Siboga-Expeditie
XXXIXc³

THE DECAPODA BRACHYURA OF THE SIBOGA-EXPEDITION

VII

BRACHYGNATHA: PORTUNIDAE

BY

JENTINA E. LEENE
(Zoological Laboratory, University of Amsterdam)

With 87 figures in the text

LEIDEN
E. J. BRILL
1938

THE DECAPODA BRACHYURA OF THE SIBOGA-EXPEDITION

VII
BRACHYGNATHA: PORTUNIDAE

BY

JENTINA E. LEENE

(Zoological Laboratory, University of Amsterdam)

PART I
INTRODUCTION

A few years ago the very extensive *Portunidae* material, collected by the Siboga-Expedition was placed at my disposal for investigating purposes by Prof. Dr J. E. W. IHLE, with the consent of Prof. MAX WEBER. At the same time I had the opportunity of examining the extensive material collected in the Java Sea by the exploring vessel "Gier". In the "Zoologisch Museum" in Amsterdam there were, moreover, a few minor collections, which thus far had not been determined, or the results of which had not yet been published.

At the very outset it became clear to me that in the family *Portunidae* there were several genera which very much needed revision, so that I conceived the plan of revising the genera sufficiently represented in our collections. In the case of genera of which we possessed comparatively few representatives, or where no confusion had arisen because of the small number of species, I have restricted myself to adding a few supplementary statements to existing descriptions.

I have not yet revised the genera *Neptunus* de Haan and *Thalamita* Latreille, and so I have no detailed impression of the Indo-Pacific representatives of the subfamily *Lupinae* Alcock. Therefore I have not given in this part a general characteristic of the family, nor a division into subfamilies. I hope that I shall shortly be in a position to do so, after completing my study of the genera mentioned, when I also intend to add a determination table of the various Indo-Pacific genera.

In this part I shall discuss the following genera: *Ovalipes* Rathbun, *Lissocarcinus* Adams & White, *Caphyra* Guérin, *Carupa* Dana, *Lupocyclus* Adams & White, *Podophthalmus* Lam., *Scylla* de Haan, *Charybdis* de Haan.

My thanks are due to the COMMITTEE of the LINNAEUSFONDS who, by a grant, enabled me to investigate the typematerial of *Charybdis* de Haan in Paris.

I am greatly indebted to the late Prof. Dr CH. GRAVIER and to Mr MARC ANDRÉ for their hospitality and assistance in the "Muséum National d'Histoire Naturelle" in Paris; to Prof. Dr H. BALSS (München), Dr BENICK (Lübeck), Dr E. H. BRYAN (Honolulu, Hawaii), Mr FENNER A. CHACE, JR (Cambridge, Mass.), Dr B. N. CHOPRA (Calcutta), Dr I. GORDON (London), Prof. Dr

A. SCHELLENBERG (Berlin), Dr WALDO SCHMITT (Washington), Dr O. SCHROEDER (Kiel), Dr K. STEPHENSEN (Copenhagen), Mr MELBOURNE WARD (Sydney), Dr A. ZILCH (Frankfurt a. M.) for the loan of material and for supplying all the information required. I thank Dr C. J. SHEN for the material he gave me. I wish to thank Prof. Dr H. BOSCHMA for the hospitality so frequently extended, and Miss A. M. BUITENDIJK for her assistance in the search for material in the "Rijksmuseum van Natuurlijke Historie" in Leiden. Prof. Dr L. F. DE BEAUFORT I thank for placing at my disposal all the Indo-Pacific *Portunidae* present in the "Zoologisch Museum" in Amsterdam. It would have been impossible for me to accomplish this work without the assistance of all these scientists.

I am very grateful to Dr A. J. SUNIER (director) and to Miss J. H. SCHEFFER (librarian) for their willingness in always placing at my disposal the works, mainly from the library of the late Dr J. G. DE MAN, belonging to the library of the Royal Zoological Society "Natura Artis Magistra" (Amsterdam).

To Mr J. F. OBBES, Mr M. A. KOEKKOEK and Miss A. H. MILLON (Paris) I wish to express my thanks for their accurate drawing of the figures.

Finally I thank Prof. Dr J. E. W. IHLE for all his advice and his continuous interest in this work, which I had the privilege of doing in his laboratory.

Carcinus Leach, see pp. 144, 146.
Benthochascon Alcock see pp. 144, 146.
Ovalipes Rathbun.

Ovalipes, 1899, RATHBUN, Proc. U.S. Nat. Mus., vol. 21, p. 597.
1904, STEBBING, South Afr. Crust., pt 2, p. 12.
1910, STEBBING, Ann. S. Afr. Mus., vol. 6, p. 305.
Platyonichus, 1825, LATREILLE, (pt), Encycl. Méth., Entom., vol. 10, p. 151.
1834, MILNE EDWARDS, Hist. Nat. Crust., vol. 1, p. 435.
1861, A. MILNE EDWARDS, (pt), Arch. Mus. Hist. Nat., vol. 10, p. 410.
1874, MIERS, Crust. in Zool. "Erebus and Terror", p. 2.
1876, MIERS, Cat. Stalk- and sessile-eyed Crust. of New Zealand, p. 31.
1882, HASWELL, Cat. Austr. Crust., p. 84.
1886, MIERS, Challenger Brachyura, p. 201.
1897, RATHBUN, Proc. Biol. Soc. Washington, vol. 11, p. 158, (a revision of the nomenclature).
Anisopus, 1833, DE HAAN, (subgen.) Crust. in Fauna Japonica, p. 2.

For the diagnosis of this genus see MIERS (1886). The species belonging to this genus are: *O. bipustulatus* (M. Edw.), *O. iridescens* (Miers), *O. ocellatus* (Herbst). The Siboga-Expedition collected *O. iridescens* (Miers), so this species was found in the Indian Archipelago for the first time.

Geographical distribution: In the Indo-Pacific and the W. Atlantic region.

Ovalipes iridescens (Miers).

Platyonichus iridescens, 1886, MIERS, Challenger Brachyura, p. 202, pl. 17, fig. 2.
Ovalipes iridescens, 1933, YU YOKAYA, Journ. coll. Agriculture Tokyo Imp. Univ., vol. 12, p. 174.

Station 251, 5°28'4 S, 132°0'2 E, 204 m, 7 ♂♂, 3 ♀♀.
Station 253, 5°48'2 S, 132°13' E, 304 m, 9 ♂♂, 9 ♀♀.

These specimens agree with the description given by MIERS.

Geographical distribution: Kei-Islands (MIERS); Bungo Strait, West of Asizuri-Zaki and near Kosiki Islands (YU YOKOYA).

Aeneacancer Ward, see pp. 144, 146.
Parathranites (Miers), see pp. 144, 146.
Lissocarcinus Adams & White.

Lissocarcinus, 1848, ADAMS & WHITE, "Semarang", Crustacea, p. 45.
1860, A. MILNE EDWARDS, Ann. Sc. Nat. Zool., (4), vol. 14, p. 228.
1861, A. MILNE EDWARDS, Arch. Mus., vol. 10, p. 417.
1886, MIERS, Challenger Brachyura, p. 204.
1899, ALCOCK, Journ. As. Soc. Bengal, vol. 68, pt 2, p. 18.
Assecla, 1877, STREETS, Bull. U. S. Nat. Mus., vol. 7, p. 110.

Cephalothorax as broad as long or broader than long; smooth or with one, two or many transverse ridges. These transverse ridges generally occur only on the anterior part of the cephalothorax; in *L. arkati* also on the posterior part.

Front more or less prominent beyond the inner supra-orbital angles, which are more or less clearly distinguishable, sub-entire or distinctly cut into two lobes; breadth (exclusive of the inner supra-orbital angles) one half to one third of the greatest breadth of the cephalothorax.

Antero-lateral borders a little oblique, moderately arched, nearly always cut into five lobes or teeth, including the outer orbital angle.

Postero-lateral borders straight or concave, strongly convergent posteriorly or nearly parallel.

In the upper edge of the orbit two fissures are sometimes distinct, sometimes almost indistinguishable.

Basal antenna-joint short, but not peculiarly broad: its outer angle projects as a lobule that meets the front and fills the orbital hiatus so as to exclude the flagellum.

Antennules folded nearly transversely, or a little obliquely.

Epistome short and though well enough demarcated from the palate, somewhat overlapped by the external maxillipeds.

Buccal cavern squarish, broader than long, the efferent branchial channels well-defined.

Chelipeds short, but a little longer and stouter than the legs; arm short, generally smooth and without any distinct spines; the inner angle of the wrist is nearly always dentiform; palm not prismatic, sometimes costate on the upper surface; fingers stout and rather shorter than the palm.

The other pereiopods are sub-equal in size, somewhat shorter than the chelipeds; the propus and the dactylus of the last pair are typically foliacious swimming paddles, but carpus and merus are not particularly dilated.

The abdomen of the male consists of five parts, the third—fifth terga being fused, sometimes a part of a suture between the third and fourth terga is distinguishable.

Biological remarks. Four out of the eight known species of *Lissocarcinus* are stated to occur in Salpae (*L. boholensis*), or on (in) Holothurians (*L. holothuricola, orbicularis, ornatus*).

They all have a well-developed cephalothorax with distinct transverse ridges (cf. *boholensis*), or with a distinct colour-pattern (cf. *holothuricola, orbicularis* and *ornatus*); the chelipeds have "a finely roughened surface" (cf. *boholensis*) or costae (cf. *holothuricola, orbicularis, ornatus*).

In the Pinnotheridae, where symbiosis occurs, the cephalothorax is generally ill-calcified and membraneous (TESCH, Siboga 39 c 1, p. 96), "devoid of color-markings, and their shell

is more or less rounded, the irregularities of the surface being removed by the constant pressure to which it is subjected by the living walls of their dark abode" (STREETS, p. 113). STREETS concludes from this that *L. holothuricola* does not find a permanent abode in Holothurians.

About *L. orbicularis,* which he has observed in a living condition, BORRADAILE (1902, Fauna and Geogr. Mald. and Lacc. Archip., vol. 1, pt. 2, p. 200) says: "It hides under or among the tentacles (of the Holothurian), coming out for shelter at times, perhaps to feed, and crawling all over the body of its host, on which it crouches if disturbed. Its dark purple colouring with white spots is protective, resembling the sticky black skin of the teatfish with grains of coral sand adherent. Paler brown forms live on other Holothurians, to whose colour their own is adapted."

Moreover, there are in the literature a few instances of *L. orbicularis* without a host.

On the ground of the colour-pattern and the irregularities on the carapace and the chelipeds, CHOPRA (1931, Rec. Ind. Mus., vol. 33, p. 311) suggests two possibilities: "(1) the members of this genus have taken to this mode of life very recently, (2) they visit this habitat only occasionally in search of food or for shelter."

If we leave the case of *L. boholensis* out of consideration, since in Salpae organisms are often found, which have entered with the food current and are unable to escape, and as we have only one finding-place of this species, we come to the following conclusion, with the necessary restriction, because we possess only few accurate data: (1) there is no symbiosis in the case of *Lissocarcinus* (a cohabitation of two specifically different organisms, which is to the advantage of both parties (cf. IHLE, 1929, in: IHLE en NIERSTRASZ, Leerboek der Algemeene Dierkunde, p. 281), (2) there is a more or less temporary (STREETS, CHOPRA) epoecy (a cohabitation of two specifically different organisms, in which one organism finds shelter and habitat, sometimes also food, in cavities of, or on the other one, which is neither benefited nor injured by this (cf. IHLE, pp. 281 and 289), (3) the colour-pattern is protective (BORRADAILE, p. 200).

Eight species belong to this genus: *L. arkati* Kemp, *L. boholensis* Semper, *L. elegans* Boone, *L. holothuricola* (Streets), *L. laevis* Miers, *L. orbicularis* Dana, *L. ornatus* Chopra, *L. polybioides* Adams & White.

In our collection four species are present: *L. arkati, L. laevis, L. orbicularis, L. polybioides.*

I subjoin a few remarks about three species, which are not found in our collection.

SEMPER (1880, in NAUCK, Z. Wiss. Zool., vol. 34, pp. 60, 67) described very briefly a single specimen of *L. boholensis* from Bohol. Unfortunately this specimen is lost. RATHBUN (1910, Mem. Ac. R. Sc. et L. de Danemark, (7), vol. 5, p. 363) has given a detailed diagnosis of one immature ♀, in which she corrects part of SEMPER's description.

It appears from RATHBUN's description that this species can be clearly distinguished from most of the *Lissocarcinus* species by its having many transverse ridges on the cephalothorax. It shares this characteristic with *L. arkati,* but with *L. boholensis* the ridges are very evident and fairly continuous on the anterior part of the cephalothorax only, on the posterior part they become indistinct. Other differences with *L. arkati* are: (1) the front is strongly projecting, beyond the inner supra-orbital angles; (2) the postero-lateral borders are concave; (3) the posterior border is half the greatest breadth of the cephalothorax.

STREETS (1877) has suggested a new genus *Assecla,* to which would belong *A. holothuricola* and

L. orbicularis Dana. It is not clear from his diagnosis why he does not count *A. holothuricola* among the genus *Lissocarcinus*. The only argument he puts forward is the different shape of the fifth pair of pereiopods; according to him the same difference exists between *Carcinus* and *Platyonichus*. Examining the specimens of the species in our collection I noticed that the natatory legs of *Lissocarcinus polybioides*, the specimen which is typical of the genus *Lissocarcinus*, are like those of *L. orbicularis*, so that it would seem that ALCOCK and CHOPRA were right in counting *Assecla holothuricola* among the genus *Lissocarcinus*, although they do not state their reasons for doing so.

LEE BOONE (1934, Bull. Vanderbilt Marine Mus., vol. 5, p. 50, pl. 16) adds a new species to this genus (*L. elegans*). The antero-lateral border has here only one distinct, sharp tooth (the outer orbital angle), which is distinctly separated from the other part of this border, which might be taken as one great lobe. The antero-lateral border passes without a break into the postero-lateral border.

Geographical distribution. The genus *Lissocarcinus* is found in all parts of the Indo-Pacific region, and hitherto has not been recorded outside this region.

The Siboga-Expedition collected *L, polybioides* Ad. & Wh., *L. orbicularis* Dana and *L. laevis* Miers. Of these species *L. polybioides* was found in the Indian Archipelago for the first time.

The "Gier" collected *L. arkati* Kemp, so this species was found in the Indian Archipelago for the first time.

Key to the Indo-Pacific species of *Lissocarcinus*.

A. Antero-lateral border cut into five teeth or lobes:
  I. Cephalothorax has 1,2 or no transverse ridges:
    1. Cephalothorax as broad as long; the posterior part markedly constricted; front broadly triangular, notched at tip; inner supra-orbital angles well defined; first tooth of antero-lateral border the largest; cephalothorax has only one epibranchial ridge . . . . . *L. polybioides* Ad. & Wh.
    2. Cephalothorax broader than long:
      a. Front broadly triangular, sub-entire; the last antero-lateral lobe is the smallest, the others are sub-equal; cephalotharox smooth, except for a more or less distinct epibranchial ridge *L.orbicularis* Dana.
      b. Front broadly triangular, sub-entire, only somewhat sinuous; the second antero-lateral lobe is the broadest, the fifth is the smallest and more dentiform; cephalothorax has the usual epibranchial ridge and one anterior to it . *L. holothuricola* Streets.
      c. Front deeply concave in the middle; the third and fourth antero-lateral lobes are somewhat larger than the first two, the fifth lobe is more like a blunt tooth; cephalothorax has one epibranchial ridge . . . . . *L. ornatus* Chopra.
      d. Front cut into two broad lobes; well defined dentiform inner supra-orbital angles; first and fifth antero-lateral lobes are the smallest; cephalothorax perfectly smooth . *L. laevis* Miers.

II. Cephalothorax has many transverse ridges:

1. Front strongly projecting beyond the inner supra-orbital angles; postero-lateral borders concave; posterior border half the breadth of the cephalothorax . . . . . *L. boholensis* Semper.
2. Front projecting very little beyond the inner supra-orbital angles; postero-lateral borders straight; posterior border two thirds the breadth of the cephalothorax . . . . . *L. arkati* Kemp.

B. Antero-lateral border cut by one incision into a distinct outer orbital angle and a much larger lobe-like part. No distinct transverse ridges on the cephalothorax. Front slightly bilobed . . . . . *L. elegans* Boone.

Lissocarcinus polybioides Adams & White.

Lissocarcinus polybioides, 1899b, ALCOCK, p. 19, see also for the older literature.
1884, MIERS, "Alert", p. 541.
1906, LAURIE, Rep. Pearl Oyster Fisheries, pt 5, p. 411.
1911, RATHBUN, Trans. Linn. Soc. London, (2), vol. 14, pt 2, p. 204.
1922, BALSS, Arch. Naturgesch., 88. Jahrg., Abt. A, p. 102.
1927, HERBERT M. HALE, Crust. South Australia, pt 1, p. 146.
1930, MCNEILL, Rec. Austr. Mus., vol. 17, p. 378, pl. 59, fig. 4.
1934, SAKAI, Sc. Rep. Tokyo Bunrika Daigaku, sect. B, vol. 1, p. 302, textfig. 15.

Station 260, 5°36'5 S, 132°55'2 E, 90 m, 2.3 miles N, 63° W from the North point of Nuhu Jaan, Kei-Islands, 1 ♀.

Java Sea, near Batavia, April-May, 1907, "Rembang", ottertrawl, 1 ♂.

Both specimens conform almost entirely to the description given by ALCOCK (p. 19). They only differ in a few details.

The "Siboga"-specimen shows the following differences: (1) the hands of the chelipeds have two crests on the upper surface, the outer one only ending in a tooth; (2) the first antero-lateral tooth is somewhat larger than the three following.

The "Rembang"-specimen differs in: (1) the ratio front/cephalothorax breadth being much less than ½; (2) the first antero-lateral tooth being very clearly the largest; (3) the inner angle of the wrist of the chelipeds being not dentiform, but smooth and rounded; (4) only the outer crest on the upper surface of the hand ending in a tooth.

To ALCOCK's description we add: The posterior border of the cephalothorax is concave. The postero-lateral borders are strongly convergent, concave (first part is somewhat convex). The cephalothorax, the sternum and the tergum of the abdomen are covered with numerous small markings (see ADAMS & WHITE).

Largest measurements in mm:

	♂
Length of cephalothorax	14.25
Breadth of cephalothorax	15.0
Front	5.5
Interorbital space	6.5
Major diameter of orbit	2.0
Length of cheliped	16.5

Geographical distribution: Seychelles (RATHBUN); Mulaku (BORRADAILE); Malabar Coast (ALCOCK); Gulf of Manaar (LAURIE); Ceylon (MIERS); Madras, Orissa, Ganjan, the Andamans (ALCOCK); Gulf of Martaban (HENDERSON); Nagasaki (SAKAI); South Australian Coast (MIERS); Port Jackson (HASWELL); Port Molle, Port Denison, Queensland (MCNEILL).

Lissocarcinus orbicularis Dana.

Lissocarcinus orbicularis, 1899b, ALCOCK, p. 20, see also for the older literature.
Lissocarcinus pulchellus, 1890, MULLER, Verhandl. Nat. Ges. Basel, vol. 8, pp. 475, 482, pl. 5, fig. 6.
Lissocarcinus orbicularis. 1899, NOBILI, Ann. Mus. civ. St. Nat. Genova, (2), vol. 20 (40), p. 255.
1902, BORRADAILE, Mald. and Lacc. Archip., vol. 1, pt 2, p. 200.
Lissocarcinus pulchellus, 1902, DE MAN, Abh. Senckenb. Nat. Ges., vol. 25, p. 641.
Lissocarcinus, orbicularis, 1900, CALMAN, Trans. Linn. Soc. London, Zool., (2), vol. 8, p. 20.
1906, LAURIE, Rep. Pearl Oyster Fisheries, pt 5, p. 411.
1906, NOBILI, Ann. Sc. Nat. Zool., (9), vol. 4, p. 187.
1906, RATHBUN, U.S. Fish Comm. Bull. for 1903, pt 3, p. 868.
1910, LENZ, VOELTZKOW Reise in Ost-Afrika, Bd 11, p. 553.
1911, RATHBUN, Trans. Linn. Soc. London, Zool., (2), vol. 14, pt 2, p. 204.
1923, C. H. EDMONDSON, Bern. P. Bishop Mus. Bull. 5, p. 21.
1936, SADAYOSHI MIYAKE, Annot. Zool. Japon., vol. 15, p. 507.

Station Roma, reef, on Holothurian, one egg-laden ♀.

The only Siboga-specimen conforms to ALCOCK's description (p. 20), except for the front, which is not dorsally concave; the inner supra-orbital angles are very indistinct.

In addition to ALCOCK's description we mention that: the posterior border of the cephalothorax is concave; the postero-lateral margins are convergent, nearly straight.

Measurement in mm:

	♀
Length of cephalothorax	8.0
Breadth of cephalothorax	9.0
Interorbital space	4.5
Major diameter of orbit	1.0
Length of cheliped	7.4

Geographical distribution: Obock (NOBILI); St Anna Canal (RICHTERS); Seychelles (MIERS, RATHBUN); Maldives and Laccadives (ALCOCK, BORRADAILE); Gulf of Manaar (LAURIE); Ternate (DE MAN); Liu-Kiu Islands (ORTMANN); Shika, Riukiu Islands (MIYAKE); Beagle Bay (NOBILI); Murray Island (CALMAN); Vitji Islands (DANA, A. MILNE EDWARDS); Fanning Island (EDMONDSON); Honolulu (RATHBUN).

Lissocarcinus arkati Kemp.

Lissocarcinus arkati, 1923, KEMP, Rec. Ind. Mus., vol. 25, p. 405, pl. 10, fig. 1.
1931, GORDON, Journ. Linn. Soc. Zool., vol. 37, p. 533.

Gier, no 4, Exp. 3, 16/11, 1907, 12 m, about 106°44' E, 3°22' S, one egg-laden female.

Our specimen agrees with the detailed and accurate description given by KEMP (p. 405).

Geographical distribution: Mouth of River Hughli (KEMP); Hongkong (GORDON).

Lissocarcinus laevis Miers.

Lissocarcinus laevis, 1886, MIERS, Challenger Brachyura, p. 205, pl. 17, fig. 3.
1893, J. R. HENDERSON, Trans. Linn. Soc., Zool., (2), vol. 5, p. 378.
1899b, ALCOCK, p. 21.
1902, BORRADAILE, Fauna and Geogr. Mald. and Lacc. Archip., vol. 1, pt. 2, p. 200.
1906, RATHBUN, U. S. Fish Comm. Bull. for 1903, pt 3, p. 869.
1906, LAURIE, Rep. Pearl Oyster Fish., pt 5, p. 411.
1934, SAKAI, Sc. Rep. Tokyo Bunrika Daigaku, sect. B, vol. 1, p. 302, textfig. 16.

Station 166, 2°28'5 S, 131°3'3 E, — 118 m, trawl, 1 ♀.
Station 184, anchorage off Kampong Kelang, South coast of Manipa-Island, 20 fms, 2 ♂♂.
Station 240, Banda, 1 ♀.
Station 313, anchorage East of Dangar Besar, Saleh Bay, — 36 m, 2 ♂♂, 2 ♀♀.
Ambon, reef, 1 egg-laden ♀.
Banda, 2 ♀♀ (one is egg-laden).

All the specimens are as described by ALCOCK (p. 21). I give the measurements of the largest ♂ and ♀ specimens.

Measurements in mm:

	Ambon, reef ♂	Stat. 184 ♀
Length of cephalothorax	13.0	10.5
Breadth of cephalothorax	16.5	12.5
Front	5.0	3.7
Interorbital space	6.5	4.8
Major diameter of orbit	2.5	2.5
Length of cheliped	20.5	20.0

Geographical distribution: South Nilandu (BORRADAILE); Malabar Coast (ALCOCK); Gulf of Manaar (LAURIE, HENDERSON); Ceylon; the Andamans (ALCOCK); Gulf of Martaban (HENDERSON); Mergui Archipelago (ALCOCK); Celebes Sea (MIERS); Nagasaki (SAKAI); Hawaii Islands (RATHBUN).

Caphyra Guérin.

Caphyra, 1832, GUÉRIN, Ann. Sc. Nat., (1), vol. 25, p. 283.
Camptonyx, 1861, HELLER, Crust. Roth. Meeres, p. 357.
1869, A. MILNE EDWARDS, Nouv. Arch. Mus., vol. 5, p. 156.
Caphyra, 1873, A. MILNE EDWARDS, Nouv. Arch. Mus., vol. 9, p. 172.
1901, NOBILI, Ann. Mus. Zool. Napoli, vol. 1, no 3, p. 11.
1906, NOBILI, Ann. Sc. Nat. Zool., (9), vol. 4, p. 188.
1934, BALSS, Faune des colon. franç., vol. 5, fasc. 8, p. 506.

Fifteen (? thirteen) species and one variety belong to this genus. NOBILI (1901, with a much needed addition in 1906) gave a key for determination. BALSS (1934) gave a suggestion for the affinity to the genera *Charybdis* de Haan and *Thalamonyx* A. M. Edw.; he doubts if *Caphyra archeri* Walker belongs to this genus and even if it belongs to the *Portunidae* at all. (See also pp .....).

In our material there is only one specimen, which belongs to *C. laevis* A. M. Edw.

This genus occurs throughout the Indo-Pacific region.

Caphyra laevis A. M. Edw.

Goniosoma laeve, 1869, A. MILNE EDWARDS, Nouv. Arch. Mus., vol. 5, p. 152.
Caphyra laevis, 1873, A. MILNE EDWARDS, Nouv. Arch. Mus., vol. 9, p. 173, pl. 4, fig. 2.
1887, DE MAN, Arch. Naturgesch., 53. Jahrg., Bd 1, p. 337.
1906, GRANT & MCCULLOCH, Proc. Linn. Soc. N.S. Wales, vol. 31, p. 18.
1926, MCNEILL, Austr. Zool., vol. 4, p. 307.
? *Caphyra semigranosa,* 1887, DE MAN, l.c., p. 337.

Siboga, Station 144, Anchorage north of Salomakiëe-(Damar-)island, reef, 1 ♀.

This specimen has five antero-lateral teeth; there is no granulation on its upper surface; the transverse ridge between the last antero-lateral teeth is not continued on the gastric region. So it agrees with the description and figure given by A. MILNE EDWARDS.

I think it doubtful, if *C. semigranosa* de Man is a different species.

Geographical distribution: Pulo Edam (?, DE MAN); North-west Islet, Capricorn Group, Queensland (MCNEILL.); New Caledonia (A. M. EDWARDS); Mast Head Island (GRANT & MCCULLOCH).

Carupa Dana.

Carupa, 1899, ALCOCK, Journ. As. Soc. Bengal, vol. 68, p. 25 (see also for the older literature).
1913, KLUNZINGER, Nova Acta, vol. 99, p. 328.
1924, BALSS, Denkschr. Ak. Wiss. Wien, math.-naturw. Klasse, vol. 99, p. 5.

To this genus, of which a clear diagnosis was given by ALCOCK (1899, p. 25) belong two species: *C. tenuipes* Dana and *C. laeviscula* Heller. DE MAN (1887b, p. 337), KLUNZINGER (1913, p. 329) and BALSS (1924, p. 52; 1934, p. 505) think that *C. tenuipes* Dana is identical with the immature stage of *C. laeviscula,* because a transverse ridge may occur on the cephalothorax of not fully-grown specimens of the latter species (DE MAN), and because the front is two-lobed (DE MAN, 1887b; KLUNZINGER, 1913; NOBILI, 1906, p. 189). As a third argument may be mentioned the fact that the seventh antero-lateral tooth is not so much smaller in proportion to the sixth as is the case in fully-grown specimens (RATHBUN, 1911, p. 210).

In our collection, however, there occurs a specimen (Siboga, stat. 78), which has about the same size (viz. cephalothorax length 5.1 mm, c. breadth 7.5 mm) as the specimen originally described by DANA (c.l. 2¼ lines, and c.b. 3½ lines). But it shows very clearly the characteristics of *C. laeviscula* and is not like *C. tenuipes* on account of the sinuate front, the more strongly converging antero-lateral and postero-lateral borders and the shape of the antero-lateral teeth.

We maintain therefore *C. tenuipes* Dana, though as a more or less dubious species.

Geographical distribution: Indo-Pacific region.

Carupa laeviscula Heller.

Carupa laeviscula, 1899b, ALCOCK, p. 26 (see also for the older literature).
1900, BORRADAILE, Proc. Zool. Soc. London, p. 578.
1901, LENZ, Zool. Jahrb. Syst., vol. 14, p. 455.
1902, DE MAN, Abh. Senck. Naturf. Ges., vol. 25, p. 642.
1906, NOBILI, Ann. Sc. Nat. Zool., vol. 4, p. 189.
1907, NOBILI, Mem. Reale Acc. Sc. Torino, (2), vol. 57, p. 386.
1906, RATHBUN, U.S. Fish Comm. Bull. for 1903, pt 3, p. 870.

1910, RATHBUN, Mém. Ac. R. Sc. Lettres Danemark, (7), vol. 5, p. 360.
1911, RATHBUN, Trans. Linn. Soc. London, Zool., (2), vol. 14, pt 2, p. 210.
1911, PESTA, Denkschr. Ak. Wiss. Wien, math-naturw. Klasse, vol. 88, p. 17, textfig. 1.
1923, EDMONDSON, Bern. P. Bishop Mus., Bull. 5, p. 21.

Carupa tenuipes, 1913, KLUNZINGER, Nova Acta, vol. 99, p. 329.
1924, BALSS, Denkschr. Ak. Wiss. Wien, math.-naturw. Klasse, vol. 99, p. 5.
1934, BALSS, Faune des Col. franç., vol. 5, fasc. 8, p. 505.

Station 58, anchorage off Seba Savu, reef, 1 ♀.
Station 61, Lamakwera, Solor Island, reef, 1 ♂.
Station 78, Lumu-Lumu shoal, Borneo bank, reef, 1 young specimen.
Station 133, anchorage off Lirung, Salibabu Island, reef, 1 ♂ and 1 egg-laden female.
Station 248, anchorage off Rumah Lusi, North-point of Tiur Island, reef, 1 ♂.
Station 301, 10°38' S, 123°25'2 E, reef, 1 ♂.
Gier, Ambon, 3/2, 1907, 1 egg-laden female.

For characteristics see ALCOCK, p. 26.

Of the Ambon specimen, teeth 4 and 5 on the left, and teeth 1 and 2 on the right of the antero-lateral border are grown together.

Largest measurements in mm:

	Station 61 ♂
Length of cephalothorax	11.5
Breadth of cephalothorax	16.5
Front	4.2
Inter-orbital space	5.0
Fronto-orbital border	10.5
Length of cheliped	26.0

Geographical distribution: Tahiti (HELLER); Fanning Island (EDMONDSON); Honolulu (RATHBUN); Samoa Islands (ORTMANN); Laysan (LENZ); Koh Chang (RATHBUN); Timor, Ternate, Amboina (DE MAN); Tokyo Bay (ORTMANN); Salomon (RATHBUN); Funafuti (BORRADAILE); Madagascar (BALSS); Obock, Djibouti (NOBILI); Cosseir (KLUNZINGER); Haleib, Zebejir, Massana (BALSS).

Lupocyclus Adams & White.

Lupocyclus, 1899b, ALCOCK, p. 22 (seel also for the older literature).

For the diagnosis of this genus, see ALCOCK.

The species belonging to this genus are: *L. rotundatus* Ad. & Wh., *L. philippinensis* Semper, *L. quinquedentatus* Rathbun. They are all present in the material collected by the Siboga-Expedition.

The representatives of this genus are found in all parts of the Indo-Pacific region, excepting the Red Sea.

The Siboga-Expedition collected *L. quinquedentatus* Rathbun and *L. philippinensis* Semper in the Indian Archipelago for the first time.

Key to the Indo-Pacific species;

1. Front clearly distinguishable from inner supra-orbital angles:
   a. Inner supra-orbital angles reduplicated; arm of cheliped has 5—6 spines on inner margin . . . . . *L. rotundatus* Ad. & Wh.
   b. Inner supra-orbital angles are sharp teeth; arm of cheliped has 3—4 spines on inner margin . . . . . *L. quinquedentatus* Rathb.
2. Front practically confluent with inner supra-orbital angles; arm of cheliped slender and cylindrical with 6 or more spines on inner margin *L. philippinensis* Semper.

Lupocyclus rotundatus Ad. & Wh.

Lupocyclus rotundatus, 1899b, ALCOCK, p. 24 (see also for the older literature).
1906, LAURIE, Rep. Pearl Oyster Fish., Brachyura, p. 411.
1911, RATHBUN, Trans. Linn. Soc. London, (2), vol. 14, pt 2, p. 210.
1922, BALSS, Archiv. Naturgesch., 88. Jahrg., Abt. A, p. 113.
Goniosoma inaequale, 1887, WALKER, Journ. Linn. Soc., Zool., vol. 20, p. 116, pl. 8, fig. 4.
Lupocyclus inaequalis, 1893, HENDERSON, Trans. Linn. Soc. London, (2), vol. 5, p. 378.

Station 49a, 8°23'5 S, 119°4'6 E, Sapeh Strait, 69 m, two specimens.
Station 77, 3°27' S, 117°36' E, Borneo Bank, 59 m, 1 ♂.
Station 133, Anchorage off Lirung, Salibabu Island, up to 36 m, 1 ♂.
Station 240, Banda-anchorage, 2 ♂♂, 1 ♀.
Station 299, Boeka or Cyrus Bay, South coast of Rotti Island, up to 34 m, 1 ♂.
Station 303, Haingsisi, 36 m, 1 ♂.
Station Makassar, 5 ♂♂.
Jedan, 10/2/1907, 1 ♂.

In the younger specimens the frontal teeth are obtuser than is the case in the older specimens; but in all cases the inner supra-orbital angles are always clearly distinguishable from the front.

Geographical distribution: Saya de Malha; Seychelles (RATHBUN); Ceylon (ALCOCK, LAURIE); Andaman Sea (ALCOCK); Island of Balambangan, North end of Borneo (ADAMS & WHITE); Seas of Amboina (DE MAN); Port Molle, Queensland; Friday Island (MIERS).

Lupocyclus quinquedentatus Rathbun.

Lupocyclus quinquedentatus, 1906, RATHBUN, U.S. Fish Comm. Bull. for 1903, pt 3, 869, pl. 12, fig. 7, textfig. 28.
1911, RATHBUN, Trans. Linn. Soc. London, (2), vol. 14, pt 2, p. 210.

Station 37, Sailus Ketjil, Paternoster Islands, —27 m, 1 ♀.
Station 310, 8°30' S, 119°7'5 E, 73 m, 1 ♂.

Our specimens are in accordance with the description given by RATHBUN (1906, p. 869).

Geographical distribution: Cargados Carajos, Amirante, Seychelles (RATHBUN, 1911); South Coast of Molokai Island; Anau Channel; Penguin Bank, South Coast of Oahu, Northest Coast of Hawaii Island; vicinity of Modu Manu (RATHBUN, 1906).

Lupocyclus philippinensis Semper.

Lupocyclus strigosus, 1899b, ALCOCK, p. 24.
1900, ALCOCK, Ill. Zool. Invest., pl. 46, fig. 1.
1902, BORRADAILE, Fauna and Geogr. Mald. and Lacc. Arch., vol. 1, pt 2, p. 200.
1906, LAURIE, Rep. Pearl Oyster Fish., Brachyura, p. 412.

Lupocyclus philippinensis, 1880, SEMPER in NAUCK, Zeitschr. wiss. Zool., vol. 34, p. 68.
1887, DE MAN, Zool. Jahrb. Syst., vol. 2, p. 718.
1922, BALSS, Arch. Naturgesch., 88. Jahrg., Abt. A, p. 113.

Station 2, 7°25′ S, 113°16′ E, Madura Strait, 2 ♂♂.
Station 64, Kambaragi Bay, Tanah Djampeah, up to 32 m, 1 ♂.
Station 313, Anchorage East of Dangar Besar, Saleh Bay, up to 36 m, 1 ♂ and 1 ♀.

Our specimens are in accordance with the description of *L. strigosus*, given by ALCOCK.

L. strigosus differs only in a few characteristics from *L. rotundatus* Ad. & Wh. The most striking differences are the long and slender chelipeds and the fact, that the front is confluent with the inner supra-orbital angles.

I think that *L. strigosus* is identical with *L. philippinensis* Semper, because the proportion cephalothorax length to cheliped length and the armature of the arm of the chelipeds are the same (according to DE MAN, 1887).—Unfortunately DE MAN has given no characteristics of the front.—Therefore, the name '*philippinensis*' has to be maintained for reasons of priority.

Geographical distribution: Konkan Coast (ALCOCK); Gulf of Manaar (LAURIE); Madras Coast; Andaman Sea (ALCOCK).

Largest measurements in mm:

	♂
Length of cephalothorax	12.0
Breadth of cephalothorax	13.0
Length of cheliped	47.0

Podophthalmus Lamarck.

Podophthalmus, 1899b, ALCOCK, p. 93 (see also for the older literature).

For the diagnosis of this genus, see ALCOCK.

To this genus belong two species: *P. vigil* (Fabr.) and *P. nacreus* Alcock, which are both represented in our material.

This genus is found in all parts of the Indo-Pacific region. The Siboga-Expedition collected both specimens, *P. nacreus* being found in the Indian Archipelago for the first time.

Podophthalmus vigil (Fabr.).

Portunus vigil, 1798, FABRICIUS, Ent. Syst. Suppl., no 1, p. 363.
Podophthalmus spinosus, 1801, LAMARCK, Syst. Anim. sans Vert., p. 152.
1815—22, LAMARCK, Hist. Nat. Anim. sans Vert., vol. 5, p. 157.
1838, ibid., 2me éd., vol. 5, p. 471.
1803—04, LATREILLE, Gen. Crust. et Insect., vol. 1, pls 1 & 2, fig. 1; vol. 6, p. 54, pl. 46.
1825, Encycl. Meth., vol. 10, p. 308, fig. 1.
1825, DESMAREST, Consid. sur les Crust., p. 100, pl. 6, fig. 1.
1829—44, LATREILLE, Règne Anim., vol. 4, p. 33.
Podophthalmus vigil, 1815, LEACH, Zool. Misc., vol. 2, p. 149, pl. 108.
1837, DE HAAN, Faun. Jap., Crust., p. 44.
1834, H. MILNE EDWARDS, Hist. Nat. Crust., vol. 1, p. 467.
Crust. in: CUVIER, Règne Anim., Atlas, vol. 18, pl. 9, fig. 1.

1839, RANDALL, Journ. Ac. Nat. Sc., vol. 8, pt.1, p. 118.
1861, A. MILNE EDWARDS, Arch. Mus., vol. 10, p. 420.
1877, STREETS, Bull. 7, U.S. Nat. Mus., p. 113.
1874, HOFFMANN in: POLLEN et VAN DAM's, Rech. sur Faune Madagasc., pt 5, p. 39.
1880, E. NAUCK, Zeitschr. wiss. Zool., vol. 34, p. 60.
1880, MIERS, Ann. and Mag. Nat. Hist., (5), vol. 5, p. 238.
1886, MIERS, "Challenger", Brachyura, p. 207.
1889, CANO, Boll. Sc. Nat. Napoli, vol. 5, p. 91.
1889, NOBILI, Ann. Mus. Civ. St. Nat. Genova, (2a), vol. 20 (40), pp. 255, 498.
1901, LENZ, Zool. Jahrb., Syst., vol. 14, p. 458.
1903, NOBILI, Boll. Mus. Torino, vol. 18, p. 32.
1904, DE MAN, Samml. Geol. Reichsmus. Leiden, (1), vol. 7, p. 274.
1906, NOBILI, Ann. Sc. Nat. Zool., (9), vol. 4, p. 213.
1906, RATHBUN, U.S. Fish Comm. Bull. for 1903, pt 3, p. 875.
1910, RATHBUN, Mem. Ac. Roy. Sc. et Lettr. Danemark, (7), vol. 5, p. 366.
1913, KLUNZINGER, Nova Acta Ac. Leop. Carol., vol. 99, no 2, p. 375.
1915, LAURIE, Journ. Linn. Soc. London, Zool., vol. 31, p. 442.
1922, BALSS, Arch. Naturgesch., 88. Jahrg., Abt. A., p. 112.
1923, RATHBUN, Bull. Bernice P. Bishop Mus., vol. 5, p. 23.
1925, DELSMAN and DE MAN, Treubia, vol. 6, p. 314, pl. 15 b and c.
1934, LEE BOONE, Bull. Vanderbiltmuseum, vol. 5, p. 81, pls 37 and 38.
1936, SAKAI, Sc. Rep. Tokyo Bunrika Daigaku, sect. B, vol. 2, p. 163.
1937, SHEN, Bull. Raffl. Mus., 13, p. 137, textfig. 20.

Siboga (?), Dobo, pelagical, 1 ♂.
Batavia, March 1906, 1 ♂.
Bribes, 29/6/1906, 1 ♂.
Batavia, coll. van Kampen, 1 ♂.
Gier, no 4, Exp. 3, 16/11/1907, 1 ♂, 1 ♀.
Gier, no 4, Exp. 11, 23/11/1907, 1 ♂.
Gier, no 4, Exp. 16, 29/11/1907, 1 ♂.
Gier, no 9, Exp. 19, 1°3'5 S, 104°35' E, 6—8 fms, 1 ♂, 1 ♀.
Gier, no 9, Exp. 20, 1°22' S, 104°43' E, 5—8 fms, 1 ♀.
Gier, no 9, Exp. 21, 2°3' S, 105°48'5 E, 15—17 fms, 1♂.
Gier, no. 19, Exp. 8, 5°7' S, 107°29' E. 18—20 fms, 1 ♂, 1 ♀.

For the description of this species, see LEE BOONE (p. 81). She gives extensive information as to the characteristics.

Geographical distribution: throughout the Indo-Pacific region.

Measurements in mm:

	Gier, 19, Exp. 8		Gier, 9, Exp. 20	Gier, 9, Exp. 19		Gier, 4, Exp. 3	Batavia III, 1906	Bribes 20. VI, 1906	Batavia, v. Kampen	Dobo	Gier, 4, Exp. 16
	♂	♀	♀	♂	♀	♀	♂	♂	♂	♂	♂
Length of cephalothorax	43.5	38.2	24.1	30.6	23.5	44.0	49.0	35.6	34.0	18.4	11.0
Breadth of cephalothorax	106.5	88.2	55.8	71.6	54.2	103.2	117.0	84.9	83.0	40.8	24.2
Length of cheliped	151.8	106.4	66.2	79.0	67.2	125.7	183.9	113.8	110.7	—	27.7
Breadth of cephalothorax / Length of cephalothorax	2.47	2.31	2.32	2.34	2.31	2.35	2.39	2.38	2.43	2.21	2.20
Length of cheliped / Length of cephalothorax	3.49	2.76	2.75	2.58	2.86	2.86	3.75	3.17	2.44	—	2.52

Podophthalmus nacreus Alcock.

Podophthalmus nacreus, 1899b, ALCOCK, p. 93; Ill. Zool. Invest., pl. 48, fig. 4.
1922, BALSS, Arch. Naturgesch., 88, Jahrg., Abt. A, p. 112.

Siboga, station 64, Kambaragi-bay, Tanah Djampeah, up to 32 m, 1 ♀.
Siboga, station 313, Anchorage East of Dangar Besar, Saleh Bay, —36 m, two specimens.

The specimens, which I could examine, were very small and rather badly damaged. Nevertheless, I could ascertain that ALCOCK had sufficient reason to separate *P. nacreus* from *P. vigil* (Fabr.). There are very distinct differences between the two species in the shape of the cephalothorax and the armature of the chelipeds, which are not due—as BALSS suggested—to the juvenile stage of the representatives of *P. nacreus*. I could, namely, compare our specimens with a young specimen of *P. vigil* (about 13 mm broad, while the largest specimen of *P. nacreus,* mentioned and figured by ALCOCK, is 23 mm broad).

To the description of ALCOCK I add:

The antero-lateral border has a small incision near the place, where it rather abruptly bends posteriorly.

Geographical distribution: Andamans Isls, Gulf of Martaban (ALCOCK).

Scylla de Haan.

Scylla, 1899b, ALCOCK, p. 27, (see also for the older literature).
1876, MIERS, Cat. Crust. of N. Zealand, p. 27.
1882, HASWELL, Cat. Austr. Crust., p. 78.

To this genus (for the diagnosis see ALCOCK, p. 27) belongs only one living species.
The geographical distribution is very extensive and intensive throughout the Indo-Pacific region.

Scylla serrata (Forsk.).

Scylla serrata, 1899b, ALCOCK, p. 27 (see also for the older literature and synonyms).
1899, NOBILI, Ann. Mus. Civ. St. Nat. Genova, (2a), vol.20 (40), pp. 254 and 497.
1900, LANCHESTER, Proc. Zool. Soc. London, p. 748.
1902, DOFLEIN, Abh. Math. phys. Cl. Königl. bay. Ak. Wiss., vol. 21, p. 658.
1904, DOFLEIN, "Valdivia", vol. 6, p. 98.
Scylla tranquebarica, 1907, STIMPSON, Smith. Misc. Coll., vol. 49, p. 75.
Scylla serrata, 1910, RATHBUN, Mem. Ac. Roy. Sc. et Lettr. Danemark, (7), vol. 5, p. 360.
1910, STEBBING, Ann. S. Afr. Mus., vol. 6, p. 308.
1913, KLUNZINGER, Nova Acta Acad. Leop. Carol., vol. 99, no 2, p. 345.
1917, ROUX, Nova Guinea, vol. 10, Zool., p. 603.
1917, STEBBING, Ann. Durban Mus. vol. 2, pt 1, p. 9.
1918, KEMP, Mem. As. Soc. Bengal, vol. 6, pt. 5, p. 250.
1922, BALSS, Arch. Naturgesch., 88. Jahrg., Abt. A, p. 110.
1925, DELSMAN and DE MAN, Treubia, vol. 6, p. 308, pl. 10, fig. a.
1931, GORDON, Journ. Linn. Soc. Zool., vol. 37, p. 527.
1934, LEE BOONE, Bull. Vanderbiltmus., vol. 5, p. 68, pls 25—30.
1936, SHEN, The Chinese Journ. of Zool., vol. 2, p. 64.
1936, SAKAI, Sc. Rep. Tokyo Bunrika Daigaku, Sect. B, vol. 2, p. 162.
1936, SADAYOSHI MIYAKE, Annot. Zool. Japon., vol. 15, p. 507.

Station 47, Bay of Bima, 55 m, 2 ♀♀.
Station 71, Makassar, up to 32 m, 1 ♂ and 1 ♀.
Station 131, Anchorage off Beo, Karakelang-Islands, 13 m, 1 ♀.
Coll. Kleiweg de Zwaan, West-Nias, 1 ♂ and 1 ♀.

Coll. de Bussy, Deli, Sumatra, 1 ♂.
Onderneming Ramoema, S.E.C., leg. van Hoorn, 1915, 2 specimens.
Aru-Islands, Tissot van Patot leg. et don., 1 ♀.
Moro (near Surabaya), 1 ♂.
Batavia, haven, 1906, 1 young ♀.
Djankar, reef, 4 ♂♂.
Gier exp., Java Sea, 1 ♂ and 1 ♀.
Toxopeus leg., locality illegible, 1 ♂.

All the specimens agree with ALCOCK's description (p. 27).

Largest measurements (Siboga, Station 71, ♂): Cephalothorax length 100 mm, and cephalothorax breadth 148 mm.

The geographical distribution of this species is very extensive in the Indo-Pacific region.

Charybdis de Haan.

Portunus, (pars), 1798, FABRICIUS, Suppl. Ent. Syst.
Thalamita (pars), 1829, LATREILLE, Règne animal, 2e éd., t. 3, p. 33.
Charybdis and *Oceanus,* 1835, DE HAAN, Faun. Japon., Crust., pp. 10, 9.
Goniosoma, 1860, A. MILNE EDWARDS, Ann. Sc. Nat., Zool., (4), vol. 14, p. 263.
1861, A. MILNE EDWARDS, Arch. du Mus., vol. 10, p. 367.
1886, MIERS, Challenger Brachyura, p. 189.
Charybdis, 1897, RATHBUN, Proc. Biol. Soc. Washington, vol. 11, p. 161.
1899b, ALCOCK, p. 47.
1910, STEBBING, Ann. S. Afr. Mus., vol. 6, p. 306.

The genus *Charybdis* is very nearly related to the genera *Neptunus* de Haan and *Thalamita* Latreille. So long as the last two genera have not been revised I do not know the full significance of this relation. On account of this it is yet impossible for me to give a satisfactory demarcation of the genus *Charybdis.*

This is the reason why I have not included in the genus *Charybdis* those species which nearly resemble *Thalamita,* namely *Goniosoma lineatum* A. M. Edw. (on comparison of the typespecimen with the typespecimen of *Charybdis cookei* Rathbun, these two species proved to be identical), *Goniosoma longifrons* A. M. Edw. (the only known specimen, the type-specimen is no longer in the collection of the Museum in Paris) and *Thalamonyx danae* A. M. Edw. I also excluded the species *Goniosoma millerii* A. M. Edw., which resembles *Neptunus* because the antero-lateral border of the cephalothorax has nine teeth, and the basal antenna-joint does not touch the front.

Therefore I shall quote ALCOCK'S diagnosis of the genus, with a few slight modifications:

The cephalothorax is hexagonal, moderately broad, depressed or little convex, usually with transverse ridges, at any rate on its anterior part.

The front proper (not including the inner supra-orbital angles from which it is distinctly separated) is usually between a fourth and a third the greatest breadth of the cephalothorax, and is cut into six lobes or teeth (exclusive of the inner supra-orbital angles).

The antero-lateral borders are oblique, moderately arched, longer than the postero-lateral, and cut into 6 to 7 (8)—usually six—teeth, including the outer orbital angles.

The upper border of the orbit usually has two notches or fissures; usually there is a gap in the lower border, and the inner angle of this border is usually dentiform and moderately prominent. The antennulae are folded transversely.

The "basal" antenna-joint is short and broad; its outer angle forms a lobe which usually fills the orbital hiatus and meets the front, excluding the flagellum from the hiatus.

The epistome is sufficiently long; the buccal cavern is squarish, broader than long; the efferent branchial channels are usually well defined.

The chelipeds are massive, longer than any of the legs, usually a little unequal; the arm has spines, the inner angle of the wrist is strongly spiniform, the outer angle usually armed with spinules; the palm prismatic or tumid; the fingers are strong, usually about as long as the palm, strongly toothed.

The second to fourth pairs of pereiopods are compressed. In the natatory legs the meropodites and carpopdites are shortened and broadened (the meropodite usually has a spine a short distance proximal to the distal end of the posterior border) and the propodites and dactylopodites are typically foliaceous for swimming.

The abdomen of the male is five-jointed, the third to fifth terga being fused; the first tergum in both sexes is almost entirely concealed beneath the cephalothorax.

The name of *Charybdis* is preferable for this genus, as the name of *Goniosoma* is preoccupied for a genus of the *Arachnoidea* (as RATHBUN has stated). For the same reason (cf. RATHBUN) we cannot maintain the name of *Goniosoma* for a subgenus, which ALCOCK still thought possible.

ALCOCK divided the genus *Charybdis* into three subgenera: *Charybdis* (= *Goniosoma* A. M. Edw.), *Goniohellenus* Alcock, and *Gonioneptunus* Ortmann (while he is inclined to class *Thalamonyx* with *Charybdis*). In these subgenera the antero-lateral border of the cephalothorax is divided either into five well-developed teeth, and one not so well-developed tooth or into six well-developed teeth. (The outer orbital angle is always included in the numbers mentioned here). There are, however, species which undoubtedly belong to the genus *Charybdis* and whose antero-lateral border is divided either into four well-developed teeth and two (or three) small almost rudimentary teeth, or into five well-developed teeth and two (or three) small almost rudimentary teeth. It seemed to me preferable not to include these two groups in the subgenus *Charybdis*, to which they would belong on account of other characteristics, as this subgenus would then have to be considerably extended, but to classify them as two new subgenera.

The first group, of which at present only one species is known, I have called subgenus *Gonioinfradens* (it has one large tooth less than the other subgenera), the second group I have named subgenus *Goniosupradens* (it has at least one tooth more than the other *Charybdis* species).

In the subgenus *Charybdis* I could include a new variety: *Ch. variegata* var. *salehensis*; in the subgenus *Goniohellenus* I included two new varieties: *Ch. hoplites* var. *omanensis* and *Ch. hoplites* var. *longicollis*. For *Ch. (Ch.) sexdentata* de Man I suggest a new name, viz. *Charybdis amboinensis*, because there is much confusion as regards *Ch. sexdentata* Herbst, and the type specimen is lost.

The Siboga-Expedition collected of these varieties *Ch. variegata* var. *salehensis*. The other two varieties were in the material which I borrowed from the Indian Museum in Calcutta and from the "Zoologische Staatssammlung" in München respectively.

In the present publication I cancel *Ch. (Ch.) barneyi* Gordon (= *Ch. affinis* Dana, as Miss GORDON already suggested); *Ch. (Ch.) sowerbyi* Rathbun (= *Ch. japonica* A. M. Edw.); *Ch. (Ch.) merguiensis* de Man (= *Ch. hellerii* A. M. Edw., as DE MAN already suggested); *Ch. Smithii* Macleay (= *Ch. (Gonioneptunus) bimuculata* Miers, at the suggestion of Mr MELBOURNE WARD); *Ch. (Gonioneptunus) investigatoris* Alcock (= *Ch. (Ch.) miles* de Haan); *Ch. Giardi* Nobili (= *Ch. (Gonioinfradens) paucidentata* (A. M. Edwards)).

Of the majority of *Charybdis*-species I saw representatives and (or) types. The following species I know only from publications: *Ch.* (*Ch.*) *jaubertensis* (Rathbun), *Goniosoma spiniferum* Miers (=? *Ch. hellerii* A. M. Edw.), *Ch.* (*Gonioneptunus*) *africana* Shen, *Ch.* (*Gonioneptunus*) *whiteleggei* Ward.

For a complete revision it would have been necessary to examine all the specimens mentioned in the literature. As this was impossible, I have restricted myself to the material present in the "Zoologisch Museum" (Amsterdam), the "Rijksmuseum van Natuurlijke Historie" (Leiden) and in the "Muséum National d'Histoire Naturelle" (Paris). I further borrowed material from the various museums mentioned in the introduction. I hope that in the future I shall be able to examine the important collections of various museums mentioned in the older literature.

In imitation of Dr GORDON I examined as far as possible the first male pleiopods of the species. Their shape appeared to be of no greater significance for systematical classification than the usual characteristics.

The genus *Charybdis* is found in all parts of the Indo-Pacific region. *Ch. hellerii* (A. M. Edw.) has also been observed in the Mediterranean. This is the only *Charybdis*-species, which has been found outside the Indo-Pacific region.

The Siboga-Expedition collected: *Ch. cruciata* (Herbst), *Ch. miles* de Haan, *Ch. hellerii* (A. M. Edw.), *Ch. annulata* (Fabr.), *Ch. orientalis* Dana, *Ch. variegata* (Fabr.), *Ch. variegata* var. *salehensis* nov. var., *Ch. rathbuni* nov. spec., *Ch. hongkongensis* Shen, *Ch. truncata* (Fabr.), *Ch. subornata* Ortmann.

Of these the following species were found in the Indian Archipelago for the first time: *Ch. miles* de Haan, *Ch. variegata* (Fabr.), *Ch. variegata* var. *salehensis* nov. var., *Ch. rathbuni* nov. spec., *Ch. hongkongensis* Shen, *Ch. subornata* Ortmann.

The "Gier" collected: *Ch. cruciata* (Herbst), *Ch. miles* de Haan, *Ch. hellerii* (A. M. Edw.), *Ch. anisodon* de Haan, *Ch. orientalis* Dana, *Ch. callianassa* (Herbst), *Ch. variegata* var. *brevispinosa* Leene, *Ch. natator* (Herbst), *Ch. hongkongensis* Shen, *Ch. vadorum* (Alcock), *Ch. truncata* (Fabr.).

Of these the following species were found in the Indian Archipelago for the first time: *Ch. callianassa* (Herbst), *Ch. vadorum* (Alcock), *Ch. variegata* var. *brevispinosa* Leene.

Other collectors found: *Ch. affinis* Dana, *Ch. annulata* (Fabr.), *Ch. anisodon* de Haan, *Ch. callianassa* (Herbst). This material was deposited in the "Zoologisch Museum" (Amsterdam) and has not previously been mentioned in the literature.

Neither the "Siboga" nor the "Gier" collected: *Ch. rivers-andersoni* Alcock, *Ch. japonica* (A. M. Edw.), *Ch. rosea* (Hombron et Jacquinot), *Ch. acuta* (A. M. Edw.),*Ch. sexdentata* De Man (= *Ch. amboinensis* nom. nov.), *Ch. lucifera* (Fabr.), *Ch. jaubertensis* Rathbun, *Ch. heterodon* Nobili, *Ch. demani* Leene, *Ch. rostrata* (A. M. Edw.), *Ch. hoplites* (Wood-Mason) and varieties, *Ch. bimaculata* (Miers), *Ch. africana* Shen, *Ch. whiteleggei* Ward, *Ch. paucidentata* (A. M. Edw.), *Ch. obtusifrons* Leene, *Ch. acutifrons* (De Man), *Ch. erythrodactyla* (Lam.).

Note during correction.

While this was printing I received further data concerning *Ch. incisa* Rathbun, from Mr FRANK A. MCNEILL (Sydney). On the ground of these I think that one specimen which I included in *Ch. incisa*, must be considered as a new species, viz., *Ch.* (*Ch.*) *rathbuni* (see p. 97), and *Ch. incisa* Rathbun as a young specimen of *Ch. orientalis* Dana (see p. 69).

The five subgenera are characterized as follows:

I. The lobule at the external angle of the "basal" antenna-joint joins the front and completely excludes the flagellum from the orbital hiatus. The posterior angles of the cephalothorax may be accented or not, but the margin of the posterior border forms a curve with the postero-lateral borders. The four median teeth of the front are not very dissimilar to the lateral frontal teeth. The antero-lateral border is cut into six teeth (or seven, but then there are six large and one small spines). No spine on the posterior border of the arm of the cheliped . . *Charybdis* de Haan.

II. The lobule at the external angle of the "basal" antenna-joint joins the front and completely excludes the flagellum from the orbital hiatus. The posterior border of the cephalothorax is straight and forms an eared junction with the postero-lateral borders. The four median frontal teeth are dissimilar to the lateral frontal teeth. The antero-lateral border is cut into six teeth. The posterior border of the arm of the cheliped ends distally in a spine . . . *Goniohellenus* Alcock.

III. The lobule at the external angle of the "basal" antenna-joint does not touch the front, so that the flagellum stands in the upper part of the orbital hiatus. The posterior border of the cephalothorax is nearly straight and forms an angular junction with the postero-lateral borders. The four median frontal teeth are larger and broader than the lateral frontal teeth. The antero-lateral border is cut into six teeth. The posterior border of the arm of the cheliped ends distally in a spinule . . . . . *Gonioneptunus* Ortmann.

IV. The lobule at the external angle of the "basal" antenna-joint touches the front and completely excludes the flagellum from the orbital hiatus. The margin of the posterior border of the cephalothorax forms a curve with the postero-lateral borders. The antero-lateral border is cut into four large and two (or three) very small teeth. The four median frontal teeth are not very dissimilar to the lateral frontal teeth. No spine on the posterior border of the arm of the cheliped . . . . . *Gonioinfradens* nov. subgen.

V. The lobule at the external angle of the "basal" antenna-joint touches the front and completely excludes the flagellum from the orbital hiatus. The margin of the posterior border of the cephalothorax forms a curve with the postero-lateral borders. The antero-lateral border is

cut into five large and two (or three) very small teeth. The four median frontal teeth are not very dissimilar to the lateral frontal teeth. No spine on the posterior border of the arm of the cheliped . . . . . *Goniosupradens* nov. subgen.

Key to the genus *Charybdis:*

1 a. Antennal flagellum completely excluded from orbital hiatus 2
b. Antennal flagellum not excluded from orbital hiatus . . III. *Gonioneptunus*, p. 23
2 a. Margin of posterior border of cephalothorax forming a curve with postero-lateral borders 3
b. Posterior border of cephalothorax straight and forming an angular junction with postero-lateral borders . . . II. *Goniohellenus*, p. 22
3 a. Antero-lateral border divided into six teeth, of which four are large and two very small . . . . . IV. *Gonioinfradens*, p. 23
b. Antero-lateral border divided into six teeth, of which at least five are large . . . . . I. *Charybdis*, p. 19
c. Antero-lateral border divided into more than six teeth 4
4 a. Antero-lateral border divided into five large and two or three very small teeth . . . . . V. *Goniosupradens*, p. 24
b. Antero-lateral border divided into six large and one very small teeth (*Ch. demani* Leene) . . . . . I. *Charybdis*, p. 19

I. The antennal flagellum is completely excluded from the orbital hiatus; the margin of the posterior border of the cephalothorax forms a curve with the postero-lateral borders; the antero-lateral border is cut into six teeth (or seven, six of which are large) (*Charybdis*):

A. No distinct transverse ridges on the cephalothorax behind the last antero-lateral teeth:

1. First antero-lateral tooth is more or less truncate:

a. Anterior border of the arm of the cheliped has three large spines:

α. Hand of cheliped has four spines:

i. First antero-lateral tooth notched; the meso-branchial regions not swollen . . 1. *Ch. cruciata* (Herbst), p. 24

ii. First antero-lateral tooth not notched, but obliquely truncate; meso-branchial regions distinctly swollen . . . . . 2. *Ch. rivers — andersoni* Alcock, p. 28

β. Hand of cheliped has five spines:

i. Hand has five well-developed spines; the convex lateral borders of sixth abdominal

segment of male are gradually convergent; meropodite of natatory leg is about 1.5 as long as broad . . . . . 3. *Ch. japonica* (A. M. Edw.), p. 30

ii. Hand has three large and two small spines; the lateral borders of sixth abdominal segment of male are parallel for the larger part of their length; meropodite of natatory leg is about 1.3 as long as broad . . . . . 4. *Ch. affinis* Dana, p. 35

b. Anterior border of arm of cheliped has four large spines; first tooth of antero-lateral border anteriorly truncated and notched; acute frontal teeth . . . . . 5. *Ch. miles* de Haan, p. 38

c. Anterior border of arm of cheliped has two spines; hand has three spines; front very prominent beyond the inner supra-orbital angles 6. *Ch. rosaea* (Hombr. et Jacq.), p. 43

2. First antero-lateral tooth is not truncate:

a. The second antero-lateral tooth is about as large as the first: . . . . . .

α. The carpus of the natatory leg has a spine . 7. *Ch. hellerii* (A. M. Edw.), p. 44

β. The carpus of the natatory leg has no spine:

i. All frontal teeth very acute; antero-lateral teeth very acute; "basal" antenna-joint has two spinules . . . . . 8. *Ch. acuta* (A. M. Edw.), p. 50

ii. Frontal teeth have rounded tops:

α′. Distinct granular transverse ridges on cephalothorax; much granulation on chelipeds . . . . . 9. *Ch. amboinensis* nom. nov., p. 53

β′. Faint granular transverse ridges on cephalothorax:

α″. Median lobule of the lateral part of lower border of orbit is sharply dentiform; four pale spots on the meso-branchial regions . . . . 10. *Ch. lucifera* (Fabr.), p. 57

β″. Median lobule of the lateral part of lower border of orbit is not dentiform . . . . . 11. *Ch. annulata* (Fabr.), p. 60

b. The second antero-lateral tooth is distinctly smaller than the first:

α. Last antero-lateral tooth is a long spine; anterior border of arm of cheliped has two spines; hand has two spines; the transverse

ridges on cephalothorax are hardly distinguishable . . . . . 12. *Ch. anisodon* de Haan, p. 64

β. Last antero-lateral tooth is not more prominent than the preceding teeth:

i. The first antero-lateral tooth is the largest; the submedian frontal teeth are truncate, much broader than the medians . . . . 13. *Ch. jaubertensis* Rathbun, p. 67

ii. The first antero-lateral tooth is not the largest; the submedian frontal teeth are triangular, nearly as broad as the medians 14. *Ch. orientalis* Dana, p. 68

c. The first and second antero-lateral teeth are grown together except for the distal end, though it appears to be a bifurcated tooth; upper border of orbit has one incision; lower border of orbit without gap. . . . . 15. *Ch. heterodon* Nobili. p. 73

3. The first antero-lateral tooth sometimes divided into two teeth, making the total number of antero-lateral teeth seven (six large and one small spines); arm of cheliped has two spines, hand has three spines; gradually convergent convex lateral borders of sixth abdominal segment of male . . . . . 16. *Ch. demani* Leene, p. 76

B. A transverse ridge on cardiac region, but none on the posterior part of the branchial region:

1. Two spines on hand of cheliped; gradually convergent convex lateral borders of sixth abdominal segment of male; median frontal teeth are very prominent beyond the other frontal teeth . . . . 17. *Ch. rostrata* (A. M. Edw.), p. 78

2. Three spines on hand of cheliped; lateral borders of sixth abdominal segment of male are parallel for half their length . . . . . 18. *Ch. callianassa* (Herbst), p. 81

C. A transverse ridge on cardiac region, and two on the meso-branchial regions:

1. The median and submedian frontal teeth are subequal and prominent beyond the lateral frontal teeth. The lateral borders of the sixth abdominal segment of the male are convex . . . . . 19. *Ch. variegata* (Fabr.), p. 84

a. The last antero-lateral tooth is much longer than the preceding teeth . . . . . forma *typica*, p. 84

b. The last antero-lateral tooth is only a little longer than the preceding teeth . . . . . var. *brevispinosa* Leene, p. 88

c. The last antero-lateral tooth is not more prominent than the preceding teeth . . . . . var. *salehensis* nov. var., p. 90

2. The median and submedian frontal teeth are subequal and not prominent beyond the lateral frontal teeth. The lateral borders of sixth abdominal segment of male are parallel for nearly their whole length . . . . . 20. *Ch. natator* (Herbst), p. 93

3. The submedian frontal teeth are much broader than the medians; the inner supra-orbital angles are much broader than the lateral frontal teeth; the second antero-lateral tooth is much smaller than the first . . . . . 21. *Ch. rathbuni* nov. spec., p. 97

II. The antennal flagellum is completely excluded from the orbital hiatus; posterior border of the cephalothorax straight, and forms an eared angular junction with the postero-lateral borders; the posterior border of the arm of cheliped ends in a spine (*Goniohellenus*):

A. Last tooth of antero-lateral border more or less distinctly longer than any of the preceding teeth:

1. The four median frontal teeth are separated from the lateral frontal teeth by wide incisions . . . 22. *G. hoplites* W. M., p. 99

a. Last tooth of antero-lateral border is much longer than the preceding teeth:

α. Upper borders of carpopodites of second pair of pereiopods end in three spinules or have no armature. Meropodite of natatory leg is about 1.6 times as long as broad . . . forma *typica*, p. 99

β. Upper borders of carpopodites of second up to fourth pairs of pereiopods end in spinules. Meropodite of natatory leg is about twice as long as broad. Dwarf-variety . . . . . var. *pusilla*, p. 102

b. Last tooth of antero-lateral border is only somewhat longer than the preceding teeth:

α. Chelipeds are about three times the length of cephalothorax. Lateral borders of sixth abdominal segment of male are slightly convex . . . . . var. *omanensis* nov. var., p. 104

β. Chelipeds are about 2¼ times the length of cephalothorax. Lateral borders of sixth abdominal segment of male are sinuous . . . var. *longicollis* nov. var., p. 107

2. The four median frontal teeth are separated from the lateral frontal teeth by narrow incisions:

a. Last antero-lateral tooth is slightly longer than the preceding teeth; the lateral borders of the sixth abdominal segment of male are slightly convex . . . . . 23 *G. hongkongensis* Shen, p. 110

b. Last antero-lateral tooth is much longer than the preceding teeth; the lateral borders of the sixth abdominal segment of male are strongly convex 24. *G. vadorum* (Alcock), p. 114

B. Last tooth of antero-lateral border smaller than any of the preceding teeth; the lateral borders of the sixth abdominal segment of male are strongly convex . . 25. *G. truncata* (Fabr.), p. 118

III. The lobular process of the "basal" antenna-joint does not nearly touch the front, so that the flagellum stands in the upper part of the orbital hiatus; the posterior border of the cephalothorax forms an angular junction with the postero-lateral borders; the posterior border of the arm of the cheliped ends in a spine (*Gonioneptunus*):

A. Last antero-lateral tooth distinctly more prominent than the preceding teeth. First antero-lateral tooth is narrowly triangular . . . . . 26. *G. subornata* (Ortmann), p. 122

B. Last antero-lateral tooth not more prominent than the preceding teeth:

1. Lateral borders of sixth abdominal segment of male are straight . . . . . 27. *G. Whiteleggei* Ward, p. 125

2. Lateral borders of sixth abdominal segment of male slightly convex:

a. First antero-lateral tooth is truncate with rounded angles; lateral frontal teeth are clearly distinguishable from inner supra-orbital angles 28. *G. bimaculata* (Miers), p.126

b. First antero-lateral tooth is truncate with acute anterior angles; lateral frontal teeth are almost confluent with inner supra-orbital angles . . 29. *G. africana* Shen, p. 129

IV. The antennal flagellum is completely excluded from the orbital hiatus; the antero-lateral border is divided into four large and two (or three) very small teeth (*Gonioinfradens*):

Antero-lateral border divided into six teeth, the second and fourth are very small; truncate median frontal teeth; "basal" antenna-joint with tooth-like spine . . 30. *G. paucidentata* (A. M. Edw.), p. 131

V. The antennal flagellum is completely excluded from the orbital hiatus; the antero-lateral border is divided into five large and two (or three) very small teeth (*Goniosupradens*):

A. No transverse ridges behind the last antero-lateral teeth. Front has rather obtuse, triangular teeth; "basal" antenna-joint has one obtuse tooth. . . . . 31. *G. erythrodactyla* (Lam), p. 134

B. A transverse ridge on the cardiac region and one on the mesobranchial region:

1. Front has very acute, triangular teeth; "basal" antenna-joint has two spines . . . . . 32. *G. acutifrons* (de Man), p. 138
2. Front has truncated teeth; "basal" antenna-joint has large granules. . . . . 33. *G. obtusifrons* Leene, p. 140

1. *Charybdis (Charybdis) cruciata* (Herbst). (figs. 1 and 2)

Charybdis (Goniosoma) crucifera, 1899, ALCOCK, Journ. As. Soc. Beng., vol. 68, pt 2, p. 51 (see also for the older literature and synonymy).
1900, NOBILI, Ann. Mus. Civ. St. Nat. Genova, (2), vol. 20 (XL), p. 498.
Goniosoma cruciferum, 1901, LANCHESTER, Proc. Zool. Soc. London, pt 2, p. 545.
Charybdis cruciatus, 1904, STEBBING, Marine Invest. S. Afr., vol. 2, Dept. Agric., p. 9.
1910, STEBBING, Ann. S. Afr. Mus., vol. 6, p. 306.
Charybdis crucifera, 1907, RATHBUN, Stimpson, Smiths. Misc. Coll., vol. 49, p. 80.
Charybdis cruciata, 1910, RATHBUN, Mem. Ac. Sc. Danemark, (7), vol. 5, p. 363.
1910, RATHBUN, Bull. Mus. Comp. Zool., vol. 52, p. 313.
Charybdis crucifera, 1918, KEMP, Mem. As. Soc. Bengal, vol. 6, p. 250.
1922, BALSS, Arch. Naturgesch., 88. Jahrg., Abt. A, p. 104.
Charybdis cruciatus, 1925, DELSMAN and DE MAN, Treubia, vol. 6, p. 316.
Charybdis cruciata, 1929, MCNEILL, Rec. Austr. Mus., vol. 17, p. 149, pl. 37, fig. 5.
Charybdis (Goniosoma) crucifera, 1931, GORDON, Journ. Linn. Soc. London, Zool., vol. 37, p. 537, fig. 13e.
Charybdis (Goniosoma) cruciata, 1932, SHEN, Hong Kong Nat., vol. 3, p. 38, fig. 6, pl. 8.
Charybdis crucifera, 1934, LEE BOONE, Bull. Vanderbilt Mus., vol. 5, p. 53, pl. 17.
Charybdis (Goniosoma) cruciatus, 1935, CHOPRA, Rec. Ind. Mus., vol. 37, p. 482, textfig. 7.
Charybdis (Goniosoma) cruciata, 1937, SHEN, Bull. Raffl. Mus., 13, p. 117.

