NOTES ON CHARYBDIS DEMANI NOV. SPEC., CHARYBDIS VARIEGATA VAR. BREVISPINOSA NOV. VAR. AND OTHER CHARYBDIS-SPECIES

by

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

With 4 textfigures

Examining the material of the genus *Charybdis* de Haan in the Rijks-Museum van Natuurlijke Historie and in the De Man-collection in the Zoological Museum at Amsterdam for comparison with material of the Siboga expedition and other expeditions for Prof. Dr Max Weber and the Zoological Museum at Amsterdam, I made the following notes.

I am very much indebted to Prof. Dr H. Boschma for his kindness in placing his material at my disposal and for his hospitality at the Leiden Museum.

Charybdis (Goniosoma) merguiensis (De Man)

Goniosoma merguiense, De Man, 1888, Journ. Linn. Soc. Zool., vol. 22, p. 82, pl. 5 figs. 3 & 4; 1895, Zool. Jahrb. Syst., vol. 8, p. 560.

Charybdis (Goniosoma) merguiensis, Alcock, 1899, Journ. As. Soc. Bengal, vol. 68 pt. 2, p. 56; Nobili, 1899, Ann. Mus. Civ. Storia Nat. Genova ser. 2a, vol. 20, p. 254; 1900, p. 498; 1903, Bull. Mus. Torino 18 no. 455, p. 31; Lenz, 1905, Abh. Senckenb. Naturf. Ges., vol. 27, p. 360; Monod, 1930, Zool. Anz., vol. 92, p. 140, fig. 7; Steinitz, 1933, Pubbl. Stat. Zool. Napoli, vol. 13, p. 151; Chopra, 1935, Rec. Ind. Mus., vol. 37, p. 484 textfig. 8.

Goniosoma annulatum, De Man, 1883, Notes Leyden Museum, vol. 5, p. 151.

When I examined the *Charybdis annulata* material in the Leiden Museum I found that the six specimens (3 ♂♂ and 1 ♀ in the Hoedt-collection and 2 ♀♀ in the Schorel-collection) from the shores of the island of Amboina (De Man, 1883) belonged to *Charybdis merguiensis* (De Man). They all had the characteristic spine at the posterior border of the carpus of the natatory leg.

Chopra (1935) compares the length of the carapace with its breadth, and he concludes that the females are proportionately broader than the males.

I measured therefore the six above-mentioned specimens, the two male type specimens (Leiden Museum) and one male specimen and a female one in the De Man-collection (see table 1) and I placed the measurements found in literature in table 2. If I compare the figures found for the proportion carapace breadth: carapace length, I arrive at the same con-

clusion as Chopra, that the females have the highest figures (varying between 1.48—1.73, whereas the figures for the males vary between 1.45—1.62). It has struck me that the Mergui-specimens have proportionately higher figures for the males (1.56—1.62) as well as for the females (1.63—1.67) than the specimens from other localities (except the female of the Sandheads off the mouth of the Hooghly River, which has the figure 1.73). I got the impression that this is because the last antero-lateral spine is larger in these specimens than in the other ones.

I could not find the strongly arched "Querlinie" to which both Monod and Steinitz have referred. Most specimens only had a shallow groove, without pile, running almost exactly as shown in Monod's figure. In every case this "Querlinie" is not identical with the other transverse ridges on the carapace.

Of the three dark red spots on the carapace, mentioned by Monod, I could only find two traces in the smallest female specimen in the Schorel-collection.

Measurements in mm:

TABLE 1

	Mergui-Archipelago, type ♂	Mergui-Archipelago, type ♂	Mergui-Archipelago, de Man-coll. ♂	Mergui-Archipelago, de Man-coll. ♀	Amboina Hoedt-coll. ♂	Amboina Hoedt-coll. ♂	Amboina Hoedt-coll. ♂	Amboina Hoedt-coll. ♀	Amboina Schorel-coll. ♀	Amboina Schorel-coll. ♀
Length of carapace	20.2	25.0	25.2	24.2	51.0	56.0	57.0	31.0	30.0	39.0
Breadth of carapace	31.5	39.8	41.0	39.5	74.5	82.0	83.0	47.5	44.8	59.5
Front	8.0	10.0	10.3	10.5	19.5	23.0	24.0	12.5	12.0	15.5
Interorbital space	11.5	13.0	13.5	13.0	25.5	31.0	32.0	16.0	16.0	20.0
Orbit	5.0	6.0	5.5	5.4	9.0	9.0	9.0	7.0	6.5	7.5
Orbito-frontal border	20.5	23.2	24.0	22.5	43.0	48.5	49.0	28.5	27.0	35.0
Length of cheliped (largest)	40.0	49.0	50.5	46.5	113.0	137.5	142.5	60.0	58.2	78.0
Length of merus (natatory leg)	7.0	8.0	8.0	7.5	14.5	17.5	18.5	9.0	8.8	11.0
Breadth of merus (natatory leg)	3.5	4.0	4.5	4.0	8.0	9.0	9.0	5.0	5.0	6.0
Length 6th ♂ abdominal segment	3.3	3.8	4.0	—	7.5	8.0	8.0	—	—	—
Breadth 6th ♂ abdominal segment	3.3	4.0	4.5	—	8.0	9.0	9.0	—	—	—
$\frac{\text{Carapace breadth}}{\text{Carapace length}}$	1.56	1.59	1.62	1.63	1.46	1.46	1.45	1.53	1.49	1.53

