
1914. *C. purpurea* Rathbun. Ibid. p. 140. Hab. like the preceding, in 90 fathoms.
1914. *C. angusta* Rathbun. Ibid. p. 142. Hab. like the preceding, in 90 fathoms.
1914. *C. verdensis* Rathbun. Ibid. p. 143. Hab. like the preceding, in 394 fathoms.
1914. *C. specularis* Rathbun. Ibid. p. 143. Hab. like the preceding, in 159 fathoms.

Pilumnoplax Miers.

1886. *Pilumnoplax* Miers. Rep. "Challenger", Brachyura, p. 225.

Nec *Pilumnoplax* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 93.

This genus was established in 1858 to receive four species: *sulcatifrons*, *longipes*, *sculpta*

1) Hist. Nat. Crust., t. 2, 1837, p. 59.

2) Proc. Biol. Soc. Washington, v. 19, 1906, p. 91. It is indeed disappointing to find, how this author at every time misses the opportunity of filling up the gaps and incompletenesses in carcinological literature and, I am sorry to say, frequently adds to the existing confusion. Obscure species, the systematic place of which is even often uncertain, are passed by with hardly any comment whatever; new species are rapidly glanced over, her descriptions take the form of short notes, hurriedly thrown down, and figures are either not at all given, or, if so, are often dispensed with by photographs, which, in many cases, leave one unsatisfied about essential features. Her enormous productivity of work is by no means always associated with painstaking exactness.

and *ciliata*. The first species, however, certainly belongs to *Eucrate* de Haan; *longipes* is very obscurely known, but according to STIMPSON's posthumous treatise¹⁾ the front is "deflexed and emarginate at the middle" and with a supra-marginal line of long hairs, which suggests an affinity to *Litocheira* Kinahan; *sculpta* is according to STIMPSON's figure²⁾ too much sculptured to belong to *Pilumnoplax* and the front is likewise deflexed³⁾; finally *ciliata* is doubtless a species of *Litocheira*.

The name should, then, become a synonym, partly of *Eucrate*, partly of *Litocheira*, but MIERS afterwards included into *Pilumnoplax* two species, which certainly warrant the constituting of a new genus and, though strictly speaking the name given by STIMPSON is not admissible, I have retained it here. We must in this case adhere to ALCOCK's definition⁴⁾ of the genus, and particularly exclude from it those species with the front turned strongly down and bilobed; in genuine *Pilumnoplax* the front is, on the contrary, feebly deflexed, in a line with the general longitudinal curve of the carapace, overhanging the antennulae, and with the anterior margin perfectly straight and usually entire; the carapace is flattened from side to side and hairless; the ambulatory legs are slender.

The species of the genus thus restricted are all inhabitants, as far as is known, of the deeper parts of the ocean bottom, save *P. vestita* (de Haan), which seems to live in shallow water. This species deviates also in its outer aspect from the other species, for the carapace, the legs and especially the chelae are very hairy, the front does not overhang the antennules, and the legs are stout and short; yet, following MIERS and ORTMANN, I have let it retain its place in the present genus. On the other hand I have serious doubts about the true systematic place of *P. acanthomerus* Rathbun⁵⁾, found at only 30 fathoms near the Amirante Islands in the Western Indian Ocean. This species has the front nearly half as broad as the carapace, with the anterior edge sinuous, emarginated in the middle and near each lateral angle, the chelipeds and ambulatory legs are profusely spiny, stout and bulky.

I thus admit only the following species, one of which has been brought home by the "Siboga":

- P. vestita* (de Haan)
- P. heterocheir* (Studer)
- P. abyssicola* Miers
- P. glaberrima* Ortmann
- P. americana* Rathbun
- P. cooki* Rathbun.

Key to the species:

1. Carapace much hairy, with two widely separated, little prominent teeth behind each external orbital angle. Chelae with a long fur on proximal and upper part of outer surface. Ambulatory

1) *Smithson. Inst., Miscell. Coll.*, v. 49, 1907, p. 91.

2) *Ibid.*, p. 91, pl. 11, f. 3.

3) I shall refer to this species later on, as the "Siboga" caught a species nearly related to it.

4) "Investigator" *Deep Sea Brachyura*, 1899, p. 74; *Journ. As. Soc. Bengal*, v. 69, part 2, 1900, p. 311.

5) *Transact. Linn. Soc. London* (2), v. 14, 1911, p. 237, pl. 18, f. 3.

- legs short and stout, heavily fringed, especially propodites of last pair of legs. *P. vestita* (de Haan)¹⁾
 Carapace and legs naked 2
2. Inner angle of wrist of cheliped with two spines 3
 Inner angle of wrist with only one spine 4
3. Carapace granulate anteriorly, front notched in the middle, epigastric lobes distinct, gastric and anterior branchial regions with transverse ridges. Ambulatory legs about twice the length of carapace, mero-, carpo- and propodite roughly granulate at anterior margin *P. heterocheir* (Studer)²⁾
 Carapace smooth, finely frosted, front grooved, but not notched in the middle, no epigastric lobes. Ambulatory legs slender, penultimate pair about three times the length of carapace, not granulate at anterior margin *P. americana* Rathbun³⁾
4. Both epibranchial teeth behind ext. orb. angle prominent, acute and of equal size *P. abyssicola* Miers
 Anterior epibranchial tooth small and blunt, next one strong, spiniform 5
5. Inner angle of wrist of cheliped prominent, acute, in the middle of inner surface of palm one obtuse tubercle. Propodite of last pair of ambulatory legs somewhat depressed and flattened. *P. glaberrima* Ortmann⁴⁾
 Inner angle of wrist subrectangular. Ambulatory legs slender, second pair more than twice the length of carapace; propodites of last pair not flattened. *P. cooki* Rathbun⁵⁾

1. *Pilumnoplax abyssicola* Miers.

1886. *Pilumnoplax abyssicola* Miers. Rep. "Challenger", Brachyura, p. 228, pl. 19, f. 2.

Stat. 139. 0° 11' S., 127° 25' E. Between Kajoa Island and Batjan. Depth 397 m. 1 ♂.

Stat. 266. 5° 56'.5 S., 132° 47'.7 E. South-east of Kei Islands. Depth 595 m. 1 ♂ juv.

Stat. 267. 5° 54' S., 132° 56'.7 E. South east of Kei Islands. Depth 984 m. 1 ♂.

This interesting species has been well described and figured by MIERS, so that a long description is useless. According to MIERS the carapace is closely granulate and pubescent near the margins, in the specimens at hand, however, the carapace is not granulate, but densely

1) *Cancer (Cartonotus) vestitus* de Haan, Faun. Japon., Crust., 1835, p. 51, pl. 5, f. 3; *Carcinoplax vestitus* H. Milne-Edwards, Ann. Sc. Nat. (3), t. 18, 1852, p. 164; *Pilumnoplax vestita* Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 687; *Carcinoplax vestita* Rathbun, Proc. U. S. Nat. Mus., v. 26, 1903, p. 24. Hab. Japan.

2) Literature and description: MIERS, Rep. "Challenger", Brachyura, 1886, p. 227, pl. 19, f. 1; DOFLEIN, Wiss. Erg. "Valdivia", Bd 6, Brachyura, 1904, p. 119; STEBBING, Transact. Roy. Soc. Edinburgh, v. 50, prt 2, 1914, p. 265. Hab. Southern parts of Atlantic and Indian Ocean, in depths from 75 to 375 fathoms.

3) Literature and description: DOFLEIN, l. c., p. 120, pl. 35, f. 3—4. Hab. Atlantic coast of North America, coast of Travancore (British India), west coast of Sumatra, in depths varying from 80 to 440 fathoms.

4) Zool. Jahrb., Syst., Bd 7, 1894, p. 687, pl. 23, f. 2. Hab. Japan, depth unknown.

5) Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 835, pl. 7, f. 3. Hab. Hawaiian Islands, in 256—330 fathoms.

punctate, when seen under the lens, and there is not a trace of pubescence. The dentation of the margins agrees quite well with MIERS' figure, specially with his figure 2a, which presents the anterior part of the cephalothorax in ventral view. The meropodite of the cheliped is armed with an obsolete tooth near the distal end of the superior margin, the inner angle of the wrist strongly prominent, the palm perfectly smooth, minutely punctate, at least in the adult (in the young ♂ the palms are closely studded with small, sharp granules); the chelae are unequal, the right being the larger; in the larger chela the palm is higher, the fingers are shorter and more strongly toothed than in the left; in both chelae the fingers are longitudinally grooved; the mobile finger of the right bears a strong, obtuse tooth, curved backward, near the base of the inner margin. In the adult ♂ of Stat. 139 the fingers retain still a light-brown colour, like that of the cornea, and the propodites of the ambulatory legs are clad with a short fur, wrapped all round, and extending on to the dactyli; in the second adult and in the young the fingers are nearly or wholly colourless, the two last joints of the walking legs are much less hairy.

The largest ♂ of Stat. 139 has a greatest width of carapace (between tips of posterior epibranchial teeth) of 15.5 mm. and a length of 11.75 mm., the ♂ of Stat. 267 is very slightly smaller, and the young specimen of Stat. 266 is only 5 mm. broad and 4.5 mm. long. This last specimen was found on a deep sea Sponge (a Hexactinellid); perhaps in youth the species leads a commensalistic existence.

The only "Challenger" specimen was dredged near the Fiji Islands, from a depth of 315 fathoms and was of about the size of my adult individuals.

Eucrate de Haan.

1835. *Eucrate* de Haan. Faun. Japon., Crust., p. 36.

1858. *Heteroplax* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 94.

1903. *Platyosius* Borradaile. Faun. and Geogr. Maldives and Laccadive Arch., v. 1, p. 243.

In the fronto-orbital breadth not being much less than the greatest width of the carapace, the genus, with *Pilumnoplax*, differs from *Carcinoplax* and its allies (*Catoptrus*, *Libystes*), but it is distinguished among all others by the basal (or rather second) joint of the antennae excluding itself from the orbit by means of an acute process at its antero-external angle, which process is in contact with the inner suborbital lobe, and with the external angle of the front.

The anterior margin of the front is straight, slightly notched in the middle; the antero-lateral margins of the carapace are short and usually armed with four depressed, blunt teeth; the dactyli of the walking legs are long, slender and unarmed, those of the last pair are shorter, much depressed, spiny along the margins and wholly straight.

The genus *Heteroplax* with two species is very little known, but STIMPSON expressly states the excluding of the antennae from the orbits; for this reason DE MAN¹⁾ placed the genus near *Eucrate* and ALCOCK²⁾ afterwards considered it identical with DE HAAN's genus.

1) Journ. Linn. Soc. London, v. 22, 1888, p. 89.

2) L. c., p. 298.

Miss RATHBUN¹⁾, however, maintains *Heteroplax* as a distinct genus and records both of STIMPSON's species from the Gulf of Siam, but without any comment whatever.

As to *Platyozius* it was first established by BORRADAILE as a subgenus of *Pseudozius*; afterwards²⁾ it was declared to be nearer related to *Pilumnoplax*, but still regarded as belonging to the Xanthidae. Though it must be admitted that the limit between Goneplacidae and Xanthidae is largely arbitrary, the position of the male organs in such genera as *Pilumnoplax*, *Eucrate* etc. certainly points to the Goneplacidae, and I have associated *Platyozius* with *Eucrate*, on account of its general appearance, notwithstanding BORRADAILE's not mentioning anything about the antennae.

Five species in all are here included in the genus³⁾, one of which has been dredged by the "Siboga".

Key to the species:

1. Margins of carapace without teeth or at most with two inconspicuous nodules. Chelipeds in ♂ very massive, longer than the walking legs *E. hamiltoni* Mc Culloch⁴⁾
Antero-lateral margins of carapace four-toothed. 2
2. Front transversely grooved. Antero-lateral teeth of carapace all distinct, but the two middle ones on each side the largest . 3
Second and fourth antero-lateral teeth nearly obsolete . . . 4
3. Large species (breadth of carapace 30—40 mm.); carapace much convex longitudinally, not sculptured, only with an oblique ridge on posterior teeth *E. crenata* (de Haan)⁵⁾
Small species (breadth of carapace 15—20 mm.); carapace more flattened, with some short transverse ridges anteriorly; on the branchial regions at each side a more or less distinct, longitudinal ridge, laterally of which the carapace is strongly declivous. *E. sulcatifrons* (Stimpson)
4. Length of carapace to breadth as 1 : 1.27 *E. dentata* (Stimpson)⁶⁾
Length of carapace to breadth as 1 : 1.46 *E. transversa* (Stimpson)⁷⁾

1. *Eucrate sulcatifrons* (Stimpson).

1858. *Pilumnoplax sulcatifrons* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 93.

1877. *Pilumnoplax sulcatifrons* Targioni-Tozzetti. Viag. "Magenta", Crost., p. 102, pl. 7, f. 2.

1) K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 342.

2) L. c., p. 429.

3) The species *E. sexdentata* Haswell, mentioned by ALCOCK (l. c., p. 301), in reality belongs to the *Prionoplacinae* (*Homoioplax* Rathbun).

4) Rec. Austral. Mus., v. 7, 1908, p. 58, pl. 12, f. 1. Hab. Queensland.

5) *Cancer (Eucrate) crenatus* de Haan, Faun. Japon., Crust., 1835, p. 51, pl. 15, f. 1; *Eucrate crenata* Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 688; RATHBUN, Proc. U. S. Nat. Mus., v. 26, 1903, p. 23. Hab. Japan.

6) *Heteroplax dentata* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 94; RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 342; STIMPSON, Smithsonian Inst., Miscell. Coll., v. 49, 1907, p. 94. Hab. Hongkong and Gulf of Siam.

7) *Heteroplax transversa* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 94; RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 342; STIMPSON, Smithsonian Inst., Miscell. Coll., v. 49, 1907, p. 95. Hab. Hongkong and Gulf of Siam.

1881. *Eucrate affinis* Haswell.-Proc. Linn. Soc. N. S. Wales, v. 6, p. 547.
 1881. *Pseudorhombila sulcatifrons* var. *atlantica* Miers. Ann. Mag. Nat. Hist. (5), v. 8, p. 259.
 1882. *Eucrate affinis* Haswell. Cat. Austral. Crust., p. 86.
 1884. *Pseudorhombila sulcatifrons* var. *australiensis* Miers. Zool. H. M. S. "Alert", Crust., p. 242, pl. 24, f. C.
 1888. *Eucrate affinis* de Man. Journ. Linn. Soc. London, v. 22, p. 89, pl. 5, f. 5-7.
 1900. *Eucrate crenata* and var. *affinis* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 300.
 1903. *Platyozius laevis* Borradaile. Faun. and Geogr. Maldives and Laccadive Arch., v. 1, p. 243, textfig. 45.
 1907. *Pilumnoplax sulcatifrons* Stimpson. Smithson. Inst., Miscell. Coll., v. 49, p. 90.
 1910. *Eucrate crenata* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, p. 340.
 1911. *Eucrate crenata* Rathbun. Transact. Linn. Soc. London (2), v. 14, p. 237.

Stat. 114. Entrance of Kwandang Bay, north coast of Celebes. Depth 75 m. 1 ♂.

Stat. 162. West coast of Salawatti Island, north-west of New Guinea. Depth 18 m. 1 ♀.

Stat. 303. Haingsisi, Samau Island, south-west of Timor. Depth up to 36 m. 1 ♂.

The species *E. crenata* and *E. sulcatifrons* are so very much alike, that there may be no sufficient reason to separate them: both have the front transversely-sulcate, the same dentation of the carapace and the same characteristic patch of hairs at the distal end of the wrist of the cheliped. In STIMPSON'S species the carapace is somewhat less convex longitudinally and there is not only a short transverse ridge, parting from each posterior lateral tooth, but also a faint indication of two epigastric lobes, and the declivous parts of the branchial regions are marked dorsally by a beaded ridge, as mentioned by STIMPSON, DE MAN and ALCOCK in his var. *affinis*.

If *E. crenata* and *sulcatifrons* are really identical and the latter only must be considered a young stage of the former, it remains unexplained why specimens of the Indian Ocean, as far as measurements are given, are constantly smaller than typical *crenata* specimens from Japan. I think it preferable, then, to keep the name *crenata* for the Japanese specimens, that grow to a large size, and to refer the much smaller specimens from the Indian Ocean to *E. sulcatifrons*.

By far the best description and figure of the latter species has been provided by DE MAN. MIERS (1884) considered *Pilumnoplax sulcatifrons* identical with *E. affinis*, and described a new subspecies (*australiensis*), distinguished by the absence of a median notch in the front and by the distal end of the wrist of the cheliped not being furnished with a woolly patch. This latter character may be of no systematic importance, as ALCOCK in some specimens of *E. affinis* observed, that this woolly patch individually varies in extent.

HASWELL'S description is far from complete, but if DE MAN'S identification is right, of which I have no doubt, the *Pilumnoplax sulcatifrons* of STIMPSON is wholly identical with HASWELL'S species, for the American author (1907) expressly mentions "a slight longitudinal ridge or angle on each side above and parallel with the postero-lateral margin", and in the essential features his description perfectly tallies with DE MAN'S.

In my specimens the transverse ridges parting from the base of each third antero-lateral tooth, as well as the faint elevation connecting these ridges with the epigastric lobes (DE MAN, p. 91), are absent, or almost so.

I think *Platyozius laevis* Borradaile is the same as our species, although the front is

not observed to be transversely sulcate, and exhibits "a broad, shallow bight in the middle" (no small, triangular notch), the hairy patch of the wrist is absent and the ambulatory legs are comparatively more slender than usual, but these differences may be accounted for, perhaps, by the very small size of the animal (length of carapace 5 mm.).

My ♂ specimens have a maximum breadth of carapace of 9.75 and 8.5 mm. and a length of 8 and 7 mm.; the ♀, that has lost the chelipeds, is 12 mm. wide and 9.5 mm. long. The abdomen of the latter sex exhibits nearly exactly the same, triangular shape as that of the ♂, but it is regularly tapering from the third segment to the terminal one, which latter is elongate-triangular; the tips of the elongate and slender pleopods project in a bunch from beyond the end of the abdomen. The first segment of the abdomen of the ♂ is unusually long and gradually widens towards the next segment, which is as broad as the third.

If my list of synonyms be right, the species extends over the whole Indian Ocean: from the Seychelles to the Mergui Archipelago, the Andamans, Suvadiva Atoll, Madras, and to the Gulf of Siam; it occurs at Hongkong, in the Moluccas, and at the coast of Australia (Port Denison, Port Molle), always in shallow waters of 20—40 fathoms depth. A subspecies (*atlantica*) has been described by MIERS (1881) from Goree Island (Senegambia).

Psopheticus Wood-Mason.

1890—91. *Psopheticus* Wood-Mason. Admin. Rep. Mar. Survey of India, p. 20 (nomen nudum),
1899. *Psopheticus* Alcock. "Investigator" Deep-Sea Brachyura, p. 72.

As ALCOCK remarks the genus is nearly related to *Carcinoplax*; indeed, it are the chelipeds, and more particularly the quadrate wrist with its acute external tooth, that are similar in both genera; as in *Carcinoplax* and *Pilumnoplax* the front is square-cut, overhanging the antennulae; and, as in *Pseudorhombila*, the dactyli of the last pair of legs are styliform, not depressed. The fronto-orbital breadth is usually nearly equal to the greatest width of carapace; the external orbital angle is strongly projecting, flattened, and at a considerable distance behind it there is one acuminate epibranchial tooth.

The three species show a distinct preference to the deeper parts of the ocean bottom, occurring mostly beneath the 100 fathoms line.

Key to the species:

1. Carapace subquadrate, width between external orbital angles about three-fourths the greatest breadth or nearly equal to it 2
Carapace subcircular, with the lateral margins strongly arched; distance between external orbital angles about two-thirds the greatest breadth. Meropodites of walking legs with a single subdistal spine. First segment of abdomen of ♂ entirely covering the sternum and wider than second and third segment *Ps. hughi* Rathbun ¹⁾
2. Distance between external orbital angles nearly equal to greatest

1) Proc. U. S. Nat. Mus., v. 48, 1914, p. 144. Hab. Philippine waters (near Northern Mindanao), in depths of 200—220 fathoms.

- breadth of carapace. Anterior margin of meropodites of walking legs with a series of spines *Ps. stridulans* Wood-Mason
- Distance between external orbital angles about three-fourths the greatest width of the carapace. Anterior margin of meropodites of walking legs with a single (subdistal) spine *Ps. insignis* Alcock¹⁾

1. *Psopheticus stridulans* Wood-Mason.

1892. *Psopheticus stridulans* Wood-Mason. Ill. Zool. "Investigator", Crust., prt 1, pl. 5, f. 1.

1894. *Psopheticus stridulans* Alcock. Ann. Mag. Nat. Hist. (6), v. 13, p. 402.

1899. *Psopheticus stridulans* Alcock. "Investigator" Deep-Sea Brachyura, p. 73.

1900. *Psopheticus stridulans* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 309.

1904. *Psopheticus stridulans* Doflein. Wiss. Erg. "Valdivia", Bd 6, Brachyura, p. 118, pl. 30, f. 4.

Stat. 38. 7° 35'.4 S., 117° 28'.6 E. North of Paternoster Islands, Bali Sea. Depth 521 m.²⁾. 1 ♂.

It would not be worth while to give a new description of this species or to figure it again, for ALCOCK'S diagnosis is rather complete and though I could not see the figure in the Ill. Zool. "Investigator", the photographic reproduction provided by DOFLEIN conveys an excellent idea of this deep-sea inhabitant. As my specimen happens to be considerably larger than those of ALCOCK (whose largest ♂ is only 20 mm. broad) some few remarks may be of use.

In the first place ALCOCK notes that the carapace is "crossed transversely in its posterior half by a broad groove which is continued obliquely across the pterygostomial regions to the angles of the mouth", and further remarks, that this groove which is sharply defined and of a red colour, divides the carapace into an anterior "livid red or almost violet" portion and a posterior one of a dusky red colour. I do not see anything of this kind in my specimen: there is no transverse groove at all, save the short, ill-defined cervical groove³⁾, and the whole animal is of a uniform ivory-white colour.

Secondly it is true, that the suborbital and subhepatic regions in my specimen are somewhat inflated, but they are covered with very minute granules only, and do not constitute a "granular eminence" (ALCOCK).

The eye-stalks are short, but the cornea of the eye, which does not quite reach to the flattened, much prominent external orbital angle, is very large, rounded and forms, with the stalk, a hammer-shaped structure, as in *Hexaplax* Doflein. The upper orbital margin presents an obtuse prominence in the middle, the inferior margin is entire, finely beaded, and projects inwardly into a large, obtuse tooth, leaving a wide gap between it and the external angle of the front, which gap is partly filled by the antenna, the flagellum of which is nearly twice as long as the eye-stalk; the orbit itself is nearly as wide as the square-cut, overhanging front, beneath which the elongate antennulae are transversely folded.

1) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 310; Ill. Zool. "Investigator", Crust., prt 9, 1902, pl. 54, f. 2. Hab. Gulf of Martaban, in only 60—67 fathoms depth.

2) According to list of stations. On label in bottle a considerably greater depth is indicated (400—500 fathoms, about 720—900 metres).

3) Neither do I detect a distinct indication of this transverse groove in DOFLEIN'S figure.

The chelipeds are not very unequal in my specimen, the right being only slightly the larger, and $2\frac{1}{3}$ times the length of the carapace. In Doflein's specimen the fingers are much gaping at the base and present some few teeth only near the distal end, in the "Siboga" specimen, however, the fingers do not gape, the fixed one is deflexed and the cutting margin is provided all along with numerous triangular teeth, two of which are much the larger; the movable finger is less distinctly toothed and bears in the right chela, near the base, a large, obtuse tooth, directed backward. The margins of the palm are smoothly rounded off and the inner surface presents a deep, longitudinal impression near the under margin, especially conspicuous in the left chela.

The first pair of walking legs bears only a single, subdistal spine at the meropodites; the meropodites of the three following pairs present a series of five spines, and the anterior margin of the carpopodites is also spinous, though there is only a single spine in the case of the first and fourth pair. The dactyli are very elongate, thin and styliform, slightly curved and with some longitudinal rows of very minute hairs towards the horny tips. These minute hairs are indeed the only ones to be observed, as the whole animal is entirely naked.

The abdomen of the ♂ entirely resembles that of *Carcinoplax longimana* (de Haan); it is very short and broad, reaching forward only to the level of the anterior pair of walking legs; the first segment is partly concealed beneath the carapace, the second is strongly keeled transversely, and both segments do not quite cover the space between the bases of the last pair of legs, the third segment is broader and touches the coxopodites of the last pair of legs, the fourth to sixth segment gradually decrease in breadth, but increase in length, the last segment is very short, much shorter than broad. The first abdominal appendages are very strongly calcified and terminate in a short, acuminate tip.

Dimensions in mm.:

Distance between external orbital angles	23.5
Distance between tips of epibranchial teeth	27.—
Anterior margin of front	7.75
Length of carapace	21.—
Length of right cheliped	about 61.—
Length of right chela	28.—
Length of penultimate pair of legs.	about 56.—

Doflein gives the length of the cephalothorax as 62 mm., the breadth as 29 mm.; the first number must be certainly a misprint, and probably altered into 22; his figure seems to be twice enlarged.

This rare species has been firstly known from the Andaman Sea, where it was repeatedly dredged at depths between 173–419 fathoms. The "Valdivia" expedition caught it, at a depth of about 165 fathoms, S. W. of Great Nicobar Island ($6^{\circ}54'N.$, $93^{\circ}38'.8E.$).

The "Siboga" record is thus remarkable, as the first instance of the occurrence of the species outside the Andaman Sea, and, if the indication "400–500 fathoms" on the label be truly reliable, the vertical distribution of the species is also somewhat extended.

The large eye with its dark brown, almost black retina is worth noting in this deep sea species.

Litocheira Kinahan.

1858. *Litocheira* Kinahan. Journ. Roy. Dublin Soc., v. 1, p. 121.

1880. *Brachygrapsus* Kingsley. Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 203.

1900. *Litochira* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 314.

The members of this genus are all very small and characterized, as has been rightly put forth by ALCOCK, by the front being turned down and arched, never lamellar and square-cut, mostly, if not always, bilobed anteriorly, and by the very long silky setae, fringing not only the carapace, but also the chelipeds and the walking legs. A row of very long setae is nearly always inserted across the front and continued on the eye-stalks; the carapace is mostly covered with shorter or larger hairs, but may be also naked and covered with granules; the various regions are indistinct; the chelipeds short.

The type of the genus which now includes even more species than *Carcinoplax*, is *L. bispinosa* Kinahan, an apparently common species of Australia and probably also occurring at New Zealand. All species are found in shallow waters.

ALCOCK divides the genus into two groups; one in which the carapace is broader than long, "as in KINAHAN'S type",¹⁾ and another; in which it is nearly square. The material of the "Siboga", however, renders it impossible to maintain this mode of dividing the species, as there are gradual transitions.

The "Siboga" expedition yielded 6 species, 3 of which are new.

Key to the species:

- | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-------------------------------------------------------------------------------------------------------|
| 1. Antero-lateral margins of carapace distinctly toothed . . . | 2 | |
| Antero-lateral margins of carapace entire, faintly notched or
inconspicuously angular behind external orbital angle . . . | 10 | |
| 2. Antero-lateral margins of carapace with 4 teeth in all; the
external orbital angle is a broad, sharply-edged plate and
incompletely fused with the next tooth, the two following
ones are depressed, truncate and the last is small and
subacute. Greatest breadth of carapace 1.4 times the length,
the latter dimension equal to extent of fronto-orbital border | | <i>L. ciliata</i> (Stimpson),
<i>angustifrons</i> Alcock,
<i>cristata</i> Rathbun ²⁾ |
| Antero-lateral margins of carapace with less than 4 teeth in all | 3 | |

1) The type species is, however, according to MC CULLOCH'S figure (Rec. Austral. Mus., v. 9, n^o 3, 1913, p. 324, textfig. 42), but very little broader than long.

2) *Pilumnoplax ciliata* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 94; Smithsonian Inst., Miscell. Coll., v. 49, 1907, p. 92. Hab. Simoda (Japan).

Litochira angustifrons Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 315; Borradaile, Fauna and Geography Maldives and Laccadive Arch., v. 1, 1903, p. 430. Hab. Bombay, Karachi and Male Atoll.

Litocheira cristata Rathbun, Proc. Biol. Soc. Washington, v. 22, 1909, p. 111; K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 340, textfigs 25—26. Hab. Gulf of Siam.

These three species seem to have so much in common, that they may be perhaps really identical. In ALCOCK'S and MISS RATHBUN'S species the greatest breadth of the carapace is 1.4 times its length, in STIMPSON'S *L. ciliata* considerably more (1.58 times its length) but on the other hand in *L. ciliata* the meropodites of the walking legs are crested anteriorly, in the same way as in *L. cristata*, in which, however, the crest of the last legs is found posteriorly; again these two species agree in having the arm of the cheliped sharply-edged and prominent near its distal end. Such mutual relations support the probability of the three species being really identical.

3. External orbital angle prominent, spiniform 4
 External orbital angle not prominent, at most rectangular 6
4. Two sharp spinules behind external orbital angle. Meropodites of walking legs without spines *L. beaumontii* Alcock ¹⁾
 Meropodites of walking legs armed with a row of spines, save in the last pair of legs (or with a single spine). 5
5. Two spinules behind external orbital angle. Anterior margin of meropodites with several spines *L. aranea* n. sp.
 One very large spine behind external orbital angle. Carapace nearly exactly quadrate, front deeply bilobed in dorsal view. Anterior margin of meropodites with only one subdistal spine *L. kingsleyi* Miers ²⁾
6. One spine behind external orbital angle *L. bispinosa* Kinahan ³⁾
 Two spines or depressed lobes behind external orbital angle, sometimes followed by a minute third one 7
7. Teeth of antero-lateral margins of carapace blunt. Greatest breadth of carapace about $1\frac{1}{2}$ times its length, the latter equal to width of fronto-orbital border *L. setosa* (A. Milne-Edwards)
 Teeth of antero-lateral margins of carapace spiniform. Greatest breadth of carapace always less than $1\frac{1}{2}$ times its length 8
8. Outer surface of palm of cheliped with longitudinal rows of large, pearly granules; a tuft of short hairs between bases of fingers. Width of fronto-orbital border equal to length of carapace *L. sculptimana* n. sp.
 Outer surface of palm of cheliped smooth and glossy or with rather irregularly-arranged small granules beneath a short and dense fur; gap of fingers without hairs. Width of fronto-orbital border exceeding length of carapace. 9
9. Antennae and some markings on the carapace (viz.: a horse-shoe shaped figure behind the front and some large spots on the epistome, the subhepatic and subbranchial regions) of a dark sepia-brown. Anterior margin of meropodites of walking legs with one or two spines *L. quadrispinosa* Zehntner
 Antennae and carapace not coloured. Anterior margin of meropodites of walking legs wholly unarmed *L. affinis* n. sp.
10. Antero-lateral margins of carapace passing with an obtuse

1) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 315. Hab. Andamans and Ceylon.

2) Rep. "Challenger", Brachyura, 1886, p. 232, pl. 21, f. 1; DOFLEIN, Wiss. Erg. "Valdivia", Bd 6, Brachyura, 1904, p. 121; STEMMING, Ann. S. Afr. Museum, v. 6, prt 4, 1910, p. 314. Hab. Agulhas Bank, near Cape of Good Hope.

3) Literature: MC CULLOCH, Rec. Austral. Mus., v. 9, n^o 3, 1913, p. 323, textfig. 42. Hab. coasts of Australia (except perhaps the north coast), Tasmania and probably New Zealand (*Brachygrapsus laevis* Kingsley).

- angle into postero-lateral margins. Walking legs naked (?) *L. glabra* Baker¹⁾
 Lateral margins of carapace regularly arched 11
 11. Carapace covered with a dense pubescence. 12
 Carapace not pubescent, smooth or granulate 13
 12. Length of carapace to breadth as 1 : 1.32, lateral margins
 not much convex, with three very faint notches or pro-
 minences in their anterior part *L. subintegra* Lanchester
 Length of carapace to breadth as 1 : 1.45 (approximately),
 lateral margins much convex, with two inconspicuous
 notches in their anterior part. *L. integra* (Miers)²⁾
 13. Carapace smooth, breadth little exceeding its length, with
 traces of two faint notches on either side *L. inermis* Borradaile³⁾
 Carapace strongly granulate, especially on the hepatic
 regions, length to breadth as 1 : 1.25, no notches on
 lateral margins *L. de charmoyi* Bouvier⁴⁾

1. *Litocheira setosa* (A. Milne-Edwards). Pl. 1, Fig. 1.

Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 315.

RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 340.

Stat. 34. Labuan Pandan, east coast of Lombok. Depth 18 m. 1 ♀.

Stat. 53. Nangamessi Bay, north coast of Sumba. Depth up to 36 m. 1 ♂.

Stat. 127. Taruna Bay, Great Sangir Island, between Celebes and Philippines. Depth 45 m.
 1 ♂, 2 ♀ (one with eggs).

Stat. 181. Ambon. Depth 36—54 m. 1 ♂, 2 ♀ (one of the latter with a parasitic Bopyrid in
 the left branchial cavity).

Stat. 240. Banda. Depth 9—45 m. 1 ♀ (with *Sacculina*).

The carapace of this species is for the greater part smooth and naked, without indication of regions, only the cervical groove being visible as a short, straight and shallow depression, terminating at either end into a semi-lunar concavity, which is beset with very short hairs. Similar hairs are found along the anterior and antero-lateral borders of the carapace and in the long median sulcus parting from the anterior margin of the front; among these hairs, at least near the suborbital and antero-lateral borders, numerous granules are freely scattered. The greatest breadth of the carapace varies between 1.4 to nearly 1.5 times its length and the fronto-orbital border is almost or quite exactly as long as this length, so that the lateral margins are conspicuously arched anteriorly. The external orbital angle is not prominent and behind it we find two prominences on the lateral margins, which prominences vary rather largely: sometimes they present the shape of two depressed teeth, the anterior somewhat larger

1) Transact. R. Soc. South Australia, Adelaide, v. 30, 1906, p. 110, pl. 2, f. 1, pl. 3, f. 3. Hab. South Australia.

2) *Carcinoplax integra* Miers, Rep. Zool. "Alert", 1884, p. 543, pl. 48, f. C; *Litocheira integra* Alcock, Journ. As. Soc. Bengal; v. 69, prt 2, 1900, p. 314; BOUVIER, Bull. sc. France et Belgique, v. 48, 1915, p. 119, textfig. 34; LAURIE, Journ. Linn. Soc. London, v. 31, 1915, p. 464, pl. 45, f. 2. Hab. Seychelles, Mergui Arch., Mauritius, Red Sea. An *Litocheira integra* Borradaile, Fauna and Geography Maldive and Laccadive Arch., v. 1, 1903, p. 430²

3) BORRADAILE, Fauna and Geography Maldive and Laccadive Arch., v. 1, 1903, p. 430. Hab. Male Atoll.

4) Bull. sc. France et Belgique, v. 48, 1915, p. 121, textfig. 35, pl. 5, f. 8, pl. 6, f. 9. Hab. Port Louis (Mauritius).

than the next, and separated by rather deep notches, but as often they take the form of two spines only (fig. 1 *a*) and are in this case more difficult to be detected. Immediately behind the posterior tooth the carapace reaches its greatest breadth, and from this point the sharp lateral margin disappears altogether backward.

The external maxillipeds are rather broad, the merus is much shorter than the ischium, roughly quadrate, with the antero-external angle somewhat prominent and smoothly rounded; the exognath is narrow, its breadth attaining only a third of that of the ischium. The lateral borders of the buccal cavity are parallel.

The chelipeds are subequal in the ♀, but unequal in the ♂, the larger chela being found at the left in all the ♂ at hand. The meropodite is sharply edged at upper and inner border, but not serrate; the upper border presents a very indistinct prominence near its distal end, which scarcely can be called a tooth; the carpopodite is somewhat sharpened at the inner angle, but not produced, and for the most part smooth, only towards the anterior border we observe numerous granules, mostly scattered among very short hairs, and the same granules and hairs are found all over the outer surface of both palms in the ♀, and of the right palm in the ♂; towards the bases of the fingers the granules often show the tendency to arrange themselves in one or two longitudinal rows, which in the ♀ extend half-way up the fingers, the distal half of the fingers in both sexes is dark sepia-brown, smooth and naked, longitudinally grooved and roughly crenulate, especially so in the case of the lower finger; inner surface of palm and fingers perfectly smooth. The larger (left) palm of the ♂ (fig. 1 *b*) is for the greater part entirely smooth, and the usual granules and long setae, that cover the surface of the right palm, are here restricted to a small portion along the upper border, the lower finger is very short and high, tapering rapidly, the mobile finger is much longer, much curved (in the figure the tip of the finger is seen to be broken off), and the dark colour of the fingers extends here farther backward than is the case in the opposite finger. In young ♂ the outer surface of the left palm is still wholly covered with granules and hairs like that of the right, but with advancing age the smooth portion becomes larger and larger, the final stage apparently being attained at rather different sizes of the various individuals at hand¹).

The walking legs are not very much elongate, the penultimate pair, which is the longest, being not quite three times the length of the carapace. All the legs are quite unarmed, but rather densely fringed along the margins, particularly so along the outer (anterior) border of carpo- and propodite and on the dactylus. The meropodites are four times as long as broad, the dactyli are nearly straight, longer than the preceding propodites, at least in the case of the middle pairs of legs, with the horny tip freely projecting and slightly curved.

The first and the third segment of the abdomen of the ♂ touch the coxopodites of the posterior legs; the abdomen of the ♀ is not very broad and resembles largely that of the other sex, though it is much more regularly tapering from the third to the seventh segment. The eggs are not very numerous and unusually large (0.57 mm. in diameter).

1) In this way it may be explained why A. MILNE-EDWARDS (Nouv. Arch. Mus. Paris, t. 9, 1873, p. 267, pl. 12, f. 2) describes the under part of the left palm as being finely granulate, whereas DE MAN (Arch. Naturgesch., Jahrg. 53. I., 1888, p. 349) in a specimen of nearly the same size found the under part of this left palm quite smooth, though minutely pitted.

The species has been found in the following localities: New Caledonia, Mergui Arch., Banda, Noordwachter Island near Batavia, Andamans and Gulf of Siam.

Dimensions in mm.:	1 ♂	2 ♂	3 ♀	4 ♀	5 ♀
Breadth of fronto-orbital border . . .	5.3	4.4	6.05	5.06	4.6
Breadth of front	2.85	2.6	3.63	2.75	2.65
Greatest breadth of carapace	7.48	6.4	8.8	7.48	6.4
Length of carapace	5.3	4.4	6.0	5.06	4.5

N^o 1, 4 and 5 are from Stat. 127 (n^o 4 is egg-bearing), n^o 2 is from Stat. 53, n^o 3 is from Stat. 240 and bears a *Sacculina* beneath the abdomen. None of my specimens attains the size of those of MILNE-EDWARDS and DE MAN (breadth of carapace 9 mm. and more).

2. *Litocheira affinis* n. sp. Pl. I, Fig. 2.

Stat. 66. South of Saleyer Island, Flores Sea. Depth 8—10 m. 1 ♀.

Stat. 315. Paternoster Islands, north of Sumbawa. Depth up to 36 m. 2 ♂.

This new species much resembles the preceding, but the fronto-orbital breadth is proportionately larger, there are always three spiniform teeth at either side of the carapace, excluding the outer orbital angle, the walking legs are more slender, the chelipeds nearly equal, the inner angle of the wrist is produced, and the left palm of the ♂ lacks the bare, smooth outer surface, so conspicuous in *L. setosa*.

The fronto-orbital border is always longer than the length of the carapace; the latter presents scarcely any trace of regions, and, besides with short and widely-separated setae, it is uniformly covered with numerous minute, squamiform granules, visible only on microscopical examination; these are particularly crowded on the eye-stalks. The shorter hairs near the suborbital and antero-lateral borders, found to a greater or lesser extent in *L. setosa*, are wholly absent, and the whole animal is of a dull, milky-white colour. The proportion of length to breadth is for the rest the same as in the preceding species.

As usual, the front is strongly deflexed, bilobed and provided with a continuous, transverse row of long, silky setae, while similar, but much shorter, hairs are implanted on the eye-stalks (fig. 2 a). Contrary to what is found in *L. setosa*, there is a trace of a rectangularly-cut outer orbital angle, and at equal distances behind it we observe at either side three spiniform teeth, the anterior of which is the larger; between the external orbital angle and the anterior epibranchial tooth the margin is straight or slightly concave, and the distance between the tips of the anterior teeth is scarcely smaller than that between the tips of the next teeth, where the carapace is largest, so that the lines connecting at either side the tips of the anterior and posterior epibranchial teeth are subparallel; beyond the teeth the margins are blunt and converging somewhat backward.

The antennulae are comparatively longer and more slender than, and the last joint of the peduncle does not increase in thickness towards the distal end so conspicuously as, in *L. setosa*.

The external maxillipeds (fig. 2 b), which by the way are covered with the same squamiform granules as the carapace, are likewise more slender than in the preceding species; the merus is smoothly rounded off at its antero-external angle, not at all produced, the inner

margin of the ischium is serrate; the exognath is slender, measuring only one-half of the breadth of the ischium.

There is scarcely any difference in size between the chelipeds of the young ♂ and the ♀, but in the only apparently adult ♂ specimen the right (not the left, as in *L. setosa*) is somewhat larger; all the joints are covered with numerous flat granules, that are somewhat raised and sharpened on the outer surface of the palm. The meropodite is short, upper and inner border sharpened, the former much curved and entirely unarmed near its distal end, the inner border with 8—10 spinules; the inner angle of the wrist is sharpened, somewhat produced, the tip being directed forward; the palm is granulate at the outer surface, longer than high and longer than the fingers, upper and under border are rounded; the outer surface of the fingers is longitudinally grooved, and of a brown colour, but much less so than in the preceding species, the immovable finger wholly straight, conical, tapering to a fine tip, that is sharply curved upward, the movable finger is more curved towards the tip, granulate on the back; the cutting margins of both fingers are finely crenulate, in the case of the upper finger it is the first tooth, near the base, and in the case of the under finger the second, that is the largest (fig. 2c).

The walking legs again much resemble those of the preceding species; the penultimate pair is 2.75 times as long as the carapace. The meropodites are wholly unarmed; four times as long as broad; the propodites are elongate, even those of the last pair of legs, and the dactyli are as long as the propodites, rather thick and conical, with the tip curved, free from setae and of a horny colour; in the case of the last pair of legs the dactyli are armed with some minute spines near the end of the outer border and also with a few spinules at the inner side, near the tip (fig. 2d).

The first segment of the abdomen of the ♂ wholly covers the space between the coxopodites of the last pair of legs, the second segment is narrower and the third again as broad as the first; from here the abdomen gradually tapers towards the tip. All the segments are very distinctly separated.

Dimensions in mm.:

	♂	♀
Fronto-orbital distance	4.2	4.6
Breadth of front	2.2	2.4
Greatest breadth of carapace	5.4	6.3
Length of carapace	3.75	4.3
Length	10.5	—
Length of meropodite	3.5	—
Breadth of meropodite	0.85	—
Length of propodite in the median line	2.4	—
Length of dactylus	2.4	—

} of penultimate pair of legs }

3. *Litocheira quadrispinosa* Zehntner. Pl. 1, Fig. 3.

1894. *Litocheira quadrispinosa* Zehntner. Rev. Suisse Zool., v. 2, p. 171, pl. 8, f. 11.

1900. *Litochira quadrispinosa* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 316.

- Stat. 53. Nangamessi Bay, north coast of Sumba. Depth up to 36 m. 1 ♂.
 Stat. 131. Karakelang, Talaut Islands. Reef. 1 ♀.
 Stat. 193. Sula Besi, Sula Islands. Reef. 1 ♂.
 Stat. 248. Tiur Island, between Ceram and Kei Islands. Reef. 1 ♂.

This species is easily recognisable by the dentation of the antero-lateral borders, by the rows of spines on the meropodites of the walking legs and by the characteristic dark markings on the body. These features are so reliable that I do not doubt of the identity of my specimens with ZEHNTNER's species, which, for the rest, was founded on a young ♀ only, but nevertheless they do not in all respects answer to description and figure of the Swiss author.

The convexity, or rather the depression, of the carapace and the covering of the long, silky and transparent setae are the same as in the other species of *Litocheira*. The only trace of regions to be detected is the long concave cervical groove, otherwise the carapace is smooth, sparsely covered with setae, that become larger towards the orbits and the front, and with widely-separated granules. Very characteristic are some dark markings on the lightly-yellow carapace, as has been put forth by ZEHNTNER and ALCOCK: firstly there is a most conspicuous horse-shoe shaped spot behind the front, the lateral parts of which spot vary in thickness in different individuals: in the largest ♂ (Stat. 248) this figure assumes the shape of two obliquely-longitudinal, pear-shaped, large blotches, contiguous at their anterior end; further, similar, but much more irregular markings extend along the antero-lateral margins of the carapace, on the subhepatic and subbranchial regions, on the epistome and on the under side of the eye-stalks, but their distribution varies much individually, and again in the ♂ of Stat. 248 they are the most developed. ZEHNTNER mentions and figures traces of epigastric lobes, which were, however, absent in my individuals.

The front is not so much deflexed as in the preceding species, so that the deep sinus, dividing the anterior margin into two obliquely-sloping lobes, may be largely detected in dorsal view of the carapace; these lobes are, however, much more distinct in anterior view of the animal and it is then stated that each of them projects in a sharp angle near the lateral end. The supra-orbital border is twice emarginated by a triangular notch, one situated in the middle and the other quite near the outer orbital angle; the fronto-orbital border is very large, occupying 0.8—0.9 of the greatest breadth of the carapace, not including the antero-lateral teeth. The outer orbital angle is a small, obtuse lobe, not projecting beyond the level of the supra-orbital border, and not so sharp and prominent as shown in ZEHNTNER's figure. Behind this angle the margin is very deeply concave, then turns forward again to form the first antero-lateral tooth, which, like the slightly smaller second, is large, spini-form, turned straight forward in its distal half and reaching nearly to the level of the outer orbital angle; the distance between the tips of the second pair of teeth is scarcely greater than that between the first pair. Behind the last teeth the margins are obsolete, subparallel to each other, then slightly converging towards the base of the second pair of walking legs.

The antennulae are rather short and thick; the last joint of the peduncle greatly increases in bulk towards the distal end, as in *L. setosa*. The flagellum of the antenna is long, measuring

more than twice the length of the eye-stalk, but not as long as the carapace (ZEHNTNER) and the greater part of the 17 joints of which it is composed bears a wreath of several long setae, similar to those of the carapace and the legs. The flagellum is rendered conspicuous by the same sepia-brown colour as shown by the various markings of the carapace, this hue may be, however, absent on account of its having been extracted by alcohol. The external maxillipeds (fig. 3a) are more slender than in the two preceding species, but otherwise very much alike to those of *L. affinis*: the antero-external angle of the merus is rounded, rectangular, not at all prominent; the exognath measures near its base not yet one-half of the breadth of the ischium. The lateral margins of the buccal cavern are parallel.

The chelipeds are unequal in the adult, the left being the larger, as in *L. setosa*, both in the ♂ and in the ♀; in the ♂ figured here (Stat. 193) only the left cheliped is present, but this happens to be unusually small and the ratio may here have been the reverse. According to ZEHNTNER they are equal (in ♀). The short meropodite is sharply-edged at upper and particularly at inner border, the former is armed with a strong, curved tooth near the distal end, preceded in the proximal half of the border by a series of much smaller spines, and similar spines are found in a single file along the inner border of both ischio- and meropodite; the outer surface of the latter is granulate, like upper portion of wrist and outer surface of palm. Inner angle of wrist sharply produced, turned forward. Both in the larger and in the smaller chela, but more distinctly so in the latter, the granules of the outer surface present the tendency of arranging themselves in longitudinal rows, but it is remarkable, that in the unusually small chela here figured (fig. 3b) nothing of this kind is observed, the palm is longer than the fingers and the borders are rounded. Near the base of the immovable finger of the large chela and along the under border, in the case of the adult specimens, the same, perfectly smooth, naked, ivory-white portion is developed as has been described in *L. setosa*. Also with regard to the fingers the two species resemble each other: the immovable finger of the large chela is perfectly straight, save the curved, acuminate tip, very high at the base and rapidly tapering, the opposite finger is granulate on the back, near the base, faintly curved in the proximal two-thirds, more strongly so towards the tip, the cutting margins of both fingers are roughly crenulate; in the right chela the fingers are somewhat lower at the base and the crenulations are sharper, turned forward and decreasing from base to tip of the inner margin (see also ZEHNTNER's figure 11b); in both chelae the fingers are coloured generally a chestnut-brown, but in the ♀ of Stat. 131 they are simply ivory-white, like the apparently discoloured antennae.

The strong walking legs afford nothing remarkable but the characteristic spines on the meropodites. The number and disposition of these spines offer individual variations, but in the adult ♂ of Stat. 248 I observe the following: the anterior margin of the first to third pair inclusive ends in a spine and, besides, in the distal half of the first and second pair again two spines, close to one another, are found, the distal one of which is the larger, the third pair bears only a single spine at the beginning of the distal third of the margin; the meropodites of the fourth pair finally are entirely unarmed. Among the long setae fringing the anterior margins of all the meropodites some long, feathered hairs are to be observed.

The posterior margin of the meropodites of the first pair are armed in their distal half with a row of 6—7 spines, the penultimate of which is by far the larger; in the middle third of the same margin of the second pair three much smaller and widely-separated spinules are found; the meropodites of the two following pairs are entirely spineless. In the adult ♀ (Stat. 131) all the spines are less in number.

The dactyli of the posterior legs show several spines near the horny, transparent tip, similar to, but longer than, those of *L. affinis*.

The third segment of the abdomen of the ♂ (fig. 3c) reaches as far outward as the first; the second is only slightly narrower.

ZEHNTNER's specimen (a ♀) came from Amboyna. ALCOCK records a specimen from the Andamans.

Dimensions in mm. :		♂	♂
Width of fronto-orbital border		4.6	5.6
Breadth of front		2.2	2.4
Greatest breadth of carapace (between tips of post. epibranchial teeth)		5.5	6.—
Length of carapace		3.75	4.85
Breadth at the level of bases of anterior pair of walking legs		4.95	5.5
Length of meropodite	} of penultimate pair of legs	3.5	—
Breadth of meropodite		1.—	—
Length of carpopodite along anterior margin		1.65	—
Length of propodite along anterior margin		1.85	—
Breadth of propodite		0.7	—
Length of dactylus		2.—	—

The first ♂ measured is the one here figured (Stat. 193), the second from Stat. 248.

4. *Litocheira aranea* n. sp. Pl. 2, Fig. 1.

Stat. 144. Salomakieë, near south point of Halmaheira. Depth 45 m. 1 ♂ juv.

Stat. 250. Kur Island, Kei Islands, Depth 20—45 m. 1 ♂.

Stat. 285. South-east coast of Timor. Depth 34 m. 1 ♀.

This species is readily distinguished by the long, slender, spider-like and spinulous walking legs and by the narrow external maxillipeds.

The carapace is decidedly broader than long, but less so than in *L. quadrispinosa*, the ratio of length to greatest breadth being 1 : 1.25—1.3 and in the preceding species 1 : 1.35—1.45. The fronto-orbital border in the present species is also broader than the length of the carapace. The latter itself is more convex than in *L. quadrispinosa* and covered with numerous soft setae; these are, however, shorter than usually is the case: in the ♂ here figured (Stat. 250) the hairs are very inconspicuous and short, even on the surface of the front, in the ♀ they are longer, but not arranged in a distinct transverse row across the front. Regions are scarcely to be made out, only the cervical groove being visible, but behind the front traces of two epigastric lobes, separated by a longitudinal furrow, that bifurcates backward, may be seen. For the rest the whole surface of the carapace seems to be smooth. The front is strongly deflexed; the anterior margin is bilobed, though this is scarcely visible in dorsal view;

the lobes are separated by a broad, triangular notch and, in anterior view, much sloping dorsally and backward towards the lateral angles, where a slight prominence is found. The upper margin of the orbit is obliquely sloping backward, somewhat convex (fig. 1*a*), not notched as in the preceding species; the external orbital angle projects in the form of a small, curved tooth, with the tip curved forward, a little way behind it an exactly similar tooth is found and at a smaller distance than that between the first and the second a third much smaller tooth is observed. In the adult ♂, that is smaller than the ♀, these lateral teeth are proportionately stronger than in the adult ♀ (compare figs 1 and 1*a*). The lateral margins of the carapace are nowhere sharpened, not even in the neighbourhood of the teeth; their course is convex, but the breadth of the carapace between the external orbital angles is exactly the same as that at the level of the penultimate pair of legs.

The antennae are strong, the flagella composed of about 13—17 joints; in the ♂ each of these joints, except several of the distal ones, is very little hairy, in the ♀ they bear a wreath of very long setae. The last joint of the antennular peduncle is thick, not increasing much in size towards the distal end. The epistome is pushed far backward, especially in its central portion, the free margin nearly vertical; lateral margins of buccal cavern parallel. External maxillipeds characteristically elongate, the long axis of the ischium nearly twice its breadth (fig. 1*b*), antero-internal angle of ischium projecting, merus roughly elliptical, much shorter and narrower than ischium, lateral and anterior margin forming a regular curve without interruption, carpus very broad and implanted at distal extremity of merus; exognath slender, half as broad as ischium.

Chelipeds short, of equal size in the ♂. Outer border of meropodite finely serrate, outer surface granulate, inner border with one spine, two proximal ones being placed on the inner margin of the ischiopodite, upper border with four smaller spines, increasing in size distally. Wrist finely granular at upper surface, inner angle with a sharp tooth, directed forward, beneath this tooth and placed farther backward a similar, but smaller tooth is observed, antero-external border of wrist with two sharp teeth. Chela (fig. 1*c*) rather high in the ♂, with scattered granules at outer surface, upper and under border rounded; fixed finger high at the base, greatly compressed and keeled below, with four wing-like expansions, separated by curved furrows, at the inner margin, the last crenulation being as large as the faintly curved tip of the finger; movable finger greatly curved in its distal half, not compressed, and with two or three faint crenulations at the inner margin.

The walking legs are much elongate, so that the specific name *aranaea* seems appropriate; penultimate pair more than three times the length of the carapace. Meropodites slender, not narrowing distally, more than five times as long as broad, and spinous along anterior margins. In all the legs this margin ends in a spine; besides, in the first pair of legs there are two spines on the distal half of the margin, in the second pair three or four spines are placed at equal distances, in the third a group of three very small spines are placed near one another in the proximal half and two much larger ones in the distal portion, the last pair

finally presents no spines save the very small distal one. In all the legs the anterior margin of the carpopodite ends in a distinct spine. In the middle pairs of legs the propodites are greatly elongate, being four times as long (in the median line) as broad, but the dactyli of these legs are even longer than the preceding joints, conical and straight for the greater part. All the dactyli are spinous near the horny, transparent tip.

The abdomen of the ♂ (fig. 1*d*) does not taper so much from the third segment to the tip and is on the whole shorter than in the preceding species.

Dimensions in mm.:

	♂	♀
Breadth of fronto-orbital border	3.75	5.3
Breadth of front	1.85	2.75
Greatest breadth of carapace (behind post. lateral teeth)	4.3	6.4
Length of carapace	3.3	5.1
Length	10.5	—
Length of meropodite	3.5	—
Breadth of meropodite	0.65	—
Length of carpopodite along anterior margin	1.75	—
Length of propodite along anterior margin	2.2	—
Breadth of propodite	0.5	—
Length of dactylus	2.4	—

} of penultimate pair of legs

N^o 1 is the ♂ (here figured) from Stat. 250, n^o 2 the ♀ from Stat. 285.

5. *Litocheira sculptimana* n. sp. Pl. 8, Fig. 2.

Stat. 51. Madura Bay, west coast of Flores. Depth 54—90 m. 12 ♂ (all but one juv.), 6 ♀ (3 egg-bearing).

Stat. 260. 5° 36' 5" S., 132° 55' 2" E. North west of Kei Islands. Depth 90 m. 1 ♂, 3 ♀ (one egg-bearing).

This remarkable species is at once characterized by its finely sculptured chelae, by the lobelike antero-lateral teeth of the carapace and by the serration of the meropodites of the ambulatory legs.

The fronto-orbital breadth is nearly exactly equal to the length of the carapace and twice the breadth of the front; front and eye-stalks together occupy nearly the whole greatest breadth of the carapace (80—90% of the latter), so that the carapace is almost quadrate, much more so than in all other known species of *Litocheira*.