Deli, Sumatra coll. de Bussy, 2 ♂♂ and 1 ♀.
Billiton (?), 1 ♂.
Soerabaya, 1914, leg. G. J. Terwiel, capt. s.s. Roepat, 1 ♂.
Djangkar, shore, 2 juv.
Gier, no 3, Exp.5, 16/10, 1907, 6° 13′ S, 107° 57′ 30″ E, 8½—7 fms, 1 ♀.
Gier, no 3, Exp. 22, 24/10, 1907, 3° 58′ S, 109° 2′5 E, 11—15 fms, 10 juv.
Gier, no 3, Exp. 23, 24/10, 1907, 1 juv.
Gier, no 4, Exp. 3, 16/11, 1907, 1 ovigerous ♀.
Gier, no 4, Exp. 11, 23/11, 1907, Pekalongan, 14 juv.
Gier, no 4, Exp. 20, 15/12, 1907, 1 ♀.
Gier, no 6, Exp. 11, 9/1, 1908, 7° 10′ S, 114° 6′ E, 1 ♂ and 1 ♀.
Gier, no 9, Exp. 9, 18/6, 1908, 1 spec. with Rhizocephalan.
Gier, no. 14, Exp. 4, 16/12, 1908, 3° 12′ S, 116° 38′ E, 14—18 fms, 1 spec, with Rhizocephalan.
Gier, no. 14, Exp. 7, 17/12, 1908, 3° 24′ S, 116° 37′ E, 15—18 fms, 1 spec. with Rhizocephalan.
Gier, without exact locality, 5 juv.

It is very remarkable that there are no specimens of this species in the Siboga material, for it is a very common crab in the Indo-Pacific region.

Description: The cephalothorax, smooth and bare, has ill-defined regions. It is crossed by some faint, granular ridges, viz.: (1) one, between the last antero-lateral teeth, interrupted by the

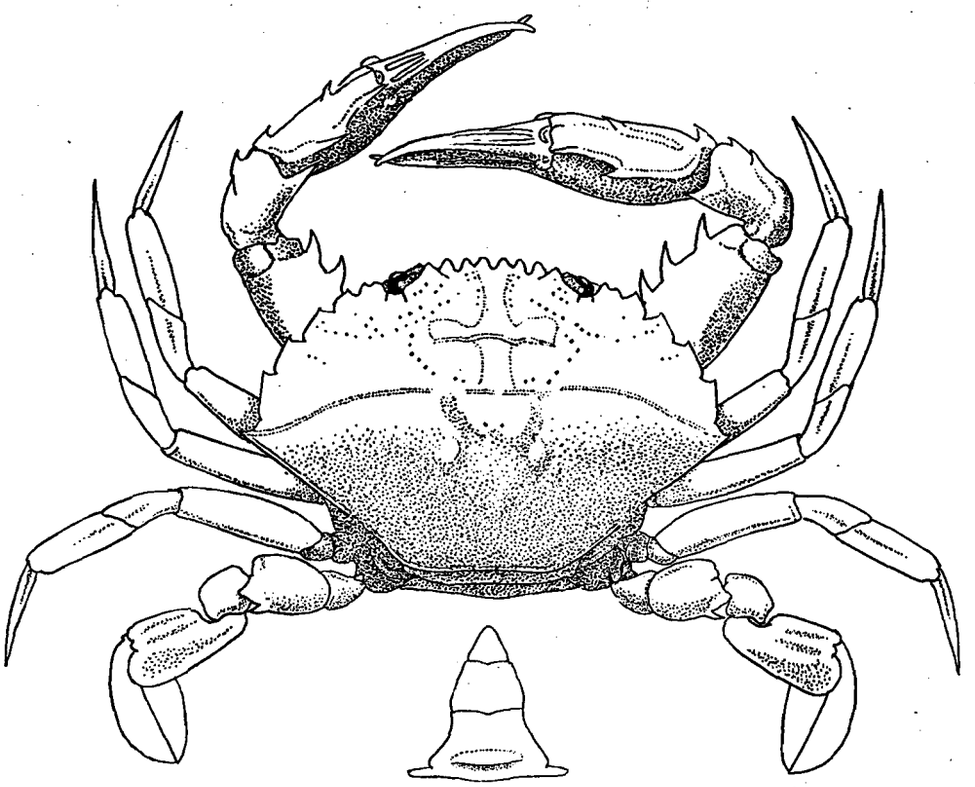


Fig. 1. *Charybdis cruciata* (Herbst), ♀, dorsal view, and male abdomen. (× 4/5).

cervical groove and in the middle on the gastric region, (2) one on the mesogastric region, interrupted in the middle, (3) one on each of the protogastric regions.

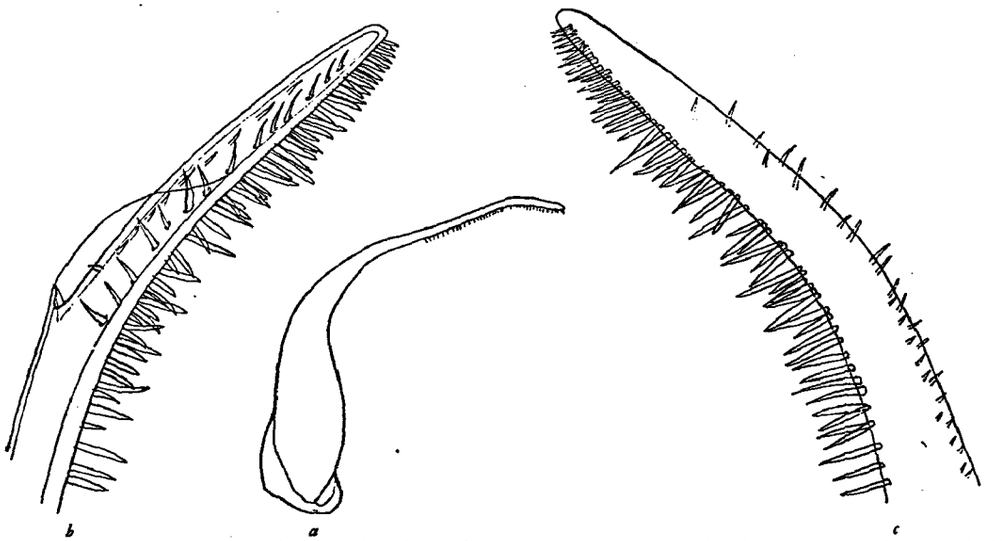
The front is cut into six teeth. The median and submedian teeth are the same size and shape, triangular with blunt tops; the medians are prominent beyond the submedians and the latter are on a higher plane. The lateral teeth are separated from the submedians by a V-shaped incision, which is deeper than the incision between the median and submedian teeth and that between the median teeth. The triangular, lateral teeth are somewhat narrower and acuter than the submedians (in the female figured here, they are about the same size and shape as the submedians). Of all the teeth the borders are smooth. The front is prominent beyond and on a lower plane than the inner supra-orbital angles.

The antero-lateral border is cut into six teeth. The first tooth is broad, short and notched; the incision is wide and round, the tops are blunt. The second tooth is a little notched, the anterior top is sharper than the posterior, the incision is much less distinct than in the first. The third, fourth and

fifth teeth are the same shape: broad, short, triangular; the anterior border is concave, the outer border is long and a little curved; the tops are rather acute; the third tooth is the broadest, the fourth tooth the narrowest (in the specimen of the figure the fifth tooth is the broadest). The anterior borders of the second up to the fourth teeth have faintly distinguishable granules; all the other borders are smooth. The sixth tooth is more spine-like; the anterior border is concave, the top therefore directed anteriorly.

The postero-lateral borders converge rather strongly posteriorly.

The margin of the posterior border forms a curve with the postero-lateral borders.



b *a* *c*

Fig. 2. *Charybdis cruciata* (Herbst), *a*, left first male pleopod, posterior view (× 3); *b*, apex, posterior view; *c*, apex, anterior view. (× 52).

The orbit has a distinct dorsal inclination. The upper border is divided into three parts by two incisions; the inner supra-orbital angles are rather narrow (with regard to other *Charybdis*-species), triangular, rather acute. The lower border is cut into two parts by a lateral incision. The median lobule of the outer part is distinct. The inner infra-orbital angle is very little prominent and not dentiform.

The "basal" antenna-joint touches the front, excluding the flagellum from the orbit; the surface is granular and has a very low granular crest.

The antennulae are folded transversely. There is a low crest on the large "basal" joint.

The sub-orbital, sub-branchial, sub-hepatic and pterygostomian regions are bare and very finely granular. There is a faintly granular, pleural groove.

Of the abdomen of the male the sixth tergum has converging, convex lateral borders; the anterior border is a little sinuous; the posterior border is a little curved anteriorly. The second and third terga are carinate over the whole breadth, the fourth tergum only in the middle.

The chelipeds differ slightly is length and shape, in the larger cheliped the hand is a little tumid. The anterior border of the arm has three spines, of which the proximal one is the smallest; moreover there are some large granules, which are sometimes nearly spinules; the posterior and distal borders are unarmed; the inferior border has distally a sharp spinule, which is blunt in the largest specimens; all the surfaces are smooth and bare. The wrist has a strong spine at the inner angle and three

spinules at the outer angle; the upper and outer surfaces have some faintly granular ridges. The hand, with five smooth costae, has four spines on its upper surface: two on the inner costa (one in the middle and one at the distal end), one on the next outer one, some distance distally to the middle, and one near the wrist-articulation. The movable finger is longer than the palm.

The second up to the fourth pairs of pereiopods have no specific characteristics.

Of the natatory leg the posterior border of the merus has the usual spine. The posterior border of the propus is smooth.

The first male pleopod has a long, slender neck and a slender apex. On the posterior surface there is a transparent membrane, of which the border is strongly curved. Under the membrane there begin two rows of spines from which the outer one runs further distally than the inner one. The outer border of the apex and of the distal part of the neck has many spines, which are arranged in two rows. On the anterior surface there are on the proximal part of the apex and the (larger) distal part of the neck near the inner border two rows of spinules (on the apex the spinules are longer than on the neck).

Colour: Preserved in spirit, the cephalothorax has on the anterior part a large yellow cross on a purplish brown background, by which it can be easily distinguished from the other *Charybdis*-species.

The juvenile specimens differ in the following points from the adults: (1) the front is much more distinctly prominent beyond the inner supra-orbital angles, (2) the four median frontal teeth are elliptical, blunt; the medians are a little prominent beyond the submedians, and the latter are prominent beyond the lateral teeth, which are triangular and m u c h narrower, than the submedians, (3) except for the first tooth, which is distinctly notched, the antero-lateral teeth are acuter than in the adult specimens, (4) the „basal" antenna-joint does not touch the front.

G e o g r a p h i c a l d i s t r i b u t i o n: Indo-Pacific region.

Measurements of adult specimens in mm:

	Deli, Sumatra		Billiton?	Gier, no 3, Exp. 5	Gier, no 4, Exp. 3 ovige-rous	Gier, no 4, Exp. 20	Gier, no 6, Exp. 2	Gier, no. 6, Exp. 11	
	♂	♀	♂	♀	♀	♀	♂	♂	♀
Length of cephalothorax	61.0	66.8	102.5	31.5	58.8	41.2	65.5	31.8	41.2
Breadth of cephalothorax	91.0	100.0	156.0	46.0	87.8	60.6	99.0	47.8	60.6
Front	20.8	21.5	31.5	11.0	19.0	13.5	21.8	11.0	13.5
Interorbital space	25.0	26.0	39.0	13.2	24.0	16.8	26.8	13.5	16.8
Orbit	9.5	10.2	14.5	5.8	9.5	7.0	9.8	6.0	7.0
Orbito-frontal border	42.0	45.5	66.0	23.0	40.6	29.5	44.8	24.0	29.5
Length of cheliped (largest)	139.0	146.0	315.0	60.0	124.5	81.5	156.5	59.5	81.5
Length of merus (natatory leg)	14.8	15.5	26.0	7.8	13.8	10.0	15.8	7.8	10.0
Breadth of merus (natatory leg)	11.0	12.2	19.2	5.8	11.0	7.5	13.0	5.5	7.5
Length 6th ♂ abdominal segment	9.8	—	16.5	—	—	—	11.0	5.0	—
Breadth 6th ♂ abdominal segment	14.5	—	24.5	—	—	—	15.5	7.0	—
Posterior border	30.5	34.5	49.0	15.5	30.0	20.2	32.5	16.0	20.2
$\frac{\text{Cephalothorax breadth}}{\text{Cephalothorax length}}$	1.49	1.50	1.52	1.46	1.49	1.47	1.51	1.48	1.47
$\frac{\text{Cheliped length}}{\text{Cephalothorax length}}$	2.28	2.19	3.07	1.90	2.12	1.98	2.39	1.84	2.11

2. *Charybdis* (*Charybdis*) *rivers-andersoni* Alcock. (figs. 3 and 4).

Charybdis (*Goniosoma*) *rivers-andersoni*, 1899b, ALCOCK, p. 53; 1900, Ill. Invest. Zool., Crust., pl. 40, fig. 3.
Charybdis rivers-andersoni, 1922, BALSS, Arch. Naturgesch., 88. Jahrg., Abt. A, p. 105.
1931, GORDON, Journ. Linn. Soc. Zool., vol. 37, pp. 538, 537, fig. 13c.
Charybdis sagamiensis, 1916, PARISI, Atti Soc. It. Sc. Nat., vol. 55, p. 175, pl. 11, fig. 1.

By the kindness of Dr CHOPRA I could examine a male specimen of this species, belonging to the type-series (stat. 242, Arabian Sea, 17° 24′ N, 71° 41′ E, 56—58 fms, coll. by the Marine Survey).

Description: The cephalothorax is bare and finely granular (only visible through a

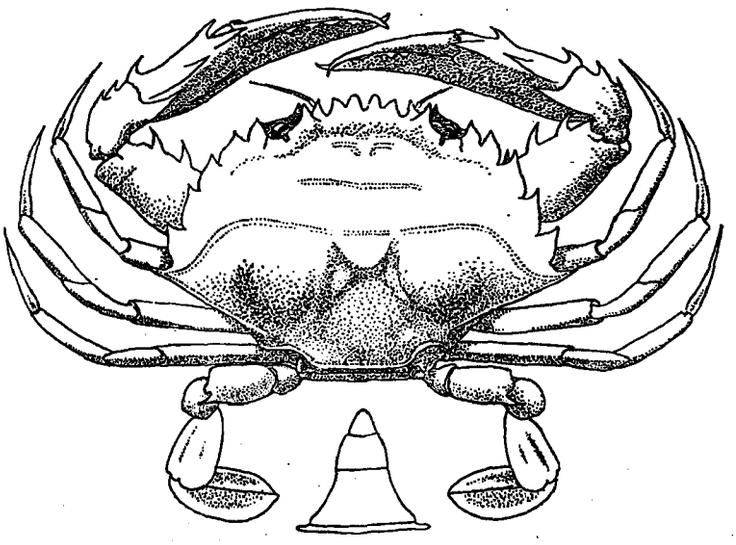


Fig. 3. *Charybdis rivers-andersoni* Alcock, ♂, dorsal view and abdomen. (× 1,5).

strong lens), with a few very faint, granular transverse ridges: (1) the usual one between the last antero-lateral teeth, interrupted by the cervical groove and in the middle; (2) one on the mesogastric region, interrupted in the middle; (3) one on each of the protogastric regions, hardly visible; (4) two low elevations, as indications of a ridge on the frontal region. The regions are rather distinct, the mesobranchial region is much swollen, which is very characteristic of this species.

The front is cut into six teeth. The median teeth are the most prominent; they are separated from one another by a deep V-shaped incision; they are triangular, the tops are rounded. The submedians are also triangular, but with acute tops; the incision between the median and submedian teeth is less deep than between the medians; the inner border forms an acuter angle with the base than the outer border does; they are not prominent beyond the lateral teeth. The lateral teeth are very acute, much narrower than the other frontal teeth and clearly distinguishable from the inner supra-orbital angles.

The antero-lateral border is divided into six teeth. The first tooth is the narrowest and the smallest; the granular anterior border is nearly straight; the granular outer border is sinuous, the top is acute. The second up to the fifth teeth are nearly the same size and shape. The granular anterior and posterior borders of the second tooth are sinuous. The anterior borders of the third to fifth teeth are concave, their proximal parts are granular; the outer borders gradually grow straight and are about

smooth. The sixth tooth is spine-like, the proximal part of the anterior border is granular, it is directed nearly laterally.

The postero-lateral borders are strongly convergent posteriorly.

The posterior border is short and its margin forms a curve with the postero-lateral borders.

The orbit has a rather strong dorsal inclination. The finely granular upper border is divided into three parts by two incisions, of which the median one in V-shaped. The inner supra-orbital angles are narrow, very acute and tooth-like. The granular lower border is divided into two parts by a lateral incision. The median lobe of the outer part is distinct. The inner infra-orbital angles are prominent, tooth-like, acute.

The "basal" antenna-joint touches the front, excluding the flagellum from the orbit; the surface is granular, with a low granular crest.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are nearly smooth and bare. The plueral groove is very faintly granular.

The sternum is bare and smooth.

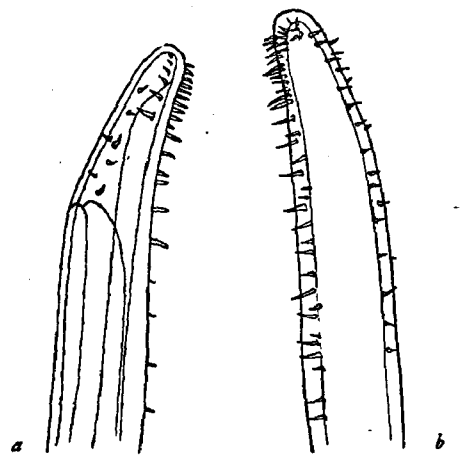


Fig. 4. *Charybdis rivers-andersoni* Alcock, *a*, apex of first male pleopod, posterior view; *b*, id., anterior view. (× 47).

The second and third terga of the male abdomen are carinate; the sixth tergum has gradually convergent, slightly convex lateral borders; the anterior border is nearly straight; the posterior border is strongly curved anteriorly.

The chelipeds do not differ in length; all their surfaces are smooth. The anterior border of the arm has three spines, of which the proximal one is the smallest; the inferior border ends distally in a spinule. The wrist has a well-developed spine at the inner angle and three spinules at the outer angle; the outer surface has three faint ridges. The hand has six smooth costae, and four spines, viz.: two on the inner costa, one on the next outer one, placed somewhat distally to the middle, and one near the wrist-articulation. The fingers are long and slender, the movable finger is longer than the palm.

Measurements in mm:

	♂
Length of cephalothorax	32.8
Breadth of cephalothorax	48.0
Front	12.5
Interorbital space	15.0
Orbit	6.5
Orbito-frontal border	26.2
Length of cheliped	67.0
Length of merus natatory leg	8.8
Breadth of merus natatoty leg	4.8
Length 6th ♂ abdominal segment	4.0
Breadth 6th ♂ abdominal segment	6.0
Posterior border	14.2

The second up to the fourth pairs of pereiopods have no specific characteristics.

The natatory leg has a slender merus, with the usual spine on the posterior border a short distance proximal to the distal end; the distal border ends posteriorly in a little spinule. The propus sometimes has a spinule on its posterior border.

The first male pleopod has a long, nearly straight neck. On the posterior surface of the apex there are three rows of spinules, which are more or less parallel to one another. On the anterior surface there are a group of spinules at the top of the apex and rows of spines near the inner and outer borders.

Prof. BALSS (1922) suggested, that *Ch. sagamiensis* Parisi is identical with *Ch. rivers-andersoni* Alcock. After comparison of the figure and description, given by PARISI, with the cotype I agree with him. The only difference I observed was, that in the natatory leg the ratio merus length to merus breadth in *Ch. sagamiensis* (1.51) is less than in our specimen (1.83); this may be owing to PARISI's specimen being larger than ours. Moreover these figures may vary a good deal as I observed in other species.

Geographical distribution: Konkak Coast (ALCOCK); Bay of Sagami (PARISI; BALSS).

3. *Charybdis* (*Charybdis*) *japonica* (A. M. Edw.). (figs. 5, 6 and 7).

Portunus (*Charybdis*) *6-dentatus*, 1850, DE HAAN, Faun. Jap., Crust., p. 41, pl. 12, fig. 1.
Charybdis sexdentatus, 1858, STIMPSON, Proc. Ac. Nat. Sci. Philad., p. 39.
Goniosoma japonicum, 1861, A. MILNE EDWARDS, Arch. du Mus., vol. 10, p. 373.
1891, J. E. IVES, Proc. Ac. Nat. Sc. Philad., p. 210.
1893, ORTMANN, Zool. Jahrb., Syst., vol. 7, p. 81.
Charybdis japonica, 1902, DOFLEIN, Abh. math.-phys. Cl. Kais. Ak. Wiss., vol. 21, p. 659.
1902, RATHBUN, Proc. U. S. Nat. Mus., vol. 26, p. 27.
1906, RATHBUN, U. S. Fish Comm. Bull. for 1905, pt 3, p. 872, pl. 13, fig. 2.
Charybdis sexdentata, 1907, STIMPSON, Smiths. Misc. coll., vol. 49, p. 81.
Charybdis japonica, 1916, PARISI, Att. Soc. It. Sc. Nat., vol. 55, p. 173.
1922, BALSS, Arch. Naturgesch., 88. Jahrg., Abt. A, p. 104.
1928, YOKOYA, Sc. Rep. Tohoku Imp. Univ., (4), (biology), vol. 3, no 4, fasc. 2, p. 772.
Charybdis sowerbyi, 1929, RATHBUN, Lignan Science Journ., vol. 8, p. 75, pl. 5.
Charybdis (*Goniosoma*) *japonica*, 1932, SHEN, Zool. Sinica, (A), vol. 9, fasc. 1, p. 72, figs. 41, 42 and 43.
Charybdis (*Gonioneptunus*) *peichihliensis*, 1932, SHEN, Zool. Sin., (A), vol. 9, fasc. 1, p. 78, figs 44 and 45.
1935, SHEN, Ann. and Mag. Nat. Hist., (10), vol. 15, p. 404.
Charybdis japonica, 1935, DERJUGIN and KOBJAKOWA, Zool. Anz., vol. 112, pp. 143, 144.
Charybdis (*Goniosoma*) *japonica*, 1937, LEENE, Zool. Meded., vol. 19, p. 168.

A. MILNE EDWARDS has changed the name of *Charybdis sexdentata* de Haan into *Goniosoma japonicum*, as he was afraid of confusion with *Thalamita sexdentata* Rüppell. Moreover, according to him, it is not identical with *Cancer sexdentatus* Herbst. But the only figure of *Cancer sexdentatus* Herbst in HERBST's "Naturgeschichte" is not accurate, and the material of *Thalamita sexdentata* Rüppell is not homogeneous, as I could state as far as the part of this collection, which is stored in the Leiden Museum, is concerned. I found, however, among others, two male specimens of *Ch. japonica* in this collection (LEENE, 1937). Moreover, there are no indications, that MILNE EDWARDS examined the *Cancer sexdentatus* Herbst. Therefore I think that MILNE EDWARDS' conclusions are premature. But being unable to examine the *Cancer sexdentatus* Herbst, which is probably lost to science (it is not present in the Berlin Museum), I propose to maintain the name MILNE EDWARDS suggested.

IVES (1891) supposed that *Goniosoma japonicum* is identical with *G. acutum* A. M. Edw., because he examined a few specimens which he thought intermediate in character between these species. I do not agree with his view, as the differences between these species are too distinct. As the most striking ones I mention: (1) the armature of the "basal" antenna-joint, (2) the shape of the sixth tergum of the male abdomen, (3) the shape of the first male pleopod.

Dr WALDO SCHMITT sent me very good photographs and an excellent figure of the "basal" antenna-joint of *Ch. sowerbyi* Rathbun. I suppose that this species is identical with *Ch. japonica*, I am not able to find any specific differences between these species.

In 1932 SHEN published as a new species *Charybdis* (*Gonioneptunus*) *peichihliensis*; in 1935 he suggested, that it is a juvenile *Goniosoma*-species, and after that he wrote me, that it was probably a young stage of *Ch. japonica.*

In our collections there are no specimens of this species. But I could examine the female type specimen and two male cotypes of *Charybdis sexdentata* de Haan (coll. v. Siebold, Japan) and three males and three females from Amoy (coll. by G. Schlegel) in the Leiden Museum. Moreover, Dr SHEN offered me a male specimen of *Ch. japonica* from Jungchenheien (Shantung Peninsula) and Dr CHACE lent me a male specimen from the collections of the Museum for Comparitive Zoology, Cambridge, Mass.

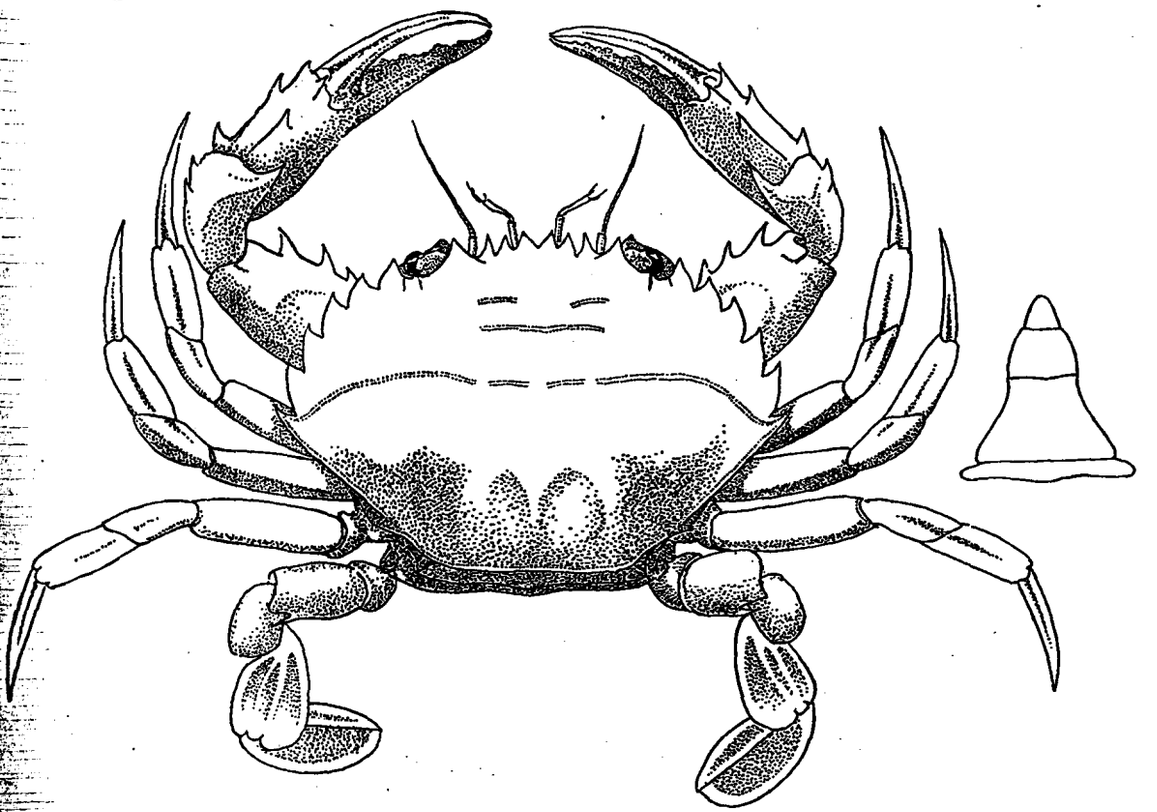


Fig. 5. *Charybdis japonica* A. M. Edw. (♀ type of *Ch. sexdentata* de Haan) dorsal view, and male abdomen (♂ cotype of *Ch. sexdentata* de Haan). Natural size.

Description of the ♀ type specimen of *Charybdis sexdentata* de Haan:

It is pubescent, owing to which the regions and transverse ridges on the cephalothorax can hardly be distinguished. The ridges only occur on the anterior part: (1) one between the last antero-lateral teeth, interrupted by the cervical groove and in the middle, (2) anterior to it an unbroken one on the gastric region and (3) a short one on each of the protogastric regions.

The front is cut into six sharp triangular teeth. The tops of the median teeth are directed outwards, the borders are straight; the sub-median teeth are narrower than the medians, the median

borders are shorter than the lateral borders, the tops are directed forwards; the median teeth are prominent beyond the submedians; the triangular lateral teeth are the narrowest and somewhat longer than the submedian teeth. The front can clearly be distinguished from the inner supra-orbital angles.

The antero-lateral borders are cut into six sharp teeth, nearly claw-like. The first tooth has a straight anterior border and a very slightly sinuous outer border; the second to fifth teeth are the same shape (the second is only somewhat shorter), the anterior borders are somewhat concave and the outer borders are convex. The sixth tooth is much narrower and more spine-like. Of all the teeth the tops are dark-pointed, very sharp, directed forward, spine-like.

The postero-lateral borders are strongly convergent posteriorly.

The posterior border forms a curve with the postero-lateral borders and is somewhat sinuous.

The faintly granular upper border of the orbit is cut into three parts by two distinct incisions. The inner supra-orbital angle is sharp, spine-like; the outer angle of the middle part is spine-like, the inner lobe of the outer part is a sharp denticle. The granular lower border has a V-shaped incision; the inner lobe of the outer part is dentiform.

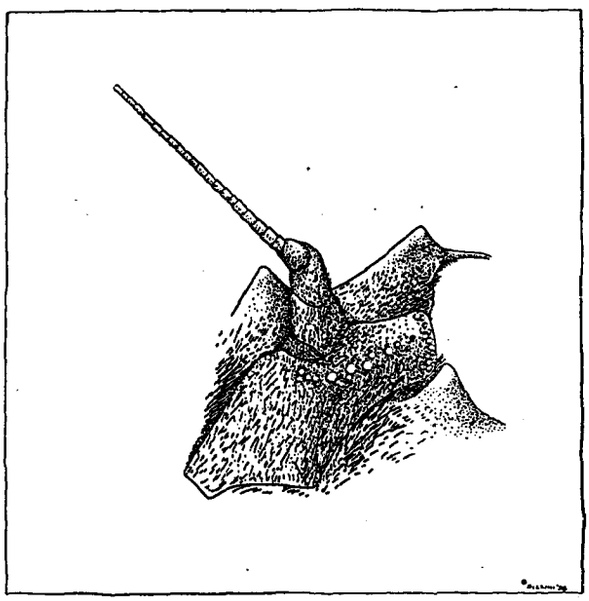


Fig. 6. *Charybdis japonica* A. M. Edw., (type of *Ch. sowerbyi* Rathbun), basal antenna-joint, drawn by Mr PIZZINI (Washington). (× 7).

The "basal" antenna-joint has a low granular crest. The lobule at the external angle joins the front and completely excludes the flagellum from the orbital hiatus.

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, sub-branchial and pterygostomian regions are densely pubescent. There is a distinctly granular pleural groove.

The sternum is pilose.

The abdomen has the usual six clearly distinguishable segments.

The chelipeds are densely haired, their length is just over twice the length of the cephalothorax. The arm has three spines on the anterior border, the proximal spine is the smallest, the posterior border is unarmed, the inferior border is somewhat granular. The wrist has a strong spine at the inner angle and three spinules at the outer angle. The hand has seven granular costae; on the upper surface there are five spines, one at the wrist-articulation, two on the inner costa and two on the next outer one; the movable finger is longer than the palm. (The hand of the larger (left) cheliped—there is only little difference in length—is distinctly more swollen).

The second to fourth pairs of pereiopods are sub-equal.

The natatory legs have meropodites, each of whose posterior borders having one spine near the distal end; they are 1.5 times as long as broad; the posterior borders of the propodites are smooth.

If we compare this ♀ type with the largest ♂ specimen of the VON-SIEBOLD-collection we notice several differences:

1. The pubescence is missing, this specimen being totally bare; only the two last segments of the pereiopods and all the segments of the natatory legs are hairy.
2. The frontal and antero-lateral teeth have no spine-like tops.
3. The first and second antero-lateral teeth are sub-equal and m u c h narrower and shorter than the following teeth.
4. The last antero-lateral tooth is not so distinctly directed forward.
5. The spines on the arm of the cheliped are less developed and blunter.
6. The movable finger of the cheliped is as long as the palm.
7. The hand in the larger cheliped is much more swollen.

In the collections of the Leiden Museum there are also younger males, which have the same characteristics as the female type. They still have the pubescence and the spine-like armature of

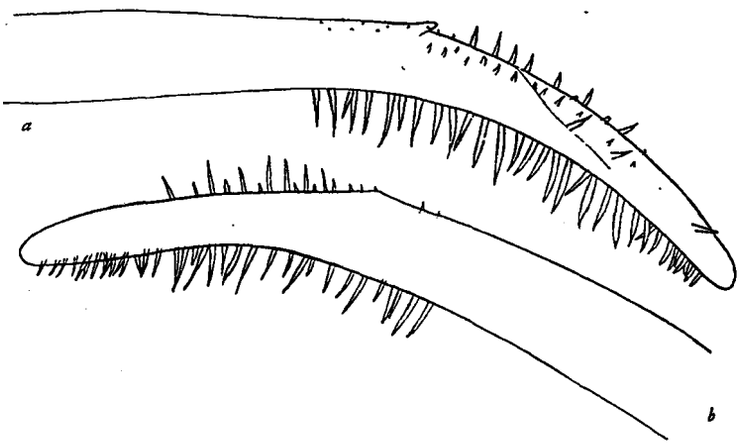


Fig. 7. *Charybdis japonica* A. M. Edw. (*Ch. sexdentata* de Haan, ♂ cotype). *a*, apex of the first male pleopod, posterior view; *b*, id., anterior view. (× 36).

cephalothorax and chelipeds. But they soon lose the dense tomentum of sternum and cephalothorax.

To the description of the female type I add the following characteristics for the male:

The sixth abdominal segment has gradually convergent sides; it is broader than long, the anterior border is nearly straight, the posterior border is slightly curved anteriorly, the lateral borders are slightly convex.

Of the first ♂ pleopods the outer border has a row of long spines on the distal part of the neck and on the apex; the inner border of the apex has a row of shorter spines. On the posterior surface we notice two rows of short spines under the membrane and a short row of somewhat longer spines distal to the membrane.

Comparing the first pleopods of three males I noticed a few differences in the armature of the posterior surface and one of the pleopods had the same shape as one of the pleopods of *Ch. affinis* Dana. When these two species are compared they seem to be nearly related to each other, but they differ in: (a) the first antero-lateral tooth in *Ch. affinis* being much more truncate, (b) the length of

Measurements in mm:

	Japan, v. Siebold coll. Leiden Museum					Amoy, Schlegel coll. Leiden Museum						Moluccas Macklot coll. Leiden Museum	Red Sea Rüppell coll. Leiden Museum		Shendon.	Cambridge coll.
	♀ type	♂	♂	♂	♀	♂	♂	♂	♀	♀	juv.	♂	♂	♂	♂	♂
Length of cephalothorax	55.8	54.8	17.5	60.8	42.2	32.0	27.5	21.7	32.2	31.0	19.5	71.2	50.5	61.2	35.8	45.5
Breadth of cephalothorax	80.0	79.0	25.0	89.0	61.0	46.8	41.0	32.2	48.5	44.9	29.0	103.0	73.2	87.0	50.0	63.0
Front	18.8	18.8	7.2	20.7	14.0	12.0	10.5	8.3	11.7	11.5	7.5	24.0	18.0	21.0	13.0	16.0
Interorbital space	24.0	24.0	8.0	26.5	18.7	15.0	13.0	10.2	15.0	14.0	9.0	30.2	22.2	26.5	16.2	20.5
Orbit	9.4	8.5	4.0	9.5	7.2	6.8	5.8	4.5	6.2	6.0	3.7	11.0	9.0	9.7	7.0	8.0
Orbito-frontal border	41.8	38.8	15.8	43.0	32.3	26.5	23.2	18.0	26.6	25.5	16.5	49.5	39.0	44.0	29.0	34.8
Length of cheliped (largest)	103.6	126.7	31.2	139.3	—	61.2	51.5	38.4	58.7	53.8	34.0	172.5	110.4	137.0	72.6	98.5
Length of merus natatory leg	14.0	13.8	5.5	16.7	11.2	8.5	7.2	5.6	8.6	8.4	5.2	20.2	13.5	16.5	10.0	12.0
Breadth of merus natatory leg	10.0	9.8	3.0	10.2	7.5	5.4	4.8	3.5	5.5	5.2	3.0	13.0	9.2	10.8	6.0	7.5
Length 6th ♂ abdominal segment	—	7.2	2.5	8.0	—	4.5	3.8	3.0	—	—	—	10.2	7.0	8.2	5.0	6.0
Breadth 6th ♂ abdominal segment	—	9.8	3.2	11.0	—	6.2	4.8	4.0	—	—	—	12.8	9.5	11.0	7.0	8.2
Posterior border	30.0	25.8	8.5	29.5	22.2	16.8	14.5	11.0	17.0	16.9	10.0	34.2	25.0	29.5	18.8	21.6
Cephalothorax breadth / Cephalothorax length	1.43	1.44	1.43	1.46	1.45	1.45	1.49	1.48	1.51	1.45	1.48	1.45	1.46	1.42	1.39	1.38
Merus length / Merus breadth	1.40	1.41	1.83	1.63	1.49	1.57	1.50	1.60	1.56	1.61	1.73	1.55	1.47	1.53	1.67	1.60

the merus in *Ch. japonica* being about 1.5 times the breadth, whereas in *Ch. affinis* it is about 1.3 times the breadth, (c) the different shape of the sixth male abdominal segment, (d) the frontal teeth are, as a rule, much sharper than in *Ch. affinis.*

Geographical distribution: Red Sea (LEENE); China (MILNE EDWARDS, BALSS, STIMPSON, SHEN); Japan (DE HAAN, MILNE EDWARDS, DOFLEIN, RATHBUN, PARISI, BALSS, YOKOYA, DERJUGIN, KOBJAKOWA).

This distribution is very remarkable. Since two specimens were found in the RÜPPELL material this species should also occur in the Red Sea. It is surprising, that it is never found between these extremes of the Indo-Pacific region.

4. *Charybdis* (*Charybdis*) *affinis* Dana (figs. 8 and 9).

Charybdis affinis, 1852, DANA, Proc. Nat. Sci. Philad., p. 85; U. S. Expl. Crust., pt 1, p. 286, pl. 17, figs 12 a—c.
Goniosoma affine, 1861, A. MILNE EDWARDS, Arch. Mus., vol. 10, pp. 384—385.
1887, DE MAN, Journ. Linn. Soc. Zool., vol. 22, p. 80, pl. 5, fig. 2.
1893, J. R. HENDERSON, Trans. Linn. Soc. Zool., (2), vol. 5, p. 374.
1895, DE MAN, Zool. Jahrb., Syst., vol. 8, p. 559.
1900, LANCHESTER, Proc. Zool. Soc. London, p. 747.
1901, LANCHESTER, Proc. Zool. Soc. London, pt 2, p. 545.
Charybdis (*Goniosoma*) *affinis,* 1899b, ALCOCK, p. 56.
1906, RATHBUN, U. S. Fish Comm. Bull. for 1903, pt 3, p. 872.
1910, RATHBUN, Mem. Ac. R. Danemark, (7) vol. 5, p. 364, pl. 2, fig. 11.
1918, KEMP, Mem. As. Soc. Bengal, vol. 6, pt 5, 250.
Charybdis (*Goniosoma*) *barneyi,* 1930, GORDON, Ann. and Mag. Nat. Hist., (10), vol. 6, p. 522. b and b'.
1931, GORDON, Journ. Linn. Soc. Zool., vol. 37, p. 536, figs 13 a, b and b'.
1934, SHEN, Hong Kong Nat. Suppl., no 3, p. 42, figs 6—8.
Charybdis (*Goniosoma*) *affinis,* 1937, SHEN, Bull. Raffl. Mus., no 13, p. 119, textfig. 11.

Deli, Sumatra, coll. de Bussy, 1⅓ ♂♂ and 3 egg-laden ♀♀.

Description: The cephalothorax is pilose, the regions are not clearly distinguishable; there is some granulation on the whole surface, only perceptible through a strong lens. Between the last antero-lateral teeth a transverse ridge runs across the cephalothorax, interrupted by the cervical groove and in the middle. Anterior to it another one occurs on the gastric region and there are short ones on the protogastric regions.

The front is cut into six teeth. The median teeth are a little prominent beyond the others, triangular, the top is more or less blunt, the sides are slightly convex. The submedian teeth are also triangular, somewhat smaller than the medians, the sides are straight; they slope somewhat outwards. The lateral teeth are acuter, narrower and sometimes longer than the submedians; they can be well distinguished from the inner supra-orbital angles.

The antero-lateral borders are cut into six teeth (including the outer orbital angle). The first is rather distinctly truncate, the anterior lobe is merely dentiform, the posterior lobe is rounded. The second tooth has a straight anterior border and a convex outer border. The third, fourth and fifth teeth are sub-equal, the anterior borders are concave and end in a spine, the outer borders are convex; of

these three the fifth tooth is the smallest. The sixth tooth is a spine, slightly longer than the preceding teeth.

The postero-lateral borders are strongly convergent.

The margin of the posterior border forms a curve with the postero-lateral borders and is nearly straight.

The upper border of the orbit is cut into three parts by two distinct incisions. Of the outer part the inner angle is somewhat turned up and blunt; the border of the median and inner part is granular; the inner supra-orbital angle is well-developed and dentiform. The inferior border is granular; it has

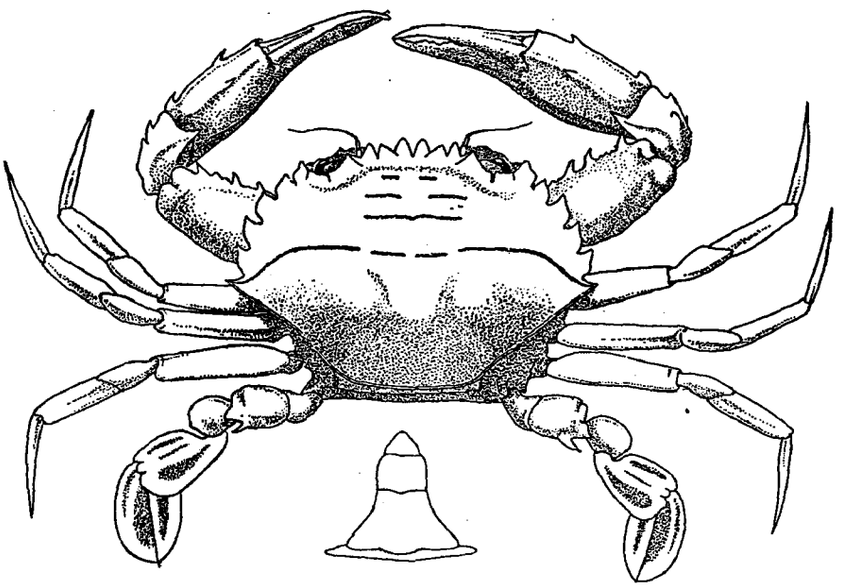


Fig. 8. *Charybdis affinis* Dana, ♂, dorsal view and abdomen. (× 1,5).

an incision laterally; the inner infra-orbital angle is clearly prominent and dentiform, the median part of the outer part of the border is lobe-like.

The "basal" antenna-joint has a low granular ridge and the lobule at the external angle joins the front and completely excludes the flagellum from the orbital hiatus.

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are partly pilose. There is a distinct, granular pleural groove.

The sternum is smooth.

Of the abdomen of the male the third up to the fifth terga are fused; the sixth tergum has sides which are strongly convergent in the second half; the boundary between the fifth and sixth segments is somewhat curved forward; it is broader than long. The surface of the abdomen of the male as well as of the female is always smooth.

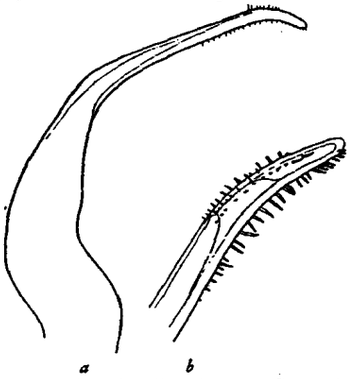
The length of the chelipeds is just over twice the length of the cephalothorax in the larger

males; the arm has three spines and some granules on the anterior border; the posterior border is smooth, on the upper surface there are some squamiform markings and other granulations; the wrist has a well-developed spine at the inner angle and three spinules at the outer angle, the outer surface has two costae; the hand is tumid, six-costate; on the upper side there are three well-developed spines (one near the wrist-articulation, the others nearly side-by-side in the middle) and two spinules behind the finger-joint; the right chela is somewhat larger than the left one.

The second up to the fourth pairs of pereiopods are sub-equal.

The natatory legs have meropodites, each of whose posterior borders has one spine proximal to the distal end. They are only a little longer than broad (the breadth is three fourths of the length); the posterior borders of the propodites are smooth.

The first ♂ abdominal appendage has a long narrow neck, which slopes distinctly outwards. On the posterior surface the apex has: (1) a few rather long spines, (2) a row of shorter spines, which is partly under the thin membrane. Moreover, we can sometimes distinguish: (3) one or two little rows of short spines at the beginning of the apex under the membrane. Once I found: (4) two rather long spines under the membrane lateral to the row mentioned in (2); another time I found only one spine. (In this material, which is from *one* locality, there proved to be rather much variability in the armature of the posterior side of these pleopods). The free border of the membrane is slightly convex. The outer border of the distal part of the neck and of the apex is armed with very strong spines. On the inner border of the distal part of the neck and of the apex there are spines in two rows; the spines are of different length. The rows of spines of outer and inner border continue on the anterior side of the neck and apex distally and proximally.



a *b*

Fig. 9. *Charybdis affinis* Dana. *a*, first male pleopod, posterior view (× 8); *b*, apex, posterior view. (× 23).

RATHBUN (1906 p. 872) suggests that *Ch. affinis* Alcock is not identical with *Ch. affinis* Dana, because the latter has no transverse ridge on the cardiac region. But KEMP (1918, p. 250) remarks: "This character, which is used by ALCOCK in his key to the Indian species of the genus, is evidently not valid in the case of very large specimens".

I could compare one of the specimens of *Ch. affinis* Dana from Penang (RATHBUN, 1906) with one of the specimens collected by N. Annandale (KEMP, 1918), which proved to be identical. But unfortunately I could not compare either of them with one of the specimens determined by ALCOCK. I have among my material a young male, which lacks the transverse ridge on the cardiac region.

The *Goniosoma affine* de Man also belongs to this species. I had on loan a specimen determined by DE MAN (Zool. Jahrb. Bnd. 8, p. 559), which proved to be identical with the *affinis*-specimens above mentioned.

Comparing the *affinis*-specimen with one of the ♂ specimens of *Ch. barneyi* Gordon, (Hong Kong, Shen coll. in British Museum) I could state identity of these species.

Geographical distribution: Coast of Orissa (ALCOCK); Akyab (ALCOCK); Mergui Archipelago (DE MAN, ALCOCK); Singapore (LANCHESTER, SHEN); Malakka (DE MAN); Trengganu (LANCHESTER); Singora (KEMP); Siam, coast of Lem Gnob (RATHBUN); Hong Kong (GORDON).

Measurements in mm:

	Deli, Sumatra, coll. de Bussy														Penang coll. by Purnam	
	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♀	♂	
Length of cephalothorax	29.2	34.8	28.0	28.0	22.0	31.0	24.0	—	15.0	29.2	33.0	[illegible]	[illegible]	25.5	31.0	[illegible]
Breadth of cephalothorax	43.0	50.0	40.8	41.0	33.2	44.0	37.0	38.0	23.0	44.0	47.2	[illegible]	[illegible]	39.0	45.5	[illegible]
Front	11.2	13.0	10.8	11.0	8.5	11.9	9.7	10.0	6.0	11.3	12.2	[illegible]	[illegible]	9.8	12.0	[illegible]
Interorbital space	14.2	17.2	13.5	14.0	11.0	14.5	12.0	12.5	7.5	15.0	15.5	[illegible]	[illegible]	12.5	15.8	[illegible]
Orbit	6.0	6.7	6.0	6.0	5.0	6.5	5.0	5.3	4.0	6.2	7.0	[illegible]	[illegible]	5.8	6.5	[illegible]
Orbito-frontal border	25.8	30.0	24.0	25.0	19.5	26.4	21.3	22.5	14.0	26.0	28.2	[illegible]	[illegible]	22.5	27.5	[illegible]
Length of cheliped (largest)	63.0	78.5	58.7	58.5	39.2	69.0	49.8	53.0	26.0	65.0	73.2	[illegible]	[illegible]	[illegible]	65.2	[illegible]
Length of merus natatory leg	7.0	8.5	6.8	6.5	5.8	7.2	6.0	6.0	4.0	7.0	7.6	[illegible]	[illegible]	5.8	7.5	[illegible]
Breadth of merus natatory leg	5.5	6.8	5.5	5.6	4.0	6.2	5.8	5.0	2.8	5.8	6.5	[illegible]	[illegible]	4.8	6.5	[illegible]
Length 6th ♂ abdominal segment	4.5	5.0	4.0	4.0	3.0	4.5	3.8	4.0	2.5	4.2	4.8	—	—	—	4.8	[illegible]
Breadth 6th ♂ abdominal segment	5.7	7.0	5.3	5.5	4.6	6.5	4.8	5.0	3.0	6.0	6.5	—	—	—	6.2	[illegible]
Posterior border	16.5	18.5	15.3	15.0	12.5	17.0	13.8	14.0	8.0	16.5	17.0	[illegible]	[illegible]	14.5	16.5	[illegible]
Cephalothorax breadth / Cephalothorax length	1.47	1.44	1.46	1.46	1.51	1.42	1.54	—	1.53	1.51	1.43	[illegible]	[illegible]	1.53	1.47	[illegible]
Merus length / Merus breadth	1.27	1.25	1.24	1.16	1.45	1.16	1.03	1.20	1.43	1.21	1.17	[illegible]	[illegible]	1.21	1.16	[illegible]

5. *Charybdis* (*Charybdis*) *miles* de Haan. (figs. 10, 11, 12 and 13).

Portunus (*Charybdis*) *miles*, 1850, De Haan, Faun. Japon., Crust., p. 41, pl. 11, fig. 2.
Charybdis miles, 1858, Stimpson, Proc. Ac. Nat. Sc. Philad., p. 39.
Goniosoma miles, 1861, A. M. Edwards, Arch. Mus., vol. 10, pp. 378, 385.
1893, Ortmann, Zool. Jahrb., Syst., vol. 7, p. 81.
Charybdis (*Goniosoma*) *miles*, 1899b, Alcock, p. 62.
Charybdis miles, 1902, Doflein, Abh. math.-phys. Cl. Bay. Ak. Wiss., vol. 21, p. 659.
1900, Whitelegge, Mem. Austr. Mus., no 4, pt 2, 157.
1902, Rathbun, Proc. U. S. Nat. Mus., vol. 26, p. 27.
1907, Stimpson, Smiths. Misc. Coll., vol. 49, p. 82.
1916, Parisi, Atti Soc. Ital. Sc. Nat., vol. 55, p. 175.
1922, Balss, Arch. f. Naturgesch., 88. Jahrg. Abt. A, p. 104.
1933, Yu Yokoya, Journ. coll. Agric. Tokyo, Imp. Univ., vol. 12, p. 175.
Charybdis (*Goniosoma*) *miles*, 1935, Chopra, Rec. Ind. Mus., vol. 37, p. 486, textfig. 9.
1937, Shen, Bull. Raffl. Mus., 13, p. 123, textfig. 13.
Charybdis (*Gonioneptunus*) *investigatoris*, 1899b, Alcock, p. 70.
1900, Alcock, Ill. Zool. Invest., part 8, pl. 46, fig. 4.
1935, Shen, Ann. and Mag. Nat. Hist., (10), vol. 15, p. 404.

Siboga, station 77, Borneo-Bank, 59 m, 1 juv.
Siboga, station 306, 8°27′ S., 122°54′.5 E., 247 m, 1 juv.
Siboga, station 318, 6°36′.5 S., 114°55′.5 E., 88 m, 1 egg-laden female.
Gier, 6°28′ S., 112°33′ E., 1 juv.

In the Siboga material there is only one adult specimen, a female. I compared it with the type specimen in the Leiden Museum, where I also examined six cotypes and sixteen other specimens.

Description: The cephalothorax, with ill-defined regions, is hairy. It is crossed by the

following granular transverse ridges: (1) one between the last antero-lateral teeth, interrupted by the cervical groove, and in the middle, (2) one on the mesogastric region, interrupted in the middle, (3) one on each of the protogastric regions, (4) one near the frontal region, interrupted in the middle. There is granulation between the transverse ridges on the meso- and protogastric regions, in the median axis of the gastric region, on the cardiac region, on the branchial lobe and on the median part of the mesobranchial region. There is a light-coloured spot with a dark edge on the meso-branchial region, near the postero-lateral border (when preserved in alcohol it is generally invisible).

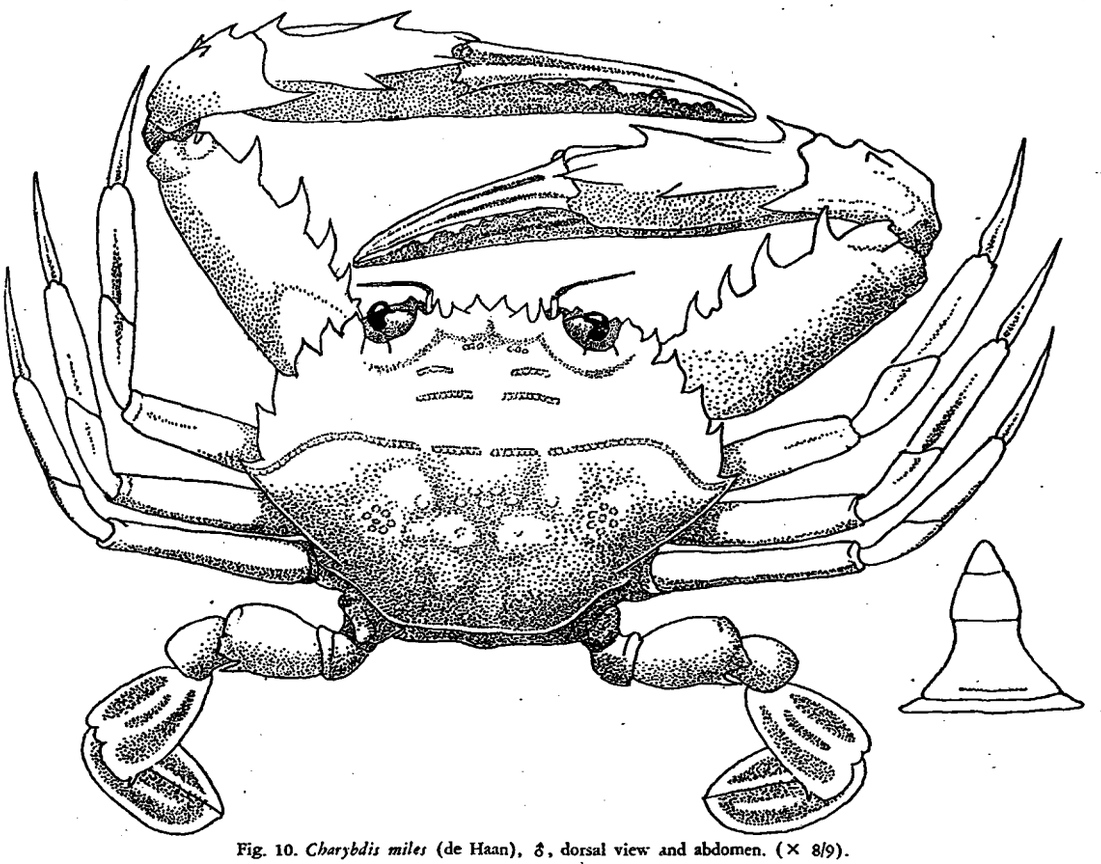


Fig. 10. *Charybdis miles* (de Haan), ♂, dorsal view and abdomen. (× 8/9).

The front is cut into six teeth. The median teeth are prominent beyond the others; they are acute, triangular. The submedians are on a higher plane, somewhat broader than the medians, triangular, acute, the tops are directed outwards. The lateral teeth are very narrow, triangular and acute; they are prominent beyond the submedian teeth and the inner supra-orbital angles. The incision between the submedian and the lateral teeth is narrow and V-shaped, between the medians it is widely V-shaped, as between the medians and submedians. All the borders are smooth. (Sometimes the upper surfaces are granular).

The antero-lateral border is cut into six teeth. The first tooth is notched, the anterior angle is sharp, the posterior angle is round. The second tooth is about as broad as the first tooth at the base; the anterior border is nearly straight, the outer border is convex; the top is acute. The third and fourth

teeth are the same shape and size, they are distinctly broader than the second; the anterior borders are slightly concave, the outer borders slightly convex. The fifth tooth is the broadest, the outer border is a little sinuous. The sixth tooth is more spine-like, but not prominent beyond the others, the top is directed forward. The anterior borders, except that of the first tooth, have some small granules; the outer borders are smooth. (In one of the males the outer borders were also granular).

The postero-lateral borders are rather strongly converging.

The posterior border is slightly sinuous, the margin forms a curve with the postero-lateral border.

The orbit has a rather strong dorsal inclination; the upper border is divided into three parts by two incisions; the inner supra-orbital angle is rather narrow, acute; the middle part has a granular

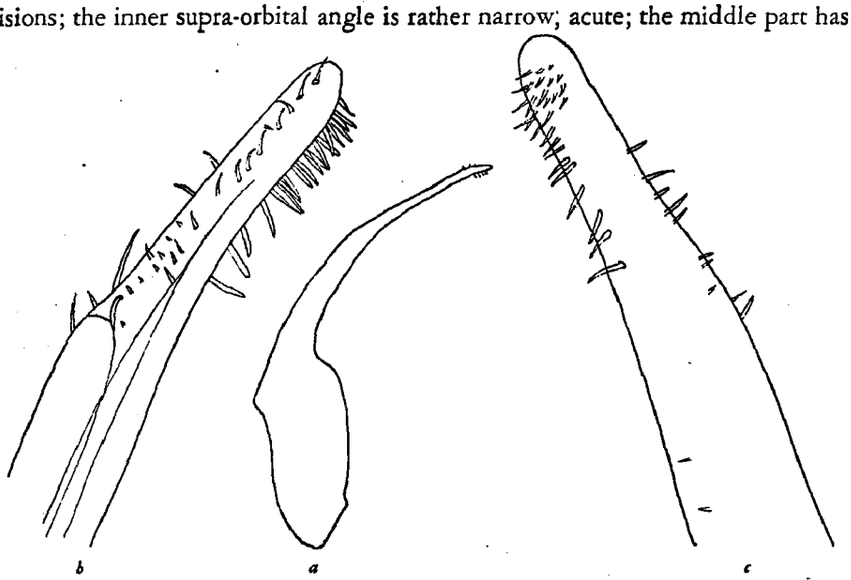


Fig. 11. *Charybdis miles* de Haan. *a*, first male pleopod, posterior view (× 3); *b*, apex, posterior view; *c*, apex anterior view (× 52).

border; the inner angle of the outer part is a little turned up. The lower, granular border is divided into two parts by a lateral incision; the median lobule of the outer part is rather distinct; the inner infra-orbital angle is acute, prominent, tooth-like.

The granular "basal" antenna-joint has a low granular crest; it touches the front, excluding the flagellum from the orbit.

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are smooth (probably they are also pilose, but our specimens have lost their pile). In most specimens the under surfaces of the antero-lateral teeth are granular.

The sternum is smooth and bare.

The sixth tergum of the male abdomen has gradually converging, slightly convex lateral borders; the posterior border is nearly straight; the anterior border is slightly convex. The second and third terga are carinate over the whole breadth, the fourth tergum has a short carina.

The chelipeds differ slightly in length. On the anterior border of the arm there are four spines, increasing in length distally (sometimes there are five spines; in other cases there are large granules proximal to the spines); the inferior border has a spinule distally; the upper and posterior

surfaces are granular; the inferior border is granular; the under surface sometimes has squamiform granular markings. The wrist has a strong spine at its inner angle and three spinules at its outer angle; there are three faintly granular ridges. The hand has six granular costae; the surfaces have squamiform markings, except for the upper surface, which is smooth. There are four spines: one at the wrist-articulation, two on the inner costa and one on the next outer one. The fingers are long and slender; the movable finger is somewhat longer than the palm.

The second up to the fourth pairs of pereiopods have no specific characteristics.

The merus of the natatory leg has the usual spine on its posterior border a short distance proximal to the distal end. The posterior border of the propus has a few spinules at the distal end.

The first male pleopod has a rather narrow neck, the apex is short and narrow. On the posterior surface of the apex there are four rows of spines, of which the distal row has the largest ones; on the proximal part of the inner border of the apex there are a few large spines. On the anterior surface of the apex there is a group of short spines some distance proximal to the distal end; moreover there is a row of larger spines, placed near the outer border; the inner border also has some spines. The distal parts of the outer and inner borders of the neck have rows with few spinules.

The shape of the front is greatly different in very young specimens, as CHOPRA (1935, p. 486) stated for a female with a cephalothorax length of about 11 mm: "In the small Sandheads specimen... the median teeth are only bluntly rounded lobes, separated from one another by a somewhat deep incision. The teeth of the next pair are not sharply separated off from those of the median pair; these are separated from the sub-median teeth by deep and broad incisions. The inner supra-orbital angles are barely noticeable; they are in the form of broad lobes, hardly separated off either from the upper orbital border or from the front proper."

Fig. 12. *Charybdis miles* de Haan, juv. (From CHOPRA, 1935, text-fig. 9 a). (× 5).

DOFLEIN (1902) had two males, which showed characteristics, which are among others peculiar to Gonioneptunes.

In our collections I found three specimens, which, according to the description and figure given by ALCOCK, belong to *Gonioneptunus investigatoris* Alcock. But after an exact examination I agree with SHEN's suggestion (1935), that this species must be a young specimen of a *Charybdis* species, namely of *Ch. miles.*

The young specimens (Java Sea c.l: 13.0 mm, c.b. 17.5 mm.; and Siboga, station 77 : c.l. 12.3 mm, c.b. 16.4 mm) differ from the adult specimens in: (1) the shape of the front, viz., the median frontal teeth are more or less elliptical, prominent beyond the submedians, which are broad lobes, of which the inner borders slope outwards, the outer borders run nearly straight backwards, the tops are round; the lateral teeth are much narrower, triangular and acute; (2) the inner infra-orbital angle is a little prominent, but lobe-like, not sharply dentiform; (3) the first antero-lateral tooth is, as in CHOPRA's specimen, a large broad tooth, faintly notched in the middle and its anterior angle is sharply acute.

The specimen of station 306 has the front as figured by CHOPRA. The first antero-lateral tooth is less clearly notched (c.l. 6.0 mm, c.b. 7.5 mm).

Geographical distribution: Ganjam Coast (ALCOCK); Mouth of Hooghly River (CHOPRA); Gulf of Martaban (ALCOCK); Tioman Island, South China Sea (SHEN); Hong Kong

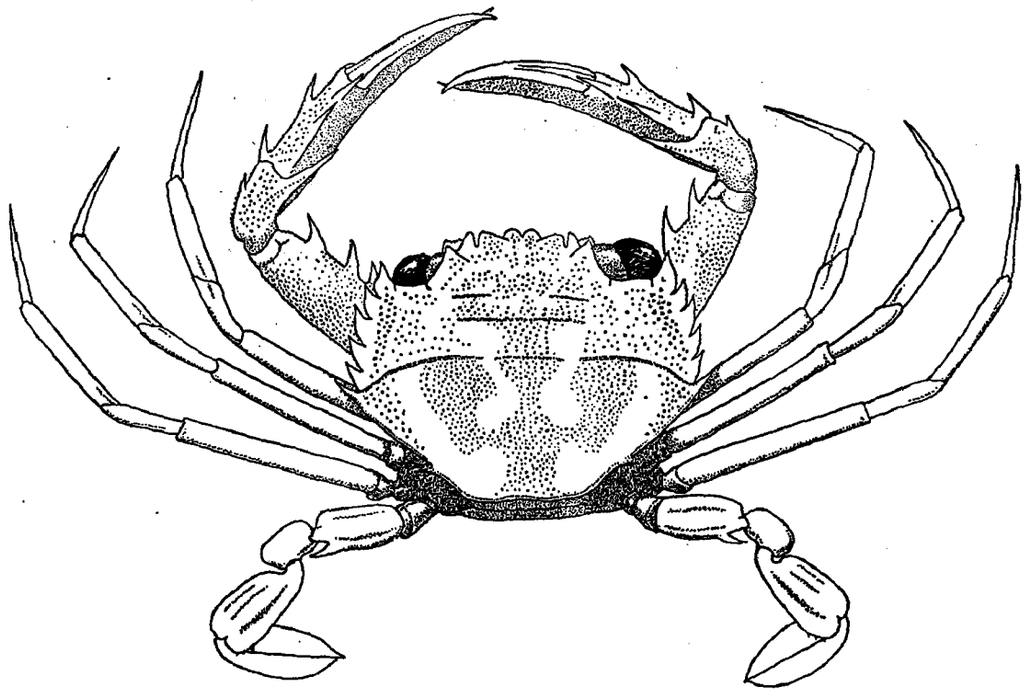


Fig. 13. *Charybdis miles* de Haan, juv., dorsal view. (× 4).

(STIMPSON); Japan (MILNE EDWARDS, ORTMANN, DOFLEIN, RATHBUN, PARISI, BALSS, YOKOYA); N. S. Wales (WHITELEGGE).

Measurement in m

	JAPAN										
	type ♂	cotype ♂	cotype ♂	cotype ♀	cotype ♀	cotype ♀	cotype ♀	von Siebold ♀	van Kattendijke ♀	♂	♂
Length of cephalothorax	64.0	64.0	48.5	51.8	55.0	37.5	38.7	45.6	50.0	58.3	33.8
Breadth of cephalothorax	92.0	91.2	66.5	72.2	76.2	52.0	52.3	62.5	70.5	83.0	46.5
Front	21.0	21.7	16.0	16.5	18.2	12.8	13.0	15.5	16.5	19.5	12.0
Interorbital space	26.6	26.7	20.0	20.8	23.0	15.8	15.8	18.6	20.0	24.0	14.5
Orbit	11.2	11.0	9.5	9.5	10.0	7.5	8.2	9.5	10.2	10.5	7.7
Orbito-frontal border	48.2	47.2	38.0	40.0	42.5	30.2	32.0	36.0	40.0	24.5	28.0
Length of cheliped (largest)	195.5	189.0	122.0	123.8	136.8	86.8	83.6	108.0	122.4	172.3	—
Length of merus natatory leg	18.5	18.0	13.2	14.5	15.5	11.0	11.0	13.0	14.5	17.0	—
Breadth of merus natatory leg	13.5	14.0	9.8	10.2	11.5	7.0	8.0	9.5	9.8	12.5	—
Length 6th ♂ abdominal segment	9.5	9.8	7.0	—	—	—	—	—	—	8.2	5.0
Breadth 6th ♂ abdominal segment	13.5	12.2	9.8	—	—	—	—	—	—	11.5	7.0
Posterior border	31.5	32.2	24.7	26.4	29.0	20.0	20.2	24.5	26.8	29.5	17.6
$\frac{\text{Cephalothorax breadth}}{\text{Cephalothorax length}}$	1.44	1.42	1.37	1.39	1.39	1.39	1.35	1.37	1.41	1.42	1.37

6. *Charybdis* (*Charybdis*) *roseae* (Hombron et Jacquinot). (fig. 14).

Thalamita rosaea, HOMBRON et JACQUINOT, Voyage au pôle Sud, Crust., vol. 3, p. 55, pl. 5, fig. 11.
Goniosoma rosaeum, 1861, A. MILNE EDWARDS, Arch. Mus., vol. 10, p. 378.

The type specimen (a male, collected by Mrs HOMBRON and JACQUINOT, New Guinea),

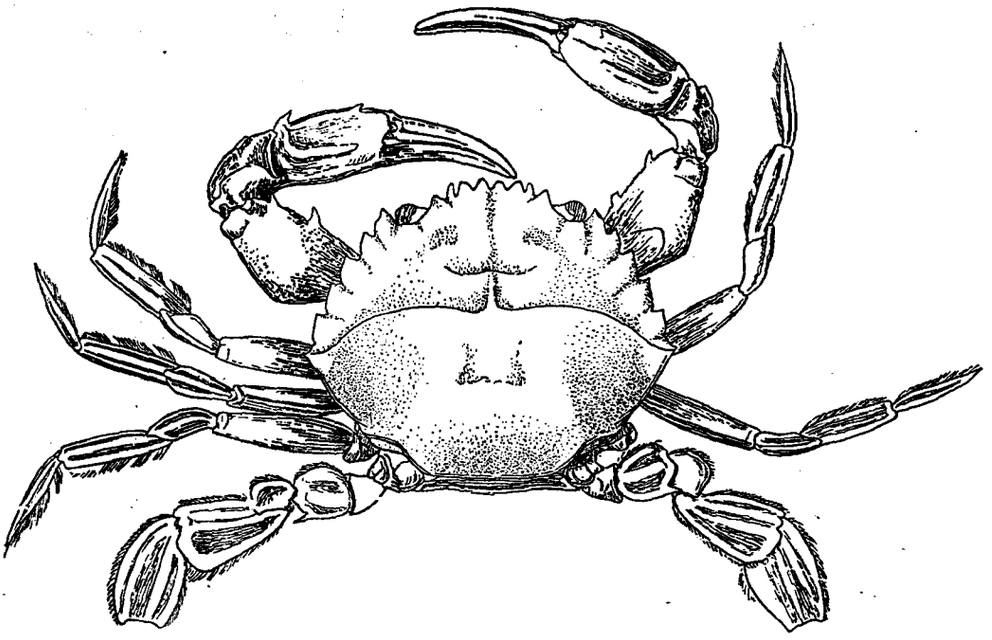


Fig. 14. *Charybdis rosaea* (Hombron et Jacquinot), dorsal view (× 2/3), drawn bij Miss MILLON.

present in the collection of the "Muséum National d'Histoire Naturelle" in Paris, is preserved in a dried condition in a closed box. Owing to this I was not able to observe all the characteristics.