TABLE 2

	De Man, 1888 Mergui-Archipelago		De Man, 1895 Java Sea	Alcock, 1899 largest specimen	Nobili, 1899 Amboina	Nobili, 1900 Singapore	Nobili, 1903 Singapore	I.enz, 1905 Majunga	Monod, 1930 Palestine	Steinitz 1933 Palestine	Chopra, 1935		
											Sand-heads Hoogh-ly River	Indian Mus. coll.	
	♂	♀ (Pl. 5, fig. 3)	♂		♂	♂	♂	♀	textfig.	?	♀	♂♂	♀♀
Length of carapace	39.0	31.0	27.0	46.0	32.0	31.0	32.5	33.0	—	16	37.0	38—45	28—32
Breadth of carapace	63.0	52.0	41.0	69.0	50.0	49.0	50.0	48.0	—	24	64.0		
Carapace breadth / Carapace length	1.61	1.67	1.51	1.50	1.56	1.58	1.54	1.48	1.59	1.50	1.73	1.53—1.56	1.62—1.67

Charybdis (Goniosoma) annulata (Fabr.)

(fig. 1)

Goniosoma annulatum var., De Man, 1883, Notes Leyden Museum, vol. 5, p. 151.

The adult female from the island of Nossy-Faly, near Madagascar, which Dr de Man regarded as a remarkable, perhaps local variety, belongs

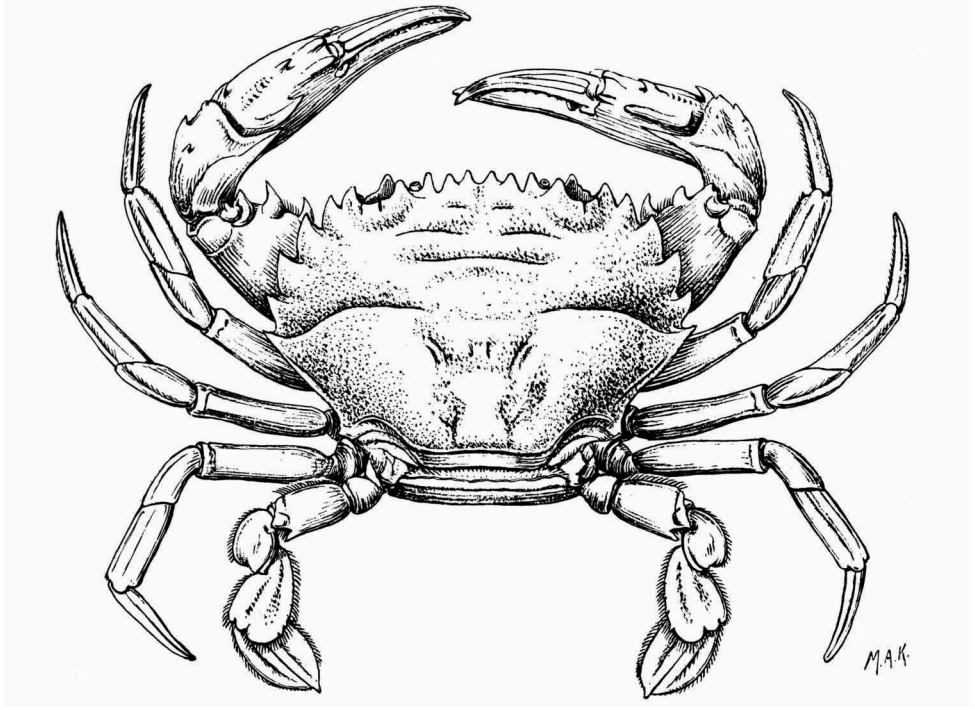

Fig. 1. *Charybdis annulata* (Fabr.), dorsal view. × ¾

to *Charybdis annulata* (Fabr.). I was able to compare it with one of the type specimens (the smallest and a female), which Dr Olaw Schröder from the "Zoologisches Museum der Universität Kiel" was kind enough to lend me.