The carapace is not much depressed, but vaulted both in longitudinal and transverse direction, smooth, of a dull, milky-white colour, without indications of regions, a straight, cervical groove, bifurcating at each end, being the only furrow; immediately before the cervical groove two spots of a chalky white are observed. The whole surface is covered with the usual long setae, so characteristic of the genus; these setae are particularly long anteriorly; the orbits are connected across the front with a straight row of such setae, that are arranged in two bunches, the middle setae in each of them projecting the most.

Beyond this transverse row, the front is perpendicularly deflexed, presenting a distinct, but shallow median sulcus, but the anterior margin is not at all bilobed, in anterior view it

is only somewhat wavy, straight in the middle and sloping regularly towards the lateral angles, which are subrectangular. The inner and upper orbital margin are regularly curved, entire, not notched, and the external angle is not at all prominent.

The eye-stalks are very thick, cylindrical. Lateral margins of the carapace in their anterior third part transformed into two depressed, broadly-triangular lobes, terminating in a small cup, directed straight forward in the first and obliquely in the second lobe, between the tips of the latter the carapace reaches its greatest breadth, which, however, as has been said, only slightly exceeds the fronto-orbital width; behind the second lateral lobe, the lateral margins of which are strongly converging backward, a third, very minute, tooth is found and then the lateral margins disappear altogether and the carapace is regularly narrowing backward. Posterior margin convex.

The antennae are slender, the flagella scarcely hairy. Peduncle of antennulae rather long, last joint much increasing in thickness towards the distal end; hairs of flagellum generally of a smoky or dusty colour which contrasts much against the dull-white colour of the animal. Epistome large, sunk, with the hind part vertical. Lateral margins of buccal cavern parallel. External maxilipeds broad, completely closing the buccal cavity (fig. 2*a*); ischium only little longer than broad, with the antero-internal angle rounded and the inner margin entire, not crenulate, and wholly hairless; merus short, only slightly longer than half the length of ischium, but quite as broad as the latter, owing to the antero-external angle being strongly expanded, much more so than in any other species of *Litocheira* that I know of; exognath nearly one-third as broad as ischium.

Chelipeds subequal and in the ♀ as fully developed and large as in the ♂. Meropodite short, with all three borders sharpened, inner and outer border finely serrate, outer surface rugose, upper border entire, but with one very strong, triangular tooth near the distal end. Wrist with sharp granules above, inner surface flattened, provided at ventral margin with a series of fine serrulations and terminating distally into a slightly depressed, triangular tooth, the tip of which is curved forward. Palm (fig. 2*b*) very characteristically sculptured and affording the best means of distinguishing the species at first glance: outer surface with five, obliquely-longitudinal rows of sharp granules; the upper row near the somewhat keeled and overhanging border of the palm is the broadest, but also the shortest, and between these rows the surface of the palm is perfectly smooth and glossy; under border of palm very sharply keeled in its proximal third part, more distally this keel passes into a row of fine crenulations, continued on the outer surface of the palm and the fixed finger till nearly to the tip, these crenulations are accompanied in their proximal portion by closely-set, very short, brown hairs; inner surface of chela smooth for the greater part, but in its ventral part provided with two longitudinal rows of granules, the inferior row being much the larger and continued till the tip of the immovable finger; under border of the latter granulate, straight, tip slightly curved upward, height of finger remaining almost the same in its proximal half, where at the outer side of the cutting margin a sharp, concave and prominent keel is found, distal portion of finger rapidly tapering to tip and with three crenulations, the proximal two being very large, wing-like; mobile finger regularly curved, the whole back occupied by

numerous rows of sharp granules and the long setae fringing the upper border of the palm continued to the tip of the finger, cutting margin flattened in its proximal portion and accompanied at the outer side by a long prominent keel, similar to that of the immovable finger, distal part of cutting margin with four teeth, alternating with those of the other finger, and diminishing in size towards tip of finger; base of fingers gaping, the gap being filled with four bunches of stiff hairs, one being placed on the palm, one on the fixed finger, and the two remaining ones on the other finger.

The walking legs are slender, but not very long, the penultimate pair being not yet twice as long as the carapace. The meropodites are four times as long as broad, and finely crenulate along both margins; anterior margin of carpo- and propodite armed in the same way. Dactyli longer than propodites; conical, nearly straight, armed along both margins with largely-separated spines.

The abdomen of the ♂ (fig. 2c) is much narrower than that of any other species of *Litocheira*: though the first and third segment exactly reach as far outward as to touch the coxopodites of the last pair of legs, the fourth, fifth and sixth segment do not taper at all, their lateral margins being parallel, these segments are subequal in length and the length is about half the breadth in each case; the terminal segment is broader than long and broader than the preceding segment, its outline is about three-quarters of that of a circle. The abdomen of the ♀ is likewise narrow, though of course broader than in the ♂; it narrows very gradually from the third segment to the terminal one, which latter is semi-elliptical and twice as long as the preceding. The eggs are comparatively few in number and rather large, their diameter varying from 0.35 to 0.4 mm.

Dimensions in mm.:

	1 ♂	2 ♂	3 ♂	4 ♀ with eggs
Breadth of fronto-orbital border	3.85	3.5	2.4	4.6
Breadth of front	2.1	1.85	1.2	2.4
Greatest breadth of carapace	4.4	4.2	2.85	5.85
Length of carapace	3.9	3.5	2.45	4.8
Base of abdomen	—	1.1	—	—
Length of meropodite	—	2.—	—	—
Breadth of meropodite	—	0.48	—	—
Length of carpopodite along anterior margin	—	1.—	—	—
Length of propodite along anterior margin	—	1.2	—	—
Length of dactylus	—	1.55	—	—
Horizontal length of chela	—	3.3	—	—
Height of palm	—	1.85	—	—

N^o 1 and 3 are from Stat. 51, n^o 2 (the ♂ here figured) and 4 are from Stat. 260.

6. *Litocheira subintegra* (Lanchester). Pl. 16, Fig. 1.

1888. *Carcinoplax integer* de Man nec Miers. Journ. Linn. Soc. London, v. 22, p. 93.

1900. *Litochira integra*? Alcock. Journ. As. Soc. Bengal, v. 69, prt. 2, p. 314.

1900. *Carcinoplax subinteger* Lanchester. Proc. Zool. Soc. London, 1900, p. 750, pl. 46, f. 9.

Stat. 153. 0° 3'.8 N., 130° 24'.3 E. Near north-west point of Waigeu Island. Depth 141 m. 1 ♂.

It is with some diffidence that I refer the specimen at hand to the present species. Three species have been described with the lateral margins of the carapace entire and unarmed or nearly so, viz. *L. integra* (Miers), *L. subintegra* (Lanchester) and *L. inermis* Borradaile¹⁾. The latter may be easily distinguished by the carapace being almost square, smooth, hairless and microscopically pitted, but as to the remaining species, which both are covered with a short, dense fur, it is not at all certain whether they are really distinct. LAURIE²⁾, who records *L. integra* from the Red Sea, apparently does not accept LANCHESTER'S species and BOUVIER³⁾ identifying a specimen from Mauritius with MIERS' species, mentions BORRADAILE'S view⁴⁾ about the distinctness of the two forms, but does not venture to express any definite opinion about the question.

Unfortunately the information of MIERS⁵⁾ about his "*Carcinoplax*" *integra* is not very exhaustive, and about one important point, viz. the ratio of the length of the carapace to its breadth, there is a discrepancy, as LAURIE rightly puts forth, between text and figure, the former giving this ratio as 1 : 1.25 and the latter as 1 : 1.5. Leaving this aside, BOUVIER describes a specimen of exactly the same dimensions as those of MIERS, and most likely identical with the species, as being provided on the hepatic regions with sharp granules, projecting in an irregular way beyond the outline of the carapace.

BORRADAILE, who records *L. integra* from Hulule, Male Atoll, enumerates the following points, by which *L. subintegra* is distinguished: three, instead of two, faint notches, on the antero-lateral margin, external orbital angle almost right, not obtuse, front narrower.

Taking as base MIERS' figure, which is probably reliable, and with which both LAURIE'S and BOUVIER'S examples are expressly stated to agree completely, the specimen of the "Siboga" is certainly not identical with *L. integra*, for the ratio of the length of the carapace to its breadth varies, according to MIERS and LAURIE, between 1 : 1.5—1.4, so that the carapace is decidedly broader than in my specimen (length to breadth as 1 : 1.32, viz. exactly the same as in DE MAN'S specimen⁶⁾ which is identified by LANCHESTER with *L. subintegra*). The width of the fronto-orbital border is also greater than in the five specimens of LAURIE (0.83 of the greatest breadth in my specimen, and only 0.7 in those of LAURIE).

The whole carapace is densely covered with a short fur, but, when this is removed, there is nothing to be seen of the sharp granules on the hepatic regions, as mentioned by BOUVIER in *L. integra*; indeed the carapace is everywhere entirely smooth. The lateral margins are little arched, and provided in their anterior part with three extremely-minute angles, which hardly can be called prominences, the anterior of which, however, is by far the most distinct⁷⁾. The front is distinctly bilobed and measures 0.44 of the greatest breadth of the carapace (nearly

1) Fauna and Geography Maldives and Laccadive Arch., v. 1, 1903, p. 430, textfig. 111. Hab. Hulule, Male Atoll.

2) Journ. Linn. Soc. London, v. 31, 1915, p. 464.

3) Bull. sc. France et Belgique, v. 48, 1915, p. 119.

4) L. c., p. 430.

5) Zool. H. M. S. "Alert", 1884, p. 543, pl. 48, f. C.

6) From LANCHESTER'S measurements it results, that here the ratio is respectively 1 : 1.4, 1 : 1.24, 1 : 1.25 and 1 : 1.25. Save in the first instance, which rather points to *L. integra*, this ratio better agrees with those found by DE MAN and by myself.

7) LANCHESTER figures three notches at each antero-lateral margin of the carapace, thus marking off four lobe-like teeth, which are scarcely or not all prominent, and the margins themselves are much more strongly arched.

exactly one-third in LAURIE's specimens of *L. integra*). This fact is in contradiction to BORRADAILE's statement, that the front in LANCHESTER's species is narrower than in *L. integra*.

The external maxillipeds agree with MIERS' figure; the antero-external angle of the merus is rounded and not prominent.

The chelipeds are equal in my specimen; the meropodite is not armed at the upper border; the wrist is granulate above, produced at the inner angle; the outer surface of the palm is likewise finely granulate; the fingers are as long as the palm, not compressed, gaping, strongly curved towards the tips, finely crenulate at inner margins, and of a light sepia-brown in their distal portion.

The walking legs are slender, the penultimate pair measuring more than $2\frac{1}{2}$ times the length of the carapace; the propodites elongate, as long as the dactyli; the latter are of the usual shape in *Litocheira*, not spined near the tip. DE MAN says that the dactyli of the last legs are slightly curved, upward, "both in this species and in *C. setosus*, the same way as in the genus *Pilumnoplax*" and this is indeed observed to be the case, if the dactylus is viewed from behind.

Though the negative evidence of my specimen being not identical with *L. integra* is, in my opinion, beyond question, there is, it must be admitted, none the more probability that my identifying the specimen with *L. subintegra* is right, my only argument being that the animal apparently agrees with that of DE MAN, and LANCHESTER expressly states that specimens from the very locality (Mergui Arch.) whence DE MAN got his material, agree with his (from Singapore or Malacca).

Dimensions in mm.:

Breadth of fronto-orbital border . . .	3.75
Breadth of front	1.98
Greatest breadth of carapace . . .	4.5
Length of carapacé	3.45

Libystes A. Milne-Edwards.

1867. *Libystes* A. Milne-Edwards. Ann. Soc. Ent. France (4), t. 7, p. 285.

1868. *Libystes* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 4, p. 83.

This genus, together with the following, is nearly related to *Carcinoplax*, on account of the carapace being transversely-oval and the fronto-orbital border being far less than the greatest width. On the other hand there is even a greater resemblance to the Portunidae, as will be explained in discussing the genus *Catoptrus*.

The differences enumerated by ALCOCK between *Libystes* and *Catoptrus* are of no special importance; the type species of each genus indeed differ widely by the carapace being entire at its antero-lateral margins in *L. nitidus* and toothed in *C. nitidus*, but in *L. edwardsi* Alcock we have a remarkable transitional form with the carapace toothed entirely as in *Catoptrus*. Neither is the form of the merus of the external maxillipeds (greatly produced at antero-external angle in *Libystes*, only slightly so or not at all in *Catoptrus*, according to ALCOCK) of importance,

as in one species of the latter genus they are shaped entirely as in *Libystes*. Indeed I see no reason, judging from the evidence available, to maintain the genus *Catoptrus* (which is of a later date), but yet I shall keep the genera separated, because I had no opportunity of examining a species of *Libystes*.

Key to the species:

1. Margins of carapace entire, unarmed. Last two joints of posterior pair of ambulatory legs not paddle-like . . . 2
 Margins of carapace toothed anteriorly. Last two joints of posterior pair of ambulatory legs paddle-like, apparently adapted for swimming. *L. edwardsi* Alcock ¹⁾
2. Carapace subquadrilateral *L. alphonsi* Alcock ²⁾
 Carapace elliptical *L. nitidus* A. Milne-Edwards ³⁾.

Catoptrus A. Milne-Edwards.

1870. *Catoptrus* A. Milne-Edwards. Ann. Sc. Nat. (5), t. 13, p. 82.

1888. *Goniocaphyra* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 339.

This genus does not belong to the Catometopous Crabs, as has been lately proved by BORRADAILE ⁴⁾, who rightly ranged it among the Portunidae, in the vicinity of *Carupa*, and instituted a new subfamily (*Goniocaphyrinae*), apparently then in ignorance of DE MAN's statement ⁵⁾ that *Goniocaphyra truncatifrons* is identical with *Catoptrus nitidus*; already DE MAN regarded his genus as belonging to the Portunidae. It is true, that the most characteristic feature of the Portunidae, the paddle-like transformation of the last two joints of the posterior legs, is absent in *Catoptrus* ⁶⁾, but on the other hand the form of the carapace, the tothing of the anterolateral margins, the elongated chelipeds, the shape of the abdomen of the ♂ (broadly-triangular, with all but the last two segments fused) and last, but not least, the peculiar lobes at the first maxillipeds, so characteristic of the Portunidae, are likewise present in *Catoptrus*, as has been already shown by BORRADAILE ⁷⁾. These lobes, as is shown in the figure, form two rather thick membranous expansions at the inner side of the endopodite of the first maxilliped (Pl. 9, fig. 3c, a).

Though thus the systematic place of the genus is doubtless established among the true swimming-crabs, I have in the present paper retained *Catoptrus* among the Goneplacidae, where it is closely related to *Carcinoplax*.

1) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 306; Ill. Zool. "Investigator", Crust., prt 10, 1903, pl. 61, f. 1. Hab. Persian Gulf and Andamans.

2) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 306; Ill. Zool. "Investigator", Crust., prt 10, 1903, pl. 61, f. 2. Hab. Andamans. This species, though only known by a single young specimen, is probably identical with *L. nitidus*.

3) Nouv. Arch. Mus. Paris, t. 4, 1868, p. 83, pl. 20, f. 5—7; NOBILI, Ann. Sc. Nat. (9), t. 4, 1906, p. 297. Hab. Zanzibar and Djibouti.

4) Proc. Zool. Soc. London, 1900, p. 577.

5) Notes Leiden Mus., v. 12, 1890, p. 67.

6) *Libystes*, which is certainly very closely related to *Catoptrus*, presents such swimming paddles in the species *L. edwardsi* Alcock.

7) Fauna and Geography Maldive and Laccadive Arch., v. 1, 1903, p. 425, textfig. 110.

Key to the species:

- Ratio of length of carapace to greatest breadth (posterior teeth not included) 1 : 1.4—1.5, antero-lateral teeth decreasing in size from external orbital angle to penultimate tooth. Merus of external maxillipeds longer than broad, slightly produced at antero-external angle. *C. nitidus* A. Milne-Edwards.
- Ratio of length of carapace to greatest breadth as 1 : 1.7—1.8, middle antero-lateral teeth somewhat larger than the other ones. Merus of external maxillipeds broader than long, with the antero-external angle greatly produced *C. inaequalis* Rathbun.

1. *Catoptrus nitidus* A. Milne-Edwards. Pl. 9, Fig. 4.

1870. *Catoptrus nitidus* A. Milne-Edwards. Ann. Sc. Nat. (5), t. 13, p. 82.
 1888. *Goniocapbyra truncatifrons* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 339, pl. 14, f. 1.
 1890. *Goniocapbyra truncatifrons* (= *Catoptrus nitidus*) de Man. Notes Leiden Mus., v. 12, p. 67.
 1894. *Catoptrus nitidus* Ortmann. Zool. Jahrb., Syst., Bd 7, p. 687.
 1894. *Goniocapbyra* sp. Zehnter. Rev. Suisse Zool., t. 2, p. 163, pl. 8, f. 12.
 1900. *Catoptrus nitidus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 307.
 1900. *Goniocapbyra truncatifrons* Borradaile. Proc. Zool. Soc. London, 1900, p. 577.
 1906. *Catoptrus nitidus* (part) Laurie. Rep. Pearl Oyster Fish. Ceylon, prt 5, p. 422.
 1911. *Catoptrus nitidus* Rathbun. Transact. Linn. Soc. London (2), v. 14, p. 239.

Stat. 144. Salomakiëe Island, south of Halmaheira. Depth 45 m. 1 ♂ juv.

Stat. 154. 0° 7'.2 N., 130° 25'.5 E. North of Waigeu Island. Depth 59—83 m. 1 ♂.

LAURIE has taken the trouble of comparing his specimen most attentively with those of ALCOCK and DE MAN and with the type specimen of *C. inaequalis* and concludes, that Miss RATHBUN'S species most probably is a synonym of the present one. He adds that Miss RATHBUN'S photograph "gives an excellent impression of the present specimen", but as the ratio of the length of the carapace to the greatest breadth is given as 1 : 1.51 we are again inclined to refer his specimen to *C. nitidus*. Lately Miss RATHBUN (1911), in comparing a series of no less than 47 specimens belonging to both species, enumerates 9 points of difference, all of which, save the third (the granulation of the hepatic regions of the carapace is in my material rather finer and more regularly in *C. nitidus*), I can wholly confirm.

In her first diagnosis Miss RATHBUN remarks, that *C. inaequalis* is narrower than *C. nitidus*, but this statement must be a slip, for in her paper of 1911 the reverse is expressly stated to be the case. This character at once demonstrates itself on comparing figs. 4 and 5 (pl. 9) and is very obvious, the ratio of length of carapace to breadth being 1 : 1.44 in my larger specimen of *C. nitidus* and 1 : 1.82 in *C. inaequalis*¹). The antero-lateral margins of the carapace of the first species show five teeth (including the external orbital angle, but not the last strong spine), regularly decreasing in size (see fig. 4a) backward, but in DE MAN'S type specimen of

1) In the type specimen of Miss RATHBUN the ratio, according to text, becomes 1 : 1.51 (exactly the same as in LAURIE'S specimen, which is referred to *C. nitidus*), the photograph gives a ratio of 1 : 1.62.

Goniocaphyra truncatifrons it are the posterior teeth that are the larger. The carapace is regularly vaulted, both longitudinally and transversely.

To the 9 points of difference enumerated by Miss RATHBUN it may be allowed to add a tenth, viz. the shape of the external maxillipeds. The latter are rather elongate and slender in *C. nitidus* (fig. 4*b*), the ischium is distinctly longer than broad, as is also the merus, the latter is only slightly produced at its antero-external angle, and on the whole I find an almost complete agreement with DE MAN's figure 1*a*. In *C. inaequalis* on the other hand the external maxillipeds (fig. 5*b*) are much broader, ischium and merus being both broader than long, and the antero-external angle of the latter is greatly produced outward. The horny hairs at the dactylus of the palp are much more finely pectinate in *C. nitidus* than in the other species.

The elongate meropodite of the cheliped bears a proximal and a distal spine in my specimen of *C. nitidus*; in the other species the anterior margin of the meropodite is regularly crenulate. The left (smaller) chela in my ♂ of *C. nitidus* wholly resembles the equal chelae of the ♀ of Miss RATHBUN's species in that the palm is low, rounded and as long as the fingers, but the cutting margin of the immovable finger bears more prominent, triangular teeth in the former species, and is not finely serrulate between these teeth, as in *C. inaequalis* (see fig. 5*c*). The right chela of *C. nitidus* is larger, the palm is longer than the fingers, the latter are high, not gaping, and the cutting margins are provided with a few very broad, but low, teeth.

The present species is recorded from Samoa, Fiji Isles, Noordwachter Island near Batavia, Amboyna, Ceylon, Mauritius, Amirante and Coetivy.

Dimensions in mm.:

Length of carapace	6.75	2.2
Greatest breadth of carapace (just before posterior lateral teeth)	9.75	3.16

MILNE-EDWARDS' very large specimen (breadth of carapace no less than 23 mm.) ranks foremost in size among all other recorded examples.

2. *Catoptrus inaequalis* Rathbun. Pl. 9, Fig. 5.

1906. *Goniocaphyra inaequalis* Rathbun. Bull. U. S. Fish Comm. for 1903, v. 23, p. 870, textfig. 29, pl. 12, f. 9.

1906. *Catoptrus nitidus* (part) Laurie. Rep. Pearl Oyster Fish. Ceylon, prt 5, p. 422.

1911. *Catoptrus inaequalis* Rathbun. Transact. Linn. Soc. London (2), v. 14, p. 239.

Stat. 116. West of Kwandang Bay entrance, north coast of Celebes. Depth 72 m. 1 ♀.

Between this and the preceding species numerous points of difference are already mentioned: the carapace is proportionately broader, the shape of the lateral teeth is different, the middle teeth on either side being the most prominent, the external maxillipeds are much more operculiform. We may add that, as Miss RATHBUN remarks, the infra-orbital margin is entire and not armed with three denticles, as in the preceding species, that the supra-orbital margin passes with a right angle into anterior margin of front (fig. 5*a*), and that the eye-stalks are not thickened at the base and provided with a small knob near the cornea, at the anterior side, as in *C. nitidus* (fig. 4*a*), but simply cylindrical.

This species seems to have an equally wide distribution: it has been first recorded from the Hawaiian Islands and afterwards from several stations near the Seychelles. The "Siboga" record is intermediate between these widely distant localities.

Dimensions in mm.:

Length of carapace	4.85
Breadth of carapace (just before posterior lateral teeth)	8.8

Subfam. GONEPLACINAE.

This group, which has bestowed its name upon the whole group, is readily characterized by the elongate eye-stalks, and the narrow front. The greatest breadth of the carapace is lying between the tips of the external orbital angles. In some cases the last segment of the sternum is largely exposed, the base of the abdomen of the ♂ by far not reaching to the coxopodites of the posterior legs, but the segment may be in other cases completely covered by the abdomen.

To this subfamily only two genera are referred, *Goneplax* and *Ommatocarcinus*.

Key to the genera:

Eye-stalks moderately elongate; front square-cut, not constricted	Goneplax Leach
Eye-stalks very long, thickening towards eye, front constricted between eye-peduncles	Ommatocarcinus White.

Goneplax Leach.

1814. *Goneplax* Leach. Edinburgh Encycl., v. 7, p. 430 (*Goneplat* on p. 393 is an evident typographical error) ¹⁾.

1815. *Goneplax* Leach. Transact. Linn. Soc. London, v. 11, p. 323.

1816. *Goneplax* Leach. Malacostraca Podophth. Brit., opposite pl. 13.

This genus, on account of its elongate eye-stalks and the narrow front, bears a great resemblance to *Macrophthalmus*, with which it has been generally associated by earlier authors.

The well known European species *G. angulata* (Fabricius) has long been the only representative of the genus. MIERS first recorded a species from the Indo-Malayan Archipelago. Lately Miss RATHBUN described two new species from the Indo-Pacific and BORRADAILE ²⁾ has made known an interesting species (*G. hirsutus*) from the South Atlantic, near Rio de Janeiro. The "Siboga" collection yielded two species.

Key to the (Indo-Pacific) species ³⁾:

1. Lateral margins of carapace slightly converging backward, without teeth, save the strong, spiniform external orbital angle; anterior margin of front somewhat concave. Meropodites of ambulatory

1) Fide RATHBUN, Proc. Biol. Soc. Washington, v. 11, 1897, p. 167.

2) British Antarctic ("Terra Nova") Exp., 1910, Zool., v. 3, n^o 2, 1916, p. 100, textfig. 11.

3) It must be mentioned here, that ALCOCK (Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 317) records a small specimen of *Goneplax* from the Persian Gulf, that resembles the European *G. angulata*, but is distinguished by the want of the subterminal spine on the anterior margin of the meropodites of the walking legs.

- legs with a subdistal spine at the anterior margin, save in the case of the last legs. *G. sinuatifrons* Miers
- Antero-lateral margins of carapace with an epibranchial tooth, behind external orbital angle 2
- Lateral margins of carapace feebly convergent backward; external orbital angle spiniform; eye-stalks reniform, greatly widening distally. Meropodites of walking legs with a subdistal spine at anterior margin *G. renoculis* Rathbun¹⁾
- Lateral margins of carapace distinctly convergent backward; external orbital angle obtuse or subrectangular; eye-stalks club-like. Meropodites of walking legs unarmed, last pair of legs with the propodites broadened and transformed into swimming paddles . *G. maldivensis* Rathbun

1. *Goneplax sinuatifrons* Miers. Pl. 9, Fig. 2a.

1886. *Goneplax sinuatifrons* Miers. Rep. "Challenger", Brachyura, p. 246, pl. 20, f. 2.

Stat. 181. Amboyna. Depth 36—54 m. 1 ♂, 1 ♀, 8 juv. (aet. div.).

MIERS rightly remarked that this species is extremely like the European *G. rhomboide* (Fabricius), which must be regarded as hardly a subspecies of *G. angulata*, but it differs in having the anterior margin of the front not straight, but slightly concave; it must be said, however, that also in the European species the same character, though less marked, is to be observed. The shape of the carapace is nearly exactly the same, but the slight prominence or tubercle, representing an obsolete epibranchial tooth, in *G. rhomboides* is wholly wanting in the Indian species, and the chelipeds are short and not greatly elongate in the ♂ of the latter species, but this may be perhaps attributed to the small size of the examples as yet found. There is, however, another and perhaps more remarkable feature in the Indian species, viz. the breadth of the abdomen of the ♂, which seems to have been overlooked by MIERS, for he expressly states that in all species of *Goneplax* the abdomen entirely covers up the space between the bases of the last legs. Now, in the present species, the first segment is hidden under the carapace, the second segment is exactly one-half, and the third segment not completely two-thirds of the breadth of the last segment of the sternum (fig. 2a), so that the lateral parts of the third segment of the abdomen conspicuously fall short of the coxopodites of the legs²⁾. In *G. rhomboides*, on the other hand, the first segment is exposed, as broad as the next, both not covering up the last segment of the sternum, the third segment of the abdomen nearly touches the coxopodites of the last legs. In both species the remaining parts of the abdomen are only very slightly narrowed towards the tip, but in *G. sinuatifrons* the terminal segment is shortly-triangular, twice (in the ♀ even 3 times) as broad as long, in *G. rhomboides*, however, more elongate and longer than broad.

1) Proc. U. S. Nat. Mus., v. 48, 1914, p. 145. Hab. Philippines.

2) It may be added, that the same is the case in the ♀, in which the abdomen is only slightly broader than in the ♂; only the first segment is not concealed beneath the carapace.

Chelipeds in the ♂ moderately long, but by far not so much elongate as in the adult ♂ of *G. rhomboides*, in which the meropodite exceeds the length of the carapace. In both species the upper border of the meropodite presents a tooth or an obsolete tubercle, a little beyond the middle of the border, and all three borders are rounded, but in the Indian species the outer border bears a subdistal spine, the inner angle of the wrist is sharply produced, depressed, and there is also a small, but distinct spine on the outer border, which spine is not obsolete in my specimens as in that of MIERS; the chelae are a little unequal, the right being the larger, the palm is low and as long as the fingers, smooth, rounded below and somewhat keeled above; the fingers are closely fitting, greatly compressed, the fixed finger is sharply keeled below, retaining its height at the base for nearly two-thirds of its length, then tapering rapidly towards the very short, scarcely curved-up tip, the movable finger is regularly curved in its distal half, more finely crenulate at its inner margin, at least in the case of the larger chela, than its antagonist, near the base, however, it shows one large, obtuse tooth, directed backward, which tooth is absent in the left chela.

The ambulatory legs are slender; as in *G. rhomboides*; the meropodites, save those of the last pair, exhibit a subdistal spine at the anterior margin, and all are considerably narrowed distally; the dactyli are conical, very thin and finely pointed.

The whole animal, which is of an ivory-white colour, is almost perfectly hairless, only the walking legs bear some few short, widely-scattered hairs, even on the dactyli. In *G. rhomboides* the dactyli, which are flattened like those of *Ocyroda*, are fringed with dense, short hairs, especially in the case of the first and second pair.

MIERS regarded his unique specimen as probably not being fully adult, on account of its small size (length of carapace little more than 7 mm., breadth about 9.5 mm.). None of the 10 "Siboga" specimens even attains this size and it may well be possible, that indeed the species does not grow larger.

Dimensions in mm :

	♂	♀
Greatest breadth of carapace (distance between external orbital angles)	8.4	9.25
Length of carapace	5.3	6.5
Breadth of front at anterior margin.	2.2	2.3

The "Siboga" examples were got at exactly the same locality, whence the "Challenger" obtained the hitherto only specimen.

2. *Goneplax maldivensis* Rathbun. Pl. 9, Fig. 1.

1902. *Goneplax maldivensis* Rathbun. Bull. Mus. comp. Zool. Harvard Coll., v. 39, p. 124, figs. 3—5.

Stat. 204. Between Wowoni and Buton Island, south-east of Celebes. Depth 75—94 m. 2 ♂ juv.

The carapace of this minute species is almost straight transversely and longitudinally, but curved in its anterior part towards the front, which latter is perpendicularly deflexed; the surface is smooth, finely punctate anteriorly (I did not observe the "finer wrinkles" mentioned by Miss RATHBUN); there are faint traces of two epigastric lobes; the gastric region as a whole

is obscurely indicated, with an indistinct longitudinal sulcus between the protogastric areas, a cervical groove is present, but very short and straight, and a cardiac area is separated from the branchial regions, but on the whole the carapace may be regarded as nearly not subdivided into regions.

The ratio of the length of the carapace to its greatest breadth (the latter being taken between the tips of the epibranchial teeth) is 1 : 1.46 in my larger specimen, in that of Miss RATHBUN it is 1 : 1.53 according to text and 1.61 in the figure, accordingly in the "Siboga" specimen the carapace is proportionately narrower, but perhaps this may be attributed to the small size of my specimen.

The front is broader than either orbit, its surface is obscurely grooved in the middle, and its anterior margin is perfectly straight¹⁾. Eye-stalks short, increasing in thickness towards the eye, which is greatly enlarged and club-like in anterior view. Supra-orbital margin entire, sloping backward towards the subrectangular, not at all prominent, external orbital angle; behind this angle a single, sharp epibranchial tooth is found, curved forward and somewhat outward; it is between the tips of these teeth that the carapace attains its greatest breadth. Behind these epibranchial teeth the margins of the carapace are distinctly convergent backward, so that the posterior breadth, at the level of the penultimate pair of legs is about three-fourths of the distance between the external orbital angles.

Peduncle of the antennae free, flagella little longer than width of orbit. Lateral margins of buccal cavern convergent backward; external maxillipeds slender (fig. 1a), with the merus rectangularly rounded at the antero-external angle and very slightly prominent outward; inner margins of both ischium and merus crenulate and hairy.

The chelipeds are short, finely granulate and equal in my specimen, but unequal according to Miss RATHBUN. Meropodite short, with sharp borders, outer border crenulate, inner margin unarmed, upper border with a row of long hairs, extending to the subterminal, acuminate and curved spine (not a blunt tooth as Miss RATHBUN observed) near the distal end. Wrist small, with sharply-produced and flattened inner angle, but devoid of the outer spine of *G. sinuatifrons*. Chela (fig. 1b) not elongate, palm longer than fingers, with the borders rounded, upper margin of chela with a row of hairs; fingers greatly compressed, immovable finger not sharply keeled below, straight, with the tip curved upward, cutting margin with about 5 crenulations, the 2nd and 3rd of which are much broader than the remaining ones, movable finger greatly curved towards the tip, inner margin crenulate, but near the base a large, obtuse tooth is seen; outer surface of chela granulate, the granules tending to form two longitudinal rows on each finger. Miss RATHBUN's figure of the right chela differs rather much from mine; the palm appears to be much more inflated, and the fingers are shorter, apparently not compressed; the crenulations on the inner margins of the fingers are not clearly shown.

The walking legs are slender, but not very long, the penultimate pair being not yet twice as long as the carapace. Meropodites five times as long as broad, quite unarmed distally; dactyli finely pointed, not flattened, considerably longer than the preceding propodites. The legs are somewhat more hairy than in *G. sinuatifrons*, but these hairs are rather widely

1) In my specimen I neither noticed the lateral notches in which the peduncles of the antennae are lodged, nor the impressed line near and parallel to the margin of the front, as noted by Miss RATHBUN.

scattered, even on the dactyli. The last pair of legs is peculiarly transformed: the carpo- and especially the propodite are rather much flattened, so as to form a swimming paddle; the latter joint is indeed broader than half the length of the anterior margin (RATHBUN); the dactylus is perfectly straight, not curved near the tip, flattened, but not considerably broadened. All three named joints are fringed with feathered hairs (fig. 1c), generally as long as the breadth of the joint to which they are attached, but longer on the inner margin of the propodite, and on the inner margin of the dactylus decreasing in length from base to tip; the outer margin of the dactylus bears numerous feathered hairs of about equal length, between which are placed a few ordinary hairs.

The abdomen of my larger ♂ specimen (fig. 1d) differs somewhat from that figured by Miss RATHBUN in being considerably broader from the 4th segment to the tip; in other points there is a general agreement: the 1st segment is hidden under the carapace (in my figure it is exposed, on account of the abdomen being severed from the cephalothorax), the 2nd segment is as broad as the following and both entirely cover the last segment of the sternum. As has been said the rest of the abdomen of Miss RATHBUN's specimen is very narrow, the last segment being much longer than broad, whereas in my specimen the abdomen resembles that of *G. sinuatifrons* in being considerably wider, the terminal segment presenting about equal dimensions in length and along the base.

Notwithstanding small discrepancies between the descriptions there can be no doubt as to the identity of my specimen with Miss RATHBUN's, the differences being easily accounted for either by the different size of the examples or to individual variations. The shape of the carapace with its rectangular, not prominent external orbital angle, followed by an acuminate epibranchial tooth, and the transformation of the last pair of legs into swimming paddles afford excellent specific characters.

Miss RATHBUN's specimen was caught at Gan Island, Addu Atoll, Maldive Arch.

For completeness' sake I add the measurements of this former example.

Dimensions in mm.:		1 ♂	2 ♂
Distance between external orbital angles		4.3	7.5
Breadth of front		1.65	2.5
Distance between tips of epibranchial teeth		4.5	7.8
Length of carapace		3.1	5.1
Length of meropodite	} of penultimate pair of legs	2.2	—
Breadth of meropodite		0.44	—
Length of carpo-and propodite together		1.85	—
Length of dactylus		1.4	—
Length of meropodite	} of last pair of legs . . .	1.65	—
Breadth of meropodite.		0.44	—
Length of carpo-and propodite together		1.75	—
Length of propodite along anterior margin		0.71	—
Breadth of propodite		0.39	—
Length of dactylus		1.1	—

N^o 1 is the "Siboga" specimen, n^o 2 that of Miss RATHBUN.

Ommatocarcinus White.

1852. *Ommatocarcinus* White. Append. in Stanley's Voy. H. M. S. "Rattlesnake", v. 2, p. 393.

There can be no doubt, as has been suggested by MIERS, that this genus is nearly related to *Goneplax*, which it resembles in the great elongation of the eye-stalks and the chelipeds, the bulging of the corneae, the narrowness of the front and the fine build of the dactyli of the walking legs.

From *Goneplax* the present genus is distinguished by the greatly-developed, spiniform external orbital angle being directed straightly outward, by the much concave lateral margins, and consequently the acuminate angles, of the front, and by the shortness of the antennae.

Two species have been described from Australian and New Zealandian waters, viz.: *O. macgillivrayi* White¹⁾ and *O. huttoni* Filhol²⁾. I shall not venture to give a diagnostic key to these species (which are both incompletely known), because I had no opportunity of consulting the original description and figure of WHITE. It is most remarkable, that apparently a new species of the genus has been found by the "Siboga" in the Indo-Malayan Archipelago.

1. *Ommatocarcinus orientalis* n. sp. Pl. 10, Fig. 2.

Stat. 260. 5° 36'.5 S., 132° 55'.2 E. North-west of Kei Islands. Depth 90 m. 1 ♂.

This remarkable species is somewhat vaulted in transverse direction, more so in a longitudinal sense; regions are very faintly indicated on the carapace, but there is a trace of two epigastric lobes, a longitudinal, broad and shallow depression behind them on the gastric region, and branchial and hepatic regions are separated by a concave groove on either side, much curving backward on the median side, but not connected by a cervical groove, that is entirely absent. The whole surface is perfectly smooth, without any granules or hairs.

The front is obliquely deflexed, somewhat constricted between the eye-stalks (fig. 2*b*); measured in dorsal view it is little less than one-fourth the greatest width of the carapace, the anterior margin is somewhat concave, with an obtuse prominence in the middle, and the lateral angles are acuminate, not rectangular. The supra-orbital margins are greatly sloping backward, so that a line connecting the external orbital angles divides the median longitudinal axis of the carapace into two nearly equal parts; (in *O. huttoni*, and probably also in WHITE's species, the supra-orbital margins are nearly transverse), in the middle third of their course they are bulging forward, becoming again concave towards the spiniform external orbital angles, which are large, directed straightly outward, like in the other species, not flattened; the distance between the tips of these teeth is only slightly less than twice the length of the carapace. The lateral margins of the latter are unarmed, straight, greatly converging backward, so that the breadth of the carapace at the level of the penultimate pair of legs measures not yet two-thirds of its greatest breadth, the posterior margin is perfectly straight.

1) L. c., p. 393, pl. 5, f. 1; *O. macgillivrayi* H. Milne-Edwards, Ann. Sc. Nat. (3), t. 18, 1852, p. 163; *O. macgillivrayi* Miers, Rep. "Challenger", Brachyura, 1886, p. 247. Hab. Port Curtis (Australia) and Queen Charlotte Sound near Long Island (New Zealand).

2) Miss. ile Campbell, t. 3, prt 2, 1885, p. 384, pl. 43, f. 1-2, 5. Hab. Otago (New Zealand).

The orbits are long, narrow trenches, for the reception of the eye-peduncles; the inferior margin (fig. 2*a*), which, like the opposite one, is wavy, presents a broad, triangular, but low tooth in its inner part, tipped by a feathered hair; similar hairs, three in number, are placed on the convex part of the margin. Both margins are very finely crenulate, the inferior one does not project beyond the superior, in dorsal view, and on the dorsal roof of the orbit is placed a serial row of ordinary hairs, increasing in length towards the outer tooth. The eye-stalks are very much elongate, the basal joint is not very thick, but the second greatly enlarges gradually towards the much bulging cornea, which in dorsal view occupies one-third of the whole length of the eye-stalk; the length of the latter exceeds the breadth of the orbit, so that the stalk, if laid back into the orbit, slightly projects with the terminal part of the cornea beyond the outer orbital angle.

The antennulae are folded quite transversely beneath the anterior margin of the front; they are much longer and thicker than the small antennae, the peduncle of which rises freely at the inner side of the base of the inner suborbital lobe, in the wide gap between this lobe and the lateral angle of the front; the flagellum of the antennae consists of about seven joints, which together are scarcely as long as one-third of the length of the eye-peduncle. Epistome distinct, somewhat produced at its free margin, nearly vertical. Margins of buccal cavity convergent backward. External maxillipeds (fig. 2*c*) greatly divergent forward, ischium longer than broad and longer than the small, quadrate merus, the antero-external angle of which is not produced and rounded off (according to FILHOL's figure 5 this angle is greatly obtuse); exognath half as broad as ischium; inner margin of ischium and merus crenulate and hairy.

The chelipeds are greatly elongate, as seems to be the usual case in the genus, at least in the ♂, measuring more than 3 times the length of the carapace; in my specimen they are equal in length and size (in *O. huttoni* the right cheliped of the ♀, the only sex known, is slightly the larger). Meropodite (fig. 2*d*) long-stretched, nearly cylindrical in section, but inner margin with a thin, sharp keel, that is abruptly cut off near the distal articulation and regularly crenulate and somewhat hairy for the greater part of its length, upper border wholly unarmed (both in *O. macgillivrayi* and *O. huttoni* it is armed with a spinule in the middle, and in the ♀ of the first species there are 2—3 spinules on the distal part of the anterior border, according to MIERS). Wrist very small; in dorsal view of the cheliped the inner angle is very inconspicuous, but if the cheliped be outstretched and examined in outer view (fig. 2*d*) this inner angle turns out to be large, triangular, and directed upward. Chela elongate, palm twice as long as high, gradually increasing in height towards base of movable finger, borders rounded; near upper border the palm is very minutely granulate, but not hairy; the outer surface, like that of the whole cheliped, bears some few low granules or meandrian wrinkles; the fingers are greatly shorter than the palm, depressed, but not keeled; the fixed finger is straight, in a line with the under border of the palm, slightly curved up at the tip, and regularly crenulate at inner margin; the movable finger is rather high, curved in its distal half, inner margin with a few indistinct crenulations, the basal one of which, in the right chela, is much the largest.

Ambulatory legs slender, but not very long, shorter and weaker than the chelipeds, but more slender than in *O. huttoni*, according to FILHOL's figure; they are wholly hairless, even

on the propodites and the dactyli, except for some minute hairs on the meropodites. These latter are five times as long as broad, narrowing towards the distal end, unarmed, longer than carpo- and propodite together; dactyli long, curved, styliform, finely pointed, as long as propodites.

Abdomen of ♂ (fig. 2a) much resembling that of *G. sinuatifrons* (pl. 9, fig. 2a): first segment hidden under the carapace; second segment exposed, half as broad only as the last segment of the sternum, so that a wide space is left between the sternum and the last pair of legs; third segment but very little broader than the preceding, with the lateral angles obtuse, scarcely prominent; fourth to sixth segment gradually increasing in length, fourth and fifth segment narrowing forward, though very little, sixth segment with lateral margins perfectly parallel and twice as broad as long; terminal segment triangular, somewhat longer than the preceding, but little more than half as long as broad, tip rectangular. That the base of the abdomen is much narrower than the space between the insertion of the posterior legs is also shown in FILHOL's figure of *O. huttoni*.

The occurrence of this new representative of *Ommatocarcinus*, which in its outer appearance recalls some broad-fronted species of *Uca*, (on account of the greatly-elongate eye-stalks), in the Indo-Malayan region is worth mentioning, the genus being hitherto confined to East Australian and New Zealandian waters only. The single specimen is very small, measuring not yet 5 mm. in breadth, the other two species grow to a much larger size; as has been said, I could not consult WHITE's original diagnosis and so I am ignorant, whether dimensions at all are given, but MIERS' specimens (both ♀) of *O. macgillivrayi* are very much larger, the breadth of the carapace, not including outer orbital angles, measuring 15 and 19 mm., and the single specimen of *O. huttoni* even attains a maximum breadth of 33 mm., with the lateral spines included.

Dimensions in mm.:

Greatest breadth of carapace (lateral teeth included)	4.6
Breadth of front between bases of eye-peduncles.	1.1
Length of eye-peduncle.	2.25
Transverse diameter of eye	0.6
Length of carapace	2.35
Length of cheliped.	7.5

Subfam. PRIONOPLACINAE.

This subfamily was originally instituted by STIMPSON¹⁾ to receive his genus *Euryplax*, described already in 1862, and some related genera; the name *Euryplacinae* was accordingly bestowed upon the group. MIERS²⁾ retained it as a subgroup of his subfamily *Carcinoplacinae* (fam. Ocypodidae) and afterwards ALCOCK³⁾, becoming aware that most likely the obscure genus *Prionoplax* of H. MILNE-EDWARDS, established as early as 1852, would form the prototype of the group, accordingly altered the name of this subfamily into *Prionoplacinae*.

1) Bull. Mus. comp. Zool. Harvard Coll., v. 2, 1870, p. 150.

2) Rep. "Challenger", Brachyura, 1886, p. 222. Into the same group the *Eucratopsinae* of STIMPSON (l. c., p. 151) are included.

3) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 286, 292.

Without ample material, such as only Miss RATHBUN may dispose of, it is impossible to discriminate the genera and species of the group. Nearly all genera are very obscurely known, most of the species are not figured at all.

The *Prionoplacinae*, like the *Pseudorhombilinae*, but apparently even at a higher degree, are nearly related to Xanthid genera, such as *Panopeus* and *Galene*. The characteristic diagnostic feature of the group, which I am, for want of material, unable to appreciate fully, consists in the abdomen of the ♂ being narrow, the third segment, and *à plus forte raison* the second, distinctly falling short of the breadth between the bases of the posterior legs, and narrower than the first segment.

The following is an account of the genera of the present group in chronological order:

- Prionoplax* H. Milne-Edwards, Ann. Sc. Nat. (3), t. 18, 1852, p. 163. Species: *P. spinicarpus* (See Arch. Mus. Paris, t. 7, 1853, p. 167, pl. 11, f. 3). Hab. unknown. A second species is *P. ciliata* Smith (Transact. Connecticut Ac., v. 2, 1870, p. 160) from Panama.
- Speocarcinus* Stimpson, Ann. Lyc. Nat. Hist. New York, v. 7, 1862, p. 59. Species: *S. carolinensis* (l. c., p. 59, pl. 1, f. 1—3; RATHBUN, Bull. Lab. Nat. Hist. State Un. Iowa, v. 4, 1898, p. 281; Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 11, textfig. 2). Several additional species have afterwards been added: *S. granulimanus* Rathbun, Proc. U. S. Nat. Mus., v. 16, 1893, p. 242, *S. californiensis* Rathbun, Harriman Alaska Exp., v. 10, 1903, p. 190, pl. 9, f. 1, *S. ostreaticola* Rathbun, Proc. U. S. Nat. Mus., v. 38, 1911, p. 545, p. 48, f. 2. The type species is West Indian, the two next species are from California, and *S. ostreaticola* comes from Peru.
- Euryplax* Stimpson, Ann. Lyc. Nat. Hist. New York, v. 7, 1862, p. 60. Species: *E. nitida*. Literature and description: RATHBUN, Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 8. Hab. West India. Second species: *E. polita* Smith (Transact. Connecticut Ac., v. 2, 1870, p. 163) from Panama.
- Eucratopsis* Smith, Amer. Journ. Sc., v. 48, 1869, p. 391; Transact. Connecticut Ac., v. 2, 1870, p. 35. Species: *Eucrate crassimanus* Dana, which, according to STIMPSON'S researches (Journ. Nat. Hist. Boston, v. 7, 1863, p. 588) is generically distinct from DE HAAN'S species *Eucrate crenata*. Afterwards *Eucratoplax elata* A. Milne-Edwards (Bull. Mus. comp. Zool. Harvard Coll., v. 8, 1880, p. 18) has been added to *Eucratopsis* by Miss RATHBUN (Bull. Lab. Nat. Hist. State Un. Iowa, v. 4, 1898, p. 281). Hab. West India and Rio de Janeiro (?)
- Glyptoplax* Smith, Transact. Connecticut Ac., v. 2, 1870, p. 164. Species: *G. pugnax* from Panama. Probably this genus is more nearly related to *Panopeus* and so to the Xanthidae.
- Panoplax* Stimpson, Bull. Mus. comp. Zool. Harvard Coll., v. 2, 1871, p. 151. Species: *P. depressa* from West India. See also: RATHBUN, Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 12.
- Eucratoplax* A. Milne-Edwards, Bull. Mus. comp. Zool. Harvard Coll., v. 8, 1880, p. 17. Species: *E. guttata* from West India. A second species of MILNE-EDWARDS (*E. elata*) seems to belong to *Eucratopsis*.

- Oediplax* Rathbun, Proc. U. S. Nat. Mus., v. 16, 1893, p. 241. Species: *O. granulata* from the Gulf of California.
- Tetraplax* Rathbun, Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 9. Species: "*Frevillea*" *quadridentata* Rathbun, Bull. Lab. Nat. Hist. State Un. Iowa, v. 4, 1898, p. 287, pl. 8, f. 1. Hab. West India.
- Cyrtoplax* Rathbun, Proc. U. S. Nat. Mus., v. 47, 1914, p. 118, pl. 2. Species: "*Eucratoplax*" *spinidentata* Benedict, John Hopkins Un. Circ., v. 11, n^o 97, 1892, p. 77; RATHBUN, Ann. Inst. Jamaica, v. 1, 1897, p. 26; "*Eucratopsis*" *spin.* Rathbun, Bull. Lab. Nat. Hist. State Un. Iowa, v. 4, 1898, p. 281; Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 11. Hab. West India.
- Chasmophora* Rathbun, Proc. U. S. Nat. Mus., v. 47, 1914, p. 119. Species: "*Eucratopsis*" *macrophthalmia* Rathbun, Proc. U. S. Nat. Mus., v. 21, 1898, p. 601, pl. 43, f. 3—4, from Panama.
- Homoioplax* Rathbun, Proc. U. S. Nat. Mus., v. 48, 1915, p. 146. Species: "*Pseudorhombila*" *vestita* var. *sexdentata* (Haswell) Miers, Zool. H. M. S. "Alert", 1884, p. 240, pl. 24, f. B. Hab. Indo-Malayan Arch.

A primary division between the genera, though based on the ♂ only, has been proposed by MIERS¹⁾: one, in which the last segment of the sternum is for the greater part concealed, the anterior corners being only visible, and another, in which this last segment is largely exposed. To the first group the following genera would belong: *Euryplax*, *Eucratopsis*, *Panoplax*, *Oediplax* and *Homoioplax*, to the second: *Speocarcinus*, *Eucratoplax*, *Prionoplax*, *Cyrtoplax* and *Chasmophora*. *Glyptoplax* is left aside on account of its doubtful affinities to the *Prionoplacinae*, and I am uncertain as to the exact place of *Tetraplax*, as the original description of "*Frevillea*" *quadridentata* is inaccessible to me; in Miss RATHBUN's paper of 1901 the abdomen is said to be narrower than the sternum and most likely it would therefore belong to the second group.

As results from the list given here nearly all the genera are American, the species living either at the Atlantic or the Pacific coasts, in shallow water. *Homoioplax* forms the only exception. The "Siboga" not only dredged the only species of the latter genus, but also two other species of the *Prionoplacinae*, one belonging to *Speocarcinus*, and another constituting apparently a new genus.

1. *Homoioplax haswelli* (Miers) Rathbun. Pl. 10, Fig. 1.

1884. *Pseudorhombila vestita* (de Haan) var. *sexdentata* (Haswell) Miers. Zool. H. M. S. "Alert", p. 240, pl. 24, f. B.

1886. *Pilumnoplax vestita* var. *sexdentata* (Haswell) Miers. Rep. "Challenger", Brachyura, p. 229.

1915. *Homoioplax haswelli* Rathbun. Proc. U. S. Nat. Mus., v. 48, p. 146.

Stat. 2. Madura Strait, south of Madura. Depth 56 m. 1 ♂.

MIERS supposed that this species was nearly related to "*Curtonotus*" *vestitus* de Haan,

1) Rep. "Challenger", Brachyura, 1886, p. 222.

which now is agreed to have its proper place in *Pilumnoplax*, and identified it, though with much reserve, with "*Eucrate*" *sexdentatus* Haswell¹⁾. In reality the present species has nothing to do with that of DE HAAN, and, as to "*Eucrate*" *sexdentatus* Haswell, it is so insufficiently known as to be better discarded altogether. MIERS himself proposed the specific name *haswelli* for his specimen, for the case the latter would turn out to be distinct. Lately Miss RATHBUN, becoming aware of MIERS' description of the abdomen, definitely removed the species from the *Pseudorhombilinae*, creating a new genus, *Homoioplax*, for it among the present subfamily.

Carapace and legs are "scantily pubescent", according to MIERS; in my specimen only a few short hairs are observed on the carapace; much more conspicuous, however, is a coarse granulation all over the carapace and over the exposed part of the sternum. The former is moderately vaulted in both main directions, strongly declivous on the lateral branchial regions, the whole surface is sculptured, a cervical groove, though discontinued, is found before the middle of the longitudinal axis of the body, and before this groove a very broad gastric area is found, which is generally not subdivided, but anteriorly two epigastric ridges are seen, separated by a narrow groove, which, immediately behind the ridges, bifurcates and disappears gradually. Between hepatic and branchial regions the carapace is bulging; a cardiac area is separated off from the inner branchial ones, the latter are defined laterally by a conspicuous, broad groove, beyond which the carapace is sloping abruptly downward.

The front measures, between the bases of the eye-peduncles, nearly exactly one-half of the distance between the outer orbital angles; it is nearly horizontal, scarcely deflexed, granulate like the rest of the carapace, with an obscure longitudinal groove in the middle; the anterior margin is perfectly straight, with a very slight notch in the middle, and is distinctly visible in dorsal view; the lateral margins are divergent backward and thickened and pass insensibly into the concave, almost transverse, superior orbital margins, the external angle of which is acute, somewhat depressed, and not much prominent. The distance between these angles is exactly the same as the length of the carapace. Parting from the external angles the lateral margins of the carapace are divergent in their anterior third portion, finely serrate and armed with two prominent and sharp epibranchial teeth. The anterior of these teeth is placed nearer to the external orbital angle than to the posterior tooth, it is flattened, and of the same shape as the orbital angle, though conspicuously larger; the posterior tooth is not flattened, but spiniform, slightly curved; directed obliquely-forward, and between the tips of these teeth the greatest width of the carapace is to be found. Behind the posterior teeth the lateral margin is not sharply marked off as a prominent ridge, but entirely disappears; in dorsal view of the carapace, however, it describes a sigmoid curve, being first concave and then convex, mainly parallel to that of the other side; the posterior margin is slightly concave in the middle.

The eye-peduncles are very short and thick; the retina of the eye is of a light horny colour, not black (in spirit preservation); the finely-serrate and quite straight inferior orbital margin reaches farther forward at the inner end, where it is cut abruptly, so that a wide space is formed, between this inner orbital angle and the lateral angle of the front, for the reception

1) Cat. Austral. Crust., 1882, p. 86.

of the antenna, the flagellum of which consists of 15 joints, and reaches outward as far as to the tip of the anterior epibranchial tooth. The antennulae are folded quite transversely beneath the front, separated by a narrow septum. Epistome short, but distinct, transversely deeply folded. Lateral margins of buccal cavity conspicuously convergent backward; external maxillipeds consequently greatly divergent forward, slender, ischium twice as long as broad, longitudinally sulcate, merus quadrate, with the antero-external angle rectangular, not prominent, exognath slender, not quite half as wide as ischium.

Chelipeds subequal, of moderate length, granulate at outer surface. Meropodite projecting somewhat beyond carapace, borders sharpened, but unarmed, except for a triangular, curved tooth near the distal end of the upper margin, which tooth is preceded by a row of long hairs, extending also along the outer border; carpopodite with a large, flattened tooth as the inner angle, beneath which a tuft of hairs projects, which is continued at either end into a row of shorter hairs; chela (fig. 1*a*) not much elongate, though more than twice as long as high; palm $1\frac{1}{2}$ times as long as the fingers, finely granulate at both surfaces, with upper and under border rounded, the latter nearly in a straight line with that of the fixed finger; fingers compressed, but not keeled; under finger with a row of short, feathered hairs beneath, continued towards one side to the curved, blunt tip and proximally extending to the palm, cutting margin with a few coarse teeth; movable finger curved, granulate on the back, where a row of feathered hairs, diminishing in length distally, is observed to extend to the tip, proximally these hairs extend to the upper border of the palm, inner margin with some low teeth, interlocking with those of the other finger, one tooth, near the base, being most prominent, blunt and directed backward, at least in the right chela.

Ambulatory legs slender, elongate, the penultimate pair measuring about $2\frac{1}{2}$ times the length of the carapace. Meropodites $6\frac{1}{2}$ times as long as broad, narrowing distally, unarmed, but fringed with a few hairs, which on the anterior margin are feathered; anterior margin of carpopodite and both margins of propodite fringed with long hairs, which are especially long in the case of the posterior legs, in which the propodites are comparatively shorter and more flattened (without, however, assuming the shape of swimming paddles) than in the preceding pairs. Dactyli longer than propodites, not flattened, almost completely straight, though slightly curved at the tip, with four longitudinal rows of hairs, the two marginal rows being the longest; in the last pair of legs the dactyli are perfectly straight, somewhat flattened, with only an inner and an outer series of long hairs, which are feathered, like those of the propodites (fig. 1*b*).