JAPAN											Siboga-Expedition			Gier,
♂	♂	♂	♂	♂	♂	♂	♂	♂	♀	♀	Stat. 318 ♀	Stat. 77 juv.	Stat. 306 juv.	Java Sea juv.
61.2	52.2	48.0	52.0	56.5	39.5	38.0	35.5	31.2	47.0	41.0	45.0	12.1	5.8	13.2
86.0	73.5	68.0	70.4	78.2	53.5	51.5	48.0	42.5	64.2	54.6	65.0	16.1	7.4	17.5
20.2	17.5	17.0	17.0	20.0	13.7	13.0	12.4	11.3	15.7	14.0	15.0	5.2	—	5.4
25.2	21.2	20.0	21.2	24.2	16.2	16.0	14.5	13.2	19.0	16.5	19.2	6.8	—	6.2
11.4	10.2	9.5	10.0	9.0	8.5	8.2	7.5	6.6	9.0	8.2	9.0	3.7	—	3.8
46.5	41.0	38.5	40.0	39.5	32.4	31.2	28.8	26.6	36.0	32.4	36.2	12.8	—	13.0
158.5	145.0	125.0	136.0	135.0	92.7	96.8	81.8	58.9	114.0	90.2	115.0	25.8	—	27.6
16.5	15.6	13.6	14.5	15.0	11.0	11.0	10.5	9.2	12.6	11.2	12.8	4.3	—	4.5
12.0	10.5	10.0	11.0	10.0	7.5	7.5	7.0	5.6	9.2	7.2	8.3	1.9	—	2.2
9.0	7.5	7.4	7.8	7.2	5.8	5.6	5.2	4.8	—	—	—	—	—	—
12.0	11.2	9.5	10.5	10.5	7.6	7.2	6.8	6.0	—	—	—	—	—	—
31.0	26.8	24.5	27.0	25.2	20.5	19.0	18.8	16.0	25.2	21.5	25.7	6.0	—	6.7
1.41	1.41	1.42	1.35	1.38	1.35	1.36	1.35	1.36	1.37	1.33	1.44	1.33	1.28	1.33

Description: The smooth cephalothorax is rather tumid, and crossed by the following faintly granular transverse ridges: (1) one between the last antero-lateral teeth, interrupted by the cervical groove, (2) an unbroken sinuous one on the mesogastric region, (3) one on each of the protogastric regions, which is short and curved anteriorly, (4) one on the frontal region, which is interrupted in the middle. Moreover there is a faint ridge-like elevation on the cardiac region.

The front, which is prominent beyond the inner supra-orbital angles, is cut into six teeth. The median teeth are triangular, the outer borders are straight. The submedian teeth are broader at their base, the median borders slope rather strongly laterally, the lateral borders run nearly straight backwards; they are prominent beyond the narrow, triangular lateral teeth.

The antero-lateral border is long, compared with the other *Charybdis*-species, and is cut into six teeth. The first five teeth are broadly triangular. The first tooth has a straight anterior border, the faintly granular outer border is slightly convex. The second is about the same size and shape, perhaps it is a little narrower than the first; the granular anterior border is straight, the granular outer border is convex. The third tooth is much broader, the granular anterior border is slightly concave, the granular outer border slightly convex. The fourth tooth is larger than the third, the granular anterior border is nearly straight, the granular outer border is slightly sinuous. The fifth tooth is smaller than the third, but larger than the first and second teeth; the borders are as in the fourth tooth. The sixth tooth is not prominent or spine-like, it is rather broad. (I could not make out exactly the shape of the teeth, for they were not completely intact).

The postero-lateral borders are rather short with regard to the antero-lateral borders; they converge rather strongly posteriorly.

The posterior border is straight; the margin forms a curve with the postero-lateral borders.

The orbit has a rather distinct dorsal inclination. The upper border is cut into three parts by two incisions. The inner supra-orbital angle is rather broad, the top is slightly rounded. The lower border is cut into two parts by a lateral incision. The inner infra-orbital angle is dentiform.

The "basal" antenna-joint touches the front, excluding the flagellum from the orbital hiatus; it has a low crest.

The chelipeds differ in size. The granular anterior border of the arm has two short spines. The wrist has the usual armature; a spine at the inner angle and three little spinules at the outer angle; there are three granular ridges on the upper surface. The hand is six-costate; the costae are distinct, but faintly granular. The palm is strongly tumid in the larger cheliped; it has three spines: one at the wrist-articulation, and two on the upper surface, nearly side-by-side some distance proximal to the finger-joint. The movable finger is slender, and a little longer than the palm.

The second up to the fourth pairs of pereiopods have no specific characteristics, as far as I could observe.

The merus of the natatory leg is very short and considering its shortness, rather broad; it has the usual spine at its posterior border. The propus has no armature.

Geographical distribution: Coast of New Guinea (A. MILNE EDWARDS).

7. *Charybdis* (*Charybdis*) *Hellerii* (A. M. Edw.). (figs. 15, 16 and 17).

Thalamita sexdentata, 1830, RÜPPELL, 24 Arten kurzschwänzigen Krabben, p. 4, pl. 1, fig. 1, (part.).
Goniosoma sexdentatum, 1861, A. MILNE EDWARDS, Arch. Mus., vol. 10, p. 372.

Goniosoma Hellerii, 1867, A. MILNE EDWARDS, Bull. Soc. Entom., vol. 7, p. 282.
1873, A. MILNE EDWARDS, Nouv. Arch. Mus., vol. 9, p. 167.
Goniosoma annulatum, 1883, DE MAN, Notes Leyden Mus., vol. 5, p. 151, (see also DE MAN, 1887a).
Goniosoma merguiense, 1887a, DE MAN, Journ. Linn. Soc., Zool., vol. 22, p. 82, pl. 5, figs 3 and 4.
1887b, DE MAN, Arch. f. Naturgesch., Jahrg. 53, Bnd 1, p. 335.
Goniosoma spiniferum, 1884, MIERS, "Alert", p. 233, pl. 23, fig. c.
Goniosoma Hellerii, 1893, HENDERSON, Trans. Linn. Soc. Zool., (2), vol. 5, p. 375.
Goniosoma merguiense, 1895, DE MAN, Zool. Jahrb., Syst., vol. 8, p. 560, (1896, vol. 9, pl. 13, fig. 9).
Charybdis (Goniosoma) merguiense, 1899, ALCOCK, Jour. As. Soc. Bengal, vol. 68, pt 2, p. 55.
1899, NOBILI, Ann. Mus. Civ. St. Nat. Genova, ser. 2a, vol. 20, p. 254.
1900, NOBILI, ibid., p. 498.
1903, NOBILI, Bull. Mus. Torino, 18, no 455, p. 31.
Goniosoma merguiense, 1905, LENZ, Abh. Senckenb. Naturf. Ges., vol. 27, p. 360.
Charybdis (Goniosoma) merguiensis, 1906, NOBILI, Ann. Sc. Nat. Zool., (9), vol. 4, p. 196.
Charybdis spiniferus, 1906, GRANT and MCCULLOCH, Proc. Linn. Soc. N. S. Wales, vol. 31, p. 18.
Goniosoma merguiense, 1910, LENZ, Voeltzkow Reise Ostafrika, vol. 2, p. 556.
1913, KLUNZINGER, Nova Acta Acad. Leop. Carol., vol. 99, pt 2, p. 367.
Charybdis (Goniosoma) merguiensis, 1930, MONOD, Zool. Anz., vol. 92, p. 140, fig. 7.
1933, STEINITZ, Pubbl. Stat. Zool. Napoli, vol. 13, pp. 151 and 152.
1935, CHOPRA, Rec. Ind. Mus., vol. 37, p. 484, textfig. 8.
1937, LEENE, Zool. Meded., vol. 19, p. 165.
1937, SHEN, Bull. Raffl. Mus., 13, p. 121, textfig. 12.
nec *Goniosoma orientale,* 1868, HELLER, Novara, p. 29, pl. 3, fig. 3, (see DE MAN, 1887a, p. 83, footnote).
nec *Charybdis (Goniosoma) Hellerii,* 1906, NOBILI, Ann. Sc. Nat. Zool., (9), vol. 4, p. 195.
nec *Goniosoma Hellerii,* 1913, KLUNZINGER, Nova Acta Acad. Leop. Carol., vol. 99, pt 2, p. 367.

Siboga, stat. 50, —40 m, Laboean Badjo, 1 ♂.
Siboga, stat. 162, between Loslos and Broken Islands, Westcoast of Salawatti, 18 m, 1 juv.
Siboga, stat. 164, 1°42'.5 S., 130°47'.5 E., 32 m, 1 ♀.
Gier, no 9, exp. 18 2/7, 1908, 0°14' N., 104°4' E., 18—16 fms, 1 ♂.
Gier, no 12, exp. 13, 8/10, 1908, 6°15' S., 110°50' E., 22—28 fms, 1 ♂.
Gier, no 20, exp. 4, 21/5, 1909, 2 ♂♂.

In the Paris Museum I examined a large male of *Goniosoma Hellerii* A. M. Edw. from New Caledonia, which very probably is the type-specimen. It proved to be identical with *Goniosoma merguiense,* which DE MAN (1887b) already suggested. Moreover, DE MAN stated, that *Goniosoma orientale* Heller was identical with *G. annulatum* Fabr. and not with *G. merguiense.*

I also examined *G. sexdentatum* (Herbst) (A. M. EDWARDS, 1861) in Paris, and it proved to be identical with *G. hellerii* A. M. Edwards (as ALCOCK suggested in 1899).

Comparing the male specimen of *Ch. hellerii* from Obock (Dr Jousseaume coll., 1897) determined by G. NOBILI (1906, p. 105) with the sketches from *Ch. orientale* Dana, wich Dr CHACE sent me, I could state their identity [KLUNZINGER (1913) only referred to NOBILI (1906)].

In the collections in Paris I found four specimens (one young and two ovigerous females, and one male) from Tamatave, Madagascar and one male from the Bay of Passan, Madagascar (coll. Dr Millot) determined by Prof. BALSS as *Ch. lucifera.* They proved to be representatives of *Ch. hellerii* A. M. Edw.

After comparing a young specimen of *Ch. hellerii* in our collection with the figure of *G. spiniferum* Miers I think that these two species are also identical (as DE MAN already suggested in 1895). There are, however, some minor differences according to HENDERSON and DE MAN: a) the posterior

border of the propus of the natatory leg is not denticulated, b) the wrist has only two spinules on the outer surface instead of three spinules.

In the Leiden Museum I found in the *Thalamita sexdentata* material of Rüppell one male and one female of *Ch. hellerii*.

Here follows the description of the typespecimens of *Goniosoma merguiense* de Man, which are deposited in the Rijksmuseum van Natuurlijke Historie in Leiden.

Description: The cephalothorax, of which the regions can be distinguished with some difficulty only, is covered with a dense pile (which is usually not present, the cephalothorax generally being totally bare). There are the usual transverse ridges on the anterior part, which are faintly granular, viz., (1) the ridge between the last antero-lateral teeth, only interrupted by the cervical groove, (2)

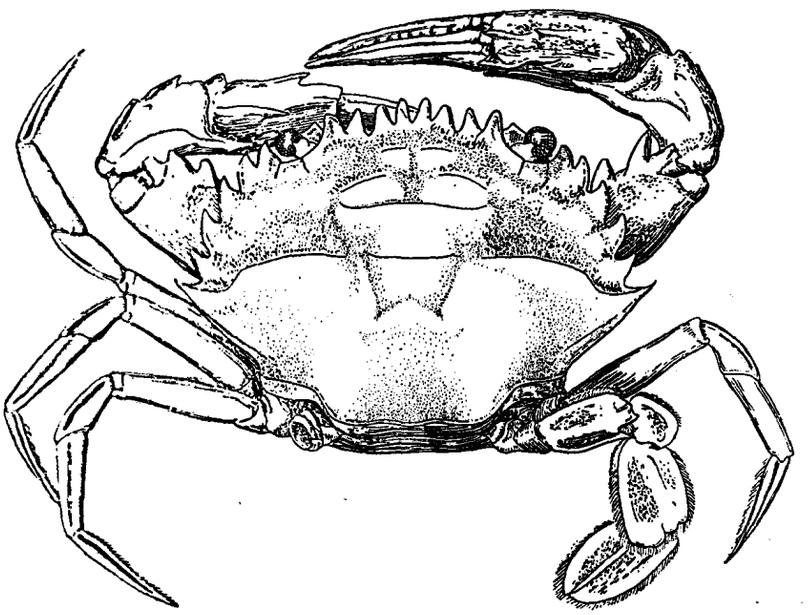


Fig. 15 *Charybdis hellerii* (A. M. Edw.), ♀ typespecimen, (× 9/10), drawn by Miss MILLON.

an unbroken one on the gastric region, (3) a short ridge on each of the protogastric regions, and (4) one on the frontal region, interrupted in the middle.

The front is cut into six teeth. The medians, a little prominent beyond the others, are subquadrate with rounded angles in the younger specimens, but triangular with blunt tops in the older specimens. The submedian teeth are triangular, their tops directed somewhat outwards, their tops are acuter than those of the median teeth, the inner borders are shorter than the outer borders; they are distinctly separated from the lateral teeth by a V-shaped incision. The lateral teeth are triangular, rather acute, at the base a little narrower than the submedian teeth and than the inner supra-orbital angles.

The antero-lateral border is cut into six teeth, with dark-coloured tops. They are nearly the same shape. The first and second teeth have nearly straight anterior borders, and convex outer borders. They are nearly the same size. The third tooth is about 1.5 times as broad as the second; the fourth tooth is a little narrower than the third; the fifth tooth is as broad as the second at the base; the third

up to the fifth teeth have concave anterior borders, convex outer borders and rather acute tops. The sixth tooth is more spine-like, not longer than the fifth tooth, the top is directed more laterally.

The postero-lateral borders converge strongly posteriorly.

The posterior border is a little convex and it forms a curve with the postero-lateral borders.

The upper border of the orbit is divided into three parts by two distinct fissures. The inner supra-orbital angle is rather prominent, somewhat broader and blunter than the lateral frontal teeth. The lower border has a fissure laterally; the inner part has a granular border, the inner angle is rather prominent, dentiform; the outer part has a distinct, but not dentiform lobule with a granular border.

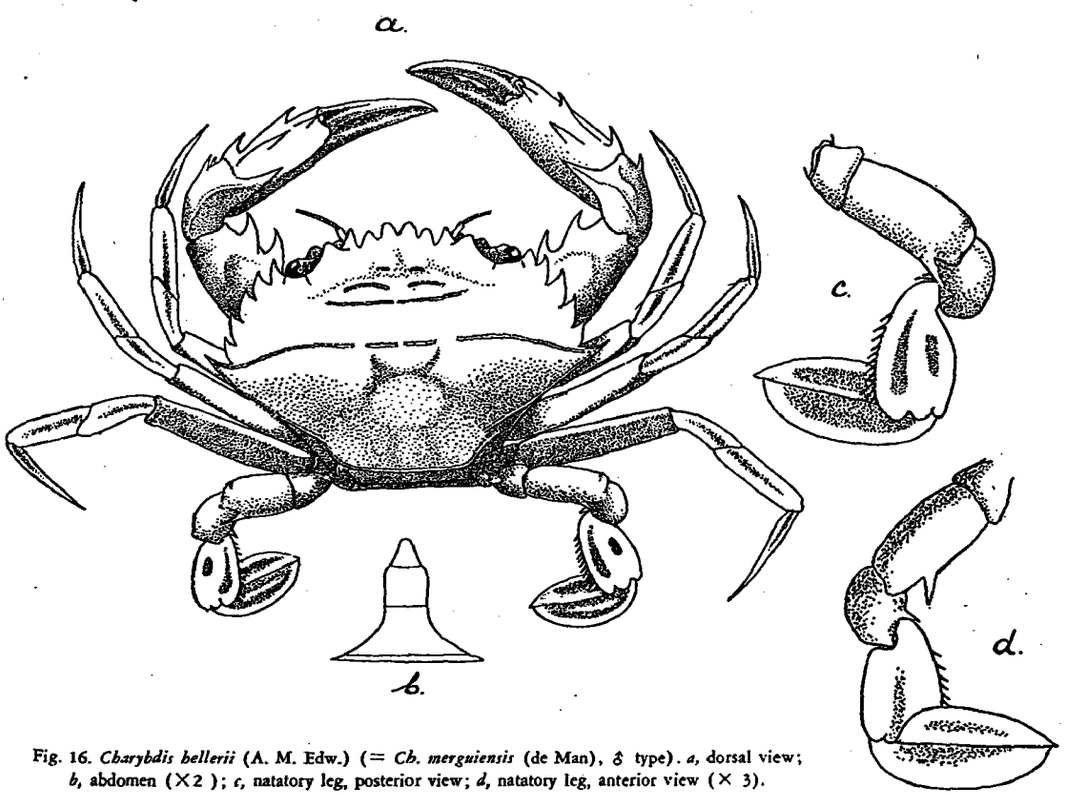


Fig. 16. *Charybdis hellerii* (A. M. Edw.) (= *Ch. merguiensis* (de Man), ♂ type). *a*, dorsal view; *b*, abdomen (×2); *c*, natatory leg, posterior view; *d*, natatory leg, anterior view (× 3).

The "basal" antenna-joint, with a low granular crest, touches the front, excluding the flagellum from the orbit (except in the juvenile specimens, where it does not touch the front).

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, sub-branchial and pterygostomian regions are pilose (in the older specimens they are only partly pilose). The granular pleural groove is distinct.

The sternum is bare and smooth.

Of the abdomen of the male the second and third terga are transversely keeled; the fourth tergum also has a keel, but not over the breadth. The sixth tergum is nearly as long as broad, its lateral borders are parallel for three fourths to five sixths of their extent, the anterior border is straight, the posterior border is nearly straight (in the younger specimens it is very slightly curved anteriorly).

The chelipeds are nearly the same size (the left one is only very little longer than the right one), it has 2.5 times the length of the cephalothorax. The arm has three spines on its anterior border, of which the proximal one is the smallest, its posterior and inferior borders have no armature, the posterior border sometimes has some faint granulation in the middle; the upper and under surfaces are smooth. The wrist is smooth, except for three faint ridges; the spine at the inner angle is well-developed, at the outer angle there are three spinules. The large, somewhat tumid hand is smooth, except for six faint costae, which are not granular; it has four spines and one little spinule (one spine at the wrist-articulation, two on the inner ridge of the upper surface and one on the next outer one; the spinule

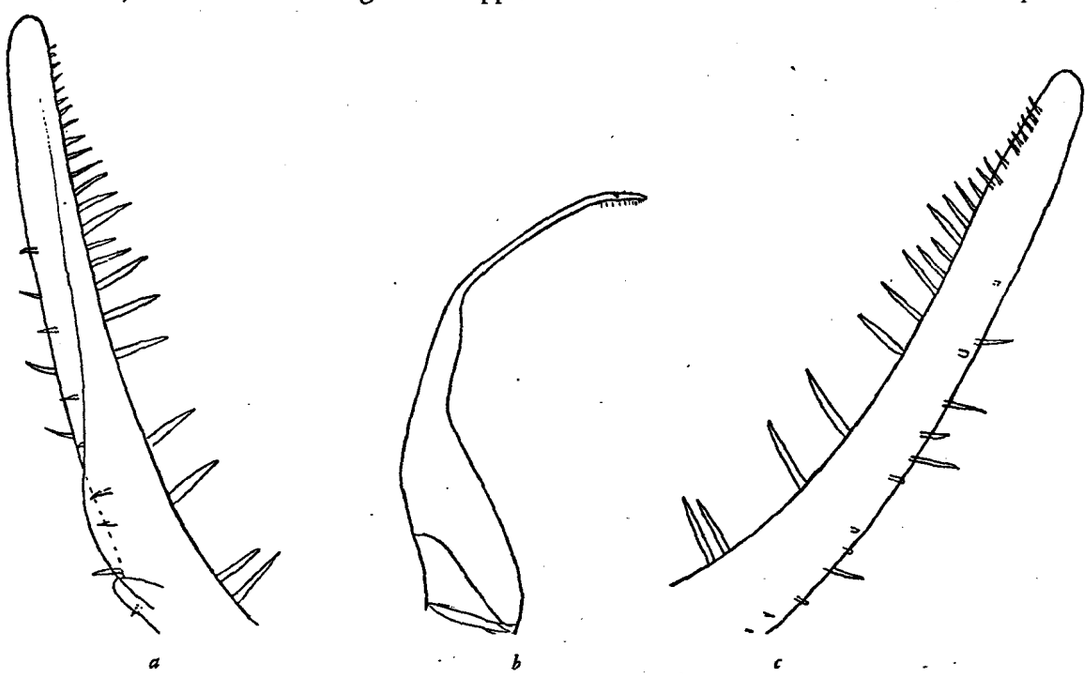


Fig. 17. *Charybdis hellerii* (A. M. Edw.) *a*, first male pleopod, posterior view (× 3); *b*, apex, posterior view; *c*, apex, anterior view (× 52).

is at the finger-articulation); the inner surface has a ridge, which sometimes has a very faint granulation. The movable finger is longer than the palm.

The second up to the fourth pairs of pereiopods have no specific characteristics.

Of the natatory leg the length of the merus is about twice the breadth, its posterior border has a spine near the distal end; the propus has a serrated posterior border.

The first male abdominal appendage has a narrow neck, which is rather long; the apex is narrow and it forms only a slight curve with the neck. The posterior surface of the apex has only a few spines. The inner border has several spines on the apex only. The outer border has a row of spines, which are small near the top of the apex. The anterior surface of the apex has some spines (which were broken off in the specimen I examined), which are continued as small spinules for a short distance on the neck. The posterior surface of the apex has a membrane with a faintly curved free border.

If we compare the proportion cephalothorax breadth: cephalothorax length (see table) I find for the (small) female 1.46 and for the males 1.47—1.53.

CHOPRA (1935, p. 484) also calculated the proportion cephalothorax breadth: cephalothorax length and found the figures 1.53—1.56 for large males, and for the females 1.62—1.67; for one female (Sandheads, Hooghly River) 1.73.

As I published (1937, p. 166) before, I found for six other males the figures 1.45—1.62 and for four females 1.53—1.63.

The material examined is not extensive enough to allow of any conclusion. We may only conclude from the measurementstables, that in the material examined the figures vary from 1.45—1.62 for the males, and from 1.46—1.73 for the females.

MONOD (1930, p. 140) and STEINITZ (1933, pp. 151, 152) referred to the presence of a strongly arched "Querlinie" behind the front. MONOD has shown its exact position in his figure of the species. Moreover he observed dark red spots on the cephalothorax. CHOPRA also found the "Querlinie" and the dark red spots in some specimens. In the Siboga- and Gier-specimens I did not see anything of it. The "Querlinie" was only indicated by a line without a pile, which is more usual in specimens with a rather dense pile; I did not observe any trace of the dark red spots (but the specimens had been preserved in spirit during many years).

Ch. hellerii is very nearly related to *Ch. annulatum* (Fabr.), but there are several distinct differences, of which the presence of the spine at the posterior border of the carpus of the natatory leg is the most important. It can also very clearly be distinguished from *Ch. amboinensis* (nom. nov.) by: (1) the cephalothorax being smooth, with very faint transverse ridges, (2) the cheliped being smooth, without distinct granulation, (3) the sixth tergum of the male abdomen being nearly quadrate, (4) the shape of the first male appendage, (5) the spine at the posterior border of the carpus of the natatory leg.

Geographical distribution: Palestina (STEINITZ, MONOD); Obock (NOBILI); Majunga, Madagascar (LENZ); Tuticorin; Rameswaran (HENDERSON); Ceylon (HENDERSON and LENZ); River Hooghly (CHOPRA); King Island Bay; Elphinstone Island (DE MAN); Singapore (NOBILI, SHEN); Java Sea (DE MAN); Amboina (NOBILI); New Caledonia (A. MILNE EDWARDS); Port Curtis (GRANT and MCCULLOCH).

Measurements in mm:

	Siboga, Stat. 50	Siboga, Stat. 162	Siboga, Stat. 164	Gier, no. 20, Exp. 4		Gier, no. 9, Exp. 18	Gier, no. 12, Exp. 13
	♂	juv.	♀	♂	♂	♂	♂
Length of cephalothorax	8.0	6.2	12.5	47.8	45.2	43.5	37.2
Breadth of cephalothorax	—	8.5	18.3	70.5	68.8	65.5	57.0
Front	4.0	3.1	6.0	19.5	19.0	18.0	15.5
Interorbital space	5.0	3.4	7.0	24.8	24.0	23.0	21.0
Orbit	2.5	2.0	3.2	9.0	9.2	8.5	7.7
Orbito-frontal border	—	6.8	13.5	41.5	41.0	39.5	34.8
Length of cheliped (largest)	13.8	10.6	21.7	111.3	99.0	82.5	79.2
Length of merus (nat. leg)	3.0	2.2	4.0	14.0	14.0	13.5	11.0
Breadth of merus (nat. leg)	1.5	1.2	2.2	7.5	7.0	7.2	6.0
Length of 6th ♂ abd. segment	1.3	—	—	7.0	6.5	6.2	5.7
Breadth of 6th ♂ abd. segment	1.5	—	—	7.5	7.0	7.0	6.5
$\frac{\text{Cephalothorax breadth}}{\text{Cephalothorax length}}$	—	1.37	1.46	1.47	1.52	1.50	1.53

8. *Charybdis* (*Charybdis*) *acuta* A. M. Edw. (figs. 18, 19 and 20).

Goniosoma acutum, 1869, A. MILNE EDWARDS, Nouv. Arch. vol. 5, p. 150, pl. 7, figs. 8—10.
1893, ORTMANN, Zool. Jahrb., Syst., vol. 7, p. 82.
Charybdis acuta, 1922, BALSS, Arch. f. Naturgesch. Jrg., 88, Abt. A., p. 105.
Charybdis (Goniosoma) acuta, 1934, SHEN, Hong Kong Naturalist Suppl. 3, p. 39, figs 2—5.

This species, of which no specimens are represented in the Siboga and Gier collections, is only known from Japan. I suppose therefore, that is has a very limited distribution. Prof. BALSS sent me on loan a male specimen from Yokohama, which enabled me to examine this species.

Description: The cephalothorax, covered with a dense, short tomentum, is crossed by

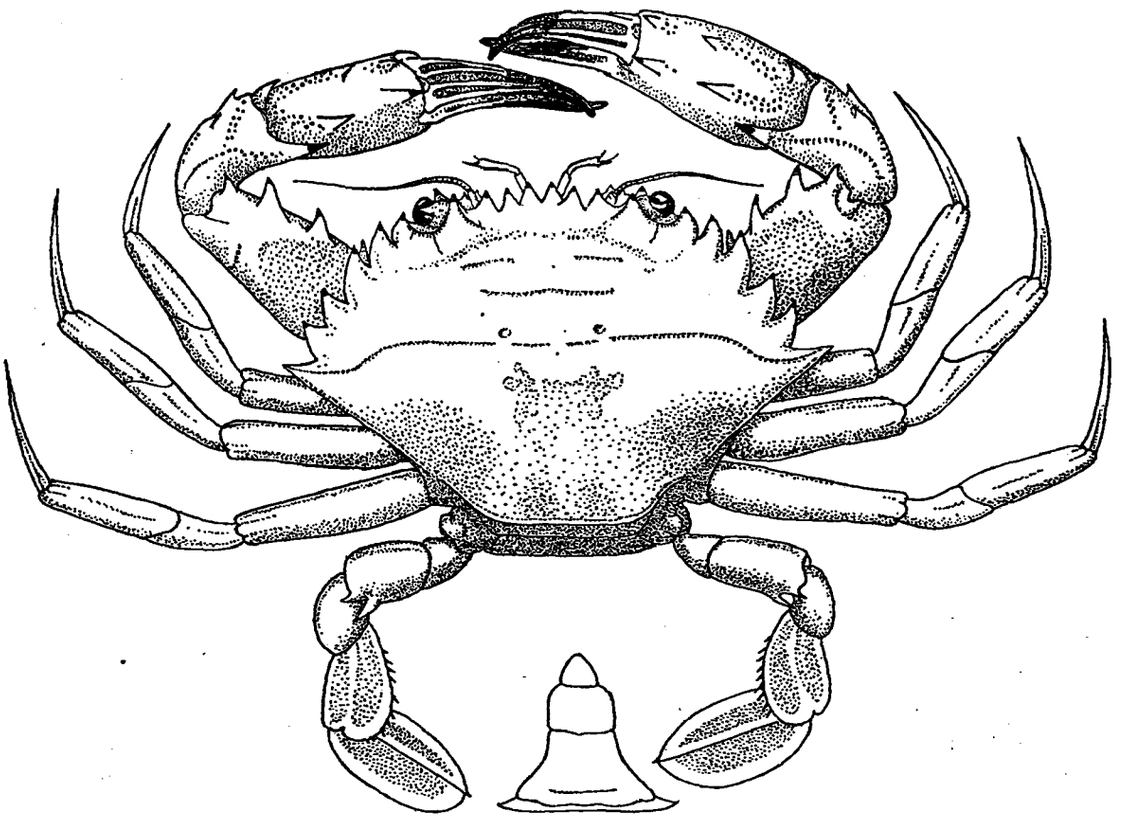


Fig. 18. *Charybdis acuta* (A. M. Edw.), ♂, dorsal view and abdomen, natural size.

some rather distinct granular transverse ridges viz.: (1) one between the last antero-lateral spines, interrupted by the cervical groove, (2) an unbroken one on the mesogastric region, (3) one on each of the protogastric regions, (4) a very short one, consisting of only a few granules, on each half of the frontal region, only visible through a strong lens. Behind the transverse ridge mentioned first there are no ridges. The regions are rather difficult to distinguish; the orbital regions are distinctly separated from the others by a groove, which is not pilose. This groove cannot be compared with the transverse ridges, but I suppose it is like the groove which MONOD (1930, Zool. Anz., vol. 92, p. 140) and

STEINITZ (1933, Publ. Stat. Zool. Napoli, vol. 13, p. 151) observed in *Charybdis hellerii* A. M. Edw.

The front is cut into six acute, triangular teeth with darker coloured tops. The median teeth are most prominent; they are as broad as the submedian teeth, the latter being on a somewhat higher plane. The borders of these four teeth have a few small granules on their proximal parts. The lateral teeth are narrower than the submedian ones, their median borders have only a few granules on their proximal parts and the lateral borders have a row of granules, which begins at a short distance behind the top and which is continued nearly till the inner supra-orbital angle; their under surfaces have a row of granules; they are separated from the inner supra-orbital angles by wide incisions.

The antero-lateral borders are cut into six teeth. The first tooth is the smallest; its anterior border is slightly concave, its outer border is convex; both borders are granular. The second tooth, only very little broader than the first tooth, also has a concave anterior border, which is nearly smooth, and a slightly granular convex outer border. The third tooth is very much larger than any of the other teeth. The fourth tooth is much narrower than the third, but a little broader than the second. The fifth tooth is as broad as the second, but distinctly longer than the latter. The anterior and outer borders in the third up to the fifth teeth are as in the second tooth. The sixth tooth is a spine, which is about twice as long as the fifth tooth; the anterior border has a few granules, the posterior border is nearly smooth.

The postero-lateral borders are strongly convergent posteriorly.

The margin of the posterior border is straight, it forms a curve with the postero-lateral borders.

The orbit has a rather distinct dorsal inclination; its granular upper border has two incisions. The inner supra-orbital angle is sharp and prominent, the median border is granular, except for the distal part, therefore the top is smooth. The granular, lower border has an incision laterally; the median lobe of the outer part is a little tooth-like; the inner infra-orbital angle is prominent and very acute.

The "basal" antenna-joint has two teeth, of which the median one is the largest.

The antennulae are folded transversely.

The sub-orbital, pterygostomian, sub-hepatic and sub-branchial regions are pilose and smooth. There is a distinct granular pleural groove.

The sternum is smooth and bare; perhaps it has lost its pile, for there are some remains of tomentum.

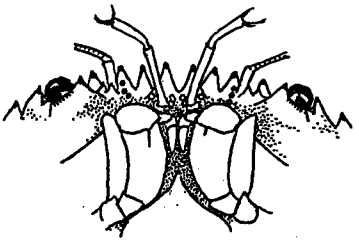


Fig. 19. *Charybdis acuta* (A. M. Edw.), frontal view, natural size.

The abdomen of the male has transverse carinae on the second and third terga; there is a low carina on the fourth tergum. The sixth tergum is much broader than long, the lateral borders are parallel for the greater part, the posterior angles are round; the anterior border is a little curved anteriorly and the posterior border is nearly straight.

The chelipeds, which are rather hairy, are about twice as long as the cephalothorax (there is only a little difference in length and shape between the two chelipeds). The arm has three spines (of which the proximal one is the smallest) on the anterior border; the distal border ends anteriorly in a spinule; the posterior border is unarmed; the inferior border ends distally in a very little spinule; the arm is smooth, except for some granules on the anterior border, the granular distal

border and the granular posterior surface. The wrist has three granular ridges, besides some granules on the upper surface; it has a strong spine at the inner angle and three spinules at the outer one. The hand has six granular costae; five spines on its upper surface, viz.: one at the wrist-articulation, two on the inner costa and two on the next outer one; the spines on the latter costa are placed a little more distally than on the inner one. The movable finger is somewhat longer than the palm. The under surface of the hand is somewhat granular.

The second up to the fourth pairs of pereiopods have no specific characteristics.

Of the natatory leg the merus has the usual spine at its posterior border, the distal border ends posteriorly in a spinule. The propus has a row of spinules on its posterior border.

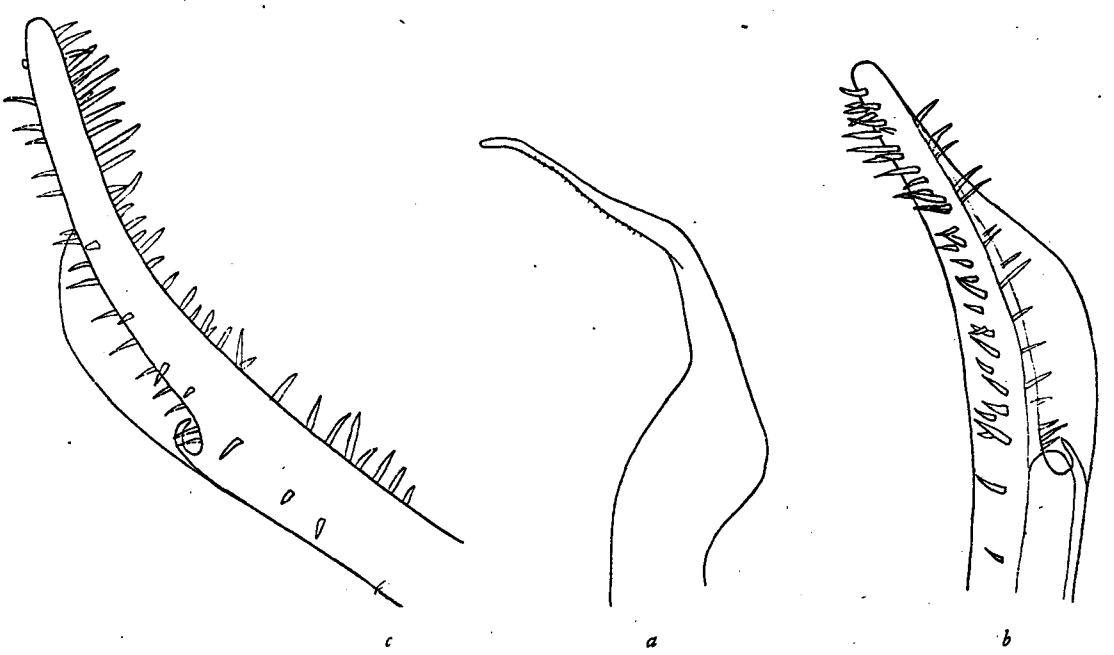


Fig. 20. *Charybdis acuta* (A. M. Edw.). *a*, first male pleopod, posterior view (× 4¼); *b*, apex, posterior view; *c*, apex, anterior view (× 52).

The first male pleopod, the neck of which is narrow with regard to the rest of the pleopod, has a broad membrane, strongly curved at its border on the posterior surface. Under this membrane the inner border of the apex shows two rows of spines. The posterior surface of the apex also has two rows of spines, which are continued on the distal part of the posterior side of the neck and more proximally on the outer border of the neck. These spines are continued until a short distance distally to the curve in the neck. On the anterior surface of the proximal part of the apex and the distal part of the neck there is one row of spines.

At the first superficial view there seems to be a relationship with *Ch. acutifrons* (de Man). But when the transverse ridges on the cephalothorax, the shape of the frontal and antero-lateral teeth and the pleopods are compared, it appears that there are important differences.

Geographical distribution: Tokyo Bay (A. MILNE EDWARDS, ORTMANN); Sagami Bay (BALSS); Hong Kong (SHEN).

Measurements in mm:

	♂
Length of cephalothorax	56.0
Breadth of cephalothorax	90.5
Front	23.0
Interorbital space	28.7
Orbit	9.5
Orbito-frontal border	45.5
Length of cheliped (right)	120.5
Length of merus natatory leg	17.5
Breadth of merus natatory leg	9.5
Length 6th ♂ abdominal segment	8.0
Breadth 6th ♂ abdominal segment	10.8
Posterior border	25.5
Cephalothorax breadth / Cephalothorax length	1.62

9. *Charybdis* (*Charybdis*) *amboinensis* nom. nov. (figs. 21 and 22).

Goniosoma sexdentatum, 1879, DE MAN, Notes Leyden Museum, vol. 1, p. 59.
? *Cancer sexdentatus*, 1783, HERBST, Naturgesch. Krabben u. Krebse, vol. 1, p. 153, pl. 7, fig. 52.
?? *Thalamita sexdentata*, 1830, RÜPPELL, 24 Arten kurzschwänzigen Krabben, p. 4, pl. 1, fig. 1.
? *Charybdis sexdentata*, 1902, DOFLEIN, Abh. math.-phys. Cl. Bayr. Ak. Wiss., vol. 21, p. 659.
?? *Charybdis* (*Goniosoma*) *sexdentata*, 1906, NOBILI, Ann. Sc. Nat. Zool., (9), vol. 4, p. 196.
?? *Charybdis sexdentata*, 1908, STEBBING, Ann. S. Afr. Mus., vol. 6, pt 1, p. 10.
1910, STEBBING, Ann. S. Afr. Mus., vol. 6, p. 306.
? *Goniosoma sexdentatum*, 1913, KLUNZINGER, Nova Acta Ac. Leop. Carol., vol. 99, no. 2, p. 366.
nec *Portunus* (*Charybdis*) *6-dentatus*, 1850, DE HAAN, Fauna Japon. Crust., p. 41, pl. 12, fig. 1.
nec *Charybdis sexdentata*, 1907, STIMPSON, Smiths. Miscell. Coll., vol. 49, p. 81.
nec *Goniosoma sexdentatum*, 1861, A. MILNE EDWARDS, Arch. Mus., vol. 10, p. 372, (see also ALCOCK, 1899b, p. 51).

The typespecimen of *Cancer sexdentatus* Herbst is not present in the Berlin Museum. Owing to this I only had for comparison the figure in HERBST's Naturgeschichte, which, like many other figures in this book, is very inexact. Therefore I was not able to state, what are the characteristics of this type.

Moreover there is much confusion in the literature with regard to this species.

In 1830 RÜPPELL described some specimens as *Thalamita sexdentata*, but his material proved to be not homogeneous. Thus I found in the part of his collection, which is in the Leiden Museum, two specimens of *Ch. japonica* (A. M. Edwards) (LEENE, 1937, p. 168), one male of *Ch. orientalis* Dana and two specimens of *Ch. hellerii* (A. M. Edw.).

In 1850 DE HAAN described a *Ch. sexdentata*, which A. MILNE EDWARDS named *Ch. japonica*, *Ch. sexdentata* (Herbst) being a different species. Examining a specimen, determined by A. MILNE EDWARDS in the Paris Museum (collected by M. Beaudouin, New Caledonia) I found that it was *Ch. hellerii* (A. M. Edw.) (as ALCOCK, 1899b, p. 51 already suggested).

In 1902 DOFLEIN mentioned a male specimen belonging to *Ch. sexdentata* (cf. A. MILNE

EDWARDS, 1861), but MILNE EDWARDS' description is not so extensive, that confusion is impossible.

In 1906 NOBILI only referred to RÜPPELL, for he did not find any specimens.

In 1908 and 1910 STEBBING gave two lists of synonyms, which differ much. According to these lists *Ch. annulata* (Fabr.) and *Ch. japonica* (A. M. Edw.) would be identical, which is not the case. Moreover, it is not possible to conclude from his remarks (1908) to what species the specimen in the Durban Museum belongs [(I suppose to *Ch. annulata* (Fabr.)].

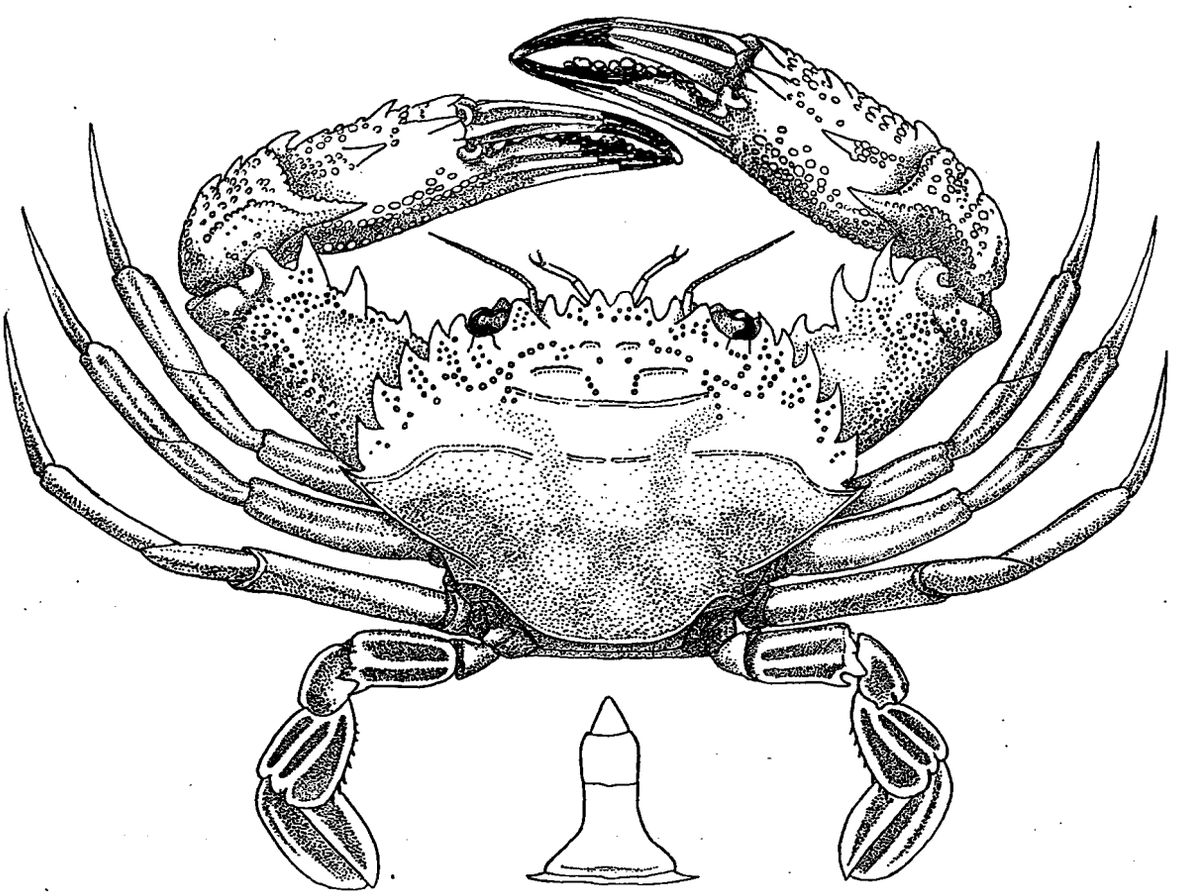


Fig. 21. *Charybdis amboinensis* nom. nov., ♂, dorsal view and abdomen. (× 9/10).

In 1913 KLUNZINGER gave a list of synonyms, in which he distinguished *Ch. sexdentata* (STIMPSON, 1907) from *Ch. japonica* (A. M. Edwards), whereas RATHBUN (STIMPSON, 1907) declared in a footnote, that STIMPSON's specimen is identical with *Ch. japonica* (A. M. Edw.).

At any rate it is doubtful, if the specimens, which I have described here, belong to *Ch. sexdentata* (Herbst). They are not, however, representatives of any other known *Charybdis*-species.

In order to avoid further confusion I therefore propose as a new name for this species: *Ch. amboinensis.*

In this case it is not possible to give the geographical distribution. Of this species no specimens

are present in the Siboga and Gier collections, but I could examine two male specimens from Amboina (coll. Hoedt 1869), which belong to the collection of the Leiden Museum.

D e s c r i p t i o n: The cephalothorax is covered with a rather dense pile (in the younger male it is denser than in the older male), the regions can only be distinguished with some difficulty. There occur several granular transverse ridges on the anterior part: (1) the usual one between the last antero-lateral teeth, interrupted in the middle and by the cervical groove, (2) an unbroken one in front of it on the mesogastric region, (3) a short one on each of the protogastric regions and (4) a short one on the frontal region, interrupted in the middle. Besides these granular ridges there occurs some sparse granulation on the antero-lateral teeth, on the orbital regions and on the frontal teeth.

The front is cut into six teeth. The median teeth are truncate with rounded angles in the younger male, in the older male they are more triangular, but with blunt tops. (The exact shape cannot be distinguished for the teeth are slightly damaged). At their base the submedian teeth are as broad as the medians, they are rather triangular, the median borders are shorter than the lateral borders, the blunt tops are directed somewhat outv[illegible]s. These four teeth are separated from the lateral teeth by a wide and deep fissu*us Plucifera* (teeth are a little narrower than the submedian ones, triangular with rather acute tops. Suppl. Entom. [illegible]y distinguishable from the inner supra-orbital angles, the latter being much broader and o[illegible] MILNE EDW. higher plane.

The antero-lateral border is cut into six teeth. [illegible] first five are about the same shape, with concave anterior borders and convex outer borders. The first two are the smallest; the first tooth has a dark-coloured top, which is sharp in the younger male; the second tooth has no dark top and it is not so sharp. In the older male the 3rd up to the 5th teeth are nearly the same size; in the younger male the third and fourth teeth are the largest with dark sharp tops; and the fifth tooth is only a little narrower than the fourth. The sixth tooth is more spine-like, with a dark-coloured top and it is not prominent beyond the others.

The postero-lateral borders converge strongly posteriorly.

The margin of the posterior border is somewhat convex, and forms a curve with the postero-lateral borders.

The upper border of the orbit is divided into three parts by two distinct incisions. The inner supra-orbital angle is rather broad and prominent with a blunt top. The lower border has a distinct incision, the median lobule of the outer part is distinct. The inner infra-orbital angle is clearly dentiform, but not very prominent.

The "basal" antenna-joint touches the front, excluding the flagellum from the orbit. It has a distinct granular crest.

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, sub-branchial and pterygostomian regions are pilose; the under surfaces of the teeth are granular. The pleural groove can easily be distinguished.

The sternum is bare and smooth.

Of the abdomen of the male the second, third and fourth terga are transversely keeled, the fourth segment is keeled nearly over the whole breadth; the sixth segment is only a little broader than long, the lateral borders are somewhat *divergent* posteriorly for two thirds of the length and then converge. The posterior border is curved anteriorly and the anterior border is nearly straight.

The larger cheliped is more than twice the length of the cephalothorax. The arm has three spines

(the proximal one being the smallest) on its anterior border, the posterior border is unarmed (the inferior border has a sharp spinule in the younger male), the anterior, under and posterior surfaces and the distal part of the upper surface are granular (the under surfaces only with faintly granular squamiform markings). The wrist has a strong spine at the inner angle and three spinules at the outer surface (in the younger male these spinules are sharper); it has a granular surface and three granular ridges. The hand has six granular costae. The upper and outer surfaces have large granules between the costae; the under surface has granular squamiform markings, the inner surface also has large granules between the two lower costae, more or less arranged in little rows; it has five spines, viz., one

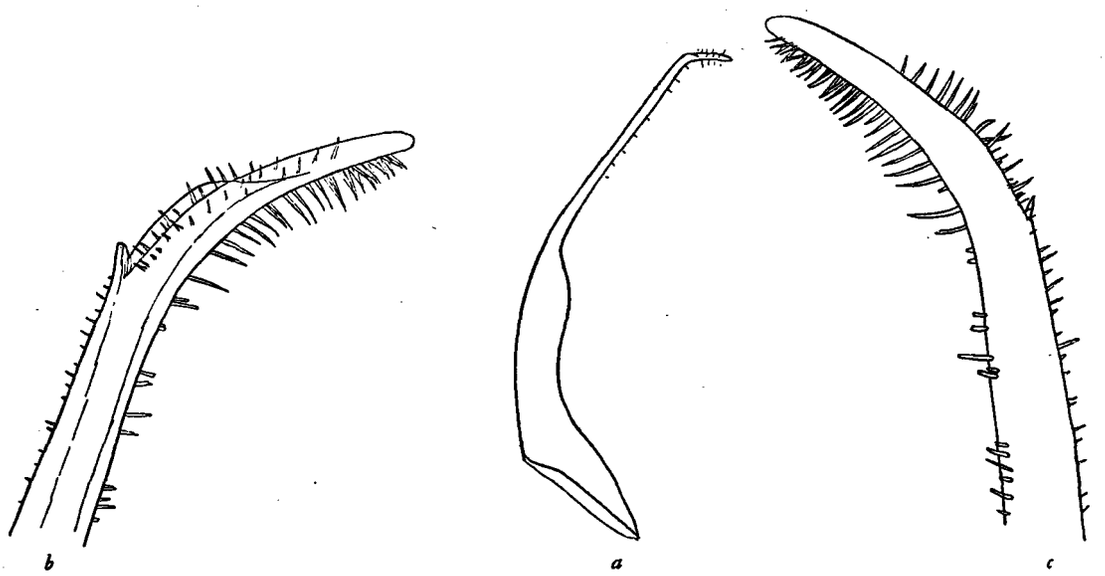


Fig. 22. *Charybdis amboinensis* nom. nov. *a*, first male pleopod, posterior view (× 4); *b*, apex, posterior view; *c*, apex, anterior view (× 3).

at the wrist-articulation, two on the inner costa and two on the next outer one. (In the younger male the spines are much acuter). The movable finger is a little longer than the palm.

The length of the merus of the natatory leg is about twice the breadth; the posterior border has a spine at a short distance proximal to the distal end (in the younger male the distal border has a spinule posteriorly); the posterior border of the propus has a row of spinules.

The first ♂ abdominal appendage has a long, narrow neck. On the posterior surface of the apex there occur three rows of spines, of which one is entirely and the other two are for the proximal part under the membrane. The inner border of the distal part of the neck has well-developed spines, which are continued on the inner border of the apex. The outer border of the neck and of the apex has very strong spines.

Colour: dark brown, the granular ridges are reddish. Therefore DE MAN suggested an affinity between this species and *Ch. natator* (Herbst). Comparing these two species there appear to be some distinct differences, of which the following are the most striking: there are a granular ridge on the cardiac region and two granular ridges on the mesobranchial region in *Ch. natator*, which are absent in *Ch. amboinensis*. The similarity, therefore, is only superficial.

Measurements in mm:

	♂	♂
Length of cephalothorax	68.0	47.5
Breadth of cephalothorax	97.8	67.0
Front	27.0	20.0
Interorbital space	35.0	25.0
Orbit	11.0	8.0
Orbito-frontal border	55.2	41.0
Length of cheliped (largest)	162.5	103.5
Length of merus (nat. leg)	20.0	14.5
Breadth of merus (nat. leg)	10.8	7.5
Length 6th ♂ abdominal segment	9.5	7.0
Breadth 6th ♂ abdominal segment	11.0	8.5
Posterior border	31.0	21.0
Cephalothorax breadth / Cephalothorax length	1.44	1.41

10. *Charybdis* (*Charybdis*) *lucifera* (Fabr.) (figs. 23, 24 and 25).

Portunus lucifer, 1798, FABRICIUS, Suppl. Entom. Syst. p. 364.
Goniosoma quadrimaculatum, 1861, A. MILNE EDWARDS, Arch. Mus. vol. 10, p. 375, pl. 34, fig. 3.
Goniosoma luciferum, 1893, J. R. HENDERSON, Trans. Linn. Soc. London, Zool. (2) vol. 5, p. 374.
Goniosoma annulatum, 1893, J. R. HENDERSON, ibid., p. 375 (part.).
Goniosoma quadrimaculatum, 1893, ORTMANN, Zool. Jahrb., Syst., vol. 7, p. 82.
Goniosoma luciferum, 1887, DE MAN, Journ. Linn. Soc. Zool. vol. 22, p. 83, footnote.
Charybdis (*Goniosoma*) *quadrimaculatum,* 1899b, ALCOCK, p. 54.
1904, DOFLEIN, "Valdivia", vol. 6, p. 96.
Charybdis lucifera, 1910, RATHBUN, Mem. Ac. Roy. sc., Danemark, (7), vol. 5, p. 364.
1922, BALSS, Arch. f. Naturgesch., 88. Jahrg., Abt. A, p. 106.
Goniosoma luciferum, 1925, DELSMAN & DE MAN, Treubia, vol. 6, p. 313, pl. 13, fig. b.

Neither in the Siboga nor in the Giermaterial are there any specimens of this species. But I had for examination the male specimen which DE MAN described (1925, De Man coll., Zool. Mus.). Moreover, I had material from the British Museum, which is part of the *Goniosoma annulatum* material collected by J. R. HENDERSON (1893, p. 375). The specimens in this material, being much smaller than the above-mentioned male, have several aberrations, which I shall mention after the description of the large male.

Description: The cephalothorax is bare and faintly granular, with two pale spots on either branchial region (the median spot is much larger than the lateral one); the regions are hardly distinguishable. There are the following faintly granular transverse ridges: (1) one between the last antero-lateral teeth, which is interrupted by the cervical groove and which is very faint on the gastric region, where it is interrupted in the middle, (2) one on the mesogastric region, which is slightly sinuous and (perhaps) interrupted in the middle, (3) a curved one on each of the protogastric regions, (4) a short one on the frontal region.

The front is cut into six teeth; the median and submedian ones are nearly the same size; the medians are blunter and more prominent than the submedians, which are more triangular and directed a little outwards. The lateral triangular teeth are separated from the submedians by a rather deep V-shaped incision; they are narrower than the submedians and only a little prominent beyond the inner supra-orbital angles.

The antero-l·r l borders are cut into six teeth. The first tooth is blunt and small, the straight inner and slightl· d outer borders are smooth. The second tooth is also rather small, but a little larger than the fi.. ..h; its smooth anterior border is straight. The third up to the fifth teeth are the same size and shape, larger than the second tooth and also have straight anterior and strongly curved

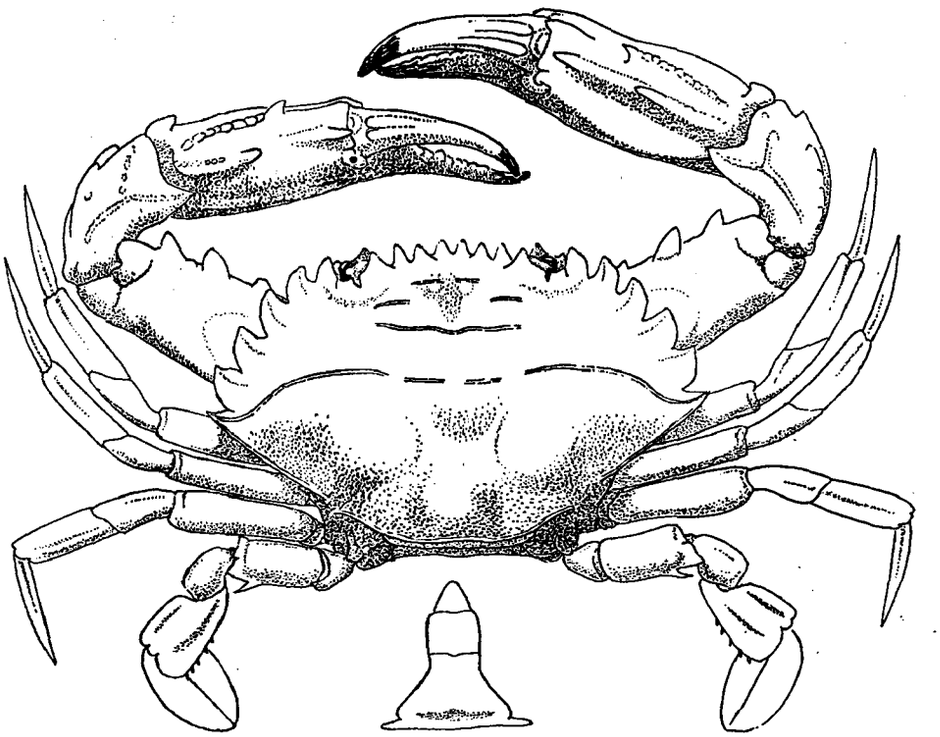


Fig. 23. *Charybdis lucifera* (Fabr.), ♂, dorsal view and abdomen. (× 7/8).

outer borders. They are somewhat acuter than the first two teeth, and the borders are smooth. The last (sixth) tooth is very distinctly the smallest and more spine-like.

The postero-lateral borders converge strongly posteriorly.

The posterior border is nearly straight and its margin forms a curve with the postero-lateral borders.

The orbit is rather narrow, there is a strong dorsal inclination; of the upper border, which is divided into three parts by two distinct incisions, only the median part is granular. The broad inner supra-orbital angle is rather prominent, blunt and triangular. The inner angle of the outer part is slightly turned up. Of the granular lower border the median lobule of the outer part is clearly tooth-like; the inner angle of the inner part is tooth-like and prominent.

The "basal" antenna-joint has a low finely granular crest. It touches the front, excluding the flagellum from the orbit.

The antennulae can be folded transversely.

The sub-orbital, pterygostomian, sub-hepatic and sub-branchial regions are faintly granular. The pleural groove can be clearly distinguished.

The sternum is very faintly granular (only perceptible through a strong lens) and bare.

Of the abdomen of the male the sixth segment has nearly parallel sides, the posterior angles are round, the posterior border is a little curved anteriorly, the anterior border is nearly straight; it is broader than long. The third up to the fifth terga are fused; the second and third terga are transversely keeled.

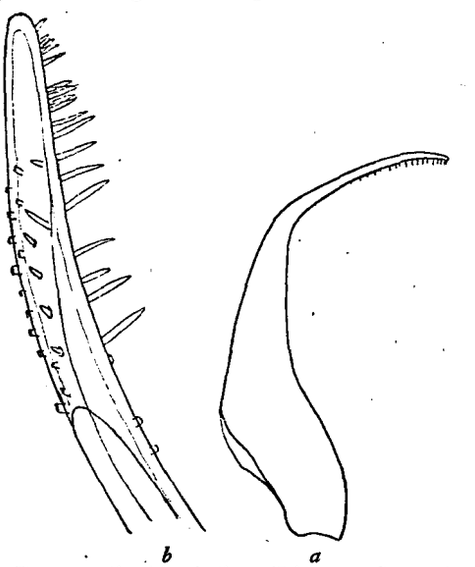


Fig. 24. *Charybdis lucifera* (Fabr.). *a*, first male pleopod, posterior view (× 3,8); *b*, apex, posterior view (× 42).

The chelipeds are long and strong. The right cheliped is larger than the left one. The anterior border of the arm has three strong spines, of which the proximal one is the smallest: the upper and under surfaces are nearly smooth, the outer border has some more distinct traces of granulation. The wrist has one short strong spine at the inner angle and three blunt spinules at the outer angle, moreover there is some granulation on the upper surface. The hand has five short spines, one at the wrist-articulation, two near the finger-articulation and two practically in the middle of the two upper costae; the proximal parts of these costae are granular. There are seven costae (more or less distinct), of which that on the inner surface has some large granules. The finger of the larger cheliped is a little shorter than the palm.

The second up to the fourth pairs pereiopods have no specific characteristics.

The merus of the natatory leg has the usual spine near the distal end of the posterior border; it is about twice as long as broad. The propus has some spinules at the posterior border.

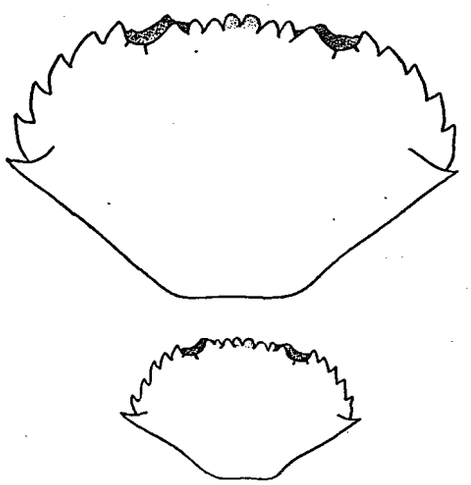


Fig. 25. *Charybdis lucifera* (Fabr.), cephalothorax of young specimens (× 1½).

The neck of the first male pleopod is narrow and of average length. The distal part of the outer border of the neck and the outer border of the apex have strong spines (During the examination most of the spines broke off). The inner border of the apex also has three rows of spines (broken off). The posterior surface has three rows of spines, the outer row has two spines, the middle row six and the inner row at least three spines. The anterior surface has no specific characteristics and armature.

In the *Goniosoma annulatum* material, collected by J. R. HENDERSON near Madras (1893, p. 375) I found four specimens, which probably belong to this species. I could not state this with certainty for I had for comparison only the large male specimen described above. But the differences between the latter and the largest female specimen in this material are not so large as to make them specific characteristics.

a. This female specimen has a differently shaped front. The median and submedian teeth are very blunt, and nearly the same shape. I could not observe the four pale spots on the cephalothorax. But in the figures and photographs published in the literature, the four spots are not always visible. So I suppose they may disappear on preservation in alcohol, or they are perhaps only present in the large specimens. The second antero-lateral tooth is the largest. Cephalothorax, chelipeds and legs are more hairy.

b. A much damaged female specimen, with the front as mentioned in a, has sharper antero-lateral teeth.

c. A very small specimen and d. a juvenile specimen with a rather dense pile, the rest as in b. In the last two specimens the last antero-lateral teeth are distinctly longer than the preceding teeth.

Geographical distribution: Coasts of Malabar (A. MILNE EDWARDS); Ceylon (HENDERSON, DOLFLEIN); Madras (HENDERSON); Penang (DOFLEIN, BALSS); Siam (RATHBUN); Java (A. MILNE EDWARDS, DELSMAN & DE MAN); Formosa (BALSS); Bay of Sagami (BALSS).

Measurements in mm:

	de Man coll.	British Museum coll.			
	♂	♀	♀	♂	juv.
Length of cephalothorax	61.0	31.5	18.5	16.0	11.3
Breadth of cephalothorax	95.0	48.5	29.5	26.0	18.0
Front	23.0	12.2	8.0	6.8	4.5
Interorbital space	28.5	15.8	9.8	8.5	5.9
Orbit	9.5	6.0	4.0	3.8	3.0
Orbito-frontal border	47.0	26.5	17.0	15.0	11.0
Length of cheliped	162.5	59.0	34.0	—	20.0
Length of merus natatory leg	19.0	9.5	5.8	5.0	—
Breadth of merus natatory leg	9.3	5.0	3.0	2.6	—
Length 6th ♂ abdominal segment	8.0	—	—	2.3	—
Breadth 6th ♂ abdominal segment	9.8	—	—	3.0	—
Posterior border	26.0	16.5	10.0	8.0	5.0
$\frac{\text{Cephalothorax breadth}}{\text{Cephalothorax length}}$	1.56	1.54	1.59	1.62	1.59

11. *Charybdis* (*Charybdis*) *annulata* (Fabr.). (figs. 26, 27 and 28).

Portunus annulatus, 1798, FABRICIUS, Syst. Ent. Suppl., p. 364.
Goniosoma annulatum, 1861, A. MILNE EDWARDS, Arch. Mus., vol. 10, p. 374.
1874, HOFFMANN, Rech. Faun. Madagasc., 5e partie, 2me livr., p. 11.
1880, MIERS, Ann. and Mag. Nat. Hist., (5) vol. 5, p. 238.
Goniosoma annulatum var., 1883, DE MAN, Notes Leyden Mus., vol. 5, p. 151. (nec *G. annulatum*, ibid., p. 151).
Goniosoma annulatum, 1887, DE MAN, Journ. Linn. Soc., Zool., vol. 22, p. 83, footnote.
1895, DE MAN, Zool. Jahrb., Syst., vol. 8, p. 516, (1896, vol. 9, pl. 13, fig. 10).
Charybdis (*Goniosoma*) *annulata*, 1899b, ALCOCK, p. 54.
? 1903, NOBILI, Bull. Mus. Torino, vol. 18, no 455, p. 31.
1910, RATHBUN, Mem. Ac. R. Danemark, (7), vol. 5, p. 364.
1922, BALSS, Arch. Naturgesch., 88. Jahrg., Abt. A, p. 106.
1937, LEENE, Zool. Meded., vol. 19, p. 167, fig. 1.

Goniosoma orientale, 1865, HELLER, Novara Reise, p. 29, pl. 3, fig. 3.
nec *G. annulatum,* 1893, J. R. HENDERSON, Trans. Linn. Soc., (2), vol. 5, p. 375.

Siboga, stat. 131, Anchorage off Beo, Karakelang-Islands, 13 m, 1 ♂.
Kleiweg de Zwaan-collection, Nias, 1 ♂.
Zool. Mus. coll., 1 ♂, East Indies, died in Aquarium of the Roy. Zool. Soc. N.A.M., Amsterdam.

Of these three males the specimens from station 131 and Aquarium showed most distinctly the characteristics of the species. The specimen from Nias showed some differences. By the kindness of Dr OLAW SCHROEDER I had on loan for a long time a female typespecimen from the "Zoologisches Museum der Universität Kiel".

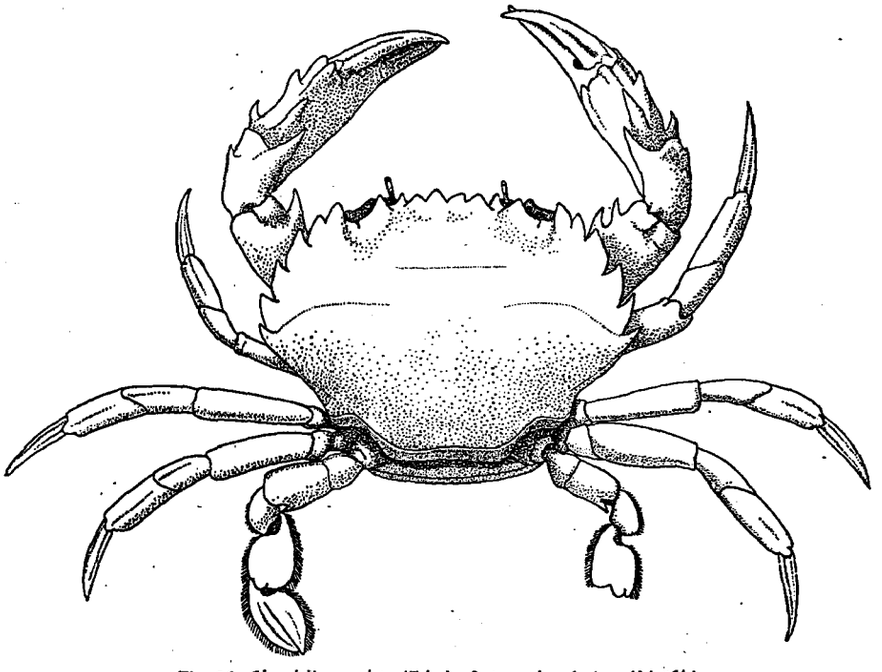


Fig. 26. *Charybdis annulata* (Fabr.), ♀ type, dorsal view (× 1½).

Description: The cephalothorax is rather convex, with faintly granular ridges on the anterior part, (1) one between the last antero-lateral teeth, which is interrupted over the whole of the gastric region, (2) one on the mesogastric region and (3) one on each of the protogastric regions. The regions are very difficult to distinguish. The surface is smooth and bare.

The front is cut into six teeth. The medians are the most prominent, broad, triangular, rather blunt; the submedians ar the same shape and size, their tops are slightly more laterally directed (at least in the younger specimens); the lateral teeth are narrower and longer than the others, their tops are directed forward; the incision between the lateral and submedian teeth is deep. The front is clearly distinguishable from the inner supra-orbital angles.

The antero-lateral borders are cut into six triangular teeth. The first two teeth are blunter than the others; the first may be a little narrower than the second. The anterior and outer borders of the

first tooth are straight; the anterior border of the second tooth is short and straight in the older specimens, the outer border is slightly convex. The third tooth is the largest, rather acute with a dark top; the anterior border is concave, the outer border is slightly convex. The fourth tooth is smaller than the third tooth, but has the same shape, and also a dark sharp top. The fifth tooth is smaller than the fourth, (but broader than the second tooth in the female type specimen and as broad as the second tooth in the larger specimens). The sixth tooth is the smallest and most spine-like.

The postero-lateral borders converge rather strongly posteriorly.

The margin of the posterior border is faintly curved, and forms a curve with the postero-lateral borders.

The smooth upper border of the orbit is divided into three parts by two distinct incisions. The inner supra-orbital angle is broad (much broader than the lateral frontal teeth), its top is directed forward; the inner angle of the outer part is somewhat turned up. The granular lower border is divided into two parts; the inner angle of the inner part is strongly developed (especially in the older specimens); the outer part has a slightly developed inner lobe.

The "basal" antenna-joint has a low smooth crest; it touches the front excluding the flagellum from the orbit.

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are smooth (in smaller specimens faintly granular) and nearly bare (except the sub-branchial regions, which are more or less hairy). The pleural groove is distinct, but faintly granular.

The sternum is bare.

Of the abdomen of the male the third up to the fifth terga are fused. Of the sixth tergum the lateral borders are parallel for three fourths, then they are strongly convergent; it is a little broader than long.

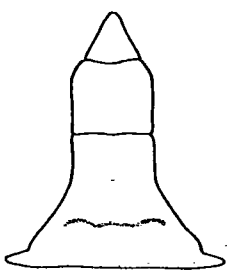


Fig 27. *Charybdis annulata* (Fabr.), abdomen of male (× 2).

The length of the chelipeds in the male is twice the length of the cephalothorax. The surface is smooth. The arm has three curved spines (of which the proximal one is the smallest) on its anterior border; the outer border has no spine (in younger specimens there may be some faint granulation). The wrist has a strong spine at the inner angle; the outer angle has three spinules; the upper surface has some faintly distinguishable ridges. The hand has five spines, of which the two behind the finger-joint are less distinct. In my specimens the fingers are longer than the palm; as well in the larger as in the smaller cheliped. ALCOCK remarks: "the fingers of the larger cheliped are as long as the palm, those of the smaller cheliped are longer than the palm" (p. 55).