Because the specimen from Nossy-Faly is much larger, the frontal teeth are differently shaped. They are somewhat narrower and sharper than in the type specimen. In both specimens the major diameter of the orbit is about one third of the interorbital space, whereas Alcock (1899, Journ. As. Soc. Beng., vol. 68 pt 2, p. 55) remarks: "the major diameter of the orbit is only a fourth the width of the interorbital space". For the rest Alcock's description agrees with the type specimen.

Moreover there was a female specimen in dried condition (Macklot collection) from the Moluccas.

This species is by no means identical with *Cancer fasciatus* Herbst. Prof. Dr A. Schellenberg, Berlin, was so kind as to send me a photograph of this type, which proved that this type does not belong to the Portunidae. The type of *Cancer sexdentatus* Herbst does not exist in the Berlin Museum, so I suppose it is lost to science. So it is now impossible to state with certainty the identity of *Ch. annulata* (Fabr.) and *Cancer sexdentatus* Herbst, as Alcock suggests.

Measurements in mm:

	Type ♀	Nossy—Faly ♀
Length of carapace	30.8	53.0
Breadth of carapace	42.0	76.0
Front	12.0	21.8
Interorbital space	15.5	28.4
Orbit	5.0	9.0
Orbito-frontal border	25.3	44.0
Length of cheliped (largest)	52.5	95.0
Length of merus (natatory leg)	8.8	15.5
Breadth of merus (natatory leg)	4.5	7.8
Posterior border	14.5	25.0

Charybdis (Goniosoma) japonica (De Haan) (A. M. Edw.)

Of this species there are two male specimens in dried condition, which belong to the Rüppell-collection (Red Sea). They are identical with the type specimens of *Charybdis sexdentata* de Haan (*Charybdis japonica* A. M. Edw.).

Moreover one male specimen in the Macklot collection from the Moluccas.

Charybdis (Goniosoma) variegata (Fabr.)

Portunus variegatus, Fabricius, Ent. Syst. Suppl. p. 364.
Charybdis variegatus, De Haan, 1850, Fauna Jap. Crust. pl. 1, fig. 2.
Charybdis variegata, Chopra, 1935, Rec. Ind. Mus., vol. 37, p. 488, textfig. 10.

From the Copenhagen Museum I had on loan the two type specimens of *Portunus variegatus* Fabr., which Dr K. Stephensen kindly sent me. I compared them with the type specimens of *Charybdis variegatus* De Haan in the Leiden Museum. I could state the identity of these types.

In the Museum there are three males and one female of this species from Amoy (collection G. Schlegel), but they differ from the type specimens in several points.

The forma typica of this species, viz., is characterized, i.a., by: (1) the second antero-lateral tooth is only a little smaller than the first tooth, (2) the last antero-lateral spine is much longer than the fifth tooth, especially in the female, (3) the inner lobule of the outer part of the lower orbital border is sharply dentiform, (4) the hands of the chelipeds are very unequal in the male, in the female they are nearly the same.

Now 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 last antero-lateral spine is not so much longer than the fifth tooth, (4) the inner lobule of the outer part of the lower orbital border is not so distinctly sharply dentiform, (5) the hands of the chelipeds are nearly the same size in the male.

The shape of the first male pleopod, however, is as in the *variegata*-specimens, which Chopra described.

Measurements in mm:

	largest ♂	type of Fabr. ♂
Length of carapace	17.0	21.0
Breadth of carapace	29.0	36.0
Front	6.5	7.5
Interorbital space	8.0	10.5
Orbit	4.5	4.5
Length of cheliped (largest) . . .	41.5	55.0
Length of merus (natatory leg) . .	4.5	5.0
Breadth of merus (natatory leg) . .	3.5	4.0

Charybdis (Goniosoma) variegata var. **brevispinosa** nov. var.