The abdomen of the ♂, like the sternum, is granulate; it is rather thick, not transparent, as perhaps we should expect in so small an animal. The first segment (fig. 1*c*) entirely covers the sternum between the last pair of legs; the second segment rapidly narrows distally, so that the last segment of the sternum is visible at either side of this abdominal segment; the third segment again widens laterally, but does not quite reach the bases of the last legs.

Though, to my mind, there cannot be any doubt about the identity of the "Siboga" specimen with those of the "Alert" expedition, described by MIERS, there are a few points put forth by this author, which I cannot confirm. According to MIERS, the chelae are pubescent,

and it is this feature which induced him to regard his specimens as closely related to "*Carcinoplax*" *vestita* (de Haan), whereas I observed only a row of feathered hairs along upper and under border and none on the surface of the chela; in the "Challenger" specimens of MIERS the chelae are said to be pubescent on the upper part of the palm and the base of the dactylus, and the carpopodite presents an obsolete tooth on the outer margin. Apart from the quite different shape of the abdomen in the present species and in that of DE HAAN, the shape of the carapace in the former, with its prominent antero-lateral teeth, its roughly-quadrangular outline and its marked sculpture certainly affords evidence of the distinctness of these two species; besides "*Carcinoplax*" *vestita* grows to a much larger size.

Whether MIERS' species is identical with "*Eucrate*" *sexdentata* Haswell must remain uncertain, on account of HASWELL'S quite incomplete diagnosis.

The "Alert" specimens were obtained in the Arafura Sea, from a depth of 32—36 fathoms, those of the "Challenger" in the Japanese Seas, from 10—15 fathoms. These examples were only slightly larger than that of the "Siboga" expedition.

Dimensions in mm.:

Distance between external orbital angles	5.2
Breadth of front between eye-stalks.	2.5
Greatest breadth of carapace (between tips of posterior lateral teeth).	7.—
Length of carapace	5.2
Length of meropodite	5.—
Breadth of meropodite	0.75
Length of carpopodite along anterior margin	2.—
Length of propodite along anterior margin	2.5
Breadth of propodite	0.5
Length of dactylus	1.15

} of penultimate pair of legs }

Speocarcinus Stimpson.

1862. *Speocarcinus* Stimpson. Ann. Lyc. Nat. Hist. New York, v. 7, p. 59.

This genus now contains four species, enumerated on p. 189, which in their outer aspect much resemble *Rhizopinae*, on account of their vaulted carapace, the small eyes, partly concealed in upper view, and long, hairy legs. In the *Rhizopinae*, however, the surface of the carapace is scarcely or not at all sculptured and the lateral margins, if at all, are obscurely notched, never toothed; the eye-peduncles, which are very short, are usually fixed, not mobile and nearly completely concealed in dorsal view of the animal, and the abdomen of the ♂ is very narrow at its base, covering one-half or one-third only of the space between the last pair of legs, whereas in *Speocarcinus* the carapace is sculptured and toothed, the eye-stalks are mobile, and the abdomen of the ♂ occupies the greater part of the last segment of the sternum.

MISS RATHBUN, who examined all the species and herself made known three of them, has never provided a key to discriminate them. As to myself, I am unable to do so, partly because the description of one species (*S. californiensis*) is inaccessible to me, and partly on account of the general deficiency of the diagnoses. I can only say that in *S. granulimanus*, from Lower California, the outer orbital angle is followed by three antero-lateral teeth, separated

by narrow sinuses and not prominent, that the supra-orbital margin has two notches and that the chelae are provided with longitudinal rows of granules, whereas in *S. carolinensis*, from West-India, and *S. ostracoricola*, from Peru, the antero-lateral teeth are more prominent (five in the former, the anterior one being fused with the external orbital angle, and three broad, flattened ones in the latter species), the supra-orbital margins are not notched, at least according to figures, and the chelae are quite smooth.

All four species are American; the type species (*S. carolinensis*) is known to inhabit subterranean galleries, excavated in the mud of shallow water, probably by other animals. It is this habit that gave rise to the generic name:

Among the Brachyura of the "Siboga" I found one animal, which, on account of its striking resemblance to the type species, is considered to be a new species of *Speocarcinus*.

1. *Speocarcinus celebensis* n. sp. Pl. 11, Fig. 1.

Stat. 116. West of Kwandang Bay entrance, north coast of Celebes. Depth 72 m. 1 ♂.

This small specimen exhibits most of the distinctive characters of the genus and consequently I have referred it to *Speocarcinus*, though the third segment of the abdomen is scarcely produced laterally and the fourth to sixth segments are not coalesced.

The ratio of the length of the carapace to its greatest width is 1 : 1.4¹⁾, its surface is much convex in longitudinal direction, but nearly straight transversely. Regions are fairly well to be made out: the mesogastric area is distinctly outlined, the protogastric lobes are defined anteriorly by two epigastric ridges, between which a deep furrow divides the surface of the front; a sulcus separates the hepatic region from the protogastric and branchial areas, which themselves shade into one another; a cardiac area is also seen behind the cervical groove. The surface of the carapace is somewhat granulate towards the margins, which are fringed with hairs; these hairs are also seen on the subhepatic and subbranchial regions.

The front is vertically deflexed, its width is more than one-half (exactly 56%) of the distance between the external orbital angles, or rather of the fronto-orbital breadth; in dorsal, and also in ventral view, it is inflated, made up of two equal, rounded lobes, separated by a deep furrow, but in anterior view the free margin is regularly convex; the lateral angles are not produced. The orbits are small, marginal, the supra-orbital margin forming scarcely a distinct excavation in the regular outline of the carapace, which excavation is completely filled by the short eye-stalks, terminating in a very small eye, chiefly situated ventrally. The supra-orbital margin is entire, not notched, transverse, passing with a gentle curve into the lateral margin of the carapace, so that an external orbital angle is not formed. The antero-lateral margin of each side, however, presents three epibranchial teeth, the first of which is the larger, well defined by deep sinuses both anteriorly and posteriorly, somewhat flattened, but ending in a short spine, directed forward; the second and third teeth, at the level of which the carapace

1) In *S. carolinensis*, to which this species shows the greatest affinity, the ratio is 1 : 1.3 in Porto Rican specimens and in one from Tortugas; in a specimen from Charleston (South Carolina) the ratio is less and intermediate between the Porto Rican specimens and the type specimen, which latter presents the narrowest carapace (RATHBUN Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 11).

reaches its greatest width, are spiniform, the former larger than the latter, both directed forward. Behind the teeth the margins of the carapace remain parallel and the posterior one is very long and convex.

Antennulae short, folded transversely in their fossae beneath the front. Antennae free in the inner orbital gap, reaching laterally to the tip of the first antero-lateral tooth. Epistome short, but distinct, its distal border wavy. Lateral margins of buccal cavity convergent backward, as also the longitudinal axes of the external maxillipeds, which consequently leave a wide triangular space between them; ischium (fig. 1a) slightly longer than broad, and longer than the merus, which is broader than long, owing to the antero-external angle being conspicuously produced outward; exognath about half as broad as ischium.

Chelipeds (the right only is present in my specimen) much shorter than the legs, granulate at outer and upper surface, and hairy, especially on the chela. Meropodite short, inner and outer border somewhat serrate, upper border with a subterminal tooth; wrist with a flattened, not much prominent tooth at inner angle, which is directed forward; chela (fig. 1b) small, palm as long as high and as long as the fingers, borders, especially the upper one, with a row of hairs, which extend on to the fingers, outer surface granulate, the granules being arranged in four groups, stretching longitudinally, the upper and under group of which likewise are continued on the back of the fingers, fingers somewhat compressed, not gaping, irregularly-crenulate at opposite margins, sharply acuminate at the curved tip.

Ambulatory legs long and slender, the penultimate pair being three times as long as the carapace, the four last joints fringed with rather distant hairs, more closely set on the dactyli. Meropodites six times as long as broad, unarmed, carpo- and propodites elongate, dactyli as long as, or slightly shorter than, propodites, faintly curved near the tip; in the last pair of legs the propodites are shortened and the dactyli are almost straight and somewhat more flattened than in the preceding pairs.

The first segment of the abdomen of the ♂ (fig. 1c) is partly hidden under the carapace and occupies three-fourths of the space between the last pair of legs, the second segment is only half as broad as the preceding, and the third about as broad as the second and scarcely produced laterally, the remaining segments are all distinct, not coalesced, gradually decreasing in breadth. This shape of the abdomen differs widely from those of other species (at least *S. carolinensis* and *S. granulimanus*) in the third segment being not or scarcely produced laterally and in the third to fifth segment not being fused; it is, on the contrary, much more *Rhizophine*-like. As has been already stated, however, the whole aspect of the "Siboga" specimen so strongly suggests a close affinity to *S. carolinensis*, in the sculpture and dentation of the carapace, that a removal of my specimen from the present genus does not appear to be justified. From *S. carolinensis* the new species is distinguished by the carapace being comparatively broader¹⁾, by the front measuring more than half the fronto-orbital breadth, by the absence of a distinct outer orbital angle, by a less curved course of the lateral margins of

1) In comparing Miss RATHBUN's figure (Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 11, textfig. 2) with my own the reverse seems to be the case, but there are individual variations in the West Indian species in the ratio of length and greatest width of carapace.

the carapace (in *S. carolinensis* the distance between the posterior teeth is greater than that between the preceding) and by the chelae being granulate, not smooth.

Notwithstanding the differently-shaped abdomen, the "Siboga" specimen truly belongs to *Speocarcinus*, and this is the first instance of a representative of the genus outside the American waters.

Dimensions in mm.:

Fronto-orbital breadth.	2.75
Breadth of front.	1.55
Greatest breadth of carapace	3.85
Length of carapace.	2.85
Length of penultimate pair of legs .	8.5

Lophoplax n. g.

The "Siboga" expedition yielded two remarkable Brachyura, which in my opinion, are somehow related to the Goneplacidae, and more particularly to the *Prionoplacinae*. Dr. J. G. DE MAN, to whom I sent the larger ♂, kindly informed me, that he could not identify it with any known form, and that it should rather belong to a new genus *incertae sedis*. I propose to bestow the name *Lophoplax* on it, the diagnostic features of which are as follows: Carapace thickly pubescent, granulate beneath the fur and with the various regions distinct, lateral margins all along with a series of blunt, depressed teeth, front strongly deflexed, bilobed. Chelipeds heavy, meropodite and carpodite pubescent, like the carapace. First segment of abdomen of ♂ entirely occupying the space between the bases of the posterior legs, second segment much narrower, third segment again produced laterally, but not reaching to the coxopodites of the last legs; last segment of sternum exposed at anterior corners.

It is this character of the abdomen, which in my opinion refers the new genus to the present subfamily *Prionoplacinae* and more particularly to genera exhibiting a similar feature, such as *Euryplax*, *Eucratopsis*, *Panoplax*, *Oedioplax* and *Homoiooplax*, which, however, are distinguished by having at least one tooth less behind the external orbital angle (in *Lophoplax* there are five of such teeth, none of which are spiniform); these genera are, however, with exception of *Homoiooplax*, very obscurely known.

The genus is founded on:

1. *Lophoplax bicristata* n. sp. Pl. 12, Fig. 2.

Stat. 77. Borneo Bank, Strait of Makassar. Depth 59 m. 1 ♂.

Stat. 260. 5° 36'.5 S., 132° 55'.2 E. North west of Kei Islands. Depth 90 m. 1 ♂.

The carapace of this species is subquadrate, the distance between external orbital angles being very slightly less than the length of the carapace. The surface of the latter is everywhere concealed under a thick fur of short, club-shaped hairs, which are somewhat longer on the eye-stalks and especially across the front; it is only when this fur is thoroughly removed (as has been done on the right side of the figure) that the sculpture of the carapace is to be

traced out. A mesogastric area, from which a median sulcus passes forward to the front, is distinctly outlined, a cardiac region, flanked by a prominence at either side, is seen behind, while hepatic and branchial regions are not clearly separated one from another, but studded with rather few, scattered granules; most conspicuous, however, and even clearly standing out from the fur, are two obliquely directed, but straight, oblong prominences or thick ridges, one on each protogastric region, pointing outward in the direction of the external orbital angle, but clearly cut off on all sides; it are these ridges which induced me to designate the new species *bicristata*.

The various regions of the carapace are slightly bulging, but on the whole the surface is rather flattened in both main directions, only rapidly falling off on the front, which is vertically deflexed, beyond the transverse row of slender, club-like hairs; there are some few large granules between this row of hairs and the protogastric ridges; the anterior margin is somewhat produced in the middle and slightly notched, the lateral angles are rectangular, not smoothly rounded off, and pass with a deeply-concave curve into the somewhat raised inner orbital margins, that are separated off from the surface of the front by a shallow, oblique sulcus. The breadth of the front is more than twice the width of the small orbit, the supra-orbital border of which is entire, transverse, and provided with a slight prominence, near, and exactly similar to, the blunt external orbital angle, directed forward and little prominent. The eye-stalk is short, piriform, its dorsal surface is thickly clothed with club-like hairs, and the small eye, with intensely-black pigment, is situated chiefly on the ventral side. The lateral margins of the carapace are regularly and not very greatly curved, the breadth of the carapace, however, is enlarged by strong, lobe-like, somewhat flattened teeth, numbering five in all behind each external angle of the orbit and extending to the level of the penultimate pair of legs; these teeth are projecting somewhat beyond the thick fur of the margins of the carapace, but it is only after removal of these hairs that the exact shape of the lateral teeth may be clearly made out: the first of these teeth is separated by a deep notch from the outer angle of the orbit, the second and third are the largest, separated by a rather wide interspace, the second presents a tubercle on its hind margin and is blunt, directed outward, the third exhibits the same shape, but is slightly smaller, more flattened, its plane being oblique to that of the carapace, the fourth is situated close to the preceding, is smaller and still more ridge-like in dorsal view of the carapace, the fifth tooth finally is placed far back, just before the level of the bases of the penultimate pair of legs, and of a semi-circular, flattened shape. Along the margins the surface of the carapace is entirely smooth (beneath the hairs) and much flattened, rising abruptly, with a steep slope, towards the elevated and granulated branchial regions. The hind margin of the carapace is convex and somewhat thickened.

Antennulae folded somewhat obliquely beneath the front, separated by a very narrow septum. Antennae about $1\frac{1}{2}$ times as long as the width of the orbit; basal joint of the peduncle as long as the two following together and firmly fixed between the lateral angle of the front and the inner orbital angle, which is not prominent. Epistome distinct, strongly folded transversely, with the hind margin nearly vertical, much wavy. Lateral margins of buccal cavity somewhat

converging backward. External maxillipeds (fig. 2a) nearly closing the cavity, ischium longer and broader than merus, the latter with the antero-external angle smoothly rounded, but somewhat produced outward.

Chelipeds somewhat unequal (the right chela being the larger), as long as, but much stronger than the walking legs, mostly covered with the same fur of closely-set, club-shaped hairs as are observed on the carapace. Meropodite short, inner and upper margin sharp, the former with a series of long hairs, terminating distally into a prominent tooth; outer surface thickly hairy, with a prominent, transverse ridge near the distal end. Carpopodite bulky, upper surface tuberculate or granulate, but the sculpture is concealed mostly beneath the fur; in the middle of the surface we observe a roughly quadrangular space of a callose appearance, entirely devoid of hairs and somewhat raised above the surroundings; the inner angle of the wrist is somewhat produced and an exactly similar tooth is found on the opposite margin of the wrist. Chela strong, palm twice as long as the fingers and longer than high, both margins rounded, but inferior margin slightly keeled and somewhat sinuous where it passes into that of the fixed finger; outer surface in the larger (right) chela smooth for the greater part, though with reticulating, interwoven, ivory-white lines on a darker ground-color, which lines are divided into groups by three or four similar, but longitudinal lines; near upper border the surface is closely covered with the usual fur and a series of ordinary hairs runs along this border and extends to the back of the movable finger, only partly concealed by the fur numerous large, pearly granules are to be seen on the palm; in the smaller chela similar granules, arranged in longitudinal rows, are found all over the outer surface, in the middle of the latter only they are not covered with hairs, and the fingers, especially in the gap between them and at the inner sides, are much more hairy; the fingers are slightly compressed and have retained a greyish hue over their greater part, the inner margins are crenulate, the teeth gradually diminishing in size from base to tip of finger.

Walking legs not very long, the penultimate pair measuring about $1\frac{1}{2}$ times the length of the carapace, fringed with club-like hairs. Meropodites six times as long as broad, anterior margin wavy, each prominence capped by a cluster of thick and short hairs; on each leg there are six to eight of such prominences, increasing in height distally, but in the last pair the margin is continually fringed with hairs, and only one subdistal prominence is to be found. Propodites flattened, fringed along both margins. Dactyli very long, not flattened, nearly straight, slightly longer than propodites, fringed with feathered hairs of different length; in the last pair they are not curved at all, longer than the preceding joints and the hairs are longer.

Base of abdomen of σ^7 (fig. 2b) completely occupying the space between the last legs, second segment considerably narrower, but widening distally, third segment greatly produced laterally, as wide as the first, but not reaching coxopodites of posterior legs; parting from this segment the abdomen narrows considerably, but the lateral margins of the penultimate segment are perfectly parallel, the last segment is semi-elliptical.

This species offers so many characteristic features, that it may be easily recognized. It

bears an unmistakable resemblance to "*Pilumnoplax*" *sculpta* Stimpson¹⁾, which in my opinion should certainly be included into the genus *Lophoplax*. That it is not identical with the present species is proved at once by the different sculpture: there are two oblong, longitudinal protogastric lobes, instead of the oblique prominent ridges, in STIMPSON'S species; besides, the meropodites of the walking legs are considerably broader. In other respects there is a remarkable agreement: the carapace, according to STIMPSON, is also thickly pubescent, the front deflexed, with a supra-marginal fringe of long hairs, the lateral margins are provided "with five tuberculiform or paxilliform teeth"; the description of the chelae agrees nearly wholly with that in the present new species, and "the grooves separating the posterior teeth of the lateral margin are continued for a considerable distance upon the subbranchial region, passing obliquely forward", precisely the same as in *Lophoplax bicristata*; finally the ratio of the length of the carapace to its greatest width is identical in both species (1 : 1.27).

STIMPSON'S species (♀ only) was taken near Ousima (Japan).

Dimensions in mm.:

Distance between external orbital angles	4.6
Breadth of front	2.4
Greatest width of carapace (between tips of second epibranchial teeth)	6.—
Length of carapace	4.75

Subfam. RHIZOPINAE.

This group has been first instituted by STIMPSON²⁾, and subsequently defined and enlarged by MIERS, ORTMANN and ALCOCK. It is to the diagnosis of the last named author³⁾ that I may particularly refer: the species of this subfamily are characterized by a nearly smooth carapace, that is greatly vaulted longitudinally, by the fronto-orbital breadth being narrow, by most defectuous eyes and very often fixed eye-stalks, by the lateral margins of the carapace being entire or nearly so (and never distinctly dentate), and greatly curving inward anteriorly towards the eye-stalks, which are nearly level with the margins of the carapace, so that the orbit is very shallow; the abdomen of the ♂ is usually much narrower than the sternum. This last character has been always considered a safe characteristic of the *Rhizopinae*, in such a way, that, for some years past, Miss RATHBUN⁴⁾ established a new subfamily, *Typhlocarcinopsinae*, chiefly on account of the abdomen of the ♂ being greatly enlarged at the base, so that the first segment exactly covers up the interspace between the bases of the posterior legs. Apart from the fact, that in many genera of the *Rhizopinae* the first segment of the abdomen presents a clear tendency to enlarge and to become broader than the third segment, I see no reason to found a new subfamily, convenient as doing so perhaps may appear to the systematist, on

1) Compare Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 91, pl. 11, f. 3.

2) Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 95.

3) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 287.

4) K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 345.

such a character¹⁾: the genus *Typhlocarcinops*, except for this slight difference, is absolutely and intimately related to *Typhlocarcinus* Stimpson, as regards all principal features. Personally I am convinced, that there is no need of such a sharp demarcation between the two genera, as to range them in different subfamilies, and I think it is preferable to include *Typhlocarcinops* in the former, with slight modification of the diagnosis of the latter.

The lack of sculpture and the absence of dentation of the carapace, together with the great uniformity in the shape of the small, sharply-keeled chelae, renders the discrimination of the species, and even in some cases of the genera, a rather troublesome undertaking. ALCOCK has admirably succeeded in drawing up a synoptical key to the genera known to him, from British Indian waters, and it is his key, which is here largely used, with addition of all Indo-Pacific genera, that I know of.

Almost all the *Rhisopiinae* are of small size, a few millimetres in breadth, and the majority seems to seek shelter in coral stocks, worm tubes etc.; it is to this habit, that the general reduction of the eyes, going even to complete blindness, is to be attributed. Most of the species are living in rather shallow water, but a few genera are obtainable from rather considerable depths (400—500 fathoms).

Key to the genera:

- | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---------------------------------|
| 1. Antennules completely fit into the fossae beneath the front | 2 | |
| Antennules cannot be folded up (so as to be concealed in dorsal view of the animal), as the basal joint entirely fills the fossa | 14 | |
| 2. Epistome of good length, commonly prominent at posterior margin | 3 | |
| Epistome short, not prominent at posterior margin | 13 | |
| 3. Eyes well formed, nearly always pigmented | 4 | |
| Eyes obsolete, or nearly so; if distinct, the first abdominal segment of both sexes occupies the whole breadth of the last sternal segment | 9 | |
| 4. Eye-stalks movable, not fixed into the orbits | 5 | |
| Eye-stalks firmly fixed and completely filling the orbits. Antero-lateral angle of merus of external maxillipeds conspicuously produced outward | | Ceratoplax Stimpson |
| 5. Carapace smooth, glossy, lateral margins parallel, fronto-orbital breadth nearly equal to greatest width of carapace. Walking legs elongate, much longer than breadth of carapace | | Notonyx A. Milne-Edwards |
| Lateral margins of carapace never parallel, fronto-orbital breadth generally not exceeding half the greatest width of the carapace, usually narrower | 6 | |
| 6. Lateral margins of carapace divergent backward, front narrow. | | |

¹⁾ Even within the limits of a single genus (f. i. *Goneplax*) the breadth of the abdomen may vary in this respect, that the third segment either touches, or does not reach, the coxopodites of the penultimate pair of legs.

- Merus of external maxillipeds suboval, antero-external angle not produced. Abdominal segments of ♂ partly coalesced. Lateral margins of carapace strongly convergent backward. 7
7. Margins of carapace everywhere marked by a prominent ridge, fronto-orbital border measuring two-thirds of greatest width of carapace. Merus of external maxillipeds very broad and as long as ischium. Dactyli of two last pair of legs short, about half as long as propodites. **Chasmocarcinus** Rathbun¹⁾
- Margins of carapace not marked by a prominent ridge, fronto-orbital border measuring one-half of greatest breadth of carapace 8
8. Front bilobed, with longitudinal sulcus. Walking legs almost naked, meropodites of penultimate pair of legs with a tooth at posterior margin, dactyli extremely short, scarcely one-third of the length of the much thickened propodites. **Paranotonyx** Nobili²⁾
- Front not bilobed, without longitudinal sulcus. Walking legs thickly fringed with hairs, meropodites of all the legs unarmed, dactyli about as long as propodites **Selwynia** Borradaile³⁾
9. Carapace much broader than long 10
- Carapace only a little broader than long; postero-lateral margins divergent backward 12
10. Postero-lateral margins of carapace mostly parallel. Merus of external maxillipeds not produced at antero-external angle 11
- Postero-lateral margins of carapace somewhat convergent backward. Merus of external maxillipeds slightly produced at antero-external angle. Wrist of cheliped with the inner angle spiniform. Ambulatory legs slender, penultimate pair more than $2\frac{1}{2}$ times the length of carapace. **Paraselwynia** n. g.
11. First abdominal segment of ♂ broadened, but by far not filling up the interspace between the coxopodites of the last pair of legs **Rhizopa** Stimpson⁴⁾
- Typhlocarcinus** Stimpson

1) This genus was founded on the species *Ch. typicus* Rathbun (Bull. Lab. State Un. Iowa, v. 4, 1898, p. 285, pl. 7, f. 3-5), dredged N. of Trinidad, and an additional species, *Ch. obliquus*, (l. c., p. 286, pl. 7, f. 6) was described at the same time, from the Bahamas. In the same year the author added a third species, *C. latipes* (Proc. U. S. Nat. Mus., v. 21, p. 602, pl. 43, f. 5) from Magdalena Bay, Lower California, and in 1901 a fourth species, *Ch. cylindricus* (Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 10, textfig. 1) from Porto Rico.

Until recent years the genus was thus known only from American waters, but now a fifth species has lately been described by Miss RATHBUN (*Ch. cavimanus*, Proc. U. S. Nat. Mus., v. 48, 1914, p. 149) from Philippine waters, from the rather considerable depth of 300 fathoms. The "Siboga" did not obtain any species of *Chasmocarcinus*.

2) Ann. Sc. Nat. (9), t. 4, 1906, p. 298. Founded on the species *P. curtipes* Nobili (pl. 8, f. 7). Hab. Red Sea.

3) Fauna and Geography Maldives and Laccadive Arch., v. 1, 1903, p. 430. Based on the only species, *S. laevis* (l. c. p. 431, textfig. 112), which inhabits Hulule, Male Atoll.

4) Literature and description of the only known species, *Rh. gracillipes* Stimpson: RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 342, textfig. 27. ALCOCK (Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 322) approaches this genus to *Typhlocarcinus* and MIERS (Rep. "Challenger", Brachyura, 1886, p. 235, note) to *Ceratoplax*. Hab. Chinese Seas and Gulf of Siam.

- First abdominal segment of ♂ so much broadened as to cover in a narrow stripe the whole breadth of the last sternal **Typhlocarcinops** Rathbun
12. Anterior margin of front obscurely sinuous. Cornea of eye extremely small, terminal. Flagellum of antenna of ordinary shape, slender and naked. Merus of external maxillipeds not produced at antero-external angle **Xenophthalmodes** Richters
- Anterior margin of front distinctly bilobed. Cornea of eye larger, placed ventrally at tip of eye-stalk. Flagellum of antenna markedly plumed, thick. Merus of external maxillipeds produced at antero-external angle **Mertonia** Laurie
13. Eyes minute, orbits placed ventrally, not visible from above. Merus of external maxillipeds produced at antero-external angle **Scalopidia** Stimpson
- Eyes obsolete, orbits visible in dorsal view. Merus of external maxillipeds not produced at antero-external angle. **Typhlocarcinodes** Alcock
14. Eyes small, but perfect **Hepthopelta** Alcock
- Eyes reduced to a speck of pigment or unpigmented 15
15. Antennules of normal size. Outer border of merus of external maxillipeds strongly convex **Camatopsis** Alcock
- Antennules enormously thick, the last two segments of the peduncle wider than the lobes of the front. Antero-lateral margins of carapace short, forming a distinct angle with the subparallel and long postero-lateral ones. **Megaesthesius** Rathbun¹⁾.

Ceratoplax Stimpson.

1858. *Ceratoplax* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 96.

1886. *Ceratoplax* Miers. Rep. "Challenger", Brachyura, p. 233.

The genus is distinguished at once by the eyes being well developed, the eye-peduncles fixed, and the antero-external angle of the merus of the external maxillipeds conspicuously produced. Otherwise it bears the greatest resemblance to *Typhlocarcinus* and *Typhlocarcinops*. As to *Rhizopa*, MIERS thinks that it is scarcely to be separated from *Ceratoplax* and the recent description given by Miss RATHBUN appears to strengthen this presumption, but unfortunately the latter author has not discussed this point. If the two genera turn out to be really identical, the name *Ceratoplax* should disappear, occupying in STIMPSON'S paper a place after *Rhizopa*.

The diagnostic features of *Ceratoplax* enumerated above prevent the including of *C. villosa* and *C. leptochelis*, both described by ZEHNTER²⁾, into this genus, on account of the eye-

1) K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 344, based on the species *M. sagedae* (l. c., p. 344, textfig. 30—31, pl. 2, f. 5), found in very shallow water near Singapore.

2) Rev. Suisse Zool., t. 2, 1894, p. 173—174, pl. 7, f. 8 and 9.

stalks being mobile, not fixed, and the antero-external angle of the merus of the external maxillipeds not produced at all; both these species came from Amboyna. *C. villosa* certainly belongs to the *Rhizopinae*, although I am unable to indicate its proper systematic place; *C. leptochelis*, however, is quite another species, and its whole habitus points to *Panopeus* or rather to *Melia*.

Key to the species:

1. Carapace nude and hairless (at least in its central parts). Walking legs scantily fringed 2
Carapace tomentose 6
2. Postero-lateral margins of carapace subparallel. Ratio of length of carapace to greatest breadth as 1 : 1.3 3
Postero-lateral margins of carapace convergent backward 4
3. Outer surface of palm smooth and polished, except for a few depressed granules inferiorly *C. ciliata* Stimpson
Outer surface of palm of cheliped with 4—5 longitudinal rows of granules. Back of movable finger with a group of granules at the base *C. punctata* Baker¹⁾
4. Ratio of length of carapace to greatest breadth as 1 : 1.3. Mero-podite of cheliped with a subdistal tooth, carpopodite angulate at inner angle. Dactyli of last pair of legs apparently not curved backward *C. laevis* Miers²⁾
Ratio of length of carapace to greatest breadth as 1 : 1.6. Dactyli of last pair of legs curved backward 5
5. Fronto-orbital breadth more than one-half of greatest breadth of carapace, front faintly bilobed, greatest width of carapace situated anteriorly. Lateral angles of third abdominal segment of ♂ acute *C. fulgida* Rathbun³⁾
Fronto-orbital breadth equal to, or less than, one-half of greatest breadth of carapace, front perfectly straight at anterior margin, greatest width of carapace situated further backward than in preceding species. Lateral angles of third abdominal segment of ♂ rectangular *C. truncatifrons* Rathbun
6. Antero-lateral margins of carapace passing angularly into postero-lateral ones. Outer surface of palm smooth *C. arcuata* Miers⁴⁾
Outer surface of palm with large granules 7
7. Eyes unpigmented *C. hispida* Alcock⁵⁾

1) Transact. Roy. Soc. South Australia, v. 31, p. 176; pl. 23, f. 2. Hab. unknown.

2) Zool. H. M. S. "Alert", Crust., 1884, p. 244, pl. 25, f. C. Hab. Arafura Sea, 32—36 fathoms. Probably identical with *Notonyx nitidus* A. Milne-Edwards.

3) Proc. U. S. Nat. Mus., v. 48, 1914, p. 146. Hab. Philippines, 83 fathoms.

4) Zool. H. M. S. "Alert", Crust., 1884, p. 243, pl. 25, f. B. Hab. Port Darwin, 12 fathoms.

5) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 321; Ill. Zool. "Investigator", Crust., prt 10, pl. 61, f. 4; Rathbun, K. Dansk Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 342. Hab. Palk Strait and Gulf of Siam, in depths of a few fathoms.

Eyes pigmented. Coxopodites of walking legs dorsally with pectinated processes *C. granulosa* Mc Gilchrist¹⁾.

Carapax ciliata Stimpson. Pl. 11, Fig. 2.

Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 320.

RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 342.

Stat. 162. West coast of Salawatti, near northwest New Guinea. Depth 18 m. 1 ♂.

The specimen rather well agrees with ALCOCK's description and with MIERS' figure²⁾ (the diagnoses, if anyone is given, of WALKER and CANO, cited by ALCOCK, could not be consulted by me), but it is considerably larger than that of MIERS, whose specimen was only 8.5 mm. broad and 6.5 mm. long.

The carapace is much arched longitudinally, especially in its anterior part, and straight transversely. Towards the margins it is covered with short hairs, like the subhepatic and subbranchial regions, but the central parts of the carapace are smooth. There is a trace of a cervical groove, situated far backward, and at either end of this an irregular depression, covered with very short hairs, forms the most conspicuous marking of the carapace; there is further a transverse hairy line behind the front and the surface of the latter is obscurely divided by a short longitudinal sulcus.

The front is deflexed; its free edge regularly arched (fig. 2a), but not notched in the middle in my specimen, as ALCOCK states; across its surface a transverse row of long hairs is to be observed, and this row is continued on the supra-orbital margin and further laterally and backward along the antero-lateral margins of the carapace. The eye-stalks are piriform, the eyes distinct, but in dorsal view of the animal nothing is seen from the eye, as this is chiefly developed on the ventral side of the eye-stalk; its pigment is of a dark sepia tint, not black. The antero-lateral margins of the carapace are regularly arched and divided into three portions by two faint notches; the subparallel postero-lateral margins are much more obsolete and somewhat granulate, and at the transition between the anterior and posterior part the carapace reaches its greatest breadth, which is 1.3 times its length; the posterior margin is somewhat wavy, slightly convex in its middle part.

Antennulae folded transversely beneath the front. Antennae very short, peduncle free, not fixed to the front or to the inner orbital lobe. Epistome distinct. Lateral margins of buccal cavern greatly convergent backward. External maxillipeds broad, antero-external angle of merus conspicuously produced outward, exognath about half as broad as ischium, which latter is longitudinally grooved in the middle, about 1½ times as long as broad, and slightly narrower than the merus.

Chelipeds subequal, bulky, but shorter than the walking legs. Meropodite short, mostly smooth, but granulate towards the borders; upper border with a row of long hairs, which row

1) Ann. Mag. Nat. Hist. (7), v. 15, 1905, p. 263; ALCOCK & Mc GILCHRIST, Ill. Zool. "Investigator", Crust. prt 11, 1905, pl. 74, f. 2. Hab. Gulf of Martaban, 61 fathoms.

2) Rep. "Challenger", Brachyura, 1886, pl. 19, f. 3.

terminates distally into a triangular, erect tooth. Carpopodite likewise granulate towards the margins, inner angle sharpened, but not produced, with a tuft of hairs projecting beneath it. Chela (fig. 2*b*) high; palm nearly as high as long and longer than the fingers, upper and under border rounded, not keeled, both surfaces smooth and shining, but the lower part of the outer surface is occupied in its proximal part by a few depressed granules, particularly in the left chela, similar granules are seen running in a longitudinal row near and parallel to the under border of the chela, and there are also some crowded and small granules near the upper border, which is provided with a row of long hairs, continued for some distance on the back of the movable finger; the fingers are short, not much curved, bisulcate both at inner and at outer surface, and the crenulations of the fixed finger are larger than those of the opposite one.

The ambulatory legs are moderately elongate and not much differing in length, the penultimate pair being little more than twice as long as the carapace; all the legs are fringed with coarse, yellow hairs, especially along the last three joints. Meropodites with some transverse rugosities on the upper surface, four times as long as broad, unarmed near the distal end; in the last pair the meropodite is hairless along the greater part of the anterior margin, the posterior margin is provided all along with numerous hairs, exceeding frequently in length the breadth of the meropodite. Dactyli of all the legs conical, falciform, shorter than preceding joints, thickly fringed with hairs; those of the last pair are nearly straight, but not curved dorsally; their shape is somewhat obscured by the coating of long hair.

The first segment of the abdomen of the ♂ (fig. 2*c*) is broadened, but clearly falls short of the coxopodites of the last pair of legs; the second segment is much narrower; the third again widens to the breadth of the first segment and projects into two somewhat acuminate prominences; the following segments gradually decrease in width, but increase in length; the terminal segment is semi-elliptical, longer than broad.

This species inhabits shallow waters, in the Chinese Sea, the Gulf of Siam, the Andaman Sea and Torres Straits.

Dimensions in mm.:

Fronto-orbital distance	8.—
Width of front between eye-stalks	4.5
Greatest breadth of carapace	14.5
Length of carapace	11.—

2. *Ceratoplax truncatifrons* Rathbun. Pl. 12, Fig. 1.

1914. *Ceratoplax truncatifrons* Rathbun. Proc. U. S. Nat. Mus., v. 48, p. 147.

Stat. 193. Sula Besi, Sula Islands, east of Celebes. Depth 22 m. 2 ♂, 5 ♀.

This small species is at once recognized by its remarkably smooth and shining carapace (at least in the ♂, in the ♀ the carapace is crowded with small punctae), that is perfectly bare; there are only some hairs across the front and the eye-stalks, and the lateral margins are shortly pubescent, like also the subbranchial regions, and of a ruddy brown colour.

The carapace is almost semi-cylindrical longitudinally, but completely straight in transverse direction. The various regions are scarcely to be made out, but there is some indication of a cervical groove, situated far behind, and traces of gastro-hepatic and branchio-hepatic sulci.

The front is perpendicularly deflexed, its free edge is perfectly truncate (fig. 1a) and the lateral angles rounded, subrectangular. Supra-orbital margin transverse. Orbit shallow, small; eye-stalk piriform, very thick in the middle; the small eye with its light brown pigment is lying at the ventral side of the tip of the ocular peduncle. In the specimen measured by Miss RATHBUN the fronto-orbital distance is exactly one-half the greatest width of the carapace, but in my specimens this distance is usually somewhat larger. The antero-lateral margins of the carapace are $1\frac{1}{2}$ times as long as the postero-lateral ones, entire and conspicuously divergent backward, so that the ratio of length of carapace to greatest width is 1 : 1.6, much greater than in the preceding species. At the level of the greatest breadth the lateral margins are much less sharply defined and convergent backward, in an individually varying degree: in the adult ♂ and in some small ♀ this convergency is much more marked than in other individuals, so that in the former group the convex posterior margin of the carapace is proportionately shorter than in the second group.

Antennules transversely folded beneath the front; antennae short, scarcely outreaching the width of the orbit. Epistome distinct, vertical, its free edge straight. Lateral margins of buccal cavity parallel. External maxillipeds smooth and glossy (fig. 1b), antero-external angle of merus conspicuously produced outward and forward; exognath more than one-half as broad as ischium, thick, vaulted transversely.

Chelipeds markedly unequal in the apparently adult ♂ (the left being much the larger), in the remaining examples they are equal in size. Meropodite short, inner and upper border unarmed, but hairy; carpopodite broader than long, inner angle sharply produced, hairy; chelae (fig. 1c, d) entirely smooth and bare, save for some sparse hairs along the borders of smaller chela; palm carinate at upper border, especially proximally, and with a longitudinal, low keel running very near the under border; fingers compressed, crenulate at inner margins, the crenulations being much less pronounced in the adult ♂ (here figured) than in the other individuals, both fingers, especially the fixed one, of a lighter colour than the palm, which must perhaps be ascribed to their original colour (red?) having disappeared in alcohol preservation.

Walking legs of the same build as in *C. ciliata*, but much less hairy. Meropodites slender, nearly naked, but with some hairs at the distal end of the posterior margin. Dactyli of first pair straight, those of second and third pair very faintly curved, in last pair curved backward and upward.

Abdomen of ♂ (fig. 1e) very narrow, the first segment, that is almost linear, scarcely measuring one-third of the breadth of the last segment of the sternum; the third segment is very little projecting outward, so that its lateral angles are right.

This species with its relatively broad and very shining carapace is easily recognizable; it is most nearly related to *C. fulgida* Rathbun, from which it is, however distinguished by differences, enumerated by Miss RATHBUN and also partly mentioned in the key to the genus, given a few pages before.

C. truncatifrons has been discovered by the "Albatross" in a depth of 22 fathoms, in Philippine waters.

Dimensions in mm.:

	♂	♂	♀	♀	♀
Fronto-orbital breadth	2.75	2.2	2.85	2.6	2.5
Width of front at anterior margin. . .	1.4	1.—	1.35	1.3	1.1
Greatest breadth of carapace	5.5	3.85	5.6	5.2	4.4
Length of carapace	3.4	2.5	3.2	3.1	3.—
Posterior border of carapace.	4.3	3.3	5.2	4.5	3.5

The last specimen bears a few eggs, which are rather large (0.25—0.33 mm. in diameter).

Typhlocarcinus Stimpson.

1858. *Typhlocarcinus* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 95.

This genus very much resembles *Ceratoplax*, but the eyes are so greatly reduced as to be almost obliterated, and the pigment has completely disappeared, or nearly so; besides, the antero-external angle of the merus of the external maxillipeds is not at all produced. Quite recently Miss RATHBUN¹⁾ described a new species of *Typhlocarcinus*, which in important facts disagrees with the original understanding of the genus: the eyes are black and terminal, the merus of the external maxillipeds is produced at the antero-external angle, the carapace well sculptured, punctate, pubescent; the transition between antero- and postero-lateral margins of the carapace is marked by an obtuse tooth. Leaving this aberrant species aside there remain three species, which are already discriminated by ALCOCK; I cannot, however, agree with him in separating the species on account of the antero-lateral borders of the carapace being toothed or entire, as this criterium is not always reliable.

Key to the species:

1. A faint pigment speck nearly in the middle of the subcircular eye-stalk. 2.
No pigment speck in the eye-stalk, the latter of a piriform shape.
Inner angle of wrist of cheliped produced, dentiform. Animal of a ruddy-brown colour *T. rubidus* Alcock²⁾
2. Ratio of length of carapace to breadth 1 : 1.6. Lateral margins of buccal cavity divergent backward; exognath of external maxillipeds narrow (one-fourth the breadth of ischium). Chelae almost smooth, walking legs little hairy; dactyli of last pair curved upward and backward *T. nudus* Stimpson
- Ratio of length of carapace to breadth 1 : 1.3. Lateral margins of buccal cavity subparallel; exognath of external maxillipeds broader (about one-third the breadth of ischium). Large chela of ♂ smooth, smaller one pubescent; both chelae of ♀ pubescent; walking legs fringed with hairs; dactyli of last pair straight, not curved . . . *T. villosus* Stimpson.

1) *T. craterifer* Rathbun, Proc. U. S. Nat. Mus., v. 48, 1914, p. 147. Hab. Philippine waters, depth 80 fathoms.

2) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 323. Hab. Bay of Bengal, depth 20—65 fathoms.

1. *Typhlocarcinus nudus* Stimpson. Pl. 13, Fig. 1.

1. *Typhlocarcinus nudus* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 96.

2. *Typhlocarcinus nudus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 322.

3. *Typhlocarcinus nudus* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, p. 343, pl. 1, f. 6, textfig. 29.

Stat. 71. Macassar. 1 ♂, 2 ♀.

Stat. 174. Waru Bay, north-east coast of Ceram. Depth 18 m. 1 ♀ juv.

The carapace of this species is strongly and regularly curved in a longitudinal direction, nearly straight transversely, and the regions are indistinct: the surface of the front is furnished with a rather long and deep median groove, reaching in the youngest ♀ of Stat. 71 even beyond the middle of the carapace; a general gastric region is faintly outlined and defined posteriorly by an interrupted, short cervical groove, at either end of which a conspicuous, curved depression is observed, a cardiac area, broader than the gastric region, is also visible. The whole surface is smooth and glabrous, but the margins, especially the antero-lateral ones, are rather thickly fringed with club-shaped and feathered hairs, and within the reach of these hairs crowded granules occur.

The carapace is rather broad, the greatest width being 1.6 times its length, and the fronto-orbital breadth occupies nearly one-half of the breadth of the carapace. The front is not quite twice as broad as either orbit, deflexed, with the anterior margin straight and deeply notched in the middle. Orbits high, semi-elliptical, completely filled by the inflated eye-stalks, which show a very faint pigment, shining through the integument, somewhat beyond the middle of the peduncle, but only visible in anterior view of the animal; external orbital angles completely absent. Antero-lateral margins of carapace strongly divergent backward and, at the transition to the parallel postero-lateral ones, separated into three blunt teeth, the median of which is the most conspicuous. Posterior margin convex.

Antennulae and antennae very small, the peduncle of the latter standing in the very wide inner orbital gap and fused with the median part of the firmly-fixed eye-stalk, the flagellum of the antenna is only $1\frac{1}{2}$ times as long as the width of the orbit. Epistome rather long, vertical, inferior edge entire. Lateral margins of buccal cavity diverging backward. External maxillipeds (fig. 1a) with the ischium much longer and broader than the subquadrate merus, the antero-external angle of which is not produced, subrectangular; exognath unusually narrow, as ALCOCK rightly observed, rod-like, and only about one-fourth as broad as the ischium.

Chelipeds stout, unequal (at least in the adult ♂, in which the left is the larger), smooth and nearly hairless; the only hairs being observed are those along the upper and inner border of the arm, beneath the inner and at the outer angle of the wrist and along the back of the movable finger. Arm unarmed; inner angle of wrist produced; palm of smaller chela (in the ♂) as long as, but that at the other side somewhat longer than, the fingers; in the ♀ the chelae are nearly equal and apparently smooth in the adult specimen, but in the young individuals the right (smaller) chela is somewhat more hairy than the left; upper border of palm and under margin of the somewhat deflexed fixed finger sharply keeled, and this inferior keel is continued

for some distance on the palm, gradually passing to its outer surface towards the articulation with the wrist; fingers compressed, sharp, crenulate at inner margins.

Ambulatory legs moderately elongate, the penultimate pair measuring three times the length of the carapace. Meropodites unarmed near distal end, four times as long as broad, nearly hairless, except in the last pair; carpo- and especially propodite elongate, fringed along anterior margin and along posterior margin of propodite, but nearly hairless in the case of the penultimate pair; dactyli slender, falciform, little curved, hairy, and as long as preceding joints, those of the last pair are strongly bent upward and somewhat backward.

The first abdominal segment of the ♂ (fig. 1♂) is very short, linear, and broader than the third segment, which is little produced laterally; from the third segment to the terminal one the abdomen is regularly tapering.

This species has been originally recorded from Hongkong, ALCOCK examined specimens from several British Indian localities (Karachi, coast of Mekran and Madras, Sandheads and Andamans) and Miss RATHBUN from Singapore and the Gulf of Siam.

Dimensions in mm.:

	♂	♀	♀
Fronto-orbital breadth . . .	2.85	2.75	2.2
Greatest width of carapace .	6.8	6.6	4.8
Breadth of front	1.2	1.15	1.—
Length of carapace	4.3	4.2	3.3

2. *Typhlocarcinus villosus* Stimpson. Pl. 13, Fig. 2.

Literature: ALCOCK, l. c., p. 322.

RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 343, textfig. 28.

Stat. 53. Bay of Nangamessi, north coast of Sumba. Depth down to 36 m. 1 ♀.

Stat. 285. South-east coast of Timor. Depth 34 m. 1 ♂.

This species is readily distinguished by means of the following particulars:

- 1^o The carapace is much narrower, its breadth being only $1\frac{1}{3}$ times the length; the margins are fringed, but entire in my specimens, not notched; and the surface is almost entirely glabrous. According to ALCOCK, however, the margins are notched, and the surface is pubescent and here and there granulate.
- 2^o The longitudinal furrow on the surface of the front bifurcates further backward, and this is almost the only trace of a subdivision of the carapace.
- 3^o The lateral margins of the buccal cavity are subparallel; the antero-external angle of the merus of the external maxillipeds (fig. 2a) is very much rounded off ("well marked" according to ALCOCK), so that the lateral margin passes regularly into the anterior one, as in Miss RATHBUN's figure; the exognath is broader, and about one-third of the width of the ischium.
- 4^o The chelipeds are more hairy; at least in the apparently adult ♂ the left (smaller) chela is thickly covered with club-shaped hairs, whereas the right is smooth and glabrous; the wrist is fringed at both margins with similar hairs.
- 5^o The ambulatory legs are much more hairy than in the preceding species; the hairs are

longer, club-shaped or feathered; it is especially the last pair of legs which is thickly fringed. A remarkable feature of this species is the gradual decrease in length of the dactyli from the first to the fourth pair of walking legs¹). In the last pair the dactyli are wholly straight, not curved upward and backward.

The general ivory-white colour of the animal is variegated on the legs by some sharply-defined, ruddy-brown patches, at least in the ♂, not in the (young) ♀. Firstly there is such a patch on the upper border of the meropodites of the chelipeds; the first pair of walking legs is devoid of them; on the meropodites of the second pair again a large patch is found along the upper border; the meropodites of the third pair are deeply coloured over the whole distal half of the dorsal surface and this colour extends anteriorly over the upper border; in the last pair of legs the brown colour is observed all over the under surface of mero-, carpo- and propodite; on these last legs, as well as on the chelipeds, the hairs implanted on the coloured parts are of the same hue, as if impregnated by the colouring matter. These very conspicuous patches, which have apparently lost nothing of their vigour during an alcohol preservation of almost twenty years, afford perhaps an important diagnostic of the species²).

6⁰ The third abdominal segment of the ♂ is somewhat more produced laterally than in *T. nudus*.

The present species inhabits the sea near Hongkong, the Bay of Bengal and the Gulf of Siam.

Dimensions in mm.:

	♂	♀
Fronto-orbital breadth	2.65	—
Greatest breadth of carapace	5.7	5.1
Width of front	1.2	—
Length of carapace	4.25	3.75
Length of dactyli of first pair of walking legs	1.65	—
Length of dactyli of second pair of walking legs	1.55	—
Length of dactyli of third pair of walking legs	1.45	—
Length of dactyli of fourth pair of walking legs	1.—	—

Typhlocarcinops Rathbun.

1909. *Typhlocarcinops* Rathbun. Proc. Biol. Soc. Washington, v. 22, p. 112.

1910. *Typhlocarcinops* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, p. 345.

This genus was considered by its author to represent a new subfamily, *Typhlocarcinopsinae*, on account of the first abdominal segment of the ♂ covering the whole width between the last pair of legs. As has been already remarked (p. 199—200) I cannot appreciate this character to such a degree as to remove the present genus from the *Rhizopinae*. Apart from the diagnostic named *Typhlocarcinops* is extremely alike such genera like *Ceratoplax* and *Typhlocarcinus*; the eyes are sometimes well developed and pigmented, but faint and almost obsolete in other cases.

1) It is this character that also characterizes a species of *Typhlocarcinops* (*T. decrescens* Rathbun, Proc. U. S. Nat. Mus., v. 48, 1914, p. 151), which of course is readily recognizable by the first segment of the abdomen entirely occupying the space between the last pair of legs.

2) It may be added, that this brown colour is also observed on the free margin of the epistome.

As to the abdomen, it has been repeatedly stated in the present paper, that both in *Ceratoplax* and in *Typhlocarcinus* the first segment in both sexes shows a tendency to extend laterally; this has only been accomplished more fully in *Typhlocarcinops* and occurs also in my specimens of *Typhlocarcinodes*.

Five species of *Typhlocarcinops* have now been described by Miss RATHBUN¹⁾. The "Siboga" collected one of these and, besides, two new species.

Key to the species:

1. Fronto-orbital width about equal to, or more than, half the greatest width of the carapace. 2
 Fronto-orbital with much less than half the greatest width of the carapace 6
2. Postero-lateral margins of carapace parallel or divergent backward 3
 Postero-lateral margins of carapace convergent backward; antero-lateral margins with three groups of denticles or with blunt teeth 5
3. Whole animal sparingly hairy. Eye-stalks almost circular; eye faintly pigmented; orbits somewhat sloping backward. Front widening anteriorly. Antero-external angle of merus of external maxillipeds not produced. *T. canaliculata* Rathbun²⁾
 Animal densely fringed. Eye-stalks piriform. Front not widening distally 4
4. Dactyli of walking legs regularly decreasing in length from the first to the fourth pair; propodites shortened. Eyes faintly pigmented or quite pale. *T. decrescens* Rathbun
 Dactyli of penultimate pair of legs distinctly exceeding in length those of preceding and of following pair; propodites elongate, narrowing distally. Eyes distinct, black, terminal. *T. angustipes* n. sp.
5. Antero-lateral margins of carapace long, denticulate, "three interruptions in the denticles forming three teeth"; surface of carapace rather well sculptured; breadth about 1.3 times its length. Eyes pigmented, dark *T. marginata* Rathbun³⁾
 Antero-lateral margins of carapace shorter than postero-lateral ones, very obtuse, with three blunt tubercles, widely separated; at the level of the posterior tubercles the carapace attains its greatest breadth, which is about $1\frac{1}{2}$ times its length. Eyes faintly pigmented *T. transversa* n. sp.

1) A sixth species (*T. piroculata*) in reality belongs to *Typhlocarcinodes*.

2) Proc. Biol. Soc. Washington, v. 22, 1909, p. 112; K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 345, pl. 12, f. 16, textfig. 32. Hab. Gulf of Siam.

3) Proc. U. S. Nat. Mus., v. 48, 1914, p. 152. Hab. Philippines, 27 fathoms. The author remarks in the course of the diagnosis: "this species is the only one of the genus in which the postero-lateral margins converge towards the posterior margin", but on the very page two species are described, in which the same character is observed, and in one of these (*T. angustifrons*) it is even more pronounced than in *T. marginata*.

6. Lateral margins of carapace entire. Eyes pigmented, well developed. *T. ocellaria* Rathbun ¹⁾
 Lateral margins of carapace with two teeth, granulate. Eyes very
 faintly pigmented *T. angustifrons* Rathbun ²⁾.

.. *Typhlocarcinops transversa* n. sp. Pl. 13, Fig. 3.

Stat. 47. Bay of Bima, north coast of Sumbawa. Depth 13—31 m. 1 ♂, 1 ♀.

This species is broader than any other known species of the genus, the breadth of the carapace measuring nearly $1\frac{1}{2}$ times its length. The surface of the carapace is somewhat pubescent, more so the ♀ than in the ♂, and densely fringed with long, club-shaped hairs along the margins, especially the antero-lateral ones; on the other hand are front and eye-stalks nearly destitute of hairs. The front is longitudinally grooved, which groove bifurcates distally; for the rest there is scarcely any trace of regions on the longitudinally-vaulted carapace.

The free edge of the front is on the whole straight, slightly wavy in anterior view, and longer than either orbit. This small orbit is, as usual, completely filled by the firmly-fixed eye-stalk, which is of a semi-circular shape and provided with a faint speck of pigment near the distal end; this pigment is stronger in the ♀ specimen. As is of general occurrence in the *Rhizopinae*, the orbits and eye-stalks do not form an interruption in the general outline of the carapace; the antero-lateral margins are directed nearly straightly outward near the orbits, then curve back, and form three blunt teeth, only visible, however, after removal of the row of hairs and the pubescence covering them. These teeth are separated by very wide interspaces; the median one, which is of the same build as the first, is situated nearer to the third than to the first; the third tooth is the smallest, crest-like, longitudinal, and marks the transition to the postero-lateral margins of the carapace, that are somewhat converging backward; it is near these margins that the carapace is roughly granulate. The posterior margin is convex, thickened.

Antennulae and antennae are shaped quite like those of *Typhlocarcinus*. The epistome is distinct, vertical, its free edge not crenulate or wavy; the septum between the endostome ridges is very distinct. Lateral margins of buccal cavity parallel. Merus and ischium of external maxillipeds (fig. 3a) pubescent and granulate, as is also the exognath; external maxillipeds completely closing the buccal cavity; merus subquadrate, as broad as, but shorter than, ischium, antero-external angle somewhat produced; exognath about one-third the width of ischium.

Chelipeds strong, longer than the first pair of walking legs in the ♂. Meropodite with upper border unarmed, but granulate and hairy, like inner border, under surface with numerous granules. Wrist short, granulate and hairy near the rounded inner margin. Chelae equal, but larger in ♂ than in ♀, sharply keeled above; in the ♀ both surfaces of palm are entirely covered with a short pubescence, intermingled with longer hairs at outer surface, and, together with this pubescence, the palm is everywhere granulate; in the ♂ the same occurs, but a patch in the middle of the outer surface is devoid of pubescence and entirely smooth; the

1) Proc. U. S. Nat. Mus., v. 48, 1914, p. 153. Hab. Philippines, 50 fathoms.

2) Proc. U. S. Nat. Mus., v. 48, 1914, p. 153. Hab. Philippines, 135 fathoms.

fingers are shorter than the palm, for the greater part glabrous, greatly compressed, sharply crenulate at inner margins, back of mobile finger and under margin of opposite one with a row of hairs, which are much longer on the movable finger; in the ♂ the fixed finger does not present a longitudinal row of hairs.

Walking legs not much elongate. Outer margin of carpo- and propodite and inner margin of latter fringed with the usual, club-shaped hairs; penultimate pair of legs with some scattered hairs only, propodites of this pair longest, narrowing distally; dactyli as long as preceding joints, styliform, hairy, little curved, those of last pair shortest, straight, but curved upward near the tip.

First abdominal segment of both sexes very broad, reaching to the bases of the last pair of legs, but almost linear, third segment in ♂ (fig. 3b) little produced laterally, remaining segments gradually narrowing.

This species in its general appearance seems nearest to *T. marginata*, of which no figure as yet is published, but in the new species the antero-lateral margins are obtuse, and present three blunt, widely-separated teeth instead of the apparently closely-grouped, denticulate teeth of Miss RATHBUN'S species; the carapace of *T. transversa* is wider, the eyes are not prominent and dark. In both these species the fronto-orbital distance is approximately one-half of the greatest breadth of the carapace.