The other walking-legs have no specific characteristics.

Of the natatory leg the merus is about twice as long as broad, the posterior border has the usual spine; the propus has a row of spinules on its posterior border.

The first male pleopod has a rather long curved neck, the apex is slightly curved. It has many long spines on the outer border, which are continued until a short distance behind the top of the apex. On the anterior surface the distal half of the inner border of the neck has some small spines, which are continued on the proximal part of the apex. On the posterior surface of the apex there are some rows of small spines under the membrane (the number may vary rather greatly).

The male specimen from Nias shows some differences with the description given above: (1) the inner supra-orbital angles are not so prominent, they are much blunter, (2) the posterior border

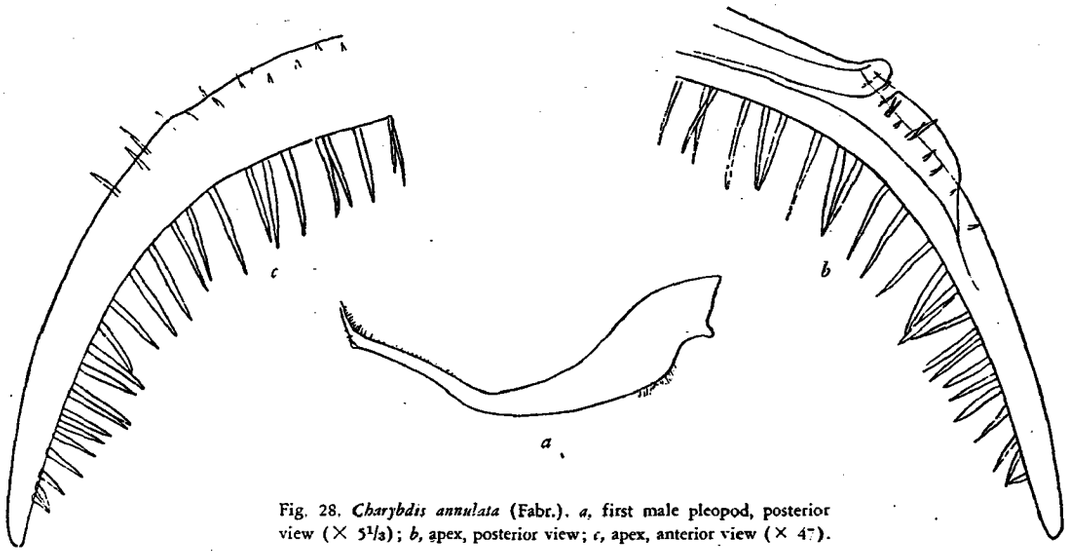


Fig. 28. *Charybdis annulata* (Fabr.). *a*, first male pleopod, posterior view (× 5⅓); *b*, apex, posterior view; *c*, apex, anterior view (× 4⅞).

of the propus of the natatory leg has only very few minute spinules, (3) the cheliped is shorter in proportion to the length of the cephalothorax than in the other male specimens.

Measurements in mm:

	Station 131 ♂	Nias ♂	East Indies ♂
Length of cephalothorax	35.0	47.5	44.0
Breadth of cephalothorax	50.0	68.0	63.0
Front	14.0	19.5	17.5
Interorbital space	18.0	25.0	22.0
Orbit	6.0	7.5	7.0
Orbito-frontal border	28.5	38.5	35.0
Length of largest cheliped.	70.0	78.0	90.0
Breadth of merus nat. leg.	5.0	7.0	7.0
Length of merus nat. leg.	10.0	14.0	13.0
Length 6th ♂ abd. segment	5.0	7.0	6.5
Breadth 6th ♂ abd. segment.	6.0	7.5	7.0
Cephalothorax breadth / Cephalothorax length	1.43	1.43	1.43

The specimen from Nossy-Faly, mentioned by HOFFMANN, is the large ♀ specimen of *Ch. annulata* I described in Zool. Meded. vol. 19 p. 167, where I also discussed DE MAN, 1883, Notes Leyden Mus. vol. 5, p. 151.

The identity of *Ch. annulata* with *Goniosoma orientale* (HELLER, 1865) is stated by DE MAN 1887c, p. 83. footnoote). Whether the specimen mentioned by NOBILI (1903, p. 31) belongs to this

species, is doubtful, as NOBILI remarks himself. I suppose, that the specimens, which ALCOCK joins to *Ch. annulata,* are really representatives of this species, but that he made an error in the measurements. Miss GORDON lent me the *Ch. annulata*-material (20 specimens) collected by J. R. HENDERSON (1893) near Madras. The examination proved, that none of these specimens belong to *Ch. annulata.* The specimen, of which Dr GORDON figured the male pleoped (Journ. Linn. Soc. Zool., vol. 37, p. 537, fig 13d, p. 538) belongs to this HENDERSON material, and is a specimen of *Ch. callianassa* (Herbst).

Geographical distribution: Nossy-Faly (HOFFMANN); Karachi (ALCOCK); Bimlipatam (ALCOCK); Penang (ALCOCK); Malakka (DE MAN); Siam (RATHBUN): Batavia, Java (A. MILNE EDWARDS); Tamsui, N. Formosa (BALSS).

12. *Charybdis* (*Charybdis*) *anisodon* (de Haan) (figs. 29 and 30).

Portunus anisodon, 1850, DE HAAN, Fauna Japonica, p. 42.
Charybdis anisodon, 1857, STIMPSON, Proc. Ac. Nat. Sci. Philad., p. 42, pl. 12 fig. 1.
1907, STIMPSON, Smithsonian Miscell. coll., vol. 49, p. 80, pl. 62, fig. 1.
1910, RATHBUN, Mém. Ac. Danemark, 7ième serie, Sect. d. sc., t. 5, p. 364.
1922, BALSS, Archiv. für Naturgeschichte, Jahrg. 88, Abt. A., p. 105.
Goniosoma anisodon, 1861, A. MILNE EDWARDS, Arch. du Mus., vol. 10, p. 381, pl. 33, fig. 4.
1873, A. MILNE EDWARDS, Nouv. Arch. Mus. Hist. Nat., vol. 9, p. 167.
1880, MIERS, Ann. & Mag. Nat. Hist., (5), vol. 5, p. 239.
1892, DE MAN, Weber's Zool. Ergebn. Niederl. Ost-Indien, vol. 2, p. 285.
1893, ORTMANN, Zool. Jahrb., Syst., vol. 7, p. 83.
1895, DE MAN, Zool. Jahrb., Syst., vol. 8, p. 563.
1913, KLUNZINGER, Nova Acta Acad. Leop. Carol., vol. 99, no. 2, p. 368.
Charybdis (*Goniosoma*) *anisodon,* 1903, NOBILI, Bollettino di Torino, no. 455, p. 32.
1906, NOBILI, Ann. d. Sc. Nat. Zool., (9), vol. 4, p. 198.
1931, GORDON, Journ. Linn. Soc., vol. 37, p. 527.

Gier, no 4, Exp. 11, 1 ♂.
Gier, no 4, Exp. 20, 2 ♂♂ and 3 ♀♀.
Gier, no 5, Exp. 6, 18/12, 1907, Bay of Soerabaya, 1 ♀.
Gier, without exact indication of the locality, 1 ♂.
Kleiweg de Zwaan coll., Nias, 1 ♀.

There are no specimens of this species in the Siboga-material, but we found two female specimens in the Gier and the Kleiweg de Zwaan collections. For comparison I received specimens from Singapore (coll. de Man), from off the river-mouth near Tello, Celebes (coll. Max Weber) and one ovigerous female from Makassar (coll. Max. Weber). Owing to this it is possible to give an extensive description, which has hitherto been wanting.

Description: The cephalothorax is smooth, without a pile. The regions are not well defined. There are three transverse ridges, viz., the ridge which crosses the cephalothorax between the epibranchial spines, only interrupted by the cervical groove; one anterior to it, which is unbroken and another in front of it, which is widely interrupted in the middle.

The front is cut into six teeth. The medians are slightly prominent beyond the sub-medians, they are truncate, and separated from one another by a slight V-shaped fissure. The sub-medians seem to lie on a somewhat higher plane, they are also truncate and separated from the medians by a very little

fissure. Between the sub-median and the lateral teeth there is a much deeper fissure. The lateral teeth are sub-triangular. They are clearly distinguishable from the inner supra-orbital angles.

The antero-lateral borders are cut into six teeth. The first two are the smallest and nearly of the same size. The third and fourth teeth are twice as broad as the first two. The fifth tooth is narrower than the fourth. The sixth tooth is twice as long as the fifth. The edges of all the teeth are smooth.

The postero-lateral borders are convergent posteriorly.

The posterior border is nearly straight and the ridge that bounds the dorsum of the cephalothorax posteriorly forms a curve with the postero-lateral borders.

The upper border of the orbit has two narrow incisions. The lower border has one incision; the outer part has a distinct median lobule. The edges of both borders are smooth.

The "basal" antenna-joint has a low crest. It joins the front.

The antennulae are folded transversely.

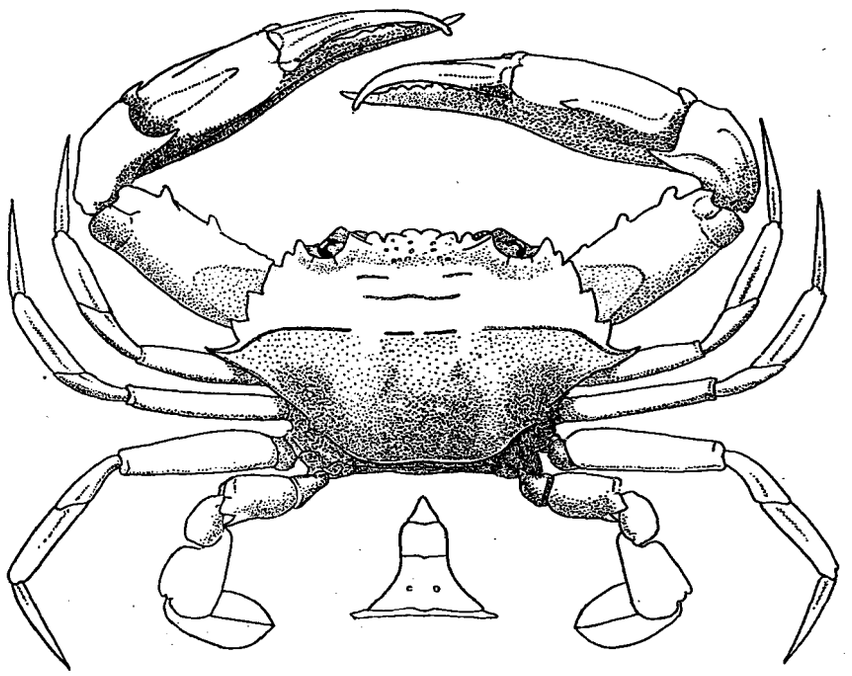


Fig. 29. *Charybdis anisodon* (De Haan), ♂, dorsal view and abdomen, natural size.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are smooth and very little hairy.

The sternum is smooth.

The abdomen of the male has the second and third terga carinate, the fourth and fifth terga are fused (there is a trace of a boundary), the sixth tergum has convergent sides, the posterior angles are rounded, the posterior border is somewhat curved anteriorly.

The chelipeds are without any granulation. The arm has two spines on the distal half of the anterior border; the proximal part has some granules; the posterior border is without spines. The

Measurements in mm:

	Weber don., Zool. Mus. Amsterdam, Makassar	Tello, Celebes (Weber, 1889) Zool. Mus. Amsterdam					Gier no. 4, Exp. 20					Gier no. 4, Exp. 11	Gier no. 5, Exp. 6	Gier Exp. without exact locality	Singapore coll. de Man
	ovig. ♀	ov. ♀	♀	♂	♂	♂	♀	♀	♂	♂	♂	♂	♀	♂	♂
Length of cephalothorax	25.5	21.5	19.5	17.0	16.0	12.8	29.4	20.5	25.5	18.8	16.6	19.7	21.5	12.2	39.3
Breadth of cephalothorax	45.4	39.5	—	30.0	27.3	21.6	51.8	35.2	43.4	32.8	28.6	35.5	37.7	20.0	69.6
Front	12.2	10.7	9.5	8.2	7.9	6.5	13.7	10.0	12.0	9.0	7.9	9.7	10.0	5.9	18.0
Interorbital space	14.8	12.8	—	10.0	9.3	7.7	17.0	12.0	14.8	11.0	9.5	11.8	12.3	7.0	22.7
Orbit	6.5	5.9	5.4	5.0	4.5	3.8	7.0	6.7	6.5	5.3	4.7	5.2	5.6	3.6	8.8
Orbito-frontal border	27.0	24.2	—	19.2	18.5	15.2	30.7	23.0	—	20.8	18.6	22.0	23.0	13.8	40.0
Length of cheliped (largest)	54.2	—	—	32.3	32.7	—	—	45.1	—	—	36.0	—	—	—	119.5
Length of merus natatory leg	7.5	—	6.2	5.5	4.8	4.0	8.5	6.0	8.0	5.7	5.5	6.8	6.0	3.8	12.6
Breadth of merus natatory leg	4.5	—	3.7	3.3	3.2	2.5	5.2	3.6	4.9	3.7	3.2	4.0	4.0	2.5	7.5
Length 6th ♂ abdominal segment	—	—	—	2.8	2.5	2.2	—	—	3.8	2.7	2.5	3.2	—	2.0	5.3
Breadth 6th ♂ abdominal segment	—	—	—	3.5	3.2	2.7	—	—	5.0	4.0	3.5	4.0	—	2.5	7.8
Posterior border	15.2	13.5	12.9	10.8	10.1	7.9	18.0	13.0	15.5	11.5	10.5	12.0	13.6	7.5	23.3
Cephalothorax breadth / Cephalothorax length	1.78	1.84	—	1.77	1.71	1.69	1.76	1.72	1.70	1.74	1.72	1.80	1.75	1.64	1.77
Merus length / Merus breadth	1.67	—	1.68	1.67	1.50	1.60	1.63	1.63	1.63	1.54	1.72	1.70	1.50	1.52	1.68

wrist has a well-developed spine on the inner angle; the outer angle has three spinules. The hand has two spines; one at the wrist-joint and one some distance behind the finger-joint; the five costae are faint. In the larger cheliped the finger is nearly as long as the palm.

The other legs have no special characteristics. The last pair of legs (the natatory ones) have a spine at the distal part of the posterior border of the merus, the propus has no spines on the posterior border.

The first ♂ pleopod has a neck which bends abruptly outwards and is narrow with regard to the basis. The inner border has some short rows of spines (in the drawing some spines are drawn as short stumps, the spines being broken off), one of which is continued on the anterior surface. The outer border has a longer row of large spines, which is continued on the anterior surface as a row of little spinules. On the posterior surface there occurs a short row of spinules, which is continued for a short distance under the membrane. The free edge of the membrane is a little curved.

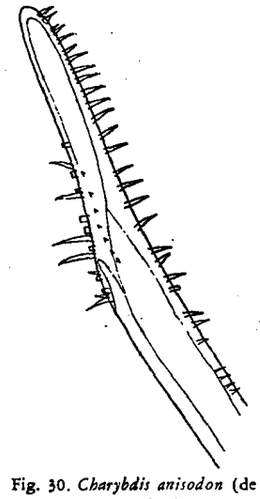


Fig. 30. *Charybdis anisodon* (de Haan), apex of first male pleopod, posterior view (× 47).

The younger specimens (♂♂ and ♀♀) show the following differences with the specimen described: (1) The second tooth of the antero-lateral border is somewhat smaller than the first, (2) the fourth and fifth antero-lateral teeth are mere spines, (3) the arm of the cheliped has a granular posterior surface, (4) the spines of the chelipeds are much acuter, (5) the posterior border of the propus of the natatory leg has some spinules.

Geographical distribution: Red Sea (NOBILI, 1906; KLUNZINGER); Siam (RATHBUN); Singapore (NOBILI, 1903; SHEN, 1937); Java Sea (A. MILNE EDWARDS; DE MAN, 1895); Makassar, Celebes (DE MAN, 1892); Cebu, Philippines (BALSS); Hong Kong (STIMPSON; SHEN, 1932); Mako, Pescadore Isles (BALSS); Takao, South Formosa (BALSS); near Shanghai (BALSS); coasts of Japan (A. MILNE EDWARDS, 1861, 1873); New Caledonia (A. MILNE EDWARDS, 1861).

13. *Charybdis (Charybdis) jaubertensis* Rathbun (fig. 31).

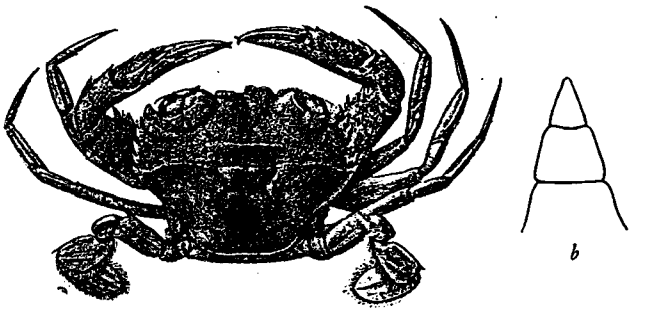
Charybdis (Charybdis) jaubertensis, 1924, RATHBUN, Arkiv för Zoologi, vol. 16, no 23, p. 23, pl. 1, figs 10—11.

There are no representatives of this species in our collections. Here follows the description of the type specimen, which Miss RATHBUN has given.

Description: "Surface hairy and in the main granulate; a granulate ridge between teeth of last pair; in front of it a gastric ridge; about half as far from this a third ridge broadly interrupted in the middle; and a very short ridge on the front, behind each submedian sinus; posterior half of carapace without granulate lines but surface very uneven and rough. Lateral teeth 6, the first or orbital the largest, the second smallest, third to sixth inclusive subequal, narrow, acuminate, pointing well forward. Frontal teeth 6 besides orbital angles; median and submedian teeth subtruncate or broadly rounded, the submedian the larger; two outer teeth subtriangular with rounded tips, the orbital tooth with a broader base; of the sinuses, the median is narrow but open, the submedian appears shallow because the submedian tooth overlaps the median; the third sinus is similar to, but

wider than, the median. Two narrow open fissures in upper margin of orbit, an equilaterally triangular sinus below outer angle, and a broadly rounded lower inner angle, less advanced than the upper inner angle. Antenna excluded from the orbit. Posterior angles of carapace rounded.

Merus of chelipeds with three large spines on inner margin besides a small enlarged spinule near the distal end; the carpus has a long and strong spine at inner angle, and three smaller ones, two of which are on the distal margin and the other not far behind; five spines on the hand, four of which are arranged in two rows above, the distal spine of the outer row being smaller than the others. The chelipeds are hairy and granulate, the granules arranged largely in rows; on the outer surface of the palm there are two granulate ridges between the spines and the level of the immovable finger; the fingers are deeply grooved and the propodal one has externally two ridges, the lower of which is continued the length of the palm, and the upper is prolonged only a short distance on the palm.



a *b*

Fig. 31. *Charybdis jaubertensis* Rathbun, ♂ dorsal view (× 2½), abdomen (× 5). (From RATHBUN, 1924, pl. 1, figs 10 and 11).

The natatory foot has a large spine at the postero-distal angle of the merus, and a minute spine above it at the articulation; no spine on carpus; a row of spinules on posterior edge of propodus.

The male abdomen is constricted slightly at the union of the fifth and sixth segments, the sides of the sixth segment are convex, its distal shorter than its proximal end.

Relationship: This is a very *Thalamita*-like *Charybdis*, in its narrowness resembling *C. (Gonioneptunus) investigatoris* Alcock, but the latter is a smooth species, with second lateral tooth not reduced, a narrower interorbital space, and a basal antennal segment which does not meet the front.

Type-locality: Cape Jaubert, 45 miles W.S.W.; 72 feet; one male.

Total length of carapace 11.6, extreme width 14.6, width between outer angles of orbits 12.5, between inner angles of orbits 6.5 mm."

14. *Charybdis* (*Charybdis*) *orientalis* Dana (figs. 32, 33 and 34).

Thalamita sexdentata, 1830, RÜPPELL, 24 Arten kurzschwänzigen Krabben, p. 4, pl. 1, fig. 1, (part.).
Charybdis orientalis, 1852, DANA, Proc. Ac. Nat. Sci. Philad., p. 85.
DANA, U. S. Expl. Exp. Crust., pt 1, p. 285, pl. 17, fig. 10.
Goniosoma orientale, 1861, A. MILNE EDWARDS, Arch. Mus., vol. 10, pp. 383, 385.
Goniosoma dubium, 1874, HOFFMANN, Rech. Faun. Madagasc., vol. 5, pt 2, p. 11, pl. 2, figs 6—8.
1879, DE MAN, Notes Leyden Mus., vol. 1, p. 60.
1883, DE MAN, Notes Leyden Mus., vol. 5, p. 151.
Goniosoma orientale, 1881, LENZ & RICHTERS, Abh. Senck. Nat. Ges. Frankf., vol. 12, p. 422.
1889, CANO, Boll. Soc. Nat. Napol., vol. 3, p. 220.
1893, J. R. HENDERSON, Trans. Linn. Soc. Zool., (2), vol. 5, p. 375.
1893, DE MAN, Notes Leyden Mus., vol. 15, p. 286.
Charybdis (*Goniosoma*) *orientalis,* 1906, LAURIE, Ceylon Pearl Oyster Fish., Suppl. Rep., vol. 40, p. 418.
1906, NOBILI, Ann. Sc. Nat. Zool., (9), vol. 4, p. 195.

Charybdis (*Goniosoma*) *hellerii*, 1906, NOBILI, ibid., p. 195.
Charybdis orientalis, 1906, RATHBUN, U. S. Fish. Comm. Bull. for 1903, pt 3, p. 872 (part.).
Goniosoma orientale, 1901, LENZ, Zool. Jahrb. Syst., vol. 14, p. 457.
1910, LENZ, VOELTKOW's Reise Ost-Afrika, Bd. 2, p. 556.
1913, KLUNZINGER, Nova Acta Ac. Leop. Carol., Bd. 99, no 2, p. 365, pl. 7, fig. 21.
Charybdis orientalis, 1918, STEBBING, Ann. Durb. Mus., vol. 2, pt 2, p. 50.
Charybdis (*Charybdis*) *incisa*, 1923, RATHBUN, "Endeavour", Commonwealth of Australia, vol. 5, pt 3, p. 131, pl. 33.
nec *Goniosoma orientale*, HELLER, Novara, Crust., p. 29, pl. 3, fig. 3 (see DE MAN, 1887, Journ. Linn. Soc. Zool., vol. 22, p. 83, footnote).
nec G. *orientale*, 1899b, ALCOCK, p. 63.
Siboga, station 131, Anchorage off Beo, Karakelang-Islands, 13 m, 3 ♂♂ and 1 ♀.
Siboga, station 133, Anchorage off Lirung, Salibabu-island, up to 36 m, 2 ♂♂, 2 ♀♀ and 1 juv.
Siboga, station 174, Waru-bay, North coast of Ceram, 18 m, 1♂.
Siboga, station 179, Kawa-bay, West coast of Ceram, 36 m, 1 ♀.
Kleiweg de Zwaan coll., Nias, 1 specimen (♀?).

I examined the type specimens of *Goniosoma dubium* Hoffman and the other *G. dubium* material (two males and one female from Timor, one male from Endeh and one male from the Red Sea, the latter being one of the *Thalamita sexdentata* specimens in the Rüppell collection) in the Leiden Museum.

Mr FENNER A. CHACE JR., was so kind as to sketch the cephalothorax of the holotype of *Ch. orientalis* Dana. Moreover, he examined a male from Calapan, Mindoro, Philippine Islands, (length of cephalothorax: 17.1 mm, breadth: 26.6 mm) and a male from the Society Islands (length of cephalothorax: 19.9, breadth: 29.1 mm). He referred these two males to *Ch. orientalis*, because they "differ from the type only in having the third pair of transverse ridges from the front joined at the midline; the lateral frontal teeth are even more markedly triangular than those of the type, which are obviously worn, and the intermediate pair are much more triangular than truncate".

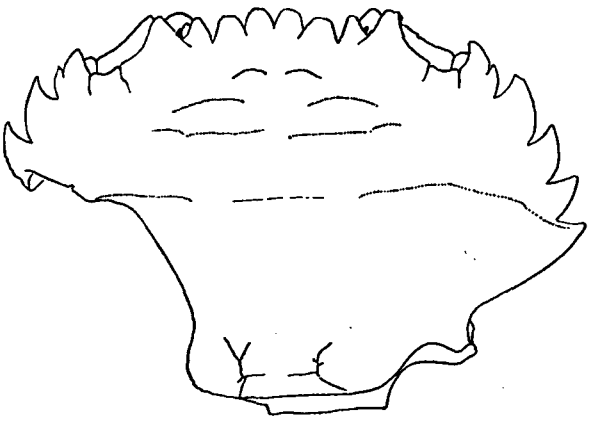


Fig. 32. *Charybdis orientalis* Dana, holotype, dorsal view, (× 2), drawn by Mr FENNER A. CHACE, jr.

Comparison of the description and the sketch with the types of *Ch. dubia*, showed these species to be identical. It is doubtful, however, if the Hawaiian specimen, described and figured in Miss RATHBUN'S paper (1906) belongs to *Ch. orientalis* Dana. Mr CHACE mentions the following points where it differs from the type: (1) a spine on the posterior margin of the arm of the cheliped, (2) the hand has five strong spines instead of four strong and one blunt spines, (3) the inner surface of the hand is costate and granular, whereas in *orientalis* it is smooth, glossy and not costate, (4) the merus of the natatory leg is 1.5 times as long as broad instead of twice as long as broad. And I add as fifth difference: the shape of the front is greatly different.

1) After comparison of the ovigerous female of station 179 with the figures of the holotype of *Ch. incisa* Rathbun I got the impression that very probably these specimens are identical. There are only a few minor differences, viz., (1) the "basal" antenna-joint is somewhat more prominent and more distinctly granular in *Ch. incisa*, (2) in *Ch. incisa* the fourth antero-lateral tooth is larger than the third, whereas in *Ch. orientalis* Dana the third tooth is larger.

In the Paris Museum I examined *Charybdis hellerii* A. M. Edw. from Obock (NOBILI, 1906, p. 195) and *Charybdis orientalis* Dana (NOBILI, 1906, p. 195), which proved to be identical and to belong to the latter species.

Dr CHOPRA lent me a male specimen of *Ch. orientalis* determined by ALCOCK (Cheduba, Arakan Coast, 7 fms, Marine Survey). It proved to belong to a different species. I suppose it is identical with *Thalamita exetastica* Alcock, which I hope to discuss in the monograph on the genus *Thalamita.*

As DE MAN (1887c) stated *Goniosoma orientale* Heller is identical with *Ch. annulata* Fabr. Here follows the description of the ♂ type of *G. dubium* Hoffmann.

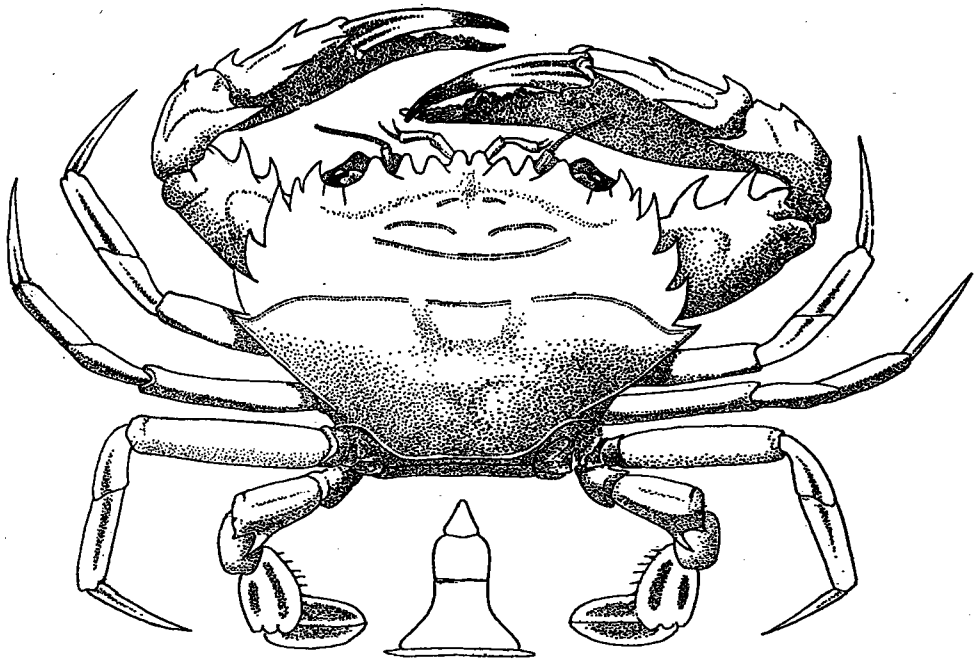


Fig. 33. *Charybdis orientalis* Dana [= *Ch. dubia* (Hoffmann)], ♂ type, dorsal view and abdomen (× 1¼).

Description: The cephalothorax, with ill-defined regions, is pilose, and crossed by several granular transverse ridges: (1) one between the last antero-lateral teeth, interrupted by the cervical groove, (2) an unbroken one on the mesogastric region, (3) one on each of the protogastric regions, 4) one on the frontal region, interrupted in the middle. There are no transverse ridges on the posterior part of the cephalothorax in the type specimen. (In some specimens in the collection there are elevations on the cardiac region, which are not mere transverse ridges). The cephalathorax is very finely granular, except for some larger granules on the antero-lateral teeth.

The front is cut into six teeth. The median teeth are elliptical; they are slightly prominent beyond the submedian teeth, which are on a higher plane. The less obtuse submedian teeth have the tops directed a little outwards; they are separated from the lateral teeth by a deep incision, more or less V-shaped. (In the smallest specimens the submedian teeth are a little less obtuse). The lateral teeth are triangular, acuter and narrower than the other frontal teeth; they are separated from the inner supra-orbital angles by a wide incision.

The antero-lateral border is cut into six teeth of which the second is the smallest. The first tooth has a concave, anterior border, the outer border is convex. The second tooth is nearly the same shape, and very much smaller. The third tooth is the largest. The fourth tooth is a little smaller than the third, the fifth tooth is smaller than the fourth, but still larger than the first. The sixth tooth is a spine, which is not longer than the preceding tooth. Of all the teeth the borders are smooth.

The postero-lateral borders converge rather strongly posteriorly.

The posterior border is nearly straight, being only a little sinuous; the margin forms a curve with the postero-lateral borders.

The upper border of the orbit is divided into three parts by two incisions, which are clearly

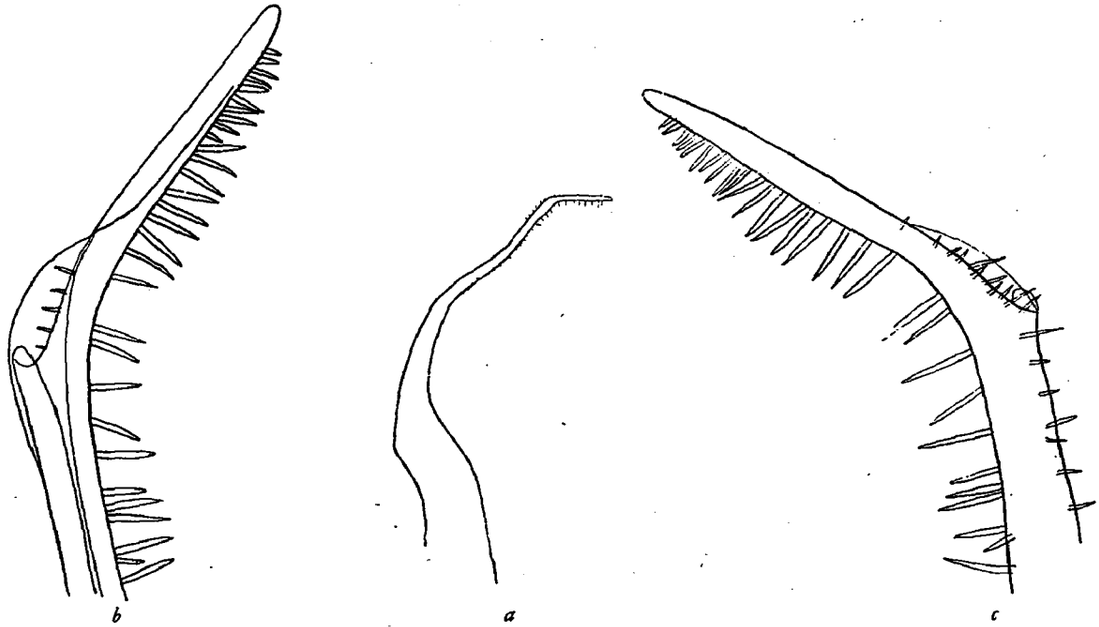


Fig. 34. *Charybdis orientalis* (Dana) [= *Ch. dubia* (Hoffmann)]. *a*, first male pleopod, posterior view (× 7); *b*, apex, posterior; *c*, apex, anterior view (× 47).

distinguishable. The obtuse supra-orbital angles are much broader than the lateral frontal teeth, separated from them by a wide incision. The lower border has a lateral incision; the outer part of this border has a distinct median lobule; the obtuse inner infra-orbital angle is prominent, but not dentiform.

The "basal" antenna-joint touches the front, excluding the flagellum from the orbit. This segment is granular and has a low granular crest.

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are pilose (but in the older specimens the pile is lost for the greater part). They are nearly smooth, and have only a very fine granulation on some parts. The pleural groove is very clearly distinguishable.

The sternum is bare and smooth.

The abdomen of the male has carinae on the second and third terga. The sixth tergum is

somewhat broader than long. The lateral borders are parallel for the greater part and then converge posteriorly. The anterior border is straight, the posterior border is slightly convex.

Of the cheliped the anterior border has three spines (in one specimen the arm had four spines), of which the proximal one is the smallest; between the spines there are granules, the posterior border also has granules. The wrist has a large spine at the inner angle; at the outer angle there are three spinules. The hand, swollen in the largest cheliped, is six-costate and has four spines (one near the wrist-articulation, two on the inner costa and one on the next outer one, nearly in the middle, the outer costa ends in a knob). The movable finger is as long as the palm.

The second up to the fourth pairs of pereiopods have no specific characteristics.

Of the natatory legs the merus has the usual spine a short distance proximal to the distal end of the posterior border; the distal border ends posteriorly in a spinule. The posterior border of the propus has a row of spinules.

The first male pleopod has a long, slender neck, which is a little sinuous, and a slender apex. The outer border has long spines from the middle of the neck until a short distance proximal to the distal end of the apex. The membrane has a curved anterior border. On the anterior surface we can observe that the inner border of the most distal part of the neck and the proximal part of the apex have short spines.

Geographical distribution: Durban (STEBBING); Madagascar (LENZ, RICHTERS); Reunion (HOFFMANN); Red Sea (RÜPPELL, NOBILI, KLUNZINGER); Gulf of Manaar (HENDERSON, LAURIE); Ceylon (HENDERSON); Flores (DE MAN); Timor (DE MAN); Philippines (A. MILNE EDWARDS); Point Inskip, Great Sandy Strait, Queensland (RATHBUN).

Measurements

	Coll. Leiden Mus. type spec.		Siboga, Stat. 131					
	♂	♂	♂	♂	♂	♀	♂	♂
Length of cephalothorax	39.5	33.0	29.2	26.0	25.5	22.2	32.0	24.5
Breadth of cephalothorax	59.0	50.5	43.5	38.0	38.0	33.5	48.2	37.2
Front	17.5	15.0	13.2	12.5	12.0	10.5	15.0	12.0
Interorbital space	23.2	21.0	18.0	16.0	16.0	13.8	19.5	15.6
Orbit	7.0	6.5	6.0	5.5	5.5	5.0	6.5	5.0
Orbito-frontal border	36.5	33.0	29.5	26.5	26.0	23.0	31.0	24.2
Length of cheliped (largest)	91.5	76.5	66.2	56.6	54.5	43.5	73.0	50.5
Length of merus natatory leg	12.0	11.0	9.0	8.3	8.0	7.0	9.7	7.8
Breadth of merus natatory leg	6.2	6.0	4.8	4.0	4.2	3.8	5.2	4.2
Length 6th ♂ abdominal segment	5.8	5.0	4.5	3.9	3.8	—	5.5	4.0
Breadth 6th ♂ abdominal segment	7.0	5.5	4.7	4.2	4.5	—	5.8	5.0
Posterior border	18.2	16.0	14.0	12.8	12.5	12.0	15.5	12.6
Cephalothorax breadth / Cephalothorax length	1.49	1.53	1.49	1.46	1.49	1.51	1.51	1.52

15. *Charybdis (Charybdis) heterodon* Nobili (figs 35 and 36).

Charybdis (Goniosoma) heterodon, 1905, Nobili, Bull. Mus. Hist. Nat., no 6, p. 401.
1906, Nobili, Ann. Sc. nat. zool., (9), vol. 4, p. 196, pl. 8, fig. 4.
Goniosoma heterodon, 1913, Klunzinger, Nova Acta Ac. Leop. Carol., vol. 99, no 2, p. 368.

In our collections there are no representatives of this species. In the Paris Museum I could examine the type specimen, which proved to be a male (Nobili, 1906, erroneously mentioned it as a female), which was collected by Dr Jousseaume near Obock 1897.

Description: The cephalothorax is flat, smooth, only granular near the antero-lateral teeth. It is crossed by granular transverse ridges: (1) one between the last antero-lateral teeth, interrupted by the cervical groove, (2) an unbroken one on the mesogastric region, which is sinuous, (3) a short one on each of the protogastric regions, (4) one on the frontal region, which is rather widely interrupted in the middle. (The granular ridges on the meso- and protogastric regions are not clearly separated from one another, there are granules between them).

The front is cut into six teeth. The medians are prominent beyond the others; they are elliptical, separated from each other by a narrow incision. The submedians are directed outwards, the median borders slope outwards, the lateral borders are directed posteriorly, parallel to the median axis, the tops are round. The triangular lateral teeth are a little shorter and narrower than the others; the tops are subacute; they can be clearly distinguished from the inner supra-orbital angles. The incision between the lateral and submedian teeth is wider and deeper than between the median teeth.

The antero-lateral border is cut into five teeth, the first of which, however, has two tops, and seems really to consist of two teeth, which are grown together, except for the tops (I suppose, this is

m		Siboga st. 174	Siboga st. 179 egg.-laden	Kleiweg de Zwaan coll. Nias	Coll. Leiden Mus. Timor			Leiden Mus. Endeh	Leiden Mus. Red Sea	Deli Olehleh
♀	juv.	♂	♀	♀	♂	♂	♀	♂	♂	juv.
43	10.5	21.5	12.7	26.5	21.0	21.0	20.5	14.0	26.5	12.7
35	15.4	32.8	18.9	39.5	31.8	31.0	31.8	21.0	40.0	17.8
10	5.1	10.0	6.2	11.8	10.0	10.0	10.0	6.5	12.0	6.2
12	6.8	13.5	8.0	16.0	—	13.0	12.8	9.0	16.0	7.5
11	3.0	5.0	3.5	5.5	4.8	4.5	4.5	3.5	5.0	3.6
30	12.0	22.5	14.0	25.5	21.0	22.0	21.5	15.0	25.2	13.8
18	18.0	44.8	22.0	47.0	39.5	44.2	39.0	22.5	57.5	23.5
9	3.5	7.2	4.5	—	6.5	6.5	6.2	4.8	8.0	4.2
12	1.8	3.6	2.0	—	4.0	3.8	3.5	2.5	4.0	2.0
—	—	3.6	—	—	3.0	3.5	—	2.2	4.0	—
—	—	4.0	—	—	3.8	4.0	—	2.5	4.8	—
13	6.0	11.9	7.3	14.8	11.5	11.0	11.2	7.5	13.0	6.5
14	1.47	1.52	1.49	1.49	1.51	1.48	1.55	1.50	1.51	1.40

the reason why NOBILI included this species in the genus *Charybdis*). The anterior border of the first tooth is concave and granular; the posterior border is straight; on the right side it is distinctly separated from the second tooth by a wide U-shaped incision, on the left side the incision is more V-shaped. The second tooth seems to be truncated on the right side, on the left it is less clearly truncated; it is a little smaller than the first; the anterior border is a little convex, the outer border is curved inwards and the posterior border is shorter than the anterior border and straight; it is separated from the third tooth by a wide U-shaped incision; on the left side the anterior border is straight and the outer and posterior borders, not distinctly separated from one another, are convex. The third tooth, nearly as broad as the second tooth at its base, is acute; the anterior border is concave,

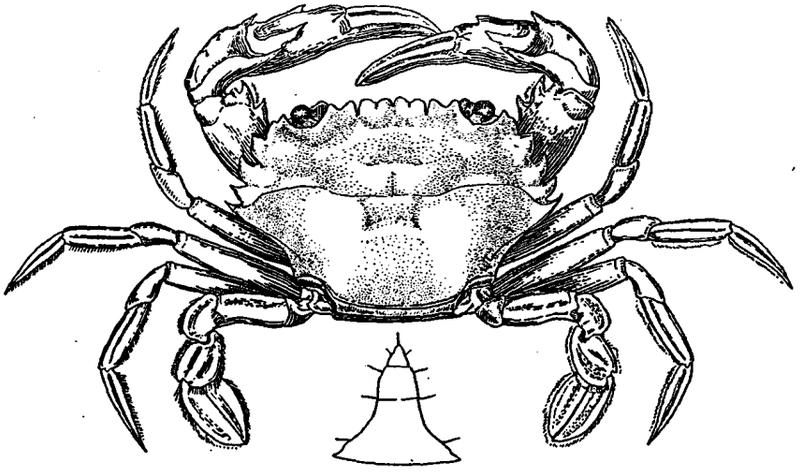


Fig. 35. *Charybdis heterodon* Nobili, ♂ type, dorsal view and abdomen, drawn by Miss MILLON (× 2).

the outer border convex. The fourth tooth is much narrower and smaller, but has the same shape as the third. The fifth tooth is a spine, about as long as the fourth tooth.

The postero-lateral borders rather strongly converge posteriorly.

The margin of the straight posterior border forms a curve with the postero-lateral borders.

The orbit has no strong dorsal inclination; *the upper border has only* o n e *incision,* which is near the middle, the outer part is very finely granular. The inner supra-orbital angles are broader than the lateral frontal teeth and less acute. *The lower granular border has* n o *incision.* The inner infra-orbital angle is prominent and nearly smooth.

The granular "basal" antenna-joint has a distinct crest, which is granular.

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are pilose. There is a distinct granular pleural groove.

The sternum is smooth.

The sixth tergum of the male abdomen has lateral borders converging backwards, the anterior border is straight and the posterior border is convex.

The chelipeds are about the same size. The anterior border of the arm has three spines, of which the proximal one is the smallest, the posterior and inferior borders have no armature, the

upper surface has some squamiform markings. The wrist has a long spine at its inner angle and three spinules at its outer angle; there are three distinct granular ridges. The hand, six-costate, has four spines: one at the wrist-articulation, one a short distance distally to the middle of the outer costa of the upper surface and two, one of which near the finger-articulation, on the next inner one (NOBILI describes five spines; he may have mistaken the knob at the distal end of the outer costa for the fifth spine).

The second up to the fourth pairs of pereiopods have no specific characteristics.

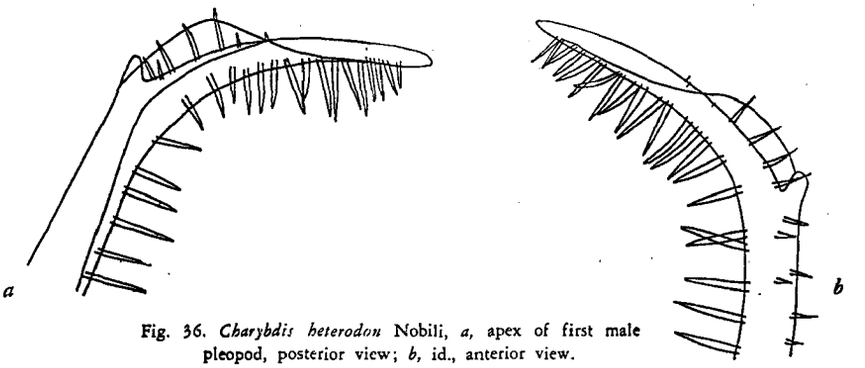


Fig. 36. *Charybdis heterodon* Nobili, *a*, apex of first male pleopod, posterior view; *b*, id., anterior view.

The merus of the fifth pair has the usual spine at the posterior border and the propus has a row of spinules.

The first male pleopod has a long, slender, curved neck and a slender apex. On the posterior surface the outer border of the distal part of the neck and of the apex has long spines. On the anterior surface the apex has long spines at its inner border, which are continued on the most distal part of the neck as two rows of short spines.

Measurements in mm:

	♂ type
Length of cephalothorax	18.2
Breadth of cephalothorax	27.2
Front	8.4
Interorbital space	10.8
Orbit	4.0
Orbito-frontal border	18.0
Length of cheliped	34.6
Length of merus natatory leg	6.8
Breadth of merus natatory leg	3.0
Length 6th ♂ abd. segment	3.0
Breadth 6th ♂ abd. segment	3.4
Posterior border	9.8

16. *Charybdis* (*Charybdis*) *demani* Leene (figs 37 and 38).

Charybdis (*Goniosoma*) *callianassa*, 1925, DE MAN, Treubia, vol. 6, p. 324, fig. 1.
Charybdis (*Goniosoma*) *demani*, 1937, LEENE, Zool. Meded., vol. 19, p. 172, fig. 3 and figs. 4 c & d.

In our collections there are no representatives of this species.

Locality of the type specimen: East coast of Sumatra, Amphitrite Bay (Mouth of the Indragiri), De Man collection, Zoologisch Museum, Amsterdam, one male (holotype) and one egg-laden female (paratype).

Description: The cephalothorax is not hairy on the whole surface (perhaps it was denuded by DE MAN), but only the anterior part (especially the epibranchial regions) is covered with a dense pile, which is more developed in the female than in the male. The regions are fairly distinct. The whole surface is granular. Between the last antero-lateral teeth a transverse ridge crosses the cephalothorax,

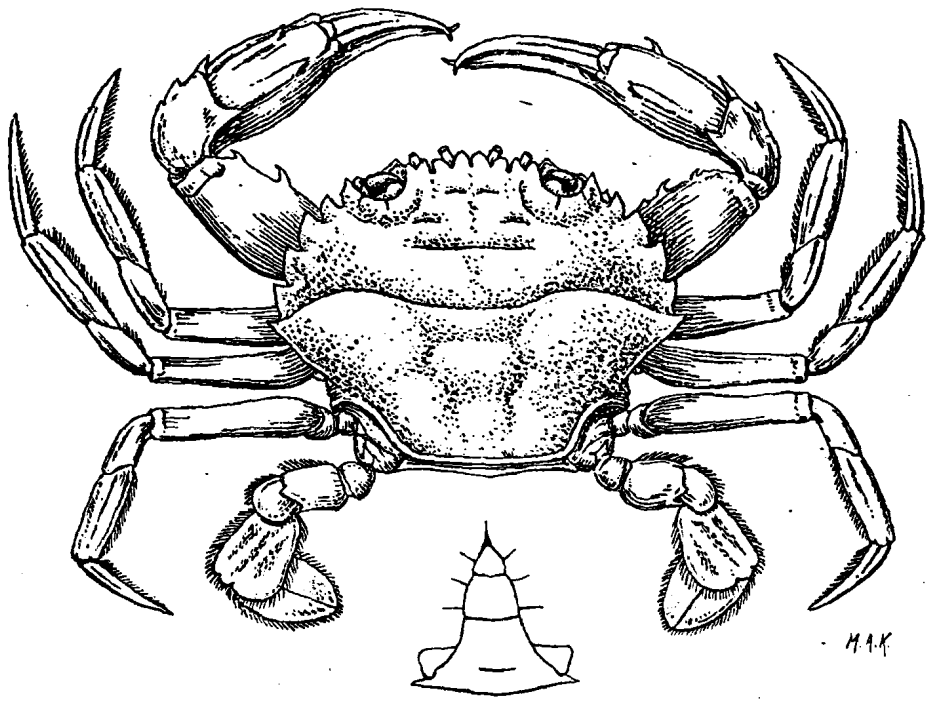


Fig. 37. *Charybdis demani* Leene, ♂ holotype, dorsal view and abdomen (× 2), drawn by M. A. KOEKKOEK. (From LEENE, 1937, fig. 3).

which is only interrupted by the cervical groove. Another transverse ridge occurs on the mesogastric region and anterior to it there is an additional one, widely interrupted in the middle. On the somewhat swollen cardiac region there occurs no transverse ridge; there is only a somewhat coarser granulation in the female.

The front is cut into six teeth. The median teeth are prominent beyond the others (in the male more than in the female); they are elliptical. The submedian teeth are on a somewhat higher plane than the medians, their inner edges slope outwards and their outer edges run straight backwards. The lateral teeth are nearly as long as the submedians; they are narrower than the others and triangular

(in the male the top is acuter than in the female). They are clearly separated from the inner supra-orbital angles, which are somewhat shorter than the lateral frontal teeth and they are rather acute.

The antero-lateral borders are cut into six teeth. The first tooth is notched. In the male on the right side it seems to be a larger tooth and a smaller one, on the left side the tooth is sub-quadrate and not notched; in the female the outer border of the right tooth is cut into one larger and one smaller tooth and of the left tooth the smaller part is more lobe-like. The second tooth is nearly as broad as the first on the left side and somewhat smaller on the right side (there seems to be some correlation between the breadth of the second tooth and the first tooth being notched or not). The third tooth is much broader. The fourth tooth is nearly as broad as the third. The fifth tooth is narrower than the fourth. The second up to the fifth teeth have nearly the same shape and are triangular, the anterior edges are short and the outer edges are long, while both edges are finely serrulate. The sixth tooth is more spine-like (in the female it is much prolonged), its anterior edge is serrulate and its posterior edge is smooth.

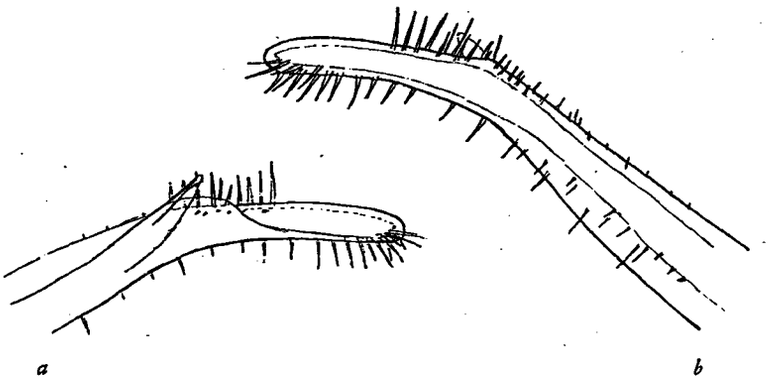


Fig. 38. *Charybdis demani* Leene. *a*, apex of first male pleopod, posterior view; *b*, id., anterior view (× 48). (From LEENE, figs 4 c and d).

The postero-lateral borders converge strongly posteriorly.

The margin of the posterior border forms a curve with the postero-lateral borders.

The orbits have a perceptible, although not strong dorsal inclination; the major diameter is about half the width of the interorbital space. The upper border is divided into three parts by means of two distinct fissures; it is granular. The lower border is divided into two parts by a distinct lateral fissure; the outer part is somewhat prominent beyond the inner part and the lobule of this outer part is hardly distinguishable; the border of the inner part is somewhat granular.

The "basal" antenna-joint touches the front and excludes the flagellum from the orbit. It is granular over the whole surface and it has a very low crest.

The antennulae are folded transversely.

The sub-orbital and pterygostomian regions are smooth and bare; the sub-hepatic and sub-branchial regions are hairy. There is a clearly distinguishable granular pleural groove.

The sternum is smooth and bare.

The abdomen of the male has carinae on the second and third terga. The third, fourth and

fifth terga are fused. On the fourth tergum there is a transverse keel. The sixth tergum has gradually converging sides, it is broader than long. The posterior border is somewhat curved anteriorly, the anterior border is straight.

The length of the chelipeds (which are only present in the male specimen) is about $1^{4}/_{5}$ times the length of the cephalothorax. On the distal part of the granular anterior border of the arm there are two curved spines, some distance proximal to the first spine there is a little knob. The granular distal part of the posterior border has no spine. The upper and under surfaces of the arm are smooth. The wrist has a fairly strong spine at the inner angle; at the outer angle there are two spinules, the anterior granular ridge on the upper surface does not terminate in a spinule. The palm of the hand is six-costate; it has three spines, one at the wrist-joint and two side-by-side some distance behind the finger-joint. The movable finger is longer than the palm (in the left, larger cheliped).

The merus of the natatory leg has a spine near the distal end of the posterior border; it is a little longer than broad; the posterior border of the propus has no spinules.

The first male pleopod has a long narrow neck. The apex is long and narrow. The inner border has two rows of spines, which are long at the distal part and grow shorter proximally. The outer border also has a row of long spines, which begins at the anterior surface. There is a short row of spinules at the posterior surface under the membrane. The free edge of the membrane follows a half curve. A membranous part projects beyond the apex. There are little spinules on the anterior surface of the neck.

Measurements in mm:

	♂	♀
Length of cephalothorax	22.4	18.7
Breadth of cephalothorax	30.0	27.8
Front	8.0	6.6
Interorbital space	9.5	7.7
Orbit	4.8	4.0
Orbito-frontal border	18.7	15.2
Length of cheliped (largest)	42.0	—
Length of merus nat. leg.	5.0	4.0
Breadth of merus nat. leg.	4.0	3.5
Length 6th ♂ abd. segment	3.5	—
Breadth 6th ♂ abd. segment	4.5	—
Posterior border	11.4	10.3
$\frac{\text{Cephalothorax breadth}}{\text{Cephalothorax length}}$	1.34	1.49

17. *Charybdis (Charybdis) rostrata* A. M. Edw. (figs 39 and 40).

Goniosoma rostratum, 1861, A. Milne Edwards, Arch. du Mus., vol. 10, p. 379, pl. 35, figs 2 and 2b.
1893, J. R. Henderson, Trans. Linn. Soc. London, Zool., (2), vol. 5, p. 377.
Charybdis (*Goniosoma*) *rostrata*, 1899b, Alcock, p. 59.
1925, De Man, Treubia, vol. 6, p. 326, fig. 2.
1935, Chopra, Rec. Ind. Mus., vol. 37, p. 491, textfig. 12.

Neither in the Siboga collection nor in the Gier collection are there any specimens of this species. But I could examine the female specimen, mentioned by DE MAN (1925), one female specimen determined by H. BALSS (leg. J. D. F. Hardenberg) and six males and one female (leg. Herbst, det. DE MAN) all from Bagan Api Api, Sumatra (collection Zool. Mus. Amsterdam) and one male specimen from the Sandheads (mouth of the Hooghly River), which Dr CHOPRA sent me on loan.

Description: The cephalothorax is covered with a dense short pile; the regions, with the exception of the cardiac region, are rather difficult to distinguish. It is crossed transversely by the following granular ridges: (1) one between the epibranchial spines, only interrupted by the cervical

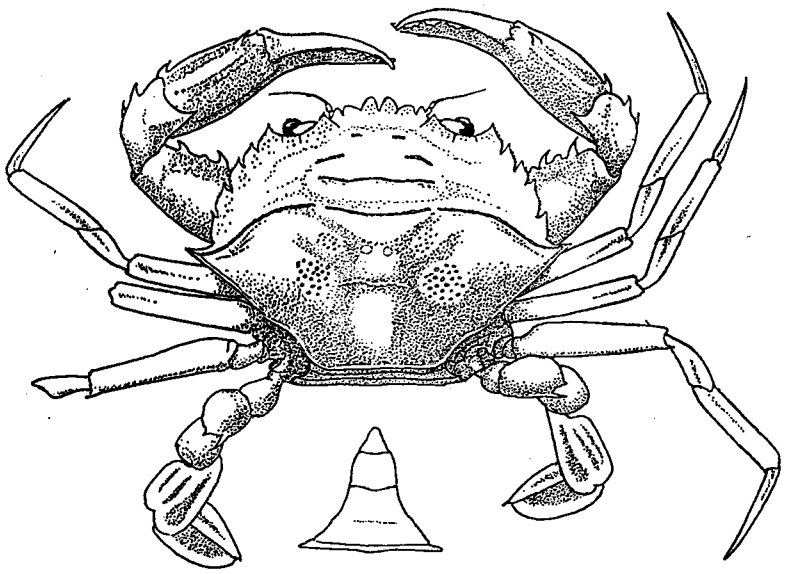


Fig. 39. *Charybdis rostrata* (A. M. Edw.), ♂, dorsal view and abdomen (× 2½).

groove, (2) an unbroken one on the mesogastric region, (3) one on each of the protogastric regions, (4) one on the frontal region, interrupted in the middle, (5) one on the cardiac region. Moreover there are two granular elevations on each of the mesobranchial regions, which may be more or less ridge-like.

The antero-lateral borders are cut into six acute teeth, the upper surfaces of which are granular. The first tooth has a nearly straight, granular anterior border, the outer granular border is convex. The second tooth is a little smaller than the first; the third tooth is the largest; the fourth is only a little narrower than the third; the fifth is much smaller, it is as broad as the second; of the second up to the fifth teeth the anterior borders are straight, the outer borders are convex. The sixth tooth is more spine-like and longer than the preceding ones (in the females and younger males it is much longer). The anterior and outer borders of all the teeth are granular, except for the smooth outer border of the sixth tooth.

The front, which is distinctly prominent beyond the inner supra-orbital angles, is cut into six teeth. The median elliptical teeth are very prominent beyond the others. The submedian teeth, which at the base are as broad as the median ones, are triangular; the inner border is very long and slopes

outwards, the outer border runs nearly parallel with the median axis, the top is blunt. The lateral teeth are much narrower than the submedian ones, triangular; the outer borders are more convex than the inner borders, the tops are blunt.

The postero-lateral borders converge rather strongly posteriorly.

The posterior border is nearly straight and its margin forms a curve with the postero-lateral borders. Its margin is finely granular.

The granular upper border of the orbit is divided into three parts by two distinct incisions. The granular lower border has an incision laterally; the outer part has a distinct median lobe. The inner infra-orbital angle is acute and rather prominent.

The "basal" antenna-joint, which touches the front, has a short granular crest.

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are pilose and faintly granular. The pleural groove is distinct, but only faintly granular.

The first three segments of the sternum have granular anterior margins; the following four segments are nearly smooth. (In the Sandheads specimen these segments are granular over the whole of their surfaces).

The second and third terga of the abdomen of the male are transversely keeled for their whole breadth, the fourth tergum has a short keel. Of the sixth tergum the very slightly curved lateral borders converge posteriorly, the anterior border is convex anteriorly, the posterior border is also convex.

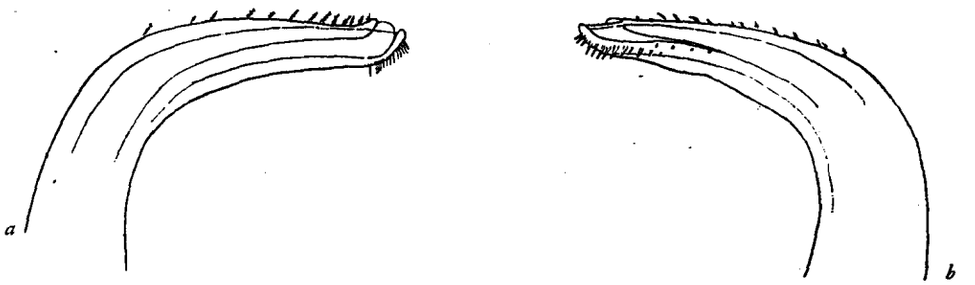


Fig. 40. *Charybdis rostrata* (A. M. Edw.) *a*, apex of first male pleopod, posterior view; *b*, id., anterior view (× 35).

In the Sandheads male the length of the cheliped is nearly 7/4 the length of the cephalothorax. The under surface is bare and smooth. The granular anterior border of the arm has two small curved spines; the upper surface is faintly granular; the posterior border is granular and the inferior border ends distally in a sharp spinule. The wrist has a granular upper surface; the inner angle has a well-developed spine, the outer angle two spinules. The hand is seven-costate, tumid; the upper costae are granular; it has two spines, one at the wrist-articulation and one, a short distance behind the finger-articulation; in both chelipeds the movable fingers are longer than the palms.

Of the second, third and fourth pairs of the pereiopods the posterior borders of the meropodites end in a spinule.

The meropodite of the natatory leg is only a little longer than broad; the distal border ends posteriorly in a spinule and the posterior border has its usual spine proximal to the distal end. The posterior border of the propodite is smooth.

The first male pleopod is abruptedly bent near the apex. The apex is thick and blunt; on its inner border it has many spines, which are more or less clearly feathered; the outer border has a group of small spines at its distal end only.

CHOPRA (1935) measured the length (including the median frontal teeth) and the breadth (including the lateral spines) of the cephalothorax and found for the proportion cephalothorax length: cephalothorax breadth in the males: 0.70—0.75 and in the females: 0.64—0.67. I measured therefore the specimens I had for examination, and found in the males: 0.67—0.81 and in the females: 0.67—0.70. My figures are not so clearly distinct from one another as CHOPRA gave; they partly overlap.

Geographical distribution: Ceylon (ALCOCK); Calcutta (A. MILNE EDWARDS, HENDERSON, CHOPRA): Andamans (ALCOCK); Gulf of Martaban (HENDERSON, ALCOCK); Mergui (ALCOCK); Mouth of Indragiri (DE MAN).

Measurements in mm:

	Sandheads coll. Indian Museum	Bagan Si Api Api coll. de Man	Bagan Si Api Api; leg. Herbst coll. Zool. Mus. Amsterdam							Bagan Si Api Api leg. Hardenberg Zool. Mus. Amsterdam
	♂	♀	♂	♂	♂	♂	♂	♂	♀	♀
Length of cephalothorax	18.5	15.0	14.0	19.5	15.8	18.0	19.0	18.5	17.0	19.0
Breadth of cephalothorax	25.5	22.5	20.8	26.0	22.0	24.0	25.5	24.0	25.0	27.0
Front	6.5	5.5	4.2	7.0	6.0	6.5	7.0	6.0	6.2	7.2
Interorbital space	7.0	6.2	6.0	8.2	7.0	7.5	8.0	6.8	7.5	8.0
Orbit	4.0	3.0	3.0	4.0	3.5	4.0	4.0	4.0	3.5	4.0
Orbito-frontal border	15.0	12.0	11.0	15.0	13.0	14.6	15.0	14.5	13.0	14.5
Length of cheliped (largest)	32.0	23.5	—	—	—	—	—	—	—	—
Length of merus natatory leg	3.5	3.5	3.0	—	3.5	3.8	3.8	4.0	3.5	3.8
Breadth of merus natatory leg	3.0	2.5	2.2	—	2.8	3.0	3.2	3.2	3.0	3.0
Length 6th ♂ abdominal segment	2.5	—	2.0	2.5	2.5	2.2	2.8	2.5	—	—
Breadth 6th ♂ abdominal segment	3.5	—	2.0	3.5	3.0	3.2	3.5	3.0	—	—
Cephalothorax length / Cephalothorax breadth	0.81	0.67	0.67	0.75	0.72	0.75	0.74	0.77	0.68	0.70

18. *Charybdis* (*Charybdis*) *callianassa* (Herbst) (figs 41, 42 and 43).

? *Cancer callianassa,* 1789, HERBST, Krabben, Bd. 3, 2. Heft, pl. 54, fig. 7.
Goniosoma callianassa, 1861, A. MILNE EDWARDS, Arch. Mus., vol. 10, pp. 382, 385 (part).
Goniosoma variegatum, 1879, MIERS, Proc. Zool. Soc., p. 33.
1884, MIERS, "Alert", p. 233.
1893, HENDERSON, Trans. Linn. Soc., (2), Zool., vol. 5, p. 376.
Goniosoma annulatum, 1893, HENDERSON, ibid., p. 375 (part.).
Charybdis (*Goniosoma*) *callianassa,* 1899b, ALCOCK, p. 57.
Goniosoma callianassa, 1901, LANCHESTER, Proc. Zool. Soc., London, pt 2, p. 545.
Charybdis callianassa, 1910, RATHBUN, Mem. Ac. R. Danemark, (7), vol. 5, p. 364.
1918, KEMP, Mem. As. Soc. Bengal, vol. 6, p. 250.

Charybdis (*Goniosoma*) *callianassa*, 1935, CHOPRA, Rec. Ind. Mus., vol. 37, p. 489, pl. 9, fig. 1, textfig. 11.
1937, SHEN, Bull. Raffl. Mus., 13, p. 125, textfig. 14.
nec *Charybdis callianassa*, 1925, DE MAN, Treubia, vol. 6, p. 324, fig. 1.

Gier, no 9, exp. 21, 4/7, 1908, 1 ♂.
Gier, no 12, exp. 4, 7/10, 1908, 1 ♂.
Gier, Boom Batang p.i., 16/6, 1906, 1 ♂ and 1 ♀.
Deli, Sumatra, coll. de Bussy, 2 ♂♂.

Of this species there are no specimens in the Siboga material, but 3 ♂♂ and 1 ♀ in the Gier material and 2 ♂♂ in the de Bussy collection.

Description: The cephalothorax is covered with a short pile. The cardiac region is somewhat swollen. On the mesobranchial region there is some granulation, not ridge-like. On the boundaries

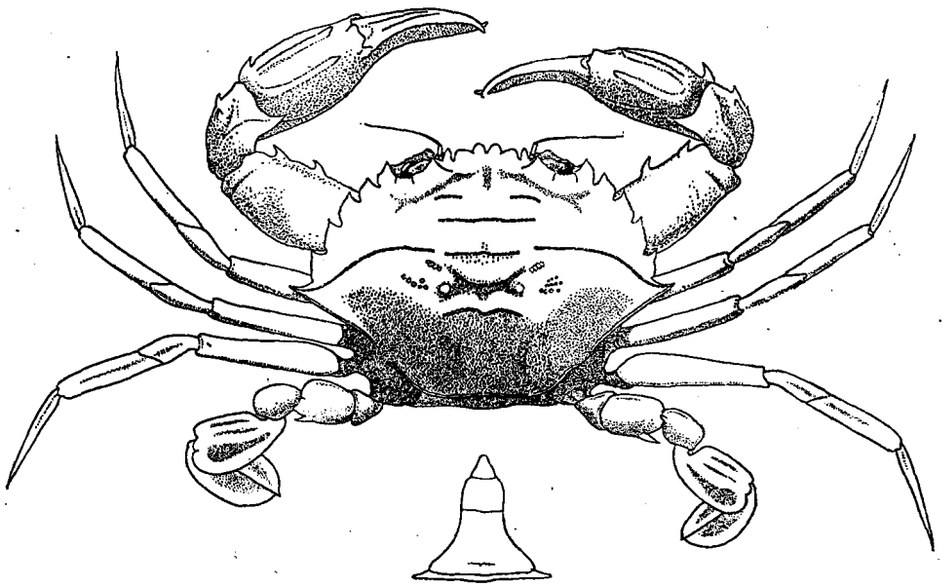


Fig. 41. *Charybdis callianassa* (Herbst), ♂, dorsal view and abdomen (× 2).

between the mesobranchial and gastric regions there is on either side one short granular ridge, which is not placed in the usual way, viz., not more or less parallel to the epibranchial ridge, but in the direction of the boundaries before-mentioned. In the principal axis there is some granulation on the gastric region. Between the epibranchial spines there runs a granular transverse ridge, which is only interrupted by the cervical groove. Anterior to it an unbroken granular ridge crosses the gastric region and in front of the latter there is an additional one, which is widely interrupted in the middle. There also occurs a granular transverse ridge on the cardiac region.

The front is cut into six teeth, of which the elliptical medians are on a lower plane than the others and somewhat prominent beyond them. The incision between these teeth is therefore V-shaped. The submedians are somewhat broader than the medians; the inner edges slope outwards, the anterior edges are rounded and the lateral edges run parallel to the principal axis. The lateral teeth are much narrower and sub-acute. The inner and lateral edges are somewhat convex. They are separated from the

submedians by a rather wide incision (of which the sides are subparallel) and from the inner supra-orbital angles by a wide V-shaped incision.

The antero-lateral borders are cut into six teeth. Of the first sub-truncate tooth the inner angle is acute and the outer angle is lobe-like; the outer edge is serrulate. The second tooth has nearly the same shape and size, the anterior and outer edges are serrulate. The third and fourth teeth are larger, rather acute; the anterior and outer edges are serrulate. The fifth tooth is smaller than the two preceding teeth and has the same size as the second tooth; its outer edge is not clearly convex, but more or less straight and its inner edge is more laterally directed. The sixth tooth is the largest, only the anterior edge is serrulate. In the female this tooth is much larger than the preceding teeth.

The postero-lateral borders are nearly straight. They converge strongly posteriorly; they are gently beaded.

The margin of the posterior border forms a curve with the postero-lateral borders and is also beaded.

The orbit has a slight dorsal inclination, its major diameter is nearly half the interorbital space. There are two fissures in the upper border. The inner angle of the outer part and the outer angle of the median part are somewhat turned up. The inner and the median parts are finely granular. In the lower border there is laterally a narrow fissure. From the inner part of this border the inner angle is broad, tooth-like, with smooth sides; it is very prominent beyond the inner angle of the upper border. Near the outer angle of this part of the lower border it seems to have a little lobe, which has finer granules than the rest of this border. The outer part has a granular edge.

The "basal" antenna-joint, whose lobule joins the front, has a granular ridge.

The antennulae are folded transversely.

The sub-orbital, sub-hepatic and sub-branchial regions are hairy; the pterygostomian regions are nearly smooth.

The sternum is smooth.

Of the abdomen of the male the second and third terga are carinate; the fourth and fifth are fused, with a keel on the fourth tergum; the sides of the sixth tergum are convex, the posterior angles are rounded, the anterior and posterior sides are curved anteriorly.

The larger cheliped of the male is about $1^4/_5$ times the length of the cephalothorax. The arm has two spines on the anterior border; the upper border is somewhat hairy; the posterior border has no spine, it is granular on the distal part. The wrist has a rather strong spine at the inner angle, at the outer angle it has three spinules; on the outer surface there are two granular carinae and on the upper surface one granular ridge, which is furcated. Between the carinae and the ridge the surface is hairy. The hand, especially of the larger cheliped, is swollen; it has three spines, one at the wrist-joint and two, side-by-side, some distance behind the finger-joint; it is six-costate, the two costae on the upper surface and the next one on the outer surface are granular; the others are smooth; only between the granular costae the surface is hairy and very finely granular.

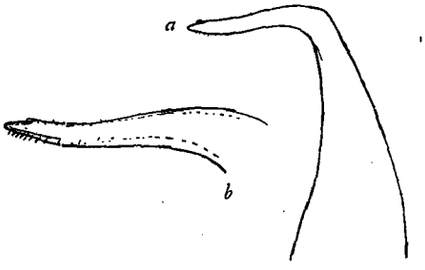


Fig. 42. *Charybdis callianassa* (Herbst). *a*, first male pleopod, posterior view (× 12,5); *b*, apex, posterior view (× 30).

The second to fourth pairs of pereiopods have no special characteristics; from the fifth pair of pereiopods the merus is but a little longer than broad and has a spine some distance proximal to the distal end of the posterior border; the posterior border of the propus is unarmed.

The first ♂ abdominal appendages are abruptly bent near the apex, which is armed on the anterior surface with a short row of rather strong spines and on the inner border there are only a few spinules. The posterior surface is unarmed.

This species proved to be identical with *Goniosoma variegatum* MIERS (1884, p. 232) after comparison with the specimens Miss GORDON kindly lent me from the British Museum collections.

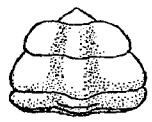


Fig. 43. *Charybdis callianassa* (Herbst), abdomen of male (intersex), among *Goniosoma* material, determined by J. R. HENDERSON (British Museum), (× 1½).

I was able also to compare them with a male specimen from Koh Kong (Th. Mortensen, I. 21, 1900), which Dr STEPHENSEN was kind enough to send on loan.

The *Ch. callianassa*, which DE MAN (1925) described proved to belong to a different species, as I published elsewhere (LEENE, 1937).

On examination the *Goniosoma annulatum* material, determined by J. R. HENDERSON, appeared for the greater part to consist of *Ch. callianassa* (see also fig. 43).

Geographical distribution: Karachi (MIERS, HENDERSON, ALCOCK); Bombay (HENDERSON, ALCOCK); Madras Coast (HENDERSON, ALCOCK); Orissa Coast (ALCOCK); Mouth of Hooghly River (CHOPRA); Singapore (SHEN); Kota Bharu, Kelantan (LANCHESTER); Singora (KEMP); Siam (RATHBUN); Port Darwin (MIERS).

Measurements in mm:

	Deli, Sumatra coll. de Bussy		Boom batang p.i. Gier Exp.		Gier no. 9 Exp. 21	Gier no. 12 Exp. 4
	♂	♂	♂	♀	♂	♂
Length of cephalothorax	24.5	20.6	23.4	16.5	21.6	18.2
Breadth of cephalothorax	36.9	31.2	32.8	27.0	30.5	27.0
Front	8.5	7.5	8.0	6.0	7.1	6.6
Interorbital space	10.0	8.5	9.2	7.0	8.4	7.5
Orbit	5.0	4.3	4.8	3.5	4.2	4.0
Orbito-frontal border	19.4	16.8	18.5	13.5	16.6	15.0
Length of cheliped (largest)	—	41.9	—	—	43.5	37.5
Length of merus natatory leg	5.9	5.0	6.0	4.1	5.3	4.7
Breadth of merus natatory leg	5.0	3.6	4.5	3.0	4.3	3.5
Length 6th abdominal segment	3.4	3.0	3.5	—	3.0	2.6
Breadth 6th abdominal segment	5.0	4.0	4.6	—	5.4	3.5
Posterior border	13.6	11.5	12.3	10.0	12.4	10.4
Cephalothorax breadth / Cephalothorax length	1.50	1.51	1.40	1.64	1.41	1.48

19. *Charybdis* (*Charybdis*) *variegata* (Fabr.) (figs 44 and 45).

Portunus variegatus, 1798, FABRICIUS, Ent. Syst. Suppl., p. 364.
Charybdis variegatus, 1850, DE HAAN, Fauna Japon., Crust., pl. 1, fig. 2.
1852, STIMPSON, Proc. Ac. Nat. Sci. Philad., p. 39.
Goniosoma callianassa, 1861, A. MILNE EDWARDS, Arch. Mus., vol. 10, p. 382 (part.).
Goniosoma variegatum var. *callianassa*, 1893, J. R. HENDERSON, Trans. Linn. Soc. Zool., (2), vol. 5, p. 377.

Charybdis (*Goniosoma*) *variegata*, 1899b, ALCOCK, p. 60.
Charybdis variegata, 1902, RATHBUN, Proc. U. S. Nat. Mus., vol. 26, p. 27.
1906, NOBILI, Ann. Sc. Nat. Zool., (9), vol. 4, p. 196.
1910, RATHBUN, Mém. Ac. Roy. Danemark, (7), vol. 5, p. 364.
1913, KLUNZINGER, Nova Acta Ac. Leop. Carol., vol. 99, no 2, p. 368.
1922, BALSS, Arch. Naturgesch., 88. Jahrg., Abt. A, p. 104 (part.).
?? 1933, YU YOKOYA, Journ. coll. agricult., Tokyo Imp. Univ., vol. 12, p. 176.
Charybdis (*Goniosoma*) *variegata*, 1935, CHOPRA, Rec. Ind. Mus., vol. 37, p. 488, textfig. 10.
1937, LEENE, Zool. Meded., vol. 19, p. 169.
1937, SHEN, Bull. Raffl. Mus., 13, p. 127, textfig. 15.

Siboga, station 4, 7°42' S., 114°12'6 E, anchorage off Djangkar (Java), 9 m, 1 ♂, 1 ♀, and 1 juv.

From the Copenhagen Museum I had on loan the two type specimens of *Portunus variegatus* Fabr., therefore I am able to state precisely the characteristics of the types. Unfortunately the specimens have been kept in dried condition, so it was impossible for me to observe the first ♂ pleopods.

From the "Muséum National d'Histoire Naturelle" in Paris I borrowed a male specimen of

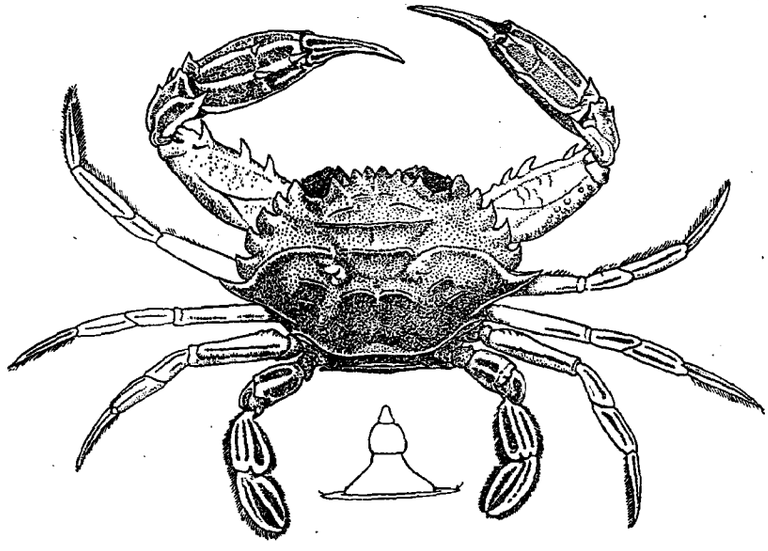


Fig. 44. *Charybdis variegata* (Fabr.), ♂ type, dorsal view and abdomen (× 1½).

Goniosoma callianassa (Herbst). Compared with the types above-mentioned, it proved to be *Charybdis variegata* (Fabr.). This specimen has also been kept in dried condition.

In the "Rijksmuseum van Natuurlijke Historie" in Leiden I found the type specimens of *Charybdis variegatus* De Haan, preserved in dried condition. They were identical with the type specimens of FABRICIUS.

In the Leiden Museum there are besides the type specimens one female and three male specimens from Amoy (coll. G. Schlegel). They differ from the Fabricius types in four points, but I think these differences are not evident enough to propose a new variety (see also LEENE, 1937).

Here follows the description of the ♂ type of Fabricius:

The cephalothorax is covered with a rather dense short tomentum, the regions are fairly

distinct, the cardiac region is somewhat swollen. It is crossed by several granular transverse ridges, which are very distinct: (1) the usual one between the last antero-lateral teeth, which curves strongly forward and is only interrupted by the cervical groove, (2) an unbroken one on the mesogastric region, (3) a short curved one on each of the protogastric regions, (4) one on the frontal region, interrupted in the middle, (5) one on the cardiac region, sligthly interrupted in the middle, (6) two short ones behind one another on each mesobranchial region.

The front is cut into six teeth. The median teeth are the most prominent, triangular, the top is a little rounded; the submedian teeth slope somewhat outwards, the tops are rounder than the tops of the median teeth, they are nearly as broad as the medians, they are on a higher plane than the median teeth, the outer borders run straight backwards; they are prominent beyond the lateral teeth; the latter are very narrow, small and rather acute, and separated from the submedians by a distinct incision. They are also narrower than the supra-orbital angles, which are on a higher plane.

The antero-lateral borders are cut into six teeth. The first tooth is sub-quadrate with rounded angles. The second tooth is the smallest, it has a short, nearly straight, smooth anterior border and a smooth, longer convex outer border. The third up to fifth teeth are nearly the same shape and size; the proximal parts of their short, nearly straight anterior borders are serrated, their long convex outer borders are smooth; the fourth tooth is the largest. The sixth tooth has 1.5 times the length of the fifth in the male and twice in the female; it is a spine, which is curved forward in the male, its anterior border is granular for the greater, proximal part and the posterior border is smooth.

The postero-lateral borders are strongly convergent posteriorly.

The margin of the posterior border forms a curve with the postero-lateral borders, it is somewhat sinuous.

The orbit has a rather strong dorsal inclination. The upper border is cut into three parts by two distinct incisions, the borders of the inner and middle parts are finely granular. The inner angle of the outer part is slightly turned up. The granular lower border is cut into two parts by a distinct fissure; the lobule at the outer part is very distinct and dentiform, the inner angle of the inner part is somewhat prominent, but not merely dentiform.

On the "basal" antenna-joint, which touches the front, excluding the flagellum from the orbit, there occurs a crest, which is dentiform.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are granular and hairy. (The pterygostomian and sub-orbital regions are least hairy).

The sternum is smooth and bare.

Of the abdomen of the male the fourth and fifth terga are fused; the sixth tergum is broader than long, it has strongly curved lateral bordes; the anterior border is straigt, the posterior one is curved anteriorly.

The length of the larger (left) cheliped is more than 2.5 times the length of the cephalothorax. The under surface of the arm has squamiform markings and it is sparsely hairy; the greater, distal part of the upper surface is hairy and granular; the anterior border has three spines: the first is near the distal end of this border, the second nearly in the middle and the third a short distance proximal to the second; sometimes there is a fourth tooth a short distance proximal to the third; the granules behind the proximal spine are very large; the posterior border has no spine. The wrist has three distinct granular ridges; the whole surface is hairy, the outer and upper surfaces are granular; there is a large

spine at the inner angle and on the outer angle there are two spinules, which are rather strongly developed. The hand has seven costae, which are very distinctly granular; the surfaces are hairy and granular with squamiform markings, except the under surface which is bare and nearly smooth; the upper surface bears four spines and a little spinule: one spine at the wrist-articulation, two spines nearly side-by-side about the middle, and a spine and a spinule at the finger-articulation; in the larger cheliped the palm is much swollen and the movable finger is shorter than the palm, whereas in the other cheliped they are the same length.

Of the natatory leg the meropodite is a little longer than broad, the posterior border has a spine distally; the posterior border of the propodite has some little spinules.

Of the first ♂ abdominal appendages (of the Amoy specimens) the apex has some large spines on the proximal part of the inner border, which grow smaller proximally and are continued on the distal part of the neck; the outer border has a row of great spines, which is continued on the anterior side of the neck in a row of spinules and ends in a group of little spinules. On the posterior surface of the apex there are two large spines, and a row of five smaller spines, while under the membrane, which is hardly to be distinguished, there are the spines of the inner border, which are more clearly distinguishable on the anterior surface. On the neck, near the point where it bends outwards rather abruptly, there occur some little spinules. If we compare them with the figures given by CHOPRA there are only a few minor differences. In his figure there are few spines, perhaps he did not clear it up sufficiently, and the membrane has a somewhat different shape, which may be owing to the method of preparing.

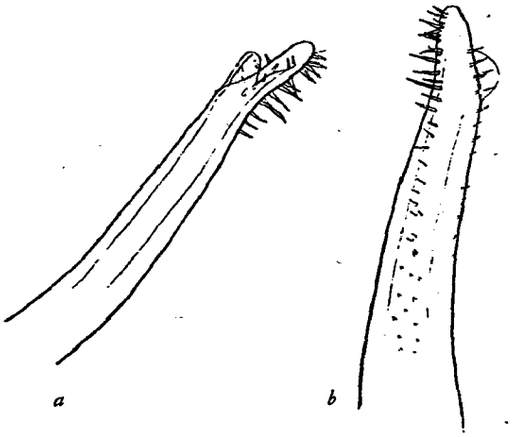


Fig. 45. *Charybdis variegata* (Fabr.), forma *typica*. *a*, apex of first male pleopod, posterior view; *b*, id. anterior view (× 47).

So the forma *typica* of this species is characterized by the following:

(1) the transverse ridges on the cephalothorax are very distinct,
(2) the last antero-lateral spine is much longer than the fifth tooth, especially in the female,
(3) the second antero-lateral tooth is only a little smaller than the first tooth,
(4) the inner lobule of the outer part of the lower orbital border is sharply dentiform,
(5) the hands of the chelipeds are very unequal in the male; in the female they are nearly the same.

The specimens from Amoy differ from the *forma typica* in the following points:

(1) less acute frontal teeth,
(2) the second antero-lateral tooth is distinctly smaller than the first tooth,
(3) the inner lobule of the outer part of the lower orbital border is not so distinctly sharply dentiform,
(4) the hands of the chelipeds are nearly the same size in the male.

I was also able to examine one male and one female specimen from Japan collected by VON SIEBOLD, of which the male showed a distinct difference in the size of the chelipeds. But they agreed

with the specimens from Amoy in differing from the types in the other points mentioned above.

In the Siboga material I found three little specimens of which the larger ones showed distinctly the characteristics of the forma typica. The juvenile specimen on the other hand has (1) a differently shaped front: the lateral teeth being confluent with the inner supra-orbital angles; the submedian teeth being broad lobes; the median teeth being distinctly prominent beyond the submedians; (2) a different shape of the antero-lateral border: the second tooth being smaller and narrower than the first tooth, the third the largest, the fourth and fifth narrower than the third and the sixth more spine-like, its top being curved forward, (3) the length of the merus about twice the breadth, (4) the transverse ridges on the cephalothorax hardly distinguishable.

Geographical distribution: Assab (NOBILI); Persian Gulf (ALCOCK); Bombay (A. MILNE EDWARDS); Madras Coast (ALCOCK); Mouth of Hooghly River (CHOPRA); Malay Archipelago (HENDERSON); Singapore (SHEN); Siam (RATHBUN); Hong Kong (ALCOCK, BALSS); Amoy (LEENE); Nagasaki (ALCOCK, RATHBUN); Wakanoura, Kii (RATHBUN); N. Australia (HENDERSON).

In our collection I found, moreover, six specimens, which belong to the group *variegata*, when determined by the key of ALCOCK. But after comparison with the types, they show such differences that I propose to consider them as varieties of *variegata*.

Charybdis variegata var. *brevispinosa* Leene (figs 46 and 47).

Charybdis (*Goniosoma*) *variegata*, var. *brevispinosa*, 1937, LEENE, Zool. Meded., vol. 19, p. 170, figs 2, 4a, b.

Gier, no 3, Exp. 5, 6°13′ S., 107°57′ E, 8½—7 fms, 16/10, 1907, 1 ♂.
Gier, no 4, Exp. 12, 24/11, 1907, near Toeban, 5 ♀♀.

In the "Zoologische Mededeelingen" I have already published this variety.

Description: The cephalothorax is sparsely hairy, the regions are fairly distinct, the cardiac region is not swollen. There occurs some more granulation on the gastric region, on the mesobranchial regions between the two transverse ridges, near the orbits and on the antero-lateral teeth than in *Ch. variegata*. The transverse ridges are arranged as in *Ch. variegata*, but they are not clearly distinguishable.

The front is cut into six teeth. The median teeth are most prominent, they are broader than the submedian ones, the outer borders slope strongly laterally, the tops are round; the inner borders run nearly straight backwards; the lateral teeth are separated from the submedian ones by a rather wide incision, they are much narrower, smaller and acuter than the other frontal teeth, they are also narrower than the inner supra-orbital angles.

The antero-lateral borders are cut into six teeth, of which the first and second are sub-quadrate, nearly the same size (the second may be a little narrower than the first); the third up to the fifth teeth have concave anterior borders, the proximal parts of which are granular, the outer borders are nearly smooth, they are nearly the same size (the fifth may be a little narrower); the sixth tooth is only a little longer than the fifth tooth, its anterior border is granular, its top is directed forward.

The postero-lateral borders are rather strongly convergent posteriorly.

The margin of the posterior border forms a curve with the postero-lateral borders.

The orbit has a strong dorsal inclination, its upper border is cut into three parts by two distinct incisions, the borders of the inner and middle parts are finely granular. The inner angle of the outer

part is slightly turned up. The granular lower border is cut into two parts by a distinct fissure; the lobule at the outer part is very distinct and dentiform, the inner angle of the inner part is somewhat prominent, but not merely dentiform.

On the "basal" antenna-joint, which touches the front, excluding the flagellum from the orbit, there occurs a crest, which is dentiform.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are granular and hairy. The pterygostomian and sub-orbital regions are least hairy.

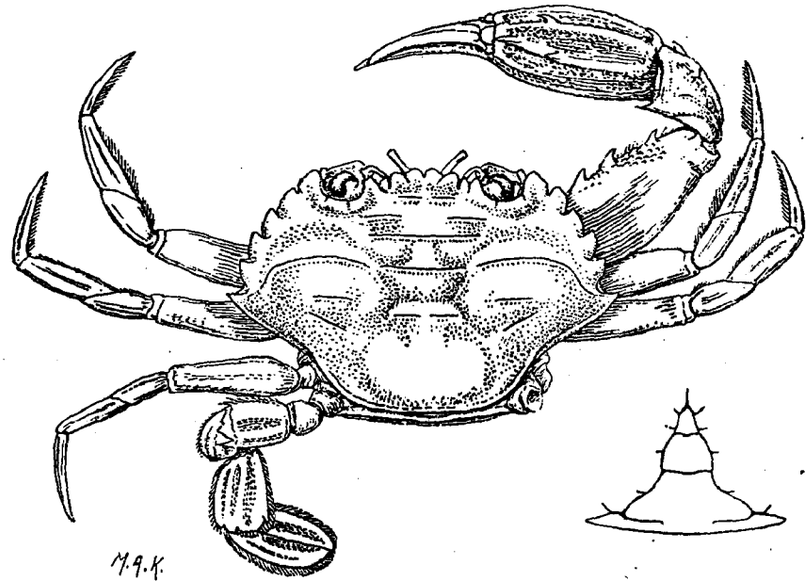


Fig. 46. *Charybdis variegata* var. *brevispinosa* Leene, ♂ type, dorsal view and abdomen, drawn by M. A. KOEKKOEK (From LEENE, 1937, fig. 2) (× 2).

The first three segments of the sternum have a fine granulation. The other segments are smooth, only the anterior margins of the fourth and fifth segments have granules.

Of the abdomen of the male the fourth and fifth terga are fused; the sixth tergum has strongly curved lateral borders; it is broader than long; the anterior border is straight, the posterior border is curved anteriorly.

The right cheliped has 2.5 times the length of the cephalothorax. The under surface of the arm has squamiform markings with small granules on their margins and large granules on the inner border; the upper surface is sparsely hairy and it has large granules on the greater distal part; the anterior border has three spines, the granules between the spines are rather large; the posterior border has no spine. The wrist has three less distinct granular ridges; between these ridges there occur some granules and it is very sparsely hairy; there is a well-developed spine at the inner angle and on the outer angle there is one blunt spinule. The hand has seven costae, which are somewhat less distinct than in *variegata*; all the surfaces are hairy and more granular than in *variegata*; the upper surface has four little, slightly curved blunt spines (arranged as in *variegata*); the hand of the larger cheliped is distinctly swollen.

The first male pleopod has a row of spines on the outer border,which is continued on the anterior border; on the posterior border there are two large spines and two rows of shorter spines, one of the rows is continued under the membrane; the membrane has no lobule; the inner border has only few short spines.

This variety differs from the forma *typica* in:

(1) the sixth antero-lateral tooth is only somewhat longer than the preceding teeth and it is not so slender as in the forma *typica,*

(2) the spinules on the chelipeds are much blunter,

(3) the shape of the first male pleopods.

It differs from the variety *salehensis* in:

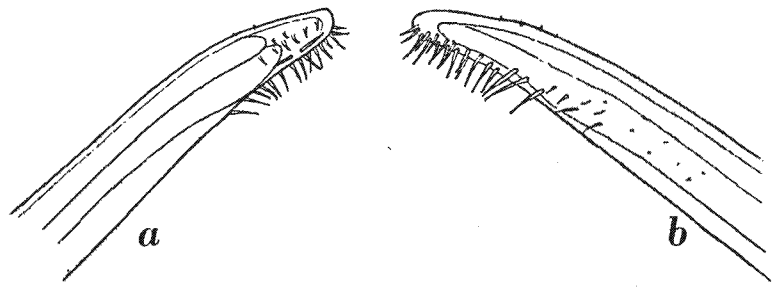


Fig. 47. *Charybdis variegata* var. *brevispinosa* Leene. *a,* apex of first male pleopod, posterior view; *b,* id., anterior view (× 48). (From LEENE, 1937, figs 4 a and b.).

(1) the shape of the first male pleopods,

(2) the length of the sixth antero-lateral tooth,

(3) the ratio of the cephalothorax breadth to cephalothorax length.

Charybdis variegata var. *salehensis* nov. var. (figs 48 and 49).

Siboga, station 313, Anchorage East of Dangar Besar, Saleh-bay, up to 36 m, 4 ♂♂ and one ovigerous female.

Description: The cephalothorax is sparsely hairy, the regions are fairly distinct, the cardiac region is not swollen. The transverse ridges are arranged as in the type, but they are not so clearly distinguishable; the granules are larger. There is additional granulation on the gastric region, on the mesobranchial regions between the two transverse ridges, near the orbit and on the antero-lateral teeth.

The front is cut into six teeth. The median teeth are more prominent than in *variegata,* triangular, the top somewhat rounded; the sub-median teeth slope somewhat outwards, their tops are rounder than those of the median teeth, they are as broad as the medians, they are on a higher plane, their outer borders do not run straight backwards, but somewhat outwards. The lateral teeth are separated from the submedian teeth by a much wider incision than in *variegata,* they are very narrow and shorter than the submedians, they are also narrower than the supra-orbital angles, which are on a higher plane.

The antero-lateral border is cut into six teeth. The first tooth is sub-quadrate with rounded angles, the second tooth is nearly the same size and shape, only a little narrower, it has a concave

smooth anterior border. The third and fourth teeth are equal to one another, the proximal parts of their concave anterior borders are serrated, their outer borders are convex and nearly smooth (with a strong lens it proved to be not quite smooth). The fifth tooth is narrower than the third and fourth teeth, it is somewhat larger than the second, it has the same shape as the two preceding teeth. The sixth tooth has the same size as the fifth, its top is directed forwards like the tops of the preceding teeth, the proximal part of the anterior border is serrated, its outer border is smooth.

The postero-lateral borders are as in *variegata,* only they do not converge so strongly. The nearly straight posterior border forms a curve with the postero-lateral borders.

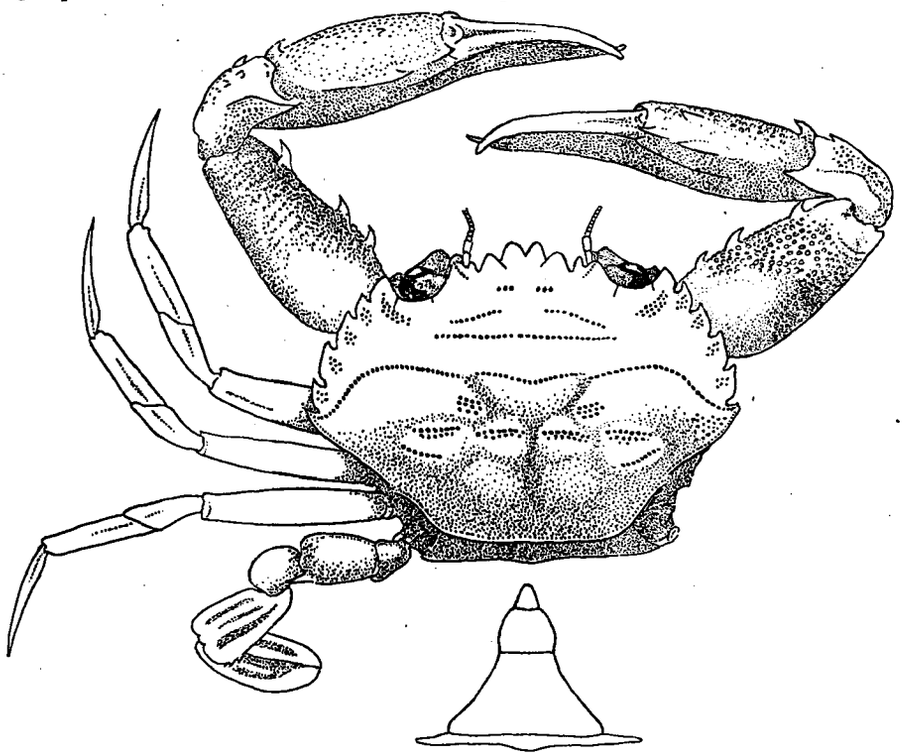


Fig. 48. *Charybdis variegata* var. *salehensis* nov. var., ♂ type, dorsal view and abdomen (× 9/10).

The orbit has a very strong dorsal inclination; for the rest the upper and lower border are as in *variegata* (Amoy).

The "basal" antenna-joint and its crest are as in *variegata.*

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are finely granular (only perceptible through a strong lens) and covered with long hairs. At the basis of the teeth there occur larger granules.

The first three segments of the sternum have a fine granulation. The other segments are smooth, only the anterior margins of the fourth and fifth segments have granules (in the female only the fourth segment).

The abdomen of the male has the same characteristics as in *variegata.*

The length of the larger cheliped (left) is 2.5 times the length of the cephalothorax. The under

surface of the arm has squamiform markings with small granules on their margins and large granules on the inner border; the upper surface is sparsely hairy and it has large granules on the greater distal part; the anterior border has three spines placed as in *variegata,* the granules between these spines are much larger than in the type, the posterior border has no spine. The wrist has three less distinct granular ridges; between these ridges there occur some granules and it is very sparsely hairy; there is a large spine at the inner angle and on the outer angle there are two spinules, which in the larger specimens are very blunt, owing to which there sometimes seems to be only one spinule. The hand has seven costae, which are somewhat less distinct than in *variegata;* all the surfaces are hairy and more granular than in *variegata;* the upper surface has four small, sligthly curved, blunt spines (arranged as in *variegata*); the hand of the larger cheliped is distinctly swollen.

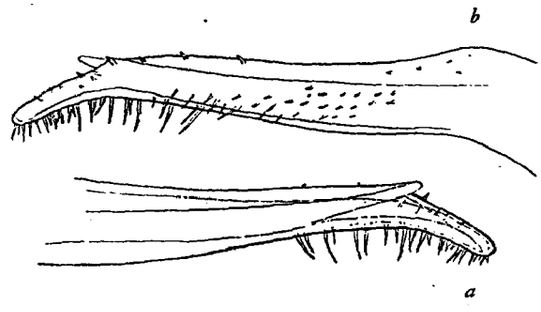


Fig. 49. *Charybdis variegata* var. *salehensis* nov. var. *a,* apex of first male pleopod, posterior view; *b,* id., anterior view (× 47).

Of the natatory leg the meropodite is longer than broad, the posterior border has a strong spine near the distal end, the distal border does not end in a spine, the posterior border of the propodite has some little spinules.

If we compare the first ♂ pleopods of *Ch. variegata* (from Amoy) and of this variety we notice some slight differences: (1) in this variety the armature of the outer border, which is continued on the anterior surface, is much more developed, (2) in *variegata* the armature of the inner border near the apex is more developed, (3) the apex in this variety is sharper.

The differences between the forma *typica* and var. *salehensis* are:

Measurements in mm.

	forma typica									
	type Fabricius	types de Haan coll. Leiden Mus.		Siboga, stat. 4			coll. Leiden Mus. Amoy			
	♂	♂	♀	♂	♀	juv.	♂	♂	♂	
Length of cephalothorax . .	21.0	12.5	13.0	7.0	5.2	3.5	17.3	15.5	13.5	
Breadth of cephalothorax . .	36.0	20.5	21.5	10.7	7.5	4.8	29.0	26.0	21.0	
Front	7.5	—	4.8	—	—	—	6.9	5.8	5.0	
Interorbital space	10.5	—	6.2	—	—	—	7.9	7.0	5.8	
Orbit	4.5	—	3.8	—	—	—	4.2	4.0	3.5	
Orbito-frontal border . . .	—	—	—	—	—	—	15.5	14.0	11.8	
Length of cheliped	55.0	—	27.5	—	—	—	41.5	35.7	29.6	
Length of merus natatory leg	5.0	—	4.0	—	—	—	4.7	4.4	3.8	
Breadth of merus natatory leg	4.0	—	2.5	—	—	—	3.5	2.9	2.5	
Length 6th abdominal segment	—	—	—	—	—	—	2.7	2.5	2.2	
Breadth 6th abdominal segment	—	—	—	—	—	—	3.7	3.0	2.7	
Posterior border		—	—	—	—	—	11.0	10.8	8.5	
$\frac{\text{Cephalothorax breadth}}{\text{Cephalothorax length}}$ . . .	1.71	1.64	1.65	1.53	1.47	1.37	1.62	1.65	1.56	

(1) in var. *salehensis* the sixth antero-lateral tooth is not longer than the preceding teeth,
(2) in var. *salehensis* the armature of the chelipeds is very much blunter,
(3) the shape of the first male pleopod,
(4) the ratio cephalothorax breadth: length is distinctly smaller in var. *salehensis* than in *variegata*.

The length of the sixth antero-lateral tooth with regard to the preceding teeth is not so variable as may be supposed. For in all the specimens, also in the very young ones, of the var. *salehensis* the sixth tooth is short, and the young specimens (except for the smallest of stat. 4) of the forma *typica* have very distinctly a long sixth antero-lateral tooth.

20. *Charybdis* (*Charybdis*) *natator* (Herbst) (figs 50 and 51).

Cancer natator, 1789, Herbst, Krabben u. Krebse, pl. 40, fig. 1.
Thalamita natator, 1834, Milne Edwards, Hist. Nat. Crust., vol. 1, p. 463, pl. 17, figs 13, 14.
Portunus (Charybdis) natator, 1850, De Haan, Faun. Jap. Crust., p. 10.
Portunus (Charybdis) granulatus, 1850, De Haan, Faun. Jap. Crust., p. 42, pl. 1, fig. 1.
Krauss, Südafr. Crust., p. 24.
Charybdis granulatus, 1858, Stimpson, Proc. Ac. Nat. Sci. Philad., p. 39.
1907, Stimpson, Smiths. Misc. Coll., vol. 49, p. 82.
Goniosoma natator, 1861, A. Milne Edwards, Arch. Mus., vol. 10, pp. 370, 385.
1874, Hoffmann, Rech. Faun. Madagasc., 5ième partie, 2ième livraison, p. 11.
1879, Hilgendorf, Monatb. Königl. Preuss. Ak. Wiss. Berlin, p. 801.
1884, Miers, "Alert", pp. 518, 539.
1886, Müller, Verh. Nat. Ges. Basel, vol. 8, p. 475.
1887, Walker, Journ. Linn. Soc., vol. 20, p. 110.
1887, De Man, Arch. Naturgesch., Jahrg. 53, Bd. 1, p. 334, pl. 13, fig. 5.
1892. De Man, Weber's Zool. Ergebn. Niederl. Ost-Ind., vol. 2, p. 285.
1893, J. R. Henderson, Trans. Linn. Soc. Zool., (2), vol. 5, p. 374.
1901, Lanchester, Proc. Zool. Soc., pt. 2, p. 544.

var. salehensis					var. brevispinosa					
Siboga, stat. 313					Gier no. 3 Exp. 5	Gier no. 4, Exp. 12				
ype	♂	♂	♂	♀	holotype ♂	♀	♀	♀	♀	♀
0	10.0	7.5	7.7	13.0	20.0	17.2	17.0	17.0	15.5	14.8
7	13.9	10.2	10.2	18.2	32.5	27.5	27.5	27.5	25.5	23.5
8	4.0	—	—	5.2	7.0	7.0	6.5	7.0	6.2	5.9
8	5.0	—	—	6.2	9.0	8.2	7.8	8.0	7.0	6.6
2	2.8	—	—	3.7	4.5	4.5	4.5	4.3	4.0	3.5
5	10.2	—	—	12.5	18.0	16.7	16.4	16.0	14.8	13.5
7	19.7	—	—	24.7	51.0	36.0	34.2	37.8	—	30.2
5	2.8	—	—	3.5	5.5	4.5	4.5	4.7	4.2	4.0
0	1.9	—	—	2.5	4.5	3.5	3.5	3.7	3.2	3.0
5	1.7	—	—	—	3.0	—	—	—	—	—
2	2.2	—	—	—	4.5	—	—	—	—	—
0	—	—	—	9.0	14.0	12.5	12.5	12.5	11.0	10.5
48	1.39	1.37	1.32	1.40	1.62	1.60	1.62	1.62	1.65	1.59

Charybdis (Goniosoma) natatrix, 1906, NOBILI, Ann. Sc. Nat. Zool., (9), vol. 4, p. 196.
Charybdis (Goniosoma) natator, 1904, DOFLEIN, "Valdivia", vol. 6, p. 96.
1906, LAURIE, Ceylon Pearl Oyster Fisheries, Suppl. Rep. 40, p. 418.
1908, STEBBING, Ann. S. Afr. Mus., vol. 6, pt 1, (South Afr. Crust. pt 4) p. 9, pls 28, 29.
1910, STEBBING, Ann. S. Afr. Mus., vol. 6, p. 307.
Goniosoma natator, 1910, LENZ, VOELTZKOW Reise Ost-Afr., vol. 2, p. 557.
1913, KLUNZINGER, Nova Acta Ac. Leop. Carol., vol. 99, no 2, p. 367.
Charybdis (Goniosoma) natator, 1910, RATHBUN, Mem. Ac. Roy. Sc. Danemark, 7me série, t. 5, no 4, p. 364.
1922, BALSS, Arch. Naturgesch., 88. Jahrg., Abt. A, p. 106.
1923, RATHBUN, Commonwealth Austr., vol. 5, pt 3, p. 131.
1925, DELSMAN & DE MAN, Treubia, vol. 6, p. 312.
1932, SHEN, Hong Kong Nat., vol. 3, p. 40, figs 7, 8, pl. 9a.
Charybdis (Goniosoma) annulatum, 1893, J. R. HENDERSON, Trans. Linn. Soc. Zool., (2), vol. 5, p. 375 (part.).

Gier, no 9, Exp. 18, 2/7, 1908, 0°14′ N., 104°4′4 E., 18—16 fms, one male.
Gier, no 12, Exp. 2, 3/10, 1908, 5°20′ S., 114°34′ E., 18—19 fms, one ovigerous female.
Gier, no 14, Exp. 7, 17/12, 1908, 3°24′ S., 116°37′ E., 15—18 fms, one ovigerous female.
Gier, no 19, Exp. 1, 18/3, 1909, one female.
Gier, no 19, Exp. 2, 28/3, 1909, one ovigerous female.

Description: The cephalothorax, covered with a very dense, short pile, has ill-defined regions. It is crossed by the following granular transverse ridges: (1) a nearly straight one between the last antero-lateral teeth, interrupted by the cervical groove, (2) a slightly sinuous one on the mesogastric region, (3) one on each of the protogastric regions, (4) on the frontal region traces of a ridge, (5) a sinuous one on the cardiac region, (6) two on each of the mesobranchial regions. Moreover, there are two short ridges, behind one another, on the branchial lobe.

The front is cut into six teeth. The median teeth are a little prominent beyond the submedians; they are triangular, but the tops are truncate. The submedians are nearly the same shape and size as the medians, they are directed a little outwards. The triangular lateral teeth are a little narrower and acuter than the submedians, they sometimes project a little beyond the submedians, their under surfaces have rows of granules lengthwise. The incision between the lateral and submedian teeth is deeper than between the medians. All the borders are smooth, except for the granular, proximal parts of the lateral borders of the lateral teeth.

The antero-lateral borders are cut into six teeth. The first tooth is truncate, with round angles. The second tooth is a little longer, at the base as broad as the first tooth; its anterior border is straight, its outer border convex, but it has no sharp top. The third tooth is the largest, the fourth and fifth are the same size, but broader than the second tooth (sometimes the fifth is a little smaller than the fourth); of these teeth the anterior borders are straight, the outer ones convex and the tops acute. The sixth tooth is the smallest and narrowest, not spine-like and not prominent.

The postero-lateral borders converge rather strongly posteriorly.

The margin of the posterior border forms a curve with the postero-lateral borders; it is finely granular.

The orbit has a strong dorsal inclination; the borders are finely granular. The upper border is divided into three parts by two incisions. The inner supra-orbital angle is large and blunt, distinctly

broader than the lateral frontal teeth. The inferior border has an incision laterally; the inner lobule of the outer part is distinct. The inner infra-orbital angle is not prominent, and dentiform.

The "basal" antenna-joint is grown together with the front, excluding the flagellum from the orbit. It has a low granular ridge.

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are densely pilose. The sub-orbital region is granular near its border. The pleural groove is granular.

The sternum is pilose and it is granular on its anterior segments.

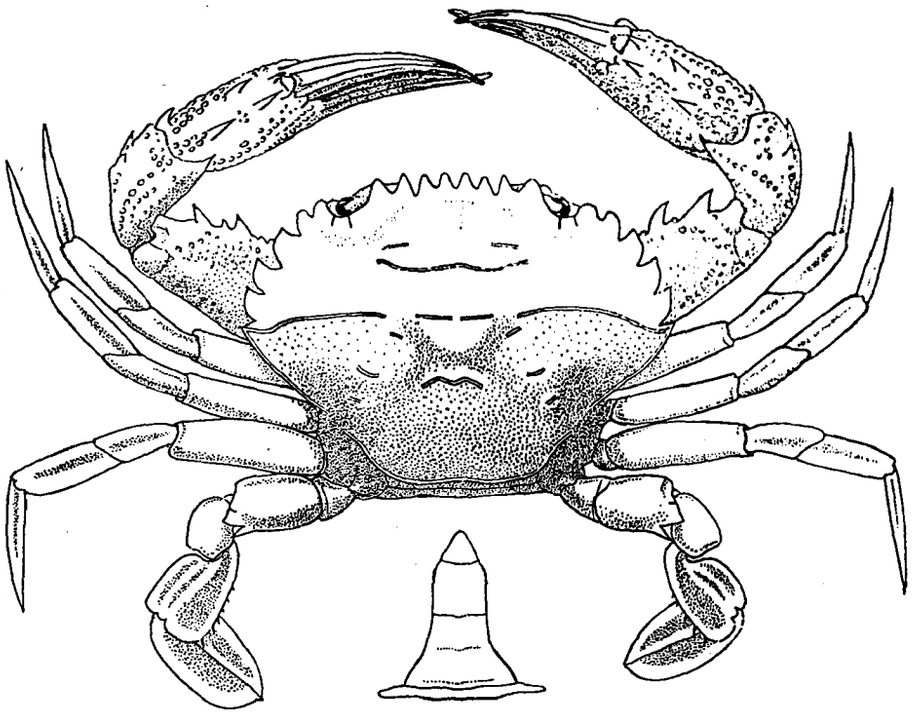


Fig. 50. *Charybdis natator* (Herbst), ♂, dorsal view and abdomen (× 7/8).

The lateral borders of the sixth tergum of the abdomen of the male are parallel for two thirds of their length, and then convergent; the anterior border is a little convex in the middle, the posterior border is nearly straight. The fourth and fifth terga are transversely keeled, but not over the whole breadth. The second and third terga are transversely keeled over the whole breadth.

The chelipeds differ only very slightly in length and shape. The anterior border of the arm has three claw-like spines, of which the proximal one is the smallest; between the spines and proximal to them there are large granules, which are nearly short spines; the distal, posterior and inferior borders have no armature. The upper, posterior and anterior surfaces are granular. The under surface has squamiform, granular markings. The wrist has a granular surface: moreover there are three granular ridges; at the inner angle the spine is strong, but rather short; at the outer angle there are three spinules. The hand is six-costate; the costae on the upper surface can less clearly be distinguished

owing to the granulation between the costae. The granulation on the under surface is squamiform. There are five spines, one at the wrist-articulation, two on the inner costa and two on the next outer one; the distal one on the latter is merely a knob. The movable finger is longer than the palm.

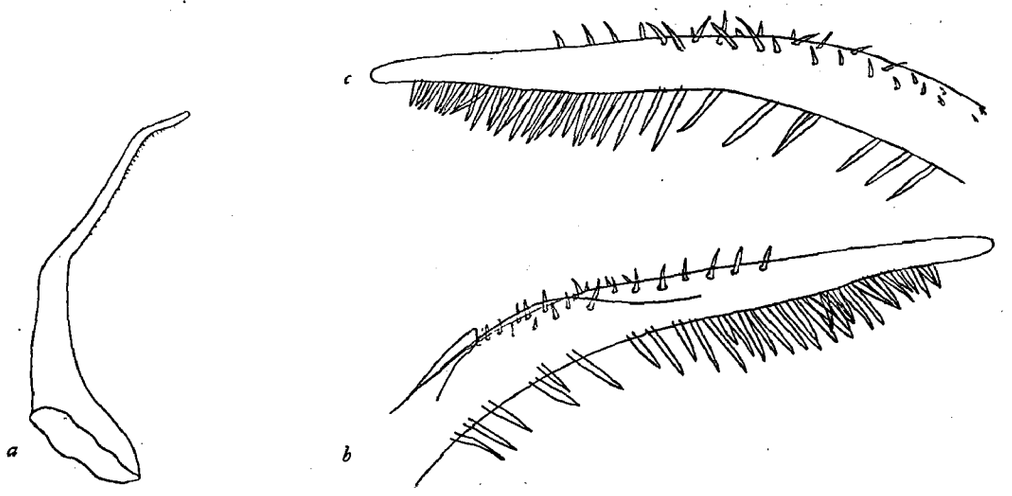


Fig. 51. *Charybdis natator* (Herbst). *a*, first male pleopod, posterior view (× 3,5); *b*, apex, posterior view; *c*, apex, anterior view (× 40).

The second up to the fourth pairs of pereiopods have no specific characteristics.

The merus of the natatory leg has the usual spine on its posterior border; the propus has some spinules on its posterior border.

The first male pleopods are slender. They have a long, nearly straight neck and the apex is not

Measurements in mm:

	Gier, no 9 ♂	Gier, no 12 ♀	Gier, no 14 ♀	Gier, no 19 Exp. 1 ♀	Gier, no 19 Exp. 2 ♀
Length of cephalothorax	59.0	70.0	55.8	57.5	57.0
Breadth of cephalothorax	82.5	100.2	79.5	83.5	83.0
Front	22.0	27.0	21.0	21.5	21.7
Interorbital space	33.0	34.8	28.0	28.2	28.0
Orbit	10.0	12.0	9.5	10.2	10.9
Orbito-frontal border	47.5	56.0	44.6	47.0	46.2
Length of cheliped (largest)	130.5	151.5	114.7	122.0	121.0
Length of merus natatory leg	16.5	18.8	14.3	15.0	15.0
Breadth of merus natatory leg.	10.8	11.8	10.5	11.0	16.0
Length 6th ♂ abdominal segment.	9.8	—	—	—	—
Breadth 6th ♂ abdominal segment.	9.9	—	—	—	—
Posterior border	28.5	35.5	29.2	30.0	30.5
$\frac{\text{Cephalothorax breadth}}{\text{Cephalothorax length}}$	1.40	1.43	1.42	1.45	1.46

abruptly bent outwards. On the posterior surface there is a transparent membrane. Under this membrane near the inner border two rows of small spines begin, one of which is distinctly continued more distally than the other; but it does not continue on the distal part of the apex. The outer border of the apex has a row of large spines, which is continued until a short distance proximal to the top; this row begins at a short distance distal to the proximal end of the neck. On the anterior surface there are two rows of spinules, near the inner border, which are on the distal part of the neck and on the proximal part of the apex.

The granulation on the cephalothorax and extremities is usually dark-red.

In the *Goniosoma annulatum* material, collected by J. R. HENDERSON there was one juvenile specimen, which belonged to *Ch. natator* Herbst.

Geographical distribution: Durban (STEBBING); Inhambene (HILGENDORF); Madagascar (HOFFMANN); Red Sea (NOBILI); Gulf of Manaar (LAURIE); Ceylon (ALCOCK, DOFLEIN, LENZ); Pondicherry (ALCOCK); Madras (ALCOCK); Penang (LANCHESTER); Singapore (WALKER, ALCOCK, SHEN); Siam (RATHUN, BALSS); Java (DELSMAN and DE MAN); Celebes (DE MAN); Amboina (DE MAN); Philippines (MIERS); Hong Kong (STIMPSON); Shanghai (MIERS).

21. *Charybdis (Charybdis) rathbuni* nov. spec. (fig. 52).

Siboga, station 240, Banda, 9—45 m, one egg-laden female (holotype).

This species differs from *Ch. natator* (Herbst) a.o. in: (1) the submedian frontal teeth being much broader than the medians, whereas in *natator* they are sub-equal, (2) the inner supra-orbital angles being very much broader than the lateral frontal teeth, whereas in *natator* there is not such a large difference in breadth, (3) the second antero-lateral tooth being very small with regard to the first tooth, whereas in *natator* the first and second antero-lateral teeth are nearly the same breadth.

Description: The finely granulated cephalothorax with ill-defined regions, is crossed transversely by the following granular ridges: (1) one, between the last antero-lateral teeth, interrupted by the cervical groove and in the middle, (2) one on the mesogastric region, interrupted in the middle, (3) one on each of the protogastric regions, (4) one on the frontal region, interrupted in the middle (5) a *faint* one on the cardiac region, interrupted in the middle, (6) two on the mesobranchial region, of which the posterior one consists of only a few granules.

The front is cut into six teeth. The medians, only very little prominent beyond the submedians, are elliptical, separated from one another by a narrow incision. The submedians are broader, more lobe-like; the tops are round, the inner border is curved, the outer border runs nearly straight backwards. Behind the submedian teeth the medians have a sort of tooth-like procession at their base. The lateral teeth are triangular, narrow, rather acute. The front is very distinctly separated from and prominent beyond the inner supra-orbital angles.

The antero-lateral borders are cut into six teeth, of which the second is very small. The first tooth has a concave anterior border, a convex outer border, a rather acute top. Of the second tooth the anterior border is less concave, the outer border less convex. The third tooth is the largest, it has a relatively rather short concave anterior border, a long, slightly convex outer border, an acute top. The fourth and fifth teeth are the same shape, but the fourth is smaller than the third and the fifth

is the smallest. The sixth tooth is more spine-like, but a little prominent beyond the others. All the borders are smooth.

The postero-lateral borders converge rather strongly posteriorly.

The posterior border is nearly straight and its margin forms a curve with the postero-lateral borders.

The orbit has a rather strong dorsal inclination. The upper border is divided into three parts by two distinct incisions; the middle part is granular. The inner supra-orbital angle is broad, not distinctly tooth-like. The granular lower border has a lateral incision; the inner lobule of the outer part can be clearly distinguished from the outer orbital angle. The inner infra-orbital angle is broad, somewhat prominent.

The "basal" antenna-joint, which touches the front over a long distance, has a granular crest.

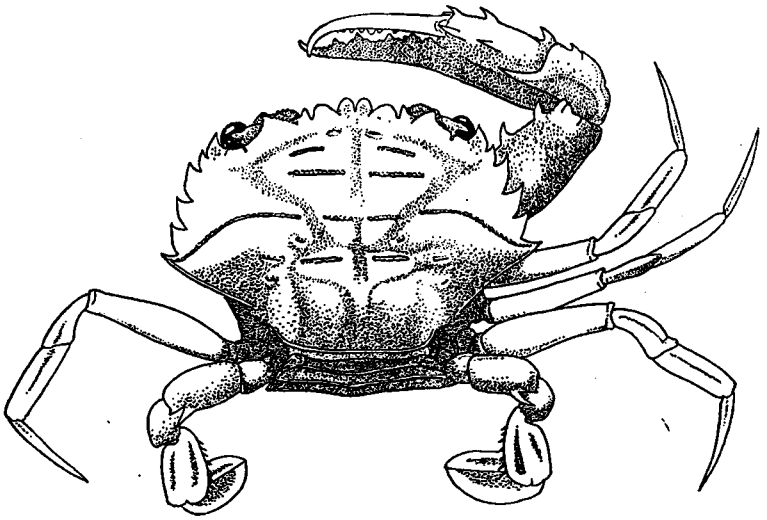


Fig. 52. *Charybdis rathbuni* n. sp., ♀, dorsal view (× 2).

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are pilose and nearly smooth; the pleural groove is granular.

The sternum is bare.

Of the abdomen of the female the second, third and fourth terga are transversely keeled.

The cheliped (the left one is missing) has three spines, of which the proximal one is very small, on the anterior border of the arm; the posterior and inferior borders have no armature; the anterior border is granular; the distal parts of the upper and posterior surfaces are granular and hairy. The wrist is pilose; the granular upper surface has three granular ridges; the spine at the inner angle is long and strong; at the outer angle there are three spinules. The hand, with seven granular costae, is pilose and granular on the upper and outer surfaces; there are four spines, viz.: two near the finger-articulation (the outer one is smaller), two about the middle and one near the wrist-articulation. The fingers are long and slender; the movable finger is much longer than the palm.

The second up to the fourth pairs of pereiopods have no specific characteristics.

The merus of the fifth leg has the usual spine a short distance proximal to the distal end of the posterior border; the distal border ends posteriorly in a spinule. The posterior part of the distal border of the carpus is granular. The posterior border of the propus has a row of granules.

Measurements in mm:

	♀
Length of cephalothorax	23.0
Breadth of cephalothorax	33.0
Front	10.5
Interorbital space	14.6
Orbit	4.7
Orbito-frontal border	23.0
Length of cheliped	46.3
Length of merus natatory leg	6.6
Breadth of merus natatory leg	3.5
Posterior border	12.6

22. *Charybdis (Goniohellenus) hoplites* Wood-Mason.

Goniosoma hoplites, 1877, Wood-Mason, Ann. Mag. Nat. Hist., (4), vol. 19, p. 422.
1894, Alcock & Anderson, Journ. As. Soc. Beng., vol. 63, pt. 2, p. 184.
1896, Alcock & Anderson, Ill. Zool. Invest. Crust., pl. 23, fig. 6.
Charybdis (Goniohellenus) hoplites, 1899, Alcock, Invest. Deep Sea Brachyura, p. 67.
1899, Alcock, Journ. As. Soc. Beng., vol. 68, pt. 2, p. 66.
? 1904. Doflein, "Valdivia", vol. 6, p. 97.
1906, Nobili, Bull. Sc. Fr.-Belg., vol. 40, p. 119.
1931, Gordon, Journ. Linn. Soc. Zool., vol. 37, p. 534, figs. 12b and b[1].

In our collections there are no representatives of this species. But by the kindness of Profs. Balss, Gravier, and of Drs Chopra and Gordon I was able to examine several specimens, mentioned in the literature. I found that they belonged to what I shall call the "forma *typica*" and three varieties.

forma *typica*. (figs 53 and 54).

I had the loan of a specimen (Bay of Bengal, 80—110 fms) from the British Museum and of nine male specimens (Nobili, 1906, Mission Bonnier et Pérez 1901, Dragage au chalut entre Al Katif et Bauchir, au point le plus profond du Golfe Persique, 42 brasses) from the "Muséum d'Histoire Naturelle" in Paris. After comparing these specimens with the description of Wood-Mason (1877) and the figure in Alcock (1896) I came to the conclusion, that they all belong to the "forma *typica*".

Description: The cephalothorax, covered with a rather dense pile, has well-defined regions; the branchial regions are tumid, the cardiac region has two granular elevations side-by-side, the branchial lobe is very distinct. It is crossed by several granular transverse ridges: (1) one between the last antero-lateral teeth, interrupted by the cervical groove (the part on the gastric region is not distinctly a ridge, but rather a group of granules), (2) an unbroken one on the mesogastric region,

slightly sinuous, (3) one on each of the protogastric regions which are more like two groups, arranged more or less ridge-like, (4) on the frontal region there are two little groups of granules. Moreover there is granulation on the frontal teeth, the orbital regions, the metagastric region, the antero-lateral teeth, the elevations of the branchial regions and on the branchial lobe.

The front is cut into six teeth. The median teeth are broad and blunt, the median border is curved, the lateral border slopes laterally; they are prominent beyond the submedian teeth, and the latter are prominent (but not so evident) beyond the lateral teeth. The submedian teeth are on a higher plane than the median teeth, blunt, the proximal parts of the median borders are granular, the lateral borders are nearly straight and run parallel to the median line. They are separated from the lateral teeth by a wide U-shaped incision. The lateral teeth are triangular and sharper than the four median teeth, much narrower than the other frontal teeth and the inner supra-orbital angles.

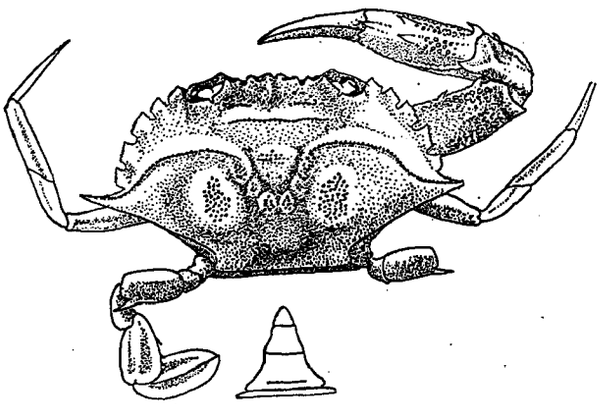


Fig. 53. *Charybdis hoplites* Wood-Mason, ♂, dorsal view and abdomen (× 1½).

The antero-lateral border is cut into six teeth. The first five antero-lateral teeth are nearly quadrate. The anterior and posterior borders run nearly parallel and the outer borders are at about right angles to the anterior and posterior borders; the incisions are U-shaped. The first tooth is about as broad as the second; they are separated from each other by a wide incision; the outer border of the second tooth is a little curved, while that of the first tooth is nearly straight. The third tooth is much larger; the fourth tooth is about the same size. The fifth is much narrower than the third tooth, but a little broader than the second. The anterior borders of the second up to the fifth teeth have only a few granules, the outer borders have large granules and the posterior borders are smooth. The last antero-lateral tooth is merely a spine, which is much prominent beyond the preceding one.

The postero-lateral borders are strongly convergent posteriorly.

The margin of the posterior border is nearly straight, and form an eared junction with the postero-lateral borders.

The orbit has a rather strong dorsal inclination; the granular upper border is divided into three parts by two incisions, of which the inner one is a rather wide gap. The inner supra-orbital angle is distinctly broader than the lateral frontal tooth; its upper border is granular. The granular lower border of the orbit is divided into two parts by a wide, lateral incision; the outer part has a rather distinct median lobule; the inner infra-orbital angle is not tooth-like, yet distinctly prominent beyond the front.

The "basal" antenna-joint, the lobule of which touches the front, excluding the flagellum from the orbital hiatus, is granular and has a very low crest with somewhat larger granules.

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, sub-branchial and pterygostomian regions are pilose and granular. The pleural groove can be clearly distinguished.

The sternum is covered with short hairs; the borders of the anterior segments are granular.

The second and third terga of the male abdomen are sharply transversely keeled. The fourth tergum is also keeled, but not over the whole breadth. The fourth and fifth terga are fused. The anterior border of the sixth tergum is nearly straight, the posterior border is only slightly curved anteriorly; the lateral borders are convergent posteriorly, they are very slightly sinuous.

All the surfaces of the chelipeds are granular. On the anterior border of the arm there are two

Fig. 54. *Charybdis hoplites* Wood-Mason, forma *typica*. *a*, first male pleopod, posterior view (× 12,5); *b*, apex, posterior view; *c*, apex, anterior view (× 30).

short, claw-like spines, one about the middle, and a stronger one a short distance proximal to the distal end; moreover there is a trace of a third spine, proximal to them, which is merely a large granule; the posterior and inferior borders end in spinules. The wrist has a spine at the inner angle and three spinules at the outer angle. The hand, seven-costate (all costae having large granules), has four spines, one at the wrist-articulation, two on the inner costa on the upper surface, and one on the next outer one somewhat distally to the middle; it is swollen in the larger cheliped. The movable finger is about as long as the palm.

The posterior border of the under surface of the merus of the second up to the fourth pairs of pereiopods ends distally in a spinule. The upper border of the carpus of the second pair ends in three spinules (the specimens from the Persian Gulf have the same armature, except for the carpus, which has no armature).

Of the natatory leg the posterior border of the merus has the usual spine a short distance

proximal to the distal end; the distal border ends posteriorly in a spine, its anterior part is granular. The posterior border of the propus has some spinules.

Of the first male pleopod the neck is rather short and strongly bent with regard to the rest of the appendage. The posterior surface of the apex has some rows of spinules. The inner borders of the apex and the most distal part of the neck have rather strong spines, which are continued on the anterior surface of the neck. On the outer border there are short spines, the number of which may vary.

Geographical distribution: Persian Gulf (NOBILI); Indus Delta (ALCOCK); Madras Coast (WOOD-MASON, ALCOCK and ANDERSON, ALCOCK).

Charybdis (*Goniohellenus*) *hoplites* var. *pusilla* Alcock (figs. 55 and 56).

Charybdis (*Goniohellenus*) *hoplites* var. *pusilla*, 1899b, ALCOCK, p. 67.

ALCOCK only gave this description: "This is a dwarf variety, egg-laden females having a carapace only about 9 mm long and about 16 mm in extreme breadth. — The carapace is of a thin texture, the chelipeds and legs are slenderer, and the dorsal bulge of the branchial regions is stronger and sharper."

This would lead one to think, that in all other characteristics the forma *typica* and the variety *pusilla* are identical.

By means of the material which I borrowed from the Indian Museum (one male specimen, stat. 242, Arabian Sea, 56—58 fms, Marine Survey), I could, however, state that there are also differences in the shape of the frontal and antero-lateral teeth, in the armature of the carpopodites of the second up to the fourth pairs of pereiopods. These differences are perhaps a consequence of the youth of the specimens. At any rate it is remarkable that these small female specimens are ovigerous. Therefore I maintain provisionally this variety as a dwarf-variety by lack of larger material, adding an extensive description.

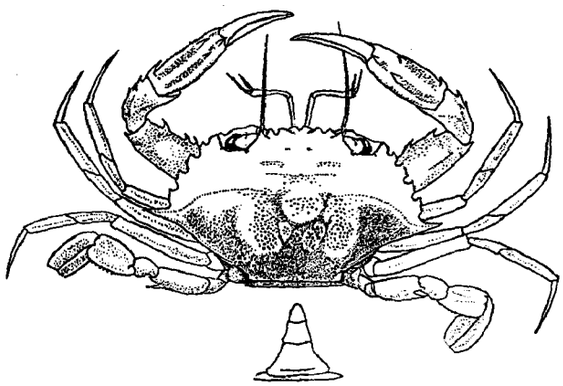


Fig. 55. *Charybdis hoplites* var. *pusilla* Alcock, ♂, dorsal view and abdomen (× 2).

Description: The cephalothorax, 1.80 times as broad as long, is rather pilose, its regions are well-defined. It is crossed by the following granular transverse ridges: (1) one between the last antero-lateral teeth; near the cervical groove the parts on the branchial regions end in the granules on the branchial lobes, they are continued on the gastric region as a group of granules, (2) a sinuous ridge on the mesogastric region, (3) one, merely a group of granules, on the protogastric region, (4) traces of a granular ridge on the frontal region. Besides these transverse ridges there are: (a) two granular elevations side-by-side on the cardiac region, (b) a large group of granules and a short distance behind it a little group of a few granules on the somewhat swollen mesobranchial region and (c) granulation on the orbital region.

The front is cut into six teeth. The surfaces of the four median teeth are granular. The median teeth are prominent beyond the other ones; they are very broad, which causes the submedian teeth, which are on a higher plane, to overlap them for a large part; the lateral borders slope very slightly laterally; the tops are round. The submedian teeth have round tops; they are separated from the lateral teeth by a rather wide V-shaped incision. The lateral teeth are triangular; they are narrower than the submedian teeth and about as broad as the inner supra-orbital angles.

The antero-lateral borders are cut into six teeth, which are separated from one another by wide incisions. They are all sub-truncate, nearly the same shape, except for the sixth tooth. The first tooth has a granular outer border and a smooth posterior border. The second tooth is a little narrower, its anterior and outer borders are granular and the posterior border is smooth. The third and fifth teeth are the same size; the fourth tooth is a little broader. The sixth tooth, a spine nearly 2.5 times as long as the fifth tooth, has a granular anterior border. The upper surface of the first five teeth are granular.

The granular postero-lateral borders converge strongly posteriorly.

The posterior border is straight and nearly forms a right angle with the last part of the postero-lateral borders. The cephalothorax is granular along the posterior border.

The granular upper border of the orbit is cut into three parts by two incisions, the median one of which is a wide gap. The granular lower border is cut into two parts by one wide incision; the outer part has a distinct lobe; the inner infra-orbital angle is prominent, but not tooth-like. The orbit has a strong dorsal inclination.

The "basal" antenna-joint nearly touches the front (this is an indication of the youth of this specimen), and has a low granular crest.

The antennulae are folded transversely.

The sub-hepatic, pterygostomian, sub-orbital and sub-branchial regions are granular. The pleural groove is granular.

The sternum, covered with a rather dense pile, has some granulation on the borders of the segments, especially on the episternites.

The second, third and fourth segments of the abdomen of the male are carinate (the fourth segment not over the whole breadth). The lateral borders of the sixth segment converge posteriorly; the anterior border is straight; the posterior border is curved anteriorly; the lateral borders are very slightly sinuous.

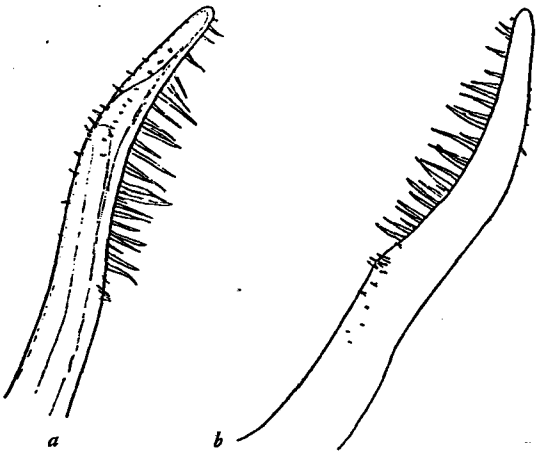


Fig. 56. *Charybdis hoplites* var. *pusilla* Alcock. *a*, apex of first male pleopod, posterior view; *b*, id., anterior view (× 47).

The length of the largest cheliped is about 2¼ times the length of the cephalothorax. The anterior border of the arm has three spines, the proximal one of which is the smallest; the posterior border ends distally in a spinule, like the inferior border; the upper, under and anterior surfaces are granular. The inner angle of the wrist ends in a strong spine; at the outer angle there are three spinules. The hand has seven granular

costae; the under surface is strongly granular, the granules are arranged in transverse rows; in the larger cheliped the hand is swollen. The movable finger is as long as the palm.

Of the second up to the fourth pairs or pereiopods the posterior inferior borders of the meropodites end in spinules. Each of the carpopodites of these legs ends in very little spinules.

The meropodite of the natatory leg has its usual spine on its posterior border, the distal border ends posteriorly in a spinule. The posterior border of the propodite has a row of spinules.

The first male pleopods are about as in *hoplites* forma *typica*. But in the variety *pusilla* the apex is a little longer.

Geographical distribution: Arabian Sea (ALCOCK).

Charybdis (*Goniohellenus*) *hoplites* var. *omanensis* nov. var. (figs. 57 and 58).

? *Charybdis* (*Goniohellenus*) *hoplites*, 1911, RATHBUN, Trans. Linn. Soc. London, (2), vol. 14, pt 2, Brachyura, p. 207.

Dr CHOPRA lent me a male specimen from the Gulf of Oman (Station 341, 230 fms, Marine Survey). When compared with the "forma *typica*" is shows several striking differences, viz.: (1) the sixth antero-lateral tooth is only a little longer than the fifth tooth, (2) the posterior border of the cephalothorax is slightly sinuous, (3) the posterior angles are not clearly eared, but only a little turned up, (4) the ratio c.b.: c.l. is about 1.50, instead of 1.83—1.96, (5) the length of the cheliped is nearly three times the length of the cephalothorax.

Dr RATHBUN described one male specimen (measurements: c.l. 27.5 mm, c.b. 43.6 mm) from Saya de Malha, which was "not typical, because the posterior lateral spine is very little longer than the teeth which precede it....., the angles of the posterior margin are scarcely eared, though prominent; the short ridges on the anterior gastric region are single lines of granules." And she concluded, that she was "not able to say whether these are age-variations or represent a subspecies". It is unfortunate, that this specimen is no longer present in the Percy Sladen collection in Cambridge. For now it was impossible for me to examine it, and I cannot state with certainty whether or not it is identical with the specimen from the Gulf of Oman. At any rate in the Oman specimen as well as in the specimen from the Bay of Bengal the short ridges on the anterior gastric regions are not distinctly single lines of granules, but more like two groups, so in this point there is no difference with the "forma *typica*". But in all the other differences above mentioned the Oman and Saya de Malha specimens agree.

Description: The regions of the cephalothorax, which is about one and a half times as broad as long, are rather clearly distinguishable. The cephalothorax is rather densely pilose and crossed by several granular transverse ridges: (1) one between the last antero-lateral teeth, which is interrupted by the cervical groove; on the gastric region it is no longer a single row of granules, but merely a group of granules; before the cervical groove the lateral parts of this ridge seem to end in groups of granules on the branchial lobes, (2) one on the mesogastric region, very slightly sinuous, (3) one short ridge on each of the protogastric regions, (4) a little elevation on each half of the frontal region, with only a few granules. Behind the first ridge there are no "ridges", but groups of granules, viz.: (a) two groups side-by-side on the cardiac region, (b) a large group on an elevation of the mesobranchial region, (c) behind this group there are two very little groups side-by-side, (d) a less clearly distinguishable group at the beginning of the cervical groove. Moreover, there is granulation on the frontal teeth, the orbital regions, the antero-lateral teeth.

The front is cut into six rather blunt teeth. The triangular median teeth, with granular upper surfaces, are prominent beyond the others and have a wide V-shaped incision between them; the median and lateral borders are granular, the lateral border slopes laterally over a long distance, which causes the submedian teeth to overlap the median teeth for the larger part. The median borders of the triangular submedian teeth are longer than the lateral borders, the median border is granular. These teeth are separated from the lateral teeth by a wide and rather deep, V-shaped incision. The lateral teeth can therefore plainly be distinguished from the median pairs; the median border is nearly smooth, the distal part is only faintly granular; the lateral border is granular; the lateral border is

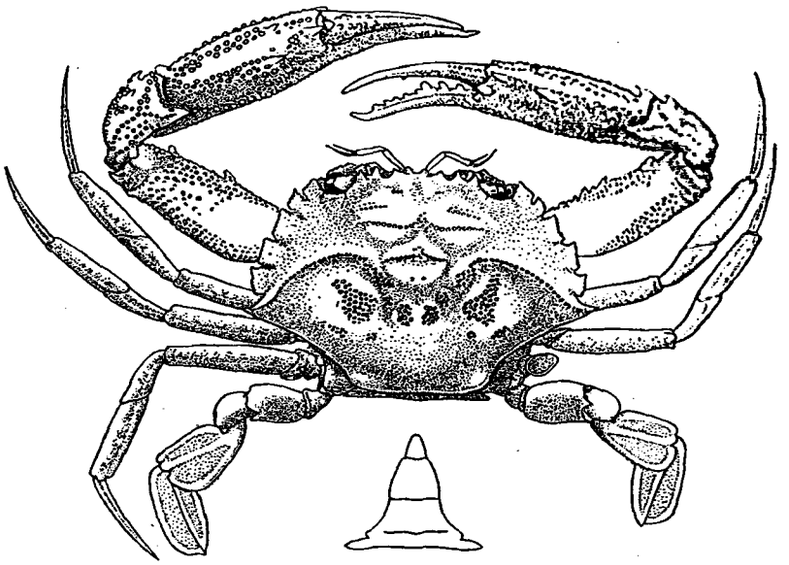


Fig. 57. *Charybdis hoplites* var. *omanensis* nov. var., ♂ type, dorsal view and abdomen, natural size.

shorter than the median border, because the incision between the lateral tooth and the inner supra-orbital angle is not so deep as between the median and lateral teeth.

The first five antero-lateral teeth are all about the same shape: they are sub-quadrate, the angles between the anterior and outer borders being not quite right, but somewhat acute in the first two teeth, and somewhat obtuse in the third up to the fifth teeth; the anterior and outer borders are granular, the posterior borders are smooth, the incisions between the teeth about U-shaped, the anterior parts of the upper surfaces of the first four teeth are granular. The third and fourth teeth are the largest, and have the same size, the fifth is a little narrower and acuter; the first is a little narrower still and the second is the narrowest. The sixth tooth is triangular, more spine-like; the anterior border is granular; it is only a little longer than the fifth tooth.

The granular postero-lateral borders converge rather strongly posteriorly.

The posterior border is very slightly sinuous, it does not form a curve with the postero-lateral borders, but its angles are not distinctly eared, they are only a little turned up.

The orbit has a rather strong dorsal inclination. The granular upper border is cut into three parts by two incisions, which are very narrow; the inner supra-orbital angle is triangular, acute,

with granular surfaces and a granular ridge. The granular lower border is cut into two parts by a lateral incision; the inner infra-orbital angle is a little prominent, but not tooth-like; the outer part of this border has a distinct median lobule.

The "basal" antenna-joint has a lobule, which joins the front; it has a low, short crest of granules; at the base there is also a ridge of granules. Moreover this joint hat some sparse granulation.

The antennulae are folded transversely.

The granular sub-orbital, sub-hepatic, sub-branchial and pterygostomian regions are almost bare (I suppose they have lost their pile). The granular pleural groove is more visible than in the "forma *typica*".

The sternum is pilose on parts of the segments (perhaps in younger specimens the pile is much more developed) and it is more granular than in the "forma *typica*".