Dimensions in mm.:

	♂	♀
Fronto-orbital distance . . .	4.1	4.1
Greatest breadth of carapace .	8.—	8.—
Breadth of front	1.85	—
Length of carapace	5.4	—

2. *Typhlocarcinops decrescens* Rathbun. Pl. 13, Fig. 4.

1914. *Typhlocarcinops decrescens* Rathbun. Proc. U. S. Nat. Mus., v. 48, p. 151.

Stat. 133. Lirung, Talaut Islands. Depth up to 36 m. 1 ♀.

Stat. 279. Roma Island, north of Timor. Depth 36 m. 1 ♂ juv.

This species is characterized by the following points:

- 1^o The whole animal, at least the adult ♀, is covered by a short, ruddy-brown pubescence; the long, feathered hairs along the margins of the carapace and along all the legs are of the same colour.
- 2^o The greatest breadth of the carapace is only 1.2 times the length, so that the animal is much narrower than the preceding species; the fronto-orbital breadth is nearly exactly one-half of this greatest breadth (according to Miss RATHBUN'S measurements the width across front and orbits is less).
- 3^o The lateral margins of the carapace are more strongly pronounced than in *T. transversa*, and, when cleaned, present two very faint notches, widely separated; behind the last notch the lateral margins are parallel or even slightly divergent backward, widening again a little above the bases of the last legs.

4^o In the (young) ♂ there is a distinct speck of pigment a little beyond the middle of the inflated eye-stalk, but in the ♀ this pigment is altogether absent. Miss RATHBUN denies the presence of pigment also in the (adult) ♂.

The external maxillipeds are more slender than in *T. transversa* and do not completely close the buccal cavity, the antero-external angle of the merus is not produced, but well marked.

6^o Chelipeds very much pubescent. Meropodite unarmed; inner angle of wrist pronounced, not produced; chelae equal in size, both in my young ♂ and in the ♀, but very unequal, as Miss RATHBUN observes, in the adult ♂; palm sharply keeled at upper and under border, granulate and hairy at outer surface, in the adult ♀ with a bare patch in the middle, inner surface smooth and bare in both sexes; fingers glabrous, shorter than palm; fixed finger greatly compressed and high at the base; movable finger with a row of long hairs along proximal half of back.

7^o Walking legs short, densely hairy, also the penultimate pair, which is as long as preceding pair; propodites short; dactyli diminishing gradually in length from the first to the fourth pair, those of last pair scarcely curved upward.

8^o First abdominal segment of ♀ not linear, but in the middle third longer than the next segment, the lateral portions greatly attenuated. Abdomen of ♂ not different from that of preceding species.

Miss RATHBUN records specimens of this species from the Sulu Archipelago, not far from the "Siboga" locality.

Dimensions in mm.:

	♂ juv.	♀
Fronto-orbital breadth . . .	2.55	3.1
Greatest breadth of carapace .	5.1	6.25
Width of front	—	1.45
Length of carapace	3.75	5.3

3. *Typhlocarcinops angustipes* n. sp. Pl. 7, Fig. 5.

Stat. 133. Lirung, Talaut Islands. Depth up to 36 m. 1 ♀, with eggs.

Stat. 274. 5° 28'.2 S., 134° 53'.9 E. North of Aru Islands. Depth 57 m. 1 ♂ juv., 2 ♀.

This new species is very much alike *T. decrescens*; it is even, at least in the specimens of Stat. 274, covered with the same ruddy-brown pubescence, but the following differences are of importance:

1^o The anterior margin of the carapace is fringed with long hairs, not nearly naked, as in *T. decrescens*.

2^o The carapace is somewhat broader, its breadth being 1.3 times the length; the fronto-orbital distance is distinctly more than half the greatest breadth of the carapace.

3^o The lateral margins are entire, not notched, and faintly divergent backward.

4^o The eyes are very distinct, black and terminal.

5^o The external maxillipeds (fig. 5a) are broader, the merus is produced at the antero-external angle, broader but shorter than the ischium and provided with club-shaped, feathered hairs

along the outer margins. The buccal cavity narrows backward, so that the lateral margins are not parallel, but convergent behind.

6° The walking legs are more slender, and the propodites of second and especially of third pair elongate, narrowing distally (fig. 5*b*); the dactyli of penultimate pair are longer than those of first pair and scantily hairy.

Dimensions in mm.:

Fronto-orbital breadth . . .	♀	♂
	2.5	3.1
Greatest breadth of carapace .	4.4	5.55
Width of front	1.2	—
Length of carapace	3.3	4.4

In its measurements (length of carapace to breadth as 1 : 1.3, fronto-orbital breadth about 55% of breadth of carapace) this species much resembles the type species, *T. canaliculata* Rathbun, from the Gulf of Siam, but this species is much less hairy, the eye-peduncles are almost circular, not piriform and the eyes faintly pigmented, the front widens anteriorly (which is not at all the case in the new species, in which on the contrary the lateral margins of the front greatly diverge backward), the lateral margins of the buccal cavity are parallel and the antero-external angle of the merus of the external maxillipeds is not produced at all, finally the second pair of walking legs, not the penultimate one, is the longest, and the inner angle of the wrist of the chelipeds is not pronounced.

Xenophthalmodes Richters.

1880. *Xenophthalmodes* Richters. Beitr. Meeresfauna Mauritius etc., p. 155.

The genus much resembles *Ceratoplax*, *Typhlocarcinus* and *Typhlocarcinops* in the general shape of the carapace, in the eye-stalks being firmly fixed, the eyes extremely small or absent, the chelae compressed, high, partly pubescent and granulate on outer surface; the first abdominal segment, however, does not reach so far outward as to cover the whole breadth of the last sternal segment; the lateral margins of the carapace are entire and diverging backward, so that the greatest breadth is lying far behind; this greatest breadth does not much exceed the length of the carapace; the dactyli of the walking legs regularly decrease in size from the first to the fourth pair.

The "Siboga" collected an apparently new species of this genus.

Key to the species:

Carapace practically bare, except along the margins. Free edge of epistome thickened, not much prominent, external margin of merus of external maxillipeds passing with a distinct angle into anterior margin. First abdominal appendages of ♂ concealed beneath abdomen. *X. moebii* Richters¹⁾

Carapace covered with a close pubescence. Free edge of epistome lamellar, prominent, vertical, external and anterior margins of merus

1) L. c., p. 155, pl. 16, f. 29, pl. 17, f. 1—5; MIERS, Proc. Zool. Soc. London, 1884, p. 12; DE MAN, Notes Leiden Mus., v. 12, 1890, p. 68, pl. 3, f. 5; ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 324. Hab. Mauritius, Red Sea, Persian Gulf, Malabar and Coromandel coast, Gulf of Martaban and Andamans.

of external maxillipeds forming together a continuous arcuate line.
 First abdominal appendages of adult ♂ projecting a long way
 beyond terminal segment of abdomen

X. dolichophallus n. sp.

1. *Xenophthalmodes dolichophallus* n. sp. Pl. 14, Fig. 1.

Stat. 4. Djangkar, east coast of Java. Depth 9 m. 5 ♂ (1 juv.), 1 ♀ juv.

Stat. 51. Madura Bay, west coast of Flores. Depth 54—90 m. 1 ♂.

Stat. 205. Lohio Bay, Buton Strait, south of Celebes. Depth 22 mm. 1 ♂ juv.

I am not quite certain about the validity of my species, for RICHTERS' and DE MAN's descriptions of *X. moebii* disagree in some points, but fortunately I could examine the specimen of the latter author in the Leiden Museum. Both the species are very much alike: the greatest breadth of the carapace, which is found far behind, only little exceeds its length, the fronto-orbital border is less than one-half this greatest breadth, the eye-peduncles are globular, there are scarcely any traces of subdivisions on the carapace, the chelae are largely compressed, carinate, and the dactyli of the walking legs decrease regularly in size from the first to the fourth pair.¹⁾ The following points, however, appear to afford specific features:

- 1" The carapace is bare in *X. moebii*, only thickly fringed along anterior and lateral margins; in the new species it is covered with a close pubescence, which, after removal, turns out to conceal a fine granulation along the lateral margins.
- 2" The front, according to RICHTERS and ALCOCK, is bilobed in anterior view, in *X. moebii*; my specimens agree in this respect perfectly with RICHTERS' fig. 1 on pl. 17, viz.: there are two rounded lobes, separated by a rather deep notch. In DE MAN's specimen, which is referred to *X. moebii*, the anterior edge of the front is, on the contrary, scarcely notched in the middle and regularly convex.
- 3" *X. moebii* is perfectly blind, according to RICHTERS; DE MAN observed, however, a very small, punctiform eye at the end of the eye-stalk, but chiefly ventral; ALCOCK, again, states that the species, of which 13 specimens from different localities could be examined, are devoid of eyes; but in one very young specimen the eye is indeed pigmented. In the adult or half-grown "Siboga" specimens there is a very faint speck of pigment on the ventral side of the eye-stalk, but in two very young specimens there is a strongly pigmented eye, even partly visible in dorsal view, larger and more conspicuous than in DE MAN's specimen.
- 4" In the literature I do not find anything regarding the epistome, except that it resembles that of *Typhlocarcinus*; in the specimen of *X. moebii* the free edge of the epistome is scarcely prominent, thickened. In the new species this edge is markedly prominent, vertical, lamellar, with a longitudinal sulcus in the middle.
- 5" The external maxillipeds of *X. moebii* are slender, the ischium is not broader than the merus, the latter quadrangular, with a distinct angle between the anterior and the external margin of the merus (see DE MAN, pl. 3, fig. 5a). In RICHTERS' figure 5 the ischium is

¹⁾ This character has hitherto not been observed in the genus, it occurs also in *Typhlocarcinus villosus* Stimpson (see p. 210) and in *Typhlocarcinus discrepens* Rathbun (see p. 214).

also as broad as the merus, but the antero-external angle of the merus is rounded off and the same is expressly stated by ALCOCK. In the new species (fig. 1*a*) the ischium is decidedly broader than the merus, granulate, as also is the exognath, and the anterior and external angle of the merus form a continuous arched line.

- 6° ALCOCK states that the wrist of the chelipeds of *X. moebii* is acuminate at inner angle; in the Leiden Museum specimen this angle is pronounced, not decidedly prominent. In *X. dolichophallus* this inner angle, though its exact shape is not easily to be made out, on account of the numerous feathered hairs inserted here, is distinctly spiniform, more so than in the other species. In RICHTERS' species the chelae are unequal and the outer surface is smooth and polished (ALCOCK); in the new species the hands are equal and the outer surface is to a greater or lesser extent pubescent and granulate.
- 7° Finally, the most remarkable are the much elongated first abdominal appendages of the ♂ of the new species. In adult and half-grown individuals these appendages reach rather far beyond the terminal segment of the abdomen (fig. 1*b*), even to the posterior margin of the buccal cavity; in very young specimens (length of carapace about 2.5 mm.) they are entirely concealed beneath the abdomen. Neither RICHTERS nor ALCOCK have noted anything of this kind in *X. moebii*, and it is likewise not to be observed in DE MAN'S specimen. It is this character, together with the apparently different development of the eye and the shape of the merus of the external maxillipeds, which induced me to establish a new species for the "Siboga" specimens, the most conspicuous feature of which is expressed by the specific name.

Dimensions in mm.:

Fronto-orbital breadth.	♂	3.2
Greatest breadth of carapace		7.2
Length of carapace.		6.5
Breadth of anterior margin of front .		1.55

Mertonia Laurie.

1906. *Mertonia* Laurie. Rep. Pearl Oyster Fish. Ceylon, prt 5, p. 423.

This genus comes very near to *Xenophthalmodes*, as the lateral margins of the carapace are diverging backward; but the fronto-orbital distance is more than half the greatest breadth of the carapace, the eyes, though minute, are quite distinct, visible in ventral view, and the antennae are unusually long, stout and provided with long, feathered hairs.

Only one species is known:

1. *Mertonia lanka* Laurie. Pl. 16, Fig. 2*a*.

1906. *Mertonia lanka* Laurie. L. c., p. 424, pl. 1, f. 11.

1910. *Mertonia lanka* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, p. 342, pl. 2, f. 4.

Stat. 273. Pulu Jedan, east coast of Aru Islands. Depth 13 m. 1 ♂.

LAURIE's description and exact figures are quite sufficient to recognize this species, but the following remarks may be of some use:

The carapace is practically smooth and polished, but there is a stripe of closely-set granules along the lateral margins; on the cardiac region three small depressions are found, placed in an equilateral triangle. The lateral margins are somewhat more divergent backward than is shown in LAURIE's figure; they are, together with the anterior margin, fringed with rather stiff setae. The orbits are visible from above and completely filled by the firmly-fixed eye-stalks; these eye-stalks are granulate above, like the lateral margins of the carapace, but completely smooth ventrally, the two parts are separated by a sharpened edge, along which the transverse row of setae passes across orbits and front. The fronto-orbital distance is more than one-half the greatest breadth of the carapace, but to a lesser degree in my specimen than in LAURIE's. Only in ventral view of the animal a small, but very distinct, black spot of pigment, near the end of the eye-stalk, and concealed beneath the transverse row of setae, denotes an eye; it has been accurately figured in LAURIE's figure 11a.

The antennules are very small, somewhat obliquely folded beneath the vertically-deflexed, deeply-bilobed front. The antennae are remarkably long (nearly half as long as the carapace), very stout, the flagellum (fig. 2a) consists of ten joints, the second of which is by far the longest; all are provided with very long, feathered hairs, except at the ventral surface; these hairs give the antennae a superficial resemblance to little fir-trees. The epistome is distinct, its free edge prominent and entire. The lateral margins of the buccal cavity distinctly converge backward and so do the external maxillipeds; the antero-external angle of the merus is produced laterally and the anterior margin is somewhat concave (not convex as in LAURIE's figure), the exognath is half as broad as the ischium.

The chelipeds are rather small, subequal; meropodite short, unarmed at upper border; upper surface of wrist roughened by depressed granules, especially near the produced inner angle of the wrist; similar granules are found at outer surface of palm, except in the central portion, which is smooth; upper border of palm sharpened; under border of chela forming a convex line, carinate along fixed finger and distal part of palm; height of palm somewhat less than horizontal length and about equal to length of fingers; fixed finger very high at base, largely compressed, provided with 3—4 obtuse teeth at inner margin; movable finger not flattened, nearly unarmed at inner margin; both fingers of a light sepia colour, darker than the palm.

Walking legs fringed with silky setae, like those of the carapace, but longer, especially in the case of the last pair; all pairs are subequal in length. The dactyli are not flattened, those of the first and second pair are the longest¹⁾. The propodites are unusually short, the posterior margin being much convex. The meropodites are unarmed; those of the fourth pair the broadest, but rapidly narrowing distally, in their proximal part the meropodites of this pair are half as broad as long, as has been accurately depicted in LAURIE's figure.

The abdomen of the ♂ is narrow; all segments are distinct; the first segment attains only one-fourth of the breadth of the last sternal segment; the third segment is little produced

1) Miss RATHBUN remarks: "second leg similar to the third, but slightly longer, the additional length being in the dactyl!"

laterally and as broad as the first, but much longer; the following segments increase in length gradually; the terminal segment is elongate, only half as broad at the base as the penultimate segment, and twice as long as broad.

The present species has been first recorded from Ceylon (Gulf of Manaar); afterwards it was obtained in the Gulf of Siam. The "Siboga" specimen is somewhat larger than those previously known.

Dimensions in mm.:

Fronto-orbital distance	4.—
Anterior margin of front.	1.55
Greatest breadth of carapace	7.6
Length of carapace.	5.5

Notonyx A. Milne-Edwards.

1873. *Notonyx* A. Milne-Edwards. *Nouv. Arch. Mus. Paris*, t. 9, p. 268.

The carapace in this genus is almost entirely hairless, the fronto-orbital distance is wide and nearly equals the greatest width of the carapace, the piriform eye-stalks present minute, though quite distinct, eyes, and the walking legs are elongate, and, like the carapace, almost devoid of hairs.

The eye-peduncles are movable, not firmly fixed within the orbits, and this character, which refutes the name *Rhizopinae*, has long been considered the exclusive possession of the present genus; we now know, however, that movable eye-stalks occur in some other genera: *Paranotonyx* Nobili, *Chasmocarcinus* Rathbun, *Selwynia* Borradaile and in a new genus, allied to the latter, which I propose to call *Paraselwynia*.

A diagnosis of the present genus is given by MIERS¹⁾ and ALCOCK²⁾.

Key to the species:

- Breadth of carapace about 1.3—1.5 times its length, postero-lateral margins slightly concave and somewhat convergent backward. Inner angle of wrist of cheliped produced, turned forward. Abdomen of ♂ broadly triangular, with the third segment broadest, and thence rapidly tapering *N. nitidus* A. Milne-Edwards
- Breadth of carapace only about 1.2 times its length, postero-lateral margins parallel. Inner angle of wrist of cheliped blunt, not prominent. Abdomen of ♂ oblong, scarcely narrowed towards terminal segment, with the third segment scarcely broader than the second *N. vitreus* Alcock.

1. *Notonyx nitidus* A. Milne-Edwards.

1873. *Notonyx nitidus* A. Milne-Edwards. *Nouv. Arch. Mus. Paris*, t. 9, p. 269, pl. 12, f. 3.

1886. *Notonyx nitidus* Miers. *Rep. "Challenger", Brachyura*, p. 236.

1900. *Notonyx nitidus* Alcock. *Journ. As. Soc. Bengal*, v. 69, prt 2, p. 319.

1) *Rep. "Challenger", Brachyura*, 1886, p. 235.

2) *Journ. As. Soc. Bengal*, v. 69, prt 2, 1900, p. 318.

Stat. 47. Bay of Bima, north coast of Sumbawa. Depth 13—31 m. 1 ♂, 1 ♀.
 Stat. 181. Ambon. Depth 54 m. 3 ♀ (2 juv.).
 Stat. 207. South-east coast of Timor. Depth 34 m. 1 ♀ with eggs.

The carapace of this elegant species is smooth and glabrous; under strong magnification here and there some punctae are seen; a cervical groove is present, concave forward, and at either end some oblique depressions are found. The carapace is straight transversely, except at the lateral branchial regions, which are strongly sloping, the hepatic regions are bulging, and the anterior part of the carapace obliquely deflexed.

The fronto-orbital distance occupies the greater part of the breadth of the carapace, as the front alone at its practically straight, but very slightly convex, margin measures about one-half of the said breadth, and the eye-stalks, which are bottle-shaped and provided with very distinct eyes, perfectly visible in dorsal view, are elongate. Upper orbital margins transverse, passing almost imperceptibly into the antero-lateral margins of the carapace, which are firstly strongly divergent backward and carinate, but soon curve strongly backward, becoming more and more obtuse and finally disappearing altogether when passing into the very slightly convergent postero-lateral margins, which again turn outward above the bases of the middle pairs of walking legs. Posterior margin of carapace sinuous, as long as the greatest breadth of the carapace, which is lying at the end of the anterior third of the latter.

Antennules folded quite transversely; antennae longer than orbits. Infra-orbital margin somewhat wavy in its lateral part, beneath the pigmented part of the eye. Epistome distinct, vertical. Lateral margins of buccal cavity convergent backward, anterior angles acute. Merus of external maxillipeds subquadrate, antero-external angle not prominent, slightly rounded; according to MILNE-EDWARDS' figure and to the express statement of ALCOCK the merus should be as long as the ischium, but in my specimens it is slightly shorter.

The chelipeds are unequal in the ♂ (the right being the larger), but equal in the ♀. Meropodite with a transverse ridge near the distal end of the upper border, preceded by a row of feathered hairs (in the ♀ this transverse ridge is not observed in my specimens; both MILNE-EDWARDS and ALCOCK state the presence of a subdistal prominence at the meropodite, but the first author describes shortly the abdomen of the ♂ and figures that of the ♀, though he could examine only a single specimen, and the sex of ALCOCK's only individual is not noted). Wrist with a pronounced inner angle, turned forward. Palm greatly compressed and carinate below, like the fixed finger, rounded above; in the larger chela of the ♂ it is longer than the fingers; both are entirely smooth and hairless.

Walking legs long and slender, 2^d and 3^d pair equal, with elongate propodites and dactyli, the latter not flattened, nearly straight, feebly curved towards the tip, those of last pair entirely straight; some scattered hairs are found along the margins.

Abdomen of ♂ triangular; first segment covered beneath the carapace; third segment broadened, with acute lateral angles, twice as long as preceding segment; thence the abdomen rapidly but regularly tapers towards the triangular terminal segment.

MILNE-EDWARDS describes his specimen as being of a rosy colour with longitudinal and oblique reddish stripes; my specimens are uniformly ivory-white. Notwithstanding some more

hairiness of the animal, it seems almost certain, that *Ceratoplax laevis* Miers¹⁾ is identical with the present species, a surmise already expressed by MIERS himself, and perfectly suggested by the author's figure. Unfortunately it is not stated, whether the eye-stalks are movable or not.

The species has been originally recorded from New Caledonia; the "Challenger" dredged it from a depth of 28 fathoms south of New Guinea; ALCOCK obtained a specimen from the Persian Gulf. "*Ceratoplax*" *laevis* was secured in the Arafura Sea, depth 22—26 fathoms. The Leiden Museum contains two specimens (♂ and ♀) of *N. nitidus*, collected by Dr. SEMMELINK near Banda in 1881.

Dimensions in mm.:	1 ♂	2 ♀	3 ♀	4 ♀	5 ♀
Fronto-orbital distance . . .	4.9	4.9	6.4	3.3	4.6
Anterior margin of front . . .	2.3	2.4	3.2	1.5	2.1
Breadth of carapace	6.—	6.2	9.—	4.4	5.8
Length of carapace	4.6	4.7	6.—	3.4	3.9

N^o 1 and 2 are from Stat. 47, n^o 3 and 4 from Amboyna, n^o 5, from Stat. 285; the latter specimen is bearing eggs, which are of nearly exactly the same size as those of the following species (0.37 mm.).

2. *Notonyx vitreus* Alcock.

1900. *Notonyx vitreus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 319.

1903. *Notonyx vitreus* Alcock. Ill. Zool. "Investigator", Crust. prt 10, pl. 61, f. 3.

Stat. 51. Madura Bay, west coast of Flores. Depth 69—91 m. 1 ♀ with eggs.

Stat. 164. South of Salawatti, near north-west New Guinea. Depth 32 m. 1 ♂ juv.

In the following particulars this species differs from the preceding:

- 1^o The carapace is proportionally narrower, its breadth being not more than 1.2 times its length; the postero-lateral margins are subparallel, not somewhat converging backward; the antero-lateral margins are more obtuse than in *N. nitidus* and keeled only along a very short distance behind the external orbital angles²⁾.
- 2^o The merus of the external maxillipeds is indeed shorter than the ischium (ALCOCK), more distinctly so than in *N. nitidus*, and the antero-external angle of the former is more pronounced, though not at all prominent, and less rounded off.
- 3^o The meropodite of the chelipeds is without a transverse ridge near the distal end of the upper border, and the feathered hairs, observed in *N. nitidus* along upper and inner border are nearly absent in the present species. The inner angle of the wrist is not prominent.
- 4^o The meropodites of the walking legs are slightly broader and the various joints are even more destitute of hairs than in the preceding species; the dactyli of the last pair are slightly curved, not straight.
- 5^o The abdomen of the ♂ is oblong, not triangular, with the lateral margins not much con-

1) Zool. H. M. S. "Alert", 1884, p. 244, pl. 25, f. C. See p. 203.

2) It must be a slip of the pen, that ALCOCK says: "front nearly half the breadth of the carapace"; in reality it is much narrower, and, like in *N. nitidus*, slightly less than half the fronto-orbital distance.

verging towards the tips: the third segment is as long as, and only very little broader than the second segment, and its lateral angles are right, not acute.

The animal is of a smooth, shining appearance and of a uniform ivory-white colour, like *N. nitidus*.

ALCOCK records a single specimen from the Andamans, depth 53 fathoms.

Dimensions in mm.:

	♂	♀
Fronto-orbital distance . . .	2.5	5.7
Anterior margin of front . . .	1.2	2.75
Breadth of carapace	2.9	7.8
Length of carapace	2.4	6.7

The eggs of the ♀ are not very numerous and rather larger (0.37—0.38 mm.).

Paraselwynia n. g.

The "Siboga" collection contains a single crab, which is certainly related to the species *Selwynia laevis* Borradaile¹⁾: the carapace is broadly oval, the lateral margins are entire and strongly arched, the eyes distinct, well pigmented and their peduncles not fixed into the orbits. Yet there are several points warranting even a generic distinctness from *Selwynia*: the walking legs are narrower, and very heavily fringed, the dactyli are long and slender; the merus of the external maxillipeds is subquadrate, with the antero-external angle distinct, rectangular, not greatly rounded off, and the carpus is inserted at the antero-internal angle, not nearly in the middle of the anterior margin, as in *Selwynia*; finally the front is not bilobed, nor grooved in the middle.

1. *Paraselwynia ursina* n. sp. Pl. 14, Fig. 2.

Stat. 258. Tual, Kei Islands. Depth 22 m. 1 ♀.

This species is broadly oval, its breadth being nearly 1.4 times its length, with the lateral margins greatly arched, entire, and the fronto-orbital distance less than half the breadth of the carapace (in *Selwynia laevis*, according to the figure, this fronto-orbital distance is somewhat more than half the breadth of the carapace); it is very slightly tumid in transverse direction, longitudinally it is strongly curved in its anterior third. The whole carapace is entirely hairless, of a dull appearance, smooth, with a few groups of large pits, distributed symmetrically: two of these groups are situated on the protogastric, two on the branchial regions, and one on the cardiac area; the cervical groove is represented, about in the centre of the carapace, by some interrupted, transverse depressions.

The front is bent downward and not at all sulcate, its anterior margin is perfectly straight, not bilobed, and about as broad as the two orbits together, its lateral angles are somewhat obtuse. The orbits are small, marginal, transverse, the eye-stalks shortened, freely movable, provided at the end with a perfectly developed, normal

1) Fauna and Geography Maldives and Laccadive Arch., v. 1, 1903, p. 430—431, textfig. 112.

eye, the cornea of which is chiefly situated on the ventral side of the stalk. The lateral margins of the carapace are much convex, converging backward in their distal half, obtuse, not keeled, and not dentate or notched, but puckled and pitted in an irregular way, the side walls of the cephalothorax are for the most part covered with a thick toment of longer and shorter, bearded hairs, growing gradually thicker in their terminal half; it is hairs of this kind which are largely distributed on the maxillipeds (so as to render obscure their exact shape) and along the chelipeds and walking legs. The hind margin of the carapace is convex, but somewhat concave in the middle, accompanied by a very faintly-impressed line near the margin.

Antennules very minute, neatly folded up beneath the front, perfectly transverse (in *Selwynia* they are, according to BORRADAILE, folded somewhat obliquely). Antennae longer than antennules, slender, hairless, about twice the length of the orbit. Epistome strongly folded transversely, its hind margin thickened, not laminar and freely prominent, sulcate in the middle. Antero-lateral angles of buccal cavity much rounded, lateral margins subparallel, thickened, adjacent parts of pterygostomian regions granulate beneath the toment.

External maxillipeds scarcely gaping, ischium longer, and also somewhat broader, than merus (fig. 2a); when the hairs covering the outer surface are removed, the merus turns out to be subquadrate and widely different from that of *Selwynia laevis*, as depicted by BORRADAILE: its length is about equal to, and not greatly less than its breadth, the antero-external angle is sharpened, not greatly rounded off, somewhat prominent, near the internal margin some long, slender, feathered hairs are inserted; the palp is very long (as in *Selwynia laevis*), but the carpus, instead of being inserted nearly in the middle of the anterior margin of the merus, is implanted at the antero-internal angle of the latter.

In my only specimen (a ♀) the chelipeds are perfectly equal, rather bulky. Meropodite very short, not projecting beyond the carapace, inner and outer margin thickly fringed, outer surface granulate, upper margin unarmed. Wrist globular, with some scattered granules near inner margin, inner angle very slightly prominent, but concealed beneath hairs. Chela rather long, inflated, rounded at the margin; palm twice as long as the fingers, smooth for the greater part, but the upper and basal portion of the inner surface thickly tomentose, like the under portion of the outer surface, but beneath the soft fur numerous granules are observed in the latter case; fingers short, straight, but strongly hooked towards the tip, fixed finger more strongly crenulate at inner margin than opposite one, both fingers tomentose, especially along the back of the movable finger (where also sharp granules are found near the base) and in the gap of the fingers (fig. 2b). In *Selwynia (laevis)* the chelae appear to be hairless and the fingers are nearly as long as the palm.

Walking legs slender, but short; first to third pair equal in length, little exceeding length of carapace, last pair inconsiderably shorter. All the joints are thickly fringed with hairs of the usual kind of this species. Meropodites slender, quite unarmed (in *Selwynia laevis* a small tooth is found in the distal part of the posterior margin); carpo-, and especially propodite, flattened, broadened; dactyli thick, conical, (with the tip slightly curved, horny and hairless), equal in length to the preceding joints, whereas they are short, claw-like in *Selwynia (laevis)*, dactyli of last pair somewhat flattened and quite straight.

Abdomen of ♀, like the sternum, naked on outer surface, but heavily fringed along the margins, covering at base two-thirds of the interspace between the bases of the last pair of legs, segments gradually increasing in length from first to sixth segment, terminal one semi-elliptical, twice as long as preceding joint.

The animal is of a uniform ivory-white colour in alcohol preservation; the toment is greyish-white, the fingers are chestnut-brown.

Dimensions in mm.:

Fronto-orbital distance	4.75
Anterior margin of front	2.25
Breadth of carapace	11.5
Length of carapace	7.7

Scalopidia Stimpson.

1858. *Scalopidia* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 95.

1881. *Hypophthalmus* Richters. Abhandl. Senckenb. Gesellsch., Bd 12, p. 429.

1900. *Scalopidia* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 325.

Scalopidia belongs to those genera of the *Rhizopinae* in which the epistome is indistinct and not well separated off by a prominent margin from the buccal cavity. The flattened, anteriorly not much deflexed carapace with its strongly marked regions, the flattened and sharply-edged chelae, one of which is very much larger than the other, and the spider-like, posteriorly spinous, walking legs render the only species of the genus very easily recognizable.

1. *Scalopidia spinosipes* Stimpson. Pl. 14, Fig. 3.

Literature: ALCOCK, l. c., p. 325.

LAURIE, Rep. Pearl Oyster Fish. Ceylon, prt 5, 1906, p. 424.

RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 344, pl. 2, f. 2.

Stat. 19. Labuan Tring, west coast of Lombok. Depth 18--27 m. 1 ♂.

Stat. 71. Macassar. Depth up to 32 m. 1 ♂ juv.

Contrary to what is the usual case in the *Rhizopinae* the carapace is much flattened and the front nearly horizontal, very short and not prominent. The general outline of the animal resembles that of *Xenophthalmodes* in being semi-circular, with the lateral margins of the carapace divergent backward, but, whereas in *Xenophthalmodes* the maximum breadth of the carapace only very little exceeds its length, it is 1.35 times this length in the present species. The surface is bare and, on close examination, it proves to be everywhere punctate, and the various regions are defined by broad, shallow depressions¹⁾. These are best developed around the cardiac area, which is of a rhombic shape and presents an indistinct, broad, but low, transverse ridge; there are further two inner branchial lobes; branchial and hepatic regions are separated by a broad sulcus, which gives off a branch passing anteriorly to a large depression behind the orbit; a median groove passes from the front backward and

1) ALCOCK states: "the regions are distinctly mapped out by fine grooves", but these grooves are not so clearly marked in my specimens.

bifurcates distally; the mesogastric area has two shallow depressions. A cervical groove does not exist, at least in the adult specimen. The front is extremely short, almost linear, obliquely-deflexed; in dorsal view it consists of two little-prominent lobes, separated by a shallow notch, but in front view (fig. 3*a*) the anterior margin is perfectly straight and measures one-fourth of the breadth of the carapace. The small orbits are not visible in dorsal view; the eye-stalks are very short, cylindrical, firmly fixed and provided with a well-developed, normal eye. The obtuse lateral margins of the carapace, rendered rugose, like the surface of the front, by numerous flattened granules, are much convex in the anterior two-thirds of their course, but distally they are subparallel to each other and disappear altogether¹); in their vicinity the epibranchial and subbranchial regions, both granulate, imperceptibly pass into one another. The posterior margin of the carapace is very long, convex, but concave in the middle part, and accompanied along its whole course by a fine ridge. The lateral margins are provided with a fringe of fine hairs, continued across the front.

The two free joints of the antennular peduncle are much elongate and slender, and scarcely to be folded within their fossae. The stem of the antennae is short, coalesced with the underlying parts, but the last joint of the peduncle is free, and bears a long flagellum, three times as long as the transverse diameter of the orbit. The epistome is very short, almost linear; its hind edge is not projecting, somewhat thickened, in front view consisting of two deeply-concave parts, separated by a lobe. The lateral walls of the buccal cavity are feebly convergent backward, concave in their anterior part and connected with the epistome by a prominent lobe. External maxillipeds (fig. 3*b*) large, granulate towards inner margin of ischium and merus; the former is broad, longitudinally grooved, with sharpened antero-median angle and somewhat longer than the merus, which latter is broadly auriculate at its antero-external angle; the palp is long and, if inflexed, easily reaches the ischium. The exognath is for the most part visible in normal position and only half as broad as the ischium.

The chelipeds, at least in the adult ♂, are largely unequal (compare figs 3*c* and 3*d*), the right being by far the larger, but in the young ♂ the chelae, though of a similar shape as those of the adult, are nearly equal in size. The meropodite is short, but strongly increasing in size distally, outer border not sharpened and provided with sharpened granules, upper border terminating in a subdistal, sharp tooth, inner border granulate, and, in the case of the large cheliped, provided with a small tooth, about in the middle of the margin. The wrist is of a rhombic shape, short, with a few punctae in the proximal part of the upper surface, and the inner angle transformed into a sharp point. The large chela (fig. 3*c*) is very high, smooth and glossy, with a few scattered, large pits on the outer surface, upper and especially lower border sharply keeled, proximal lower portion projecting backward in a sort of elbow-like prominence, inferior border of chela very deeply sinuous, palm little longer than high, with a very large and deep depression on the inner surface, near the base of the immovable finger; fingers shorter than palm, compressed; lower finger much deflexed, curved upward at tip, proximal half of cutting margin provided with four teeth, the second of

1) I have failed to detect a minute spine, denoted by ALCOCK, at the transition of antero- and postero-lateral margins.

which is the smallest, and the fourth or distal one by far the largest and the most acuminate, distal half of cutting margin finely crenulate; inner margin of mobile finger likewise with four teeth, the basal of which is the most conspicuous and the fourth, which is acuminate, situated opposite the large, sharpened tooth of the lower finger, distal half of inner margin likewise finely crenulate. Smaller chela (fig. 3*d*) weak, upper and under border not keeled, the latter fringed with hairs and much less sinuous than in the large chela; palm deeply pitted at outer surface and shorter than fingers; the latter longitudinally grooved, teeth of fixed finger sharp, rather equal in size, but with very minute serrulations scattered between the larger teeth, movable finger more obtusely toothed.

Walking legs slender, penultimate pair three times as long as the carapace, fourth pair the smallest. Meropodite long, in the middle pairs $3\frac{1}{2}$ times as long as broad and inflated near the base, shortly hairy, upper margin minutely serrate, near distal end usually provided with a small, curved tooth, inferior margin with a series of 7—8 sharp teeth, the axis of which is perpendicular to the long axis of the meropodite; the proximal one of these teeth is situated on the ischiopodite; in the case of the last pair of legs these inferior teeth are almost or completely absent. Carpo- and propodite shortly hairy, the latter elongate in the case of the penultimate pair of legs, but greatly shorter than the carpopodite in the last legs. Dactyli compressed, fringed at the margins, about as long as propodites, straight, but almost imperceptibly curved at tips, those of last legs curved upward and backward.

Sternum strongly granulate, not hirsute. Abdomen of ♂ (fig. 3*e*) narrow; first segment linear, about half the breadth of the sternum, third segment projecting laterally as far as the first segment and with two longitudinal grooves, third, fourth and fifth segment partly coalesced, as Miss RATHBUN perceived, sixth segment slightly broader than long, with two shoulder-like prominences anteriorly, terminal segment semi-circular, short.

The species was first dredged near Hongkong by STIMPSON, HENDERSON (see ALCOCK l. c.) records it from the Gulf of Martaban, ALCOCK again from Hongkong, LAURIE from the Gulf of Manaar and Miss RATHBUN from the Gulf of Siam. My adult specimen is of the same size as denoted by the latter author.

Dimensions in mm.:

Fronto-orbital distance	8.—	3.6
Anterior margin of front	4.75	—
Breadth of carapace	19.—	7.5
Length of carapace	14.—	5.75
Length of large chela	21.5	4.5
Length of small chela	12.—	4.—
Length of penultimate pair of legs	43.—	—

Typhlocarcinodes Alcock.

1881. *Typhlocarcinus* Miers (nec Stimpson). Ann. Mag. Nat. Hist. (5), v. 8, p. 260.
 1900. *Typhlocarcinodes* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 326.
 1903. *Caecopilumnus* Borradaile. Faun. and Geogr. Maldive and Laccadive Arch., v. 1, p. 267.
 1911. *Typhlocarcinops* (part.) Rathbun. Transact. Linn. Soc. London (2), v. 14, p. 239.

With the preceding genus the present one is distinguished by the epistome being sunken, not at all prominent, so that the external maxillipeds nearly encroach upon the antennulae, which latter are very minute, and directed almost longitudinally. The merus of the external maxillipeds is almost circular, distinctly smaller than the ischium, the palp is weak and short, inserted at the antero-internal angle of the merus and the exognath is very narrow, between one-third and one-fourth the breadth of the ischium. Eyes are not or scarcely visible and their peduncles are firmly fixed.

The type species is the Atlantic *T. integrifrons* (Miers¹), which in two essential features differs from the three species of the "Siboga": firstly the flagellum of the antennulae of MIERS' species is multi-articulate, hairy and longer than the peduncle, whereas in the Indian specimens this flagellum is shorter than the peduncle, almost completely hairless, and made up of very few (5—6) joints; secondly in *T. integrifrons* the abdomen does not entirely cover the last sternal segment, but in my specimens it touches the bases of the last pair of legs²).

BORRADAILE first founded a genus *incertae sedis*, *Caecopilumnus*, for the reception of a species, which was provisionally ranged among the Xanthidae, but afterwards³) he recognized that his genus was "at least allied to, if not identical with, *Typhlocarcinodes* Alcock".

The genus *Epimelus* A. Milne-Edwards⁴) is certainly very nearly related to *Typhlocarcinodes*. A co-type of the single species, *E. cessaci*, is in the Leiden Museum. It is nearest to *T. hirsutus* (Borradaile), with which it agrees in the strong granulation of the carapace and the lobulation of its lateral margins, in the shape and disposition of antennulae and antennae and in the rather long first abdominal segment, which covers all the space between the last pair of legs. That the genera are not to be considered identical is proved by the following facts: in *Epimelus* the eye-stalks are mobile, cylindrical, as long as the breadth of the front at its base, and provided with a normal eye at the tip; a rather large distance back from the cornea, a spot of pigment is shining through the tegument; secondly the merus of the external maxillipeds is not subcircular, but distinctly rectangular.

The "Siboga" obtained several specimens of the genus, belonging to at least two species. One of these is the "*Caecopilumnus hirsutus*" of BORRADAILE, another specimen is "*Typhlocarcinops*" *piroculata* Rathbun. That Miss RATHBUN'S species in reality does belong to the present genus and not to *Typhlocarcinops* I hope to explain further on. Whether a third species, unfortunately only represented by a single ♀, has a right of existence, remains uncertain as long as no further material is available.

Key to the Indo-Pacific species:

1. Carapace granulate, with regions more or less conspicuously indicated, little broader than long. Anterior margin of front rounded, lateral angles absent. Walking legs short and broad,

1) L. c., p. 260, pl. 14, f. 1. Hab. Goree Island, Senegambia.

2) It must be remarked, however, that ALCOCK, who examined a much damaged specimen, expressly states that the abdomen is narrower than the space between the last pair of legs.

3) Fauna Geogr. Maldive and Laccadive Arch., v. 1, 1903, p. 431.

4) Bull. Soc. Philom. Paris (7), t. 2, 1878, p. 227; Exp. "Travailleur" et "Talisman", Brachyures et Anomoures, 1900, p. 76, pl. 15, f. 1—8. Hab. Cape Verde Islands, depth 10—30 metres.

- fringed with very long hairs (longer than the breadth of the joint to which they are attached) 2
- Carapace almost smooth, somewhat granular only towards the margins, regions scarcely indicated, distinctly broader than long. Anterior margin of front straight, lateral angles present. Walking legs longer and more slender, fringed with rather short hairs *T. piroculatus* (Rathbun)
2. Carapace very strongly and closely granulate, regions defined by fine and deep grooves, postero-lateral margins convergent backward, straight. Surface of front not more hairy than antero-lateral margins of carapace. Eyes exceedingly minute, placed at tips of eye-stalks. Walking legs short, but propodites of last pair of legs longer than broad at the base. *T. hirsutus* (Borradaile)
- Granules on carapace more scattered and much less prominent, regions indistinctly defined by much fainter grooves, postero-lateral margins somewhat concave. Surface of front covered with a rather dense tuft of hairs, which are longer than those found laterally. Eyes completely absent. Walking legs short, propodites of last pair of legs as long as broad at the base. *T. crassipes* n. sp.

1. *Typhlocarcinodes hirsutus* (Borradaile). Pl. 15, Fig. 3.

1903. *Caccopilumnus hirsutus* Borradaile. Faun. Geogr. Maldive and Laccadive Arch., v. 1, p. 269, textfig. 59.

Stat. 51. Madura Bay, west coast of Flores. Depth 54—90 m. 2 ♂.

The carapace of this species is closely granulate, the granules being sharpened near the margins. The pentagonal mesogastric area, which is separated off from the short-necked, bottle-shaped cardiac region by a short and straight cervical groove, is clearly defined; protogastric, hepatic and branchial regions are also developed. The carapace is somewhat vaulted transversely, but much more so in the anterior half of the longitudinal axis, so that the front is deflexed. Its anterior margin is markedly convex, and passes, without presenting lateral angles, into the diverging lateral borders; the transverse diameter of the front at its base is exactly one-half of the fronto-orbital distance; its surface is provided with a short longitudinal groove, uniting backward with the two sulci defining the anterior part of the mesogastric region, and crossed by a row of hairs, which, like all those along the lateral margins of the carapace, on the subhepatic and subbranchial regions and on the legs, are feathered and very flexible, but not particularly longer than the rest. The orbits are very shallow and completely filled by the pear-shaped, dorsally granulate eye-stalks, which bear a very minute eye at their tips¹). The antero-lateral margins of the carapace are sharpened, much diverging backward, and at the transition between them and the obtuse,

¹) BORRADAILE in his figure (fig. 59e) depicts a spot of pigment, a little distance back from the cornea, and I observed the same in my specimens.

straight, converging postero-lateral borders three lobes, separated by minute notches, and granulate more strongly than the rest of the carapace, mark the level, at which the carapace attains its greatest breadth, which is only about 1.25 times the length. The posterior margin is straight, somewhat concave in the middle-third.

The antennulae are remarkably small, closely folded beneath the front and almost longitudinally directed, as is usual in the genus. The antennae are likewise small; the flagellum consists of 7 joints, nearly hairless, the last one tipped by one or two long hairs, and the whole flagellum is not longer than the two last joints of the peduncle, which joints are of equal length and provided with several very long, feathered hairs along their margins¹⁾. An epistome is not developed, the merus of the external maxillipeds nearly touching the bases of the antennae, but owing to the presence of strong endostome ridges the anterior margin of the buccal cavity is thickened in the middle and projects backward. The lateral walls of the buccal cavity are divergent backward, not convergent as depicted by BORRADAILE. The external maxillipeds are well figured by this author (fig. 59c), though I should say, that the ischium is in reality somewhat longer; between them only a narrow linear space is left and so the maxillipeds are exactly parallel, the surface of the ischium is smooth, its lateral margins are perfectly parallel, and the anterior margin is markedly concave; the merus is nearly circular in outline, with the outer and anterior margin much rounded, its surface is granulate; the carpus is, as usual, inserted at the antero-internal angle of the merus, very short, like the two following joints, so that the whole palp of the maxilliped is scarcely visible in the normal position; the exognath is very slender and only one-fifth of the breadth of the ischium.

The chelipeds are equal, strongly granulate. Arm short, much hairy along the margins and at the under surface, upper border with a subdistal notch, marking off a short, conical tooth. Wrist small, not toothed at inner angle, upper surface with pearly granules. Still larger are these granules on the outer surface of the chela, where they are placed in indistinct longitudinal rows (which arrangement is not clearly shown in BORRADAILE'S figure 59b); on the inner surface of the palm the granules are fine and closely grouped in the middle; the fingers, which are about as long as the palm are hooked at the tip, roughly crenulate at opposite margins, and longitudinally grooved at outer surface, the grooves being separated by continuous or finely granulate ridges.

The walking legs are short, the penultimate pair of legs being scarcely $1\frac{1}{2}$ times the length of the carapace. Mero-, carpo- and propodite, especially the former, are heavily fringed with feathered hairs, and, like the carapace, they are granulate at upper surface. The propodite is much broadened, but still longer than broad, even in the last pair of legs (fig. 3a). Dactyli somewhat compressed, those of the first to third pair subequal, curved, those of last pair shorter, styliform, nearly wholly straight.

Abdomen of ♂ (fig. 3b) with the first segment very broad and occupying the whole interspace between the posterior pair of legs, not diminishing in height laterally,

1) In BORRADAILE'S specimen the flagellum of the antennae seems to be broken off.

second segment narrower, but slightly longer than the first, third segment laterally produced, but the horns do not reach as far outward as the first segment, following segments all distinct, gradually increasing in length, terminal one equilaterally-triangular. The surface of the abdomen, like the sternum, is granulate.

The colour of the animal is a greyish-white, the hairs are colourless.

A single ♀ of this species was formerly collected on the reef at Fadifolu Atoll, Maldives; the "Siboga" obtained two ♂ from a depth between 54—90 metres at the west coast of Flores.

Whether ALCOCK's specimen, the locality of which is not stated, is identical with the present one, is impossible to make out.

Dimensions in mm.:

Fronto-orbital distance. . .	3.85
Width of front at base. . .	1.9
Breadth of carapace. . . .	7.25
Length of carapace. . . .	5.8
Base of abdomen	4.3

2. *Typhlocarcinodes crassipes* n. sp. Pl. 15, Fig. 1.

Stat. 225c. Lucipara Islands, Banda Sea. Reef. 1 ♀.

It is with some hesitation that a new species is established for the single ♀ obtained, as this is most closely related to the preceding species, but the following points are of importance.

- 1^o The carapace is granulate in a much less conspicuous way, the granules being less numerous and especially not sharpened and prominent towards the margins. The grooves defining the regions, as far as they are visible, present exactly the same course, but are much less distinct. The lateral margins are entire in the middle, not notched, the postero-lateral margins are somewhat concave. The surface of the front is clothed with a dense tuft of feathered hairs, which are longer than those on the eye-stalks or on the antero-lateral margins of the carapace. Eyes are completely absent, not even a speck of pigment is to be observed. On the other hand the shape of the front, of the antennulae and antennae (fig. 1a) and of the external maxillipeds exactly agree with what is found in *T. hirsutus*. The middle of the anterior margin of the buccal cavity is not thickened, and its lateral margins are convergent backward, quite like in BORRADAILE's figure of the ♀ of "*Caecopilumnus*" *hirsutus*.
- 2^o The chelipeds are like those of the preceding species, but the subdistal tooth at the anterior margin of the meropodite is larger and more ridge-like.
- 3^o The walking legs, especially the propodites, are broader, the propodites of the last pair (fig. 1b) being even broader than long.
- 4^o The first segment of the abdomen of the ♀ covers the last sternal segment.

It may be, that the differences enumerated are only due to sex, but BORRADAILE's ♀ of "*Caecopilumnus*" *hirsutus* presents a closely-granulate carapace, with the various regions as well and as sharply defined as in the ♂; further, eyes are figured and the shape of the walking legs agrees on the whole with what I found in the ♂ of BORRADAILE's species. But the outline

of the buccal cavity narrowing backward again suggests that my specimen indeed is nothing but the ♀ of the preceding species. We must await more material before this question may be solved; for the present it seems preferable to establish a new species.

Dimensions in mm.:

Fronto-orbital distance . . .	4.3
Width of front at base . . .	2.1
Breadth of carapace	8.5
Length of carapace	6.5
Base of abdomen	4.2

3. *Typhlocarcinodes piroculatus* (Rathbun). Pl. 15, Fig. 2.

1911. *Typhlocarcinops piroculata* Rathbun. Transact. Linn. Soc. London (2), v. 14, p. 239, pl. 20, f. 1—2.

Stat. 133. Lirung, Talaut Islands. Depth up to 36 m. 1 ♂.

This species is distinguished at first glance from the two preceding species by the carapace being proportionately broader, by the fronto-orbital distance being distinctly more than one-half the greatest breadth of the carapace, by the great reduction of the granulation and the absence of grooves, and by the postero-lateral margins being almost parallel. The antennulae, the walking legs and the abdomen are also different in the present species.

The carapace is flattened transversely, much convex in longitudinal direction, especially anteriorly, so that the front is strongly deflexed. As has been said, there are no granules on the carapace, except some very minute ones towards the margins, which are slightly raised¹⁾, and neither are the various regions defined, the only sculpture consisting of a faint longitudinal groove parting from the front and bifurcating distally and in two curved ones, (branchio-cardiac grooves) with the convexities turned towards each other, at the level of the cervical groove.

The front is rather broad, twice as broad as either orbit, narrowing anteriorly, but the anterior margin is but little arched, and lateral angles are distinctly developed (fig. 2 a). The eye-peduncles are firmly fixed within the orbits, pear-shaped and greatly bulging at the base. Miss RATHBUN notes small corneae, of which I did not detect any trace, only a rather large speck of pigment within the eye-stalk shining through the tegument, at a little distance back from the tip of the peduncle. The feathered hairs across the front are neatly arranged along the anterior margin and are continued across the eye-stalks and all along the lateral margins of the carapace. The latter are greatly arched, so that the carapace is proportionately broader than in the two preceding species; two faint notches, at the level of the greatest breadth, denote the transition between antero- and postero-lateral margins, and behind these notches the margins are nearly parallel, very faintly converging backward. The posterior margin is very little convex.

Antennulae of the usual shape and in the usual position. Antennae remarkable by the

1) "Sides with a raised, granulate rim" (RATHBUN).

fact, that the last joint of the peduncle is about twice as long as the preceding joint and nearly as long as the flagellum, which consists of only 5 joints (fig. 2*b*); the two last joints of the peduncle are fringed with very long feathered hairs, and the flagellum terminates in a very long hair. Epistome not prominent in the middle; linear. Buccal cavity widening backward. External maxillipeds (fig. 2*c*) much as in the two preceding species, leaving a very narrow space between them; ischium longer than merus, the latter circular, suture between ischium and merus concave; palp short and weak; exognath slender, about one-fourth of the width of the ischium.

Chelipeds equal, small. Arm short, hairy, scarcely toothed near the distal end of the anterior margin; wrist granulate at upper surface, inner angle rounded; chela likewise, but more strongly, granulate at outer surface, granules in longitudinal rows, the ventral one of which extends to the fixed finger and is continued here in the shape of a sharp keel. Walking legs slender, middle pairs more than twice as long as the carapace, fringed with hairs, but not so closely as in the two preceding species; last pair scarcely shorter than preceding legs. Meropodite unarmed; propodites not broadened, with the longest hairs along hind margin; dactyli of all the legs subequal in length, with fine, horny tip.

First abdominal segment of ♂ (fig. 2*d*) as broad as last sternal segment, longest in the median line; second segment only one-third as broad as preceding, but considerably longer; third segment produced laterally, but by far not reaching outward as far as first; next segments offering nothing remarkable.

The species is of the same uniform ivory-white colour as nearly all the members of the subfamily.

I have no doubt that my specimen is identical with "*Typhlocarcinops*" *piroculata*. Miss RATHBUN regarded this species as a member of the genus created by herself in the preceding year, on account of the first abdominal segment reaching to the bases of the posterior pair of legs. I have shown in the two preceding species, that this character also occurs in *Typhlocarcinodes*. Further, in *Typhlocarcinops* the epistome is distinct and; in front view of the animal, proves to be prominent and straight at the hind edge; the antennae are rather long, the peduncle much shorter than the flagellum¹⁾ and not provided with long hairs; the shape of the merus of the external maxillipeds is more angular and the suture between merus and ischium is straight. It must be admitted, that the present species exceedingly resembles *Typhlocarcinops*.

The species has first been recorded from the Western Indian Ocean (Amirante Islands, depth 34 fathoms). The "Siboga" obtained this species south of the Philippines.

Dimensions in mm.:

Fronto-orbital distance	2.85
Anterior margin of front.	1.42
Breadth of carapace	4.95
Length of carapace.	3.65
Length of penultimate pair of legs .	8.2
Length of last pair of legs	8.1

1) Miss RATHBUN herself remarked that in "*Typhlocarcinops*" *piroculata* the flagellum of the antenna does not exceed the peduncle in length.

Hephthopelta Alcock.

1899. *Hephthopelta* Alcock. Deep Sea Brachyura "Investigator", p. 76.

With *Camatopsis* and *Megaesthesius* this genus is distinguished by the antennulae being too large to be folded up in their fossae beneath the front. The present genus presents well-pigmented, normal eyes, on the ventral side of the movable eye-stalks; the merus of the external maxillipeds is rounded laterally and anteriorly, and the inner angle of the wrist of the chelipeds is largely produced¹⁾.

Two species of this genus are known, both obtained at rather great depths (175 and 490 fathoms). The "Siboga" collection contains a single specimen, which I take to represent a new species.

Key to the species:

1. Carapace as broad as long. Posterior border of meropodites of first two pairs of ambulatory legs spinulose *H. lugubris* Alcock²⁾
 Carapace broader than long. Meropodites of ambulatory legs unarmed at posterior margin 2
2. Eye-stalks constricted near corneae, pigment of eye dull. Lower surface of left (smaller) chela flattened, with pronounced margins, the outer margin ending in a spine *H. apta* Rathbun³⁾
 Eye-stalks not constricted, pigment of eye black. Lower surface of left chela rounded, not flattened. *H. littoralis* n. sp.

1. *Hephthopelta littoralis* n. sp. Pl. 9, Fig. 3.

Stat. 174. Waru Bay, north coast of Ceram. Depth 18 m. 1 ♀.

The carapace, which is pubescent throughout, with some longer and thicker hairs near the margins, and, save for the very long and straight cervical groove and two branchio-cardiac grooves, does not show any distinct sculpture, is broader than that of *H. apta*: in Miss RATHBUN'S species its breadth is 1.2 times, in the present one nearly 1.5 times its length. The anterior third part is rather strongly deflexed, so that the anterior edge of the front, which is straight and measures one-fourth of the total breadth of the carapace, is not visible in dorsal view. The eye-peduncles are cylindrical, shorter than the breadth of the front, somewhat bulging at base and with a perfectly-developed eye at the ventral side of the tip. The fronto-orbital distance is more than one-half the greatest breadth of the carapace and so larger than that of *H. apta*. The lateral margins of the carapace soon curve backward behind the eyes and are

1) Miss RATHBUN (Proc. U. S. Nat. Mus., v. 48, 1914, p. 149) pretends that the narrow plate, intercalated between the fourth and the fifth segment of the sternum of the ♂ and covering the genital canal leading from the coxopodites of the last pair of legs, represents a generic character. The same, however, occurs in the ♂ of *Camatopsis*.

2) Deep Sea Brachyura "Investigator", 1899, p. 77, pl. 4, f. 2; Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 327. Hab. Andaman Sea, 490 fathoms.

3) Proc. U. S. Nat. Mus., v. 48, 1914, p. 148. Hab. Philippine waters, 175 fathoms. Among the differences between this species and *H. lugubris* Miss RATHBUN also cites those taken from the chelipeds, but in ALCOCK'S only specimen these were wanting.

diverging towards the bases of the penultimate pair of legs. The posterior margin is strongly sinuous towards both ends.

An epistome is present; its free edge is slightly thickened, but does not project. Basal joint of antennulae small, not inflated (fig. 3a), each of the two next joints cylindrical, as long as the eye-stalk. Antennae small, flagellum consisting of about 8 joints, nearly hairless, reaching a little way beyond the orbit. Lateral margins of buccal cavity subparallel. External maxillipeds narrow, widely gaping; ischium longer than merus, the latter oblong, with the antero-external angle not at all produced, palp very strong, carpus and propodus cylindrical and much longer than the short terminal joint; exognath about one-third as broad as ischium, with some long hairs along outer margin.