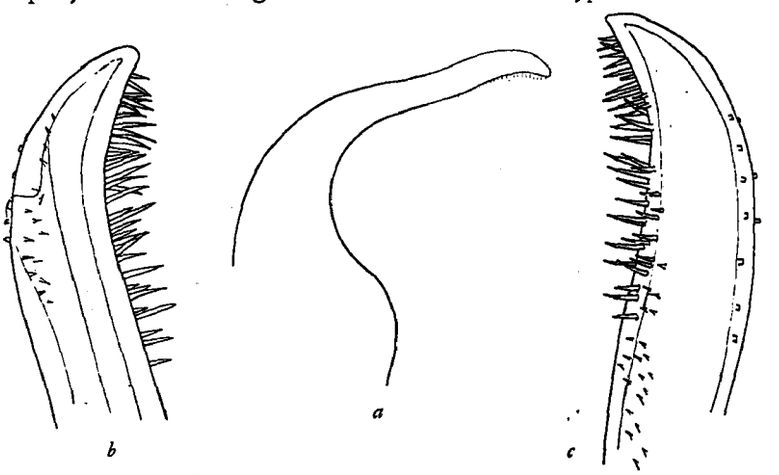


Fig. 58. *Charybdis hoplites* var. *omanensis* nov. var. *a*, first male pleopod, posterior view (× 8); *b*, apex, posterior view; *c*, apex, anterior view (× 35).

The second and third segments of the abdomen are sharply, transversely keeled. The fourth segment is also tranversely keeled, but not over the whole breadth. The lateral borders of the sixth segment strongly converge posteriorly, they are slightly convex; the posterior border is curved anteriorly.

The length of the chelipeds is nearly three times the length of the cephalothorax. The surfaces of the arm are very granular; the two spines on the anterior border are very little developed; the distal end of the posterior border has a spinule, which can hardly be distinguished. The wrist is very granular, with one spine at the inner angle and three spinules at the outer angle. The hand has seven granular costae, the under surface is granular; there are four short spines on the upper surface: one at the wrist-articulation, one a short distance behind the distal end of the outer costa, one nearly at the same place of the inner costa and one at the distal end of the same costa. The movable finger is about as long as the palm.

The second up to the fourth pairs of pereiopods are the same shape. The posterior borders of the under surfaces of the meropodites end in spinules only in the fourth pair. The upper border of the carpopodite ends in two hardly visible spinules in all the pairs.

The posterior border of the meropodite of the natatory leg has the usual spine at a short distance proximal to the distal end; the distal border ends posteriorly in a spine. The propodite has some spinules at its posterior border.

The neck of the first male pleopod is broad. The apex is short and obtuse at the end. On the posterior surface there are some rows of spines under the membrane, and the inner border has some large spines, (which broke off during the examination; therefore they are obtuse spines in the figure). The outer border has many strong spines, which are continued as short spinules on the anterior surface of the neck.

Geographical distribution: Saya de Malha (? RATHBUN).

Charybdis (Goniohellenus) hoplites var. *longicollis* nov. var. (figs 59 and 60).

The three specimens (2 ♀♀ and 1 ♂, Ras Abu Somer, Red Sea, Pola Expedition, coll. Zool. Staatssamml. München), which Prof. BALSS lent me, proved to belong to a new variety of *Ch. hoplites*. The differences with the "forma *typica*" are: (1) the last antero-lateral tooth is not much longer than the preceding teeth, (2) the posterior angles of the cephalothorax are not distinctly eared, (3) a different granulation on the posterior half of the cephalothorax, (4) a different shape of the first male pleopod, (5) the ratio c.b.: c.l. is about 1.60 in stead of 1.83—1.96.

The differences with the var. *omanensis* are: (1) the antero-lateral teeth are less quadrate, (2) a different granulation on the posterior half of the cephalothorax, (3) a different shape of the sixth tergum of the male abdomen, (4) a different shape of the first male pleopod, (5) the ratio cephalothorax breadth to cephalothorax length is about 1.60 instead of about 1.50, (6) the ratio cheliped length to cephalothorax length is about 2.30 in stead of about 2.93.

The points of resemblance between the var. *omanensis* and var. *longicollis* are a.o.: (1) the shape of the posterior angles of the cephalothorax and (2) the length of the last antero-lateral tooth being only a little more than that of the preceding tooth.

Prof. BALSS (1924) suggested that *Ch. hoplites* was identical with *Archias sexdentatus* Paulson. After examining the figures and description I cannot share his opinion, nor NOBILI'S suggestion (1906, Ann. Sc. Nat., (9), vol. 4, p. 198) that it is a species belonging to the subgenus *Gonioneptunus* (see p. ...).

Description: The cephalothorax, which is about 1.60 times as broad as long, has clearly distinguishable regions; and it is covered with a dense pile, owing to which the granulation cannot be easily distinguished. It is crossed by the following transverse ridges: (1) one, between the last antero-lateral teeth, which is widely interrupted by the cervical groove, (2) an unbroken, sinuous one on the mesogastric region, (3) a short one on each of the protogastric regions, (4) one, consisting of only a few granules, on the frontal region, interrupted in the middle, (5) one on the cardiac region, which is merely two groups of granules. Moreover there is a group of granules on the two meso-branchial regions, a group on the branchial lobe and granulation on the antero-lateral teeth.

The front, which is prominent beyond the inner supra-orbital angles, is cut into six teeth. The prominent median teeth are broadly triangular, they are separated from one another by a V-shaped incision; the lateral borders slope outwards over a long distance. The submedian teeth are acuter, but with round tops; they are on a higher plane than the median teeth, which they overlap for a large part; the median borders are granular, except for their distal parts. They are separated from the

lateral teeth by a wide U-shaped incision. The triangular lateral teeth are narrower than the sub-medians; they can be clearly distinguished from the inner supra-orbital angles.

The antero-lateral borders are cut into six teeth. The first tooth, the outer orbital angle, is sub-quadrate, the anterior angle is round, the outer border is granular. The second tooth is also quadrate, but distinctly smaller than the first; the anterior and outer borders are granular; the anterior border is straight and the posterior border is convex. The third tooth is much larger than the first and second teeth; its anterior border is concave; the outer and posterior borders are not so clearly distinguishable from each other; anterior and outer borders are granular. The fourth tooth is the same shape and size as the third. The fifth tooth is much smaller and its anterior angle is acuter than in the fourth tooth; the anterior border is smooth, the outer border granular. The sixth tooth is more spine-like, the anterior border is granular; it is a little longer than the preceding teeth; the anterior border is concave, hence the top is directed anteriorly.

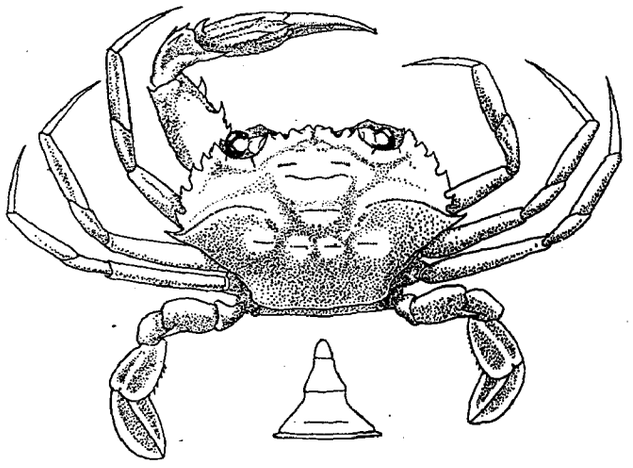


Fig. 59. *Charybdis hoplites* var. *longicollis* nov. var., ♂ type, dorsal view and abdomen (× 1½).

The postero-lateral borders converge rather strongly posteriorly.

The posterior border is nearly straight; it does not form a curve with the postero-lateral borders, neither does it form a strongly eared angle of junction; the angles are only obtuse and a little turned up.

The orbit has a rather strong dorsal inclination. Its granular upper border is divided into three parts by two incisions; the inner supra-orbital angle is not prominent. The granular lower border is cut into two parts by a V-shaped incision. The inner lobe of the outer part is clearly distinguishable. The inner infra-orbital angle is prominent, but not dentiform.

The "basal" antenna-joint touches the front, excluding the flagellum from the orbit. It has a granular surface and a low granular crest.

The antennulae are folded transversely.

Of the sub-orbital region the median part is granular; the under surfaces of the teeth are granular; the pterygostomian and sub-branchial regions are nearly smooth; there is a distinct granular pleural groove.

The sternum is nearly smooth, except for some granules on the anterior borders of the segments.

The second, third and fourth segments of the male abdomen are sharply carinated (the carina on the fourth segment is not extended over the whole breadth). The sixth segment has a nearly straight anterior border, the posterior border is curved anteriorly, the lateral borders are distinctly sinuous and converge posteriorly.

The length of the chelipeds in the male is nearly 2.3 times the length of the cephalothorax.

Measurements in mm:

	forma typica British Mus. coll.	forma typica. Nobili det. Paris Museum coll.									var. omanensis Indian Mus. coll.	var. longicollis München coll.			var. pusilla Indian mus. coll.
	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♀	♀	♂
Length of cephalothorax	21.7	25.2	25.0	29.0	21.8	25.5	26.2	17.8	24.0	19.5	38.5	20.8	16.5	18.8	13.0
Breadth of cephalothorax	42.5	48.2	47.5	53.5	—	49.2	49.0	—	45.2	—	59.0	33.0	26.2	30.0	23.5
Front	9.0	10.5	10.0	11.0	9.0	10.0	10.5	7.0	9.6	7.8	15.5	8.0	7.0	8.0	5.5
Interorbital space	10.8	13.2	12.8	14.5	11.0	12.2	13.5	9.0	12.0	10.0	19.0	10.0	8.0	9.5	6.8
Orbit	5.5	6.2	6.2	7.0	6.0	7.0	7.0	5.2	6.5	6.0	8.0	5.9	5.0	5.3	4.0
Orbito-frontal border	21.2	25.5	25.0	27.5	22.5	25.5	26.2	18.5	24.0	—	35.0	21.5	17.8	19.5	14.0
Length of cheliped	54.5	59.3	58.5	69.5	47.7	58.8	62.5	38.0	53.0	43.0	113.0	48.0	—	—	29.0
Length of merus natatory leg	7.0	8.2	7.0	9.0	7.0	8.2	8.5	6.0	7.3	6.5	9.5	6.0	5.5	5.5	4.0
Breadth of merus natatory leg	4.0	5.0	4.8	5.5	4.2	5.0	5.0	3.5	4.8	4.0	6.5	4.0	3.5	3.8	2.0
Length 6th ♂ abdominal segment	3.3	4.5	4.3	5.0	4.0	—	4.8	3.2	4.0	3.5	6.0	3.5	—	—	2.0
Breadth 6th ♂ abdominal segment	4.0	5.5	4.8	6.0	5.0	—	5.5	4.0	5.5	5.0	8.8	5.0	—	—	2.8
Posterior border	15.0	19.0	18.0	20.8	16.0	19.0	19.5	13.2	17.5	15.0	24.0	15.0	13.0	13.8	8.5
Cephalothorax breadth / Cephalothorax length	1.96	1.91	1.90	1.84	—	1.93	1.83	—	1.88	—	1.53	1.59	1.59	1.60	1.80
Cheliped length / Cephalothorax length	2.51	2.34	2.34	2.40	2.19	2.31	2.39	2.13	2.21	2.21	2.93	2.30	—	—	2.23
Merus length / Merus breadth	1 75	1.64	1.46	1.64	1.67	1 64	1.70	1.71	1.52	1.63	1.46	1.50	1.57	1.45	2.00

The granular, anterior border of the arm has two spines and proximal to them a little spinule, the posterior border ends distally in a spinule; the inferior border also ends distally in a spinule; anterior and upper surfaces are strongly granular; the posterior part of the distal border on the upper surface is also granular. The wrist has some granular ridges, its inner angle is strongly developed, there are three spinules at its outer angle. The hand, with seven granular costae, has four spines, one at the wrist-articulation, two on the inner costa of the upper surface (one nearly in the middle and one at the finger-articulation) and one at some distance proximal to the distal end of the next outer costa. The movable finger is a little longer than the palm.

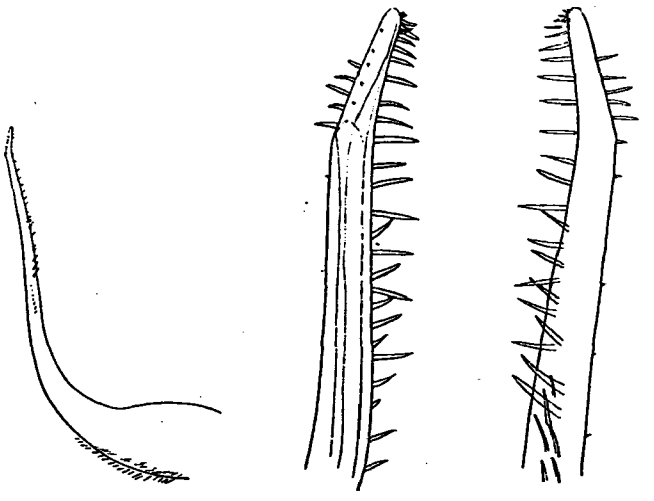


Fig. 60. *Charybdis hoplites* var. *longicollis* nov. var. *a*, first male pleopod, posterior view (× 8); *b*, apex posterior view; *c*, apex, anterior view (× 47).

Of the second, third and fourth pairs of pereiopods the carpopodites end distally in three spinules. The meropodite of the natatory leg is about one and a half times as long as broad, its posterior border has the usual spine near the distal end, the distal border ends posteriorly in a spine; the posterior border of the propodite has a row of spinules.

The first ♂ pleopod has a long narrow neck and a narrow apex. The outer border has long spines on its distal part. On the inner border of the apex there are five spines, and the posterior surface of the apex has one row of spinules. The anterior surface of the neck has many long, slender spines which are more or less arranged in two rows.

Geographical distribution: Ras Abu Somer; Ravayah (BALSS).

23. *Charybdis* (*Goniohellenus*) *hongkongensis* Shen (figs 61 and 62).

Charybdis (*Goniohellenus*) *hongkongensis*, 1934, SHEN, Hong Kong Nat., Suppl., number 3, p. 46, textfigs 11 & 12.

Siboga, Station 256, 5°26'.6 S., 132°32'.5 E., 397 m, 1 juv.
Gier, no 9, Exp. 1, 2/5, 1908, near Diamantpunt, 1 ♂.

These specimens probably belong to this species. Compared with the figures given by SHEN there are only some minor differences. As SHEN's description is very short and incomplete I will give an extensive one of the male specimen in our collection.

Description: The cephalothorax is covered with a fairly dense, short tomentum. The different regions are clearly distinguishable. There are some granular elevations: one on the gastric region, one pair on the cardiac region, and one on the mesobranchial region on either side towards the middle. Across each branchial region there runs a transverse ridge from the last epibranchial spine. This ridge is strongly curved forward and ends in a small granular elevation adjoining the gastric region, across which it does not extend. Anteriorly to it an unbroken transverse ridge crosses

the gastric region and in front of the latter there is an additional one, which is widely interrupted in the middle.

The front, which is on a lower plane and which is prominent beyond the supra-orbital angles, has six teeth with large granules on the upper surface. The median teeth are most prominent; they are separated from each other by a narrow, shallow incision, the inner edges run about parallel to each other, the anterior edges are rounded and the lateral edges slope outwards. They are on a lower plane than the submedian teeth, which partly overlap them; the anterior edge is rounded, the inner

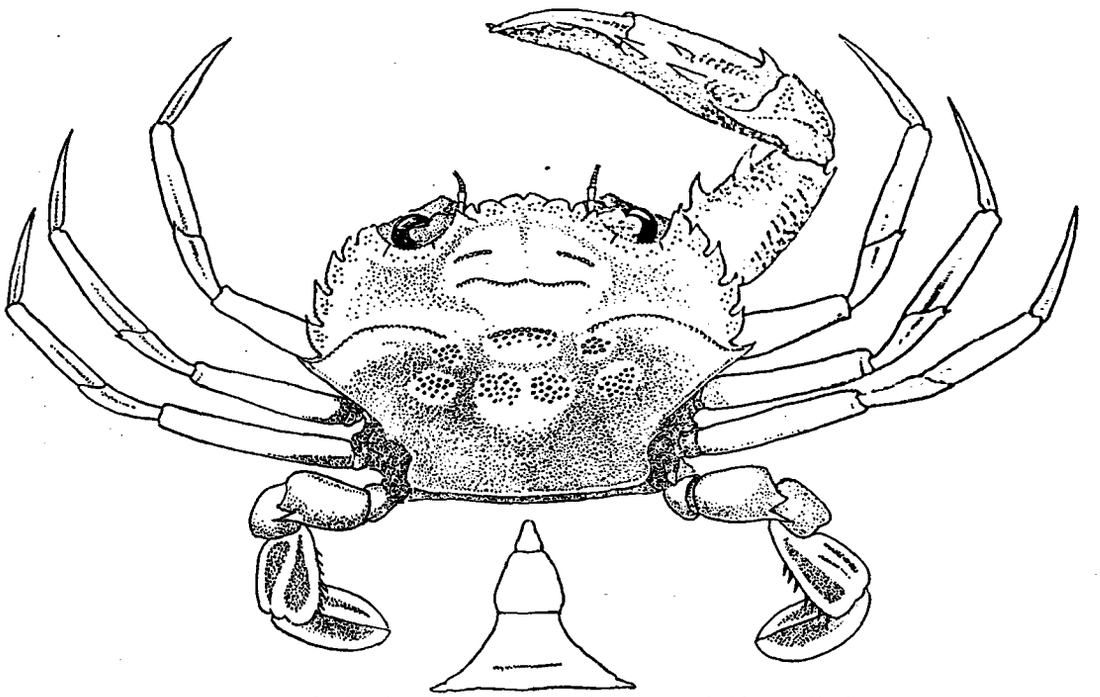


Fig. 61. *Charybdis hongkongensis* Shen, ♂, dorsal view and abdomen (× 3).

edge slopes inwards and the straight lateral edge runs slightly inwards. They are separated from the lateral teeth by an incision somewhat wider than that which separates the median teeth. The lateral teeth are much narrower than the submedians, they are sub-triangular, but rounded at the top.

The antero-lateral borders have six teeth (including the outer orbital angles). The first and second teeth are sub-equal to each other (at least at the right side), smaller than the other four; they are separated from each other by a narrow and shallow incision. The smooth anterior border of the first tooth ends in a blunt point, the outer edge is granulated and forms a right angle with the smooth posterior border; the smooth anterior border of the second tooth is slightly curved, ending in a blunt point, the outer and posterior borders are like those of the first tooth, the third tooth is separated from the second by a much deeper and wider incision, the anterior border is markedly curved and ends in a spine, the outer border, which is serrate, gradually passes into the posterior one. The shape of the fourth and fifth teeth is like that of the third, and they are subequal. The sixth tooth is a spine, slightly larger than the fifth tooth. All the teeth, except the last, have large granules on the upper surface.

The postero-lateral borders are about as long as the antero-lateral borders, they are strongly convergent posteriorly.

The posterior border is nearly straight and forms a faintly eared angular junction with the postero-lateral borders.

In the upper border of the orbit there are two incisions of which only the inner one is clearly distinguishable. The inner supra-orbital angle has a granular crest. The lower border has a wide incision laterally, and the inner infra-orbital angle is slightly prominent, broad and not dentiform. The borders are granulated.

On the "basal" antenna-joint, which excludes the flagellum from the orbit, there is a granular crest.

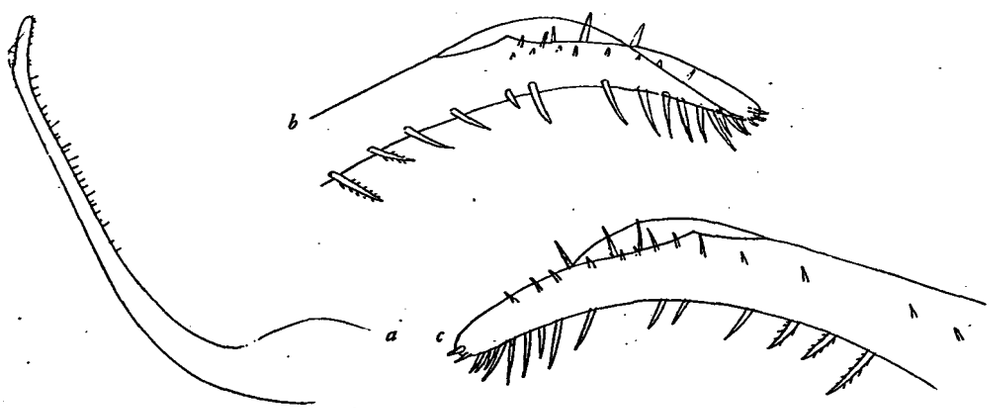


Fig. 62. *Charybdis hongkongensis* Shen. *a*, first male pleopod, posterior view (× 12,5); *b*, apex, posterior view; *c*, apex, anterior view (× 50).

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are pilose. On the sub-hepatic region granulation also occurs. The pterygostomian region is separated from the sub-orbital and sub-hepatic regions by a distinct, granulated line.

The sternum has a short and sparse pile and is granulated.

Of the abdomen of the male the third to fifth terga are fused, the second, third and partly the fourth are transversely keeled. The sixth segment has faintly curved sides, the posterior border is slightly curved forward; it is broader than long.

The chelipeds are about twice the length of the cephalothorax, the surfaces of the arm and the hand are covered with grains and granular squamiform markings. There are three spines (a small one proximally and two larger ones on the distal half) on the anterior border of the arm, the posterior border ends in a spinule distally, the inferior border also has a spine distally. The wrist has a large spine at the inner angle, about half the length of the palm and three spinules at the outer angle. The hand is seven-costate and has four spines on the upper surface, two of which are on the anterior costa, one on the next outer costa, one in front of the apex of the wrist-joint. The fingers are a little shorter than the palm. The inner surfaces are strongly toothed.

The inferior borders of the meropodites of the second, third and fourth pairs of pereiopods end distally in a spine. The carpopodites of the second and third pairs have two spinules on the upper

borders distally. The meropodite of the natatory leg is longer than broad (3 : 2), the posterior border has the usual spine and the distal border ends posteriorly in a spine, the propodite has some spinules on the posterior border.

The anterior male abdominal appendages have a long, narrow neck. Dorsally, the apex is partly covered with a membrane, the anterior border of which follows a faintly curved line. Large spines occur on the posterior border of the apex, they grow smaller at the top. On the dorsal surface under the membrane occur smaller spinules. Ventrally there are besides the large spines on the posterior border, three large spines on the anterior border and nine smaller spines which are continued as a row of spinules on the ventral surface of the neck.

The type specimen shows the following differences: (1) the shape of the median frontal teeth is less rounded, (2) the incision between the median frontal teeth is wider and more distinctly V-shaped, (3) the median frontal teeth are not distinctly prominent beyond the sub-median teeth, (4) the shape of the lateral frontal teeth is more triangular, (5) the cephalothorax also has one more granular transverse ridge, viz., on the frontal region (in the juvenile specimen in the Siboga material this ridge is also present), (6) the row of spines on the outer border of the apex of the first male pleopod is not continued to the top in the figure. Perhaps it has not been drawn, because, as I observed in my specimens, it is continued on the anterior side of this appendage.

This species differs from *Ch. hoplites* W.-M. by: (1) the shape of the front, (2) the antero-lateral borders being less clearly quadrate, (3) the last antero-lateral spine being hardly longer than the preceding teeth, (4) the spine at the inner angle of the wrist being about half the length of the palm, (5) the spines on the hand being more developed, (6) the carpopodites of the second and third pairs of legs having two spinules distally on the upper border, (7) the sides of the sixth tergum of the abdomen of the male being somewhat more convex, (8) the first male pleopods having a different shape and armature.

It can be distinguished from *Ch. vadorum* by: (1) the more granulated front, (2) the shape of the antero-lateral teeth, (3) the last antero-lateral spine is shorter, (4) the spine at the inner angle of the wrist is longer, (5) the granules on the cephalothorax are more distinct and they are differently arranged, (6) the different armature and granulation of the chelipeds, (7) the armature of the second and third pairs of pereiopods, (8) the shape of the sixth tergum of the abdomen of the male.

Geographical distribution: Hong Kong (SHEN).

Measurements in mm:

	♂	♀
Length of cephalothorax	16.0	12.3
Breadth of cephalothorax	24.9	18.0
Front	6.1	5.5
Interorbital space	8.2	6.5
Orbit	4.0	3.5
Orbito-frontal border	16.1	—
Length of cheliped	33.0	23.2
Length of merus natatory leg	4.0	3.7
Breadth of merus natatory leg	2.0	2.3
Length of 6th male abdominal segment	3.0	—
Breadth of 6th male abdominal segment	4.0	—

24. *Charybdis* (*Goniohellenus*) *vadorum* (Alcock). (figs. 63, 64 and 65).

Charybdis (*Goniohellenus*) *hoplites* var. *vadorum*, 1899, ALCOCK, Journ. As. Soc. Bengal, vol. 68, pt 2, p. 67.

Charybdis (*Goniohellenus*) *sinensis*, 1931, GORDON, Journ. Linn. Soc. London (Zool.), vol. 37, p. 534, figs. 11, 12 c, d, & d¹.

1930, GORDON, Ann. and Mag. Nat. Hist., (10), vol. 6, p. 522.

1934, SHEN, Hong Kong Nat. Suppl., p. 44, figs. 9 & 10.

Charybdis (*Goniohellenus*) *vadorum*, 1935, CHOPRA, Rec. Ind. Mus., vol. 37, p. 493, pl. 9, fig. 2 and textfig. 13.

Archias sexdentatus, 1875, PAULSON, Recherches sur les Crustacés de la mer Rouge, p. 56, pl. 8, fig. 3—3b.

1906, NOBILI, Ann. Sc. Nat., Zool., (9), vol. 4, p. 198.

Gier, no 4, Exp. 20, 15/12, 1907, near Kelampis, 9 ♂♂, 3 ♀♀.
Gier, no 4, Exp. 1, 24/11, 1897, near Toeban, 1 ♂.
Gier, no 4, Exp. 11, 23/11, 1897, Bay of Pekalongan, 2 ♂♂ & 2 ♀♀.
Gier, no 9, Exp. 19, 3/7, 1898, 108°35′ E., 1°3′.5 S., 9—12 m, one egg-laden ♀.

Description: The surface of the cephalothorax is fairly distinctly divided into various regions and is covered with a dense, short tomentum, which is interrupted by some more or less perceptible granular elevations, viz., one on the gastric region, one more or less Y-shaped on the cardiac region and one on either side of the cardiac region on the mesobranchial region. Still more

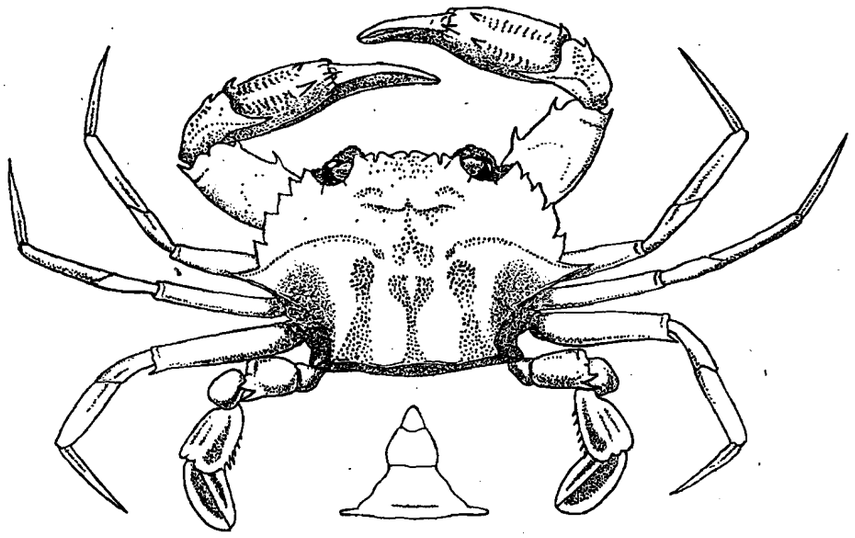


Fig. 63. *Charybdis vadorum* (Alcock), ♂, dorsal view and abdomen (× 2,5).

granulation occurs, which, however, is visible only through a strong lens. Between the last antero-lateral teeth a granular ridge crosses the cephalothorax transversely, it forms a strong curve forward and is broken off on the gastric region, each half ending in a small granular elevation. Another transverse ridge occurs on the foremost part of the gastric region. Anterior to it granules are sometimes arranged ridge-like, in which case the ridge shows a large gap in the middle.

The front — which is on a lower plane than and prominent beyond the inner supra-orbital angles — has six teeth, the medians of which project most and are separated from each other by a V-shaped incision, their anterior edge is rounded, the lateral edge slopes outwards. The sub-median

teeth are narrower and on a higher plane, than the medians, which they partly overlap; the anterior edge is rounded, the inner edge slopes inwards, the lateral edge runs straight backwards; they are separated from the lateral teeth by a deep incision. The latter are narrower than the submedians, nearly of the same size as the inner supra-orbital angles, sub-triangular, the top is rounded.

The antero-lateral borders are cut into six teeth. The first two are the smallest and sub-equal to one another; they are sub-quadrate (sometimes the second tooth is sub-triangular); the outer border of the first tooth is serrated; the short posterior border is smooth; it is separated from the second tooth by a narrow and shallow V-shaped incision, the anterior and outer borders of which are serrated. The third and fourth teeth are triangular; the third tooth is separated from the second by a wider and deeper incision, the outer and posterior borders gradually pass into each other, they are serrated like the anterior border, which passes into the outer border at a right angle. The fourth tooth is larger than the third, but it has the same shape. The fifth tooth is already more spine-like, triangular, both sides of it are serrated. The sixth tooth is a large spine, twice to three times as long as the preceding tooth, the anterior border is serrate.

The postero-lateral borders are as long as the antero-lateral borders, they are strongly convergent posteriorly.

The posterior border is almost straight, in the middle somewhat curved forward, and forms a dog's eared junction with the postero-lateral borders.

The orbit has two incisions in the upper border, the inner one is more distinct. The inner part of this border is nearly smooth, the remaining part is granular. The smooth inferior border has laterally a large, wide incision; the inner angle of the inferior border is prominent, but it is not dentiform.

On the "basal" antenna-joint, which excludes the flagellum from the orbit, there is a low granular crest.

The sub-orbital, sub-hepatic and sub-branchial regions are pilose. The pterygostomian region is not densely hairy and it is separated by the pleural groove from the sub-orbital and sub-hepatic regions.

The sternum is granular and in the males scarcely hairy, in the females pilose.

The third to fifth segments of the abdomen of the male are fused. The second and third segments are transversely keeled; on the fourth segment there occurs a short carina. The sixth segment has strongly curved sides and is much broader than long. The boundary between the sixth segment and the telson is anteriorly convex.

The chelipeds are about twice the length of the cephalothorax, they have a distinct squamiform granulation on the surface of the different parts. The arm has two large spines on the granular anterior border (sometimes there is a small third spine proximally), the posterior and inferior borders have a spine distally. The wrist has a large spine at the inner angle, about one third the length of the palm and two spinules (sometimes also a very small third spinule) at the outer angle. The hand is six-costate, tumid, with four spinules on the upper surface (two on the anterior costa, one on the next outer one and one near the wrist-articulation). The fingers are somewhat shorter than the palm.

The second, third and fourth pairs of pereiopods have a spine distally on the inferior borders of the meropodites. The meropodites of the fifth pair have a spine with a serrated inner border

near the distal end of the posterior border and the distal border ends posteriorly in a more or less claw-like spine; the posterior border of the propodite has some spinules.

The anterior ♂ abdominal appendages have a long narrow neck; the apex is posteriorly covered with a membrane; the outer border has spines, at the top they are wanting. Under the membrane there are large spines on the inner border and a row of spinules on the posterior surface. Anteriorly the row of spines on the outer border is continued on the anterior surface towards the top; the row of spines on the inner border can be distinguished more clearly. On the anterior surface a row of

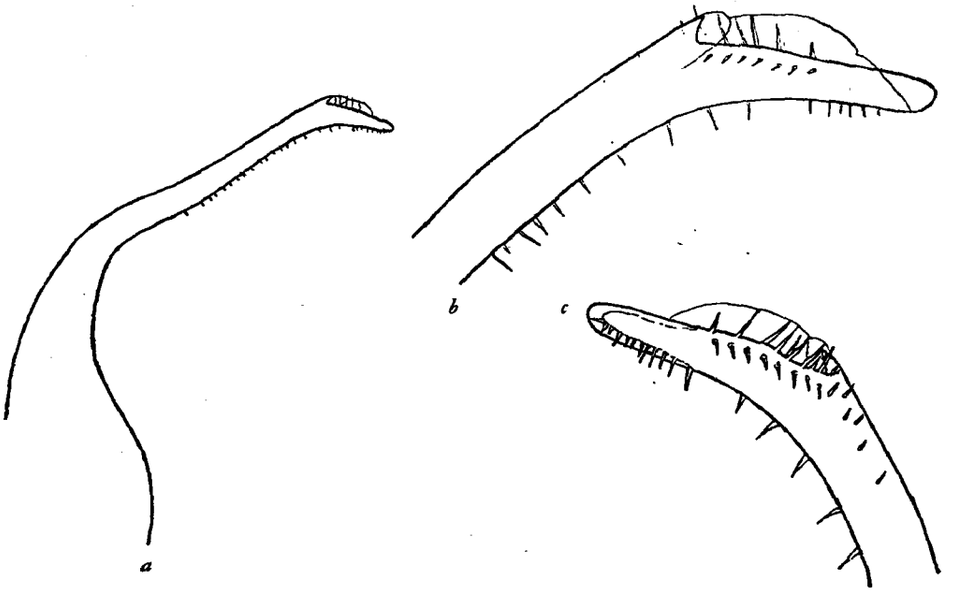


Fig. 64. *Charybdis vadorum* (Alcock), *a*, first male pleopod, posterior view (× 16); *b*, apex, posterior view; *c*, apex, anterior view (× 50).

spinules occurs, which is continued on the anterior surface of the neck. (If we compare a number of these appendages of specimens from the same or from other localities we notice that the number of spines on the inner border and the shape of the membrane may vary a little, but that the shape of the apex and the course of the spines on the outer border never varies).

This species can be distinguished from *Ch. hoplites* Wood-Mason by the following characteristics: (1) the different shape of the front, (2) the antero-lateral teeth are not quadrate, (3) the anterior borders of the antero-lateral teeth are serrate, (4) the granulation on the cephalothorax is much less distinct and arranged differently, (5) the different shape of the abdomen of the male, (6) the hand of the cheliped is tumid.

Very probably *Archias sexdentatus* Paulson is identical with *Ch. vadorum* (Alcock). After comparing the figure of *Archias sexdentatus* with the smallest specimen of *Ch. vadorum* in our collection I observed only a few minor differences (which may be due to a slight inaccuracy in the drawing): (1) in the shape of the antero-lateral teeth: in *Archias sexdentatus* they all are triangular, while in *Ch. vadorum* the first two are sub-quadrate and the others triangular; (2) in *Archias sexdentatus* there is a granular transverse ridge on the cardiac region, whereas in *Ch. vadorum* there

is a Y-shaped granular elevation. They agree in the shape of the frontal teeth, the shape of the last antero-lateral teeth, the armature of the chelipeds and in that the "basal" antenna-joint does not touch the front.

As PAULSON'S publication is very rare I have reproduced his figures.

It is very doubtful if the very young specimens, which RATHBUN (1902, Bull. Comp. Zool., vol. 39, p. 131) described as? *Archias spec.*, are nearly related to *Archias sexdentatus* Paulson, for the antero-lateral border is cut into five teeth, and the posterior border of the arm of the cheliped has no spine distally. For these reasons they do not belong to the subgenus *Goniohellenus*.

Fig. 65. *Charybdis vadorum* (Alcock) (= *Archias sexdentatus* Paulson). *a*, dorsal view (× 4½); *b*, frontal view; *c*, 3rd maxilliped (from PAULSON, 1875, pl. 8, figs 3, 3a and 3b).

Geographical distribution: Red Sea (PAULSON); Persian Gulf (ALCOCK); Orissa Coast (ALCOCK); Mouth of Hooghly River (CHOPRA); Arakan Coast (ALCOCK); Hong Kong (GORDON, SHEN).

Measurements in mm:

	Gier, no. 4, Exp. 1	Gier, no. 4, Exp. 11				Gier, no. 4, Exp. 20									Gier, no. 9, Exp. 19 egg-laden ♀
	♂	♂	♂	♀	♀	♂	♂	♂	♂	♂	♂	♂	♂	♀	
Length of cephalothorax	16.2	13.0	12.7	15.0	15.0	15.2	13.3	11.5	11.4	10.5	9.4	10.0	9.2	12.5	16.0
Breadth of cephalothorax	25.5	22.5	24.2	25.5	24.8	24.7	22.5	19.5	19.2	18.2	15.6	17.0	15.3	21.5	26.0
Front	6.7	5.3	5.2	5.8	6.3	6.3	5.5	4.8	4.8	4.5	4.0	4.3	4.0	5.0	6.5
Interorbital space	7.7	6.0	6.2	7.0	7.3	7.5	6.5	5.5	5.5	4.8	4.5	5.0	4.5	6.0	7.8
Orbit	4.2	3.5	3.4	4.0	4.2	4.0	3.5	3.0	3.2	3.0	3.0	3.0	2.7	3.5	4.5
Orbito-frontal border	16.0	12.8	12.6	15.0	15.3	15.0	13.3	11.8	11.5	10.5	10.0	10.3	9.3	12.8	16.0
Length of cheliped (largest)	34.5	—	24.3	27.7	26.8	30.3	26.2	—	—	—	—	—	—	22.8	29.3
Length of merus natatory leg	4.4	3.7	3.3	3.9	4.2	4.0	3.6	3.2	3.4	—	—	3.0	2.6	3.7	4.3
Breadth of merus natatory leg	3.4	2.5	2.5	3.0	3.0	3.0	2.8	2.5	2.2	—	—	2.0	1.8	2.5	3.5
Length 6th ♂ abdominal segment	2.7	2.3	2.5	—	—	2.5	2.3	1.8	2.0	—	1.7	1.6	1.5	—	—
Breadth 6th ♂ abdominal segment	4.0	3.3	3.2	—	—	3.8	3.4	2.8	2.8	—	2.5	2.5	2.0	—	—
Posterior border	12.0	—	10.2	12.0	11.5	11.5	10.5	8.9	8.8	8.0	7.5	7.7	7.0	10.0	12.6
Cephalothorax breadth / Cephalothorax length	1.57	1.73	1.91	1.70	1.66	1.625	1.69	1.70	1.68	1.73	1.66	1.70	1.66	1.72	1.625

25. *Charybdis* (*Goniohellenus*) *truncata* (Fabr.) (figs 66 and 67).

Portunus truncatus, 1798, FABRICIUS, Suppl. Ent. Syst., p. 365.
Portunus (*Thalamita*) *truncatus*, 1850, DE HAAN, Fauna Jap., Crust., p. 43, pl. 2, fig. 3; pl. 12, fig. 3, male only.
Charybdis truncata, 1858, STIMPSON, Proc. Ac. Nat. Sc. Philad., vol. 10, p. 39.
Goniosoma ornatum, 1861, A. MILNE EDWARDS, Arch. Mus., vol. 10, p. 376 (nec *G. truncatum* A. MILNE EDWARDS, p. 380), pl. 34, fig. 4.
1879, MIERS, Proc. Zool. Soc. London, p. 33.
? 1886, MIERS, "Challenger" Brachyura, p. 191.
1894, ORTMANN, Zool. Jahrb., Syst., vol. 7, p. 83.
1895, DE MAN, Zool. Jahrb., Syst., vol. 8, p. 562.
Charybdis (*Goniohellenus*) *ornata*, 1899b, ALCOCK, p. 64.
Goniosoma ornatum, 1901, LANCHESTER, Proc. Zool. Soc. London, pt 2, p. 545.
Charybdis (*Gonioneptunus*) *truncata*, 1902, BORRADAILE, Fauna and Geogr. Mald. and Lacc. Archip., vol 1, p. 200 (not *Ch.* (*Gonioneptunus*) *truncata*, ALCOCK, p. 67).
Charybdis truncata, 1902, RATHBUN, Proc. U. S. Nat. Mus., vol. 26, p. 27.
Charybdis (*Goniohellenus*) *ornata*, 1906, LAURIE, Ceylon Pearl Oyster Fish., Suppl. Rep., vol. 40, p. 418 (with a remark).
Charybdis truncata, 1907, STIMPSON, Smiths. Misc. Coll., vol. 49, p. 82.
Charybdis ornata, 1910, RATHBUN, Mem. Ac. Roy. Sc. Danemark, (7), vol. 5, p. 365.
Charybdis (*Goniohellenus*) *truncatus*, 1922, BALSS, Arch. Naturgesch., 88. Jahrg., Abt. A, p. 103.
Charybdis truncata, 1923, RATHBUN, Commonwealth of Austr., vol. 5, pt 3, p. 133.
Charybdis (*Goniohellenus*) *truncatus*, 1933, YU YOKOYA, Journ. coll. agric., vol. 12, p. 176.
Charybdis (*Goniohellenus*) *truncata*, 1934, SHEN, Hong Kong Nat. Suppl., no 3, p. 49, textfigs 13, 14.
1937, SHEN, Bull. Raffl. Mus., 13, p. 127.

Siboga, station 296, 10° 14′ S, 124° 5′5 E, 8—36 m, anchorage off Noimini, South Coast of Timor, 1 ♂
Gier, no 1, Exp. 6, 27/9, 1907, 5° 32′ S, 105° 57′ E, 27—18 m, 1 ♀.
Gier, no 1, Exp. 4, 27/9, 1907, 1 ♀.
Gier, no 3, Exp. 7, 17/10, 1907, 16—18 m, 1 ♂.
Gier, no 4, Exp. 3, 16/11, 1907, 3 ♂♂, 1 ♀.
Gier, no 4, Exp. 5, 17/11, 1907, 2 ♂♂, 1 ♀.
Gier, no 4, Exp. 7, 18/11, 1907, 25 ♂♂, 5 ♀♀.
Gier, no 4, Exp. 9, 14/12, 1907, 2 ♀♀.
Gier, no 4, Exp. 10, 21/12, 1907, 1 ♀.
Gier, no 9, Exp. 19, 3/7, 1908, 3 ♂♂.
Gier, no 9, Exp. 20, 3/7, 1908, 1° 22′ S, 104° 43′ E, 9—14 m, 2 ♂♂, 3 ♀♀.
Gier, no 12, Exp. 4, 7/10, 1908, 1 ♀.
Gier, no 19, Exp. 2, 28/3, 1909, 1 ♂.
Gier Exp., 1 ♂ and 1 ♀.

In the Siboga collection there is only one male, in the Gier collection there are 55 specimens.

After comparison with a photograph of the Fabrican type RATHBUN (1902) stated that *Portunus truncatus* Fabr. is identical with *G. ornatum* A. M. Edwards. In that case "*truncatus*" has the priority.

Description: The cephalothorax is moderately convex, the regions are fairly well-defined; it is covered with a dense pile. It is crossed transversely by the following well-marked granular ridges: (1) one between the last antero-lateral spines, which is widely interrupted by the cervical groove (on the gastric region the granules are not arranged in one row, but in a few rows),

(2) a slightly sinuous one on the gastric region, which is unbroken, (3) one on each of the protogastric regions, (4) one on the frontal region, merely two little groups of granules, (5) on the cardiac region two groups of granules, side-by-side, (6) on the mesobranchial region a broad one and behind it a very short one, the latter consisting of a few granules. Moreover, there is some granulation on the branchial lobe, the frontal teeth, the antero-lateral teeth and on the orbital regions.

The front is cut into six teeth. The median teeth have round tops and strongly laterally sloping lateral borders; they are separated from one another by a V-shaped incision. The submedian teeth

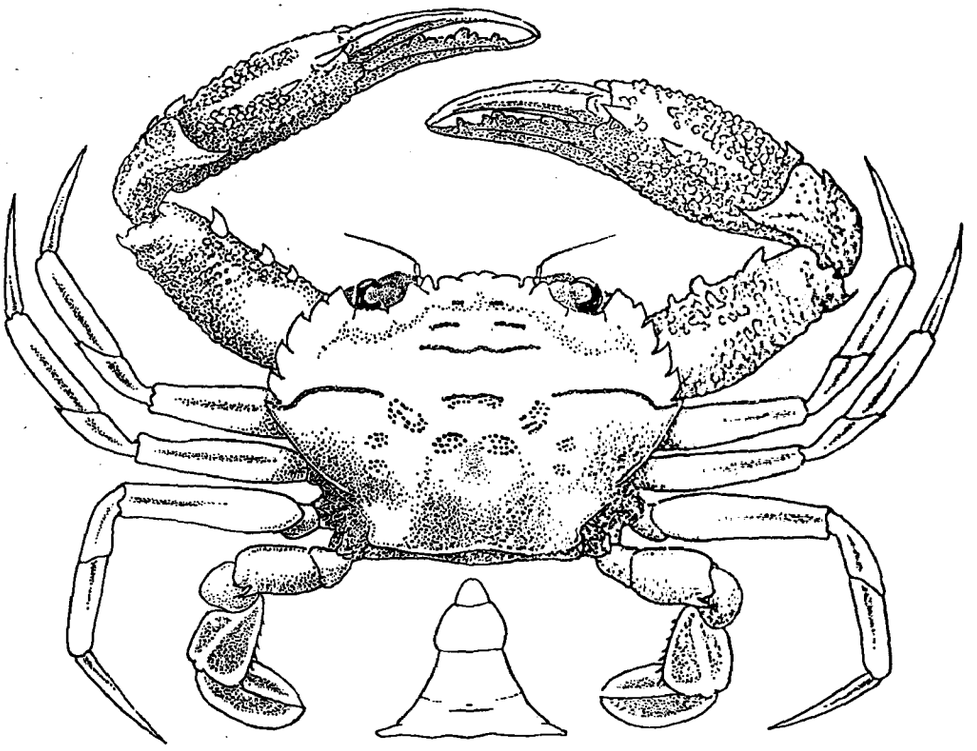


Fig. 66. *Charybdis truncata* (Fabr.), ♂, dorsal view and abdomen (× 1½).

are on a somewhat higher plane; the tops are round, the inner borders, which slope inwards, partly overlap the median teeth; the lateral borders run nearly straight backwards; they are separated from the lateral teeth by a rather narrow incision, the borders of which are nearly parallel. The triangular lateral teeth have round tops, the median borders run nearly straight backwards, the lateral borders slope laterally, they are narrower than the submedian teeth. The front is prominent beyond the inner supra-orbital angles.

The antero-lateral borders are cut into six teeth, which are truncate, except for the sixth. The first tooth is nearly quadrate, the straight anterior border is nearly smooth, the posterior part of the outer border is serrated, the straight posterior border is smooth. The second tooth has a slightly concave smooth anterior border, the outer border is serrated, the posterior border is smooth; it is

narrower than the preceding tooth. The third tooth is the largest; its smooth anterior border is concave, its convex outer border is serrated, its posterior border is short and smooth. The fourth and fifth teeth are somewhat narrower than the third, they are nearly the same shape and size as the third. The sixth tooth is much smaller than the preceding tooth.

The postero-lateral borders converge posteriorly, its borders are granular. The posterior border is slightly sinuous, it forms an eared junction with the postero-lateral borders.

The orbit has a distinct dorsal inclination. The granular upper border is divided into three parts by two faint incisions. The inner supra-orbital angle has a granular ridge. The granular lower border is divided into two parts by a lateral incision; the inner infra-orbital angle is scarcely prominent.

The "basal" antenna-joint has only a low granular ridge; it touches the front, excluding the flagellum from the orbit.

The antennulae are folded transversely.

The sub-orbital and sub-hepatic regions are granular, the pterygostomian and sub-branchial regions are without granulation; all the regions are densely pilose; the pleural groove is granular.

The sternum is pilose and granular on the surface of all the segments and on its borders.

Of the abdomen of the male the third up to the fifth terga are fused. The second and third terga are distinctly transversely keeled, the fourth tergum has a short keel. The sixth tergum has strongly convex lateral borders, the anterior border is straight, the posterior border is curved anteriorly, it is much broader than long.

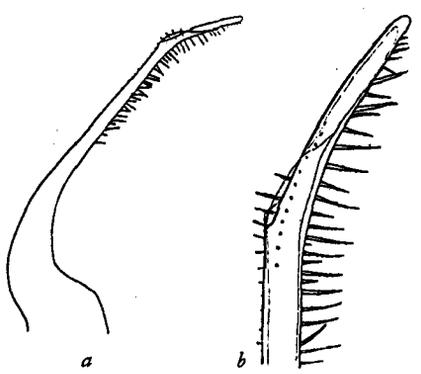


Fig. 67. *Charybdis truncata* (Fabr.). *a*, apex of first male pleopod, posterior view (× 8); *b*, id., anterior view (× 33).

The length of the chelipeds in the male is nearly $2^2/_3$ times the length of the cephalothorax. The anterior border of the arm has three spines: two rather larger spines, of which the distal one is a short distance proximal to the distal end, and a small one, which is the most proximal; the posterior border has a small spine: the upper, posterior and under surfaces are granular, the granules being arranged in rather regular transverse rows; the anterior surface has only some small granules. The wrist also has a granular surface, on which we can distinguish three ridges; the spine at the inner angle is large, at the outer angle there are three spinules. The hand of the largest cheliped is more swollen than that of the other cheliped; it is seven-costate; the costae are distinctly granular; the granules on the hand are arranged in rather regular transverse rows; between the costae there are some scattered granules; there are four rather small spines: one at the wrist-articulation, one at the finger-articulation on the anterior costa and two side-by-side about one third of the length of the palm proximally of the finger-articulation. In the larger cheliped the finger is as long as the palm, in the smaller cheliped the finger is a little longer than the palm.

Of the second pair of pereiopods the posterior border of the meropodites each ends in a spinule, on the distal end of the upper borders the carpopodites have two spinules. Of the third pair the posterior borders of the meropodites end in a spinule, the carpopodites have one to three spinules on the distal ends of the upper borders. The fourth pair lack these characteristics.

Of the natatory leg the posterior border of the meropodite has its usual spine and the distal border also ends in a spinule; the posterior border of the propodite has a row of spinules.

The first male pleopods have a long, narrow neck and a long, narrow apex, which is bent a little outward. The outer border of the apex and of the greatest distal part of the neck has long spines, of which only the most distal ones are not fringed; the spines are continued on the anterior surface of the neck proximally. On the posterior surface of the apex there is a row of spinules, for the greater part placed under the membrane. The distal part of the inner border of the neck has some small spines and on the proximal part of the apex there occur some large, fringed spines. The free edge of the membrane is slightly curved.

Geographical distribution: Haddumatu, Kolumadula, Mulaku (BORRADAILE); Ceylon (LAURIE); Coromandel Coast (ALCOCK): Hooghly River (ALCOCK); Arakan Coast (ALCOCK); Singapore (SHEN); Kota Bharu, Kelantan (LANCHESTER); Siam (RATHBUN); Java Sea (DE MAN, ALCOCK); Bay of Palos, W. Celebes (DE MAN); Arafura Sea (MIERS); Queensland (RATHBUN); Philippines (MIERS); Hong Kong (STIMPSON, ALCOCK, BALSS); Nagasaki, (RATHBUN, BALSS); Wakayama-Ken (YOKOYA); Wakaoura, Kii (RATHBUN); Kochi (ORTMANN); Bay of Sagami (BALSS); Tokyo (ORTMANN).

Measurements in mm:

	Gier, no. 4, Exp. 3 ♂
Length of cephalothorax	31.5
Breadth of cephalothorax	45.3
Front	12.6
Interorbital space	15.0
Orbit	7.6
Orbito-frontal border	30.5
Length of cheliped (largest)	86.2
Length of merus natatory leg	9.5
Breadth of merus natatory leg	6.5
Length 6th ♂ abdominal segment	4.5
Breadth 6th ♂ abdominal segment	7.7
Posterior border	23.3
$\frac{\text{Cephalothorax breadth}}{\text{Cephalothorax length}}$	1.44

Subgenus Gonioneptunus (Ortmann).

In 1893 ORTMANN published a new genus *Gonioneptunus*, which he considered as a link between *Neptunus* (*Achelous*) and *Goniosoma*, because the antennae are as in *Neptunus* and the antero-lateral borders as in *Goniosoma*.

To this genus ORTMANN arranged *Gonioneptunus subornatus*, which, according to him, is identical with *Portunus* (*Thalamita*) *truncatus* femina de Haan and *Portunus* (*Charybdis*) *truncatus* de Haan. In 1899 ALCOCK called *Gonioneptunus* a subgenus of *Charybdis* and classed with it *Gonio-*

soma variegatum var. *bimaculatum* Miers and *Charybdis investigatoris* Alcock. In 1932 SHEN published *Ch. peichihliensis* and in 1935 *Ch. africana.* In 1933 WARD included *Ch. Whiteleggei* in this subgenus.

ALCOCK divided this subgenus (in the key) into a group of which the posterior border of the cephalothorax forms an angular junction with the postero-lateral borders and a group of which the posterior border of the cephalothorax forms a curve with the postero-lateral borders. To this latter group belonged *Ch. investigatoris* Alcock and *Ch. peichihliensis* Shen. Afterwards SHEN (1935) cancelled *Ch. peichihliensis,* which proved to be a juvenile stage of *Ch. japonica* A. M. Edw., and I could state that *Ch. investigatoris* Alcock is a juvenile stage of *Ch. miles* de Haan. This disposes of the group which seemed to be nearly related to the subgenus *Charybdis,* and we maintain only the group which is nearly related to the subgenus *Goniohellenus* [1]).

The four species which belong to this subgenus cannot very clearly be distinguished from one another. [The original descriptions of all these species are very insufficient, the figures are not very clear and the key published by SHEN (1935) is based on measurements which come within the limits of the variability (see our measurementstable), on relative characteristics and on interpretation of the figures]. I am inclined to think that there is a large variability in the species, and that they, therefore, all belong to one, perhaps to two, species. But, failing extensive material, I maintain the four species, trying to distinguish between them in the key.

26. *Charybdis* (*Gonioneptunus*) *subornata* (Ortmann) (figs. 68 and 69).

Gonioneptunus subornatus, 1893, ORTMANN, Zool. Jahrb., Syst., vol. 7, p. 79, pl. 3, fig. 9.
Charybdis (*Gonioneptunus*) *truncata,* 1899b, ALCOCK, p. 67.
Charybdis subornata, 1902, RATHBUN, Proc. U. S. Nat. Mus., vol. 26, p. 28.
1916, PARISI, Att. d. Soc. Ital. Sc. Nat., vol. 55, p. 174.
Charybdis (*Gonioneptunus*) *subornata,* 1922, BALSS, Arch. Naturgesch., 88. Jahrg., Abt. A, p. 103.
? *Charybdis* (*Gonioneptunus*) *truncata,* 1902, BORRADAILE, Fauna and Geogr. Mald. and Lacc. Archip., vol. 1, pt. 2, p. 200.

Siboga, stat. 306, 8° 27′ S, 122° 54′5 E, 247 m, one male and one female.
Siboga, stat. 312, 8° 19′ S, 117° 41′ E, Saleh-bay, North Coast of Sumbawa, 274 m, four specimens (badly damaged).

Description: The cephalothorax, covered with a short tomentum and divided into distinct regions, is crossed by the following clearly distinguishable transverse ridges: (1) one, between the last antero-lateral teeth, rather strongly curved forward in the branchial region, which is interrupted by the cervical groove, (2) a slightly sinuous one on the mesogastric region, (3) one on each of the protogastric regions, (4) one on the frontal region, interrupted in the middle (the latter is less distinct). On the posterior part of the cephalothorax there are groups of granules, which are

1) Just after the manuscript had gone to press I happened to see SAKAI's article (1935, p. 74), in which he omits the division of the genus *Charybdis* into the three subgenera *Goniosoma, Goniohellenus* and *Gonioneptunus,* because he thinks this subdivision too artificial. As a matter of fact the subgenus *Gonioneptunus* is very nearly related to the subgenus *Goniohellenus.* Yet I think it advisable, at least for the present, to maintain the subgenus *Gonioneptunus,* for at any rate, as in the larger specimens of *Charybdis bimaculata* (Miers) and *Ch. whiteleggei* Ward, the "basal" antenna-joint very clearly does not touch the front. And although the subdivision of the genus *Charybdis* may be a little artifical, in the case of a large genus it is preferable to make a distinction between clearly distinguishable groups.
As I have already said, I consider *Ch. investigatoris* Alcock a juvenile form of *Ch. miles* (and not of *Ch. riversandersoni* Alcock, as SAKAI does) a.o. because of the shape of the cephalothorax and the length of the chelipeds.

arranged much less ridge-like than in *Ch. bimaculata* Miers, viz.: (a) two, side-by-side, on the cardiac region, (b) a large one on each of the mesobranchial regions, (c) a small one posterior to the latter group on the mesobranchial region, (d) one on the branchial lobe, (e) one, a little medianwards and posterior to group d. Moreover, the cephalothorax has granulation on the mesogastric region in the midline, on the metagastric region, along and posterior to the transverse ridge, which is the boundary between the epi- and mesobranchial regions, and on the posterior angles. There is a dark spot on the mesobranchial region, lateral to the anterior group of granules.

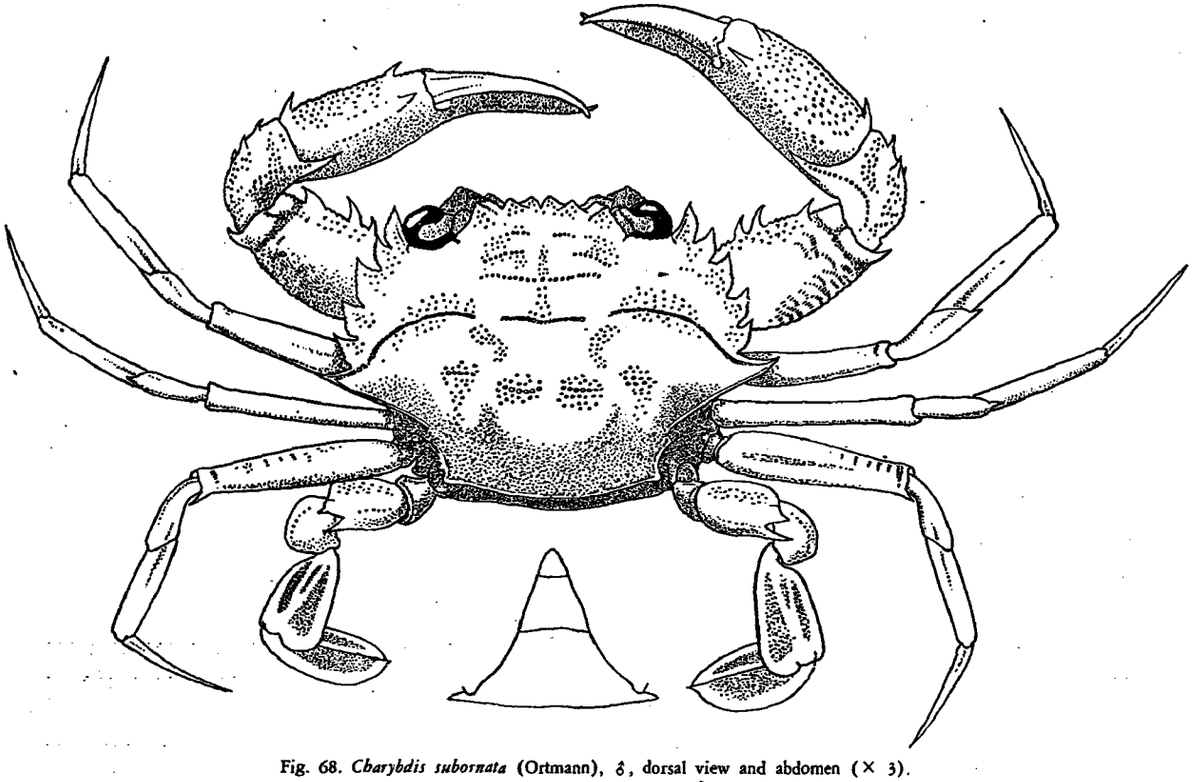


Fig. 68. *Charybdis subornata* (Ortmann), ♂, dorsal view and abdomen (× 3).

The front is cut into six teeth. The median and submedian teeth are nearly the same shape; they are very clearly distinct from and prominent beyond the lateral frontal teeth. The medians are prominent beyond the submedians; they are triangular, nearly sharp; the incisions between these teeth are V-shaped; the lateral borders slope rather strongly laterally. The submedians are on a somewhat higher plane, they are triangular, nearly sharp; the median borders slope medianwards over a shorter distance than the lateral borders of the median teeth do laterally; the lateral borders run nearly straight posteriorly. The lateral frontal teeth can hardly be distinguished (in the female they are still less distinct than in the male), in the male they are a little prominent beyond the inner supra-orbital angles, in the female they do not reach so far anteriorly as the inner supra-orbital angles. The edges, which connect the tops of the lateral frontal teeth with the tops of the inner supra-orbital angles are granular in the male and smooth in the female. The incision between the submedian and lateral teeth is wide and more

or less V-shaped. The upper surfaces of the four median teeth are granular. The borders of all the frontal teeth are smooth, except for the median borders of the submedian teeth, which are granular on their proximal parts.

The antero-lateral border is cut into six acute teeth, which are nearly the same shape, except for the sixth tooth. The first tooth has a granular, slightly concave anterior border; the outer border is nearly straight and serrate; the short posterior border forms a round and obtuse angle with the outer border. The second tooth is the smallest, the third the largest, the fourth is somewhat larger than the fifth and the fifth is only a little longer than the second. These four teeth have granular, slightly concave anterior borders; serrate, nearly straight, sometimes slightly *concave* outer borders, whereas the short posterior borders form round and obtuse angles with the outer borders (the fifth tooth is very acute). The sixth tooth is prominent beyond the preceding teeth, the anterior border is concave, the spine being therefore directed anteriorly. (In the female the first tooth is more distinctly larger than the second than in the male; perhaps the larger measurements of the female are the cause of it). The upper surfaces of the teeth are granular.

The postero-lateral borders converge rather strongly posteriorly.

The posterior border is slightly convex, it forms obtuse angles with the postero-lateral borders.

The orbit has a strong dorsal inclination. The granular upper border is divided into three parts by two distinct incisions. The granular lower border has a lateral incision. The inner supra-orbital angle has a granular ridge on its upper surface. The outer orbital angle (first antero-lateral tooth) is prominent beyond the inner supra-orbital angle. The broad inner infra-orbital angle is very prominent, its two borders are granular. The orbital region is granular.

The "basal" antenna-joint does not touch the front; it has a low granular crest (which is more distinct in the male than in the female).

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are granular and pilose; the granular pleural groove is distinct.

The sternum is bare and smooth.

The second and third terga of the abdomen of the male are carinate. The sixth segment has nearly straight convergent lateral borders (they tend to be slightly sinuous), the anterior border is slightly curved posteriorly, and the posterior border is distinctly curved anteriorly.

The chelipeds slightly differ in length in the male as well as in the female. The granular anterior border of the arm has three spines, the proximal one is the smallest; the inferior border (only in the male, which is the smaller specimen) and the posterior border end distally in a spinule; the upper and posterior surfaces have squamiform granular markings, the anterior surface is finely granular, the under surface is smooth. The wrist has three granular ridges, moreover squamiform, granular markings; the inner angle has a well-developed spine, at the outer angle there are three spinules. The hand, which is tumid in the larger cheliped, has seven costae, of which those on the upper and outer surfaces are granular; there are three spines: one at the wrist-articulation and two, side-by-side, a short distance behind the finger-articulation. The movable finger in the larger cheliped is about as long as the palm (in the male it is slightly longer than the palm, in the female as long as the palm), and in the smaller cheliped the finger is distincty longer than the palm.

Of the second, third and fourth pairs of pereiopods the posterior border of the merus ends distally in a spinule; of the second and third pairs the upper border of the carpus ends distally in a spinule.

Of the natatory leg the posterior border of the merus ends in a spine a short distance proximal to the distal end; the granular distal border ends posteriorly in a spine.

The first male abdominal appendage has a broad neck, which ends in a short apex. On the posterior surface of the apex under the transparent membrane there are a few short spines, also on the proximal part of the inner border of the apex; the outer border of the pleopod has a row of spines, which ends a short distance proximal to the top (the spines are larger on the apex than on the neck). The anterior surface of the neck has rows of spinules, the inner border of the apex has a few spines proximally.

This species differs from *Ch. bimaculata* Miers in the following points: (1) the four median frontal teeth are acuter, but still blunt; they are also narrower; (2) the first five antero-lateral teeth

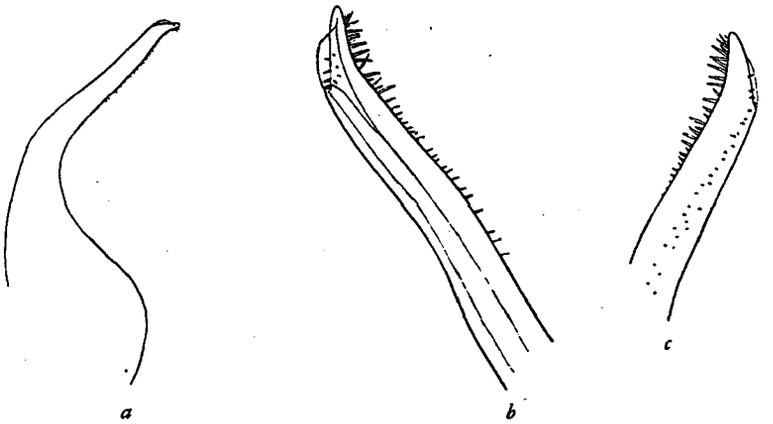


Fig. 69. *Charybdis subornata* (Ortmann). *a*, first male pleopod, posterior view (× 12,5); *b*, apex, posterior view; *c*, apex, anterior view (× 35).

are acuter, the first tooth is not truncate, but triangular; (3) the sixth antero-lateral tooth is distinctly prominent beyond the others; (4) the posterior angle of the cephalothorax is less obtuse; (5) the lateral borders of the sixth ♂ abdominal segment are slightly different, tending to follow a sinuous course; (6) the carpus of the third pair of pereiopods has a spinule; (7) the first male pleopod has a broad neck; the apex is shorter; the posterior surface of the apex has a number of spinules; the anterior surface of the neck has a great many more spinules.

Geographical distribution: Maldives and Laccadives (? BORRADAILE); Gulf of Martaban (ALCOCK); Japan (ORTMANN, RATHBUN, PARISI, BALSS).

27. *Charybdis* (*Gonioneptunus*) *Whiteleggei* Ward.

Charybdis (*Gonioneptunus*) *whiteleggei*, 1933, WARD, Austr. Zool., vol. 7, p. 380, pl. 23, figs. 1 and 2.

Of this species WARD has made the following remarks: "The following notes of comparison between the specimens before me and the figure in de HAAN's Crustacea (SIEBOLD, Fauna Japonica) are sufficient to separate the two species, and I take the opportunity to note that the figures published in the Fauna Japonica are reliable reproductions of the species represented. I have had good fortune in being able to examine collections of Japanese species housed in museums abroad, and by critical comparative study of specimens and figures, found them correct to the minutest detail.

1. The proportions of the carapace are different—*G. whiteleggei* is three-quarters as long as broad; *G. subornatus* is two-thirds as long as broad.
2. The male abdomen is narrower in *whiteleggei*; the penultimate segment is long and narrow.
3. The front is one-third the breadth of the carapace in DE HAAN's figure. The front is less than one-third of the carapace in *whiteleggei.*
4. The transverse ridge from the last antero-lateral tooth is more arched in *whiteleggei* than in *subornatus.*
5. DE HAAN's figure does not display the strong sculpturing on the carapace which is characteristic of *whiteleggei.*
6. The process on the basal antennal article which fills the orbital hiatus is broader in *whiteleggei* than in ORTMANN's figure (Zool. Jahrb., Syst., vol. 7, pl. 3, fig. 9)."

However, I do not agree with his conclusion. I have compared his remarks with the male specimen of *Portunus* (*Thalamita*) *truncatus* de Haan, and I may add to his points respectively:

1. This difference may be due to the much larger measurements of his specimen, the breadth of the cephalothorax being 44 mm.
2. As far as I could tell by the figure, the sixth tergum of the male abdomen has the same shape.
3. The drawing in DE HAAN's Fauna Japonica was not correct, as may be seen from our measurementstable; there is no difference on this point.
4. I did not observe a difference.
5. DE HAAN's figure is not complete; in DE HAAN's specimen this strong sculpturing is present.
6. It is not clear to me, how Mr WARD came to make this remark; the figure of ORTMANN does not seem to be very exact.

Geographical distribution: New South Wales (WARD).

28. *Charybdis* (*Gonioneptunus*) *bimaculata Miers* (figs. 70 and 71).

Portunus (*Thalamita*) *truncata,* 1850, DE HAAN, Faun. Japon., Crust., pl. 18, fig. 2, (?? pl. 12, fig. 13, ♀ only).
Goniosoma variegatum var. *bimaculatum,* 1886, MIERS, Challenger Brachyura, p. 191, pl. 15, fig. 3.
Charybdis (*Gonioneptunus*) *bimaculata,* 1899b, ALCOCK, p. 69.
Charybdis variegata, 1922, BALSS, Arch. Naturgesch., 88. Jahrg., Abt. A, p. 104, (part.).
Charybdis (*Gonioneptunus*) *bimaculata,* 1932, SHEN, Brachyura Crust. North China, p. 81, textfigs 46, 47; pl. 4, fig. 3.
1935, SHEN, Ann. and Mag. Nat. Hist. (10), vol. 15, p. 404, figs 1, 2.
? *Charybdis variegata,* 1933, YU YOKOYA, Journ. coll. agric. Tokyo Imp. Univ., vol. 13, p. 176 (see SHEN, 1937).

Of this species there are no specimens in our material. Dr SHEN was so kind as to offer me a male specimen from Tsingtao (Shantung Peninsula). I could compare it with the male specimen of *Portunus* (*Thalamita*) *truncatus* var. de Haan (in the Leiden Museum); the female specimen (DE HAAN, pl. 12, fig. 13) is not present in the collections of this museum.

Here follows the description of the Tsingtao specimen:

The cephalothorax, covered with a short tomentum, has rather distinct regions. It is crossed by salient, granular transverse ridges: (1) one, between the last antero-lateral teeth, rather strongly

arched forward on the branchial region, which is interrupted by the cervical groove, (2) an unbroken one on the mesogastric region, which is slightly sinuous, (3) one on each of the protogastric regions, (4) one on the frontal region interrupted in the middle, which is least distinct. Behind the first ridge mentioned, there are groups of granules arranged more or less ridge-like: (a) two groups, side-by-side, on the cardiac region, (b) two groups on each of the branchial regions, the anterior one being the largest, the posterior one consisting only of a few granules, (c) a group on the branchial lobe. The mesobranchial region has a dark spot laterally to the anterior group of granules on this region.

The front is cut into six teeth. The median teeth are a little prominent beyond the submedians; they are blunt, triangular; the lateral borders slope outwards over a long distance; they are separated

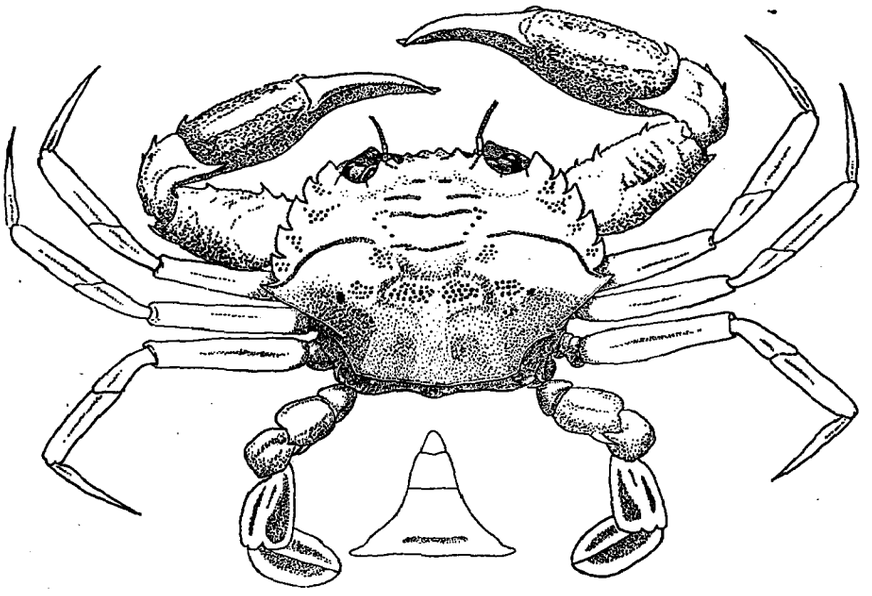


Fig. 70. *Charybdis bimaculata* (Miers), ♂, dorsal view and abdomen (× 2).

from one another by V-shaped incisions. The submedian teeth, prominent beyond the lateral teeth, are nearly the same shape as the medians; the median border slopes medianwards over a rather long distance, the lateral border is short and slopes outwards only a little. The lateral teeth are a sort of reduplicated inner supra-orbital angles, being nearly confluent with them; they are slightly prominent beyond these angles. The borders of all the teeth are smooth, except for the median borders of the submedian teeth.

The antero-lateral borders are cut into six teeth. The first tooth is truncate; the granular anterior border is straight, the outer border is straight, slightly serrate, the posterior border is parallel to the anterior border; the posterior angle is round. The second tooth is the smallest, it has a granular, concave, anterior border; the slightly curved outer border is serrate; the posterior border is smooth; the outer border passes gradually into the posterior border. The third tooth is the largest, but has the same shape as the following two teeth; the fourth is a little narrower than the third and the fifth is still narrower, while being only a little larger than the second; the anterior borders are slightly granular,

the outer borders are serrate, the anterior angles are acute. The sixth tooth is more spine-like, only a little prominent beyond the others; the anterior border is granular.

The postero-lateral borders converge rather strongly posteriorly.

The posterior border is slightly convex; its granular margin forms an obtuse angle with the postero-lateral borders.

The orbit has a distinct dorsal inclination. The granular upper border is divided into three parts by two incisions. The granular lower border has an incision laterally; the lobule of the outer part is distinctly separated from the outer orbital angle. The inner infra-orbital angle is broad, dentiform and prominent, its median border is smooth. The outer orbital angle (the first antero-lateral tooth) is prominent beyond the inner supra-orbital angle.

The "basal" antenna-joint does not touch the front; it has a low granular crest.

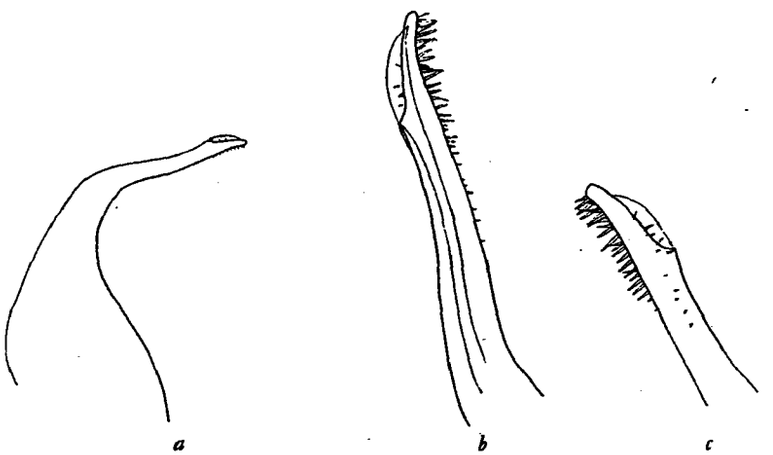


Fig. 71. *Charybdis bimaculata* (Miers). *a*, first male pleopod, posterior view (× 12,5); *b*, apex, posterior view; *c*, apex, anterior view (× 35).

The sub-orbital, sub-hepatic and sub-branchial regions are granular and pilose, the pterygostomian region is bare and smooth; the pleural groove is granular.

The sternum is bare and smooth.

The second and third terga of the abdomen of the male are carinate. The sixth segment has a straight, anterior border, a strongly curved posterior border and slightly convex, convergent lateral borders.

The chelipeds differ slightly in length. The anterior border of the arm has three spines, of which the proximal one is the smallest, (in the left cheliped there are four spines, but the two distal ones are the largest, as in the right cheliped); the posterior border has a spinule at the distal end; the inferior border is unarmed; the under, posterior and anterior surfaces are smooth; the upper surface has large granules, squamiformly arranged; the distal border is granular. The wrist has three granular ridges, also granules between the ridges on the upper surface; the inner angle has a well-developed spine, at the outer angle there are three spinules. The hand is tumid and seven-costate, the costae on the upper and outer surfaces are granular; there are three spines: two, side-by-side, a short distance proximal to the finger articulation, and one at the wrist-articulation. The movable finger is as long as the palm in the larger cheliped and longer than the palm in the smaller cheliped.

Of the second pair of pereiopods the carpus has a spinule on the distal end of the upper border. The third and fourth pairs have no specific characteristics.

The merus of the natatory leg is a little longer than broad, the posterior border has a spine a short distance proximal to the distal end, posteriorly the distal border ends in a spine. The carpus and propus have no armature.

The first male abdominal appendage has a rather broad neck, the apex is somewhat narrower. There are no spines under the membrane on the posterior surface. The inner border of the distal part of the neck and of the apex has a row of spines, which increase in length towards the top. There are a few spines near the inner border of the apex and a few spinules on the neck on the anterior surface.

Geographical distribution: Orissa Coast (ALCOCK); Shantung Peninsula (SHEN); Japan (MIERS, BALSS).

29. *Charybdis* (*Gonioneptunus*) *africana* Shen (figs. 72 and 73).

Charybdis (*Gonioneptunus*) *africana*, 1935, SHEN, Ann. and Mag. Nat. Hist., (10), vol. 15, p. 405, figs. 1 and 2 d.

I give the description of the type, published by SHEN:

"Carapace as represented in fig., covered with a dense short tomentum, crossed transversely by fine granular ridges. In addition, there are some small patches of granules on the cardiac and inner part of the branchial regions as well as on the dorsal surface of the frontal and antero-lateral teeth. The length is slightly less than $^5/_7$ of the extreme breadth.

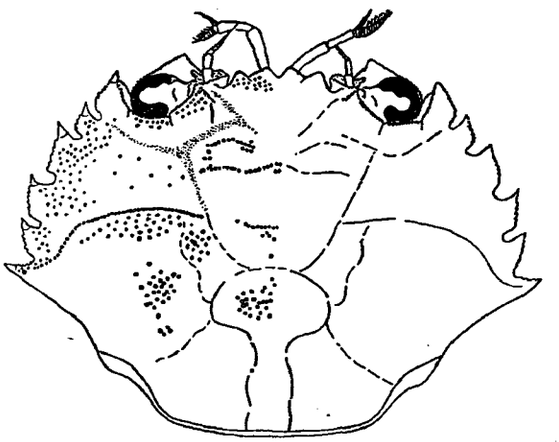


Fig. 72. *Charybdis africana* Shen, ♂ type, dorsal view (× 3) (From SHEN, 1935, fig. 1).

The front is cut into six teeth; the lateral tooth on each side is almost confluent with the inner orbital angle and bears a ridge which does not extend to the free margin; the middle four are broadly triangular and widely separated, but not so forwardly produced as in the other two species.

The lobule of the basal antenna-joint does not touch the front, so that the flagellum stands in the upper part of the orbital hiatus.

The antero-lateral margin is cut into six teeth, of which the anterior five are cut rather squarely and have the free edge serrate. The first one is largest, the second smaller than the fifth, the third larger than the fourth but smaller than the first. The sixth is spine-like, but not more prominent than any of the preceding ones.

The posterior margin of the carapace is practically straight and forms an obtuse angle of junction with each postero-lateral margin.

The right cheliped is missing, the left is detached from the body. Merus finely and densely granulated on the distal part of the upper surface and the lower part of the inner surface. It bears a distal tooth on the posterior margin and on the anterior margin three teeth, of which the distal one is far apart from the posterior ones. Carpus has three small acute teeth on the outer distal part and

a very strong spine at the inner angle. Manus very thick, with two dorsal spines situated near the dactylo-propodal articulation; the inner one is slightly in front of the outer. The outer surface has three carinae, of which the median one is most prominent, the inner surface has a single faint ridge; the dorsal surface has two longitudinal granular areas, each ending near a spine. The dactylus is slightly shorter than the palm.

The merus of the last leg is slightly longer than broad, and has the usual spine on the distal third of the posterior margin and another small but very acute tooth at the extreme distal end. The posterior margin of the propodus is smooth.

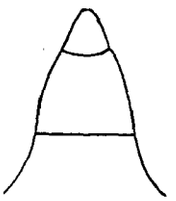


Fig. 73. *Charybdis africana* Shen, male abdomen (× 4.5) (From SHEN, 1935, fig. 2 d).

The sixth segment of the male abdomen is truncate triangular, the sides being slightly convex, the basal is twice the distal breadth. The seventh segment is narrowly triangular."

It differs from *Ch. bimaculata* Miers in:

(1) having a somewhat different shape of the front [whereas in the female the front is shaped nearly as in *Ch. bimaculata* (Miers) and *Ch. subornata* (Ortmann)]; (2) the last antero-lateral tooth being not more prominent than the other teeth; (3) having a different shape of the sixth segment of the male abdomen.

It differs from *Ch. subornata* (Ortmann) in:

(1) having a somewhat different shape of the front; (2) the first antero-lateral tooth being rather squarely, and not narrowly triangular; (3) the last antero-lateral tooth being not more prominent than the other teeth; (4) having a different shape of the sixth segment of the male abdomen.

Geographical distribution: Great Fish Point; Tugela River mouth (South Africa) (SHEN).

Measurements in mm:

	Portunus (Thalamita) truncatus var. (de Haan, Faun. Jap.) ♂	Ch. bimaculata Tsingtao Shantung Peninsula ♂	Ch. bimaculata Shen, 1935, p. 408 ♂	Ch. subornata Siboga, stat. 306 ♂	Ch. subornata Siboga, stat. 306 ♀	Ch. subornata Shen, 1935, p. 408 ♂	Ch. africana Shen, 1935, p. 408 ♂
Length of cephalothorax	18.9	19.2	22.5	16.5	18.0	17.8	19.0
Breadth of cephalothorax	27.7	29.0	35.0	25.0	27.7	27.3	27.8
Front	7.4	7.0	—	6.8	6.7	—	—
Interorbital space	8.2	8.0	—	7.8	8.0	—	—
Orbit	4.5	4.8	—	4.8	4.7	—	—
Orbito-frontal border	16.5	16.2	20.8	16.0	17.0	16.0	16.7
Length of cheliped (largest)	44.5	45.0	—	35.0	35.8	—	—
Length of merus natatory leg	5.0	5.0	—	4.5	4.5	—	—
Breadth of merus natatory leg	3.7	4.0	—	3.2	3.2	—	—
Length 6th ♂ abdominal segment	2.9	2.8	3.3	2.8	—	2.7	3.0
Breadth 6th ♂ abdominal segment	4.1	4.0	4.6	3.6	—	4.2	3.6
Posterior border	12.5	13.8	—	11.3	12.2	—	—
$\frac{\text{Cephalothorax breadth}}{\text{Cephalothorax length}}$	1.47	1.51	1.51	1.51	1.54	1.53	1.46
$\frac{\text{Cephalothorax length}}{\text{Cephalothorax breadth}}$	0.68	0.66	0.64	0.66	0.65	0.65	0.68

30. *Charybdis* (*Gonioinfradens*) *paucidentata* (A. M. Edw.) (Figs. 74, 75 and 76).

Goniosoma paucidentatum, 1861, A. MILNE EDWARDS, Arch. Mus. Paris, vol. 10, p. 381, pl. 35, fig. 3.
Charybdis paucidentata, 1911, RATHBUN, Trans. Linn. Soc. London, (2), vol. 19, pt 2, p. 206.
Thalamita Giardi, 1905, NOBILI, Bull. Mus. Hist., no 3, p. 164.
Charybdis (*Goniosoma*) *Giardi,* 1906, NOBILI, Bull. Sc. Fr.-Belg., vol. 40, p. 115, pl. 5, fig. 23 and pl. 7, fig. 34.
Charybdis Giardi, 1924, BALSS, Denkschr. Ak. Wien, math.-naturw. Kl., vol. 99, p. 3.

In our collections there are no representatives of this species. In the Paris Museum, however, I examined the type specimen of *Goniosoma paucidentatum* A. M. Edw., two cotypes of *Charybdis Giardi* Nobili (Mission J. Bonnier et Ch. Pérez 1901, stat. 52) and two other specimens of the latter specimen (1901, stat. 53). The cotypes (♂ and juv.) were much damaged; the larger specimen (♀) of stat. 53 is better preserved, the other specimen was juvenile. The type specimen of *G. paucidentatum*

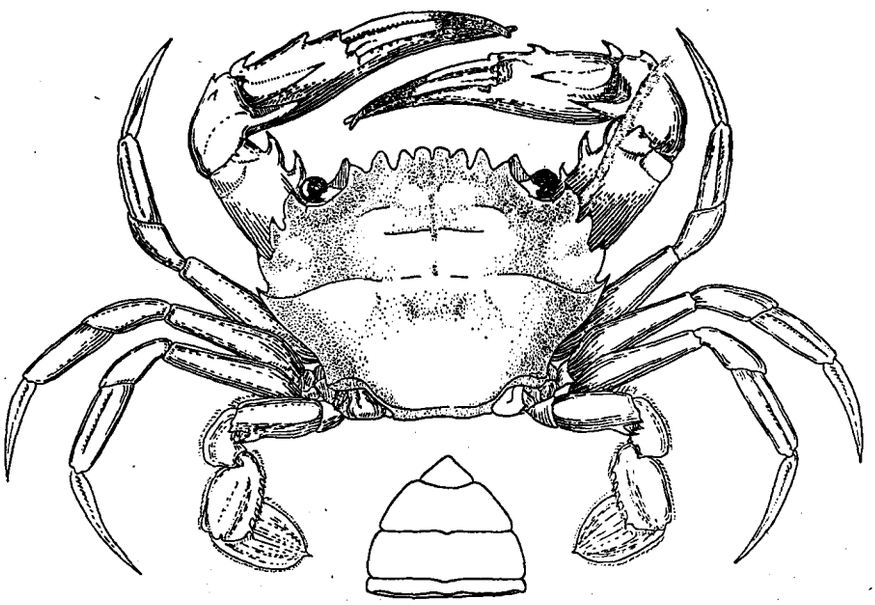


Fig. 74. *Charybdis paucidentata* (A. M. Edw.) (= *Ch. giardi* Nobili, ♀ cotype), dorsal view and abdomen (× 1½), drawn by Miss MILLON.

has been preserved in a dried condition; therefore I shall describe the largest specimen of stat. 53 of the *Ch. Giardi*-specimens, at the same time comparing it with the original description by G. NOBILI and with the cotypes.

Description: The cephalothorax, of which the regions are not clearly to be distinguished, is nearly bare and smooth. It is crossed by granular transverse ridges, which are rather faint: (1) one, between the last antero-lateral spines, interrupted by the cervical groove which is very faint on the gastric region, (2) a nearly straight, and unbroken one on the mesogastric region, (3) a short one on each of the protogastric regions and (4) one on the frontal region, widely interrupted in the middle.

The front is cut into six teeth. The median ones are truncate, but the angles are round; they

are separated from one another by a narrow incision, they are slightly prominent beyond the submedian teeth. The subtruncate, submedian teeth, as broad as the median teeth, are on a somewhat higher plane; they are a little directed outwards, the median borders sloping outwards and the lateral borders running nearly straight backwards. The triangular lateral teeth are a little prominent beyond and separated from the submedian ones by wide V-shaped incisions; they are a little acuter and broader than the submedian ones. The inner supra-orbital angles are on a higher plane than the frontal teeth, from which they can be easily distinguished.

The shape of the antero-lateral border differs materially from that of nearly all other *Charybdis*-species. There are four large teeth (of which the surfaces are granular) and two smaller ones. The anterior border of the first tooth is concave and a little granular, the outer border is rather convex. At the base of it there is a little spinule. The third tooth is a little broader than the first. The fourth tooth is a little spinule. The fifth tooth is as large as the third, the sixth tooth is smaller than the preceding one. The first, third and fifth teeth are the same shape, concave anterior borders, convex outer borders; except for the anterior border of the first tooth, all the borders are smooth. (In all the specimens the four large teeth are present, but the number of small teeth may vary: sometimes there are two, sometimes there is only one. NOBILI mentions a case in which there were three small teeth. In one of the specimens I examined the small second tooth on the right was not at the base of the first tooth, but at the top of the posterior border).

The postero-lateral borders converge rather strongly posteriorly.

The margin on the posterior border is curved and forms round angles with the postero-lateral borders.

The orbits, with a rather strong dorsal inclination, are wide. The granular upper border is cut into three parts by two incisions. The inner supra-orbital angle is broad, somewhat broader than the lateral frontal tooth. The lower granular border has one lateral incision; the lateral part has no distinct median lobe. The inner infra-orbital angle is sharp, tooth-like and prominent.

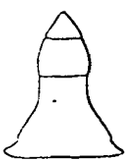


Fig. 75. *Charybdis pauridentata* (A. M. Edw.) (= *Ch. giardi Nobili*), ♂, abdomen (×1½), drawn by Miss MILLON.

The granular "basal" antenna-joint has one sharp tooth-like spine (NOBILI's description of this joint is: "il porte une grosse saillie aigüe et bidentée." In the cotypes and the other specimens, which I examined none had a bidenticulated procession).

The sub-orbital, sub-hepatic and pterygostomian regions are bare, only the sub-branchial region is pilose. The granular pleural groove is clearly distinguishable.

The sternum is smooth and bare.

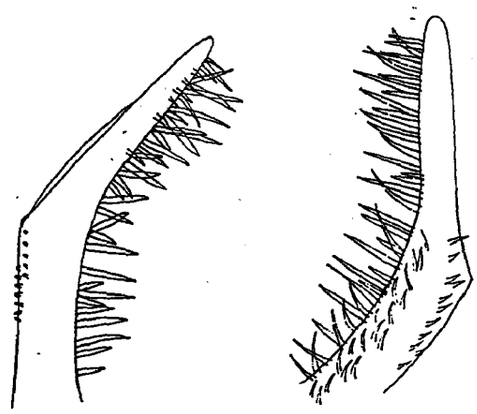
Of the sixth segment of the male abdomen the lateral borders are parallel for three fifths of their length, than they converge; the posterior angles are round; the anterior and posterior borders are straight; it is broader than long.

The chelipeds differ a little in size only. On the anterior border of the arm there are three spines, the proximal one of which is the smallest, the others are large; the posterior border has no spine; the inferior border sometimes has a little spinule at its distal end. The wrist has a well-developed spine at the inner angle and three spinules at the outer angle. The hand, four-costate, has three sharp spines, one at the wrist-articulation and two, side-by-side, about the middle; moreover, there are two knobs at the base of the movable finger; at the base of the inner costa there is an obtuse knob. The movable finger is longer than the palm. In the larger cheliped the hand is distinctly swollen. The chelipeds have very little granulation, only some granulation on the upper surface of the arm, some little developed granulation on the wrist and some granules on the hand.

The second up to the fourth pairs of pereiopods have no specific characteristics.

The merus of the natatory leg, which is long and slender, has the usual spine a short distance proximal to the distal end of the posterior border; the propus has a row of spinules on its posterior border.

The first male pleopod has a rather narrow neck. There are many spines at the distal part of the outer border of the neck and on the outer border of the apex; but they do not reach the top of the apex. On the anterior surface of the distal part of the neck there are short, thick spines near the inner border; there are long, slender spines near the outer border. On the posterior surface of the distal part of the neck there are two rows of small spinules on the inner border. The transparent membrane, which is present in about all species I could not observe.



a *b*

Fig. 76. *Charybdis paucidentata* (A. M. Edw.) (= *Ch. giardi* Nobili). *a*, apex of first male pleopod, posterior view; *b*. id., anterior view.

I suppose this species is identical with *G. paucidentatum* A. M. Edw. as NOBILI already suggested. Comparing, namely, the figures of the type of *Ch. Giardi* with the type of *Goniosoma paucidentatum* (which has no chelipeds, the reason why NOBILI hesitated to state the identicy), I observed only one difference: the armature of the antenna-joint. But as I stated previously, I suppose that the armature of this joint may be variable, just as the number of small antero-lateral teeth is variable in this species. These two specimens being identical, the name of "*paucidentata*" has the priority.

Geographical distribution: Dadalus (BALSS); Aldabra (RATHBUN); Mauritius (A. MILNE EDWARDS); Persian Gulf (NOBILI).

Measurements in mm:

	Nobili, 1906, Stat. 52, cotypes		Nobili, 1906, Stat. 53	
	♂	juv.	♀	juv.
Length of cephalothorax	27.5	15.5	28.8	11.0
Breadth of cephalothorax	36.5	20.5	38.8	14.0
Front	13.0	8.0	15.0	5.5
Interorbital space	—	10.0	18.5	7.0
Orbit	—	4.5	6.4	3.2
Orbito-frontal border	—	18.0	30.5	13.0
Length of cheliped (largest)	57.3	30.5	38.5	20.5
Length of merus (natatory leg)	10.0	6.0	9.5	4.5
Breadth of merus (natatory leg)	4.3	2.5	4.5	2.0
Length 6th ♂ abdominal segment	4.0	—	—	—
Breadth 6th ♂ abdominal segment	5.0	—	—	—
Posterior border	12.5	7.0	13.2	5.3
Cephalothorax breadth / Cephalothorax length	1.33	1.32	1.35	1.27

31. *Charybdis* (*Goniosupradens*) *erythrodactyla* (Lam.) (figs. 77—80).

Portunus erythrodactylus, 1818, LAMARCK, Hist. des Animaux sans vertèbres, vol. 5, p. 259.
Thalamita erythrodactyla, 1834, MILNE EDWARDS, Hist. nat. des Crust., vol 1, p. 464.
Thalamita pulchra, 1839, RANDALL, Journ. Ac. Nat. Sc. Philad., vol. 8, pt 1, p. 117, pl. 4.
Thalamita Teschoiraei, 1851, MILNE EDWARDS, Ann. Sc. Nat., (3), vol. 16, p. 30, pl. 10, figs. 5, 6, 7.
Charybdis durae, 1850, ADAMS & WHITE, Zoology of the voyage of H.M.S. "Semarang", Crust., p. 48.
Goniosoma erythrodactylum, 1861, A. MILNE EDWARDS, Arch. Mus. Paris, vol. 10, p. 369.
1889, DE MAN, Zool. Jahrb., Syst., vol. 4, p. 424.
1901, LENZ, Zool. Jahrb., Syst., vol. 14, p. 456.
Charybdis (*Goniosoma*) *erythrodactyla,* 1906, RATHBUN, Bull. U. S. Fish Comm. for 1903, pt 3, p. 872, pl. 4.
1906a, NOBILI, Bull. Sc. Fr. Belg., vol. 40, p. 118, fig. 3.
?? 1906b, NOBILI, Ann. Sc. Nat. Zool., (9), vol. 4, p. 194.
1911, RATHBUN, Trans. Linn. Soc. London, (2), vol. 14, p. 206.
Goniosoma erythrodactylum, 1913, KLUNZINGER, Nova Acta Ac. Leop. Carol., vol. 99, no 2, p. 364.
Charybdis erythrodactyla, 1915, LAURIE, Journ. Linn. Soc. Zool., vol. 31, p. 438.
1923, SENDLER, Abh. Senck. Naturf. Ges., vol. 38, p. 40.
1934, LEE BOONE, Bull. Vanderbiltmuseum, vol. 5, p. 57, pls 18 and 19.
1936, LEENE, Zool. Meded., vol. 19, p. 117, figs. 1—5.

The type specimen of LAMARCK, deposited in the Paris Museum is lost, likewise the specimens determined by A. MILNE EDWARDS.

A. MILNE EDWARDS (1861) considers *Thalamita Teschoiraei* Milne Edwards, *Goniosoma dura* Adams & White and *Thalamita pulchra* Randall identical with *Goniosoma erythrodactylum* Lam., without giving the reasons. But when we compare the figures of *Th. pulchra, Th. Teschoiraei* with the figures of *Ch. erythrodactyla* given by RATHBUN (1906) we are certain, that these species are identical. RATHBUN (1906) compared, moreover, *Ch. erythrodactyla* with *Th. pulchra* Randall.

About the specimens in more recent literature there is still a good deal of confusion. For instance, I am not sure that the specimens mentioned by NOBILI (1906b) and by KLUNZINGER (1913) belong to this species. I have a strong suspicion, that these specimens belong to *Ch. obtusifrons* Leene.

From the Senckenberg Museum I had on loan two male specimens (nr. 1243) and one ovigerous female (nr. 1244) from Makatea (Paumotu), determined by SENDLER, which belong to this species. In the female the right antero-lateral border has eight teeth: five large and three small ones. The third small tooth is located at the base of the outer border of the third large tooth; it is much smaller than the other small teeth.

In the "Muséum National d'Histoire Naturelle" in Paris I examined a specimen from Madagascar (Dr. Millot coll., det. Balss, 1922), as far I know not mentioned in the literature.

Here follows the description of the male and female specimens of the Marquesas Islands (Coll. Leiden), which I published previously (1936).

Description: The cephalothorax is rather convex, bare, with some faint granular ridges on the anterior part, viz., (1) one between the last antero-lateral teeth, only slightly interrupted by the cervical groove, (2) one on the gastric region, interrupted in the middle (very slightly), (3) one on each of the protogastric regions, (4) one on the frontal region, interrupted in the middle. The regions can be fairly well distinguished. Between the ridges (2) and (4) the cephalothorax has a faintly granular surface; this granulation stretches on to the bases of the first four antero-lateral teeth. There is also some very faint granulation on the bases of the frontal teeth. In the female the granulation on the anterior part of the cephalothorax is somewhat more distinct.

The front is cut into six triangular, blunt teeth. The median and sub-median teeth are nearly the same size and somewhat directed outwards; the medians are only very little prominent beyond the submedian teeth, the incisions between the median teeth and between the median and submedian teeth are very distinct and V-shaped. The submedian teeth are separated from the lateral teeth by a much

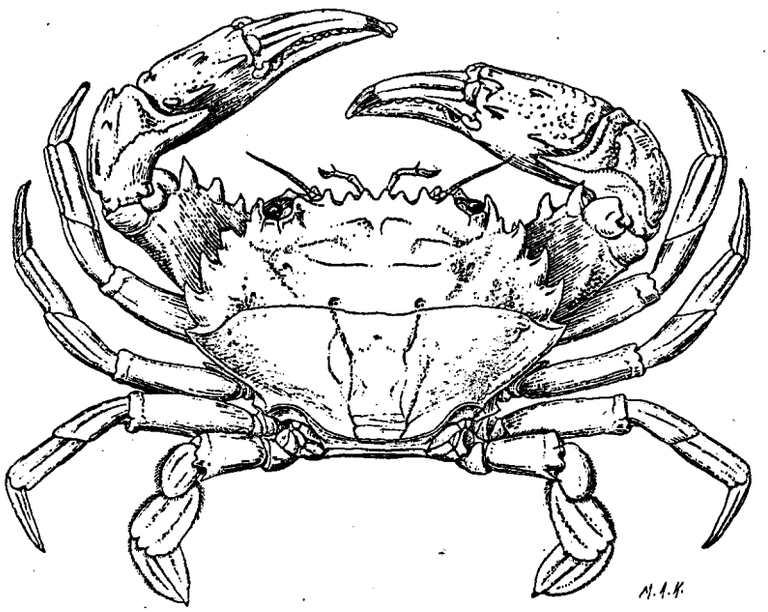


Fig. 77. *Charybdis erythrodactyla* (Lam.), ♂, dorsal view (× 2/3). (From LEENE, 1936, fig. 1).

wider and deeper incision. The latter teeth are somewhat larger than the submedian and median teeth, they are directed forward and separated from the inner supra-orbital angles by a very wide, but not so deep incision; they are a little prominent beyond these orbital angles. On a lower plane there is a little tooth-like knob between the median and submedian teeth, which can be clearly distinguished from the dorsal side.

The antero-lateral borders are cut into seven rather acute teeth, of which the second and fourth are very small. The first tooth (the outer supra-orbital angle) has a nearly straight anterior border, the outer border is convex. The second tooth is very small, it seems to be cut out of the convex outer border of the first tooth. The third tooth has a concave anterior border, a convex outer border and a dark-coloured top. The fourth tooth is an acute very small tooth. The fifth tooth is the same shape as the third tooth, but it is somewhat larger (in the male at the base of the right fifth tooth there is an indication for another small tooth, which should be separated from the larger tooth). The sixth tooth is like the preceding one, only a little smaller. The seventh tooth is much shorter than the preceding ones, it is directed more laterally.

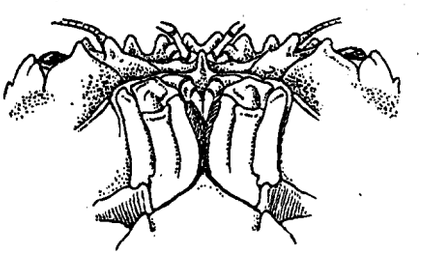


Fig. 78. *Charybdis erythrodactyla* (Lam.), frontal view. Natural size. (From LEENE, 1936, fig. 2).

The postero-lateral borders converge rather strongly posteriorly.

The posterior border is nearly straight, and its margin forms a curve with the postero-lateral borders.

The smooth upper border of the orbit is divided into three parts by two distinct incisions. The inner supra-orbital angle is broad (much broader than the lateral frontal teeth), its top is blunt, and it is on a higher plane than the frontal teeth; the inner angle of the outer part is somewhat turned up. The lower border has one incision laterally; the inner infra-orbital angle is rather prominent, tooth-like, but its top is not acute; the outer part of this border has a faintly distinguishable inner lobe.

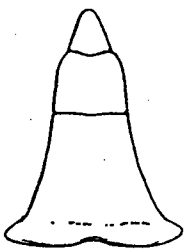


Fig. 79. *Charybdis erythrodactyla* (Lam.), abdomen of the male. Natural size. (From LEENE, 1936, fig. 3).

The "basal" antenna-joint has a lobe-like tooth, which is directed outwards, and some little granules; it touches the front, excluding the flagellum from the orbit.

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are nearly bare. Except for the pterygostomian and sub-branchial regions they are all finely granular.

The sternum is bare.

Of the abdomen of the male the third up to the fifth terga are fused. The second and third terga are transversely keeled, but not so sharp as in *Ch. acutifrons* (de Man). The sixth tergum has posteriorly convergent lateral borders (the anterior half has nearly parallel sides), the posterior border is curved anteriorly, the anterior border is nearly straight.

The length of the chelipeds in the male is nearly $2^1/_7$ the length of the cephalothorax. All the surfaces are smooth. The anterior border of the arm has three spines (the proximal one is the smallest and the distal one the largest); the distal border ends anteriorly in a broad tooth; the posterior border has no armature, it has some granules on the distal part (in the female the right cheliped has four spines on the anterior border of the arm). The wrist has a strong spine at the inner angle and three spinules at the outer angle; the carinae are distinct, smooth, there are only a few granules near and on the carina, which corresponds with the spine at the outer angle. The palm has seven smooth costae, the two costae on the inner surface are ill-developed; only between the two costae on the upper surface there occur a few granules; the upper surface has five spines, of which the two spines on the anterior costa are most clearly developed, the other three are much smaller; at the base of the proximal spine on the anterior costa there is a large knob. The movable finger is longer than the palm.

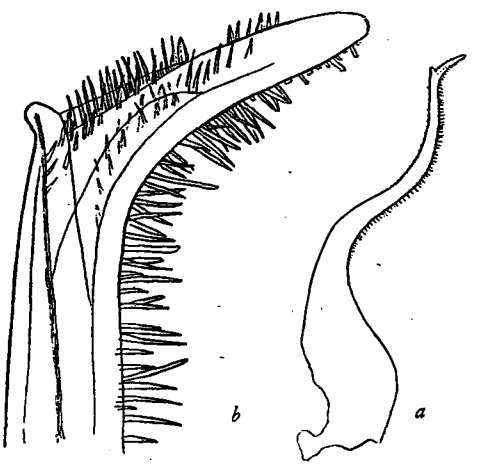


Fig. 80. *Charybdis erythrodactyla* (Lam.). *a*, first male pleopod, posterior view (× 3½); *b*, apex, posterior view (× 25). (From LEENE, 1936, figs 4 and 5).

The other legs have no specific characteristics. Of the natatory leg the meropodite is twice as

long as broad, the posterior border has the usual spine; the propodite has the posterior border with only a few very minute spinules.

The first male pleopod has a long, sinuous neck. It has many spines on the outer border, which occur to the top of the apex (in the figure the last spines at the apex are small, they were broken off during the examination). The inner border of the neck has some small spines. On the inner border and on the posterior surface the apex has a great many spines, placed in rows, which are partly under the transparent membrane; the spines do not occur on the distal parts of the inner border and posterior surface of the apex.

This species is nearly related to *Ch. acutifrons* (de Man) and *Ch. obtusifrons* Leene, in having seven antero-lateral teeth, the second and fourth of which are small.

It may de distinguished from *Ch. acutifrons* by having: (1) a differently shaped front, the frontal teeth being rather obtuse, (2) no transverse ridges on the posterior part of the cephalothorax, (3) a "basal" antenna-joint with one obtuse tooth, instead of two spines, (4) a differently shaped sixth tergum of the male abdomen, (5) a differently shaped first male pleopod.

It is distinct from *Ch. obtusifrons* by having: (1) a differently shaped front, the frontal teeth being less obtuse; (2) no transverse ridges on the posterior part of the cephalothorax, (3) a "basal" antenna-joint with one obtuse tooth, instead of large granules.

There is also some superficial resemblance to *Ch. paucidentata* (A. M. Edw.). But it differs from the latter species a.o. by having *five* large antero-lateral teeth instead of *four* large teeth, a differently shaped front, a differently armed "basal" antenna-joint, a differently shaped first male pleopod.

Geographical distribution: Red Sea (NOBILI?, KLUNZINGER?, LAURIE); Salomon, Amirante (RATHBUN, 1911); Mauritius (ADAMS & WHITE); Moluccas (A. M. EDWARDS); Hawaii Islands (RANDALL, LENZ, RATHBUN 1906); Tahiti (BOONE); Marquesas (A. M. EDWARDS, SENDLER, LEENE).

Measurements in mm:

	Senckenb. Mus. no. 1243 ♂	Senckenb. Mus. no. 1243 ♂	Senckenb. Mus. no. 1244 ♀
Length of cephalothorax	53.8	52.8	52.6
Breadth of cephalothorax	78.4	76.6	76.8
Front	23.7	24.2	24.2
Interorbital space	32.2	31.9	31.8
Orbit	7.5	7.8	7.8
Orbito-frontal border	46.5	46.0	47.0
Length of cheliped (largest)	106.3	105.6	97.8
Length of merus natatory leg	15.4	15.9	14.8
Breadth of merus natatory leg	8.0	8.2	7.8
Length 6th ♂ abdominal segment	8.5	8.7	—
Breadth 6th ♂ abdominal segment	9.8	9.5	—
Posterior border	23.7	23.9	24.5

32. *Charybdis* (*Goniosupradens*) *acutifrons* (de Man) (Figs. 81—84).

Goniosoma acutifrons, 1879, De Man, Notes from the Leyden Museum, vol. 1, p. 60.
1883, De Man, Notes from the Leyden Museum, vol. 5, p. 152.
Charybdis (*Goniosoma*) *erythrodactyla*, 1925, Delsman & De Man, Treubia, vol. 6, p. 311, pl. 15a.
1929, De Man, Bijdrage tot de Dierkunde, 26ste afl., p. 7.
Charybdis acutifrons, 1936, Leene, Zool. Mededeelingen, vol. 19, p. 121, figs. 6—10.

Of this species I have given a new description (1936) for it appeared that De Man had not observed that this species has seven antero-lateral teeth, the second and fourth of which are very small.

In the Siboga and Gier collections there are no specimens of this species.

Description: The cephalothorax is covered with a dense tomentum. The regions are hardly distinguishable. There occur several faint granular transverse ridges: (1) a ridge between the

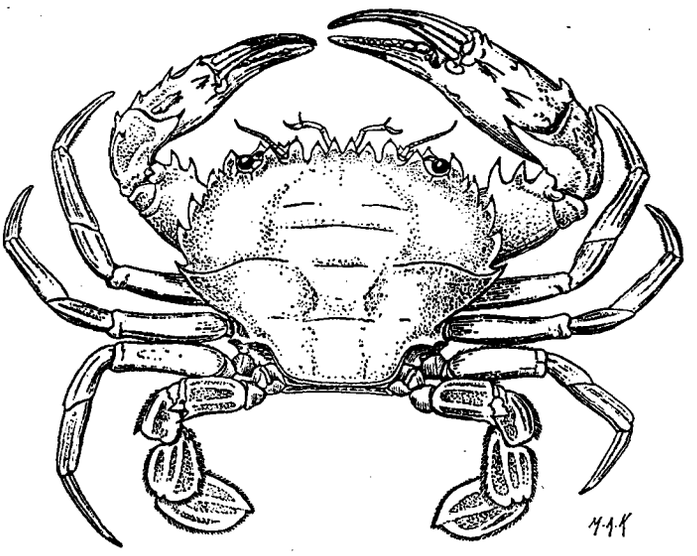


Fig. 81. *Charybdis acutifrons* (de Man), ♂, dorsal view (× 2/3). (From Leene, 1936, fig. 6).

last antero-lateral spines, only interrupted by the cervical groove, (2) anterior to it an unbroken one on the gastric region, (3) a short one on each of the protogastric regions, (4) one on the frontal region, interrupted in the middle, (5) a short one on each of the mesobranchial regions, and (6) one on the cardiac regions (in the older specimens (5) and (6) are hardly to be distinguished).

The front is cut into six teeth, which are of nearly the same size and shape. The triangular median teeth have somewhat curved sides and are very sharply pointed. The triangular submedian teeth, somewhat broader at the base than the median ones, have somewhat outward directed tops and they are separated from the lateral teeth by a somewhat deeper incision than the one that separates the submedian teeth from the median teeth. The lateral teeth are somewhat longer than the others, but at the base they are as broad as the submedian teeth; by a wide incision they are separated from the inner supra-orbital angles, which are on a somewhat higher plane. On a lower plane there is a little knob between the median and submedian teeth, which is only distinguishable at the ventral side.

There are seven antero-lateral teeth. The second and fourth teeth are very small. All the other teeth are claw-like, very acute with dark-coloured tops; the anterior borders are concave and the

posterior borders convex. The first, third and sixth teeth are the same size. The fifth tooth is a little larger and the seventh tooth is the smallest and narrowest.

The postero-lateral borders converge rather strongly posteriorly.

The posterior border is nearly straight and its margin forms a curve with the postero-lateral borders.

The upper border of the orbit is divided into three parts by two distinct incisions; the border

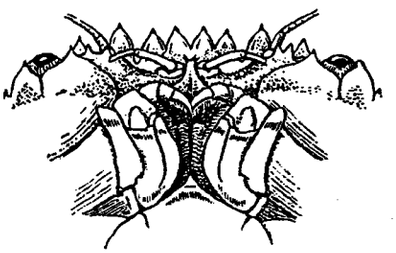


Fig. 82. *Charybdis acutifrons* (de Man), ventral view of the anterior part of the cephalothorax. Natural size. (From LEENE, 1936, fig. 7).

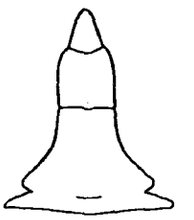


Fig. 83. *Charybdis acutifrons* (de Man), abdomen of the male. Natural size. (From LEENE, 1936, fig. 8).

of the middle part is granular. The inner supra-orbital angle is triangular with an acute top, which is directed forward; it is a little broader than the frontal teeth. The granular lower border has a distinct lateral incision. The inner infra-orbital angle is prominent, dentiform, very acute.

The "basal" antenna-joint, which touches the front, excluding the flagellum from the orbit, has two spines.

The antennulae are folded transversely.

The sub-orbital, sub-hepatic, pterygostomian and sub-branchial regions are pilose. The pleural groove is not so distinct on account of the rather dense tomentum.

The sternum is bare.

Of the abdomen of the male the lateral borders of the sixth segment are for two thirds parallel and then they converge posteriorly, the posterior border is somewhat curved anteriorly, the anterior border is nearly straight; it is broader than long. The second and third terga are transversely keeled.

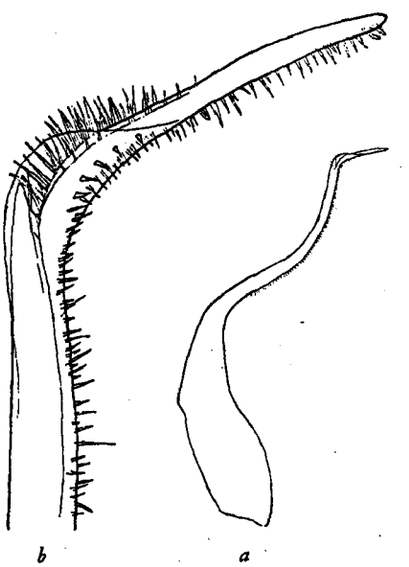


Fig. 84. *Charybdis acutifrons* (De Man). *a*, first male pleopod, posterior view (× 3½); *b*, apex, posterior view (× 25). (From LEENE, 1936, figs. 9 and 10).

The length of the chelipeds is nearly twice the length of the cephalothorax. The under surface is bare, the upper surface is rather pilose. On the anterior border of the arm there are three spines (the proximal one is the smallest), the distal border ends anteriorly in a short spine, the posterior border is unarmed, the posterior surface has some granules, the inferior border ends distally in a spinule. The wrist has a strong spine at the inner angle and three spinules at the outer angle. The hand is seven-costate and has five spines on the upper surface (one at the wrist-articulation, two on the anterior costa and two

on the next outer one); at the base of the proximal spine on the anterior costa there is a little knob, which is much less developed than in *Ch. erythrodactyla* (Lam.); there are a few granules on the upper surface. The movable finger is much longer than the palm.

The other legs are without specific characteristics.

The length of the meropodites of the natatory legs is about twice the breadth, its posterior border has a strong spine near the distal end, its distal border ends posteriorly in a spinule. The propodite has a row of spinules at its posterior border.

The first male pleopods have a long curved, narrow neck. The apex is long and narrow. The transparent membrane has a strongly curved border. On the inner border of the apex there occur many spines in several rows, placed on the inner border. The outer border of the apex also has many spines from the top downwards, and these spines are continued on the outer border of the neck. The inner border of the neck has only a few very small spinules, hardly to be distinguished even under the microscope.

This species differs from *Ch. erythrodactyla* (Lam.) by: (1) the shape of the front, the frontal teeth being much acuter, (2) having transverse ridges on the posterior part of the cephalothorax, (3) a different armature of the "basal" antenna-joint, (4) a different shape of the male abdomen, (5) a different shape of the first male pleopod.

It differs from *Ch. obtusifrons* Leene by: (1) the frontal teeth being very acute, instead of nearly truncate, (2) a different armature of the "basal" antenna-joint.

Geographical distribution: Pulau Berhala (DE MAN, 1929); Bay of Batavia (DELSMAN & DE MAN); Timor (DE MAN 1879, 1883); Moluccas (LEENE).

Measurements of the specimens I examined in mm (cf. LEENE, Zool. Meded., vol. 19, p. 124):

	a	b	c	d	e	f
Length of cephalothorax	44.5	61.0	56.8	21.0	60.0	53.0
Breadth of cephalothorax	61.5	85.0	76.2	60.0	80.0	71.0
Front	20.0	28.0	26.0	10.0	27.0	24.0
Interorbital space	27.5	36.0	33.4	13.5	36.0	31.3
Orbit	7.5	9.0	8.0	4.2	8.5	8.0
Orbito-frontal border	42.5	56.0	51.0	22.0	53.0	47.5
Length of cheliped	86.5 (r.)	116.2 (l.)	102.0 (l.)	37.0 (r.)	130.0	100.0
Length of merus (natatory leg)	12.5	17.0	16.0	6.5	17.0	14.8
Breadth of merus (natatory leg)	7.0	8.8	8.2	3.0	9.0	7.8
Length 6th ♂ abdominal segment	6.8	—	—	3.0	8.7	—
Breadth 6th ♂ abdominal segment	7.0	—	—	4.0	9.5	—
Posterior border	20.2	29.5	28.0	10.0	27.5	24.0

a, ♂ Moluccas; b, ♀ Moluccas; c, ♀ Moluccas; d, ♂ Timor (immature); e, ♂ Bay of Batavia; f, ♀ Pulau Berhala.

33. *Charybdis* (*Goniosupradens*) *obtusifrons* Leene (Figs. 85—87).

Goniosoma erythrodactylum, 1883, DE MAN, Notes from the Leyden Museum, vol. 5, p. 152.
Charybdis obtusifrons, 1936, LEENE, Zool. Mededeelingen, vol. 19, p. 124, figs. 11 and 12.

The holotype (an ovigerous female, coll. by J.A. Kruyt, 1882, from Djeddah) is deposited in the "Rijksmuseum van Natuurlijke Historie" in Leiden.

Description: The cephalothorax is pilose. The regions can hardly be distinguished. There are several granular transverse ridges: (1) one between the last antero-lateral teeth, only interrupted by the cervical groove, (2) an unbroken one on the gastric region, (3) one on the protogastric region, (4) one on the frontal region, interrupted in the middle, (5) one on the mesobranchial region, (6) one on the cardiac region (ridges (5) and (6) are faintly granular). There is some granulation at the bases of the first three teeth, but this is hardly to be distinguished owing to the pile.

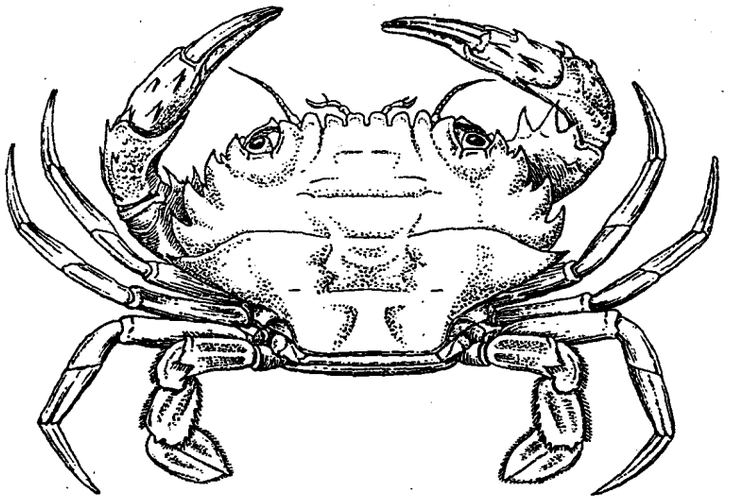


Fig. 85. *Charybdis obtusifrons* Leene, ♀ type, dorsal view (× 2). (From LEENE, 1936, fig. 11).

The front is cut into six blunt teeth. The median teeth are nearly square-cut, with round angles, there is a narrow incision between them. They are separated from the submedian teeth by a somewhat wider, but less deep incision. Of the submedian teeth the median borders are shorter than the lateral borders, the anterior borders slope somewhat up outwards; the median and lateral borders are nearly parallel to the median axis (on a lower plane between the median and submedian teeth there is a very little knob, which is not visible at the dorsal side). The lateral teeth are separated from the preceding ones by a much wider and deeper incision, of which the borders only slightly diverge anteriorly, the borders of these teeth converge slightly, their tops are round; they are prominent beyond the inner supra-orbital angles of which they are separated by a V-shaped incision.

There are seven antero-lateral teeth. The first tooth has a straight anterior border, a convex outer border, a sharp dark-coloured top. The second tooth is very small, with serrated anterior and outer borders (observed with a strong lens), without a sharp top. The third tooth is larger than the first, it has a concave anterior border, a convex outer border and a sharp, dark-coloured top. The fourth tooth is very small, a little more acute than the second, its outer border is serrated. The fifth tooth is the largest with a concave anterior border and a convex outer border. The sixth tooth is narrower than the fifth, more spine-like, and the seventh tooth is still more spine-like. The fifth up to seventh teeth all have sharp, dark-coloured tops.

The postero-lateral borders converge rather strongly posteriorly.

The posterior border is nearly straight, its margin forms a curve with the postero-lateral borders.

The orbit has two distinct incisions in its upper border; the inner supra-orbital angle is distinctly wider than the lateral frontal teeth, it has a round top; the inner angle of the outer part of this border is somewhat turned up. The lower granular border is cut into two parts by a distinct lateral incision; the inner infra-orbital angle is somewhat prominent and tooth-like; the outer part has a distinct inner lobe.

The "basal" antenna-joint touches the front, excluding the flagellum from the orbit; its surface is granular; it his a little crest with large granules.

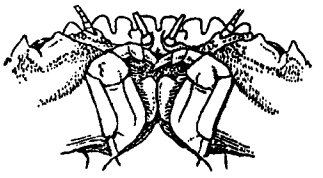


Fig. 86. *Charybdis obtusifrons* Leene, ventral view of the anterior part of the cephalothorax. (× 2). (From LEENE, 1936, fig. 12).

The antennulae are folded transversely.

The sub-orbital, sub-hepatic and pterygostomian regions are pilose and granular. The sub-branchial region is bare and only granular near the last antero-lateral teeth. There is a distinct granular, pleural groove.

The sternum is bare.

The female abdomen has its usual segments.

The length of the cheliped is about 5/3 times the length of the cephalothorax. The whole surface is pilose. The anterior border of the arm has three spines, of which the proximal one is the smallest; the distal part of the posterior border has a granular surface. The wrist has a strong spine at the inner angle, three spinules at the outer angle, a granular carina and granules on the upper surface, the other carinae are smooth. The hand is seven-costate. The palm bears four spines and one spinule: two spines on the inner costa (at the base of the proximal one there is a granular knob), one spine and a spinule on the next outer costa, a spine at the wrist-articulation; on the proximal part of the upper surface there occur a few large granules. The movable finger is longer than the palm, the costae are very distinct.

The other walking-legs are without specific characteristics.

Of the natatory leg the meropodite has the usual spine near the distal end of the posterior border, its distal border ends posteriorly in a spinule; the propodite has the posterior border with a row of spinules.

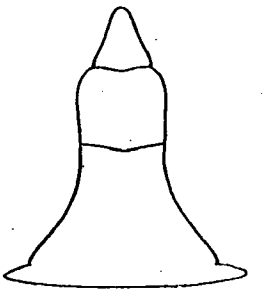


Fig. 87. *Charybdis obtusifrons* Leene (= *Ch. erythrodactyla*, Senckenberg Museum, nr. 205), ♂, abdomen (× 2).

DE MAN (1889) described a male specimen of *Ch. erythrodactyla,* which showed several differences. I could examine this specimen, which I borrowed from the Senckenberg Museum (nr 205). It proved to belong to *Ch. obtusifrons* Leene. I am now able to complete the description with the characteristics of the male abdomen and pleopod. This specimen differs from the holotype in having eight antero-lateral teeth: five large and three small ones. The front is not symmetrical, the left half is divided into two lobes instead of three truncate teeth. The armature of the "basal" antenna-joint is also a little different, there is, namely, a low crest, which ends in a row of large granules. But these joints are not completely intact, so I cannot state the exact shape.

The sixth tergum of the male abdomen has for the larger part parallel sides, posteriorly they converge rather suddenly. The anterior border is straight, the posterior border is slightly curved anteriorly.

The first male pleopod has exactly the same shape as the first ♂ pleopod of *Ch. acutifrons* (de Man).

It differs from *Ch. erythrodactyla* (Lam.) by having: (1) nearly truncate frontal teeth, instead of obtuse triangular teeth, (2) a "basal" antenna-joint with large granules instead of an obtuse tooth, (3) à transverse ridge on the cardiac and the mesobranchial regions.

It differs from *Ch. acutifrons* (de Man) by having: (1) nearly truncate frontal teeth, instead of very acute, triangular teeth, (2) a "basal" antenna-joint with large granules instead of two spines.

Dr T. SAKAI (Simoda M. B. S., Japan) wrote me, that he was in possession of specimens from the Daitô-Isls in Loo Choo, belonging to this species.

Geographical distribution: Red Sea (DE MAN); Japan (SAKAI).

Measurements in mm:

	Senckenb. Mus. no. 205 Tahiti ♂
Length of cephalothorax	38.0
Breadth of cephalothorax	58.0
Front	18.0
Interorbital space	25.8
Orbit	ab. 7.7
Orbito-frontal border	ab. 38.2
Length of cheliped (largest)	80.3
Length of merus natatory leg	11.3
Breadth of merus natatory leg	6.2
Length 6th ♂ abdominal segment	6.1
Breadth 6th ♂ abdominal segment	6.5
Posterior border	18.2

TABULAR VIEW OF THE GEOGRAPHICAL DISTRIBUTION OF THE GENERA MENTIONED IN THIS PART

In this view East Asia includes Siam and the Philippines, and Singapore is reckoned to belong to the Indian Archipelago.

GENERA AND SPECIES	EAST COAST OF AMERICA	ATLANTIC	MEDITERRANEAN	RED SEA	CAPE REGION	WEST INDIC	CEYLON	EAST INDIC	INDIAN ARCHIPELAGO	EAST ASIA	AUSTRALIA	PACIFIC	WEST COAST OF AMERICA
Carcinus													
C. maenas	+	+	+	+	—	—	+	—	—	—	—?	+	+
Benthochascon													
B. Hemingi	—	—	—	—	—	—	—	+	—	—	—	—	—
Ovalipes													
O. iridescens	—	—	—	—	—	—	—	—	+	+	—	—	—
O. punctatus	+	—	—	—	+	—	—	—	—	+	+	+	+
Aeneacancer													
A. molleri	—	—	—	—	—	—	—	—	—	—	+	—	—
Parathranites													
P. orientalis	—	—	—	—	—	+	—	+	—	+	—	+	+
P. hexagonum	—	—	—	—	—	—	—	—	—	—	—	+	—
P. latibrachium	—	—	—	—	—	—	—	—	—	—	—	+	—
Lissocarcinus													
L. arkati	—	—	—	—	—	+	—	—	+	+	—	—	—
L. boholensis	—	—	—	—	—	—	—	+	—	+	—	—	—
L. elegans	—	—	—	—	—	—	—	—	—	—	—	+	—
L. holothuricola	—	—	—	—	—	—	—	—	—	—	—	+	—
L. laevis	—	—	—	—	—	+	+	+	+	+	—	+	—
L. orbicularis	—	—	—	—	—	+	+	—	+	+	+	+	—
L. ornatus	—	—	—	—	—	—	—	+	—	—	—	—	—
L. polybioides	—	—	—	—	—	+	+	+	+	+	+	—	—
Caphyra													
C. alata	—	—	—	+	—	+	—	—	—	—	—	—	—
C. alcyoniphila	—	—	—	—	—	—	—	—	—	+	—	—	—
? C. archeri	—	—	—	—	—	—	—	—	+	—	—	—	—
C. hemisphaerica	—	—	—	—	—	—	—	—	—	—	—	+	—
C. laevis	—	—	—	—	—	—	—	—	+	—	+	+	—
C. monticelli	—	—	—	+	—	—	—	—	—	—	—	—	—
C. natatrix	—	—	—	—	—	—	—	—	+	—	—	—	—
C. octodentata	—	—	—	—	—	+	—	—	—	—	+	—	—
C. polita	—	—	—	+	—	—	—	—	—	—	—	—	—
C. rotundifrons	—	—	—	—	—	—	—	—	—	—	+	+	—
C. rotundifrons var. tridentata	—	—	—	+	—	+	—	—	—	—	—	—	—
C. Rouxi	—	—	—	—	—	—	—	—	+	—	—	—	—
C. semigranosa	—	—	—	—	—	—	—	—	+	+	—	—	—
C. tricostata	—	—	—	—	—	+	—	—	—	—	—	—	—
C. unidentata	—	—	—	—	—	+	—	—	—	—	—	—	—
C. yo-okodai	—	—	—	—	—	—	—	—	—	+	—	—	—

GENERA AND SPECIES	EAST COAST OF AMERICA	ATLANTIC	MEDITERRANEAN	RED SEA	CAPE REGION	WEST INDIC	CEYLON	EAST INDIC	INDIAN ARCHIPELAGO	EAST ASIA	AUSTRALIA	PACIFIC	WEST COAST OF AMERICA
Carupa													
C. laeviscula	–	–	–	+	–	+	–	+	+	+	–	+	–
C. tenuipes	–	–	–	–	–	–	–	–	–	–	–	+	–
Lupocyclus													
L. philippinensis	–	–	–	–	–	+	+	+	+	+	–	–	–
L. quinquedentatus	–	–	–	–	–	+	–	–	+	–	–	+	–
L. rotundatus	–	–	–	–	–	+	–	+	+	–	+	–	–
Podophthalmus													
P. nacreus	–	–	–	–	–	–	–	+	+	–	–	–	–
P. vigil	–	–	–	+	–	–	–	–	+	+	+	+	–
Scylla													
S. serrata	–	–	–	+	+	+	+	+	+	+	+	+	–
Charybdis													
Ch. acuta	–	–	–	–	–	–	–	–	–	+	–	–	–
Ch. acutifrons	–	–	–	–	–	–	–	–	+	–	–	–	–
Ch. affinis	–	–	–	–	–	–	–	+	+	+	–	–	–
Ch. africana	–	–	–	–	+	–	–	–	–	–	–	–	–
Ch. amboinensis	–	–	–	–	–	–	–	–	+	–	–	–	–
Ch. anisodon	–	–	–	+	–	–	–	–	+	+	–	+	–
Ch. annulata	–	–	–	–	–	+	–	+	+	+	–	–	–
Ch. bimaculata	–	–	–	–	–	–	–	+	–	+	–	–	–
Ch. callianassa	–	–	–	–	–	+	–	+	+	+	+	–	–
Ch. cruciata	–	–	–	+	+	+	+	+	+	+	+	–	–
Ch. demani	–	–	–	–	–	–	–	–	+	–	–	–	–
Ch. erythrodactyla	–	–	–	+	–	+	–	–	+	–	–	+	–
Ch. hellerii	–	–	+	+	–	+	+	+	+	+	–	+	–
Ch. heterodon	–	–	–	+	–	–	–	–	–	–	–	–	–
Ch. hongkongensis	–	–	–	–	–	–	–	–	+	+	–	–	–
Ch. hoplites	–	–	–	–	–	+	–	+	–	–	–	–	–
var. longicollis	–	–	–	+	–	–	–	–	–	–	–	–	–
var. omanensis	–	–	–	–	–	+	–	–	–	–	–	–	–
var. pusilla	–	–	–	–	–	+	–	–	–	–	–	–	–
Ch. japonica	–	–	–	+	–	–	–	–	–	+	–	–	–
Ch. jaubertensis	–	–	–	–	–	–	–	–	–	–	+	–	–
Ch. lucifera	–	–	–	–	–	+	+	+	+	+	–	–	–
Ch. miles	–	–	–	–	–	–	–	+	+	+	+	–	–
Ch. natator	–	–	–	+	+	+	+	+	+	+	–	+	–
Ch. obtusifrons	–	–	–	+	–	–	–	–	–	+	–	+	–
Ch. orientalis	–	–	–	+	+	+	+	–	+	+	+	+	–
Ch. paucidentata	–	–	–	+	+	–	–	–	–	–	–	–	–
Ch. rathbuni	–	–	–	–	–	–	–	–	+	–	–	–	–
Ch. rivers-andersoni	–	–	–	–	–	+	–	–	–	+	–	–	–
Ch. rosaea	–	–	–	–	–	–	–	–	+	–	–	–	–
Ch. rostrata	–	–	–	–	–	–	+	+	+	–	–	–	–
Ch. subornata	–	–	–	–	–	+?	–	+	+	+	–	–	–
Ch. truncata	–	–	–	–	–	+	+	+	+	+	+	–	–
Ch. vadorum	–	–	–	–	–	+	–	+	+	+	–	–	–
Ch. variegata	–	–	–	+	–	+	–	+	+	+	+	–	–
var. brevispinosa	–	–	–	–	–	–	–	–	+	–	–	–	–
var. salehensis	–	–	–	–	–	–	–	–	+	–	–	–	–
Ch. whiteleggei	–	–	–	–	–	–	–	–	–	–	+	–	–

LIST OF ALL KNOWN INDO-PACIFIC SPECIES, OF THE GENERA MENTIONED IN THIS PART

In this list I have not included the *Charybdis*-species whose places in this genus are uncertain.

GENERA AND SPECIES	LITERATURE	LOCALITY
Carcinus Leach (= **Carcinides** Rathbun n.n.)	ALCOCK, 1899b, p. 12 (see also for the older literature); RATHBUN, 1906, p. 867 and 1930, p. 14; KLUNZINGER, 1913, p. 319.	
C. maenas (L.)	ALCOCK, 1899b, p. 13 (see also for the older literature and synonyms); RATHBUN, 1906, p. 867 and 1930, p. 15, fig. 4; KLUNZINGER, 1913, p. 321, pl. 4, figs 15a, b; CALMAN, 1927, p. 212.	Atlantic, Panama Bay, Pacific, Ceylon, Red Sea, Suez Canal, Mediterranean, Black Sea, North Sea.
Benthochascon Alcock	ALCOCK & ANDERSON 1899, p. 10; ALCOCK 1899a, p. 68 and 1899b, p. 15.	
B. Hemingi Alcock and Anderson	ALCOCK & ANDERSON 1899, p. 10; ALCOCK, 1899a, p. 69, pl. 3, fig. 2 and 1899b, p. 15; DOFLEIN, 1904, p. 90, pl. 29, figs. 1, 2 and pl. 41, figs. 1 2.	Andaman Sea, Nicobar Isls., 338—738 m.
Ovalipes Rathbun (= **Platyonychus** Latreille).	This paper, p. 2.	
O. punctatus Rathbun (= *O. bipustulatus* (M. Edw.), = *Pl. trimaculatus* de Haan, = *Anisopus punctata* de Haan, = *Portunus catharus* White, = *Pl. purpureus* Dana)	DE HAAN, 1850, p. 44, pl. 2, fig. 1; MILNE EDWARDS, 1834, p. 437, pl. 17, figs. 7—10; WHITE in Dieffenb. New Zealand, vol. 2, p. 264; MIERS, 1874, p. 2, pl. 1, fig. 1 and 1876, p. 32; HASWELL, 1882, p. 84; FILHOL, 1885, p. 383; MIERS, 1886, p. 202; RATHBUN, 1898, p. 597 and 1902, p. 25; LENZ, 1902, p. 757; DOFLEIN, 1904, p. 92, pl. 32, fig. 6; STEBBING, 1904, p. 13 and 1910, p. 305; CHILTON, 1910, p. 554; PARISI, 1916, p. 170; BALSS, 1922, p. 101; HALE, 1927, p. 147, fig. 148; RATHBUN, 1930, p. 24, pls 5, 6, 7 8; YU YOKOYA 1933, p. 174.	Cape Region, E. Asia, Australia, Pacific, W. and E. Coast of America. up to 80 m.
O. iridescens (Miers)	This paper, p. 2.	Indian Archipelago, E. Asia. up to 324 m.
Aeneacancer Ward	WARD, 1933, p. 381.	
A. molleri Ward	WARD, 1933, p. 381, pl. 23, fig. 11.	Montague Islands, N.S. Wales, about 64 m.
Parathranites (Miers) [= **Lupocyclus** (*Parathranites*)]	MIERS, 1886, p. 186; ALCOCK, 1899b, p. 16.	
P. orientale (Miers)	MIERS, 1886, p. 186, pl. 17, fig. 1; ALCOCK, 1899b, p. 17; RATHBUN, 1911, p. 204; YU YOKOYA, 1933, p. 178.	Ki-Isls., North of Admiralty Isls., Malabar Coast, Coromandel Coast, Andamans, Salomon Bank, Japan.
P. hexagonum Rathbun	RATHBUN, 1906, p. 867, pl. 12, fig. 3, textfig. 25.	Molokai Island, till 300 m.
P. latibrachium Rathbun	RATHBUN, 1906, p. 868, textfig. 26.	Modu Manu or Bird Island, till 45 m.
Lissocarcinus Ad. & Wh.	This paper, p. 3.	
L. arkati Kemp	This paper, p. 7.	Hughli River; Hong Kong.
L. boholensis Semper	SEMPER in NAUCK, 1880, pp. 60 and 67; RATHBUN, 1910b, p. 363; GORDON, 1931, p. 533; CHOPRA, 1931, p. 310; this paper, p. 4.	Bohol; 15 miles West of Koh Kut.
L. elegans Boone	LEE BOONE, 1934, p. 50, pl. 16; this paper, p. 5.	Teviatoa Reef, Raiatea, Society Isls.

GENERA AND SPECIES	LITERATURE	LOCALITY
L. holothuricola Streets	STREETS, 1877, p. 111; EDMONDSON, 1923, p. 23; CHOPRA, 1931, p. 311; this paper, p. 4.	Palmyra Island.
L. laevis Miers	This paper, p. 8.	W. Indic, Ceylon, E. Indic, E. Asia, Indian Archipelago, Pacific; till 100 m.
L. orbicularis Dana	This paper, p. 7.	Gulf of Aden, Ceylon, Indian Archipelago, E. Asia, Australia, Pacific.
L. ornatus Chopra	CHOPRA, 1931, p. 307, pl. 7, fig. 1.	Andamans.
L. polybioides Ad. & Wh.	This paper, p. 6.	W. Indic, Ceylon, E. Indic, Indian Archipelago, E. Asia, Australia; till 130 m.
Caphyra Guérin (= **Camptonyx** Heller)	This paper, p. 8.	
C. alata Richters	RICHTERS, 1880, p. 154, pl. 16, figs 25, 26; NOBILI, 1901, p. 12; LENZ, 1910, p. 553, fig. 1; KLUNZINGER, 1913, p. 371.	Red Sea, Fouqets, Tamatava (reef)
C. alcyoniphila Monod	MONOD, 1928, p. 4, figs. 1—4; BALLS, 1934, p. 506.	Nhatrang, Annam.
? C. archeri Walker	WALKER, 1890, p. 116, pl. 9, figs 4, 5; BALSS, 1934, p. 506.	Singapore.
C. hemisphaerica Rathbun	RATHBUN, 1911, p. 204, pl. 15, fig. 9.	Coetivy, about 10 m.
C. laevis A. M. Edw.	This paper, p. 9.	This paper, p. 9.
C. monticelli Nobili	NOBILI, 1901, p. 10 and 1906, p. 188; KLUNZINGER, 1913, p. 371; LAURIE, 1915, p. 437, pl. 45, figs 1 and 1a.	Massaua, Tadjourah.
C. natatrix Zehnter	ZEHNTER, 1894; NOBILI 1901, p. 11.	
C. octodentata Haswell	HASWELL, 1882, p. 82; BALSS, 1934, p. 506; NOBILI, 1901, p. 12.	Nosy Marirana, Palm Island
C. polita Heller	HELLER, 1861, p. 359, pl. 3, figs 26—28; NOBILI, 1901, p. 12 and 1906, p. 189; KLUNZINGER, 1913 p. 370; BALSS, 1924, p. 2.	Cosseir (?), Gulf of Suez, Djeddah.
C. rotundifrons A. M. Edw.	A. M. EDWARDS, 1869, p. 156, pl. 7, figs 11 & 12 and 1873, p. 174; BORRADAILE, 1900, p. 579; CALMAN, 1900, p. 20; RATHBUN, 1911, p. 204; MCNEILL, 1926, p. 307.	New Caledonia, Rotuma, Torres Straits, Praslin, Capricorn Group.
C. rotundifrons var. *tridentata* (= *? Cancer tridentatus* Forskal)	RICHTERS, 1880, p. 154; DOFLEIN, 1904, p. 95; NOBILI, 1907, p. 386; KLUNZINGER, 1913, p. 372.	Mauritius, Teone Kura.
C. Rouxi Guérin	GUÉRIN, 1832, p. 287, pl. 8a, figs 1—5; NOBILI, 1901, p. 12.	New Ireland.
? C. semigranosa De Man	DE MAN, 1887b, p. 337; NOBILI, 1901, p. 12.	Pulo Edam
C. tricostata Richters	RICHTERS, 1880, p. 154; NOBILI, 1901, p. 12.	Mauritius
C. unidentata Lenz	LENZ, 1910, p. 555, textfigs 2, 3 and 4.	Tamatave
C. yo-okadai Sakai	SAKAI, 1933, p. 141, pl. 13, fig. 3, textfigs 2a and b.	Susaki.
Carupa Dana	This paper, p. 9.	
C. laeviscula Heller	This paper, p. 9.	Indo-Pacific region.
C. tenuipes Dana	DANA, 1852b, pt 1, p. 279, pl. 17,fig. 4; 1852a, p. 85; A. M. EDWARDS, 1861, p. 386 and 1873, p. 171; this paper, p. 9.	Poumotou Archipelago; New Caledonia
Lupocyclus Ad. & Wh.	This paper, p. 10.	
L. philippinensis Semper	This paper, p. 11.	This paper, p. 12.
L. quinquedentatus Rathbun	This paper, p. 11.	This paper, p. 11.
L. rotundatus Ad. & Wh.	This paper, p. 11.	This paper, p. 11.
Podophthalmus Lamarck	This paper, p. 12.	
P. nacreus Alcock	This paper, p. 14.	This paper, p. 14.
P. vigil (Fabr.)	This paper, p. 12.	This paper, p. 13.
Scylla de Haan	This paper, p. 14.	
S. serrata de Haan	This paper, p. 14.	This paper, p. 15.