In my specimen the right cheliped is unfortunately absent; the length of the left exceeds that of the carapace. Meropodite rather slender, unarmed at upper border; wrist short, quadrate, but with the inner angle strongly produced; chela low, palm nearly as long as fingers, pubescent, not flattened at lower border, but in the distal half and along lower finger sharply carinate and hairy; fingers long, compressed, fixed finger nearly straight, with four or five minute teeth, placed at large intervals along inner margin, movable finger somewhat curved, with a row of hairs along the back and unarmed at opposite margin.

Ambulatory legs slender, middle pairs about twice as long as carapace, last three joints heavily fringed, especially at posterior (inner) border. Meropodites unarmed, propodites elongate (except in the last pair of legs), dactyli long, straight, but in the last pair of legs, in which they are longer than the preceding joints, curved backward.

The only ♀ does not bear any eggs. It is of a bluish-white appearance, but the pubescence is of a dusky-brown.

This species, which seems to me to be readily distinguishable by its proportionately broad carapace, is also remarkable by its living in very shallow water (depth 18 metres).

Dimensions in mm.:

Fronto-orbital distance. . .	2.75
Length of eye-stalk. . . .	0.75
Breadth of carapace. . . .	5.25
Length of carapace. . . .	3.5

Camatopsis Alcock.

1899. *Camatopsis* Alcock. Deep Sea Brachyura "Investigator", p. 75.

The body in this genus, as in the preceding, is very deep, cubical, and in most respects *Camatopsis* is very nearly allied to *Hephthopelta*, but the eyes, if present at all, are greatly reduced, the eye-stalks are thicker, movable only to a slight degree, the inner angle of the wrist of the chelipeds is not produced, and the abdominal segments of the ♂ are partly coalesced.

The only known species is in the "Siboga" collection represented by a whole series of specimens.

1. *Camatopsis rubida* Alcock. Pl. 16, Fig. 3.

1899. *Camatopsis rubida* Alcock et Anderson. Ann. Mag. Nat. Hist. (7), v. 3, p. 13.
 1899. *Camatopsis rubida* Alcock. Deep Sea Brachyura "Investigator", p. 76, pl. 4, f. 3.
 1900. *Camatopsis rubida* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 329.
 1904. *Camatopsis rubida* Doflein. Wiss. Erg. "Valdivia" Exp., Bd 6, Brachyura, p. 121.
 1910. *Camatopsis rubida* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, p. 344.
 Stat. 5. 7° 46' S., 114° 30'.5 E. Near north-east point of Java. Depth 330 m. 1 ♂, 1 ♀ (ovig.).
 Stat. 114. Kwandang Bay [entrance. Depth 75 m. 2 ♂, 1 ♀ (all juv.).
 Stat. 116. West of Kwandang Bay entrance. Depth 72 m. 3 ♂ (juv.).
 Stat. 254. 5° 40' S., 132° 26' E. W. of Kei Islands. Depth 310 m. 1 ♀.
 Stat. 260. N. W. of Kei Islands. Depth 90 m. 3 ♂ (juv.).
 Stat. 302. 10° 27'.9 S., 123° 28'.7 E. Near Rotti. Depth 216 m. 1 ♂ (juv.).
 Stat. 306. 8° 27' S., 122° 54'.5 E. South of Flores. Depth 247 m. 2 ♂ (juv.), 1 ♀.
 Stat. 312. Saleh Bay, north coast of Sumbawa. Depth 274 m. 2 ♂ (1 juv.).

The various specimens present such rather important differences one from another, that at first sight I was inclined to regard them as two distinct species; on close examination, however, I have come to the conclusion, that all the specimens belong to the same species. For the sake of convenience I shall discriminate the two forms under the names A and B, beginning with A.

All but one of the specimens "forma A" are adult (breadth of carapace more than 6.5 mm.), and all occur in deep water. The carapace is little broader than long, covered with very minute granules on the anterior parts and along the postero-lateral margins, but to a greater or lesser extent covered with a short pubescence, leaving the central parts free. In some specimens there is no trace of grooves on the carapace (fig. 2), but in others two irregular depressions mark the presence of branchio-cardiac grooves. The curvature of the surface is little pronounced, and the front is only feebly deflexed, but it presents a somewhat different shape in various individuals, even of approximately the same size. So in the two specimens of Stat. 5 (fig. 3) and in that of Stat. 254 the anterior margin of the front is perfectly straight, about as long as the eye-peduncle, whereas in others (Stat. 306, 312, fig. 3a) it is strongly bilobed, more roof-like and prominent over the bases of the antennules; it is this latter case, which is figured by ALCOCK. The eye-stalks are thick and short, for the greater part concealed in dorsal view, and on the ventral side a very minute speck of pigment may be visible, but is mostly absent. The antero-lateral margins of the carapace are much convex, sharpened, granulate, the postero-lateral ones straight, obtuse, divergent backward. The posterior margin is strongly sinuous, straight in the middle, where the narrow abdomen is attached.

Epistome present, but sunken, and ill-defined posteriorly. Basal joint of antennulae not inflated, completely filling up the small fossa, the two next joints of peduncle narrow, cylindrical, the terminal one the longer (fig. 3a). Antennae weak, the two last joints of the peduncle free, flagellum consisting of a few joints. Lateral margins of buccal cavity subparallel. External maxillipeds widely gaping, ischium only very little longer than merus (fig. 3b), the latter broader than ischium, subcircular, strongly bulging outward; palp very long and thick, with the terminal joint half as long as the preceding.

Chelipeds long and slender, longer than the carapace, and of unequal build. Meropodite

narrow, unarmed at upper border; wrist elongate, more so in the right than in the left chela; palm of right chela considerably higher and more inflated than that on the left side, with the lower finger somewhat deflexed, and fingers widely gaping at base, but meeting in their distal half, where the opposite margins are finely toothed; left chela (fig. 3*e*) low, upper margin of palm shorter than movable finger, lower finger deflexed, fingers narrowly gaping, elongate, movable finger with the inner margin irregularly cut, but without distinct teeth, fixed finger with two prominent spiniform, erect teeth in the distal half, followed by 2—3 obtuse crenulations towards the tip and preceded by a row of very minute, closely-crowded serrulations, becoming more or less obliterated with age.

Walking legs slender, middle pairs twice as long as carapace, last three joints heavily fringed, hairs especially long along hind (inner) margin of propodite and dactylus. Meropodite cylindrical, unarmed; dactyli straight, blade-like, much compressed, those of first and second pair subequal and longer than those of third pair, dactyli of last pair slender, elegantly curved backward.

First abdominal segment of ♂ (fig. 3*d*) linear, occupying about one-third of the interspace between the last pair of legs, second segment less broad, third segment much longer, projecting laterally as far as first segment, but completely fused with fourth and fifth segment, penultimate segment distinctly shorter than terminal one, which is of an oblong shape.

The general colour of the animal is of a uniform milky-white, but the pubescence is greyish-white or dusky-brown; the surface of the walking legs is thickly pubescent in some individuals, but in others entirely hairless. The carapace is sometimes covered with minute reddish dots.

The specimens of the "forma B" (fig. 3*e*) are, without exception, much smaller, the largest individual (Stat. 312) measuring only 5.4 mm. across the carapace; except this specimen all were taken from much shallower depths (70—90 metres). This form is distinguished by the following points:

- 1° The carapace is somewhat less pubescent; the eye-stalks are visible plainly from above; the eyes are entirely absent. In the shape of the front the same variation occurs as in the individuals of "forma A", the anterior margin being straight or faintly bilobed (fig. 3*f*).
- 2° Antennulae shorter, last joint of peduncle thicker (fig. 3*f*).
- 3° External maxillipeds rather widely different from those of "forma A" (compare figs. 3*b* and 3*g*): ischium narrower, merus of a much more slender shape, oblong, as long as ischium and not bulging outward; terminal joint of palp very short, scarcely one-third of length of preceding joint.
- 4° Right (larger) chela agreeing with that of "forma A", but left chela differing in having the whole inner margin of the fixed finger provided with the closely-crowded, plate-like and high serrulations, found in the proximal half of that finger in "forma A", but here generally more or less obliterated (fig. 3*h*). The opposite margin of the mobile finger is unarmed, save for a rather large, truncated tooth quite near the base; this tooth, however, is wanting in some individuals.
- 5° The abdomen of the ♂ (fig. 3*i*) resembles that of "forma A", but the penultimate segment is not shorter than the terminal one, which is as long as broad at the base.

These differences may easily be accounted for by the various stages of age, though it must be admitted, that a serious objection to this assumption is lying in the differences between the meri of the external maxillipeds in the two forms. Supposing for the present, that "B" is the younger stage of "A", we arrive at the conclusion that, though in all stages of age allowance is made for individual variation with regard to the shape of the front, the growing individual, which appears to show a preference to a shallower depth than his grown-up parents¹⁾, goes through some modifications, both in the shape of the external maxillipeds and in the armature of the fingers of the left chela. This young stage or "forma B" is also generally distinguished by a ruddy-brown colour, covering to a greater or lesser extent the under and side parts of the body and the walking legs.

At one station (Stat. 312) 2 ♂ were caught, at a depth of 274 metres, one belonging to "A", the other, much smaller one, to "B". For the rest, at all stations either "A" or "B" was obtained, i. e. "A" in much deeper water than the other form. At one station (Stat. 302) a very small specimen (breadth across carapace only 3.5 mm.) lived, at a depth of 216 metres, which presents a mixture of characters of both forms: it has the general colour and the left chela entirely like in "B" or in the young stage, but the external maxillipeds are shaped like those of "A". Leaving aside this specimen, the "forma A" was found at Stat. 5, 254, 306 and 312, the other at Stat. 114, 116, 260 and 312.

The species has been recorded from the Andaman Sea, the west coast of Sumatra and the Gulf of Siam.

Dimensions in mm.:	1 ♀	2 ♀	3 ♂	4 ♂
Breadth of carapace	11.5	8.15	4.5	3.5
Length of carapace	10.5	6.6	5.4	3.1
Length of left chela	—	11.—	—	—
Length of second pair of walking legs .	—	13.—	—	—

N^o 1 is the egg-bearing specimen of Stat. 5 (diameter of eggs 0.73 mm.), n^o 2 from Stat. 254, n^o 3 ("forma B") from Stat. 312, n^o 4 (intermediate between forma "A" and forma "B") from Stat. 302.

Subfam. HEXAPODINAE.

It would seem at first sight that no subfamily among all the Brachyura could be more sharply characterized than the present one, on account of the entire lack of the fourth pair of walking legs. And yet there is some controversy among systematists with regard to the limits of the group, for species with truly three pairs of walking legs are, by means of *Amorphopus*, in which the fourth pair is represented by a minute tubercle on the coxopodites of the third pair, connected to such genera like *Pseudopinnixa*, *Tritodynamia* etc., with the fourth pair, though small and weak, distinctly developed. This fact induced ORTMANN²⁾, who considered

1) Miss RATHBUN records a single specimen (♂) from the Gulf of Siam, taken at a depth of only 20 fathoms, but she does not give any description of this specimen. ALCOCK's three specimens are from deep water (194 fathoms) and all probably adult.

2) Zool. Jahrb., Syst., Bd 7, 1894, p. 690—691.

the *Hexapodinae* a subfamily of the Pinnotheridae, to a considerable widening of the present group, including even such genera as *Malacosoma* and, though doubtfully, also *Pinnotherelia* and *Asthenognathus*. ALCOCK, on the contrary, whose views are here followed, strictly adheres to the absence or presence of the fourth pair of walking legs, allowance being only made for *Amorphopus*. It is certainly undeniable that the existence of the *Hexapodinae* renders a sharp demarcation between Goneplacidae and Pinnotheridae somewhat vague, and that they may be referred with as much right to either of these families.

It is most likely the commensalistic mode of life of the *Hexapodinae* that has brought about not only the cylindrical shape of the body, but also the disappearance of the posterior legs, which, by the fact that they are inserted at a higher level than the preceding pairs, perhaps would rather impair the animal's moving up and down in the tubes of Annelids and Hydrozoa. In many cases, however, the crabs are found outside their hosts or in indifferent surroundings. Whether a trace of the fourth pair of walking legs still exists in the very young individuals is unknown, but a specimen of *Hexapus sexpes* with a length of only 3 mm., examined by A. MILNE-EDWARDS, presented no vestige of degenerated posterior legs.

Key to the genera:

1. Fourth pair of ambulatory legs present in the shape of a tubercle, at the base of the coxopodites of third pair. **Amorphopus** Bell ¹⁾
Fourth pair of ambulatory legs completely absent. 2
2. Ambulatory legs very much elongate, slender, the meropodites of third (last) pair being $1\frac{1}{2}$ times as long as the carapace. Front narrow, much widening anteriorly; eyes very large, hammer-shaped. Deep sea species. **Hexaplax** Doflein
Ambulatory legs thick and short 3
3. Propodus of external maxillipeds angular, broadened distally and attaining about the width of the narrow merus. **Thaumastoplax** Miers
Propodus of external maxillipeds of normal shape, cylindrical. 4
4. First sternal segment of ♂ with two deep, clearly-defined, transverse trenches, into which the distal part of the rectangularly-bent sexual appendages fits **Lambdophallus** Alcock
Trenches in the first sternal segment of ♂ ill-defined and short, situated immediately beneath buccal cavity **Hexapus** de Haan.

Thaumastoplax Miers.

1881. *Thaumastoplax* Miers. Ann. Mag. Nat. Hist. (5), v. 8, p. 261.

Were it not for the unusual shape of the external maxillipeds, this genus would certainly be identical with *Hexapus*, but merus and ischium of these appendages are very narrow and weak,

¹⁾ Journ. Linn. Soc. London, v. 3, 1859, p. 27. The only species, *A. cylindraccus*, is, up to the present time, represented by one single specimen, the habitat of which is not stated.

whereas the palp is greatly developed, with the propodus considerably widening distally and truncate¹⁾.

Three species of this genus are now known, the type species is Atlantic.

Key to the species:

1. Propodus of external maxillipeds longer than wide at its distal end. Third (last) pair of walking legs as long as preceding pair.
 - Atlantic species *Th. anomalipes* Miers²⁾
 - Propodus of external maxillipeds as long as wide. Third pair of walking legs subequal to first and narrower than second pair 2
2. Fronto-orbital distance less than one-half width of carapace. Regions of carapace not distinguishable, except for a H-shaped figure in the middle. Upper margin of meropodites of middle pair of walking legs spinulose *Th. orientalis* Rathbun³⁾
- Fronto-orbital distance equal to one-half width of carapace. Gastric, and to a lesser degree the cardiac region, are distinctly defined *Th. chuenensis* Rathbun⁴⁾

Lambdophallus Alcock.

1900. *Lambdophallus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 329.

This genus is founded on the species *L. sexpes*, which is provided with a deep, transverse trench in the first sternal segment of the ♂; it is in this trench that the distal part of the rectangularly-bent sexual appendages is lodged. The meropodites of the walking legs are not very much broadened, anterior and posterior margin parallel. The pterygostomial regions, according at least to ALCOCK'S figure⁵⁾, are provided with some faint oblique striae, resembling those of *Hexapus*; the external maxillipeds, too, are much alike in both genera, but in *Lambdophallus* the last joint (dactylus) of the palp is not very much produced and as long as the propodus. This species has been dredged in the Bay of Bengal, at a depth of 65 fathoms.

A second species, *L. anfractus*, has in recent years been established by Miss RATHBUN, but, as I hope to show (p. 241), it is identical with *Hexapus sexpes*. The genus will, on close examination, probably turn out to be only a subgenus of *Hexapus*.

Hexapus de Haan.

1835. *Hexapus* de Haan. Faun. Japon., Crust., p. 35.

This genus contains but a single species, which, except for his broader walking legs and the elongate dactylus of the palp of the external maxillipeds does not materially differ from *Lambdophallus*.

1) STEBBING (Ann. S. Afr. Mus., v. 6, 1910, p. 316) throws doubt upon the exactness of MIERS' figure of these maxillipeds and calls this figure "very unconvincing", but in this very year Miss RATHBUN described in two new species of *Thaumastoplax* precisely the same kind of maxillipeds, and formerly ORTMANN (Zool. Jahrb., Syst., Bd 7, 1894, p. 693) stated that the external maxillipeds of *Tritodynamia* are of an identical build.

2) Ann. Mag. Nat. Hist. (5), v. 8, 1881, p. 261, pl. 14, f. 2. Hab. Goree Island (Senegambia).

3) Proc. Biol. Soc. Washington, v. 22, 1909, p. 113; K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 346, textfig. 33, pl. 2, f. 1. Hab. Gulf of Siam.

4) Proc. Biol. Soc. Washington, v. 22, 1909, p. 113; K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 347, textfigs. 34-35. Hab. Gulf of Siam.

5) Ill. Zool. "Investigator", Crust. prt 10, 1903, pl. 62, f. 1a.

1. *Hexapus sexpes* (Fabricius). Pl. 17, Fig. 1.

Literature: STEBBING, Ann. S. Afr. Mus., v. 6, 1910, p. 315¹⁾.

Stat. 37. Sailus Ketjil, Paternoster Islands. Depth up to 27 m. 1 ♀.

Stat. 258. Tual, Kei Islands. Depth 22 m. 2 ♂.

The descriptions and figures of A. MILNE-EDWARDS²⁾, DE MAN³⁾ and STEBBING⁴⁾, especially those of the two latter authors, are so complete that a thorough description may be dispensed with. In comparing the somewhat different appearances of the animals figured we are led to the conclusion, that in young individuals (length of carapace 3 mm.) the breadth of the carapace is twice its length, the surface pubescent throughout, and the postero-lateral margins strongly divergent backward, but that with advancing age the carapace becomes proportionately narrower, the postero-lateral margins assume a subparallel course, though developing a strongly convex bulge near the posterior angles, and the pubescence is gradually lost. The number of oblique ridges on the pterygostomian regions seems to vary individually, independent of age⁵⁾.

MISS RATHBUN⁶⁾, in describing her *Lambdophallus anfractus*, doubts whether the specimens of DE HAAN, A. MILNE-EDWARDS and DE MAN are really identical. Besides the "Siboga" specimens I have also examined DE HAAN's original individual, which is still preserved in the Leiden Museum, and after close inspection I find them all wholly identical. Neither do I hesitate to maintain the correctness of the determinations both of MILNE-EDWARDS and of DE MAN.

The following particulars will be of some use:

- 1^o The regions on the carapace are usually not perceptible; the postero-lateral margins exhibit, save perhaps in very small individuals, a somewhat flattened, prominent lobe near their distal ends.
- 2^o The front is nearly vertically deflexed, about one-fifth of the width of the carapace and truncate; the eyes are globular, with normal cornea, but with the pigment brown and scanty; the eye-stalks are not firmly fixed; there is a supra-ciliary groove along the supra-orbital margin.
- 3^o The antennulae are transverse; an epistome is distinct, and the lateral walls of the buccal cavity diverge backward. External maxillipeds gaping, the gap being for a large part filled up by the palpi; when deprived of the thick coating of hairs, merus and ischium have a characteristic shape (fig. 1a) and the fact that they are incorrectly represented by DE HAAN⁷⁾ induces me to figure them anew, also in order to compare my statements with STEBBING's figure: ischium narrow, not longer than merus, with a large widening at the inner distal angle⁸⁾; merus oblong, rounded, with the palp inserted at the tip; carpus thick and short, presenting a strong tuft of feathered hairs; propodus in STEBBING's figure longer and

1) STEBBING has overlooked ZEHNTNER's record of the species (Rev. suisse zool., t. 2, 1894, p. 159) and also that of A. MILNE-EDWARDS (see note 2).

2) Nouv. Arch. Mus. Paris, t. 9, 1873, p. 253, pl. 12, f. 1.

3) Arch. Naturgesch., Jahrg. 53. 1., 1888, p. 322, pl. 13, f. 3.

4) L. c., p. 315, pl. 41.

5) It must be noted, however, that ZEHNTNER in a very large individual from Amboyna (length of carapace 15 mm., breadth 23.5 mm.) states the complete absence of these oblique ridges.

6) K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 349.

7) Faun. Japon., Crust., 1835, pl. D.

8) Ischium, according to STEBBING's figure, longer than merus, with the lateral margins parallel over their greater part.

- also broader than carpus, but this is not the case in my specimens at hand; dactylus very long, as already stated by DE HAAN, but not figured by him; exognath narrowing distally, at its base (at least in my specimens) nearly as wide as the basal part of the ischium.
- 4^o Chelipeds unequal, the right chela being higher (height of palm nearly equalling its length) and more inflated than the left; the fingers of this chela are not so short as figured by DE HAAN¹⁾ and the movable finger exhibits one or two truncate teeth near the base of the inner margin.
- 5^o Walking legs short; meropodites of second and third (last) pair twice as long as broad, widening distally, in the second pair longer than in the third, superior margin tomentose in ♂, glabrous in ♀; propodites nearly semi-circular, with the posterior margin, like that of carpopodite, long-hairy; dactyli short, thick, straight, hairy at inner margin; in the last pair STEBBING figures the dactyli as being constricted in the distal part, but I observed nothing of this kind in my specimens.
- 6^o In the first sternal segment of the ♂ there are two broad, sinuous grooves, parting from the anterior portion of the deep trench, into which the abdomen fits, for the reception of the distal part of the long, outwardly-curving first abdominal appendages. I find these transverse grooves in the "Siboga" specimens as well as in that of DE HAAN; as they are, however, shallow and filled with hairs, they may be easily overlooked. That DE MAN has made no mention of them may possibly be explained by the gradual disappearance of the grooves in such large examples as examined by him. On account of the transverse grooves being present in *Hexapus*, the difference between this genus and *Lambdophallus* becomes only gradual, and I have no doubt that *Lambdophallus anfractus* Rathbun²⁾ is wholly identical with *Hexapus sexbes*, to which species the former showed, as Miss RATHBUN herself admitted, "a suspicious resemblance"; also in many other respects (lobe-like projection of postero-lateral margins of carapace, slight mobility of eye-stalks, shape of external maxillipeds, buccal cavity, chelipeds, walking legs and abdomen) there is a complete agreement between both species.
- 7^o The abdomen of the ♂ is very narrow as compared to the broad sternum; the two first segments (fig. 1 b) are very short, linear; the third, fourth and fifth segment are completely coalesced³⁾ and together form a continuous plate, as broad at the base as long; the penultimate segment is subquadrate, large, longer than the terminal one; the latter is subtriangular, thickly fringed with rather long, feathered hairs, which also are implanted on the suture between this segment and the preceding. The abdomen of the ♀ is only slightly broader in the middle than that of the ♂ and all the segments are separated.

This species has been recorded from Japan, New Caledonia, Amboyna, and (though doubtfully, STEBBING) from the Cape. In the Gulf of Siam a whole series of specimens of *Lambdophallus anfractus* were obtained, but, though Miss RATHBUN records several ovigerous ♀, the dimensions of a single ♂ only, of moderate size, are given.

1) L. c., pl. 11, f. 6.

2) K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 348, textfig. 36.

3) In DE HAAN's specimen, just as has been depicted by this author, these segments are not fused.

Among the specimens recorded, those of DE MAN from Amboyna are noteworthy for their large size, the length of carapace measuring nearly 13 mm., the breadth 18 mm. From the same locality ZEHNTNER records an even larger individual, which, like that of DE MAN, inhabited the tube of a large Annelid (See note 1 and 5, p. 240).

Dimensions in mm. ("Siboga" specimen):

Fronto-orbital distance	♂	3.2
Anterior margin of front		1.55
Length of carapace		5.5
Breadth of carapace		8.4
Length of meropodite } of second pair of walking legs }		3.5
Breadth of meropodite }		1.75

Hexaplex Doflein.

1904. *Hexaplex* Doflein. Wiss. Erg. "Valdivia" Exp., Bd 6, Brachyura, p. 122.

This remarkable deep sea genus is at first glance distinguished by the very large orbits and hammer-shaped, well-pigmented eyes, further by its slender, elongate legs. Only a single species is known.

1. *Hexaplex megalops* Doflein.

1904. *Hexaplex megalops* Doflein. L. c., p. 122, pl. 31, f. 3—4, pl. 50, f. 7 (eye).

1910. *Hexaplex* sp. Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, p. 349, textfig. 37.

Stat. 12. 7° 15' S., 115° 15'.6 E. North of Bali. Depth 289 m. 3 ♂ (1 juv.), 3 ♀ (1 juv.).

Stat. 212. 5° 54'.5 S., 120° 19'.2 E. West of Saleyer Island. Depth 462 m. 1 ♂ juv.

A description of this interesting species would, to a great extent, be nothing but repeating DOFLEIN'S diagnosis. This author knew only a single ♂, and I am enabled now to state that in the ♀ the "musical ridge", consisting of a great many fine ridges placed on an elevated ribbon, into which the pleural groove on the pterygostomial regions is transformed, is quite as well developed as in the ♂. DOFLEIN compares this ridge with the "musical organ" of *Ocypoda* (in which, however, as is well known, this appliance is situated at the inner surface of the large chela and is rubbed against a crest at the ischiopodite of the limb), but to my mind it is better comparable to what is found in *Trizocarcinus* Rathbun¹⁾. The surface of the carapace is so finely studded with closely-arranged granules as to give it the appearance of *Ocypoda*, under a rather strong magnification. A strongly-concave cervical groove is faintly represented. The front is strongly narrowed between the eye-stalks, widening anteriorly, with the angles rounded and the anterior margin straight, but slightly notched in the middle; it is obliquely deflexed and overhangs somewhat the antennulae, which are neatly folded up transversely; the antennae reach as far laterally as the orbit. Owing to the very large, hammer-shaped eyes the orbit, which is nearly entirely developed on the dorsal side of the animal, is greatly enlarged in its distal half, so that a semi-circular notch is cut out in the supra-orbital margin. The eye-stalks are freely movable.

1) Proc. U. S. Nat. Mus., v. 47, 1914, p. 117, textfig. 1.

The buccal cavity and the external maxillipeds greatly resemble that of *Hexapus*, but the former is yet more arch-like and the surface of the latter is not hairy, but granulate; the merus, however, is not oblong, but subquadrate, though with rounded angles.

In both sexes the right chela is slightly higher and thicker than the left. Meropodite of cheliped short, with sharp granules and a row of hairs along upper and inner margin; wrist short, with the inner angle produced; upper border of palm inflected inward and sharpened, thus being able to produce a squeaking sound when being rubbed against the "musical ridge"; fingers compressed, teeth interlocking, two of them, near the base of the movable finger of the right chela, being especially large and directed obliquely-backward.

I have nothing to add to DOFLEIN'S description of the ambulatory legs. As to the sternum, it is not smooth in my larger specimens, but finely granulate and punctate, like the carapace; and the segments of the abdomen of the ♂ are free only in the young state, in the larger individuals the 3rd to 5th segment are entirely coalesced. The first segment of the abdomen of both sexes is hidden under the carapace; the terminal segment in the ♂ is as long as the preceding. As to the abdominal appendages of the ♂ and the sexual openings I can only confirm DOFLEIN'S statements.

The animal is of uniform ivory-white colour, without special markings.

The "Valdivia" expedition obtained a single specimen south of Nias, from a depth of 470 metres. Afterwards Miss RATHBUN records a single, very young specimen (breadth of carapace only 1.8 mm.) from the Gulf of Siam, from a depth of only 6 fathoms; on account of its damaged condition the author is doubtful about identifying it with DOFLEIN'S species¹⁾.

Some of my specimens are larger than those of DOFLEIN.

Dimensions in mm.:

	♂	♂	♀	♀
Fronto-orbital distance	10.—	9.—	11.—	8.75
Width of anterior part of front	4.25	3.25	4.5	3.—
Width of front between eye-stalks	2.25	2.—	2.75	2.—
Length of carapace	11.5	10.—	12.5	9.75
Breadth of carapace	16.—	14.25	16.75	13.75
Length of left chela	—	8.5	9.25	8.—
Length of right chela	10.5	9.—	9.75	8.25
Length	31.—	29.—	33.5	28.—
Length of meropodite along ant. margin	14.5	13.—	15.—	12.5
Breadth of meropodite	2.75	2.5	2.75	2.—
Length of carpo- + propodite along ant. margin	10.5	9.5	11.—	9.—
Length of dactylus	5.—	4.—	5.—	4.—
Posterior margin of carapace	12.5	11.5	13.5	10.5
Base of abdomen	3.25	3.—	4.—	3.25

1) The front in the Siamese individual, though agreeing with that of DOFLEIN'S specimen, seems to be quite horizontal, not obliquely deflexed, and the external maxilliped, if correctly figured, is of an abnormal shape: the ischium is much longer than the merus and presents parallel margins, the carpus is produced hood-like over the propodus and the dactylus is not longer than the preceding segment.

PINNOTHERIDAE.

It is difficult to give a common diagnostic for this family. Easily as the characteristic representatives are recognizable, there is a gradual shading, through the subfamilies *Pinnotherelinae* and *Asthenognathinae*, to the *Hexapodinae*, which are referable to the Goneplacidae. With these *Hexapodinae* the members of the present family also share the commensalistic habits: the majority of the species, as far as the host is known, inhabit the mantle-cavity of Lamelli-branches, some are living in the cloaca of Holothurians, some in that of Echinids, and others again in the tubes of Annelids. The crabs are generally small, the carapace is often ill-calcified, membranaceous; regions are not defined; antennulae and antennae very minute; the eye-peduncles small and very short, slightly movable, the eyes generally present, though often showing signs of degeneration; the external maxillipeds of the typical representatives are peculiarly transformed: the ischium is indistinguishably fused with the merus and forms with it a broad plate, lying with its long axis nearly transverse to the long axis of the cephalothorax, and the palp is very large; in conformity with this arrangement the buccal cavity is of a semi-lunar shape and very broad behind. In other subfamilies, however, the external maxillipeds are lying parallel to each other with their long axes and of a normal shape, with ischium and merus distinct.

It is on the shape of these maxillipeds that the four subfamilies are founded.

Key to the subfamilies:

- | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|------------------------------|
| 1. Ischium and merus of ext. maxillipeds distinct. | 2 | |
| Ischium and merus of ext. maxillipeds fused to a single piece, which is usually placed very oblique, almost transverse; palp smaller than ischium-merus. Usually the carapace is not appreciably broader than long | | Subfam. PINNOTHERINAE 245 |
| 2. Orbits nearly parallel to the longitudinal axis of the body, wholly visible in dorsal view | | Subfam. XENOPHTHALMINAE 271 |
| Orbits in the usual position, transverse, small | 3 | |
| 3. Ischium of ext. maxillipeds smaller than merus; palp often very large. Carapace notably broader than long | | Subfam. PINNOTHERELINAE 264 |
| Ischium of ext. maxillipeds larger than merus; palp not large. | | Subfam. ASTHENOGNATHINAE 274 |

Subfam. PINNOTHERINAE.

This group contains the most typical representatives and is immediately recognizable by the shape of the external maxillipeds, besides by the carapace being nearly always of a parchment-like consistence and subcircular or indistinctly angular, but without sharpened lateral margins, which never present teeth or notches.

Key to the genera:

1. Palp of ext. maxillipeds two-jointed only, the dactylus being absent. 2
 Palp of ext. maxillipeds three-jointed, the dactylus being generally inserted at the inner side of the propodus 4
2. Terminal joint of palp of ext. maxillipeds widening distally. 3
 Terminal joint of palp of ext. maxillipeds not widening distally **Ostracotheres** H. Milne-Edwards
3. Dactyli of walking legs, except those of last pair, deeply bifurcate **Dissodactylus** S. J. Smith
 Dactyli of walking legs simple, about as long as propodites.
 Orbits ventral in position. Carapace well calcified **Cryptophrys** Rathbun
4. Lateral margins of carapace thickened, upturned 5
 Lateral margins of carapace not upturned 6
5. Middle of carapace with a prominent tubercle, shaped like a mushroom and reniform **Xanthasia** White
 Middle of carapace with a longitudinal ridge **Dürckheimia** (Rüppell) de Man
6. Propodus of ext. maxillipeds longer than merus. Carapace well calcified **Scleroplax** Rathbun.
 Propodus of ext. maxillipeds much shorter than merus.
 Carapace parchment-like 7
7. Longitudinal grooves on the carapace, beginning behind the orbits **Raphonotus** Rathbun
 No longitudinal grooves on the carapace. **Pinnotheres** Latreille

Dissodactylus S. J. Smith.

1870. *Dissodactylus* S. J. Smith. Transact. Connecticut Ac., v. 2, p. 172.

1900. *Echinophilus* Rathbun. Am. Natur., v. 34, p. 590.

The typical species is *Dissodactylus nitidus* S. J. Smith, l. c., p. 173, found at Panama. Afterwards Miss RATHBUN records it from Lower California¹⁾ and from Peru²⁾.

A second species is *Dissodactylus mellitae* Rathbun, l. c., and a third *Dissodactylus encopei* Rathbun, Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 22, textfig. 5; both these species are associated with Echinids and occur in West Indian waters.

1) Proc. U. S. Nat. Mus., v. 21, 1899, p. 609.

2) Proc. U. S. Nat. Mus., v. 38, 1910, p. 545, pl. 48, f. 6.

Cryptophrys Rathbun.

1893. *Cryptophrys* Rathbun. Proc. U. S. Nat. Mus., v. 16, p. 250.

Only one species is known, *Cryptophrys concharum* Rathbun, l. c. ¹⁾, which inhabits the coast of Lower California and lives in the mantle-cavity of *Mya arenaria* and *Cardita*.

Xanthasia White.

Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 340—341.

The typical species is the very characteristic *Xanthasia murigera* White; its records in literature are enumerated by ALCOCK, l. c. Its original localities are the Philippines, but afterwards it has been recorded from the Fiji Islands, New Caledonia, Mozambique, Mergui Archipelago, Andamans, New Guinea and Australia.

A second species is *Xanthasia whitei* de Man ²⁾ from the Mergui Archipelago. Like the typical form it inhabits the mantle-cavity of Lamellibranchs; the lateral margins of the carapace are not thin, but thickened, they are separated from the likewise thickened posterior margin, and the tubercle in the middle of the carapace is not shaped like a mushroom and ill-defined.

Dürckheimia de Man.

1889. *Dürckheimia* (Rüppell in M.S.) de Man. Zool. Jahrb., Syst., Bd 4, p. 442.

The genus has been founded on *Dürckheimia carinipes* de Man, from the Red Sea. It presents a rounded, elevated ridge parting from the middle of the posterior margin of the carapace, but disappearing in the anterior third of the carapace. In a second species, *Dürckheimia caeca* Bürger ³⁾ from the Philippines, this median ridge is thinner, crest-like, and continued forward to the deep notch in the anterior margin of the carapace.

Scleroplax Rathbun.

1893. *Scleroplax* Rathbun. Proc. U. S. Nat. Mus., v. 16, p. 250.

The only species is *Scleroplax granulata* Rathbun, l. c., p. 251, from California ⁴⁾.

Raphonotus Rathbun.

1851. *Fabia* Dana. Am. Journ. Sc. (2), v. 12, p. 290 (praeocc.).

1897. *Raphonotus* Rathbun. Proc. Biol. Soc. Washington, v. 11, p. 166.

This genus again contains only a single species, *Fabia subquadrata* Dana ⁵⁾ from Oregon

1) See also HOLMES, Occas. Pap. Californ. Ac. Sc., v. 7, 1900, p. 96; RATHBUN, Harriman Alaska Exp., v. 10, 1904, p. 188; WEYMOUTH, Leland Stanford Jr. Univ. Publ., n^o 4, 1910, p. 60.

2) Journ. Linn. Soc. London, v. 22, 1888, p. 106, pl. 7, f. 1.

3) Zool. Jahrb., Syst., Bd. 8, 1895, p. 385, pl. 9, f. 33, pl. 10, f. 31.

4) See also HOLMES, Occas. Pap. Californ. Ac. Sc., v. 7, 1900, p. 94; RATHBUN, Harriman Alaska Exp., v. 10, 1904, p. 188; WEYMOUTH, Leland Stanford Jr. Univ. Publ., n^o 4, 1910, p. 59, textfig. 8.

5) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 253; U. S. Expl. Exp., Crust., 1852, p. 383, pl. 24, f. 5; HOLMES, (part.), Occas. Pap. Californ. Ac. Sc., v. 7, 1900, p. 87; *Raphonotus subquadratus* Rathbun, Harriman Alaska Exp., v. 10, 1904, p. 186; WEYMOUTH, Leland Stanford Jr. Univ. Publ., n^o 4, 1910, p. 55, textfig. 2. HOLMES, according to Miss RATHBUN, confounded with *R. subquadratus* another apparently new species, which is called *R. lowei*. *Raphonotus* is very common in the mantle cavity of the common mussel (*Mytilus edulis*) and in the folds of *Lucaepina crenulata* (a Gastropod allied to *Fissurella*).

(California). DANA also includes "*Pinnotheres*" *chilensis* H. Milne-Edwards¹⁾, but this has been made by HELLER the type of a new genus, *Pinnaxodes*, which is now generally considered at most a subgenus of *Pinnotheres*.

*Pinnotheres*²⁾ Latreillè.

1804. *Pinnotheres* Latreille. Hist. nat. Crust. et Ins., t. 6, p. 78.

1851. *Pinnothera* Dana. Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 253.

1900. *Pinnotheres* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 337.

About the diagnosis of this well known genus, see ALCOCK and MIERS³⁾.

The genus *Pinnaxodes* Heller⁴⁾ is according to BÜRGER⁵⁾ to be merged into the present genus. HELLER founded *Pinnaxodes* on the species *P. hirtipes* which subsequent authors generally regarded as identical with *P. chilensis* H. Milne-Edwards (see note 1), though Miss RATHBUN⁶⁾ is not quite certain about the matter, and at least maintains HELLER's genus. The only character by which *Pinnaxodes* is distinguished from *Pinnotheres* consists in the dactylus of the external maxillipeds being placed end to end with the propodus and not inserted far back on the inner side of the latter. BÜRGER, however, stated that there are gradual transitions between the two cases.

The number of species of *Pinnotheres* is enormous and is certainly much larger than that of all the other genera of the whole family taken together. The Indo-Pacific species, excluding those of the West American coast, are more than 60 in number. As all these species are small and greatly alike, as in most instances only one of the sexes is known and the carapace itself offers little remarkable, the discrimination within the genus is very difficult and is founded on the shape of the external maxillipeds and on the relative length of the dactyli of the walking legs.

Carcinology is much indebted to BÜRGER, who in 1895 described about 30 new species of *Pinnotheres* and at the same time united them all, together with some others, known to him by autopsy, into a synoptical key. In recent times Miss RATHBUN⁷⁾ examined a valuable collection of *Pinnotheres* from the Gulf of Siam and again added 7 new species to the list.

Little desirous as I am to increase the number of species, two or three cases have induced me to do so in dealing with the "Siboga" collection.

1) On the literature of this remarkable species, inhabiting the cloaca of *Strongylocentrotus* on the west coast of South America, see S. J. SMITH, Transact. Connecticut Ac., v. 2, 1870, p. 170. The ♂ lives at the outside of the Echinid.

2) About the controversy, raised by ALCOCK, whether in the word *Pinnotheres* and its derivations the *h* should be dropped or not, the following must in my opinion not be lost sight of. ALCOCK quotes the authority of RUMPHIUS, who already in 1705 used the orthography *Pinnotheres*. Now it is true that ARISTOTLE speaks of *πιννοθήρης*, but also the term *πιννοθήρας* is used by this author, and it seems to me that the latter orthography is the right one, being derived from *πιννα* and *θηρῶ* (to hunt). It is not certain, which animal is meant by ARISTOTLE, for according to LATREILLE his text points to some small *Squilla* or some Macrurous Decapod. Apart from such arguments it seems preferable not to cling too firmly to ARISTOTLE or even RUMPHIUS, but to return simply to authors using the regular LINNEAN nomenclature, and I see no reason to follow ALCOCK in his orthography.

3) Rep. "Challenger", Brachyura, 1886, p. 275.

4) Reise "Novara", Crust. 1865, p. 68, pl. 6, f. 2.

5) BÜRGER, Zool. Jahrb., Syst., Bd 8, 1895, p. 362.

6) Proc. U. S. Nat. Mus., v. 21, 1899, p. 607, pl. 43, f. 10—11.

7) K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 330—336.

Enumeration of the Indo-Pacific species of *Pinnotheres*, excluding those from the West American coast, in alphabetical order.

- P. abyssicolus* Alcock et Anderson. Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 340. Hab. Travancore coast, 430 fathoms. In *Lima indica*.
- P. affinis* Bürger, Zool. Jahrb., Syst., Bd 8, 1895, p. 365, pl. 9, f. 2, pl. 10, f. 2 and 34; RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 330. Hab. Philippines and Gulf of Siam. In *Pinna*.
- P. alcocki* Rathbun (= *P. parvulus* de Man, Bürger, Alcock, nec Stimpson); DE MAN, Journ. Linn. Soc. London, v. 22, 1888, p. 105; DE MAN, Arch. Naturgesch., Jahrg. 53. 1., 1888, p. 383; BÜRGER, l. c., p. 376, pl. 9, f. 18, pl. 10, f. 17; ALCOCK, l. c., p. 339. Hab. Mergui Arch., Padang, Noordwachter Island near Batavia, Philippines. In *Cytherca*.
- P. arcophilus* Bürger, l. c., p. 371, pl. 9, f. 10, pl. 10, f. 10. Hab. Philippines. In *Arca*.
- P. barbatus* Bürger, l. c., p. 369, pl. 9, f. 8, pl. 10, f. 8. Hab. Philippines. In *Donax*.
- P. boninensis* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 108; Smithsonian Inst., Miscell. Coll., v. 49, 1907, p. 141. Hab. Bonin Islands. In "small oysters".
- P. borradalei* Nobili (= *P. tenuipes* Borradaile nec Bürger, *P. rouxi* Paulson nec H. Milne-Edwards), PAULSON, Rech. Crust. Mer Rouge, 1875, p. 70, pl. 9, f. 2; BORRADAILE, Faun. Geogr. Maldives etc., v. 1, 1903, p. 431, textfig. 113; NOBILI, Ann. Sc. Nat. (9), t. 4, 1906, p. 306. Hab. Red Sea and Minikoi. In *Mya* (?) and *Pinna*.
- P. bürgeri* Rathbun, l. c., p. 331, textfig. 12. Hab. Gulf of Siam.
- P. cardii* Bürger, l. c., p. 367, pl. 9, f. 4—5, pl. 10, f. 4; RATHBUN, l. c., p. 330, pl. 2, f. 8. Hab. Philippines and Gulf of Siam. In *Cardium unedo*.
- P. coarctatus* Bürger, l. c., p. 369, pl. 9, f. 7, pl. 10, f. 7. Hab. Philippines, in brackish water.
- P. consors* Bürger, l. c., p. 377, pl. 9, f. 20, pl. 10, f. 18. See also the present paper, p. 260. Hab. Palaos Islands. In *Circe*.
- P. coutieri* Nobili, Ann. Sc. Nat. (9), t. 4, 1906, p. 305, textfig. 10; Bull. Mus. Paris, t. 11, 1905, p. 409. Hab. Red Sea.
- P. dofleini* Lenz et Strunck, Deutsch. Südpolar Exp., Bd 15, 1914, p. 281, pl. 12, f. 17—19. Hab. Cape of Good Hope.
- P. edwardsi* de Man, Journ. Linn. Soc. London, v. 22, 1888, p. 103, pl. 6, f. 6—9; ALCOCK, Journ. As. Soc. Bengal v. 69, prt 2, 1900, p. 338. See also the present paper p. 258. Hab. Mergui Arch. In *Ostraea*.
- P. exiguus* Bürger, l. c., p. 377, pl. 9, f. 19, pl. 10, f. 30. Hab. Samar Island (Philippines).
- P. flavus* Nauck, Zeitschr. wiss. Zool., Bd 34, 1880, f. 66; DE MAN, Zool. Jahrb., Syst., Bd 2, 1887, p. 720; BÜRGER, l. c., p. 383, pl. 9, f. 29, pl. 10, f. 29 and 35. Hab. Philippines. In a Holothurian.
- P. glaber* Bürger, l. c., p. 379, pl. 9, f. 23, pl. 10, f. 21. Hab. Palaos Islands. In *Tapes turgida*.
- P. glaberrimus* Bürger, l. c., p. 366, pl. 9, f. 3, pl. 10, f. 3; RATHBUN, l. c., p. 330. Hab. Philippines and Gulf of Siam. In *Arca* and *Lima divaricata*, brackish water.

- P. gracilis* Bürger, l. c., p. 368, pl. 9, f. 6, pl. 10, f. 6; RATHBUN, l. c., p. 330. Hab. Philippines and Gulf of Siam. In *Solen*.
- P. holothuriae* Semper, Bürger, l. c., p. 381, pl. 9, f. 27, pl. 10, f. 26 and 36. Hab. Philippines. In cloaca of a Holothurian (*Stichopus variegatus*).
- P. impressus* Bürger, l. c., p. 380, pl. 9, f. 24, pl. 10, f. 23. Hab. Philippines.
- P. kamensis* Rathbun, l. c., p. 335, textfig. 18. Hab. Gulf of Siam.
- P. kutensis* Rathbun, l. c., p. 335, textfig. 19. Hab. Gulf of Siam.
- P. laevis* Bürger, l. c., p. 380, pl. 9, f. 25, pl. 10, f. 24. Hab. Palaos Islands. In *Coralliophaga*.
- P. lanensis* Rathbun, l. c., p. 332, textfig. 14. Hab. Gulf of Siam.
- P. latissimus* Bürger, l. c., p. 373, pl. 9, f. 13, pl. 10, f. 13. Hab. Manila.
- P. latus* Bürger, l. c., p. 374, pl. 9, f. 16, pl. 10, f. 15. See also the present paper, p. 259. Hab. Philippines. In *Pinna*.
- P. longipes* Bürger, l. c., p. 379, pl. 9, f. 31, pl. 10, f. 22. Hab. Philippines.
- P. lutescens* Nobili, Bull. Mus. Paris, t. 11, 1905, p. 409; Ann. Sc. Nat. (9), t. 4, 1906, p. 304. Hab. Red. Sea.
- P. mactricolus* Alcock, l. c., p. 339; Ill. Zool. "Investigator", Crust., prt 10, 1903, pl. 62, f. 4—5. Hab. British India. In *Maetra violacea*.
- P. maindroni* Nobili, Bull. Mus. Paris, t. 11, 1905, p. 410; Ann. Sc. Nat. (9), t. 4, 1906, p. 306, pl. 8, f. 8, textfig. 11. Hab. Red. Sea.
- P. major* (*Pinnaxodes major*) (Ortmann), Zool. Jahrb., Syst., Bd 7, 1894, p. 697, pl. 23, f. 10. Hab. Japan.
- P. margaritiferae* Laurie, Rep. Pearl Oyster Fish. Ceylon, prt 5, 1906, p. 424, textfig. 10; SOUTHWELL, Ceylon Mar. Biol. Rep., v. 1, prt 5, p. 227. Hab. Gulf of Manaar (Ceylon).
- P. modiolicolus* Bürger, l. c., p. 370, pl. 9, f. 9, pl. 10, f. 9. Hab. Philippines. In *Modiola philippinarum*.
- P. nigrans* Rathbun, l. c., p. 334, textfigs. 16 and 17. Hab. Gulf of Siam.
- P. novae-zealandiae* Filhol, Miss. île Campbell, t. 3, prt 2, 1886, p. 407; LENZ, Zool. Jahrb., Syst., Bd. 14, 1901, p. 467, pl. 32, f. 11—14. Hab. New Zealand.
- P. nudifrons* Bürger, l. c., p. 378, pl. 9, f. 22, pl. 10, f. 20. Hab. Philippines.
- P. obesus* Dana, Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 253; DANA, U. S. Expl. Exp., Crust., 1852, p. 380, pl. 24, f. 3; MIERS, Ann. Mag. Nat. Hist. (5), v. 5, 1880, p. 314, pl. 14, f. 4; *P. siamensis* Rathbun, l. c., p. 336, textfig. 20. See also the present paper p. 257. Hab. Fiji Islands, Borneo and Gulf of Siam.
- P. obscurus* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 108; Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 141. Hab. Hongkong.
- P. onychodactylus* n. sp. See the present paper, p. 259. Hab. Moluccas.
- P. ortmanni* Bürger, l. c., p. 384, pl. 9, f. 30, pl. 10, f. 28. Hab. Philippines.
- P. palaensis* Bürger, l. c., p. 372, pl. 9, f. 12, pl. 10, f. 12. Hab. Palaos Islands. In *Arca scapha*, *Placuna sella* and *Byssoarca*.
- P. parvulus* Stimpson (nec de Man etc.), Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 108; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 699, pl. 23, f. 12; STIMPSON, Smithson.

- Inst., Miscell. Coll., v. 49, 1907, p. 142; RATHBUN, l. c., p. 331, pl. 2, f. 9, textfig. 13.
Hab. China Sea, Japan, Gulf of Siam. In *Meroë quadrata*.
- P. pectinicolus* Bürger, l. c., p. 365, pl. 9, f. 1, pl. 10, f. 1; NOBILI, Ann. Sc. Nat. (9), t. 4, 1906, p. 303. Hab. Philippines and Red Sea. In *Pecten radula*.
- P. perezi* Nobili, Bull. Mus. Paris, t. 11, 1905, p. 164; Bull. Scient. France et Belgique, t. 40, 1906, p. 147, pl. 5, f. 25. Hab. Persian Gulf.
- P. pernicolus* Bürger, l. c., p. 375, pl. 9, f. 17, pl. 10, f. 16; NOBILI, Ann. mus. civ. stor. nat. Genova (2), t. 20, 1899, p. 264; NOBILI, Ann. Sc. Nat. (9), t. 4, 1906, p. 303. Hab. Philippines, New Guinea and Red Sea.
- P. pholadis* de Haan (= *P. pisoides* Ortmann), Faun. Japon., Crust., 1835, p. 63, pl. 16, f. 7; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 698, pl. 23, f. 11; ADENSAMER, Ann. Hofmus. Wien, Bd 12, 1897, p. 107. Hab. Japan.
- P. pilumnoides* Nobili, Bull. Mus. Paris, t. 11, 1905, p. 410; NOBILI, Ann. Sc. Nat. (9), t. 4, 1906, p. 307, textfig. 12; LAURIE, Journ. Linn. Soc. London, v. 31, 1915, p. 466. Hab. Red Sea. In sponges and Holothurians.
- P. pisum* (Linné) Latreille. Literature: ADENSAMER, Ann. Hofmus. Wien, Bd 12, 1897, p. 106; BORRADAILE, Brit. Antarct. "Terra Nova" Exp., v. 3, n^o 2, 1916, p. 100, textfig. 12. Hab. New Zealand.
- P. placunae* Hornell et Southwell, Rep. Gov. Baroda Mar. Zool. Okhamandal, prt 1, 1909, p. 99, figs. Hab. British India.
- P. purpureus* Alcock, l. c., p. 339; Ill. Zool. "Investigator", Crust., prt 10, 1903, pl. 62, f. 6; BORRADAILE, Faun. Geogr. Maldives etc., v. 1, 1903, p. 431; NOBILI, Ann. Sc. Nat. (9), t. 4, 1906, p. 303. Hab. Andamans, Felidu Atoll and Red Sea.
- P. quadratus* Rathbun, l. c., p. 333, textfig. 15. See also the present paper, p. 261. Hab. Gulf of Siam.
- P. rhombifer* Bürger, l. c., p. 374, pl. 9, f. 15, pl. 10, f. 14. Hab. Philippines. In *Pectunculus aurifluus*.
- P. ridgewayi* Southwell, Ceylon Mar. Biol. Rep., v. 1, prt 5, 1911, p. 224, figs. Hab. Ceylon.
- P. rotundatus* Bürger, l. c., p. 378, pl. 9, f. 21, pl. 10, f. 19. Hab. Philippines. In *Circe*.
- P. rouxi* H. Milne-Edwards nec Paulson, Ann. Sc. Nat. (3), t. 20, 1853, p. 218, pl. 11, f. 7. Hab. Indian Ocean.
- P. schauinslandi* Lenz, Zool. Jahrb., Syst., Bd 14, 1901, p. 468, pl. 32, f. 15—18. Hab. New Zealand. In *Mytilus*.
- P. semperi* Bürger, l. c., p. 382, pl. 9, f. 28, pl. 10, f. 27. Hab. Java. In cloaca of *Holothuria fusco-cinerea*.
- P. similis* Bürger, l. c., p. 373, pl. 9, f. 14. Hab. Philippines.
- P. socius* Lanchester, Proc. Zool. Soc. London, 1901, p. 551, pl. 33, f. 3. Hab. Penang.
- P. tenuipes* Bürger nec Borradaile, l. c., p. 371, pl. 9, f. 11, pl. 10, f. 11. Hab. Philippines. In a Holothurian.
- P. trichopus* n. sp. See the present paper, p. 256. Hab. Moluccas. In *Melcagrina*.

- P. villosulus* Guérin¹⁾. See also the present paper, p. 255. Literature: MIERS, Rep. "Challenger", Brachyura, 1886, p. 277, pl. 22, f. 2; BÜRGER, l. c., p. 366, pl. 10, f. 5. Hab. Timor, Torres Straits, Philippines. In *Meleagrina*.
- P. villosissimus* Doflein, Wiss. Erg. "Valdivia" Exp., Bd 6, Brachyura, 1904, p. 125, pl. 37, f. 5—6, textfig. 11. Hab. Padang. In the Holothurian *Muelleria lecanora*.

In the foregoing list 65 species are enumerated. The vast majority of these, as far as the host is known, inhabits the mantle-cavity of Lamellibranchs, but the following species are living in the cloaca or the "lung" of Holothurians.

- P. flavus* Nauck.
P. holothuriae Semper. In *Stichopus variegatus*.
P. pilumnoides Nobili. In *Holothuria gallensis* (also in sponges).
P. semperi Bürger. In *Holothuria fusco-cinerea*.
P. tenuipes Bürger.
P. villosissimus Doflein. In *Muelleria lecanora*.

One species, *P. dofleini* Lenz et Strunck, is found in an Ascidian, *Phallusia canaliculata*. The external maxillipeds of these species, in the majority of cases, deviate from the common type in *Pinnotheres*, inasmuch as the dactylus is spoon-like, not styliform.

In preparing a key to the species BÜRGER's synopsis has proved to be of much use. The following species I have not included:

- P. boninensis* Stimpson, on account of the imperfectness of the description.
P. placunae Hornell et Southwell, } the descriptions of which are inaccessible to me.
P. ridgewayi Southwell, }

Furthermore I have omitted the New Zealandian species:

- P. pisum* (Linné),
P. novae-zelandiae Filhol,
P. schauinslandi Lenz.

Key to the species:

- | | |
|------------------------------------------------------------------------------------------------------|----|
| 1. Dactylus of ext. maxillipeds inserted at inner margin of propodus | 2 |
| Dactylus of ext. maxillipeds placed nearly at end of propodus
and reaching much farther | 53 |
| 2. Dactylus styliform. | 3 |
| Dactylus spoon-like, widening distally. Mostly in Holothurians | 46 |
| 3. Dactyli of all the walking legs subequal in length. | 4 |
| Dactyli of the walking legs unequal in length | 17 |
| 4. Dactylus of ext. maxillipeds overreaching propodus | 5 |
| Dactylus of ext. maxillipeds not overreaching propodus | 7 |

¹⁾ This species is referred to by H. MILNE-EDWARDS and BÜRGER under the name *villosus*. I could not consult Guérin's original description in Voy. "Coquille", t. 2, 1830, p. 13, but in his subsequent work (Iconogr. Règne An., Crust. p. 7, pl. 4, f. 4) the species is named *villosulus*, which term is used by MIERS.