GENERA AND SPECIES	LITERATURE	LOCALITY
Charybdis de Haan	This paper, p. 15.	
Ch. acuta (A. M. Edw.)	This paper, p. 50.	This paper, p. 52.
Ch. acutifrons (De Man)	Thsi paper, p. 138.	This paper, p. 140.
Ch. affinis Dana	This paper, p. 35.	This paper, p. 37.
Ch. africana Shen	This paper, p. 129.	This paper, p. 129.
Ch. amboinensis nom. nov.	This paper, p. 53.	This paper, p. 55.
Ch. anisodon De Haan	This paper, p. 64.	This paper, p. 67.
Ch. annulata (Fabr.)	This paper, p. 60.	This paper, p. 64.
Ch. bimaculata (Miers)	This paper, p. 126.	This paper, p. 129.
Ch. callianassa (Herbst)	This paper, p. 81.	This paper, p. 84.
Ch. cruciata (Herbst)	This paper, p. 24.	This paper, p. 27.
Ch. demani Leene	This paper, p. 76.	This paper, p. 76.
Ch. erythrodactyla (Lam.)	This paper, p. 134.	This paper, p. 137.
Ch. hellerii (A. M. Edw.)	This paper, p. 44.	This paper, p. 49.
Ch. heterodon Nobili	This paper, p. 73.	This paper, p. 73.
Ch. hongkongensis Shen	This paper, p. 110.	This paper, p. 113.
Ch. hoplites Wood-Mason	This paper, p. 99.	This paper, p. 102.
var. *longicollis* nov. var.	This paper, p. 107.	This paper, p. 110.
var. *omanensis* nov. var.	This paper, p. 104.	This paper, p. 107.
var. *pusilla* Alcock	This paper, p. 102.	This paper, p. 104.
Ch. japonica (A. M. Edw.)	This paper, p. 30.	This paper, p. 35.
Ch. jaubertensis Rathbun	This paper, p. 67.	This paper, p. 68.
Ch. lucifera (Fabr.)	This paper, p. 57.	This paper, p. 60.
Ch. miles De Haan	This paper, p. 38.	This paper, p. 42.
Ch. natator (Herbst)	This paper, p. 93.	This paper, p. 97.
Ch. obtusifrons Leene	This paper, p. 140.	This paper, p. 143.
Ch. orientalis Dana	This paper, p. 68.	This paper, p. 72.
Ch. paucidentata (A. M. Edw.)	This paper, p. 131.	This paper, p. 133.
Ch. rathbuni nov. spec.	This paper, p. 97.	This paper, p. 97.
Ch. rivers-andersoni Alcock	This paper, p. 28.	This paper, p. 30.
Ch. rosaea (Hombron et Jacquinot)	This paper, p. 43.	This paper, p. 44.
Ch. rostrata (A. M. Edw.)	This paper, p. 78.	This paper, p. 81.
Ch. subornata (Ortmann)	This paper, p. 122.	This paper, p. 125.
Ch. truncata (Fabr.)	This paper, p. 118.	This paper, p. 121.
Ch. vadorum (Alcock)	This paper, p. 114.	This paper, p. 117.
Ch. variegata (Fabr.)	This paper, p. 84.	This paper, p. 88.
var. *brevispinosa* Leene	This paper, p. 88.	This paper, p. 88.
var. *salehensis* nov. var.	This paper, p. 90.	This paper, p. 90.
Ch. whiteleggei Ward	This paper, p. 125.	This paper, p. 126.

LITERATURE CITED

ADAMS, ARTHUR & ADAM WHITE. 1850. Crustacea. Zoology of the Voyage of H.M.S. "Samarang".

ALCOCK, A. 1899a. An account of the Deep-Sea Brachyura, Investigator.

—— 1899b. Materials for a carcinological Fauna of India. no 4. The Brachyura Cyclometopa. pt 2. A revision of the Cyclometopa with an account of the families Portunidae, Cancridae and Corystidae. Journ. Asiatic Soc. Bengal, vol. 68, pt 2.

—— & A. F. MCARDLE, Illustrations of the Zoology of the Royal Indian Marine Survey Ship "Investigator". pt 4, pl. XVI——XXVII, 1896; pt 8, pl. XLVI—XLVIII, 1900.

BALSS, H. 1922. Ostasiatische Decapoden. IV. Die Brachyrhynchen (Cancridea), Archiv für Naturgesch., 88. Jahrgang, Abt. A.

—— 1924. Expedition S. M. Schiff „Pola" in das Rote Meer. Decapoden des Roten Meeres. III. Die Parthenopiden, Cyclo- und Catometopen. Denkschr. math.-naturw. Klasse, Wien, 99. Bnd.

—— 1934. Sur quelques Décapodes brachyoures de Madagascar, Faune des colonies françaises, t. 5, fasc. 8.

BOONE, LEE. 1934. Scientific Results of the World Cruise of the Yacht "Alva" 1931, W. K. Vanderbilt, commanding. Crustacea: Stomatopoda and Brachyura. Bull. Vanderbilt Marine Museum, vol. 5.

BORRADAILE, L. A. 1900. On some Crustaceans from the South Pacific, pt 4. Proc. Zool. Soc. London.

—— 1902. Marine Crustaceans. Fauna and geography of the Maldive and Laccadive Archipelagoes, vol. 1, pt. 3.

CALMAN, W. T. 1900. On a collection of Brachyura from Torres Straits. Trans. Linn. Soc. London, Zoology, (2), vol. 8.

—— 1927. Report on the Crustacea Decapoda (Brachyura). Zoological Results of the Cambridge Expedition to the Suez Canal. Trans. Zool. Soc. London, vol. 22.

CANO. 1899. Boll. Sc. Nat. Napoli, vol. 3.

CHILTON, Ch. 1910. Note on the dispersal of Marine Crustacea by means of ships. Trans. New Zealand Institute, vol. 43 (New Issue).

CHOPRA, B. N. 1931. Further Notes on Crustacea Decapoda in the Indian Museum. II. On some Decapod Crustaceans found in the cloaca of Holothurians. Rec. Indian Mus., vol. 33.

—— 1935, Further Notes on Crustacea Decapoda in the Indian Museum. VIII. On the Decapod Crustacea collected by the Bengal Pilot Service off the mouth of the River Hooghly. Brachygnatha (Oxyrhyncha and Brachyrhyncha). Rec. Ind. Mus., vol. 37.

DANA, J. D. 1852a. Conspectus Crustaceorum etc. Conspectus of the Crustacea... Exploring Expedition..., including the Crustacea Cancroideo. Exp. Corystoidea. Proc. Ac. Nat. Sc. Philad., vol. 6.

—— 1852b. U. S. Expl. Exp., Crust., pt 1, atlas.

DELSMAN, H. C. & J. G. DE MAN. 1925. On the "Radjungans" of the Bay of Batavia. Treubia, vol. 6.

DERJUGIN, K. M. & S. KOBJAKOWA. 1935. Zur Dekapodenfauna des Japanischen Meeres. Zool. Anz., vol. 112.

DOFLEIN, F. 1902. Ostasiatische Dekapoden. Abh. math.-naturw. Classe, Bayer. Ak. Wiss., 21. Bd, 3. Abt.

—— 1904. Wissenschaftliche Ergebnisse der deutschen Tiefsee-Expedition auf dem Dampfer „Valdivia", 1898—1899, 6. Bd.

EDMONDSON, C. H. 1923. Crustacea from Palmyra and Fanning Islands. Bernice P. Bishop Mus., Bull. 5.

FABRICIUS. 1798. Suppl. Ent. Syst.

FILHOL, H. 1885. Mission de l'Ile Campbell, vol. 3, pt 2, Zool., Paris. (Atlas).

GORDON, I. 1930. Seven new species of Brachyura from the coasts of China. Ann. and Mag. Nat. Hist., (10), vol. 6.

—— 1931. Brachyura from the Coasts of China. Journ. Linn. Soc. Zool., vol. 37.

—— 1934. Résultats scientifiques du voyage aux Indes Orientales Néerlandaises ..... Crustacea Brachyura. Mémoires du Musée Royal d'Histoire Naturelle de Belgique, Hors Série, vol. 3, fasc. 15.

GRANT, F. E. & ALLAN R. MCCULLOCH. 1906. On a collection of Crustacea from the Port Curtis District, Queensland. Proc. Linn. Soc. New South Wales for the year 1906, vol. 31.

GUÉRIN, F. E. 1832. Notice sur quelques modifications à introduire dans les Notopodes de M. Latreille, et établissement d'un nouveau genre dans cette tribu. Ann. Sc. Nat., vol. 25.

HAAN, W. DE. 1850. Fauna Japonica, Crustacea.
HALE, H. M. 1927. The crustaceans of South Australia, pt 1.
HASWELL, W. A. 1882. Catalogue Australian Crustacea.
HELLER, C. 1861, Beiträge zur Crustaceen-Fauna des rothen Meeres. Erster Teil. Sitzungsber. Ak. Wiss. math.-naturw. Classe, Wien, 43. Bd, 1. Abth.
—— 1865, Reise der Novara um die Erde. Zool. Teil, Bd 2, Abt. 3, Crustaceen.
HENDERSON, J. R. 1893, Contribution to Indian Carcinology. Trans. Linn. Soc. Zool., (2), vol. 5.
HERBST, J. F. W. 1790, Versuch einer Naturgesch. der Krabben und Krebse nebst einer systematischen Beschreibung ihrer verschiedenen Arten. Atlas.
HILGENDORF, F. 1878. Die von Herrn W. Peters in Moçambique gesammelten Crustaceen. Monatsberichte der Königl. Preuss. Ak. Wiss. Berlin.
HOFFMANN, C. K. 1874. Crustacés et Echinodermes de Madagascar et de l'île de la Réunion. Rech. Faune Madagascar, 5me partie, 2me livraison.
HOMBRON et JACQUINOT. 1853. Voyage au pôle Sud. Crustacea. vol. 3.
IHLE, J. E. W. & H. F. NIERSTRASZ. 1929. Leerboek der Algemeene Dierkunde. Utrecht.
IVES, J. E. 1892. Echinoderms and Arthropods from Japan. Proc. Ac. Nat. Sc. Philad. (1891).
KEMP, S. 1918. Zoological results of a tour in the far East. Crustacea, Decapoda and Stomatopoda. Mem. As. Soc. Bengal, vol. 6.
—— 1923. Notes on Crustacea Decapoda in the Indian Museum. 16. On two interesting crabs from the mouth of the river Hughli. Rec. Ind. Mus., vol. 25.
KLUNZINGER, C. B. 1912. Über einige Ergebnisse meiner Studien über die Rundkrabben des Roten Meeres. Verhandl. der deutschen Zool. Gesellschaft, vol. 22.
—— 1913. Die Rundkrabben (Cyclometopen) des Roten Meeres. Nova Acta Ac. Caes. Leop. Carol. germanicae naturae curiosorum, 99. Bd.
LANCHESTER, W. F. 1900. On a collection of Crustaceans made at Singapore and Malacca. Pt. I. Crustacea Brachyura. Proc. Zool. Soc. London.
—— 1901. On the Crustacea collected during the "Skeat" Expedition to the Malay Peninsula, together with a note on the genus Actaeopis. Pt I. Brachyura, Stomatopoda and Macrura. Proc. Zool. Soc. London, 1901. pt 2.
LAURIE, R. DOUGLAS. 1906. On the Brachyura. Report Ceylon Pearl Oyster Fisheries off the Gulf of Manaar by W. A. Herdman. Supplementary. Rep. 40.
—— 1915. Reports on the marine Biology of the Sudanese Red Sea. XXI. On the Brachyura. Journ. Linn. Soc. Zool., vol. 31.
LEENE, J. E. 1936. Note on Charybdis erythrodactyla (Lam.), Ch. acutifrons (de Man) and Ch. obtusifrons nov. spec. Zool. Meded., vol. 19.
—— 1937. Notes on Charybdis demani nov. spec., Ch. variegata var. brevispinosa nov. var., and other Charybdis-species. Zool. Meded., vol. 19.
LENZ, H. & F. RICHTERS. 1881. Beitrag zur Crustaceenfauna von Madagascar. Abh. Senckenb. Naturf. Ges. Frankfurt, vol. 12.
LENZ, H. 1901. Ergebnisse einer Reise nach dem Pacifik (Schauinsland 1896—1897). Crustaceen. Zool. Jahrb., Abt. Syst., Bd. 14.
—— 1905. Ostafrikanische Dekapoden und Stomatopoden. Abh. Senckenb. naturf. Ges., Bd 27.
—— 1910. Crustaceen von Madagascar, Ostafrika und Ceylon. Voeltzkow Reise in Ostafrika, Bd 2.
MAN, J. G. DE. 1878. On some new or imperfectly known podophthalmous Crustacea of the Leyden Museum. Notes Leyden Museum, vol. I.
—— 1883. Carcinological studies in the Leyden Museum. Notes Leyden Mus., vol. 5.
—— 1887a. Übersicht der indo-pacifischen Arten der Gattung Sesarma Say, nebst einer Kritik der von W. Hess und E. Nauck in den Jahren 1865 und 1880 beschriebenen Decapoden. Zool. Jahrb., Abt. Syst., Bd 2.
—— 1887b. Bericht über die von Herrn Dr J. Brock im indischen Archipel gesammelten Decapoden und Stomatopoden. Archiv für Naturgesch., 53. Jahrg., B d I.
—— 1887c. Report on Podophthalmous Crustacea of the Mergui Archipelago. Journ. Linn. Soc. Zool., vol. 22.
—— 1892. Decapoden des Indischen Archipels. Weber's Zool. Ergebnisse einer Reise in niederländisch Ost-Indien. 2. Bd, 2. Heft.

MAN, J. G. DE. 1893. Report on the podophthalmous Crustacea, collected ... in some islands of the Malay Archipelago. Notes Leyden Museum, vol. 15.
—— 1895. Bericht über die von Herrn Schiffscapitän Storm zu Atjeh, an den westlichen Küste von Malakka, Borneo und Celebes sowie in der Java-See gesammelten Decapoden und Stomatopoden. Zool. Jahrb. Abt. Syst., Bd 8; 1896, Bd 9, pl. 13, figs 9 a, 10 a.
—— 1902. Die von Herrn Professor Kükenthal im Indischen Archipel gesammelten Dekapoden und Stomatopoden. Abh. Senck. Naturf. Ges., 25 Bd, 3. Heft.
—— 1904. Beschreibung einiger brachyuren Krebse aus posttertiären Schichten der Minahassa, Celebes. Samml. Geol. Reichsmus. Leiden, (1), vol. 7.
—— 1925. On two miniature Radjungans from Sumatra's East-Coast. Treubia, vol. 6.
—— 1929. On a collection of decapod and stomatopod Crustacea from Pulau Berhala, an islet situated in the Straits of Malacca. Bijdragen tot de Dierkunde. 26e aflevering.
MIERS, E. J. 1874. Zoology of the Voyage of H.M.S. "Errebus and Terror". Crustacea.
—— 1876. Catalogue of the stalk- and sessile-eyed Crustacea of New Zealand. London.
—— 1879. On a collection of Crustacea..... in the Corean and Japanese Seas. Proc. Zool. Soc. London.
—— 1880. On a collection of Crustacea from the Malayasian Region. pt I. Crustacea Oxyrhyncha and Cylometopa except Telphusidae. Ann. and Mag. Nat. Hist., (5), vol. 5.
—— 1884. Crustacea. Report on the Zoological collections made in the Indo-Pacific Ocean during the voyage of H.M.S. "Alert" 1881—1882. Pt I. the collections from Melanesia; pt II. the collections from the Western Indian Ocean.
—— 1886. Report of the Scientific Results ..... H.M.S. "Challenger", vol. 17, pt. Brachyura.
MILNE EDWARDS, A. 1860. Histoire des Crustacés podophthalmaires fossiles. Ann. Sc. Nat. Zool., (4), vol. 14.
—— 1861. Etudes zoologigues sur les Crustacés récents de la famille des Portuniens. Arch. du Mus. d'Hist. Nat., vol. 10.
—— 1867. Descriptions de quelques espèces nouvelles de Crustacés Brachyures. Bull. Soc. Entom., vol. 7.
—— 1869. Descriptions de quelques Crustacés nouveaux de la famille des Portuniens. Nouv. Arch. du Mus. d'Hist. Nat. de Paris, vol. 5.
—— 1873. Recherches sur la faune carninologique de la Nouvelle-Calédonie. 2me partie. Groupe des Cyclometopes. Portuniens. Nouv. Arch. du Mus. d'Hist. Nat. de Paris, vol. 9.
MILNE EDWARDS, H. 1834. Histoire naturelle des Crustacés, comprenant l'anatomie, la physiologie et la classification de ces animaux. Tome premier. Atlas.
MIYAKE, SADAYOSHI. 1936. Report on the Brachyura of Riukiu Islands collected ..... during the years 1932—1934. II. A list of the known species of the Brachyura from Ishigaki—Shima. Annotationes Zoologicae Japonenses, vol. 15.
MONOD, TH. 1928. Sur un Caphyra indo-chinois commensal d'un Alcyon. Service océanographique des pêches de l'Indochine. Station maritime de Caude. 8e note.
—— 1931a. Crustacés de Syrie. in: A. Gruvel. Les Etats de Syrie. Paris.
—— 1931b. Über einige indo-pazifische Decapoden der Meeresfauna Syriens. Zool. Anz., Bd 92.
MÜLLER, F. 1890. Zur Crustaceenfauna von Trincomali. Verh. der Naturf. Ges. in Basel, vol. 8.
SEMPER in: NAUCK, E. 1880. Das Kaugerüst der Brachyuren, Zeitschr. wiss. Zool., vol. 34.
MCNEILL, FRANK A. 1926. The biology of North-West Islet Capricorn Group (J). Crustacea. Austr. Zoologist, vol. 4.
—— 1929. Studies in Australian Carcinology, no 3. Rec. Austr. Mus., vol. 17.
—— & MELBOURNE WARD. 1930. Carcinological notes I. Rec. Austr. Mus., vol. 17.
NOBILI, G. 1899. Contribuzioni alla conoscenza della fauna carcinologica della Papuasia, delle Molucche e dell' Australia. Ann. del Mus. Civ. di Storia Naturale di Genova, (2 a), vol. 20 (40).
—— 1900. Decapodi e Stomatopodi Indo-Malesi. Ann. Mus. Civ. di Storia Naturale di Genova, (2 a), vol. 20 (40).
—— 1901. Decapodi e Stomatopodi Eritrei. Ann. del. Mus. Zool. di Napoli (nuova serie), vol. 1, no 3.
—— 1903. Crostacei di Singapore. Boll. Mus. Zool. Anat. comparata della Univ. di Torino, vol. 18. no. 455.
—— 1905. Crostacei di Zanzibar. Boll. dei Mus. di Zool. ed. Anat. comparata della Univ. di Torino, vol. 20, no 506.
—— 1906a. Mission J. Bonnier et Ch. Pérez (Golfe Persique 1901). Crust. Décapodes et Stomatopodes. Bull. scient. Franco-Belgique, vol. 40.
—— 1906b. Fauna carcinologique de la mer Rouge. Décapodes et Stomatopodes. Ann. Sc. Nat. Zool., (9), vol. 4.

NOBILI, G. 1907. Ricerche sui Crostacei della Polinesia (Decapodi, Stomatopodi, Anisopodi e Isopodi). Mem. Reale Acc. Sc. Torino, (2), vol. 57.

ORTMANN, A. 1893. Die Decapoden-Krebse des Strassburger Museums mit besonderer Berücksichtigung der von Herrn Dr Döderlein bei Japan und bei den Liu-Kiu-Inseln gesammelten ..... Formen. VI. Teil. Zool. Jahrb., Abt. Syst., Bd 7.

PARISI, B. 1916. I decapodi giapponesi del Museo di Milano. IV. Cyclometopa. Atti Soc. Ital. Sc. Nat., vol. 55.

PAULSON, A. 1875. Recherches sur les Crustacés de la Mer Rouge (Russian).

PESTA, O. 1911. Wiss. Forschungsreise nach den Samoa-Inseln, dem Neuguinea-Archipel und der Salomoninseln. Denkschr. math.-naturw. Klasse. Ak. Wiss. Wien, Bd 88.

RANDALL, J. W. 1839. Catalogue of the Crustaceans brought by Thomas Nuttall and J. K. Townsend, from the West Coast of North America and the Sandwich Islands. Journ. Ac. Nat. Sc. Philad., vol. 8, pt i.

RATHBUN, M. J. 1897. A revision of the nomenclature of the Brachyura. Proc. Biol. Soc. Washington, vol. 9.

—— 1898. The Brachyura collected by the U. S. Fish. Comm. Steamer Albatross on the voyage from Norfolk, Virginia to San Francisco, California. 1887—1888. Proc. U. S. Nat. Mus., vol. 21.

—— 1902. Japanese Stalk-eyed Crustaceans. Proc. U. S. Nat. Mus., vol. 26.

—— 1902. Crabs from the Maldive Islands. Bull. Mus. Comp. Zool. at Harvard College, vol. 39.

—— 1906. The Brachyura and Macrura of the Hawaiian Islands. U. S. Fish. Comm. Bull. for 1903. pt. 3.

—— 1907. in: STIMPSON. Smiths. Misc. Coll., vol. 49.

—— 1910a. Decapod Crustaceans collected in Dutch East India and elsewhere by Mr Thomas Barbour in 1906—1907. Bull. Mus. Comp. Zool. at Harvard Coll., vol. 52.

—— 1910b. The Danish Expedition to Siam 1899—1900. V. Brachyura. Mém. de l'Acad. Royale des Sciences et des Lettres de Danemark, (7), vol. 5.

—— 1911. The Percy Sladen Trust Expedition to the Indian Ocean in 1905. Marine Brachyura. Trans. Linn. Soc. London (2), vol. 14, pt 2.

—— 1923. Report on the Crabs obtained by the F. I. S. "Endeavour" on the coasts of Queensland, New South Wales, Victoria, South Australia and Tasmania. Commonwealth of Australia, Fisheries, vol. 5, pt 3.

—— in EDMONDSON. 1923. Crustacea from Palmyra and Fanning Islands. Bernice P. Bishop Museum Bull. 5.

—— 1924. Results Dr E. Mjöberg's Swedish Scientific Expedition to Australia 1910——1913. 37. Brachyura, Albuneidae and Porcellanidae. Arkiv för Zoologi, Bd 16, no 23.

—— 1929. New and rare Chinese crabs. Lignan Science Journal, vol. 8.

—— 1930. The Cancroid Crabs of America of the families Euryalidae, Portunidae, Atelecyclidae, Cancridae and Xanthidae. U. S. Nat. Mus., Bull. 52.

RICHTERS, F. 1880. Beiträge zur Meeresfauna der Insel Mauritius und der Seychellen. Decapoda. Berlin.

ROUX, J. 1917. Nova Guinea. Résultats de l'expédition scientifique néerlandaise à la Nouvelle-Guinée, vol. 5, Zoologie, livr. 6, Crustacés.

RÜPPELL, E. 1830. Beschreibung und Abbildung 24 Arten kurzschwänzigen Krabben.

SAKAI, T. 1934. Brachyura from the coast of Kyusyu, Japan. Science reports of the Tokyo Bunrika Daigaku, Section B, vol. 1.

—— 1935. New or rare species of Brachyura, collected by the "Misago" during the Zoological Survey around the Izu-Peninsula. Science Reports of the Tokyo Bunrika Daigaku. Section B, vol. 2.

—— 1936. Report on the Brachyura collected by Mr F. Hiro at Palao Islands. Science reports of Tokyo Bunrika Daigaku, Section B, vol. 2.

SENDLER, A. 1923. Die Decapoden und Stomatopoden der Hanseatischen Südsee-Expedition. Abh. Senck. naturf. Ges., 38. Bd, Heft 1.

SHEN, C. J. 1932a. The crabs of Hong Kong, pt 3. Hong Kong Naturalist, vol. 3, no 1.

—— 1932b. The Brachyuran Crustacea of North China, Zoologica Sinica. Series A. Invertebrates of China. Vol. 9, fasc. 1.

—— 1934. The Crabs of Hong Kong, pt 4. The Hong Kong Naturalist, Supplement, number 3.

—— 1935. On a new species of Charybdis, belonging to the subgenus Gonioneptunus, from South Africa. Ann. and Mag. Nat. Hist., (10), vol. 15.

—— 1936. On a collection of Brachyuran Decapoda from Hainan Island with description of three new species. The Chinese Journal of Zoology, vol. 2.

SHEN, C. J. 1937. Bull. Raffl. Museum, no 13.
STEBBING, Th. R. R. 1904. South African Crustacea, pt 2. Marine Investigations in South Africa, vol. 2. Department of Agriculture.
—— 1908. South African Crustacea, pt 4. Ann. South Afr. Mus., vol. 6, pt 1.
—— 1910. General catalogue of South African Crustacea (pt 5 of South African Crustacea). Ann. South Afr. Mus., vol. 6, pt 4.
—— 1917. I. The Malacostraca of Natal. Ann. Durban Mus., vol. 2, pt. 1.
—— 1918. Some Crustacea of Natal. Ann. Durban Mus. vol. 2, pt 2.
STEINITZ. 1933. Pubbl. Stat. Zool. Napoli, vol. 13.
STIMPSON, W. 1858. Prodomus descriptionis animalium evertrebratorum quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, Cadwaladaro Riggold et Johanne Rodgers ducibus, observavit et descripsit. Pars 4. Crustacea Cancroidea et Corystoidea, Cancridae. Proc. Ac. Nat. Sc. Philad. (1858).
STIMPSON, W. 1907. Report on the Crustacea. Brachyura and Anomura collected by the North Pacific Exploring Expedition 1853—1856. Smiths. Misc. Coll., vol. 49.
STREETS. 1877. Bull. U. S. Nat. Mus., vol 7.
TESCH, J. J. 1918. The Decapoda Brachyura of the Siboga Expedition. II. Goneplacidae and Pinnotheridae. Monographe 39 c.
THALLWITZ, J. 1892. Decapoden-Studien (Ostindischer Archipel). Abh. und Ber. Mus. Dresden, 1890/91.
URITA, TOMOYE. 1926. A check list of Brachyura found in Kagosima, Japan. Printed by the Tsingtao Times. Tsingtao.
WALKER, A. O. 1887. Notes on a collection of Crustacea from Singapore. Journ. Linn. Soc. Zool. London, vol. 20.
WARD, MELBOURNE. 1933. New genera and species of Marine Decapoda Brachyura, from the coast of N. S. Wales and Queensland. Austr. Zoologist, vol. 7, pt 5.
WHITELEGGE, Th. 1900. Scientific results Expedition "Thetis" off the coast of New South Wales, Crustacea, pt 1. Austr. Mus. Sydney, Memoir 4, pt 2.
WOOD-MASON, J. 1877. Description of a new species of Portunidae from the Bay of Bengal. Ann. and Mag. Nat. Hist., (4), vol. 19.
YOKOYA, YU. 1928. Report on the biological survey of Mutsu Bay. 10. Brachyura and Crab-shaped Anomura. Sc. Rep. Tôhoku Imp. Univ., (4), Biology, vol. 3, no 4, fasc. 2.
—— 1933. On the distribution of Decapod Crustaceans inhabiting the Continental Shelf around Japan. Journ. Coll. Agric. Tokyo Univ., vol. 12.
ZEHNTER. 1894. Crustacés de l'archipel malais. Revue Suisse Zool., vol. 2.

SAMENVATTING

Het uitgebreide *Portunidae*-materiaal, verzameld door de Siboga-Expeditie, werd mij enkele jaren geleden voor een onderzoek door Prof. Dr J. E. W. IHLE met toestemming van wijlen Prof. MAX WEBER ter beschikking gesteld. Tegelijkertijd had ik gelegenheid het veelomvattende materiaal, met het onderzoekingsvaartuig „Gier" verzameld, te bewerken. In het „Zoölogisch Museum" (Amsterdam) bevonden zich verder nog enkele kleinere collecties, die tot dusver niet gedetermineerd en (of) waarvan de resultaten van het onderzoek nog niet gepubliceerd waren. Het bleek al bij den aanvang, dat er in de familie *Portunidae* verschillende geslachten zijn, die een herziening dringend noodig hadden, zoodat ik het plan opvatte van de geslachten, waarvan het materiaal in onze collecties uitgebreid genoeg was, een herziening te geven. Van de genera, waarvan het materiaal onvoldoende was, of waarin door het geringe aantal soorten nog geen verwarring was ontstaan, heb ik mij beperkt tot het aangeven van kleine uitbreidingen aan reeds bestaande beschrijvingen, indien dit gewenscht was.

Daar ik nog niet de geslachten *Neptunus* de Haan en *Thalamita* Latreille heb herzien en dus geen volledig overzicht heb van de Indo-Pacifische vertegenwoordigers van de onderfamilie *Lupinae* Alcock, geef ik in dit eerste deel geen algemeene karakteristiek van de familie, noch een indeeling in subfamilies. Ik hoop dit te doen na de twee genoemde geslachten te hebben bewerkt, en dan tevens een determinatietabel tot de verschillende Indo-Pacifische geslachten toe te voegen. — Thans worden behandeld de genera: *Ovalipes* Rathbun, *Lissocarcinus* Ad. & Wh., *Caphyra* Guérin, *Carupa* Dana, *Lupocyclus* Ad. & Wh., *Podophthalmus* Lam., *Scylla* de Haan, *Charybdis* de Haan.

Van het geslacht *Ovalipes* Rathbun werd *O. iridescens* Miers door de Siboga-Expeditie voor de eerste maal in den Indischen Archipel gevonden. — Van het geslacht *Lissocarcinus* Ad. & Wh. werden door de Siboga-Expeditie verzameld *L. orbicularis* Dana, *L. laevis* Miers en *L. polybioides* Ad. & Wh., waarvan de laatste soort voor de eerste maal in den Ind. Archipel werd aangetroffen. De „Gier" verzamelde *L. arkati* Kemp, welke hierdoor voor de eerste maal in den Ind. Archipel werd waargenomen. — Van het geslacht *Caphyra* Guérin werd een exemplaar van *C. laevis* A. M. Edw. door de Siboga-Expeditie verzameld. Ik betwijfel, of *C. semigranosa* de Man van *C. laevis* A. M. Edw. is te onderscheiden. — Van het geslacht *Carupa* Dana werd door de Siboga-Expeditie en de „Gier" materiaal van *C. laeviscula* Heller verzameld. Ik handhaaf de twee soorten *C. laeviscula* Heller en *C. tenuipes* Dana. — De drie soorten van het geslacht *Lupocyclus* Ad. & Wh. zijn door de Siboga-Expeditie verzameld. Hiervan werden *L. quinquedentatus* Rathbun en *L. philippinensis* Semper voor de eerste maal in den Ind. Archipel waargenomen. — De beide soorten van het geslacht *Podophthalmus* Lam. zijn in ons materiaal aanwezig. *P. nacreus* Alcock is door de Siboga-Expeditie voor de eerste maal in den Ind. Archipel verzameld. — Van het geslacht *Scylla* werden van den eenigen recenten vorm vele exemplaren in ons materiaal aangetroffen.

Het geslacht *Charybdis* (de naam *Charybdis* heeft de voorkeur, daar „*Goniosoma*" reeds voor een geslacht van de Arachnoidea is gebruikt) is zeer nauw verwant met de genera *Neptunus* de Haan en *Thalamita* Latreille, en daar ik deze geslachten nog niet herzien heb, zooals ik reeds opmerkte, is het voor mij op dit oogenblik onmogelijk op een bevredigende wijze de grenzen van het geslacht

Charybdis de Haan aan te geven. Ik heb in verband hiermee niet opgenomen de veel cp *Thalamita*-lijkende soorten: *Goniosoma lineatum* A. M. Edw. (*Ch. cookei* Rathbun is hiermee identiek), *Goniosoma longifrons* A. M. Edw. en *Thalamonyx danae* A. M. Edw., en de op *Neptunus*-lijkende soort *Goniosoma millerii* A. M. Edw. Ik bepaalde me om deze redenen tot ALCOCK's diagnose van het geslacht *Charybdis*, waaraan ik weinig veranderde.

Tot dusver werd het geslacht *Charybdis* in drie subgenera verdeeld. In deze verhandeling wordt het verdeeld in vijf subgenera, waarvan *Gonioinfradens* en *Goniosupradens* nieuw zijn. Aan het subgenus *Charybdis* worden toegevoegd een nieuwe soort *Ch. rathbuni* en een nieuwe variëteit: *Ch. variegata* var. *salehensis*; aan het subgenus *Goniohellenus* twee nieuwe variëteiten. *Goniohellenus hoplites* var. *omanensis* en *G. hoplites* var. *longicollis*. Voor *Goniosoma sexdentatum* de Man stel ik als nieuwe naam voor: *Ch.* (*Ch.*) *amboinensis*. In deze publicatie worden ingetrokken *Ch.* (*Ch.*) *barneyi* Gordon, *Ch.* (*Ch.*) *incisa* Rathbun, *Ch.* (*Ch.*) *sowerbyi* Rathbun, *Ch.* (*Ch.*) *merguiensis* (de Man), *Ch. Smithii* Maclay, *Ch.* (*Gonioneptunus*) *investigatoris* Alcock en *Ch. giardi* Nobili.

Het geslacht *Charybdis* komt in alle deelen van het Indo-Pacifische gebied voor. *Ch. hellerii* A. M. Edw. is ook waargenomen in de Midd. Zee. Door de Siboga-Expeditie zijn verzameld: *Ch. cruciata* (Herbst), *Ch. miles* de Haan, *Ch. hellerii* (A. M. Edw.), *Ch. annulata* (Fabr.), *Ch. orientalis* Dana, *Ch. variegata* (Fabr.), *Ch. variegata* var. *salehensis* nov. var., *Ch. rathbuni* nov. spec., *Ch. hongkongensis* Shen, *Ch. truncata* (Fabr.), *Ch. subornata* (Ortmann). Hiervan zijn voor het eerst in den Ind. Archipel gevonden: *Ch. miles* de Haan, *Ch. variegata* (Fabr.), *Ch. variegata* var. *salehensis* nov. var., *Ch. rathbuni* nov. spec., *Ch. hongkongensis* Shen, *Ch. subornata* (Ortmann). Door de „Gier" zijn verzameld: *Ch. cruciata* (Herbst), *Ch. hellerii* (A. M. Edw.), *Ch. anisodon* de Haan, *Ch. orientalis* Dana, *Ch. callianassa* (Herbst), *Ch. variegata* var. *brevispinosa* Leene, *Ch. natator* (Herbst), *Ch. hongkongensis* Shen, *Ch. vadorum* (Alcock), *Ch. truncata* (Fabr.). Hiervan zijn voor het eerst in den Ind. Archipel gevonden: *Ch. callianassa* (Herbst), *Ch. vadorum* (Alcock), *Ch. variegata* var. *brevispinosa* Leene.

Door andere verzamelaars werden gevonden: *Ch. affinis* Dana, *Ch. annulata* (Fabr.), *Ch. anisodon* de Haan, *Ch. callianassa* (Herbst).

Van de meeste *Charybdis*-soorten heb ik vertegenwoordigers en (of) typen gezien. Voor een volledige herziening zou het noodig zijn alle exemplaren, die in de literatuur vermeld zijn, te onderzoeken. Daar dit onmogelijk is, heb ik me bepaald tot het materiaal aanwezig in het „Zoölogisch Museum" (Amsterdam), het „Rijksmuseum van Natuurlijke Historie" (Leiden) en het „Muséum National d'Histoire Naturelle" (Parijs). Verder heb ik veel materiaal ter leen gehad van de in de „Introduction" genoemde buitenlandsche musea. Ik hoop in de toekomst in staat te zijn belangrijke collecties, die in de oudere literatuur zijn vermeld, alsnog te onderzoeken.

In navolging van Dr ISABELLA GORDON heb ik de eerste pleopoden van de mannelijke exemplaren der *Charybdis*-soorten onderzocht, voor zoover mogelijk. Aan hun vorm kan geen grootere systematische waarde worden toegekend dan aan de andere bij de systematische indeeling gebruikelijke kenmerken.

SIBOGA-EXPEDITIE

RÉSULTATS 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

1ER LIEUTENANT DE MARINE

PUBLIÉS PAR

MAX WEBER

CHEF DE L'EXPÉDITION

Déjà paru:

		Prix: Souscription l'ouvrage complet	Monographies séparées
1e Livr.	(Monogr. XLIV) **C. Ph. Sluiter.** Die Holothurien der Siboga-Expedition. Mit 10 Tafeln.	*f* 6.—	*f* 9.—
2e Livr.	(Monogr. LX) **E. S. Barton.** The genus Halimeda. With 4 plates.	„ 1.80	„ 2.70
3e Livr.	(Monogr. I) **Max Weber.** Introduction et description de l'expédition. Avec Liste des Stations et 2 cartes	„ 6.75	„ 10.20
4e Livr.	(Monogr. II) **G. F. Tydeman.** Description of the ship and appliances used for scientific exploration. With 3 plates and illustrations.	„ 2.—	„ 3.—
5e Livr.	(Monogr XLVII) **H. F. Nierstrasz.** The Solenogastres of the Siboga-Exp. With 6 plates.	„ 3.90	„ 5.90
6e Livr.	(Monogr. XIII) **J. Versluys.** Die Gorgoniden der Siboga-Expedition. I. Die Chrysogorgiidae. Mit 170 Figuren im Text.	„ 3.—	„ 4.50
7e Livr.	(Monogr. XVI*a*) **A. Alcock.** Report on the Deep-Sea Madreporaria of the Siboga-Expedition. With 5 plates.	„ 4.60	„ 6.90
8e Livr.	(Monogr. XXV) **C. Ph. Sluiter.** Die Sipunculiden und Echiuriden der Siboga-Exp. Mit 4 Tafeln und 3 Figuren im Text.	„ 3.—	„ 4.50
9e Livr.	(Monogr. VI*a*) **G. C. J. Vosmaer** and **J. H. Vernhout.** The Porifera of the Siboga-Expedition. I. The genus Placospongia. With 5 plates.	„ 2.40	„ 3.60
10e Livr.	(Monogr. XI) **Otto Maas.** Die Scyphomedusen der Siboga-Expedition. Mit 12 Tafeln.	„ 7.50	„ 11.30
11e Livr.	(Monogr. XII) **Fanny Moser.** Die Ctenophoren der Siboga-Expedition. Mit 4 Tafeln.	„ 2.80	„ 4.20
12e Livr.	(Monogr. XXXIV) **P. Mayer.** Die Caprellidae der Siboga-Expedition. Mit 10 Tafeln.	„ 7.80	„ 11.70
13e Livr.	(Monogr. III) **G. F. Tydeman.** Hydrographic results of the Siboga-Expedition. With 24 charts and plans and 3 charts of depths	„ 9.—	„ 13.50
14e Livr.	(Monogr. XLIII) **J. C. H. de Meijere.** Die Echinoidea der Siboga-Exp. Mit 23 Tafeln.	„ 15.—	„ 22.50
15e Livr.	(Monogr. XLV*a*) **René Koehler.** Ophiures de l'Expédition du Siboga. 1e Partie. Ophiures de Mer profonde. Avec 36 Planches.	„ 16.50	„ 24.80
16e Livr.	(Monogr. LII) **J. J. Tesch.** The Thecosomata and Gymnosomata of the Siboga-Expedition. With 6 plates.	„ 3.75	„ 5.70
17e Livr.	(Monogr. LVI*a*) **C. Ph. Sluiter.** Die Tunicaten der Siboga-Expedition. I. Abteilung. Die socialen und holosomen Ascidien. Mit 15 Tafeln.	„ 6.75	„ 10.20
18e Livr.	(Monogr. LXI) **A. Weber**—van Bosse and **M. Foslie.** The Corallinaceae of the Siboga-Expedition. With 16 plates and 34 textfigures	„ 12.50	„ 18.80
19e Livr.	(Monogr. VIII) **Sydney J. Hickson** and **Helen M. England.** The Stylasterina of the Siboga Expedition. With 3 plates.	„ 1.50	„ 2.30
20e Livr.	(Monogr. XLVIII) **H. F. Nierstrasz.** Die Chitonen der Siboga-Exp. Mit 8 Tafeln.	„ 5.—	„ 7.50
21e Livr.	(Monogr. XLV*b*) **René Koehler.** Ophiures de l'Expédition du Siboga. 2e Partie. Ophiures littorales. Avec 18 Planches.	„ 10.25	„ 15.40
22e Livr.	(Monogr. XXVI*bis*) **Sidney F. Harmer.** The Pterobranchia of the Siboga-Expedition, with an account of other species. With 14 plates and 2 text-figures.	„ 6.75	„ 10.20
23e Livr.	(Monogr. XXXVI) **W. T. Calman.** The Cumacea of the Siboga Expedition. With 2 plates and 4 text-figures	„ 1.80	„ 2.70
24e Livr.	(Monogr. LVI*a*) **C. Ph. Sluiter.** Die Tunicaten der Siboga-Expedition. Supplement zu der I. Abteilung. Die socialen und holosomen Ascidien. Mit 1 Tafel.	„ —.75	„ 1.20

	Prix : Souscription à l'ouvrage complet	Monographies séparées
25e Livr. (Monogr. L) **Rud. Bergh.** Die Opisthobranchiata der Siboga-Exped. Mit 20 Tafeln.	*f* 11.25	*f* 16.90
26e Livr. (Monogr. X) **Otto Maas.** Die Craspedoten Medusen der Siboga-Exp. Mit 14 Tafeln.	„ 9.25	„ 13.90
27e Livr. (Monogr. XIII*a*) **J. Versluys.** Die Gorgoniden der Siboga-Expedition. II. Die Primnoidae. Mit 10 Tafeln, 178 Figuren im Text und einer Karte. . . .	„ 12.50	„ 18.80
28e Livr. (Monogr. XXI) **G. Herbert Fowler.** The Chaetognatha of the Siboga Expedition. With 3 plates and 6 charts	„ 4.20	„ 6.30
29e Livr. (Monogr. LI) **J. J. Tesch.** Die Heteropoden der Siboga-Expedition. Mit 14 Tafeln.	„ 6.75	„ 10 20
30e Livr. (Monogr. XXX) **G. W. Müller.** Die Ostracoden der Siboga-Exped. Mit 9 Tafeln.	„ 3.50	„ 5.30
31e Livr. (Monogr. IV*bis*) **Franz Eilhard Schulze.** Die Xenophyophoren der Siboga-Exped. Mit 3 Tafeln	„ 2.40	„ 3.60
32e Livr. (Monogr. LIV) **Maria Boissevain.** The Scaphopoda of the Siboga Expedition. With 6 plates and 39 textfigures	„ 4.80	„ 7.20
33e Livr. (Monogr. XXVI) **J. W. Spengel.** Studien über die Enteropneusten der Siboga-Exp. Mit 17 Tafeln und 20 Figuren im Text.	„ 14.—	„ 21.—
34e Livr. (Monogr. XX) **H. F. Nierstrasz.** Die Nematomorpha der Siboga-Exp. Mit 3 Tafeln.	„ 2.80	„ 4.20
35e Livr. (Monogr. XIII*c*) **Sydney J. Hickson** und **J. Versluys.** Die Alcyoniden der Siboga-Exped. I. Coralliidæ, II. Pseudocladochonus Hicksoni. Mit 3 Tafeln und 16 Figuren im Text.	„ 2.20	„ 3.30
36e Livr. (Monogr. XXXI*a*) **P. P. C. Hoek.** The Cirripedia of the Siboga Expedition. A. Cirripedia pedunculata. With 10 plates	„ 5.40	„ 8.10
37e Livr. (Monogr. XLII*a*) **L. Döderlein.** Die gestielten Crinoiden der Siboga-Expedition. Mit 23 Tafeln und 12 Figuren im Text	„ 8.—	„ 12.—
38e Livr. (Monogr. IX) **Albertine D. Lens** and **Thea van Riemsdijk.** The Siphonophora of the Siboga Expedition. With 24 plates and 52 textfigures	„ 13.50	„ 20.30
39e Livr. (Monogr. XLIX[1]*a*) **M. M. Schepman.** The Prosobranchia of the Siboga Expedition. Part I. Rhipidoglossa and Docoglossa, with an Appendix by Prof. R. BERGH. With 9 plates and 3 textfigures.	„ 4.80	„ 7.20
40e Livr. (Monogr. XL) **J. C. C. Loman.** Die Pantopoden der Siboga-Expedition. Mit 15 Tafeln und 4 Figuren im Text.	„ 6.25	„ 9.40
41e Livr. (Monogr. LVI*c*) **J. E. W. Ihle.** Die Appendicularien der Siboga-Expedition. Mit 4 Tafeln und 10 Figuren im Text	„ 4.80	„ 7.20
42e Livr. (Monogr. XLIX[2]) **M. M. Schepman** und **H. F. Nierstrasz.** Parasitische Prosobranchier der Siboga-Expedition. Mit 2 Tafeln	„ 1.20	„ 1.80
43e Livr. (Monogr. XLIX[1]*b*) **M. M. Schepman.** The Prosobranchia of the Siboga Expedition. Part II. Taenioglossa and Ptenoglossa. With 7 plates	„ 4.50	„ 6.80
44e Livr. (Monogr. XXIX*a*) **Andrew Scott.** The Copepoda of the Siboga Expedition. Part I. Free-swimming, Littoral and Semi-parasitic Copepoda. With 69 plates. .	„ 26.—	„ 39.—
45e Livr. (Monogr. LVI*b*) **C. Ph. Sluiter.** Die Tunicaten der Siboga-Expedition. II. Abteilung. Die Merosomen Ascidien. Mit 8 Tafeln und 2 Figuren im Text.	„ 5.75	„ 8.70
46e Livr. (Monogr. XLIX[1]*c*) **M. M. Schepman.** The Prosobranchia of the Siboga Expedition. Part III. Gymnoglossa. With 1 plate	„ —.80	„ 1.20
47e Livr. (Monogr. XIII*b*) **C. C. Nutting.** The Gorgonacea of the Siboga Expedition. III. The Muriceidæ. With 22 plates.	„ 8.50	„ 12.80
48e Livr. (Monogr. XIII*b*[1]) **C. C. Nutting.** The Gorgonacea of the Siboga Expedition. IV. The Plexauridæ. With 4 plates	„ 1.60	„ 2.40
49e Livr. (Monogr. LVI*d*) **J. E. W. Ihle.** Die Thaliaceen (einschliesslich Pyrosomen) der Siboga-Expedition. Mit 1 Tafel und 6 Figuren im Text.	„ 1.75	„ 2.70
50e Livr. (Monogr. XIII*b*[2]) **C. C. Nutting.** The Gorgonacea of the Siboga Expedition. V. The Isidæ. With 6 plates	„ 2.25	„ 3.40
51e Livr. (Monogr. XXXVII) **H. J. Hansen.** The Schizopoda of the Siboga Expedition. With 16 plates and 3 text figures.	„ 12.75	„ 19.20
52e Livr. (Monogr. XIII*b*[3]) **C. C. Nutting.** The Gorgonacea of the Siboga Expedition. VI. The Gorgonellidæ. With 11 plates.	„ 4.—	„ 6.—
53e Livr. (Monogr. XV*a*) **J. Playfair Mc Murrich.** The Actiniaria of the Siboga Expedition. Part I. Ceriantharia. With 1 plate and 14 text figures	„ 2.20	„ 3.30
54e Livr. (Monogr. XIII*b*[4]) **C. C. Nutting.** The Gorgonacea of the Siboga Expedition. VII. The Gorgonidæ. With 3 plates.	„ 1.20	„ 1.80
55e Livr. (Monogr. XXXIX*a*) **J. G. de Man.** The Decapoda of the Siboga Expedition. Part I. Family Penaeidae	„ 2.60	„ 3.90
56e Livr. (Monogr. LXII) **A. & E. S. Gepp.** The Codiaceae of the Siboga Expedition including a Monograph of Flabellarieae and Udoteae. With 22 plates	„ 12.50	„ 18.80
57e Livr. (Monogr. XIII*b*[5] **C. C. Nutting.** The Gorgonacea of the Siboga Expedition. VIII. The Scleraxonia. With 12 plates.	„ 4.80	„ 7.20
58e Livr. (Monogr. XLIX[1]*d*) **M. M. Schepman.** The Prosobranchia of the Siboga Expedition. Part IV. Rachiglossa. With 7 plates.	„ 5.—	„ 7.50

	Prix. Souscription à l'ouvrage complet	Monographies séparées
59e Livr. (Monogr. VI*a*[1]) **G. C. J. Vosmaer.** The Porifera of the Siboga-Expedition. II. The genus Spirastrella. With 14 plates	*f* 6.20	*f* 9.30
60e Livr. (Monogr. XXXIX*a*[1]) **J. G. de Man.** The Decapoda of the Siboga Expedition. Part II. Family Alpheidae	„ 6.40	„ 9.60
61e Livr. (Monogr. LIII*a*) **Paul Pelseneer.** Les Lamellibranches de l'Expédition du Siboga. Partie Anatomique. Avec 26 planches	„ 10.—	„ 15.—
62e Livr. (Monogr. XXIV[1]*a*) **R. Horst.** Polychaeta errantia of the Siboga Expedition. Part I. Amphinomidae. With 10 plates	„ 3.85	„ 5.80
63e Livr. (Monogr. LIII*b*) **Ph. Dautzenberg et A. Bavay.** Les Lamellibranches de l'Expéd. du Siboga. Partie Systématique. I. Pectinidés. Avec 2 planches	„ 2.25	„ 3.40
64e Livr. (Monogr. XLIX[1]*e*) **M. M. Schepman.** The Prosobranchia of the Siboga Expedition. Part V. Toxoglossa. With 6 plates and 1 textfigure	„ 4.80	„ 7.20
65e Livr. (Monogr. LVII) **Max Weber.** Die Fische der Siboga-Expedition. Mit 12 Tafeln und 123 Figuren im Text	„ 22.—	„ 33.—
66e Livr. (Monogr. XLIX*f*) **M. M. Schepman.** The Prosobranchia, Pulmonata and Opisthobranchia Tectibranchiata Tribe Bullomorpha of the Siboga Expedition. Part VI. Pulmonata and Opisthobranchia Tectibranchiata Tribe Bullomorpha. With 2 plates	„ 1.75	„ 2.70
67e Livr. (Monogr. XXXI*b*) **P. P. C. Hoek.** The Cirripedia of the Siboga-Expedition. B. Cirripedia sessilia. With 17 plates and 2 textfigures	„ 8.—	„ 12.—
68e Livr. (Monogr. LIX*a*) **A. Weber-van Bosse.** Liste des Algues du Siboga. I. Myxophyceae, Chlorophyceae, Phaeophyceae avec le concours de M. TH. REINBOLD. Avec 5 planches et 52 figures dans le texte	„ 6.—	„ 9.—
69e Livr. (Monogr. XXXIX*a*) **J. G. de Man.** The Decapoda of the Siboga Expedition. Supplement to Part I. Family Penaeidae. Explanation of Plates. 10 plates.	„ 3.20	„ 4.80
70e Livr. (Monogr. VII*a*) **A. Billard.** Les Hydroïdes de l'Expédition du Siboga. I. Plumularidæ. Avec 6 planches et 96 figures dans le texte	„ 5.75	„ 8.70
71e Livr. (Monogr. XXXIX*b*) **J. E. W. Ihle.** Die Decapoda brachyura der Siboga-Expedition. I. Dromiacea. Mit 4 Tafeln und 38 Figuren im Text	„ 3.50	„ 5.30
72e Livr. (Monogr. XXXII*a*) **H. F. Nierstrasz.** Die Isopoden der Siboga-Expedition. I. Isopoda chelifera. Mit 3 Tafeln	„ 2.15	„ 3.30
73e Livr. (Monogr. XVII) **A. J. van Pesch.** The Antipatharia of the Siboga Expedition. With 8 plates and 262 textfigures	„ 10.75	„ 16.20
74e Livr. (Monogr. XXXIX*a*[1]) **J. G. de Man.** The Decapoda of the Siboga Expedition. Supplement to Part II. Family Alpheidae. Explanation of Plates. 23 plates.	„ 7.—	„ 10.50
75e Livr. (Monogr. XXVIII*a*) **Sidney F. Harmer.** The Polyzoa of the Siboga Expedition. Part I. Entoprocta, Ctenostomata and Cyclostomata. With 12 plates	„ 8.80	„ 13.20
76e Livr. (Monogr. XXXIX*a*[2]) **J. G. de Man.** The Decapoda of the Siboga Expedition. Part III. Families Eryonidae, Palinuridae, Scyllaridae and Nephropsidae. With 4 plates	„ 3.75	„ 5.70
77e Livr. (Monogr. XIV) **Sydney J. Hickson.** The Pennatulacea of the Siboga Expedition, with a general survey of the order. With 10 plates, 45 text figures and 1 chart	„ 10.75	„ 16.20
78e Livr. (Monogr. XXXIX*b*[1]) **J. E. W. Ihle.** Die Decapoda brachyura der Siboga-Expedition. II. Oxystomata, Dorippidae. Mit 39 Figuren im Text	„ 1.90	„ 2.90
79e Livr. (Monogr. LXV) **O. B. Böggild.** Meeresgrundproben der Siboga-Expedition. Mit 1 Tafel und 1 Karte	„ 2.25	„ 3.40
80e Livr. (Monogr. XXIV*b*) **R. Horst.** Polychaeta errantia of the Siboga Expedition. Part II. Aphroditidae and Chrysopetalidae. With 19 plates and 5 textfigures	„ 7.75	„ 11.70
81e Livr. (Monogr. XLVI*a*) **L. Döderlein.** Die Asteriden der Siboga-Expedition I. Die Gattung Astropecten und ihre Stammesgeschichte. Mit 17 Tafeln und 20 Figuren im Text	„ 8.75	„ 13.20
82e Livr. (Monogr. XXXIX*c*) **J. J. Tesch.** The Decapoda brachyura of the Siboga Expedition. I. Hymenosomidae, Retroplumidae, Ocypodidae, Grapsidae and Gecarcinidae. With 6 plates.	„ 5.—	„ 7.50
83e (Monogr. XLII*b*) **Austin H. Clark.** The unstalked Crinoids of the Siboga Expedition. With 28 plates and 17 textfigures.	„ 16.—	„ 24.—
84e Livr. (Monogr. XXXIX*c*[1]) **J. J. Tesch.** The Decapoda brachyura of the Siboga Expedition. II. Goneplacidae and Pinnotheridae. With 12 plates	„ 6.75	„ 10.20
85e Livr. (Monogr. XXXIX*b*[2]) **J. E. W. Ihle.** Die Decapoda brachyura der Siboga-Expedition. III. Oxystomata: Calappidae, Leucosiidae, Raninidae. Mit 71 Figuren im Text.	„ 5.60	„ 8.40
86e Livr. (Monogr. XXXVIII) **H. J. Hansen.** The Sergestidæ of the Siboga Expedition. With 5 plates and 14 text figures.	„ 4.50	„ 6.80
87e Livr. (Monogr. XXXIX*a*[3]) **J. G. de Man.** The Decapoda of the Siboga Expedition. Part IV. Families Pasiphaeidae, Stylodactylidae, Hoplophoridae, Nematocarcinidae, Thalassocaridae, Pandalidae, Psalidopodidae, Gnathophyllidae, Processidae, Glyphocrangonidae and Crangonidae. With 25 plates	„ 18.—	„ 27.—

	Prix : Souscription à l'ouvrage complet	Monographies séparées
88e Livr. (Monogr. XLVI*b*) **L. Döderlein.** Die Asteriden der Siboga-Expedition. II. Die Gattung Luidia und ihre Stammesgeschichte. Mit 3 Tafeln und 5 Figuren im Text.	*f* 5.—	*f* 7.50
89e Livr. (Monogr. LIX*b*) **A. Weber-van Bosse.** Liste des Algues du Siboga. II. Rhodophyceae. Première Partie. Protoflorideae, Nemalionales, Cryptonemiales. Avec 3 planches et 57 figures dans le texte	„ 6.75	„ 8.50
90e Livr. (Monogr. XVI*b*) **C. J. van der Horst.** The Madreporaria of the Siboga-Expedition. Part II. Madreporaria Fungida. With 6 plates	„ 4.—	„ 5.—
91e Livr. (Monogr. XLVI[1]) **L. Döderlein.** Die Asteriden der Siboga-Expedition. I. Porcellanasteridae, Astropectinidae, Benthopectinidae. Mit 13 Tafeln und 7 Figuren im Text.	„ 10.80	„ 13.50
92e Livr. (Monogr. XVI*c*) **C. J. van der Horst.** The Madreporaria of the Siboga Expedition. Part III. Eupsammidae. With 2 plates and 9 textfigures	„ 2.50	„ 3.75
93e Livr. (Monogr. XXXIX*a*[4]) **J. G. de Man.** The Decapoda of the Siboga Expedition. Part. V. On a collection of Macrurous Decapod Crustacea of the Siboga Expedition, chiefly Penaeidae and Alphaeidae. With 4 plates	„ 7.—	„ 8.75
94e Livr. (Monogr. LIX*c*) **A. Weber-van Bosse.** Liste des Algues du Siboga. III. Rhodophyceae. Seconde Partie. Ceramiales. Avec 2 planches et 33 figures dans le texte	„ 10.—	„ 12.50
95e Livr. (Monogr. XXXII*b*) **H. F. Nierstrasz** und **G. A. Brender à Brandis.** Die Isopoden der Siboga-Expedition. II. Isopoda genuina. I. Epicaridea. Mit 6 Tafeln	„ 9.—	„ 11.25
96e Livr. (Monogr. XVI*d*) **H. Boschma.** The Madreporaria of the Siboga Expedition. Part IV. Fungia patella. With 2 plates	„ 3.50	„ 4.50
97e Livr. (Monogr. LVIII) **Max Weber.** Die Cetaceen der Siboga-Expedition. Mit 3 Tafeln und 5 Figuren im Text	„ 7.75	„ 9.75
98e Livr. (Monogr. XLVI[2]) **L. Döderlein.** Die Asteriden der Siboga-Expedition. II. Pentagonasteridae. Mit 6 Tafeln	„ 6.40	„ 8.—
99e Livr. (Monogr. XXIV[1]*c*) **R. Horst.** Polychaeta errantia of the Siboga Expedition Part III. Nereidae and Hesionidae. With 7 plates	„ 9.60	„ 12.—
100e Livr. (Monogr. LXVI) **A. Wichmann.** Geologische Ergebnisse der Siboga-Expedition. Mit 33 Figuren im Text	„ 14.50	„ 18.—
101e Livr. (Monogr. XXXI*bis*) **P. N. van Kampen** und **H. Boschma.** Die Rhizocephalen der Siboga-Expedition. Mit 3 Tafeln und 45 Figuren im Text	„ 8.40	„ 10.50
102e Livr. (Monogr. XXXIX*a*[5]) **J. G. de Man.** The Decapoda of the Siboga Expedition. Part VI. The Axiidae collected by the Siboga-Expedition. With 10 plates.	„ 16.—	„ 20.—
103e Livr. (Monogr. VII*b*) **A. Billard.** Les Hydroïdes de l'Expédition du Siboga. II. Synthecidæ et Sertularidæ. Avec 3 planches et 58 figures dans le texte	„ 12.—	„ 15.—
104e Livr. (Monogr. XXXV) **H. J. Hansen.** The Stomatopoda of the Siboga Expedition. With 2 plates	„ 4.20	„ 5.25
105e Livr. (Monogr. XXVIII*b*) **Sir Sidney F. Harmer.** The Polyzoa of the Siboga Expedition. Part II. Cheilostomata Anasca. With 22 plates and 23 textfigures	„ 26.—	„ 32.50
106e Livr. (Monogr. VI) **Isao Ijima.** The Hexactinellida of the Siboga Expedition. With 26 plates and 36 textfigures.	„ 38.—	„ 47.50
107e Livr. (Monogr. IV) **J. Hofker.** The Foraminifera of the Siboga Expedition. Part I. Families Tinoporidae, Rotaliidae, Nummulitidae, Amphisteginidae. With 38 plates and 11 textfigures.	„ 28.—	„ 35.—
108e Livr. (Monogr. LIX*d*) **A. Weber-van Bosse.** Liste des Algues du Siboga. IV. Rhodophyceae. Troisième Partie. Gigartinales et Rhodymeniales et Tableau de la distribution des Chlorophycées, Phaeophycées et Rhodophycées de l'Archipel malaisien. Avec 6 planches et 71 figures dans le texte	„ 16.—	„ 20.—
109e Livr. (Monogr. XXXIX*a*[6]) **J. G. de Man.** The Decapoda of the Siboga-Expedition. Part VII. The Thalassinidae and Callianassidae collected by the Siboga-Expedition with some remarks on the Laomediidae. With 20 plates.	„ 26.50	„ 33.—
110e Livr. (Monogr. IV*a*) **J. Hofker.** The Foraminifera of the Siboga Expedition. Part II. Families Astrorhizidae, Rhizamminidae, Reophacidae, Anomalinidae, Peneroplidae, with an introduction on the life-cycle of the Foraminifera. With 26 plates and 22 textfigures	„ 24.—	„ 30.—
111e Livr. (Monogr. VI*a*[2]) **Maurice Burton.** The Porifera of the Siboga Expedition. III. Calcarea. With 8 textfigures	„ 2.—	„ 2.50
112e Livr. (Monogr. XXXIX*c*[2]) **H. J. Flipse.** Die Decapoda brachyura der Siboga-Expedition. VI. Oxyrrhyncha: Parthenopidae. Mit 45 Figuren im Text	„ 5.60	„ 7.—
113e Livr. (Monogr. XXXIII*a*) **Jean M. Pirlot.** Les Amphipodes de l'Expédition du Siboga. I. Les Amphipodes Hyperides (à l'Exception des Thaumatopsidae et des Oxycephalidae). Avec 11 figures dans le texte	„ 5.20	„ 6.50

	Prix: Souscription à l'ouvrage complet	Monographies séparées
114e Livr. (Monogr. XXXII*c*) **H. F. Nierstrasz.** Die Isopoden der Siboga-Expedition. III. Isopoda genuina. Mit 2 Tafeln und 129 Figuren im Text	*f* 10.—	*f* 12.50
115e Livr. (Monogr. XIII*d*) **Arthur J. Thomson** and **Laura M. I. Dean.** The Alcyonacea of the Siboga Expedition. With 28 plates and 1 textfigure	„ 40.—	„ 50.—
116e Livr. (Monogr. XXXI*bis*) **H. Boschma.** Die Rhizocephalen der Siboga-Expedition. Supplement. Mit 41 Figuren im Text	„ 6.50	„ 8.—
117e Livr. (Monogr. XXXIII*b*) **Jean M. Pirlot.** Les Amphipodes de l'Expédition du Siboga. II. Les Amphipodes Gammarides. I. Les Amphipodes fouisseurs. Phoxocephalidae, Oedicerotidae. Avec 23 figures dans le texte	„ 6.—	„ 7.50
118e Livr. (Monogr. LIII*c*) **B. Prashad.** The Lamellibranchia of the Siboga Expedition. Systematic Part. II. Pelecypoda. With 9 plates and a chart	„ 20.—	„ 25.—
119e Livr. (Monogr. XXXIX*a*[7]) **Anna J. van Dam.** Die Decapoda der Siboga-Expedition. VIII. Galatheidea: Chirostylidae. Mit 50 Figuren im Text	„ 4.50	„ 6.—
120e Livr. (Monogr. XXXIII*c*) **Jean M. Pirlot.** Les Amphipodes de l'Expédition du Siboga. II. Les Amphipodes Gammarides. II. Les Amphipodes de la mer profonde. 1 (Lysianassidae, Stegocephalidae, Stenothoidae, Pleustidae, Lepechinellidae) Avec 26 figures dans le texte.	„ 4.80	„ 6.—
121e Livr. (Monogr. XXVIII*c*) **Sir Sidney F. Harmer.** The Polyzoa of the Siboga Expedition. Part III. Cheilostomata Ascophora. I. With 7 plates and 25 textfigures	„ 17.—	„ 21.25
122e Livr. (Monogr. XXXIII*d*) **Jean M. Pirlot.** Les Amphipodes de l'Expédition du Siboga. II. Les Amphipodes Gammarides. II. Les Amphipodes de la mer profonde. 2 (Hyperiopsidae, Pardaliscidae, Astyridae nov. fam., Tironidae, Calliopiidae, Paramphithoidae, Amathillopsidae nov. fam., Eusiridae, Gammaridae, Aoridae, Photidae, Ampithoidae, Jassidae). Avec 40 figures dans le texte	„ 6.40	„ 8.—
123e Livr. (Monogr. XXIX*b*) **W. Harold Leigh-Sharpe.** The Copepoda of the Siboga Exped. Part II. Commensal and parasitic Copepoda. With 39 text-figures	„ 4.—	„ 5.—
124e Livr. (Monogr. (XIII*b*[7]) **G. Stiasny.** Die Gorgonacea der Siboga-Expedition. Supplement I. Revision der Plexauridae. Mit 7 Tafeln, 27 Textfiguren und 2 Tabellen	„ 12.—	„ 15.—
125e Livr. (Monogr. XLVI[3]) **L. Döderlein.** Die Asteriden der Siboga-Expedition. III. Oreasteridae. Mit 8 Lichtdrucktafeln	„ 8.—	„ 10.—
126e Livr. (Monogr. XLVI*c*) **L. Döderlein.** Die Asteriden der Siboga-Expedition. III. Die Unterfamilie Oreasterinae. Mit 12 Lichtdrucktafeln	„ 16.—	„ 20.—
127e Livr. (Monogr. XXXIII*e*) **Jean M. Pirlot.** Les Amphipodes de l'Expédition du Siboga. II. Les Amphipodes Gammarides. II. Les Amphipodes de la mer profonde. 3. Addendum et partie générale. Avec une figure dans le texte. III. Les Amphipodes Littoraux. 1. Lysianassidae, Ampeliscidae, Leucothoidae, Stenothoidae, Phliantidae, Colomastigidae, Ochlesidae, Liljeborgiidae, Oedicerotidae, Synopiidae, Eusiridae, Gammaridae. Avec 45 figuren dans le texte	„ 8.—	„ 10.—
128e Livr. (Monogr. XXII) **G. Stiasny-Wijnhoff.** Die Polystilifera der Siboga-Expedition. Mit 16 Tafeln und 90 Figuren im Text	„ 24.—	„ 30.—
129e Livr. (Monogr. XXVII) **J. Wilfrid Jackson** and **G. Stiasny.** The Brachiopoda of the Siboga Expedition. With 2 collotype plates	„ 4.—	„ 5.—
130e Livr. (Monogr. XIII*b*[8]) **G. Stiasny.** Die Gorgonacea der Siboga-Expedition. Supplement II. Revision der Scleraxonia. Mit 8 Lichtdrucktafeln, 38 Textfiguren und 1 Tabelle	„ 16.—	„ 20.—
131e Livr. (Monogr. XXXIX*c*[3]) **J. E. Leene.** The Decapoda Brachyura of the Siboga-Expedition. VII. Braghygnatha: portunidae. With 87 figures in the text	„ 14.50	„ 18.—

	Prix: Souscription à l'ouvrage complet	Monographies séparées
114e Livr. (Monogr. XXXII*c*) **H. F. Nierstrasz.** Die Isopoden der Siboga-Expedition. III. Isopoda genuina. Mit 2 Tafeln und 129 Figuren im Text	*f* 10.—	*f* 12.50
115e Livr. (Monogr. XIII*d*) **Arthur J. Thomson and Laura M. I. Dean.** The Alcyonacea of the Siboga Expedition. With 28 plates and 1 textfigure	„ 40.—	„ 50.—
116e Livr. (Monogr. XXXI*bis*) **H. Boschma.** Die Rhizocephalen der Siboga-Expedition. Supplement. Mit 41 Figuren im Text	„ 6.50	„ 8.—
117e Livr. (Monogr. XXXIII*b*) **Jean M. Pirlot.** Les Amphipodes de l'Expédition du Siboga. II. Les Amphipodes Gammarides. I. Les Amphipodes fouisseurs. Phoxocephalidae, Oedicerotidae. Avec 23 figures dans le texte	„ 6.—	„ 7.50
118e Livr. (Monogr. LIII*c*) **B. Prashad.** The Lamellibranchia of the Siboga Expedition. Systematic Part. II. Pelecypoda. With 9 plates and a chart	„ 20.—	„ 25.—
119e Livr. (Monogr. XXXIX*a*[7]) **Anna J. van Dam.** Die Decapoda der Siboga-Expedition. VIII. Galatheidea: Chirostylidae. Mit 50 Figuren im Text	„ 4.50	„ 6.—
120e Livr. (Monogr. XXXIII*c*) **Jean M. Pirlot.** Les Amphipodes de l'Expédition du Siboga. II. Les Amphipodes Gammarides. II. Les Amphipodes de la mer profonde. 1 (Lysianassidae, Stegocephalidae, Stenothoidae, Pleustidae, Lepechinellidae) Avec 26 figures dans le texte.	„ 4.80	„ 6.—
121e Livr. (Monogr. XXVIII*c*) **Sir Sidney F. Harmer.** The Polyzoa of the Siboga Expedition. Part III. Cheilostomata Ascophora. I. With 7 plates and 25 textfigures	„ 17.—	„ 21.25
122e Livr. (Monogr. XXXIII*d*) **Jean M. Pirlot.** Les Amphipodes de l'Expédition du Siboga. II. Les Amphipodes Gammarides. II. Les Amphipodes de la mer profonde. 2 (Hyperiopsidae, Pardaliscidae, Astyridae nov. fam., Tironidae, Calliopiidae, Paramphithoidae, Amathillopsidae nov. fam., Eusiridae, Gammaridae, Aoridae, Photidae, Ampithoidae, Jassidae). Avec 40 figures dans le texte	„ 6.40	„ 8.—
123e Livr. (Monogr. XXIX*b*) **W. Harold Leigh-Sharpe.** The Copepoda of the Siboga Exped. Part II. Commensal and parasitic Copepoda. With 39 text-figures	„ 4.—	„ 5.—
124e Livr. (Monogr. (XIII*b*[1]) **G. Stiasny.** Die Gorgonacea der Siboga-Expedition. Supplement I. Revision der Plexauridae. Mit 7 Tafeln, 27 Textfiguren und 2 Tabellen	„ 12.—	„ 15.—
125e Livr. (Monogr. XLVI[3]) **L. Döderlein.** Die Asteriden der Siboga-Expedition. III. Oreasteridae. Mit 8 Lichtdrucktafeln	„ 8.—	„ 10.—
126e Livr. (Monogr. XLVI*c*) **L. Döderlein.** Die Asteriden der Siboga-Expedition. III. Die Unterfamilie Oreasterinae. Mit 12 Lichtdrucktafeln	„ 16.—	„ 20.—
127e Livr. (Monogr. XXXIII*e*) **Jean M. Pirlot.** Les Amphipodes de l'Expédition du Siboga. II. Les Amphipodes Gammarides. II. Les Amphipodes de la mer profonde. 3. Addendum et partie générale. Avec une figure dans le texte. III. Les Amphipodes Littoraux. 1. Lysianassidae, Ampeliscidae, Leucothoidae, Stenothoidae, Phliantidae, Colomastigidae, Ochlesidae, Liljeborgiidae, Oedicerotidae, Synopiidae, Eusiridae, Gammaridae. Avec 45 figuren dans le texte	„ 8.—	„ 10.—
128e Livr. (Monogr. XXII) **G. Stiasny-Wijnhoff.** Die Polystilifera der Siboga-Expedition. Mit 16 Tafeln und 90 Figuren im Text	„ 24.—	„ 30.—
129e Livr. (Monogr. XXVII) **J. Wilfrid Jackson and G. Stiasny.** The Brachiopoda of the Siboga Expedition. With 2 collotype plates	„ 4.—	„ 5.—
130e Livr. (Monogr. XIII*b*[8]) **G. Stiasny.** Die Gorgonacea der Siboga-Expedition. Supplement II. Revision der Scleraxonia. Mit 8 Lichtdrucktafeln, 38 Textfiguren und 1 Tabelle	„ 16.—	„ 20.—
131e Livr. (Monogr. XXXIX*c*[3]) **J. E. Leene.** The Decapoda Brachyura of the Siboga-Expedition. VII. Braghygnatha: portunidae. With 87 figures in the text	„ 14.50	„ 18.—