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| 5. Carapace quadrangular | <i>P. pectinicolus</i> |
| Carapace subcircular | 6 |
| 6. Dactylus of ext. maxillipeds considerably overreaching propodus. | |
| Chelipeds and legs nearly hairless. | <i>P. affinis</i> |
| Dactylus of ext. maxillipeds not much overreaching propodus. | |
| Chelipeds and legs hairy. Species from Japan | <i>P. pholadis</i> ¹⁾ |
| 7. Dactylus of ext. maxillipeds by far not reaching to end of propodus | 8 |
| Dactylus of ext. maxillipeds reaching to end of propodus | 15 |
| 8. Carapace pubescent. Propodus of ext. maxillipeds not longer than carpus | <i>P. villosulus</i> |
| Carapace glabrous | 9 |
| 9. Walking legs hairy. | 10 |
| Walking legs naked | 11 |
| 10. Carapace subcircular, vaulted. Walking legs rather robust. | <i>P. mactricolus</i> |
| Carapace angular, with a prominent lobe in the middle of the lateral margin | <i>P. trichopus</i> |
| 11. Dactylus of ext. maxillipeds not one-fourth of length of propodus | <i>P. rouxi</i> |
| Dactylus of ext. maxillipeds longer than one-fourth of length of propodus | 12 |
| 12. Inner (posterior) margin of merus-ischium of ext. maxillipeds strongly concave | 13 |
| Inner (posterior) margin of merus-ischium of ext. maxillipeds straight | 14 |
| 13. Propodus of ext. maxillipeds very long and narrow | <i>P. kamensis</i> |
| Propodus of ext. maxillipeds shorter and broader. | <i>P. glaberrimus</i> |
| 14. Merus-ischium of ext. maxillipeds broad, length about $1\frac{1}{2}$ times its length | <i>P. cardii</i> |
| Merus-ischium of ext. maxillipeds longer, length more than twice its breadth | <i>P. socius</i> |
| 15. Carapace large, globular, with some large pits, tomentose, branchio-cardiac grooves distinct Propodus of ext. maxillipeds flattened and broad | <i>P. edwardsi</i> |
| Carapace small, without distinct markings. Propodus of ext. maxillipeds decreasing in breadth distally. | 16 |
| 16. Propodus of ext. maxillipeds nearly as long as carpus | <i>P. kutensis</i> |
| Propodus of ext. maxillipeds longer than carpus | <i>P. obesus</i> |
| 17. Dactyli of 2 ^d pair of walking legs the longest. | 18 |
| Dactyli of 2 ^d pair of walking legs not longer than those of 1 st and 3 ^d pair | 19 |

1) According to ADENSAMER *P. pisoides* Ortmann is identical with DE HAAN's species. Unfortunately not a single one of the more than twenty specimens examined by DE HAAN is now extant in the Leiden Museum.

18. Merus-ischium of ext. maxillipeds broad, length about $1\frac{1}{2}$ times its breadth. Dactyli of walking legs rather long. Eyes unpigmented *P. birgeri*
 Merus-ischium of ext. maxillipeds slender, more than twice as long as broad. Dactyli of walking legs very short, under margin of meropodites hairy. Eyes pigmented *P. gracilis*
19. Dactyli of 3^d pair of walking legs longer than those of 2^d and 4th pair, which are subequal 20
 Dactyli of 3^d pair of walking legs not longer than those of 2^d and 4th pair 21
20. 1st pair of walking legs the longest, the succeeding pairs decreasing gradually in length *P. perezi*
 3^d pair of walking legs the longest *P. purpureus*
21. Dactyli of 4th pair of walking legs longer than the preceding, which are subequal 22
 Dactyli of 3^d and 4th pair of walking legs longer than those of 1st and 2^d pair, which are subequal 30
22. Dactylus of ext. maxillipeds overreaching propodus 23
 Dactylus of ext. maxillipeds not reaching farther than propodus. 24
23. Carapace quadrangular. Propodites of walking legs elongate, dactyli very short, but those of 4th pair twice as long as those of preceding pair. *P. coarctatus*
 Carapace narrowed anteriorly, with lateral margins much divergent backward. Propodites of walking legs shorter, somewhat hairy, dactyli strongly hooked, hairy, those of 4th pair much more slender and slightly longer than those of 3^d pair *P. onychodactylus*
24. Dactylus of ext. maxillipeds reaching as far as propodus 25
 Dactylus of ext. maxillipeds not reaching to end of propodus. 26
25. Chelipeds and walking legs hairy at inner margin; middle pairs of walking legs about equal in length to breadth of carapace. *P. tenuipes*
 Chelipeds and walking legs much less hairy; the latter slender, elongate, middle pairs about $1\frac{1}{2}$ times the breadth of carapace *P. borradaili*
26. Chelipeds and walking legs thickly hairy at inner margin *P. barbatus*
 Chelipeds and walking legs glabrous 27
27. Dactylus of ext. maxillipeds by far not reaching to end of propodus. 28
 Dactylus of ext. maxillipeds nearly reaching to end of propodus. 29
28. Dactyli of 4th pair of walking legs twice as long as those of preceding pair. *P. arcophilus*
 Dactyli of 4th pair of walking legs $1\frac{1}{2}$ times as long as those of preceding pair. *P. margaritiferae*
29. Palm of chela twice as long as fingers. Dactyli of 3^d pair of walking legs longer than those of 2^d pair *P. modiolicolus*

- Palm of chela very slightly longer than fingers. Dactyli of
 3^d pair of walking legs as long as those of preceding pair. *P. coutieri*
30. Carapace nearly $1\frac{1}{3}$ times as broad as long 31
 Carapace at most $1\frac{1}{5}$ times as broad as long. 37
31. Dactylus of ext. maxillipeds not reaching to end of propodus. 32
 Dactylus of ext. maxillipeds reaching to end of propodus . . 34
32. Antero-internal angle of ext. maxillipeds pronounced. 33
 Antero-internal angle of merus of ext. maxillipeds obsolete.
 Dactyli of 3^d and 4th pair of walking legs 3 times as long
 as those of 2^d pair *P. latissimus*
33. Carapace very much vaulted. Propodus of ext. maxillipeds
 narrowed distally *P. nigrans*
 Carapace flattened. Propodus of ext. maxillipeds not narrowed
 distally *P. lutescens*
34. Dactyli of 3^d pair of walking legs very long, 3 times as long
 as those of preceding pair *P. pernicolus*
 Dactyli of 3^d pair of walking legs somewhat longer than those
 of 2^d pair, but shorter than those of 4th pair 35
35. Posterior margin of carapace very much concave in the middle. *P. maindroni*
 Posterior margin of carapace almost straight 36
36. Dactylus of ext. maxillipeds reaching beyond propodus. . . . *P. obscurus*
 Dactylus of ext. maxillipeds not overreaching propodus. . . . *P. latus*
37. Dactylus of ext. maxillipeds not overreaching propodus. . . . 38
 Dactylus of ext. maxillipeds reaching farther than propodus . 45
38. Dactylus of ext. maxillipeds reaching to end of propodus . . 39
 Dactylus of ext. maxillipeds not reaching to end of propodus. 41
39. Dactyli of 3^d and 4th pair of walking legs subequal in length 40
 Dactyli of 4th pair of walking legs twice as long as those of
 preceding pair. *P. exiguus*
40. Dactyli of 3^d and 4th pair exactly equal in length *P. consors*
 Dactyli of 4th pair somewhat longer than these of preceding pair *P. parvulus*
41. 4th pair of walking legs longer than 3^d pair *P. rhombifer*
 4th pair of walking legs shorter than, or as long as, 3^d pair . 42
42. Dactyli of 3^d and 4th pair of walking legs subequal in length 43
 Dactyli of 4th pair of walking legs longer than those of 3^d pair *P. similis* and *P. alcocki*¹⁾
43. Dactyli of 3^d and 4th pair of walking legs about 3 times as
 long as those of 2^d pair *P. palaensis*
 Dactyli of 3^d and 4th pair of walking legs about twice as long
 as those of 2^d pair 44

¹⁾ BÜRGER discriminates these species by the front being more or less prominent, more so in *P. alcocki* (identified by this author as *P. parvulus*).

44. Propodus of ext. maxillipeds reaching to antero-internal angle of merus *P. lanensis*
 Propodus of ext. maxillipeds reaching farther than antero-internal angle of merus, spathulate. *P. quadratus*
45. 3^d pair of walking legs distinctly longer than 2^d pair, its dactyli subequal in length to preceding propodites *P. rotundatus*
 3^d pair of walking legs not longer than 2^d pair, its dactyli about half as long as preceding propodites *P. nudifrons*
46. Dactyli of walking legs subequal 47
 Dactyli of 4th pair of walking legs the longest. 52
47. Chelipeds and walking legs very much hairy 48
 Chelipeds and walking legs not much hairy. Species from the Cape region *P. dofleini*¹⁾
48. Dactylus of ext. maxillipeds as broad as propodus 49
 Dactylus of ext. maxillipeds narrower than propodus. 50
49. Carapace as broad as long *P. semperi*
 Carapace broader than long. *P. flavus*
50. Dactylus of ext. maxillipeds not reaching to end of propodus *P. pilumnoides*
 Dactylus of ext. maxillipeds reaching to end of propodus 51
51. Chelipeds and walking legs covered with very long and thick, feathered hairs *P. villosissimus*
 Chelipeds and walking legs covered with a short toment. Species from Japan. *P. major*
52. Dactylus of ext. maxillipeds not reaching to end of propodus *P. holothuriae*
 Dactyli of ext. maxillipeds reaching to end of propodus *P. ortmanni*
53. Dactyli of walking legs subequal in length 54
 Dactyli of walking legs unequal 56
54. Dactylus of ext. maxillipeds nearly as long as propodus 55
 Dactylus of ext. maxillipeds very small, much shorter than propodus *P. lacvis*
55. 1st and 4th pair of walking legs subequal in length *P. glaber*
 4th pair of walking legs much shorter than 1st pair *P. impressus*
56. Dactyli of 2^d pair of walking legs the longest. *P. longipes*
 Dactyli of 2^d and 3^d pair the longest. Deep sea species *P. abyssicolus*

1. *Pinnotheres villosulus* Guérin.

Stat. 261. Elat, Great Kei Island. Depth 27 m. 1 ♀ juv., in *Meleagrina*.

The whole animal is clothed with a thick woolly toment, only the fingers of the chela

1) According to STRUNCK this species, which has been found within an Ascidian (*Phallusia canaliculata*), should be most likely conspecific with *P. sp. Doflein* (Wiss. Erg. "Valdivia" Exp., Bd 6, Brachyura, 1904, p. 124, pl. 37, f. 3-4, textfig. 10) from Algoa, east of Port Elisabeth.

are free from these hairs. The carapace, when denuded, is flattened, slightly calcified, but flexible, and of a more angular appearance than depicted by MIERS; it wholly resembles that of *P. trichopus* (Pl. 11, Fig. 6), except that the front is less advanced and much deflexed, the lateral margins present a strong outward bulge in the middle and are much convergent backward behind this bulge; even the various pits and faint grooves are wholly arranged in the same way as in *P. trichopus*.

The external maxillipeds entirely correspond with the figures of H. MILNE-EDWARDS and BÜRGER: the antero-internal angle of the merus is obsolete, the propodus (which is best depicted by BÜRGER) is scarcely longer than the carpus, and the dactylus is very minute, by far not reaching to the end of the propodus. As BÜRGER rightly remarks MIERS' figure of the external maxillipeds is inexact, especially as regards the propodus.

The basal tooth at the inner margin of the movable finger fits into a notch, which is bordered by two crenulate prominences, at the opposite margin of the fixed finger.

The dactyli of the walking legs are acuminate and hooked; they are subequal in length, but yet they very slightly increase from the 1st to the 4th pair.

The species was already stated by BÜRGER to inhabit the pearl-oyster.

Dimensions in mm.:

Length of carapace . . .	5.2
Breadth of carapace . . .	5.7

2. *Pinnotheres trichopus* n. sp. Pl. 17, Fig. 6.

Stat. 261. Great Kei Island. Depth 27 m. 1 ♂, in *Mcleagrina*.

Found associated with the young ♀ of the preceding species, the present example shows the greatest affinity to *P. villosulus*, and I should certainly declare it to be the ♂ of this species, were it not for a few differences, which perhaps are not sexual. The carapace is perfectly alike in its shape to that of *P. villosulus*, the angular course of the lateral margins being particularly pronounced; the front is prominent, though in front view exactly agreeing with that of *P. villosulus*, as depicted by MIERS. Instead of the uniform woolly-clothing found in the preceding species, the carapace is wholly glabrous, flattened, rather hard.

The external maxillipeds in their minute dactylus (fig. 6a) also resemble those of *P. villosulus*, but the propodus is distinctly longer than the carpus.

The chelipeds are provided with some patches of hairs. Palm of chela (fig. 6b) scarcely longer than fingers, upper border hairy; back of dactylus near the base with a tuft of hairs, placed in a shallow depression, tooth at cutting margin strong, obliquely-directed backward and fitting into a notch at the opposite margin, which is bordered by two teeth, the basal one of which is large and strong, the distal one represented by a convex and crenulate bulging of the margin of the fixed finger.

The walking legs are short and again resemble those of *P. villosulus*, but their surface is naked and long, feathered hairs are inserted along the margins only. The propodites are not elongate and all the dactyli subequal.

The abdomen is long and narrow; the first segment is concealed under the carapace, the third and the fifth segment are the longest.

Dimensions in mm.:

Fronto-orbital distance . . .	3.3
Length of carapace . . .	6.4
Breadth of carapace . . .	6.4

3. *Pinnotheres obesus* Dana. Pl. 17, Fig. 3.

Stat. 174. Waru Bay, north coast of Ceram. Depth 18 m. 1 ♂. In *Arca*.

Of such small individuals as are generally met with among *Pinnotheres*, lacking any dentation or special markings on the carapace and subject to variations in the outline of the latter, the identification is often troublesome. Yet the present example so much resembles DANA's figure of *P. obesus* as to render its identification with this species very likely. The carapace is subcircular, narrowed anteriorly, the front advanced, bilobed, the antennae rather long, (but this is for the most part due to the fact that the last joint of the flagellum, which consists, as usual, of only two segments, is provided with some long hairs at the tip, among which hairs some mud or detritus is retained): The external maxillipeds, too, agree with those of DANA's species in the pronounced antero-internal angle of the merus, in the elongate and slender propodus, and in the dactylus, but whereas in DANA's figure this dactylus does not quite reach the end of the propodus, it does so exactly in my specimen (fig. 3a); in its description DANA does not state anything about this dactylus¹⁾, but MIERS' specimen agrees in this respect with mine.

The chelae are greatly swollen, palm longer than fingers, movable finger with an obliquely-directed tooth near base of cutting margin, fitting into a notch at the opposite margin; DANA depicts two very minute teeth on the movable finger.

Walking legs rather robust, much more so than in DANA's figure, the last pair by far the shortest and weakest, all dactyli subequal in length, falciform, but those of the last pair are somewhat more slender, less curved, and with some few hairs along inner margin; there are also some hairs along the posterior margin of these legs.

The abdomen is rather narrow, bottle-shaped, regularly tapering; first segment shortest, second segment twice as long, all following segments longer and of subequal length.

If my specimen is really identical with *P. obesus*, there is no serious objection to unite *P. siamensis* Rathbun with it. In some respects (external maxillipeds, shape of walking legs) the present specimen even agrees better with the latter species, though the antennae are very much longer and the flagellum is represented as consisting of 3—4 long joints. The shape of

1) DANA's original description not being accessible to me, Dr. DE MAN has had the kindness to transcribe it for me.

It must be stated here that A. MILNE-EDWARDS (Nouv. Arch. Mus. Paris, t. 9, 1873, p. 318) declared *Pinnotheres globosus* Jacquinet et Lucas to be identical with DANA's species, after comparing original specimens of both these species with individuals from New Caledonia. With all respect due to the memory of the able French carcinologist I cannot decide to follow him, though the dactylus of the external maxillipeds in *P. globosus* (see H. MILNE-EDWARDS, Ann. Sc. Nat. (3), t. 20, 1853, p. 11, f. 6) does not quite reach the end of the propodus, just like in my specimen.

the abdomen of the ♂ is different, but, as the author remarks, this abdomen was rumpled in the specimen figured.

According to DANA the ♀ of the species differs by the carapace being a good deal broader than long; in the ♂ length and breadth are nearly equal.

P. obsus came from the Fiji Islands and Borneo; *P. siamensis* originates from the Gulf of Siam.

Dimensions in mm.:

Fronto-orbital distance	1.48
Length of carapace.	3.—
Breadth of carapace	3.08
Length } of meropodite of 3 ^d pair of walking legs }	1.03
Breadth }	0.24
Length } of meropodite of 4 th pair of walking legs }	0.56
Breadth }	0.14

4. *Pinnotheres edwardsi* de Man.

Stat. 258. Tual, Kei Islands. Depth 22 m. 3 ♀.

Three large individuals, without eggs, and the host of which is unknown, were taken. They so closely resemble the figure of DE MAN that I cannot doubt their identity with *P. edwardsi*.

The carapace is subcircular, hard, little flexible, with the middle parts somewhat elevated and free from hairs; towards the margins the surface is concealed by a dense down of soft and thick hairs. After removal of these hairs several larger and smaller depressions, regularly arranged, are disclosed; it is in these depressions that a particular kind of very short and fine hairs, differing from the ordinary downy hairs, is retained. The carapace is moderately vaulted, most so in the anterior part, where it passes gradually into the deflexed front, the triangular middle portion of which is even curved backward; the surface of the front is divided by a faint median sulcus. The eyes are small, but quite distinct.

The external maxillipeds agree with DE MAN's description and figure, but the latter seems to have been taken from the object when in place: *in situ* the dactylus presents itself as a very narrow and slender rod, reaching exactly to the level of the obliquely-truncate distal margin of the propodus, but when the external maxilliped is severed from the body and examined separately the dactylus turns out to be flattened and somewhat curved towards the propodus.

Chelipeds¹⁾ and walking legs are short and covered with the two kinds of hairs observed on the cephalothorax: thick, dense, soft hairs, which are easily detached and, beneath these, very short, slender hairs, much more firmly implanted. Walking legs short, dactyli subequal, all terminating into a fine, curved point.

The only specimen hitherto known was taken from an *Ostrea* in the Mergui Archipelago.

Dimensions in mm.:

Length of carapace.	18.5
Breadth of carapace	18.5

¹⁾ ALCOCK says that the fingers of the chela are unarmed, but in my specimens the usual, though low, tooth near the base of the dactylus is distinctly seen.

5. *Pinnotheres onychodactylus* n. sp. Pl. 17, Fig. 5.

Stat. 172. Between Gisser and Ceram Laut. Depth 18 m. On reef. 3 ♀ (ovig.).

This species much resembles *P. rhombifer* Bürger, which, perhaps, is nothing but *P. palaensis* Bürger, from which *P. rhombifer* is only distinguished by having the penultimate pair of legs shorter than the last pair. In the "Siboga" specimens the carapace, the breadth of which is $1\frac{1}{3}$ times its length, agrees with those of the two named species of BÜRGER; it is very much vaulted, with bulging hepatic and branchial regions, without sculpture, completely naked and very thin. The front is thickened, not prominent, and the eyes are not visible from above.

The merus-ischium of the external maxillipeds is very broad, its outer (anterior) border much curved, and the inner border straight, passing with a distinct angle into the distal margin, along which long hairs are implanted. The carpus (fig. 5a) is short, the propodus is much longer, its breadth at the insertion of the dactylus is $2\frac{1}{2}$ times its length, the dactylus is narrow, styliform, reaching very little beyond the rounded distal end of the propodus. The palm of the chela is inflated, about $1\frac{1}{2}$ times as long as the fingers; the latter are thick, curved towards the tip, the fixed finger is hairy beneath and the dactylus has the usual tooth, which is very small in this species, near the base of the inner margin.

The walking legs are slender and elongate, 2^d and 3^d pair are the longest, twice the length of the carapace, but the 2^d pair is slightly thicker, the 4th pair is somewhat more than half the length of the preceding pair and much more slender. The distal end of the sabre-shaped and elongate propodites, as well as the dactyli, are provided with a few silky hairs. The dactyli of the first three pairs (fig. 5b) are two-thirds the length of the propodite, much flattened, broadest in the middle, where they nearly attain the breadth of the preceding joint, ending in a fine, curved tip; the inner margin of the dactylus is straight, the outer convex; in the fourth pair (fig. 5c) the dactyli are very slender, not flattened, longer than the preceding propodites and also distinctly longer than those of the third pair, which latter are subequal to those of the preceding pairs. This character brings the species nearer to *P. coarctatus* Bürger, *P. tenuipes* Bürger, *P. borradalei* Nobili etc.; it is especially to the latter species (= *P. tenuipes* Borradaile nec Bürger) that it bears a great resemblance, but in BORRADAILE'S species the length of the carapace is nearly equal to its breadth, the dactyli of the walking legs are apparently less broadened and the dactylus of the external maxillipeds reaches exactly to the end of the propodus.

The eggs are very numerous and small, measuring 0.285 mm. in diameter.

Dimensions in mm.:

Length of carapace	6.8
Breadth of carapace	8.8
Length of 3 ^d pair of walking legs .	11.55
Length of 4 th pair of walking legs .	6.35

6. *Pinnotheres latus* Bürger.

Stat. 53. Nangamessi Bay, Sumba. Depth up to 36 m. 1 ♀ juv.

Stat. 231. Ambon. Depth 40 m. 1 ♀ ovig.

Like the foregoing the present species is broader than long, the breadth of the carapace being 1.3 times its length, according to BÜRGER's measurements, and even 1.45 times the length in my specimen. BÜRGER observed that the front is rounded and little prominent; indeed I stated that its anterior margin is regularly convex and does not present the triangular lobe, curved backward, commonly met with in *Pinnotheres*. The whole carapace is perfectly glabrous, shining, very thin and flexible; its posterior margin is quite straight.

The dactylus of the external maxillipeds reaches exactly to the end of the propodus.

The walking legs are hairless and thinner than in the preceding species; save for the dactyli, all legs are of nearly equal length. The dactyli are not flattened and slightly curved; those of the 1st and 2^d pair are of equal length, about one-third the length of the preceding propodites, those of the 3^d pair are of similar shape, but twice as long as in the preceding pairs, in the last pair the dactyli are more slender, hairy along inner margin and 3 times as long as those of 2^d and 1st pair¹⁾.

The eggs of the ovigerous ♀ are most numerous and of the same diameter as in the preceding species.

Dimensions in mm.:

Fronto-orbital distance	1.43	—	
Length of carapace	3.75	8.7	
Breadth of carapace	5.5	12.75	
Length of dactylus {	of 1 st and 2 ^d pair of walking legs	0.38	—
	of 3 ^d pair of walking legs . .	0.77	—
	of 4 th pair of walking legs . .	1.1	—

7. *Pinnotheres consors* Bürger. Pl. 17, Fig. 4.

Stat. 277. Dammer Island, N. E. of Timor. Depth 40 m. 1 ♀. In *Arca*.

I am not quite certain about my determination, as BÜRGER's figure does not quite agree with mine. In the original specimen the carapace is more distinctly hexagonal and the eyes are not visible in dorsal view; in my specimen the carapace is more narrowed anteriorly, the anterior angles of the carapace being nearer to one another and very distinct, and the rounded eyes are shining through the supra-orbital margin. As to the chelae, BÜRGER says that the palm is scarcely twice as long as the fingers, though it does not seem so in his figure; in my specimen the palm is about 1½ times as long as the fingers (fig. 4b) and the latter are each provided with a distinct, oblique tooth, that of the fixed finger being placed nearer to the tip than its antagonist. Some disagreement also exists in the external maxillipeds, the propodus of which is narrowed distally in BÜRGER's figure, but not so in my specimen (fig. 4a). BÜRGER does not say much about the walking legs; from his figure we learn that the dactyli of 3^d and 4th pair are equal in length and longer than those of the preceding pairs. In my specimen the first three pairs of legs are subequal in length, and the last pair much shorter and weaker; the propodites are hairless; dactyli of 1st and 2^d pair short, strongly hooked, hairless and perfectly alike; these of 3^d and 4th pair are much more slender, regularly curved, twice as

1) BÜRGER's measurements indicate, however, that the dactyli of the 4th pair are not yet twice as long as those of the 2^d pair.

long as those of preceding pairs, in the 3^d pair the dactyli are provided with very short, microscopical hairs, curved backward, in the 4th pair with longer hairs, directed towards the tip. It is also remarkable that the first two pairs of walking legs of my specimen are more robust and their meropodites are longer than in the much weaker following pairs.

Dimensions in mm.:

Fronto-orbital distance	1.43
Length of carapace	3.95
Breadth of carapace	4.5
Length of dactyli	
{ of 1 st and 2 ^d pair of walking legs .	0.45
{ of 3 ^d and 4 th pair of walking legs .	0.9

8. *Pinnotheres quadratus* Rathbun. Pl. 17, Fig. 2.

Stat. 34. Labuan Pandan, east coast of Lombok. Depth 18 m. 1 ♂. In *Arca*.

Stat. 152. Wunoh Bay, north-west coast of Waigeu Island. Depth 32 m. 1 ♀ ovig. In *Arca*.

This species is certainly closely related to the preceding, as regards the shape of the carapace and the relative length of the dactyli of the walking legs, but differs by the dactylus of the external maxillipeds being very minute. The carapace is subcircular, but the anterior angles are pronounced; as usual, the carapace of the ♀ is more vaulted, the front less prominent and the chelae are less inflated than is the case in the ♂. In the former sex there is a triangular depression on the cardiac region, which depression is not observed in the ♂, but here the whole surface is covered with an elegant reticulation of pigment. Length and breadth of carapace are subequal and its posterior margin is regularly convex in the ♂, but concave in the ♀.

The merus-ischium of the external maxillipeds is a broad plate, with the inner (posterior) margin slightly concave and the antero-internal angle pronounced; the propodus is elongate and broad, reaching beyond the antero-internal angle of the merus, as in Miss RATHBUN's specimen; the dactylus is very minute and (in the ♂) does not even reach to the antero-internal angle of the merus, as it does in the ♀.

The 3^d pair of walking legs is slightly the longest, and the 4th the smallest (Miss RATHBUN, however, states that the last pair is longer than the 2^d and 1st pair); propodites hairless, dactyli of first two pairs equal in length, strongly hooked, those of 3^d and 4th pair about twice as long, hairy and slender, regularly curved.

The abdomen of the ♂ seems to be broader than is the usual case in the genus; so that the breadth at the base of the terminal segment distinctly surpasses its length.

This very small species is recorded by Miss RATHBUN from the Gulf of Siam.

Dimensions in mm.:

	♂	♀
Fronto-orbital distance.	1.15	1.1
Length of carapace.	2.4	2.85
Breadth of carapace.	2.75	3.2
Length of dactyli		
{ of 1 st and 2 ^d pair of walking legs .	0.22	0.38
{ of 3 ^d and 4 th pair of walking legs .	0.45	0.75

1. *Ostracotheres cynthiae* Nobili.

1906. *Ostracotheres cynthiae* Nobili. Ann. Sc. Nat. (9), t. 4, p. 301, textfig. 9.

1915. *Ostracotheres cynthiae* Laurie. Journ. Linn. Soc. London, v. 31, p. 465, pl. 45, f. 3.

Stat. 258. Tual, Kei Islands. Depth 22 m. 1 ♀ ovig., in *Styela pneumonodes*.

As has been observed by NOBILI the carapace of the ♀ is somewhat quadrangular; that of the ♂, which is described by LAURIE, is much more subcircular. It is nearly straight in transverse direction, and also longitudinally, but the anterior third part is strongly curved downward; a fine toment is found everywhere on the carapace; its lateral margins are distinct and convergent backward and the posterior margin is straight. Regions are not discernible.

In front view of the animal the front is seen to be continued by a triangular septum, directed backward, between the almost transversely-folded antennulae. The eyes are very small, though quite distinct, and concealed beneath the short toment, that covers also the epistome, the epibranchial, subhepatic and subbranchial regions. The antennae are so extremely minute that they scarcely reach beyond the small, circular orbit; the antennulae are much stouter, the outer flagellum is very short and provided with a tuft of long olfactory hairs, the inner flagellum much longer, slender, cylindrical. The external maxillipeds are covered with the usual, short, feathered hairs, among which generally mud is retained; it agrees better with LAURIE's figure than with that of NOBILI, inasmuch as the propodus is about twice as long as the carpus, not widened distally and rounded at its distal extremity, not obliquely-truncate, but the distal margin is not concave, as stated and figured by LAURIE (for the ♂); in my specimen the carpus is not so short and globular as figured by this author.

Chelae entirely covered with a dense toment, so as to conceal the exact shape of the fingers; palm inflated, (its basal ventral part flattened in the ♂, according to LAURIE), about as long as the fingers, which are apparently gaping in the ♂ (LAURIE), but nearly apposed in the ♀; fingers nearly straight with downy hairs along the free margins, decreasing regularly in height distally, but abruptly curved near the tip, especially in the case of the dactylus; at the inner margin of the latter two teeth are found, the larger one being placed quite near the base, corresponding to two similar, but larger teeth on the opposite border of the fixed finger.

The walking legs are short, slender, about $1\frac{1}{2}$ times the length of the carapace, hairy, especially along the inner border of the propodite; the last pair is not appreciably weaker (though really shorter) than the preceding pair; the dactyli of the first three pairs are strongly hooked, tapering to a fine point, those of the last pair, however, are much more straightened, curved only quite near the tip, hairy, flattened and notably longer than in the preceding pairs. This disproportion of the dactyli is much better pronounced in the ♀ than in the ♂ (LAURIE).

The eggs heaped up beneath the very bulky abdomen are numerous and of remarkable large size in such a small species, measuring about 0.55 mm. in diameter. NOBILI observed that the eggs in *Ostracotheres* vary greatly in size according to the species: in *O. affinis* they are no less than 4 times as large as in *O. spondyli*, but exact measurements are not given.

The "Siboga" specimen affords the first record of this genus from the Indo-Malayan Archipelago.

Dimensions in mm.:

Length of carapace.	3.95
Breadth of carapace	4.2
Dactyli of 3 ^d pair of walking legs .	0.85
Dactyli of 4 th pair of walking legs .	1.2

Subfam. PINNOTHERELINAE.

In the typical representatives (of the genera *Pinnotherelia* H. Milne-Edwards and *Pinnixa* White) the ischium of the external maxillipeds, though distinct, is much smaller than the merus, and forms together with this merus a broad plate, the longitudinal axis of which, like in the *Pinnotherinae*, though not quite transverse, is directed obliquely to the median axis of the animal; the palp is very large and fills to a great extent the gap between the maxillipeds, its joints are produced beyond each other and the propodus projects largely beyond the basal part of the broad dactylus¹). The carapace (in *Pinnixa* at least) is much broader than long, and the last pair of legs is often reduced in size.

Closely related to *Pinnixa* is *Tetrias* Rathbun (ALCOCK even considers the latter merely a subgenus of the former), but the external maxillipeds are placed more longitudinally, the segments of their palps are much broadened and flattened, and the propodus is truncate, not produced beyond the insertion of the dactylus.

A fourth genus, *Pseudopinnixa*, Ortmann, also certainly belongs to the present group, but the carapace is subcircular (at least in the type species) and the segments of the palp of the external maxillipeds are placed end to end, the dactylus being very much elongate and cylindrical.

ALCOCK²), though in two cases doubtful about the matter, includes still the following genera: *Malacosoma* de Man. I have examined the type specimen of the only species known and can assert that it truly belongs to the *Asthenognathinae*. *Opisthopus* Rathbun. This genus is very little known. Miss RATHBUN herself ranges it among the *Asthenognathinae*. The external maxillipeds seem to resemble those of the next genus. *Tritodynamia* Ortmann. Notwithstanding some unmistakable resemblances to the *Pinnotherelinae* it seems preferable to refer this genus also to the *Asthenognathinae*.

In recent years Miss RATHBUN founded a genus *Mortensenella*, referred by her to the *Pinnotherelinae*. If we adhere, however, to the typical genera of this group, the genera *Mortensenella* does not belong to it, and provisionally I prefer to range it among the *Asthenognathinae*,

1) This arrangement agrees with what is found in *Pinnaodes*, a genus of the preceding subfamily, which, however, is connected by gradual transitions to *Pinnotheres*.

2) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 294.

as merus and ischium of the external maxillipeds are subequal and the palp is minute and of normal shape.

As to *Parapinnixa* Holmes¹⁾ I am completely at loss where to place it, as the literature is inaccessible to me. ALCOCK brought the genus to the *Pinnotherinae*.

Most of the genera and species of the present group live on the west coast of America and at Japan.

Key to the genera *Pinnotherelia*, *Pinnixa*, *Pseudopinnixa* and *Tetrias*:

1. Palp of ext. maxillipeds long, narrow, cylindrical, segments placed end to end. Carapace not distinctly broader than long 2
 Palp of ext. maxillipeds very broad, flattened, surpassing the merus in bulk. Carapace distinctly broader than long. 3
2. Carapace subrectangular. Last pair of legs not reduced in size. Species from Peru and Chile. **Pinnotherelia** H. Milne-Edw. et Lucas
 Carapace subcircular. Last pair of legs reduced in size. Species from Japan. **Pseudopinnixa** Ortmann
3. Carapace generally more than twice as wide as long, usually with a transverse crest across cardiac region. Propodus of ext. maxillipeds projecting with its rounded distal end beyond the insertion of the dactylus. Species largely represented along American coasts. **Pinnixa** White
 Carapace less than twice as wide as long. Palp of ext. maxillipeds flattened, very much hairy, propodus and dactylus widening distally, broadly-triangular, merus with a transverse row of hairs . **Tetrias** Rathbun

Pinnotherelia H. Milne-Edwards et Lucas.

1843. *Pinnotherelia* H. Milne-Edwards et Lucas. Voy. Amér. mér. D'ORBIGNY, v. 6, prt 1, p. 24.

The only known species is *P. laevigata* (see RATHBUN, Proc. U. S. Nat. Mus., v. 38, 1911, p. 546, pl. 51, f. 3), which inhabits the coasts of Peru and Chile.

Pseudopinnixa Ortmann.

1894. *Pseudopinnixa* Ortmann. Zool. Jahrb., Syst., v. 7, p. 694.

The genus has been founded on *Ps. carinata* Ortmann (l. c., p. 694, pl. 23, f. 6), which lives apparently abundantly in Tokyo Bay.

1) Proc. Californ. Ac. (2). v. 4, prt 2, 1895, p. 587, founded on the West American "*Pinnixa*" *nitida* Lockington. HOLMES (l. c., p. 565) first used the term *Pseudopinnixa*, but becoming aware of its being praeoccupied by ORTMANN shortly before, he changed it into *Parapinnixa*.

Pinnixa White.

1846. *Pinnixa* White. Ann. Mag. Nat. Hist., v. 18, p. 177.
 1876. *Tubicola* Lockington. Proc. Californ. Ac., v. 7, p. 55.

This genus contains 18 species, which are remarkable by their transverse carapace (generally twice as wide as long), by the penultimate pair of legs being usually much larger than the last pair, and by the shape of the maxillipeds, the palp of which is very bulky, propodus and dactylus being dilated and the former largely projecting beyond the insertion of the latter. There is often a transverse crest across the cardiac region of the carapace.

As far as is known, all species are commensals of worm-tubes (hence also the term *Tubicola* used by LOCKINGTON). In general appearance and in habits these species exhibit a striking resemblance to the *Hexapodinae*, which are also known to inhabit tubes of Annelids. We ignore whether this remarkable resemblance be due to a real phylogenetic affinity or to similarity of conditions of life.

Species living at the Atlantic coasts of America:

P. cylindrica (Say) nec Stimpson, S. J. Smith.

1818. *Pinnotheres cylindricum* Say. Journ. Ac. Sc. Philadelphia, v. 1, p. 452.
 1846. *Pinnixa cylindrica* White, l. c.
 1860. *Pinnixa laevigata* Stimpson. Ann. N. York Lyceum, v. 7, p. 68.

Hab. United States.

P. monodactyla (Say), l. c., p. 454. Hab. United States.

P. sayana Stimpson, l. c., p. 236.

Pinnixa cylindrica S. J. Smith nec Say.

Hab. United States.

P. chaopterana Stimpson, l. c., p. 235.

Pinnixa cylindrica Stimpson, l. c., p. 68, nec Say.

See also: PEARSE, Biol. Bull. Woods Hole, Mass., v. 24, 1913, p. 102, figs. Hab. United States.

P. minuta Rathbun. Bull. U. S. Fish Comm. for 1900, v. 2, 1901, p. 21, textfig. 4. Hab. Majaguez Harbour, Porto Rico.

P. brevipollex Rathbun, Proc. U. S. Nat. Mus., v. 21, 1899, p. 605, pl. 43, f. 6. Hab. Gulf of San Matias, Argentina.

This species, as the author states, is nearly related to *P. monodactyla*, but its carapace is proportionately broader.

The following species occur at the coast of California¹⁾:

P. occidentalis Rathbun.

1893. RATHBUN, Proc. U. S. Nat. Mus., v. 16, p. 248.
 1900. HOLMES, Occas. Pap. Californ. Ac. Sc., v. 7, p. 89.
 1904. RATHBUN, Harriman Alaska Exp., v. 10, p. 187.
 1910. WEYMOUTH, Leland Stanford Jr. Univ. Publ., n^o 4, p. 56, textfig. 3.

¹⁾ A key to all the Californian species is given by WEYMOUTH (Leland Stanford Jr. Univ. Publ., n^o 4, 1910, p. 55).

P. californiensis Rathbun.

1893. RATHBUN, Proc. U. S. Nat. Mus., v. 16, p. 249.
 1899. RATHBUN, Ibid., v. 21, p. 605.
 1900. HOLMES, Occas. Pap. Californ. Ac. Sc., v. 7, p. 90.
 1904. RATHBUN, Harriman Alaska Exp., v. 10, p. 187.
 1910. WEYMOUTH, Leland Stanford Jr. Univ. Publ., n^o 4, p. 56.

P. tubicola Holmes.

1895. HOLMES, Proc. Californ. Ac. Sc. (2), v. 4, p. 569, pl. 20, f. 17—18.
 1900. HOLMES, Occas. Pap. Californ. Ac. Sc., v. 7, p. 91.
 1904. RATHBUN, Harriman Alaska Exp., v. 10, p. 187.
 1910. WEYMOUTH, Leland Stanford Jr. Univ. Publ., n^o 4, p. 57, textfig. 4.

P. littoralis Holmes.

1895. HOLMES, Proc. Californ. Ac. Sc. (2), v. 4, p. 571, pl. 20, f. 14—16.
 1900. HOLMES, Occas. Pap. Californ. Ac. Sc., v. 7, p. 91.
 1904. RATHBUN, Harriman Alaska Exp., v. 10, p. 187.
 1910. WEYMOUTH, Leland Stanford Jr. Univ. Publ., n^o 4, p. 58, textfig. 5.

P. faba (Dana).

1851. *Pinnothera faba* Dana. Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 253.
 1852. *Pinnothera faba* Dana. U. S. Expl. Exp., Crust., p. 381, pl. 24, f. 4.
 1900. *Pinnixa faba* Holmes. Occas. Pap. Californ. Ac. Sc., v. 7, p. 93.
 1904. *Pinnixa faba* Rathbun. Harriman Alaska Exp., v. 10, p. 188.
 1910. *Pinnixa faba* Weymouth. Leland Stanford Jr. Univ. Publ., n^o 4, p. 59, textfig. 7.

P. longipes (Lockington).

1876. *Tubicola longipes* Lockington. Proc. Californ. Ac. Sc., v. 7, p. 55.
 1877. *Pinnixa longipes* Streets et Kingsley. Bull. Essex Inst., v. 9, p. 107.
 1900. *Pinnixa longipes* Holmes. Occas. Pap. Californ. Ac. Sc., v. 7, p. 92.
 1904. *Pinnixa longipes* Rathbun. Harriman Alaska Exp., v. 10, p. 187.
 1910. *Pinnixa longipes* Weymouth. Leland Stanford Jr. Univ. Publ., n^o 4, p. 58, textfig. 6.

From the coast of Panama to those of Peru and Chile the following species are met with:

P. transversalis H. Milne-Edwards et Lucas. Literature: ORTMANN, Zool. Jahrb., Syst., Bd 10, 1897, p. 329; LENZ, Zool. Jahrb., Syst., Supplementbd 5, 1902, p. 764; RATHBUN, Proc. U. S. Nat. Mus., v. 38, 1911, p. 546, pl. 46, f. 1. Hab. from Panama to Punta Arenas, Patagonia.

P. panamensis Faxon, Bull. Harvard Mus., v. 24, 1893, p. 158. Hab. Panama.

P. affinis Rathbun, Proc. U. S. Nat. Mus., v. 21, 1899, p. 606, pl. 43, f. 7—9. Hab. Panama.

P. valdiviensis Rathbun, Rev. Chil., Hist. Nat., v. 11, 1907, p. 45, pl. 3, f. 2—3, textfig. 1.
 Hab. Valdivia, Chile.

Two species are known from the coast of Japan:

P. penultipedalis Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 108; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 695, pl. 23, f. 7; STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 143.

This species has been recorded from Hongkong and from Nagasaki.

P. tumida Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 108; STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 143.

Unlike other species of the genus, this species was found in the holes of a Holothurian (*Caudina*), in the Bay of Hakodadi (Japan).

Finally there is a species, *P. brevipes* H. Milne-Edwards, Ann. Sc. Nat. (3), t. 20, 1853, p. 220, from Madagascar, but this species does not seem to belong here (see p. 284—285).

Tetrias Rathbun.

1899. *Tetrias* Rathbun. Proc. U. S. Nat. Mus., v. 21, p. 607.

The genus has been established on *T. scabripes* Rathbun, l. c., p. 608, pl. 43, f. 12—14, from Lower California.

ALCOCK¹⁾ places also "*Pinnixa*" *fischeri* A. Milne-Edwards in the genus, but regards the latter as merely a subgenus of *Pinnixa*. I cannot agree with him. The carapace in *Tetrias* is much narrower, the transverse cardiac ridge, so commonly met with in *Pinnixa*, is altogether absent, and the whole surface of the carapace, instead of being smooth and glabrous, is thickly pubescent and granulate. In the external maxillipeds the propodus is not projecting beyond the insertion of the dactylus, but both segments are inversely-triangular, especially the former, widening distally and with a dense row of feathered hairs along outer and distal margin. The walking legs are densely hairy; the second pair, not the third as in *Pinnixa*, is the longest, the last pair is much reduced, spinous along posterior margin; the dactyli of all the walking legs are very short, nearly disappearing among the long setae of the propodites.

1. *Tetrias fischeri* (A. Milne-Edwards). Pl. 18, Fig. 1.

1867. *Pinnotheres fischeri* A. Milne-Edwards. Ann. Soc. Ent. France, t. 7, p. 287.

1873. *Pinnixa fischeri* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 319, pl. 18, f. 3.

1888. *Pinnixa fischerii* de Man. Arch. Naturgesch., Jhrg. 53. 1., p. 385, pl. 17, f. 2.

1900. *Tetrias fischeri* (*Pinnixa* (*Tetrias*) *fischeri*) Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 336.

Stat. 181. Ambon. Depth 36—51 m. 1 ♂, on reef.

The figure of the whole animal, as given by MILNE-EDWARDS, does not agree with what is found in the "Siboga" specimen. In the old example (a ♀) the carapace is represented broader than in my specimen²⁾, in which the breadth is about 1.4 times the length, and neither the setose covering of the whole animal nor the granulation of the carapace is correctly given, unless it must be admitted, what is quite likely, that adult individuals rather considerably differ from young ones.

DE MAN examined both sexes and stated that in the ♂ nearly the whole carapace is finely granulate and tomentose, with exception of some few regions (hind part of mesogastric and anterior portion of cardiac area, with its surrounding parts), which are smooth and glabrous. In my specimen, which is smaller, the gastric region is, like the rest of the surface, granulate

1) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 336.

2) MILNE-EDWARDS' measurements are in some way quite erroneous: the width of the carapace is said to be 15 mm. (by typographical error: cm.), the length 58 mm. (!)

and pubescent, but the granules are much smaller; this gastric region is not subdivided. On the whole posterior third of the carapace the granules are largest and most crowded; cardiac and branchial areas are not discernable. The surface is but little vaulted in longitudinal direction, and nearly straight transversely. The whole animal is soft, the skin being membranaceous and yielding to a slight pressure.

Front finely granulate, with a transverse row of short hairs along anterior margin, narrowing anteriorly, regularly deflexed; anterior margin exactly twice as broad as either orbit, straight in dorsal view, but in reality projecting in the median line and continued into a thin nasal plate, separating the nearly transversely-folded antennules, lateral angles of the front pronounced, bent downward. Fronto-orbital distance half the greatest width of carapace; orbits small, well defined; eye-stalks short, thick, movable; eyes well developed, with black pigment. Lateral margins of carapace regularly curved, obtuse; posterior margin of carapace little convex, longer than fronto-orbital distance.

Epistome very short, but distinct, strongly folded transversely. Antennae unusually long, as long as width of front, the three free basal segments of the peduncle elongate, the terminal one 1.5 times as long as the preceding; flagellum consisting of seven segments, the penultimate one with one strong hair, the terminal segment with three such hairs. Pterygostomian regions finely granulate, subhepatic and subbranchial regions with a dense and soft fur of feathered hairs. Buccal cavity rectangular, with the anterior angles rounded, much wider than long. External maxillipeds (fig. 1a) very widely gaping, the gap being filled to a great extent by the broadly-expanded palpi, margins thickly fringed with very long, silky, flexible, bearded hairs. DE MAN already accurately described and figured these maxillipeds, but I should wish to emphasize a few points: DE MAN states that the ischium, which is distinctly smaller than the merus, is broader than long, but the contrary is shown in his figure, and the ischium in my specimen is indeed broader than depicted by DE MAN, its outer surface is crossed by a transverse row of feathered hairs; the merus is longer than the ischium, widening distally, with the inner margin straight and fringed with very long hairs, the outer margin convex, likewise hairy, the external surface of the merus is crossed by a distinct transverse row of feathered hairs similar to those on the ischium, but the hairs are much longer¹⁾; the palp is extremely bulky, more so than ischium and merus together, and the outer margins of carpus, propodus and dactylus, which are placed end to end, are heavily fringed with very long, feathered hairs, carpus and propodus are of subequal length, bent rectangularly to each other, the former is subquadrate, the latter broadly-triangular and its antero-external angle, which projects freely, is provided with an additional tuft of dense hairs, the dactylus is of the shape of the propodus, but somewhat shorter, much flattened, and the hairs fringing the external margin are continued along the distal border, though keeping here the same transverse course and not expanded fan-like. The close resemblance of these maxillipeds to those of the genus *Thaumastoplax* Miers strongly suggests a near affinity between the two genera, which view, of course, is strengthened by the great reduction of the last part of legs in *Tetrias*. We must,

1) It is this transverse row which seems to be one of the generic characteristics, as it is also described and figured in *T. scabripes* Rathbun.

however, not overlook the fact that the dactylus of the external maxillipeds is differently inserted to the propodus: in *Thaumastoplax* it is implanted at the antero-external angle of the propodus, and the internal angle is bulging outward, whereas in *Tetrias* exactly the reverse is shown. In *Thaumastoplax* (at least in *T. orientalis* and *T. chuenensis*) there is also a transverse row of hairs across the maxillipeds. The abdomen of the ♂, however, differs widely in both genera.

Similar feathered hairs as are repeatedly spoken of in describing the external maxillipeds completely cover the chelipeds and to a lesser extent also the walking legs. Beneath this soft coating numerous pearly granules are hidden on the chelipeds; these granules assume the shape of projecting, obtuse spines along the basal half of the outer border of the meropodite, the anterior margin of the carpopodite, and the inferior border of the chela, where they are continued to the tip of the immovable finger. The chelae are equal in size, much compressed, as high as long, and slightly longer than the fingers; the outer surface is provided with longitudinal rows of granules, the inner surface is devoid of granules, but in the middle a longitudinal row of hairs is found; the fingers are short, high at the base, not greatly curved near the tip, compressed, slightly gaping, back of dactylus with long hairs, cutting margins of both fingers nearly entire.

The walking legs are rather short, the first three pairs subequal (the second pair slightly the longest) and about $1\frac{1}{2}$ times the length of the carapace, the fourth pair is greatly reduced in size and reaches only to the end of the meropodite of the preceding pair. The lower surface of the legs is almost naked, but the upper one thickly clad with soft hairs, very long along the margins. Meropodite not yet three times as long as broad, not widening distally, lower border finely crenulate; carpo- and propodite short, with a longitudinal row of very long, feathered hairs on dorsal surface, all directed inward. As these hairs are continued on the upper side of the dactylus and the likewise long hairs along the inner border of the propodite also fringe the inner side of the dactylus, the latter, which is very short, is almost completely hidden. The lower border of the meropodite of the last pair of legs (fig. 1*b*) bears some few spines, and the hairs of these legs are by far not so densely crowded as is the case in the preceding pairs. At the inner border of the propodite, near the base of the dactylus, two spines are placed side by side.

The long and narrow abdomen of the ♂, with the terminal segment nearly circular and reaching quite to the external maxillipeds (as the deep trench of the sternum receiving the abdomen is continued forward into the buccal cavity), has been well described by DE MAN. The first abdominal appendages are flattened, hairy and reach beyond the middle of the fifth segment of the abdomen; their distal part is curved somewhat outward and the tip is obtuse.

The type species, *T. scabripes* Rathbun, is distinguished by the more distinctly-rectangular, not transversely-oval, carapace, with a spinule on outer part of hepatic regions, and by the basal parts of the meropodites of the first two pairs of walking legs being armed with 1—3 spinules.

The present species has been found at New Caledonia, Amboyna and the Andamans.

At the first locality it was found associated with *Fistulana clava* (a boring Lamellibranch), at the second in the tubes of an Annelid. The "Siboga" specimen was found at this latter locality, but, like that of ALCOCK from the Andamans, it was apparently freely living on the coral reef.

Dimensions in mm.:

Fronto-orbital distance	4.—
Breadth of carapace	8.—
Length of carapace	5.7
Length of penultimate pair of legs	8.8
Length of last pair of legs	4.35
Distance between bases of last pair of legs	6.6
Breadth of abdomen at base	2.15

My specimen is about the size of that of ALCOCK.

Subfam. XENOPHTHALMINAE.

This subfamily has been instituted by ALCOCK on a single genus.

Xenophthalmus White.

1846. *Xenophthalmus* White. Ann. Mag. Nat. Hist., v. 18, p. 177.

As is well known, the genus is easily recognizable by the orbits, instead of being marginal and transverse (or nearly so), being formed by longitudinal slits in the carapace, so that the narrow front is clearly defined laterally. An epistome is absent; the external maxillipeds are broad, parallel, ischium and merus equally long, joints of palp flattened, palp somewhat spirally twisted, extremely slender, rod-like, concealed in outer view. Chelipeds, even in ♂, very small and weak, much more so than the walking legs, the meropodites of which are armed along their posterior margin with a row of spines. Abdomen of both sexes narrow, consisting of seven separated segments.

Four species in all have been assigned to the genus. Two of these, the type species *X. pinnotheroides* White and *X. obscurus* Henderson are well established. A third species is *X. duplociliatus* Sluiter¹⁾. This species, according to the description, resembles the type species, but the chelipeds are much stronger, broadly-flattened and "lepelvormig gebogen" (shaped like a spoon); besides the under surface of the posterior legs is brightly red, and the 3^d and 4th segment of the abdomen of the ♀ is provided with a transverse row of long hairs. SLUITER says that WHITE mentions the presence of bristles at the 3^d segment of the abdomen of the ♀, but the latter author's words on this subject are: "a long ciliated process proceeding from each end of the third joint". One cannot help thinking that WHITE mistook the (bifurcated) pleopod of the ♀, reaching beyond the 3^d segment, for this "ciliated process", for in reality the abdomen of the ♀ does not show any prominences on its exposed surface or on its borders.

1) Natuurkundig Tijdschrift Ned. Indië, Dl. 40, 1881, p. 163. Hab. harbour of Tandjong Priok (Batavia).

Finally there is a fourth species, *X. latifrons* Bürger¹⁾, which is so very aberrant that its being referred to the present genus is certainly erroneous. Firstly the carapace is only slightly broader than long; secondly the orbits, though longitudinal, are lying on the ventral, not on the dorsal side, of the cephalothorax, thirdly an epistome seems to be distinct and finally the external maxillipeds are widely different, resembling those of the *Pinnotherinae*: merus and ischium are fused to a single piece and the dactylus is inserted at the inner margin of the propodus, the exognath is of normal breadth, not rod-like.

Key to *X. pinnotheroides* and *X. obscurus*:

- Carapace, at least anterior part, and walking legs hairy; orbits longitudinal, parallel to each other. Propodite of first pair of walking legs as broad as long *X. pinnotheroides* White
- Carapace glabrous, walking legs hairy towards the tip only; branchial regions of carapace with an oblique, low ridge; orbits somewhat oblique, divergent backward. Propodite of first pair of walking legs longer than broad *X. obscurus* Henderson²⁾.

1. *Xenophthalmus pinnotheroides* White.

Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 332.

RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 338, textfig. 22.

Stat. 4. Djangkar, east coast of Java. Depth 9 m. 7 ♂, 10 ♀.

Stat. 311. Sapeh Bay, east coast of Sumbawa. Depth 36 m. 1 ♂, 1 ♀.

The carapace is for the greater part smooth, but towards the antero-lateral margins, on the lateral parts of the hepatic regions, a thin covering of feathered hairs, such as are found fringing the whole of the lateral borders, is observed. The greatest breadth, at the level of the penultimate pair of legs, is nearly exactly 1.5 times the length of the carapace. A gastric area, not subdivided, and beginning immediately at the end of the orbits, is distinctly outlined by fine sulci and $2\frac{1}{2}$ times as long as broad; behind it a kind of urogastric portion is developed, which is again followed distally by a well defined cardiac region, somewhat broader and shorter than the gastric area. From the end of the orbits parts on each side an oblique, indistinct, straight crest to the constriction in the lateral margin of the carapace, and a similar, slightly curved crest is discernible on each branchial region. Except at the abruptly sloping lateral branchial regions the carapace is not vaulted transversely, and only moderately so in longitudinal direction.

The front is a distinct lobe, somewhat constricted near the base, with the anterior margin straight and the lateral angles greatly rounded; it is bordered laterally by the deep orbits, which are completely filled by the club-like eye-stalks. The orbits in young specimens

1) Zool. Jahrb., Syst., Bd 8, 1895, p. 387, pl. 9, f. 32, pl. 10, f. 32. Hab. Philippines.

2) Transact. Linn. Soc. London (2), v. 5, 1893, p. 394, pl. 36, f. 18—19; ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 333; RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 338, pl. 2, f. 13, textfig. 23. Hab. Gulf of Martaban, Ganjam coast, Andamans, Gulf of Siam.

are rendered more conspicuous by a brown pubescence along their borders. Eyes very small. Lateral margins of carapace rather sharp, granulate, especially posteriorly, and separated by a constriction in the middle into two parts, the antero-lateral margins being regularly curved, and the postero-lateral ones straight, divergent backward towards the bases of the penultimate pair of legs. The lateral branchial regions are much declivous and defined dorsally by a longitudinal row of granules, parting from the bases of the last pair of legs. Posterior margin of carapace long, somewhat concave at the insertion of the abdomen.

The very minute antennulae are lying longitudinally beneath the front and do not project beyond its border. The antennae are rather strong, they are lying at the opening of the orbits. The latter are also closed by a minute tooth, situated at the outer wall of the orbit and running across to the front, without reaching the latter¹⁾. The basal joint of the antenna is short and thick, inserted beneath the lateral angle of the front, the second joint is long, cylindrical, more than 4 times as long as broad, the third joint is short, scarcely one-fourth of the length of the preceding, the flagellum consists of 5 joints. The two last joints of the peduncle are, like the anterior margin of the front, provided with long, feathered hairs. Pterygostomian regions much depressed, not inflated, smooth and glabrous. Buccal cavity wider than long, lateral margins upturned, concave; anterior border deeply hollowed, touching the antennulae and antennae, so that an epistome is formed. External maxillipeds broad, parallel to each other; merus and ischium subequal in length (see Miss RATHBUN's figure), with a faint longitudinal groove near outer margin in which long hairs are implanted, well separated by a somewhat angular suture, outer margin of ischium and merus regularly rounded; palp inserted at antero-internal angle of merus, carpus broadly-oval, disc-like, propodus and dactylus normally shaped, much shorter than carpus, placed end to end, propodus implanted at the centre of the ventral surface of carpus and perpendicular to the latter, dactylus again perpendicular to the propodus, directed backward towards the base of the palp, and parallel to the disc of the carpus²⁾; the whole palp, especially propodus and dactylus densely fringed with long hairs. The exognath is very slender, rod-like, not widening at the base, concealed behind ischium and merus and reaching to the level of the greatest breadth of the latter joint; its flagellum is very short.

The chelipeds of all my specimens, even of the largest ♂, are exceedingly weak and slender, much shorter than the first pair of walking legs, and about as long as the carapace, but Miss RATHBUN states that in the ♂ the chelae are higher and stronger than in the ♀. Upper and outer border of arm and wrist, and both margins of chela fringed with long hairs, the row of hairs along upper margin of chela being double³⁾; palm very low, longer than fingers; the latter acute, very slightly gaping near base and unarmed at the opposite margins, save a few exceedingly fine crenulations.

The walking legs are slender, ciliated, and in my specimens the third pair, which is the longest, is as long as, or longer than, twice the length of the carapace, though ALCOCK

1) This tooth has been observed already by WHITE; STIMPSON afterwards sought in vain for it.

2) This curious conformation of the palp has been already noticed by STIMPSON ("palpus spirally twisted").

3) In Miss RATHBUN's figure of the chela (of the ♀) it looks, as if the ventral row runs on the outer surface of the chela.

pretends that these legs are shorter than twice the said length. Basi- and ischiopodite with a sharp spine at distal margin, on the ventral side; these spines are continued along the posterior border of the meropodite, larger, curved spines generally alternating with obtuse prominences; in the last pair of legs these spines are almost absent. Propodite in the first pair somewhat distorted, so that the originally ventral side, which is greatly flattened and granular and forms a broadly-oval disc, nearly as broad as long, is turned to the dorsal side of the animal; dactylus broadly-triangular, depressed, as long as the preceding propodite, finely crenulate at the base of the lateral margins, and somewhat curved upward. In the middle pairs of legs the propodites are elongate, normal (in the third pair about three times as long as broad), and the dactyli long, greatly compressed, nearly straight. The propodite of the last part of legs is again short, fringed with very long, feathered hairs, and the dactylus is short, compressed, curved backward.

There is little difference between the abdomina of the sexes, that of the ♀ being narrow, like that of the ♂; all the segments are distinct. None of my ♀ is bearing eggs. The base of the abdomen of the ♂ occupies about two-fifths of the distance between the posterior pair of legs, the third segment is narrower than the first, the fifth somewhat constricted, the terminal segment is semi-circular (see Miss RATHBUN's figure), and reaches to the buccal cavity, from which the trench of the abdomen is, however, separated by a thin lamellar, movable plate, beneath which the anterior margin of the sternum projects in the form of a triangular tooth. The long first abdominal appendages, of the ♂ are obtuse at the tip, which is armed with a bunch of slender spines.

This species has been caught at the Philippines, in the harbour of Hongkong, near Batavia, in the Gulf of Martaban and in that of Siam. According to SLUITER it is not commensalistic in habits.

Dimensions in mm.:

	♂	♂	♂	♀	♀
Length of carapace	5.7	4.75	3.85	5.3	4.85
Breadth of carapace	8.6	7.—	5.95	8.—	7.15
Length of penultimate pair of legs .	12.1	9.9	9.25	10.6	10.2

Subfam. ASTHENOGNATHINAE.

No subfamily of the Pinnotheridae contains such heterogeneous elements as the present one. In some genera (*Asthenognathus*, *Tritodynamia*, *Mortensenella*) the last pair of legs is so very much reduced in size as to suggest a striking resemblance to what is found in *Pinnixa* etc., the more so because in one of these genera the carapace is sometimes twice as broad as long. As has been remarked already *Pinnixa* and its allies nearly resemble some genera of the subfamily *Hexapodinae*, which belong to the Goneplacidae. Perhaps a more direct link to the latter family, viz. to the *Rhizopinae*, is afforded by *Chasmocarcinops*, which much resembles *Camatopsis*: in these genera not only the carapace and the legs are very much alike, but the antennulae in both are not capable of being completely retracted, the basal joint completely

filling up the antennular fossa. A curious and much aberrant genus, *Hapalonotus* (= *Malacosoma*), with its globular and somewhat membranaceous carapace, connects the *Asthenognathinae* with the *Pinnotherinae*. It is not at all astonishing, then, that, the limits of the present subfamily are differently drawn, according to personal opinion of authors: *Opisthopus* has been referred by ALCOCK to the *Pinnotherelinae*, *Tritodynamia* and *Voeltzkowia* by their original authors to the *Hexapodinae*, afterwards by ALCOCK and NOBILI to the *Pinnotherelinae*, etc.

In the present paper all the genera of Pinnotheridae, in which the ischium of the external maxillipeds, which are parallel to each other, is at least as long as, and generally even distinctly longer than, the merus, are included within the *Asthenognathinae*. This criterium, artificial as it may appear, is nevertheless the only one to discriminate the subfamily.

Key to the genera:

1. Last pair of legs considerably reduced in size, reaching about to end of meropodite of preceding pair 2
 Last pair of legs not very much weaker than preceding pair 4
2. Carapace generally roughly hexagonal. External maxillipeds widely distant, ischium and merus separated by a distinct suture. Infra-orbital ridge present. 3
 Carapace with the lateral margins regularly curved. External maxillipeds close together; ischium and merus broad, nearly equal, subquadrate, separated by an indistinct suture; palp very small, inserted near antero-external angle of merus and consisting of three subequal segments, placed end to end. Fifth abdominal segment of ♂ constricted. Fingers of chela gaping, movable finger with a quadrangular tooth at inner margin. **Mortensenella** Rathbun
3. Merus of external maxillipeds slightly shorter than ischium, segments of palp placed end to end. **Asthenognathus** Stimpson
 Merus of external maxillipeds as long as ischium, dactylus of palp inserted at inner border of propodite. **Tritodynamia** Ortmann
4. Carapace globular, vaulted, membranaceous, adorned with a reticulating pattern of brown markings. **Hapalonotus** Rathbun
 (= *Malacosoma* de Man)
5. Carapace not vaulted transversely, hard, shining or granulate 5
5. Carapace nearly circular, but somewhat broader than long, regions not defined. External maxillipeds with the palp larger, the dactylus being triangular, distally truncate and inserted at inner border of propodus, overreaching the latter segment. Walking legs unarmed, dactyli well developed, half as long as preceding propodites. Species of California, living in Holothurians and in the Mollusc *Lucapina crinulata*. **Opisthopus** Rathbun

- Carapace quadrangular or transversely-elliptical, smooth or granulate and pubescent. Palp of external maxillipeds small, with the joints placed end to end, ischium much stronger than merus. 6
6. Carapace quadrangular, about as broad as long, granulate and pubescent, with two tomentose and longitudinal branchio-cardiac grooves. Front bilobed. Walking legs much longer than breadth of carapace; meropodites sharply crenulate throughout; dactyli long, those of last pair curved backward **Chasmocarcinops** Alcock
- Carapace quadrangular or transversely-elliptical, for the greater part smooth and shining, regions little or not defined. Walking legs short, not exceeding breadth of carapace; meropodites not sharply crenulate throughout; dactyli very short, sometimes nearly invisible 7
7. Carapace quadrangular, with some isolated patches of a short pubescence. Front triangular. Ischium of external maxillipeds widening towards merus, broadest at anterior margin and with the antero-internal angle sharp and freely projecting, merus small, subcircular, with palp inserted at middle of the convex anterior margin. **Voeltzkowia** Lenz
- Carapace transverse, especially so in the ♀, lateral margins regularly curved, sharp and entire. Anterior margin of front straight. Merus of external maxillipeds quadrangular, little narrower, but much shorter than ischium, with palp inserted near antero-external angle of the concave anterior margin. Walking legs short; posterior margin of meropodite with some small teeth; dactyli extremely minute, scarcely visible **Aphanodactylus** n. g.

Asthenognathus Stimpson.

1858. *Asthenognathus* Stimpson. Proc. Ac. Sc. Philadelphia, 1858, p. 107.

This genus contains two species.

Key to the species:

Posterior margin of carapace 1.5 times as long as fronto-orbital distance.

Species from Japan *A. inaequipes* Stimpson

Posterior margin of carapace equal to fronto-orbital distance. Species

from the Gulf of Siam *A. hexagonum* Rathbun.

1. *Asthenognathus inaequipes* Stimpson.

1858. *Asthenognathus inaequipes* Stimpson. L. c., p. 107.

1907. *Asthenognathus inaequipes* de Man. Transact. Linn. Soc., London (2), v. 9, p. 392, pl. 31, f. 4—6.

1907. *Asthenognathus inaequipes* Stimpson. Smithsonian Inst., Miscell. Coll., v. 49, p. 140, pl. 14, f. 1.

This species has been long known only by STIMPSON's original diagnosis, until DE MAN gave a very elaborate description. In STIMPSON's posthumous paper a useful figure of the whole animal is to be found. Hab. east coast of Nippon, in 30 fathoms. DE MAN gives as locality: "Inland Sea of Japan, in deep water".

2. *Asthenognathus hexagonum* Rathbun.

1909. *Asthenognathus hexagonum* Rathbun. Proc. Biol. Soc. Washington, v. 22, p. 111.

1910. *Asthenognathus hexagonum* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, p. 339, pl. 2, f. 14, textfig. 24.

Hab. Gulf of Siam.

Tritodynamia Ortmann.

1894. *Tritodynamia* Ortmann. Zool. Jahrb., Syst., Bd. 7, p. 692.

ORTMANN referred his genus to the *Hexapodinae*, chiefly on account of the considerable reduction of the last pair of legs. DE MAN, in describing *Asthenognathus inaequipes*, remarked that the present genus might belong to the *Asthenognathinae*. Yet Miss RATHBUN, (l. c., 1910, p. 340), who simply unites *Tritodynamia* with *Asthenognathus*, in my opinion goes too far, for the insertion of the dactylus of the external maxillipeds is different in both genera, as has been proved by NOBILI.

This latter author, in adding to the type species, *T. japonica* Ortmann (l. c., p. 693, pl. 23, f. 5) a new one, *T. horváthi* (Ann. Mus. Hung., v. 3, 1905, p. 407, pl. 10, f. 1), sharply discriminates the two species, so that a reference to his paper may suffice. The genus is only known from the coasts of Japan.

Mortensenella Rathbun.

1909. *Mortensenella* Rathbun. Proc. Biol. Soc. Washington, v. 22, p. 111.

Miss RATHBUN referred her genus to the *Pinnotherelinae*, but on account of the shape of the external maxillipeds, the palp of which is very small and not broadly expanded, (ischium and merus subequal and separated by a faint suture) I prefer to range it among the present subfamily. It is remarkable that the chela of the only species known much resembles that of *Tritodynamia horváthi* Nobili. The genus is founded on *M. forceps* Rathbun (see K. Dansk. Vid. Selsk. Skr., Afd. 5, n^o 4, 1910, p. 337, pl. 1, f. 18, textfig. 21), which inhabits the Gulf of Siam.

Hapalonotus Rathbun.

1879. *Malacosoma* de Man. Notes Leiden Mus., v. 1, p. 67 (praeocc.).

1897. *Hapalonotus* Rathbun. Proc. Biol. Soc. Washington, v. 11, p. 164.

The name *Hapalonotus* has been proposed by Miss RATHBUN in order to replace

Malacosoma, which latter term was already used by HÜBNER in 1816 for a genus of Lepidoptera (and by CHEVROLAT in 1834 again for a genus of Coleoptera).

ANNON referred this genus doubtfully to the *Pinnotheresinae*, but it certainly belongs to the present subfamily.

The only known species is:

1. *Hafalenotus reticulatus* (de Man). Pl. 18, Fig. 3.

1879. *Malacosoma reticulatum* de Man. L. c., p. 67.

This remarkable species has been never found back since its first discovery, although numerous collections were made afterwards at the very locality (Amboyna), where it was originally found. The only known specimen (a ♀) is still preserved in the Leiden Museum and I take this opportunity to make it better known, especially because no figure of it has been published.

At first sight the animal presents the outer aspect of a very large *Pinnotheres*: the carapace is globular, membranaceous, and little broader than long; the lateral margins are greatly rounded and inflated, especially the anterior ones. In the anterior part the carapace is nearly straight transversely, but it is much more vaulted posteriorly, across the branchial regions. In lateral aspect of the animal the anterior portion of the carapace, with the front, is nearly perpendicular, but in dorsal view the anterior margin of the latter is just visible, together with the small and thick eye-peduncles. The whole carapace is covered by very characteristic reticulating meshes, bordered by thick anastomosing lines of a brown colour and remarkably symmetrically distributed; this pattern has apparently lost nothing of its strength, notwithstanding the animal's being preserved in alcohol during more than half a century. There are nowhere any granules on the surface and the various regions are ill defined: on the gastric region we observe two transverse, oval pits, each of them connected by a groove to a similar depression in the middle of the hepatic region: there are two branchio-gastric or branchio-cardiac grooves, but there is no cervical sulcus between them, and the intestinal region is faintly outlined.

The front is regularly arched, its anterior margin is thickened and faintly bilobed in the middle. Orbits small and shallow, filled by the short, globular, movable eye stalks, eyes distinct, black. The fronto-orbital distance measures nearly half the greatest width of the carapace. As has been said the lateral margins, especially anteriorly are rounded and inflated, posteriorly they are not at all indicated, but here we observe a fine groove running straight to the implantation of the last pair of legs; this line is continued forward on the subhepatic and pterygostomial regions and proves to be the pleural groove, ending at the antero-external angle of the buccal cavity. Posterior margin of carapace nearly straight, strongly rimmed and equal in length to base of front.

Antennulae robust, folded transversely in rather incomplete fossae. Antennae extremely small, second joint of peduncle quadrate, flagellum very short, consisting of only two joints, but perhaps broken off (fig. 3a). Epistome present. Side walls of cephalothorax, like the carapace, entirely smooth and glabrous, except of course at the entrance of the afferent

channels to the branchial cavity, near the base of the chelipeds; some of the anastomosing lines of the carapace extend also to the subhepatic and pterygostomian regions. Buccal cavity quadrate, with the lateral borders subparallel and the anterior angles rounded. External maxillipeds parallel, rather broad, leaving only a narrow gap between than (fig. 3a); upper margin of ischium and merus neither grooved nor hairy; ischium longer than broad and distinctly longer than merus, suture between them very distinct, merus broadly-oval, nearly circular, external margin rather regularly curved; palp inserted at its summit¹⁾, longer than merus, consisting of three joints, placed end to end, dactylus somewhat longer than propodus; exognath thick, but flattened at outer surface, for the greater part exposed, almost half as broad as the ischium and not narrowing towards its summit.

The chelipeds and some of the walking legs are lost; on the left side the ambulatory legs of the second, third and fourth pair, on the right only those of the fourth pair are extant. These remaining legs regularly decrease in length from before backward, the longest leg measuring exactly the breadth of the carapace. Some darker spots and bands are observed on their surface, in conformity with the pattern on the carapace. Mero-, carpo- and propodite are entirely smooth and hairless; the dactyli are provided with a few short hairs, about half as long as preceding propodites and made up of two parts, resembling those of the Xanthidae: the basal and greater portion is conical, thick and entirely straight, sharply marked off from the slender, horny, curved tip.

The abdomen of the ♀ is large, elongate (fig. 3b), covering the whole sternum and with a ribbon-like elevation in the middle, thickly fringed along the margins, the sutures separating the joints are wavy, and the last segment is the longest, nearly semi-circular. There are no eggs in my specimen.

The only known specimen has been collected long ago (in 1864) by HOEDT at Amboyna.

Dimensions in mm.:

Fronto-orbital distance	11.—
Length of carapace	20.5
Breadth of carapace	24.—
Length of second pair of walking legs .	24.—
Length of fourth pair of walking legs .	21.—

Opisthopus Rathbun.

1893. *Opisthopus* Rathbun. Proc. U. S. Nat. Mus., v. 16, p. 251.

This genus was referred to the *Asthenognathinae* by the author herself, on account of the ischium of the external maxillipeds being distinctly developed (probably longer than the merus); there is, however, some resemblance to the *Pinnotherinae*, and especially to the genus *Scleroplax*, by the dactylus of these maxillipeds being inserted at the inner border of the propodus. It is to be regretted that this essential feature has never been figured. ALCOCK ranged the genus for some unknown reason among the *Pinnotherelinae*. Only one species is known.

1) „Affixed to its internal angle” according to DE MAN.

1. *Opisthopus transversus* Rathbun.

1893. *Opisthopus transversus* Rathbun. L. c., p. 252.
 1900. *Opisthopus transversus* Holmes. Occ. Pap. Californ. Ac. Sc., v. 7, p. 97.
 1904. *Opisthopus transversus* Rathbun. Harriman Alaska Exp., v. 10, p. 188.
 1910. *Opisthopus transversus* Weymouth. Leland Stanford Jr. Univ. Publ., n^o 4, p. 61, textfig. 9.

The species, which is not uncommon along the coast of California, inhabits a Holothurian (*Stichopus californicus*) and a kind of boring limpet (*Lucapina crenulata*). According to WEYMOUTH, the only author, as far as I know, who gave an outline of the animal, though not of its external maxillipeds, the suture between ischium and merus of these maxillipeds varies considerably in distinctness in various individuals, and the abdomen of the ♀ "varies from a width greater than that of the carapace to a size no greater than that of the male".

Chasmocarcinops Alcock.

1900. *Chasmocarcinops* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 334.

This genus again contains but a single species.

1. *Chasmocarcinops gelasimoides* Alcock.

1900. *Chasmocarcinops gelasimoides* Alcock. L. c., p. 334.
 1903. *Chasmocarcinops gelasimoides* Alcock. Ill. Zool. "Investigator", Crust., prt 10, pl. 62, f. 2—3.
 1910. *Chasmocarcinops gelasimoides* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, p. 340, pl. 1, f. 10, pl. 2, f. 12.

- Stat. 115. Kwandang Bay, north coast of Celebes. Depth 31 m. 2 ♀.
 Stat. 213. Saleyer Island, south of Celebes. Depth up to 36 m. 1 ♂ juv.

This species has been well described by ALCOCK and excellent figures have been given already. Besides the "Siboga" specimens I had the opportunity of examining four adult specimens (1 ♂, 3 ♀), collected by Prof. SLUITER many years ago in the Bay of Batavia, and belonging to the Amsterdam Zoological Museum.

The carapace is but little broader than long, with the postero-lateral margins but very faintly divergent backward, almost parallel. It is much curved downward in its anterior part, but the front is visible from above, and its surface is provided with numerous granules, but one patch on each hepatic region and one on each branchial area are destitute of such granules. The regions are rather well defined and it are especially two longitudinal, somewhat pubescent branchio-cardiac and gastro-hepatic grooves, which are conspicuous.

Front small, bilobed; its anterior margin, as seen in facial view, is concave¹⁾. Orbits deep, distinctly seen in dorsal aspect, filled by the globular and granulate eye-peduncles, which present on their ventral face, in the middle, a faint speck of pigment. Fronto-orbital distance about one-fourth of the greatest width of the carapace. Antero-lateral margins sweeping backward with an elegant curve, hairy, rather sharp, granulate, the granules being arranged in crowded

1) ALCOCK figures it as consisting of two prominent lobes.

groups near the orbit, but in a single row and assuming the shape of minute serrations further backward; postero-lateral margins obsolete. Posterior margin convex, straight in the middle, provided with a finely granulate rim.

Antennulae rather robust, not capable of being retracted within the large fossae, which are completely filled by the basal joint, a character of this species shared by *Camatopsis* Alcock, to which also in general appearance a close resemblance may be noticed. Antennae standing in the wide orbital hiatus, the two last joints of the peduncle free, subequal in length, little longer than broad, flagellum long, consisting of about twelve joints, nearly hairless. Pterygostomial regions granulate, like the carapace, pleural groove deep, disappearing backward above base of cheliped, subbranchial regions hairy and granulate, perpendicular, with a large, entirely smooth and glabrous, somewhat hollowed facet above bases of walking legs. Epistome present, but strongly folded and short. Buccal cavity with the lateral margins somewhat divergent backward. External maxillipeds widely gaping, convergent forward; ischium elongate, slender, $1\frac{1}{2}$ times as long as wide, with a longitudinal, hairy groove; merus much smaller than ischium, distinctly separated by a transverse suture, about half as long as ischium, and little longer than broad, of an oval shape; palp normal, placed at summit of merus, consisting of three joints, placed end to end, dactylus somewhat shorter than propodus; exognath concealed in normal position, breadth about one-third of that of ischium; not narrowing distally and reaching only to suture between ischium and merus, flagellum long.

Chelipeds unequal in both sexes, but much more so in the ♂. Meropodite three-faced, swollen, with a row of hairs along upper border and unarmed. Wrist small, polished, inner angle not prominent. In the adult ♂ the right chela is much more bulky than the left: the palm is greatly swollen, owing to a very much prominent bulge of the inner surface; the whole chela is entirely smooth and polished, save some hairs at the fingers; these are not longer than the palm and irregularly curved, leaving a wide space between them, but meeting near tip, the inner margins being for the most part unarmed, but where they fit together an obtuse tooth, followed by some crenulations up to the acute tip, is observed (see ALCOCK'S figure 3a). The left chela of the ♂ is as long as the right, but somewhat lower and much less inflated; the palm is shorter and the fingers are longer, nearly straight, fitting tightly together; finely crenulate at inner margin; movable finger with a low quadrangular tooth near base, fixed finger with 4—5 erect teeth, in the interspaces of which lower teeth are placed. In the ♀ and in the young ♂ the right chela resembles that of the left of the adult ♂, but the left chela is remarkable by being more elongate and lower, with the palm much shorter than the straight fingers, which are deflexed and the crenulation of which is more clearly marked than in the right chela, though the quadrangular tooth of the movable finger is wanting.

The walking legs are slender and the first three pairs, which are subequal, measure more than twice the length of the carapace; the last leg reaches to about the middle of the propodite of the preceding. Meropodite elongate, slightly narrowing distally, granulate at upper surface, posterior and especially anterior margin armed with numerous erect teeth; carpo- and propodite, like the dactylus, of first and second pair covered with woolly hairs, those of third pair almost naked and more slender than in the preceding pair. Dactylus slightly shorter than

propodites, compressed and hairy along the edges and on the ventral surface, entirely straight. The last pair of legs differs in several points: the armature of the meropodite is much less pronounced or even absent, carpo- and propodite, especially the latter, are flattened and subequal in length, and the anterior border of the former, like both margins of the propodite are fringed with long hairs, continued on both edges of the dactylus, which is fully as long as the preceding joint and strongly curved backward.

The abdomen of the ♂ is rather short, by far not reaching to the buccal cavity; at its base it covers only one-third of the interspace between the bases of the last pair of legs; the first two segments are short and provided with a transverse rim; the third segment is broader than the first, much projecting sideways, and indistinguishably fused with the two next segments, as ALCOCK already observed; the penultimate joint is broader than long and as long as the triangular seventh segment. The first abdominal appendages are robust, covered by the abdomen. Sternum granulate, especially at the end of the deep trench of the abdomen; ALCOCK stated that, like in *Camatopsis*, a narrow plate is intercalated between the 4th and the 5th segment, covering the external genital ducts.

The abdomen of the ♀ is seven-jointed, the penultimate segment being by far the strongest. One of the ♀ from the Bay of Batavia is bearing eggs, the diameter of which measures 0.77 mm.

ALCOCK obtained his specimens from Madras. The species seems to be abundant in the Gulf of Siam.

Dimensions in mm.:	1 ♂	2 ♀	3 ♂
Fronto-orbital distance	4.25	4.25	2.—
Length of carapace	10.—	10.—	4.1
Breadth of carapace	11.—	11.—	4.75
Length of right chela	12.5	9.5	3.3
Height of palm of right chela	5.25	3.—	1.1
Length of mobile finger of right chela	7.—	5.5	1.9
Length of left chela	10.—	10.—	4.1
Height of palm of left chela	4.25	2.75	1.2
Length of mobile finger of left chela	5.5	6.—	2.2
Length of penultimate pair of legs	23.—	21.—	8.25
Length of last pair of legs	17.—	16.5	7.—

N^o 1 and 2 are from the Bay of Batavia (♀ egg-bearing), n^o 3 is the young ♂ from Saleyer.

Voeltzkowia Lenz.

1905. *Voeltzkowia* Lenz. Abhandl. Senckenb. Gesellsch., Bd 27, Heft 4, p. 364.

LENZ refers his genus to the *Hexapodinae*, but the last pair of legs is normally developed. Provisionally I include it into the present subfamily.

The genus contains but a single species.

1. *Voeltzkowia sanzibarensis* Lenz.

1905. *Voeltzkowia sanzibarensis* Lenz. L. c., p. 364, pl. 47, f. 9.

Hab. Zanzibar.

Aphanodactylus n. g.

I propose this new genus for one species, which does not fit into any of the various genera. The external maxillipeds, which are longitudinally directed and subparallel to each other, and the ischium of which is distinctly longer than the merus, agree with those of the *Aesthenognathinae*. On the other hand the ♀ of the species, on which the genus is based, has its carapace nearly twice as broad as long and this, together with the occurrence of the species in tubes of Annelids, suggests some affinity to *Pinnixa*, but the walking legs are short, scarcely as long as the breadth of the carapace and their dactyli are so extremely minute, as to be almost invisible. It is this last character that is expressed in the generic name.

The type and only species is:

1. *Aphanodactylus sibogae* n. sp. Pl. 18, Fig. 2.

Stat. 313. Sapeh Bay, north coast of Sumbawa. Depth up to 36 m. 1 ♂, 1 ♀. In tubes of a Terebellid (*Loimia*).

The small crabs obtained present a smooth and shining carapace, entirely glabrous and distinctly flattened. As will be seen in the figures (2 and 2a) the sexes present remarkable differences: in the ♀ the carapace is barely twice as broad as long, but in the ♂ its breadth is less than $1\frac{1}{2}$ times its length; besides in the former sex the carapace is more strongly vaulted quite anteriorly and its lateral margins are less acute than in the ♂. Gastric and cardiac region, separated by an obscure cervical groove, are more or less distinctly outlined by narrow, interrupted grooves; hepatic and branchial regions are incompletely separated, and the former presents two pits, placed in an oblique line, branchial regions scarcely declivous in their postero-lateral parts.

The front is faintly bilobed in dorsal view; its deflexed anterior margin is somewhat angular in facial view. The eye-stalks are short, slightly movable and much flattened: in dorsal aspect of the animal they look cylindrical, but broadly-oval or rather triangular in anterior view. Eyes are well developed, cornea rather large, chiefly on the ventral side of the peduncle, pigment black. Fronto-orbital distance in ♂ almost exactly one-half, in ♀ less than four-tenths, of greatest breadth of carapace. Lateral margins of carapace keeled, entire, not hairy and regularly curved, anteriorly much more so in ♀ than in ♂, owing to the proportionally much greater breadth of the carapace in the former. Posterior margin of carapace in ♀ concave, nearly $1\frac{1}{2}$ times the fronto-orbital distance; in ♂ this margin is straight and shorter than the distance between the tips of the eyes.

Antennulae small, somewhat obliquely-folded, separated by a narrow septum. Antennae short, standing in the orbital hiatus, flagellum very short in the ♀, made up of 2—3 joints only, longer in the ♂, in which it consists of about 7 joints and reaches to the lateral end of the orbit. Pterygostomian and subbranchial regions smooth and glabrous, the latter parts hairy only above bases of legs; a deep, hairless groove runs from the lateral ends of the very short, almost linear epistome laterally and backward, accompanying the postero-lateral margins

of the carapace and continued up to the coxopodites of the last pair of legs. Buccal cavity widening backward. External maxillipeds (fig. 2*b*) little gaping, broad, smooth; ischium trapezoid, with the hind border greatly oblique, longer than merus; suture between both joints transverse, somewhat curved; merus broader than long, with the external border greatly convex, anterior border concave; palp short, inserted at antero-external angle of merus, consisting of three small joints, placed end to end, subequal in length, but diminishing rapidly in breadth; exognath wholly exposed to view, only one-third as broad as ischium, narrowing towards tip, which does not reach as far forward as merus, flagellum distinct.

The chelipeds are robust, more so in the ♂ than in the ♀; in the former sex they are slightly unequal, the right being somewhat the larger. Meropodite short, unarmed, hairy along the edges, inner surface with a triangular facet, bordered by a brown stripe; wrist small, inner angle rounded; chela (fig. 2*c*) entirely smooth and glabrous, save for some short hairs at inner surface, resembling that of *Pinnixa*, palm longer than fingers, upper border rounded, basal part of inferior border keeled, fingers short, high, compressed, tips curved, not at all gaping, inner margins wavy and minutely crenulate.

Walking legs short, in the ♂ about equal in length to breadth of carapace, in ♀ much shorter, slightly hairy. The first three pairs are subequal in length, the last pair is only little shorter. Meropodite only twice as long as broad (fig. 2*d*), anterior and posterior margin somewhat convex, so that the greatest breadth is lying in the middle, posterior margin in its distal half with some short teeth; carpo- and propodite short, the latter but little longer than the former, not narrowed, at least in the ♀, towards its distal end, dactyli remarkably minute, even more so in the ♀ than in the ♂, immovable, slender and acutely pointed, not hairy.

The abdomen of both sexes consists of seven segments, clearly separated, and occupies in the ♀ completely, in the ♂ almost so, the space between the bases of the posterior pair of legs. The first segment of the abdomen of the ♂ is broader than the third and longer than the second segment; the following segments regularly decrease in width; the terminal joint is semi-elliptical, and there is a rather wide distance between the tip of the abdomen and the hind margin of the buccal cavity. Sternal trench of the abdomen not sharply marked anteriorly. The first abdominal appendages of the ♂ with the hairy tip curved inward, reaching nearly to end of abdomen. Abdomen of ♀ broad, segments regularly increasing in length from base to tip, entirely covering the sternum, fourth segment broadest. The whole ventral surface of the ♀ at hand is concealed beneath a compact mass of eggs, the diameter of which is about 0.3 mm.

The general colour of the species is ivory-white.

I am unable to place this new species into any one of the known genera; as has been already remarked it might, on superficial examination, especially in the case of the transverse ♀, easily be mistaken for a *Pinnixa*. Now H. MILNE-EDWARDS described, as early as 1853, a species, *Pinnixa brevipes*¹⁾, from Madagascar, which is remarkable by the following features:

1) Ann. Sc. Nat. (3), t. 20, 1853, p. 220. The only additional reference to this species is given by A. MILNE-EDWARDS (Nouv. Arch. Mus. Paris, t. 9, 1873, p. 320), who remarks: "the carapace est finement ponctuée et les pinces sont moins comprimées et moins granuleuses (viz. than in "*Pinnixa*" (= *Tetrias*) *fischeri*").

“pattes courtes et paraissant obtuses au bout, les dactylopodites étant rudimentaires”. This may be perfectly applied to my new species, but unfortunately the diagnosis of *Pinnixa brevipes*, of which no figure exists, is very short, and the carapace presents a curved groove in his posterior third.

The species was found, ♂ and ♀ together, in the tube of a Terebellid (*Loimia*).

Dimensions in mm.:

	♂	♀
Fronto-orbital distance	3.85	4.2
Distance between bases of antennae . .	1.75	1.75
Breadth of carapace	7.8	11.25
Length of carapace	5.3	6.—
Posterior margin of carapace.	3.2	6.4
Length of penultimate pair of legs . .	6.6	6.8
Length of last pair of legs	4.6	5.1

In the course of the present work I have frequently felt the need of a faunistic list of Indo-Pacific Pinnotheridae. For the help of any one, who chances to study collections of this family and who wishes to arrive at least to a provisional survey of the genera and species to be expected from some subregions of the Indo-Pacific, I append the following list.

Coast of California ¹⁾:

Pinnotheres margarita S. J. Smith. Transact. Connecticut Ac., v. 2, 1870, p. 166.

Pinnotheres angelicus Lockington. Hab. Vera Cruz. See MIERS, Journ. Linn. Soc. London, v. 15, 1880, p. 86.

Pinnotheres pugettensis Holmes. Proc. Californ. Ac. Sc., v. 7, 1900, p. 86.

Pinnotheres nudus Holmes. See WEYMOUTH, Leland Stanford Jr. Univ. Publ. n^o 4, 1910, p. 53, textfig. 1.

Pinnotheres trapeziformis (Nauck). Hab. Mazatlan. See BÜRGER, Zool. Jahrb., Syst., Bd 8, 1895, p. 380, pl. 9, f. 26, pl. 10, f. 25.

Raphonotus subquadratus (Dana). See WEYMOUTH, Leland Stanford Jr. Univ. Publ., n^o 4, 1910, p. 54, textfig. 2.

Dissodactylus nitidus S. J. Smith. L. c., p. 173.

Scleroplax granulata Rathbun. See WEYMOUTH, l. c., p. 59; textfig. 8.

Cryptophrys concharum Rathbun. Proc. U. S. Nat. Mus., v. 16, 1893, p. 250.

Parapinnixa nitida Lockington, See HOLMES, l. c., p. 95.

Parapinnixa affinis Holmes. L. c., p. 95.

Pinnixa occidentalis Rathbun

Pinnixa californiensis Rathbun

Pinnixa faba (Dana)

Pinnixa tubicola Holmes

Pinnixa littoralis Holmes

Pinnixa longipes (Lockington)

} See WEYMOUTH, l. c., p. 55—59, textfigs. 3—7.

1) See especially HOLMES (Proc. Californ. Ac. Sc., v. 7, 1900) and WEYMOUTH (Leland Stanford Jr. Univ. Publ., n^o 4, 1910).

Tetrius scabripes Rathbun. Proc. U. S. Nat. Mus., v. 21, 1899, p. 608, pl. 43, f. 12—14.
Opisthopus transversus Rathbun. See WEYMOUTH, l. c., p. 61, textfig. 9.

Coast of Panama and adjacent regions:

Pinnotheres margarita S. J. Smith. See above.
Pinnotheres lithodomi S. J. Smith. L. c., p. 169.
Dissodactylus nitidus S. J. Smith. See above.
Pinnixa affinis Rathbun. Proc. U. S. Nat. Mus., v. 21, 1899, p. 606, pl. 43, f. 7—9.
Pinnixa panamensis Faxon. Bull. Mus. comp. Zool. Harvard Coll., v. 24, 1893, p. 158.

West coast of South America ¹⁾:

Pinnotheres margarita S. J. Smith. See above.
Pinnotheres silvestrii Nobili. Boll. Mus. Torino, v. 16, 1901, n^o 402, p. 21.
Pinnotheres bipunctatum Nicolet. GAY, Hist. Chile, Zool., v. 3, 1849, p. 155, pl. 1, f. 2.
Pinnaxodes chilensis (H. Milne-Edwards). See S. J. SMITH, l. c., p. 170.
Pinnaxodes hirtipes Heller. See RATHBUN, Proc. U. S. Nat. Mus., v. 21, 1899, p. 607, pl. 43, f. 10—11.
Pinnaxodes meinerti Rathbun. Proc. Biol. Soc. Washington, v. 17, 1904, p. 162.
Ostracotheres politus S. J. Smith. See LENZ, Zool. Jahrb., Syst., Supplementbd. 5, 1902, p. 765, pl. 23, fig. 9; RATHBUN, Proc. U. S. Nat. Mus., v. 38, 1911, p. 545, pl. 43, f. 3.
Dissodactylus nitidus S. J. Smith. See above. Also: RATHBUN, Proc. U. S. Nat. Mus., v. 38, 1911, p. 545, pl. 48, f. 6.
Pinnotherelia laevigata H. Milne-Edwards. See RATHBUN, Proc. U. S. Nat. Mus., v. 38, 1911, p. 546, pl. 51, f. 3.
Pinnixa transversalis (H. Milne-Edwards et Lucas). See RATHBUN, Proc. U. S. Nat. Mus., v. 38, 1911, p. 546, pl. 46, f. 1.
Pinnixa valdiviensis Rathbun. Revista Chilena Hist. Nat., v. 11, 1907, p. 45, pl. 3, f. 2—3, textfig. 1.

Coasts of Japan and neighbourhood of Hongkong:

Pinnaxodes major Ortmann. Hab. Japan. Zool. Jahrb., Syst., Bd 7, 1894, p. 697, pl. 23, f. 10.
Pinnotheres pholadis de Haan. Hab. Japan. (= *P. pisoides* Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 698, pl. 23, f. 11).
Pinnotheres parvulus Stimpson. Hab. Japan and China Sea. See RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n^o 4, 1910, p. 331, pl. 2, f. 9, textfig. 13.
Pinnotheres obscurus Stimpson. Hab. Hongkong. See STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 141.
Pinnotheres boninensis Stimpson. Hab. Bonin Islands. L. c., p. 141.
Pinnixa tumida Stimpson. Hab. Japan. L. c., p. 143.
Pinnixa penultipedalis Stimpson. Hab. Hongkong and Japan. See ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 695, pl. 23, f. 7.

¹⁾ See RATHBUN, Proc. U. S. Nat. Mus., v. 38, 1911, p. 587—588.

- Pseudopinnixa carinata* Ortmann. Hab. Japan. L. c., p. 694, pl. 23, f. 6.
Tritodynamia japonica Ortmann. Hab. Japan. L. c., p. 693, pl. 23, f. 5.
Tritodynamia horváthi Nobili. Hab. Japan. Ann. Mus. Hung., v. 3, 1905, p. 407, pl. 10, f. 1.
Asthenognathus inaequipis Stimpson. Hab. Japan. See DE MAN, Transact. Linn. Soc. London (2), v. 9, 1907, p. 392, pl. 31, f. 4—6.
Xenophthalmus pinnotheroides White. Hab. Hongkong. See the present paper, p. 272.

Red Sea (and Persian Gulf) ¹⁾:

- Pinnotheres perezi* Nobili. Hab. Persian Gulf. See NOBILI, Bull. scient. France et Belgique, t. 40, 1906, p. 147, pl. 5, f. 25.
Pinnotheres pectinicolus Bürger. Zool. Jahrb., Syst., Bd 8, 1895, p. 365, pl. 9, f. 1, pl. 10, f. 1.
Pinnotheres purpureus Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 339; Ill. Zool. "Investigator", Crust. prt 10, 1903, pl. 62, f. 6.
Pinnotheres pernicolus Bürger. L. c., p. 375, pl. 9, f. 17, pl. 10, f. 16.
Pinnotheres lutescens Nobili. Ann. Sc. Nat. (9), t. 4, 1906, p. 304, textfig. 10.
Pinnotheres coutieri Nobili. L. c., p. 305, textfig. 10 (err. typ.).
Pinnotheres borradailei Nobili (= *P. tenuipes* Borradaile, Faun. Geogr. Maldives and Laccadive Arch., v. 1, 1903, p. 431, textfig. 113).
Pinnotheres maindroni Nobili. L. c., p. 306, pl. 8, f. 8, textfig. 11.
Pinnotheres pilumnoides Nobili. L. c., p. 307, textfig. 12.
Ostracotheres tridacnae Rüppell. See H. MILNE-EDWARDS, Ann. Sc. Nat. (3), t. 20, 1853, p. 219, pl. 11, f. 10.
Ostracotheres affinis H. Milne-Edwards. L. c., p. 220, pl. 11, f. 11 (err. typ.: 5).
Ostracotheres cynthiae Nobili. See LAURIE, Journ. Linn. Soc. London, v. 31, 1915, p. 465, pl. 45, f. 3. Also in the present paper p. 263.
Ostracotheres spondyli Nobili. Hab. Persian Gulf. Bull. Mus. Paris, t. 11, 1905, p. 164.
Dürckheimia carinipes de Man. Zool. Jahrb., Syst., Bd. 4, 1889, p. 442, pl. 10, f. 12.

Coasts of Australia and New Zealand:

- Pinnotheres pisum* Linné. Hab. New Zealand. See ADENSAMER, Ann. Hofmus. Wien, Bd. 12, 1897, p. 106; BORRADAILE, British Antarctic ("Terra Nova") Exp. 1910, Zool., v. 3, n^o 2, 1916, p. 100, textfig. 12.
Pinnotheres novae-zealandiae Filhol. Hab. New Zealand. See LENZ, Zool. Jahrb., Syst., Bd. 14, 1900, p. 467, pl. 32, f. 11—14.
Pinnotheres schauinslandi Lenz. Hab. New Zealand. L. c., p. 468, pl. 32, f. 15—18.
Ostracotheres (?) ("*Pinnotheres*") *holothuriensis* Baker. Hab. South Australia. Transact. Roy. Soc. South Australia, Adelaide, v. 31, 1908, p. 177, pl. 23, f. 3.
Ostracotheres (?) ("*Pinnotheres*") *subglobosus* Baker. Hab. South Australia. L. c., p. 179.

¹⁾ See NOBILI, Ann. Sc. Nat. (9), t. 4, 1906.

LIST OF THE STATIONS,

WHENCE SPECIES OF THE FAMILIES GONEPLACIDAE AND PINNOTHERIDAE
WERE OBTAINED.

- STATION 2. Madura Strait. Depth 56 m. *Homoioplax haswelli* (Miers) Rathbun.
- STATION 4. Djangkar, East Java. Depth 9 m. *Xenophthalmodes dolichophallus* n. sp., *Xenophthalmus pinnotheroides* White.
- STATION 5. 7°46' S., 114°30'.5 E. Near north-east point of Java. Depth 330 m. *Camatopsis rubida* Alcock.
- STATION 12. 7°15' S., 115°15.6 E. North of Bali. Depth 289 m. *Hexaplex megalops* Doflein.
- STATION 19. Bay of Labuan Tring, west coast of Lombok. Depth 18—27 m. *Scalopidia spinosipes* Stimpson.
- STATION 34. Bay of Labuan Pandan, east coast of Lombok. Depth 18 m. *Litocheira setosa* (A. Milne-Edwards), *Pinnotheres quadratus* Rathbun.
- STATION 37. Sailus Ketjil, Paternoster Islands. Depth up to 27 m. *Hexapus sexpes* (Fabricius).
- STATION 38. 7°35'.4 S., 117°28'.6 E. North of Paternoster Islands. Depth 521 m. ¹⁾ *Psopheticus stridulans* Wood-Mason.
- STATION 47. Bay of Bima, north coast of Sumbawa. Depth 55 m. *Typhlocarcinops transversa* n. sp., *Notonyx nitidus* A. Milne-Edwards.
- STATION 51. Madura Bay, west coast of Flores. Depth 54—90 m. *Litocheira sculptimana* n. sp., *Notonyx vitreus* Alcock, *Xenophthalmodes dolichophallus* n. sp., *Typhlocarcinodes hirsutus* (Borradaile).
- STATION 53. Bay of Nangamessi, Sumba. Depth up to 36 m. *Litocheira setosa* (A. Milne-Edwards), *Litocheira quadrispinosa* Zehntner, *Typhlocarcinus villosus* Stimpson, *Pinnotheres latus* Bürger.
- STATION 66. Saleyer Island, south of Celebes. Depth 8—10 m. *Litocheira affinis* n. sp.
- STATION 71. Macassar. Depth up to 32 m. *Typhlocarcinus nudus* Stimpson, *Scalopidia spinosipes* Stimpson.
- STATION 77. Borneo Bank. Depth 59 m. *Lophoplax bicristata* n. g. n. sp.
- STATION 114. Kwandang Bay, north coast of Celebes. Depth 75 m. *Eucrate sulcatifrons* (Stimpson), *Camatopsis rubida* Alcock.
- STATION 115. Kwandang Bay, north coast of Celebes. Depth 31 m. *Chasmocarcinops gelasimoides* Alcock.
- STATION 116. West of Kwandang Bay, north coast of Celebes. Depth 72 m. *Catoptrus inaequalis* Rathbun, *Speocarcinus celebensis* n. sp., *Camatopsis rubida* Alcock.

¹⁾ According to List of Stations.

- STATION 127. Taruna Bay, Great Sangir Island. Depth 45 m. *Litocheira setosa* (A. Milne-Edwards).
- STATION 131. Karakelang, Talaut Islands. Reef. *Litocheira quadrispinosa* Zehntner.
- STATION 133. Lirung, Talaut Islands. Depth up to 36 m. *Typhlocarcinops decrescens* Rathbun, *Typhlocarcinops angustipes* n. sp., *Typhlocarcinodes piroculatus* (Rathbun).
- STATION 139. 0° 11' S., 127° 25' E. Between Kajoa Island and Batjan. Depth 397 m. *Pilumnoplax abyssicola* Miers.
- STATION 144. Salomakiëe, near south point of Halmaheira. Depth 45 m. *Litocheira aranea* n. sp., *Catoptrus nitidus* A. Milne-Edwards.
- STATION 152. Wunoh Bay, north-west coast of Waigeu Island. Depth 32 m. *Pinnotheres quadratus* Rathbun.
- STATION 153. 0° 3'.8 N., 130° 24'.3 E., near north-west point of Waigeu Island. Depth 141 m. *Litocheira subintegra* Lanchester.
- STATION 154. 0° 7'.2 N., 130° 25'.5 E., north of Waigeu Island. Depth 59—83 m. *Catoptrus nitidus* A. Milne-Edwards.
- STATION 162. West coast of Salawatti. Depth 18 m. *Eucrate sulcatifrons* (Stimpson), *Ceratoplax ciliata* Stimpson.
- STATION 164. South of Salawatti, near north-west New Guinea. Depth 32 m. *Notonyx vitreus* Alcock.
- STATION 172. Between Gisser and Ceram-Laut. Depth 18 m. Reef. *Pinnotheres onychodactylus* n. sp.
- STATION 174. Waru Bay, north-east coast of Ceram. Depth 18 m. *Typhlocarcinus nudus* Stimpson, *Hepthopelta littoralis* n. sp., *Pinnotheres obesus* (Dana).
- STATION 181. Amboyna. Depth 36—54 m. *Litocheira setosa* (A. Milne-Edwards), *Goneplax sinuatifrons* Miers, *Notonyx nitidus* A. Milne-Edwards, *Tetrias fischeri* (A. Milne-Edwards).
- STATION 193. Sanana Bay, east coast of Sula Besi, E. of Celebes. Reef. *Litocheira quadrispinosa* Zehntner, *Ceratoplax truncatifrons* Rathbun.
- STATION 204. Between Wowoni and Buton Island, S. of Celebes. Depth 75—94 m. *Goneplax maldivensis* Rathbun.
- STATION 205. Lohio Bay, Buton Strait, S. of Celebes. Depth 22 m. *Xenophthalmodes dolichophallus* n. sp.
- STATION 212. 5° 54'.5 S., 120° 19'.2 E. W. of Saleyer Island. Depth 462 m. *Hexaplex megalops* Doflein.
- STATION 213. Saleyer Island, S. of Celebes. Depth up to 36 m. *Chasmocarcinops gelasimoides* Alcock.
- STATION 225c. Lucipara Islands, Banda Sea. Reef. *Typhlocarcinodes crassipes* n. sp.
- STATION 240. Banda. Depth 9—45 m. *Litocheira setosa* (A. Milne-Edwards).
- STATION 248. Tiur Island, between Ceram and Kei Islands. Reef. *Litocheira quadrispinosa* Zehntner.
- STATION 250. Kur, Kei Islands. Depth 20—45 m. *Litocheira aranea* n. sp.
- STATION 254. 5° 40' S., 132° 36' E. W. of Kei Islands. Depth 310 m. *Camatopsis rubida* Alcock.
- STATION 258. Tual, Kei Islands. Depth 22 m. *Paraselwynia ursina* n. g. n. sp., *Hexapus sexpes* (Fabricius), *Pinnotheres edwardsi* de Man, *Ostracotheres cythiaie* Nobili.
- STATION 260. 5° 36'.5 S., 132° 55'.2 E. N. W. of Kei Islands. Depth 90 m. *Litocheira sculptimana* n. sp., *Ommatocarcinus orientalis* n. sp., *Lophoplax bicristata* n. g. n. sp., *Camatopsis rubida* Alcock.
- STATION 261. Elat, Great Kei Island. Depth 27 m. *Pinnotheres villosulus* Guérin, *Pinnotheres trichopus* n. sp.
- STATION 266. 5° 56'.5 S., 132° 47'.7 E. S. E. of Kei Islands. Depth 595 m. *Pilumnoplax abyssicola* Miers.
- STATION 267. 5° 54' S., 132° 56'.7 E. S. E. of Kei Islands. Depth 984 m. *Pilumnoplax abyssicola* Miers.

- STATION 273. Pulu Jedan, east coast of Aru Islands. Depth 13 m. *Mertonia lanka* Laurie.
- STATION 274. 5° 28'.2 S., 134° 53'.9 E. N. of Aru Islands. Depth 57 m. *Typhlocarcinops angustipes* n. sp.
- STATION 277. Dammer Island, N. E. of Timor. Depth 40 m. *Pinnotheres consors* Bürger.
- STATION 279. Romá Island, N. of Timor. Depth 36 m. *Typhlocarcinops decrescens* Rathbun.
- STATION 285. S. E. coast of Timor. Depth 34 m. *Litocheira aranea* n. sp., *Typhlocarcinus villosus* Stimpson, *Notonyx nitidus* A. Milne-Edwards.
- STATION 302. 10° 27'.9 S., 123° 28'.7 E. Near Rotti. Depth 216 m. *Camatopsis rubida* Alcock.
- STATION 303. Haingsisi, Samau Island, S. W. of Timor. Depth up to 36 m. *Eucrate sulcatifrons* (Stimpson).
- STATION 306. 8° 27' S., 122° 54'.5 E. S. of Flores. Depth 247 m. *Camatopsis rubida* Alcock.
- STATION 311. Sapeh Bay, east coast of Sumbawa. Depth up to 36 m. *Xenophthalmus pinnotheroides* White.
- STATION 312. Saleh Bay, north coast of Sumbawa. Depth 274 m. *Camatopsis rubida* Alcock.
- STATION 313. Saleh Bay, north coast of Sumbawa. Depth up to 36 m. *Aphanodactylus sibogae* n. g. n. sp.
- STATION 315. Sailus Besar, Paternoster Islands. Depth up to 36 m. *Litocheira affinis* n. sp.

CORRIGENDA.

- P. 165 line 16 from top read Pl. 7 instead of Pl. 1.
- P. 167 line 11 from top read Pl. 7 instead of Pl. 1.
- P. 168 line 3 from bottom read Pl. 7 instead of Pl. 1.
- P. 171 line 17 from bottom read Pl. 8 instead of Pl. 2.
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Note. — Synonyms are printed in Italics. The more important pages are indicated by heavier type.

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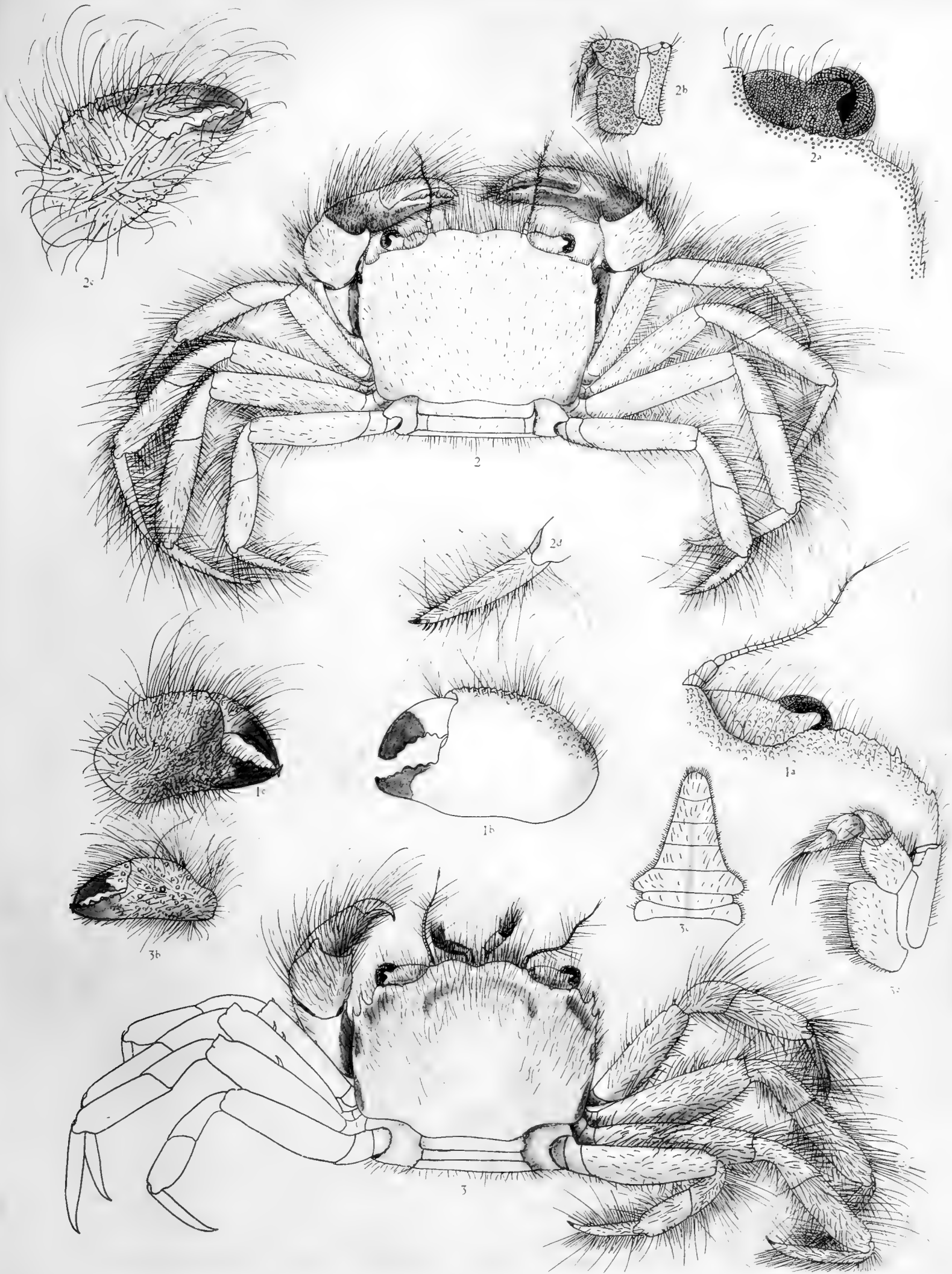
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 villosulus (Pinnotheres) 251, 252, **255**, 256.
villosus (Pinnotheres) 251.
 villosus (Typhlocarcinus) 207, **209**, 216.
 violacea (Mactra) 249.
 vitreus (Notonyx) 219, **221**.
 Voeltzkowia 275, 276, **282**.
- whitei (Xanthasia) 246.
- Xanthasia 245, **246**.
 Xenophthalminae 244, **271**.
 Xenophthalmodes 202, **215**, 217, 224.
 Xenophthalmus 271.
- zanzibarensis (Voeltzkowia) 282.





PLATE VII.

- Fig. 1*a*. *Litocheira setosa* (A. Milne-Edwards), antero-lateral part of carapace, magn. 15. Fig. 1*b* left chela of ♂, outer view, magn. 10. Fig. 1*c* right chela of ♂, outer view, magn. 10.
- Fig. 2. *Litocheira affinis* n. sp., ♂, magn. 10. Fig. 2*a* antero-lateral part of carapace, magn. 25. Fig. 2*b* external maxilliped, magn. 15. Fig. 2*c* right chela of ♂, outer view, magn. 15. Fig. 2*d* dactylus of last right leg, magn. 20.
- Fig. 3. *Litocheira quadrispinosa* Zehntner, ♂, magn. 10. Fig. 3*a* external maxilliped, magn. 20. Fig. 3*b* left chela of ♂, outer view, magn. 10. Fig. 3*c* abdomen of ♂, magn. 10.



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1. *Litocheira setosa* A. Milne-Edwards.

2. *Litocheira attinis* n.sp

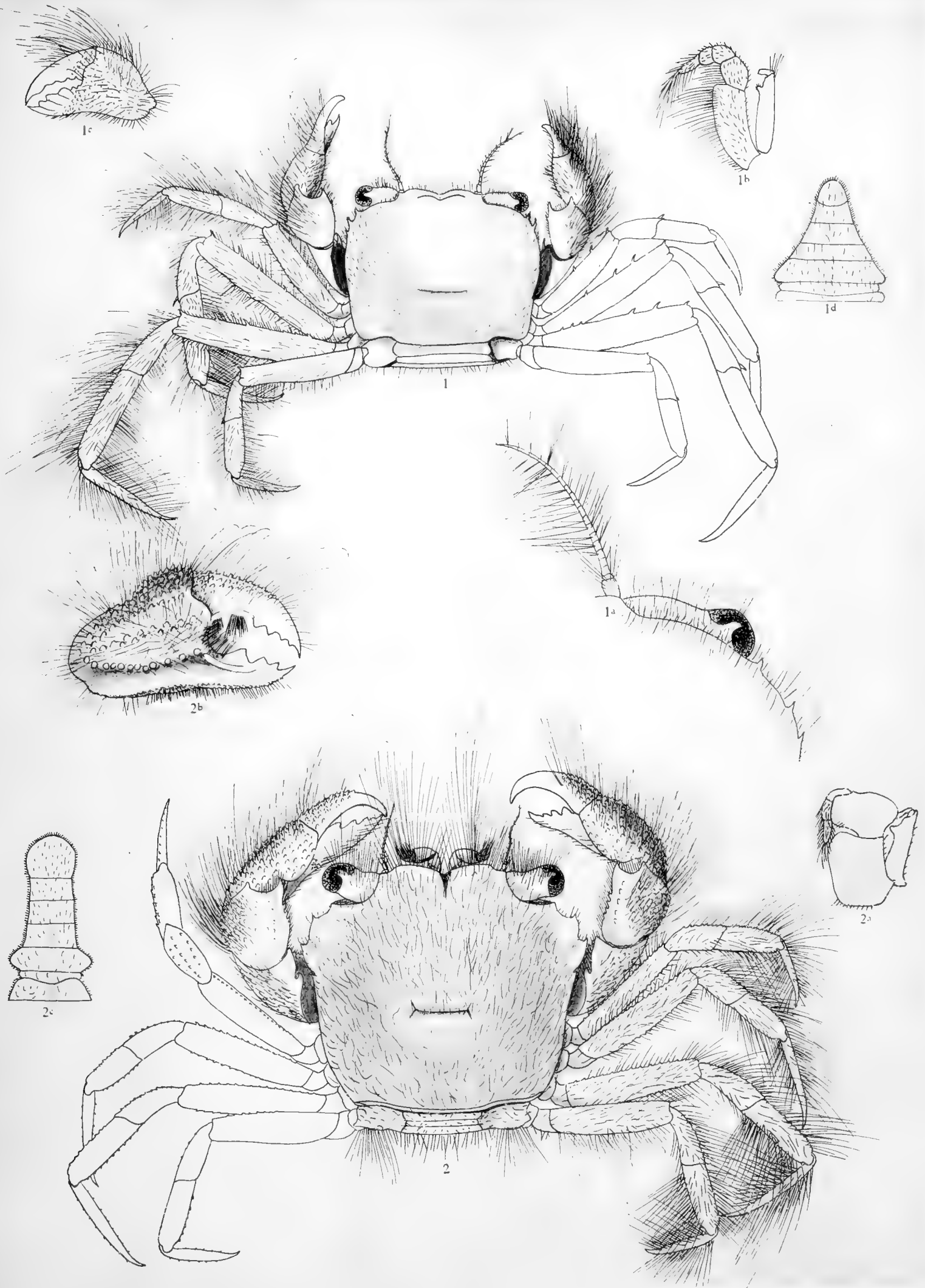
3. *Litocheira quadrispinosa* Zehntner.





PLATE VIII.

- Fig. 1. *Litocheira aranea* n. sp., ♂, magn. 10. Fig. 1*a* antero-lateral part of carapace (of ♀ of Stat. 285), magn. 20. Fig. 1*b* external maxilliped, magn. 20. Fig. 1*c* left chela of ♂, outer view, magn. 10. Fig. 1*d* abdomen of ♂, magn. 10.
- Fig. 2. *Litocheira sculptimana* n. sp., ♂, magn. 15. Fig. 2*a* external maxilliped, magn. 15. Fig. 2*b* right chela of ♂, outer view, magn. 15. Fig. 2*c* abdomen of ♂, magn. 15.



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1. *Litocheira aranea* n.sp.

2. *Litocheira sculptimana* n.sp.

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PLATE IX.

- Fig. 1. *Goneplax maldivensis* Rathbun, ♂, magn. 10. Fig. 1*a* external maxilliped, magn. 20. Fig. 1*b* right chela of ♂, outer view, magn. 20. Fig. 1*c* three last joints of posterior right leg, magn. 20. Fig. 1*d* abdomen of ♂, magn. 10.
- Fig. 2*a*. *Goneplax sinuatifrons* Miers, abdomen of ♂, magn. 10.
- Fig. 3. *Hephthopelta littoralis* n. sp., ♀, magn. 6. Fig. 3*a* cephalothorax, ventral view, magn. 10.
- Fig. 4. *Catoptrus nitidus* A. Milne-Edwards, carapace, magn. 5. Fig. 4*a* frontal and antero-lateral margin of carapace, magn. 10. Fig. 4*b* external maxilliped, magn. 15. Fig. 4*c* first maxilliped, magn. 20. Fig. 4*d* right chela of ♂, outer view, magn. 5.
- Fig. 5. *Catoptrus inaequalis* Rathbun, carapace, magn. 5. Fig. 5*a* frontal and antero-lateral margin of carapace, magn. 10. Fig. 5*b* external maxilliped, magn. 15. Fig. 5*c* left chela of ♀, outer view, magn. 5.

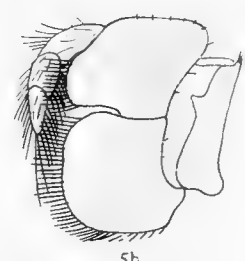
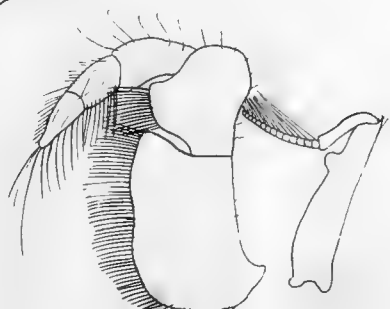
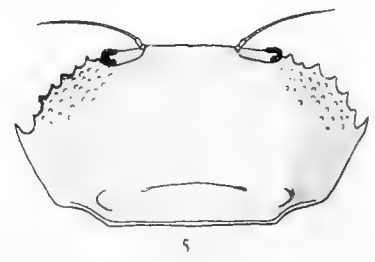
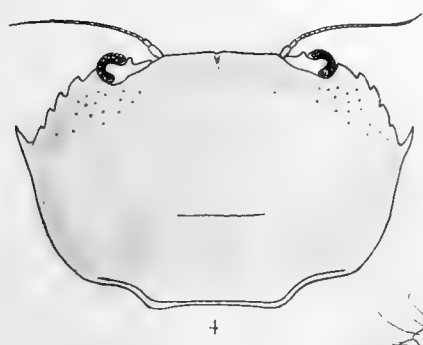
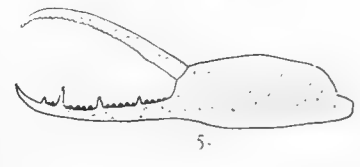
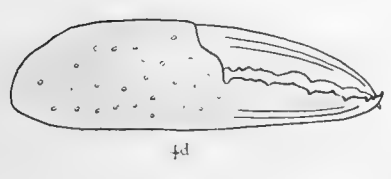
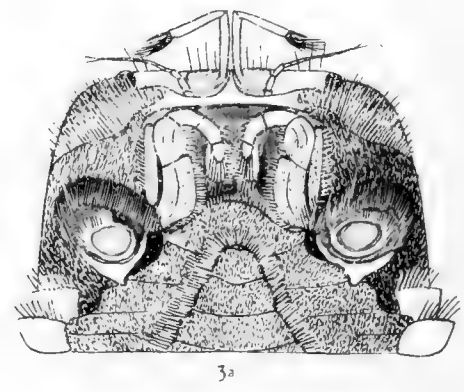
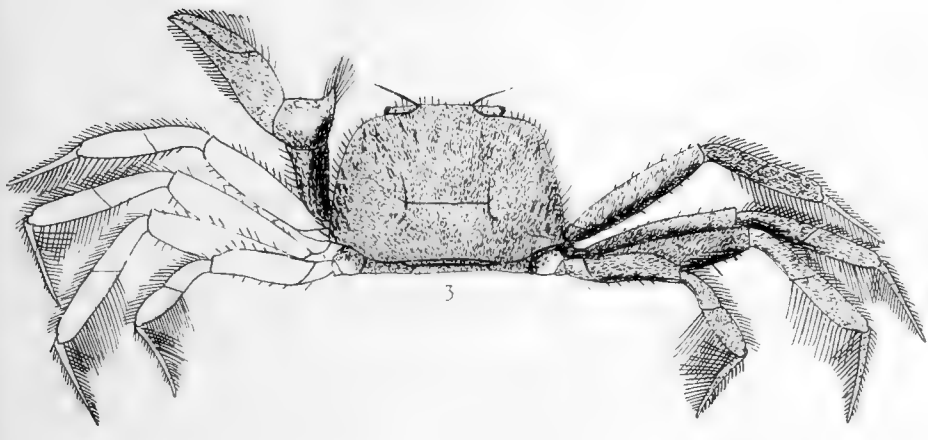
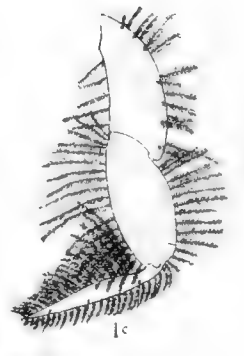
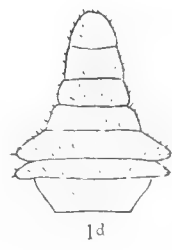
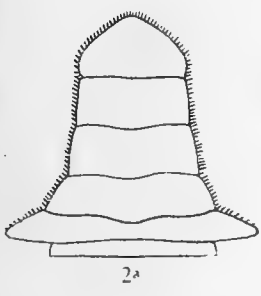
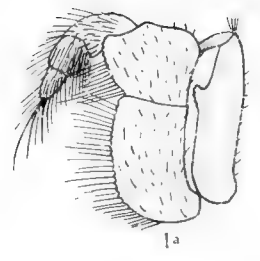
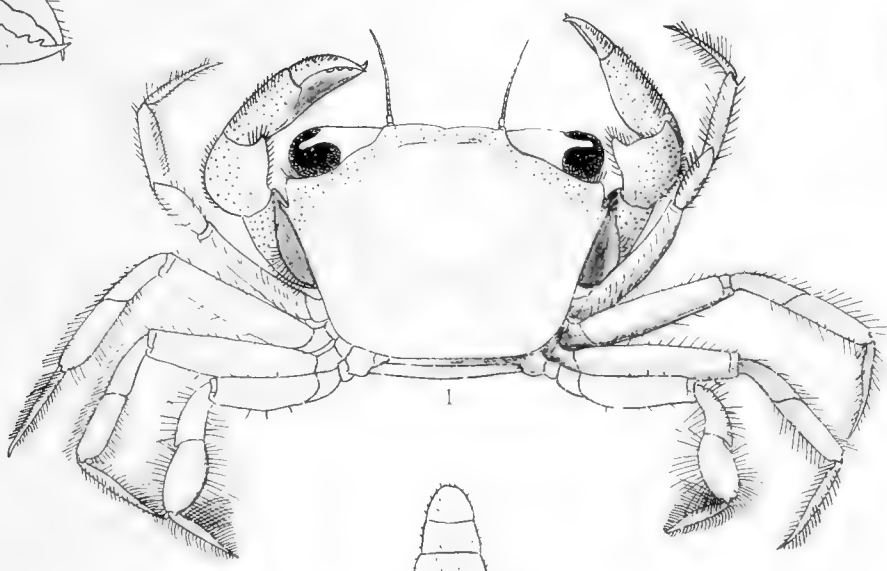
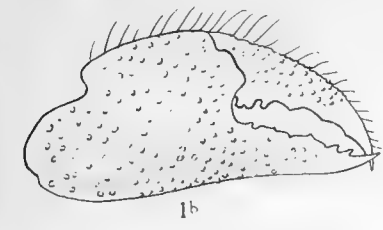
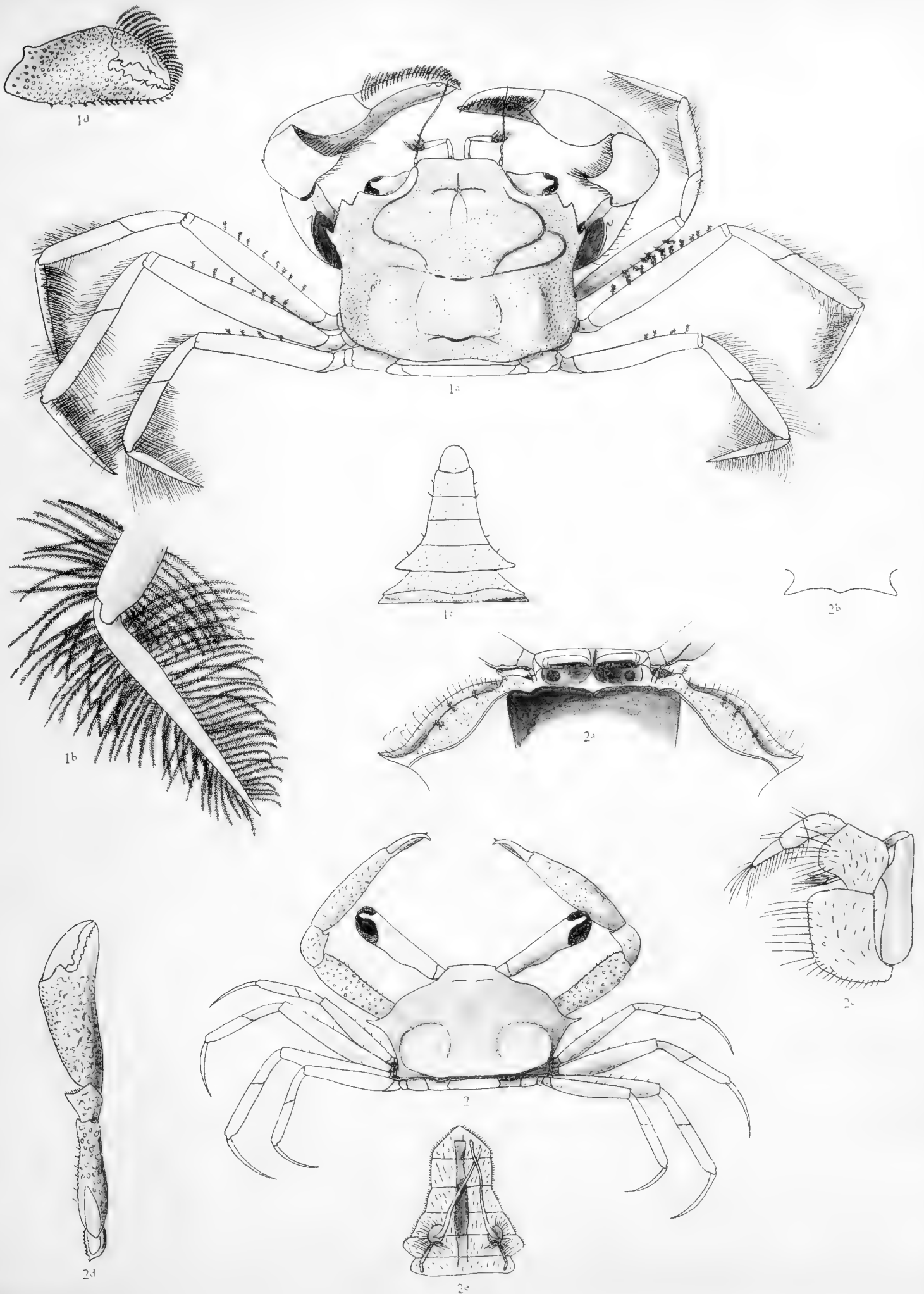






PLATE X.

- Fig. 1. *Homoioplax haswelli* (Miers) Rathbun, ♂, magn. 8. Fig. 1*a* right chela of ♂, outer view, magn. 8. Fig. 1*b* dactylus of last leg, magn. 25. Fig. 1*c* abdomen of ♂, magn. 10.
- Fig. 2. *Ommatocarcinus orientalis* n. sp., ♂, magn. 10. Fig. 2*a* ventral view of carapace, magn. 20. Fig. 2*b* outline of front, anterior view, magn. 20. Fig. 2*c* external maxilliped, magn. 30. Fig. 2*d* right cheliped of ♂, outer view, magn. 10. Fig. 2*e* abdomen of ♂, inner view, magn. 20.



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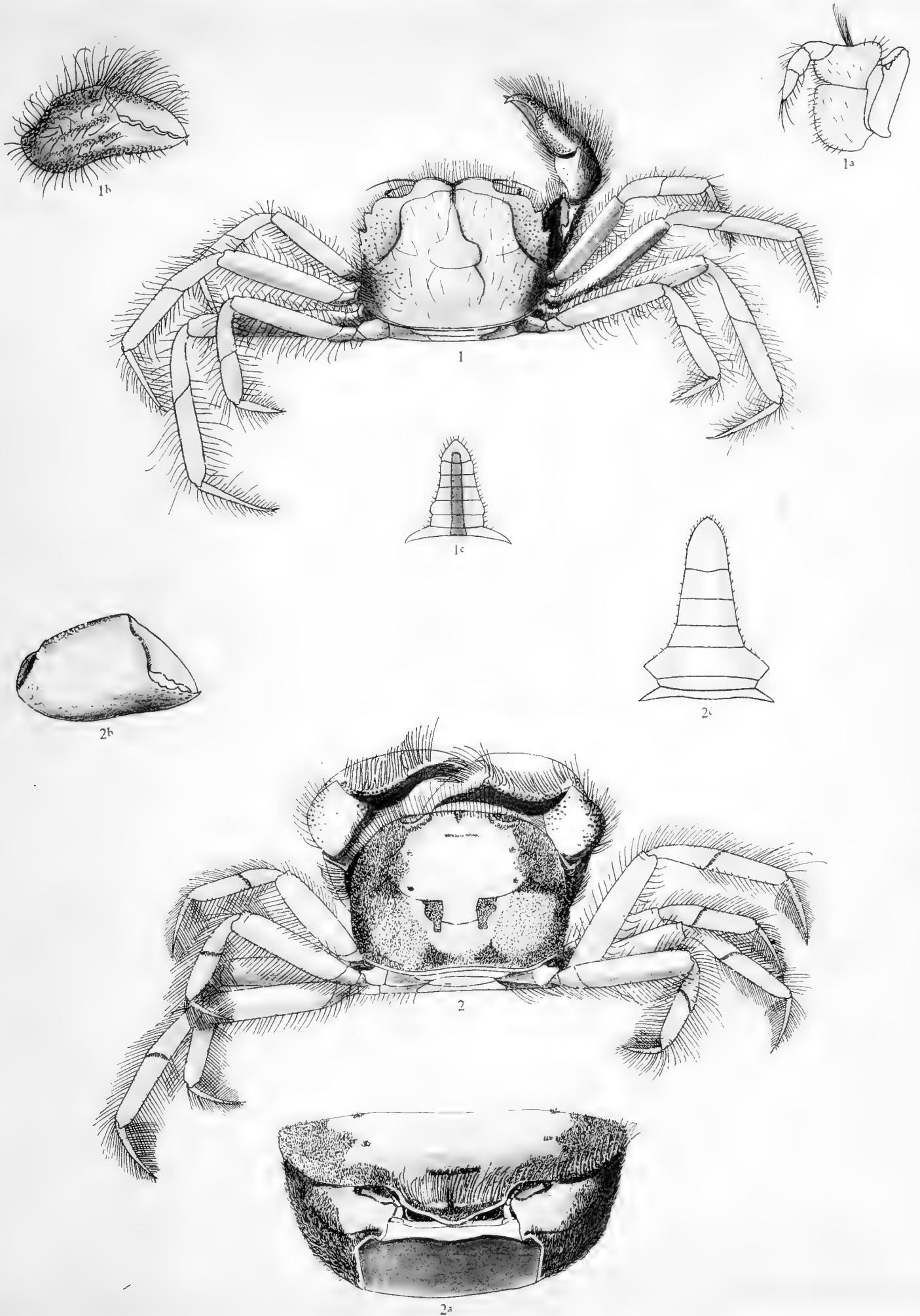
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1. Homoioplax haswelli (Miers) Rathbun.

2. Ommatocarcinus orientalis n. sp.

PLATE XI.

- Fig. 1. *Speocarcinus celebensis* n. sp., ♂, magn. 10. Fig. 1*a* external maxilliped, magn. 20. Fig. 1*b* right chela of ♂, outer view, magn. 15. Fig. 1*c* abdomen of ♂, magn. 10.
- Fig. 2. *Ceratoplax ciliata* Stimpson, ♂, magn. 3. Fig. 2*a* cephalothorax, anterior view, magn. 5. Fig. 2*b* right chela of ♂, (hairs removed), outer view, magn. 3 $\frac{1}{2}$. Fig. 2*c* abdomen of ♂, magn. 4.



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1. *Speocarcinus celebensis* n. sp.

2. *Ceratoplax ciliata* Stimpson.

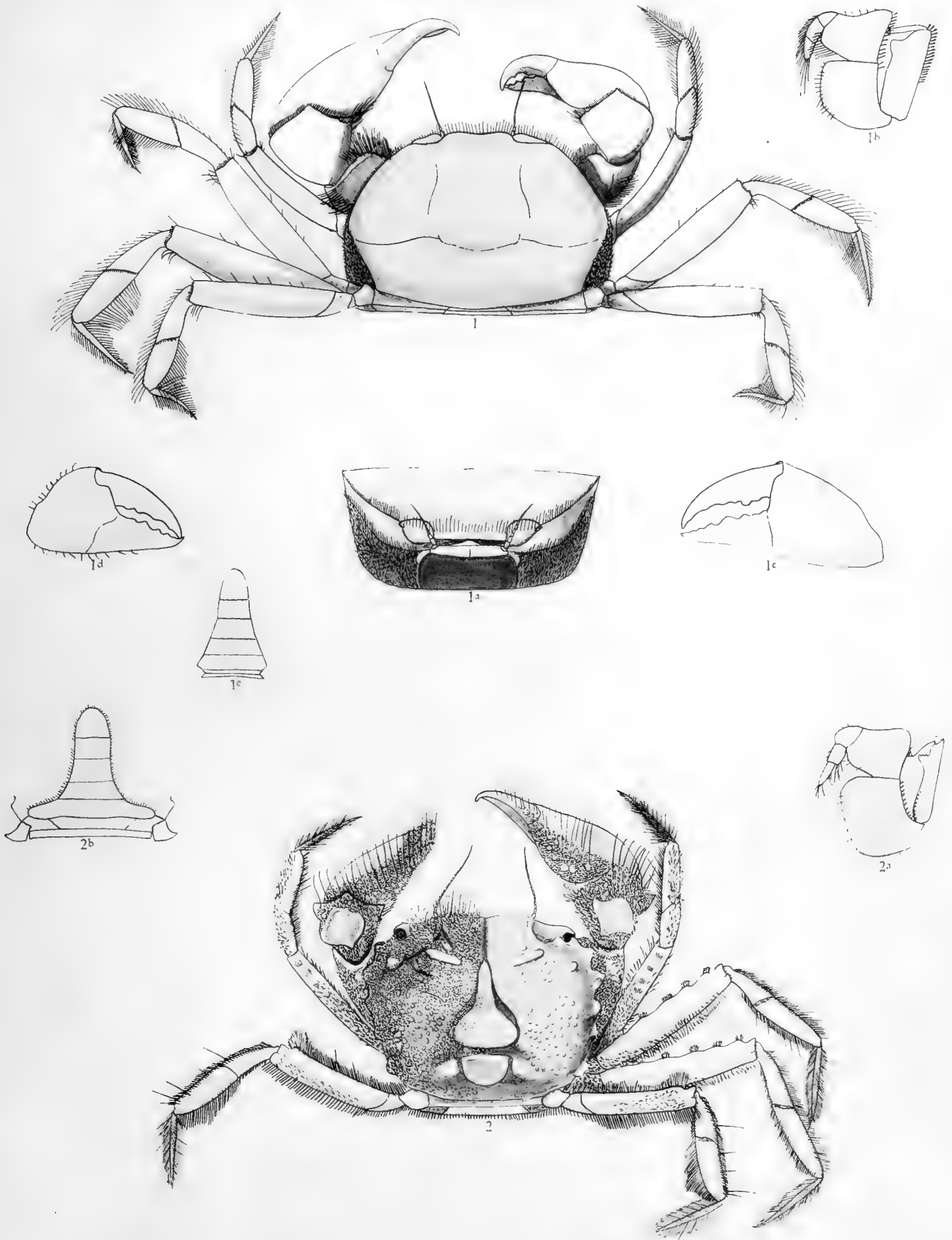
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PLATE XII.

- Fig. 1. *Ceratoplax truncatifrons* Rathbun, ♂, magn. 10. Fig. 1*a* cephalothorax, anterior view, magn. 10. Fig. 1*b* external maxilliped, magn. 20. Fig. 1*c* left chela of ♂, outer view, magn. 10. Fig. 1*d* right chela of ♂, outer view, magn. 10. Fig. 1*e* abdomen of ♂, magn. 10.
- Fig. 2. *Lophoplax bicristata* n. g. n. sp., ♂, magn. 8. Fig. 2*a* external maxilliped, magn. 15. Fig. 2*b* abdomen of ♂, magn. 8.



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1. *Ceratoplax truncatifrons* Rathbun.

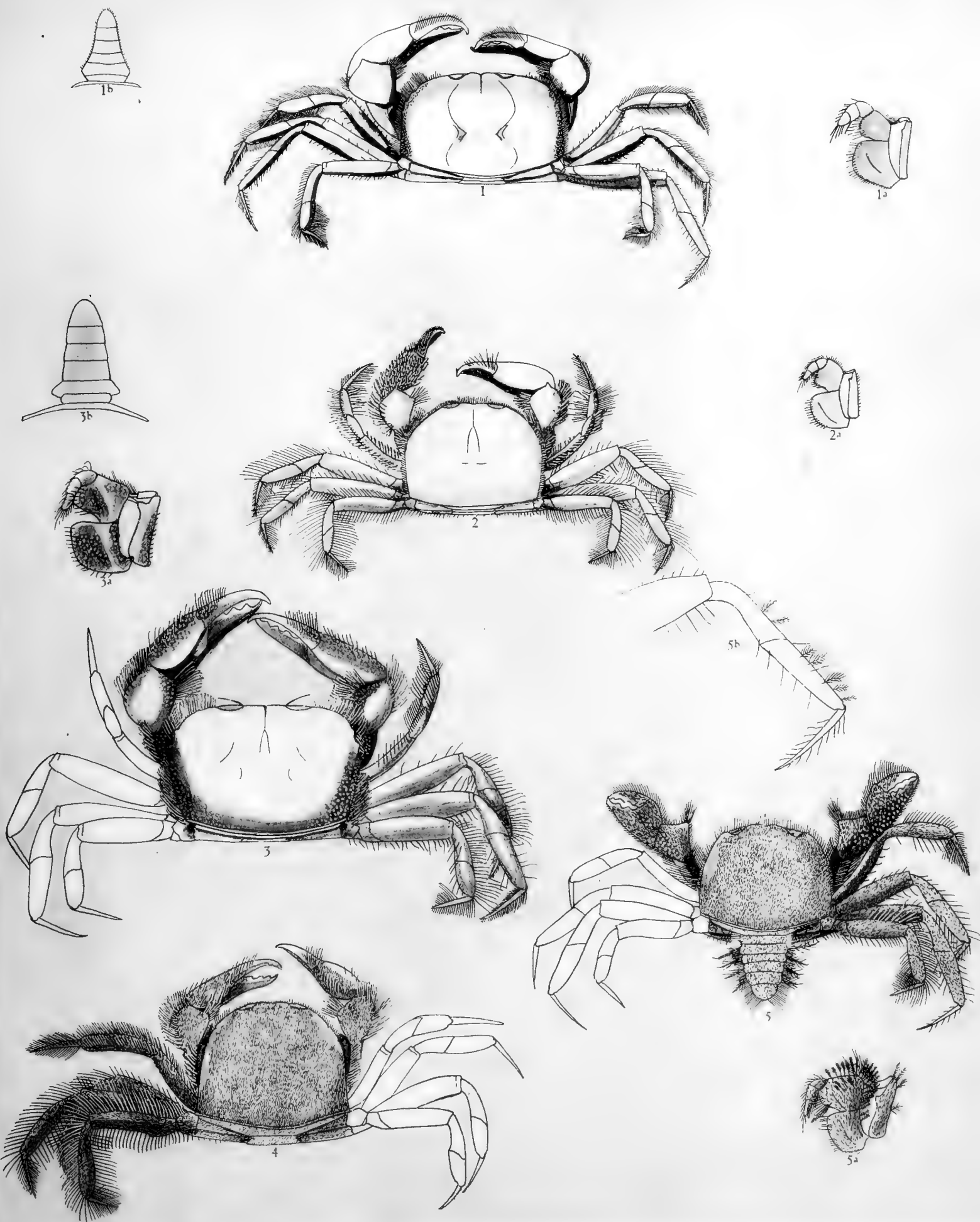
2. *Lophoplax bicristata* n. g. n. sp





PLATE XIII.

- Fig. 1. *Typhlocarcinus nudus* Stimpson, ♂, magn. 5. Fig. 1*a* external maxilliped, magn. 10. Fig. 1*b* abdomen of ♂, magn. 5.
- Fig. 2. *Typhlocarcinus villosus* Stimpson, ♂, magn. 5. Fig. 2*a* external maxilliped, magn. 10.
- Fig. 3. *Typhlocarcinops transversa* n. sp., ♂, magn. 5. Fig. 3*a* external maxilliped, magn. 10. Fig. 3*b* abdomen of ♂, magn. 5.
- Fig. 4. *Typhlocarcinops decrescens* Rathbun, ♀, magn. 5.
- Fig. 5. *Typhlocarcinops angustipes* n. sp., ♀, magn. 5. Fig. 5*a* external maxilliped, magn. 10. Fig. 5*b* right penultimate leg, magn. 10.



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- 1. *Typhlocarcinus nudus* Stimpson.
- 2. *Typhlocarcinus villosus* Stimpson.
- 3. *Typhlocarcinops transversa* n. sp.
- 4. *Typhlocarcinops decrescens* Rathbun.
- 5. *Typhlocarcinops angustipes* n. sp.

PLATE XIV.

- Fig. 1. *Xenophthalmodes dolichophallus* n. sp., ♂, magn. 5. Fig. 1a external maxilliped, magn. 10. Fig. 1b abdomen of ♂, magn. 10.
- Fig. 2. *Parasetwynia ursina* n. g. n. sp., ♀, magn. 4. Fig. 2a external maxilliped, magn. 10. Fig. 2b left chela of ♀, outer view, magn. 4.
- Fig. 3. *Scalopidia spinosipes* Stimpson, ♂, magn. 2. Fig. 3a cephalothorax, front view, magn. 2. Fig. 3b external maxillipeds, magn. 4. Fig. 3c right chela of ♂, outer view, magn. 2. Fig. 3d left chela of ♂, outer view, magn. 2. Fig. 3e abdomen of ♂, magn. 3.



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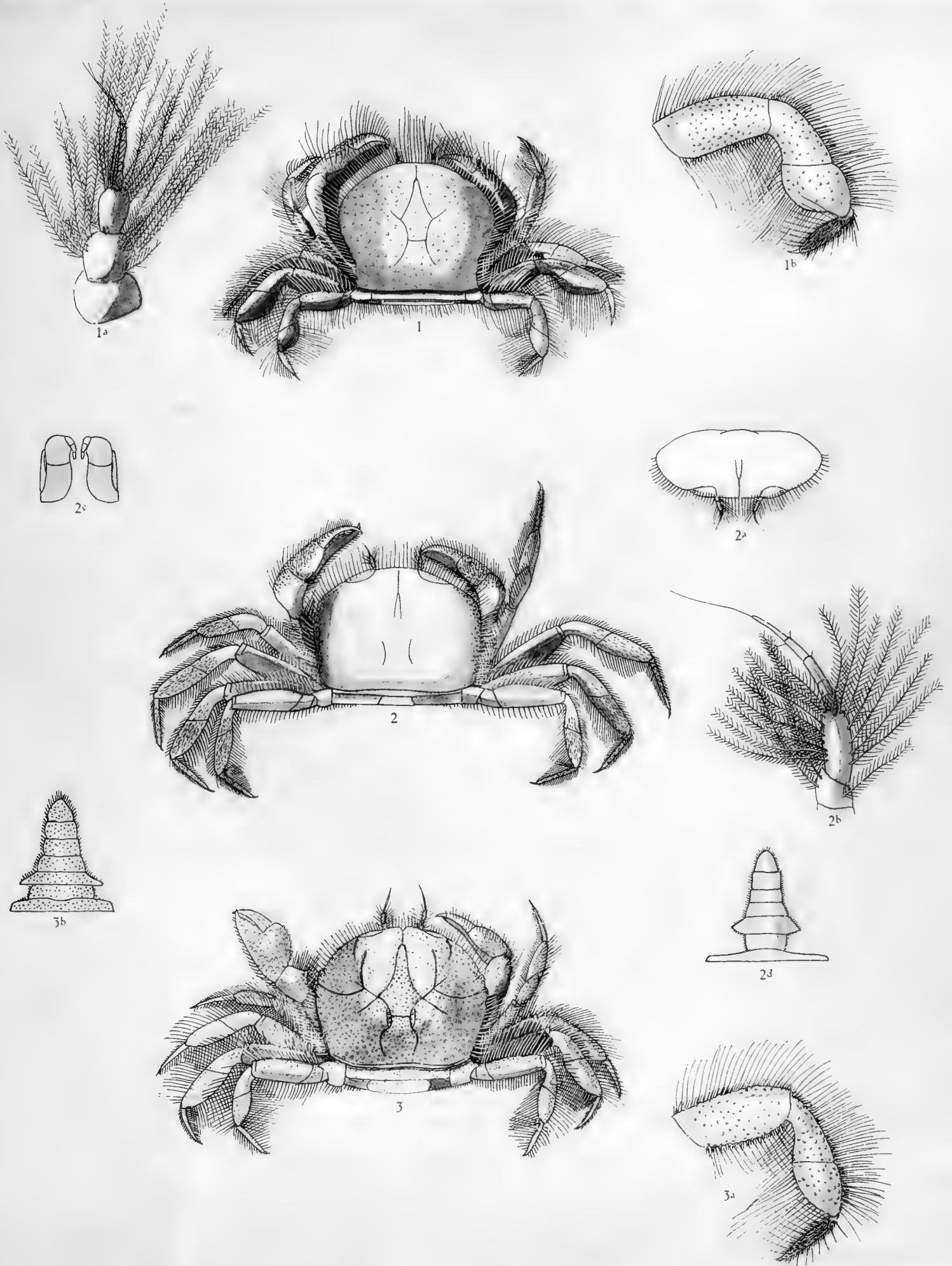
1. *Xenophthalmodes dolichophallus* n. sp.

2. *Paraselwynia ursina* n. g. n. sp.

3. *Scalopidia spinosipes* Stimpson.

PLATE XV.

- Fig. 1. *Typhlocarcinodes crassipes* n. sp., ♀, magn. 4. Fig. 1*a* left antenna, ventral view, magn. 30. Fig. 1*b* right last leg, magn. 10.
- Fig. 2. *Typhlocarcinodes piroculatus* (Rathbun), ♂, magn. 7. Fig. 2*a* carapace, front view, magn. 7. Fig. 2*b* left antenna, ventral view, magn. 40. Fig. 2*c* external maxillipeds, magn. 10. Fig. 2*d* abdomen of ♂, magn. 7.
- Fig. 3. *Typhlocarcinodes hirsutus* (Borradaile), ♂, magn. 5. Fig. 3*a* right last leg, magn. 10. Fig. 3*b* abdomen of ♂, magn. 5.



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1. *Typhlocarcinodes crassipes* n. sp.

2. *Typhlocarcinodes piroculatus* (Rathbun)

3. *Typhlocarcinodes hirsutus* (Borradaile).



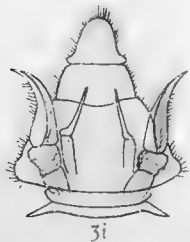
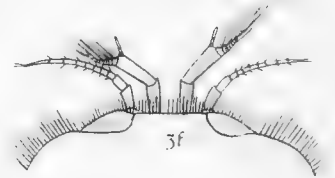
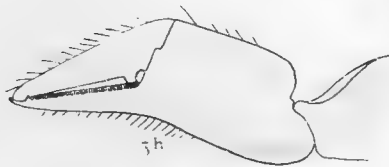
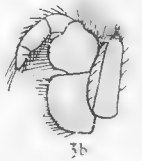
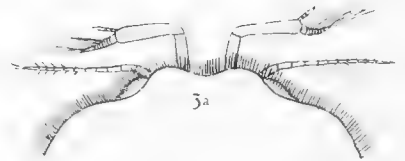
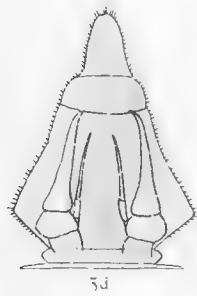
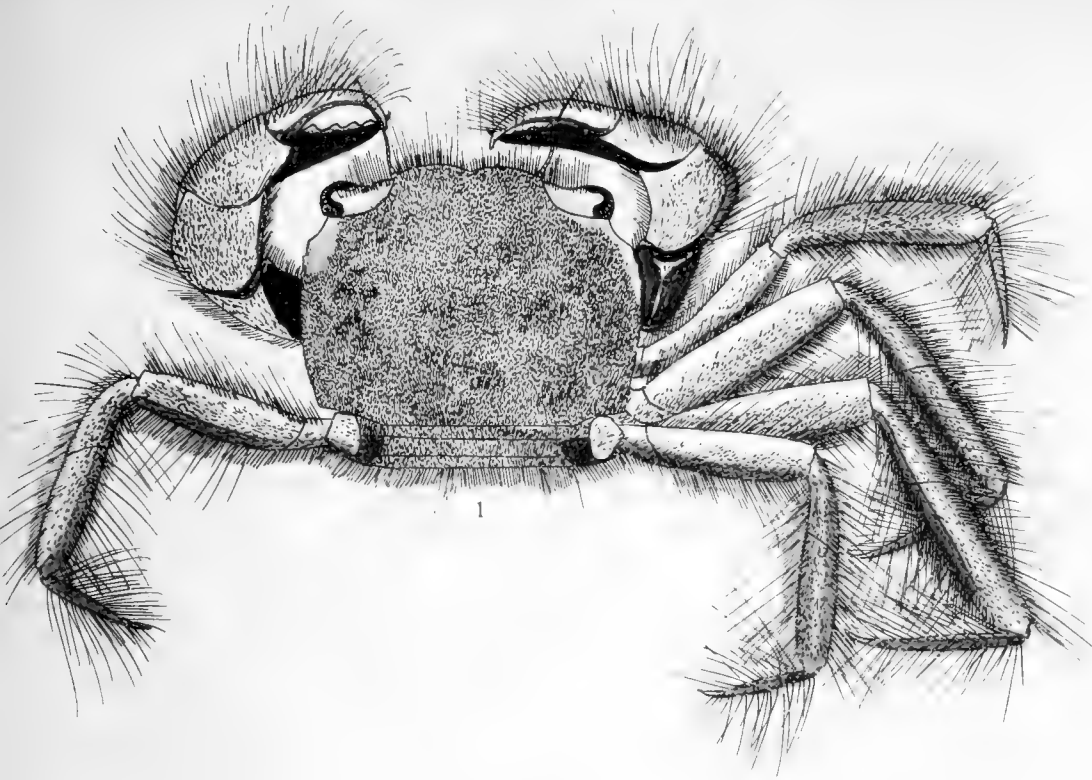


PLATE XVI.

Fig. 1. *Litocheira subintegra* Lanchester, ♂, magn. 10.

Fig. 2a. *Mertonia lanka* Laurie, antenna, magn. 30.

Fig. 3. *Camatopsis rubida* Alcock, ♀, "forma A" (specimen of Stat. 5), magn. 2. Fig. 3a carapace of ♂, "forma A" (specimen of Stat. 306), seen obliquely in dorsal and in facial view, magn. 5. Fig. 3b external maxilliped, "forma A", magn. 5. Fig. 3c left chela of ♂, "forma A", outer view, magn. 5. Fig. 3d abdomen of ♂, "forma A" (specimen of Stat. 312), inner view, magn. 10. Fig. 3e ♂, "forma B" (specimen of Stat. 312), magn. 4. Fig. 3f carapace of same specimen, seen obliquely in dorsal and in facial view, magn. 10. Fig. 3g external maxilliped of same specimen, magn. 10. Fig. 3h left chela of same specimen, outer view, magn. 10 (beneath it the serrulation of inner margin of fixed finger, magn. 60). Fig. 3i abdomen of same specimen, inner view, magn. 10.



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1 *Litocheira subintegra* Lanchester.

2^a *Mertonia lanka*. Laurie

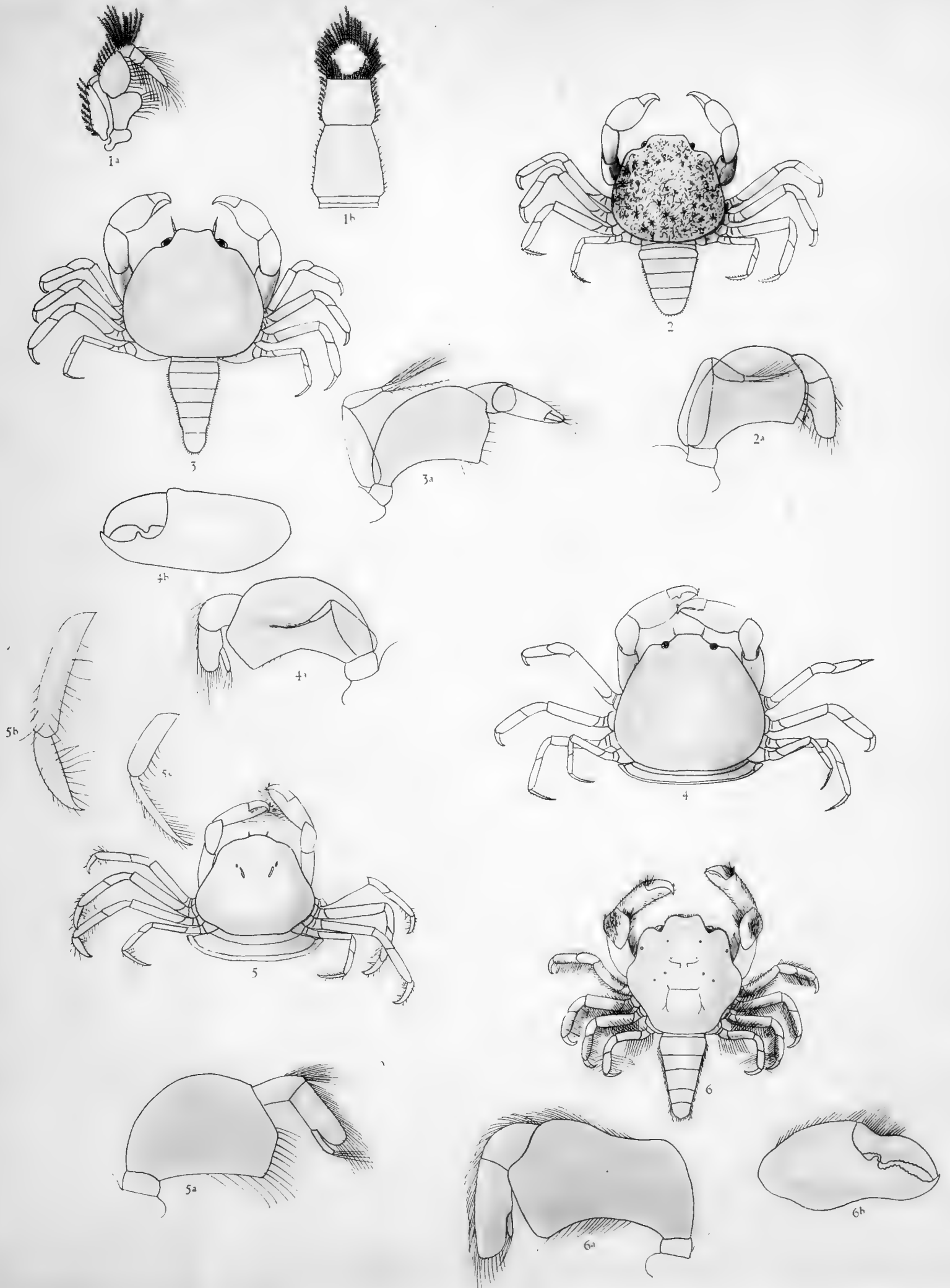
3. *Camatopsis rubida* Alcock.





PLATE XVII.

- Fig. 1 *a*. *Hexapus sexpes* (Fabricius), external maxilliped, magn. 10. Fig. 1 *b* abdomen of ♂, magn. 10.
Fig. 2. *Pinnotheres quadratus* Rathbun, ♂, magn. 10. Fig. 2 *a* external maxilliped, magn. 40.
Fig. 3. *Pinnotheres obesus* Dana, ♂, magn. 10. Fig. 3 *a* external maxilliped, magn. 40.
Fig. 4. *Pinnotheres consors* Bürger, ♀, magn. 7. Fig. 4 *a* external maxilliped, magn. 30. Fig. 4 *b* left chela of ♀, outer view, magn. 16.
Fig. 5. *Pinnotheres onychodactylus* n. sp., ♀, magn. 3. Fig. 5 *a* external maxilliped, magn. 20. Fig. 5 *b* propodite and dactylus of left penultimate leg, magn. 10. Fig. 5 *c* propodite and dactylus of left last leg, magn. 10.
Fig. 6. *Pinnotheres trichopus* n. sp., ♂, magn. 4. Fig. 6 *a* external maxilliped, magn. 30. Fig. 6 *b* right chela of ♂, outer view, magn. 10.



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1. *Hexapus sexpes* (Fabricius).

2. *Pinnotheres quadratus* Rathbun.

3. *Pinnotheres obesus* Dana.

4. *Pinnotheres consors* Bürger.

5. *Pinnotheres onychodactylus* n. sp.

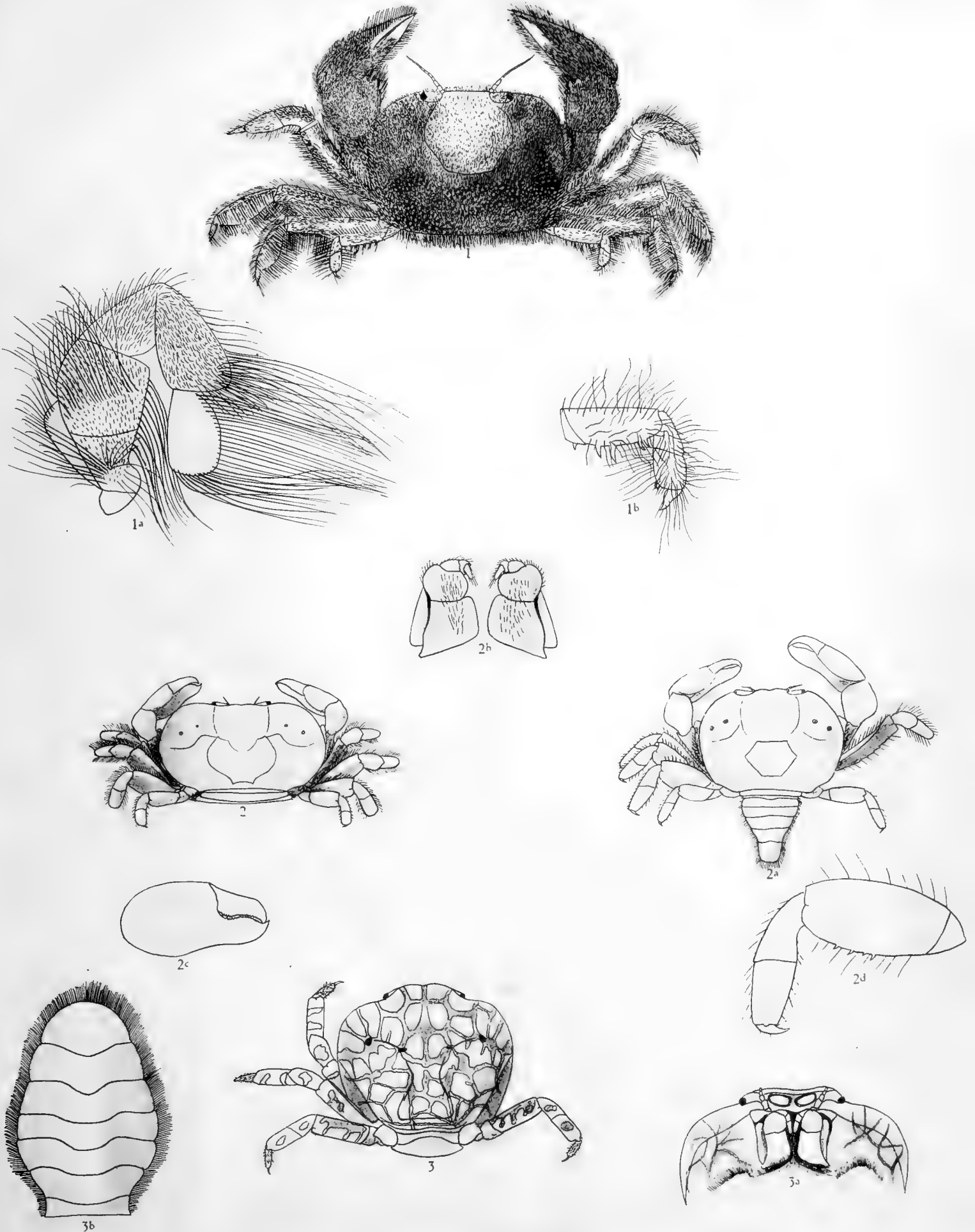
6. *Pinnotheres trichopus* n. sp.





PLATE XVIII.

- Fig. 1. *Tetrias fischeri* (A. Milne-Edwards), ♀, magn. 5. Fig. 1*a* external maxilliped, magn. 30. Fig. 1*b* right last leg, magn. 10.
- Fig. 2. *Aphanodactylus sibogae* n. g. n. sp., ♀, magn. 3. Fig. 2*a* ♂, magn. 4. Fig. 2*b* external maxillipeds, magn. 10. Fig. 2*c* right chela of ♂, outer view, magn. 5. Fig. 2*d* left penultimate leg of ♂, magn. 10.
- Fig. 3. *Hapalonotus reticulatus* (de Man), ♀, magn. 1½. Fig. 3*a* anterior part of cephalothorax, ventral view, magn. 2. Fig. 3*b* abdomen of ♀, magn. 2.



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HEJOTYPIE, LVAN LEER & C^o AMSTERDAM

1. *Tetrias fischeri* (A. Milne-Edwards).

2. *Aphanodactylus sibogae* n. g. n. sp

3. *Hapalonotus reticulatus* (de Man).



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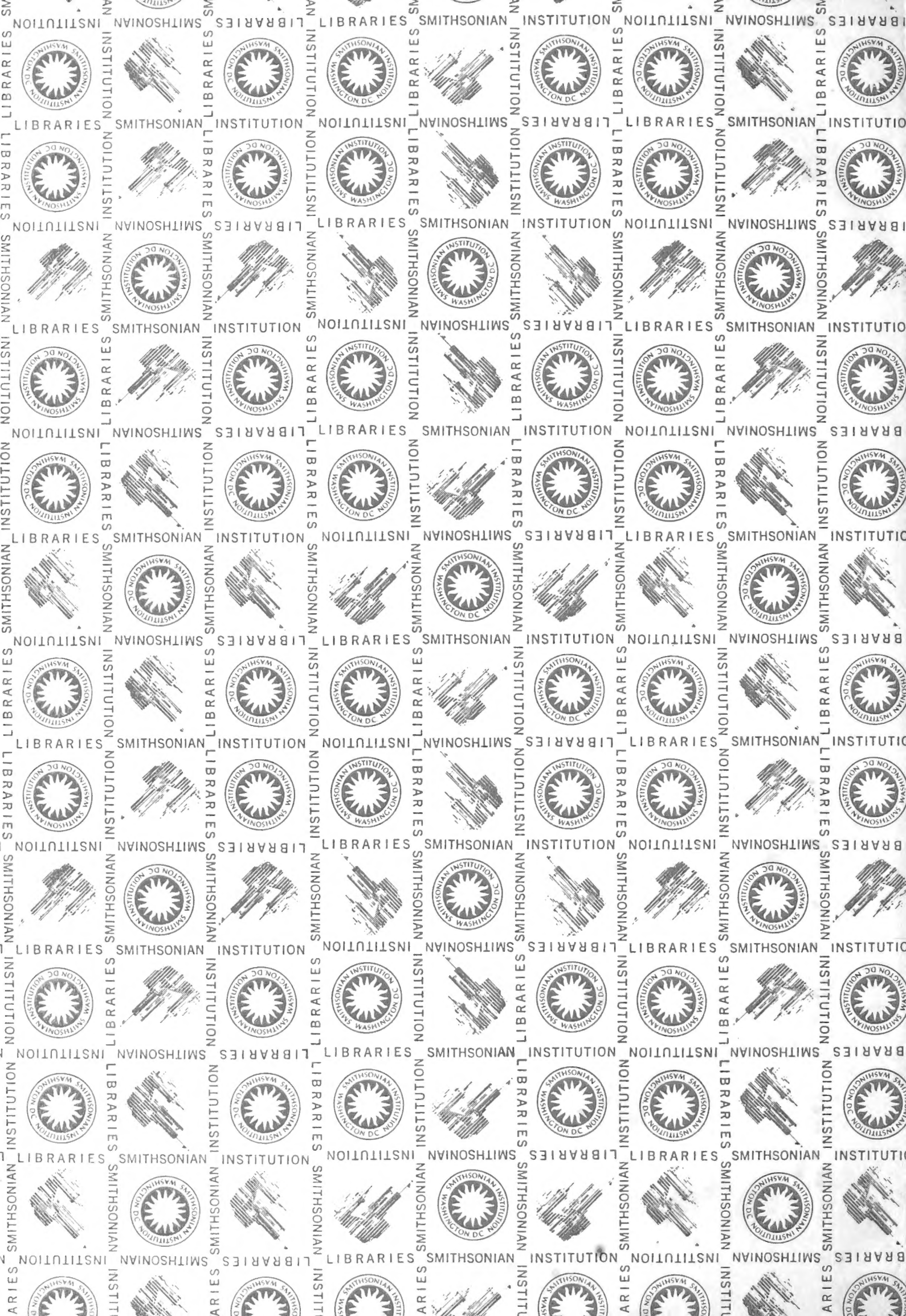
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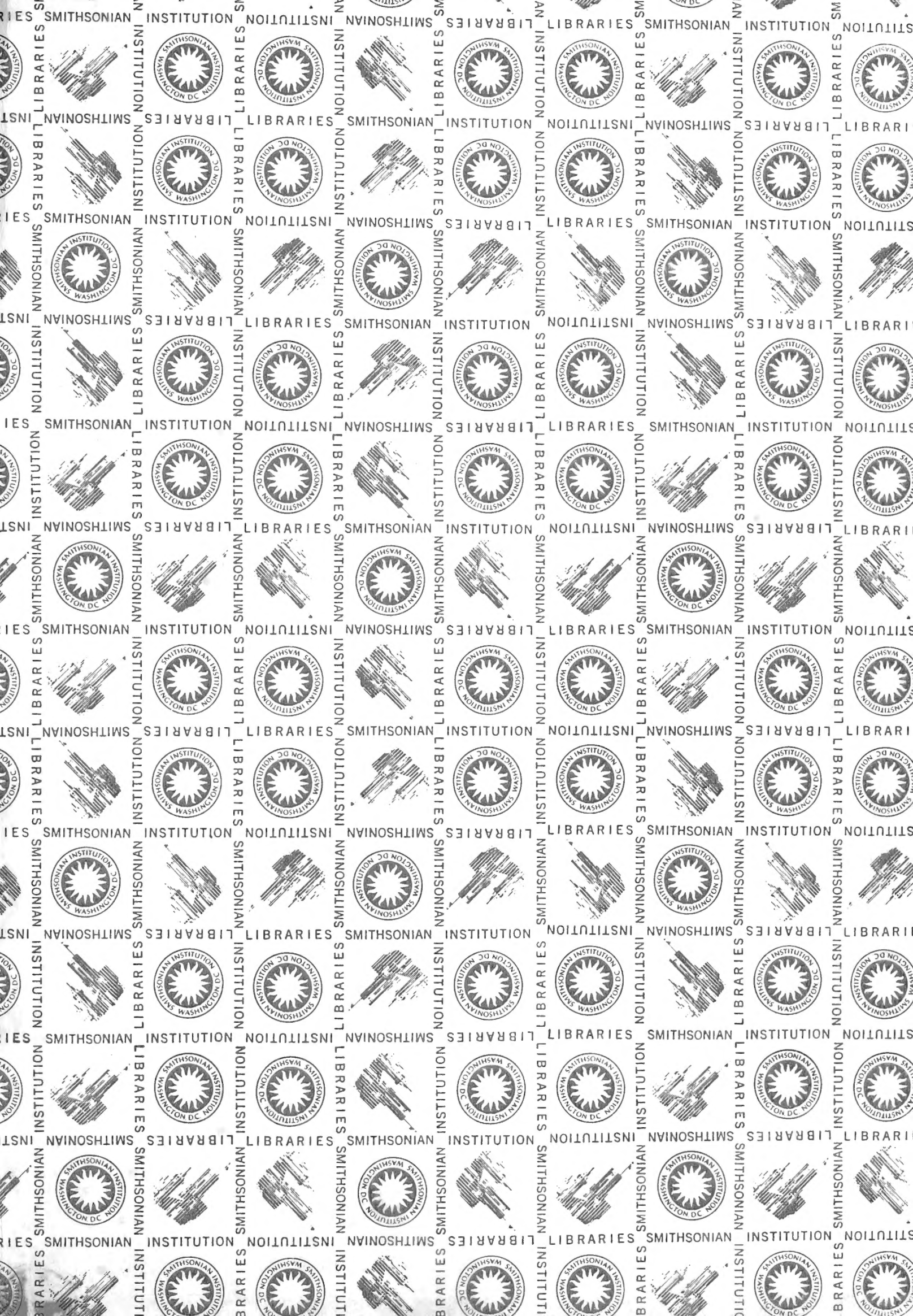












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