(figs. 2 and 4 *a*, *b*)

In the material collected by the "Gier" (collection Zoological Museum, Amsterdam, Gier no. 3, Exp. 5, 6° 13′ S, 107° 57′ E, 8½—7 fms., 16th Oct. 1907) I found a male specimen, which belonged to *Charybdis varie-*

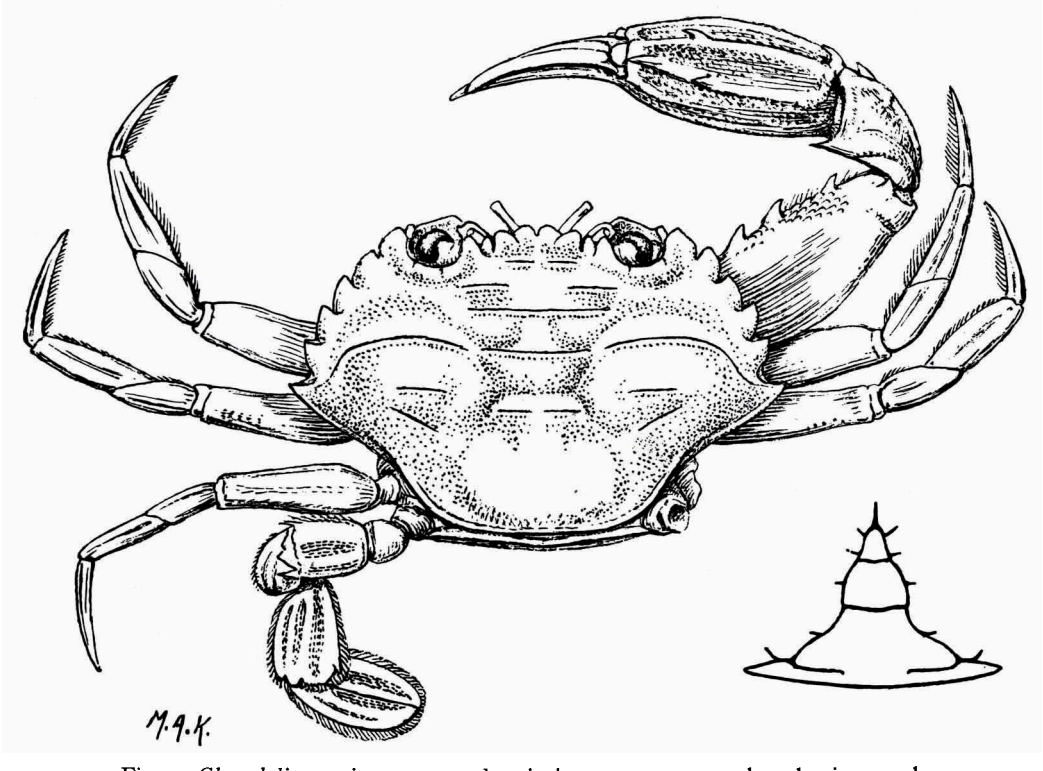

Fig. 2. *Charybdis variegata* var. *brevispinosa* nov. var., dorsal view and male abdomen. × 2

gata, if determined by the key of Alcock. When I compared it with the type specimens of *Charybdis variegata* Fabr. I noticed some differences, the most important of which are: (1) a different shape of the first male pleopod, (2) the sixth antero-lateral tooth is only a little longer than the fifth tooth, so that I propose it as a new variety of *Charybdis variegata.*

Description: The carapace 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 so clearly distinguishable.

The front is cut into six teeth. The median teeth are most prominent, they are broader than the submedian ones, the outer edges run strongly outwards backwards, the tops are round; the inner edges of the submedian teeth slope outwards, the tops are round and the outer edges 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 3rd—5th 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 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 edges 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 the least hairy.

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 the fourth and fifth terga are fused; the sixth tergum has strongly curved sides; it is broader than long; the boundary between the sixth and fifth terga is straight, between the sixth tergum and the telson it is curved anteriorly.

The right cheliped has 2.5 times the length of the carapace. The under surface of the arm has squamiform markings with little 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.

Measurements in mm:

Length of carapace	20.0
Breadth of carapace	32.5
Front	7.0
Interorbital space	9.0
Orbit	4.0
Length of cheliped	51.0
Length of merus (natatory leg) . .	5.5
Breadth of merus (natatory leg) . .	4.5

Charybdis (Goniosoma) demani nov. spec.

(figs. 3 and 4 *c*, *d*)

Charybdis (Goniosoma) callianassa, De Man, 1925, Treubia, vol. 6, p. 324, fig. 1.

Locality: East coast of Sumatra, Amphitrite-Bay (mouth of the Indragiri), De Man-collection, Zoological Museum, Amsterdam, one male and one egg-laden female.

Dr J. G. de Man named these specimens *Charybdis callianassa* (Herbst). When I compared them with *Charybdis callianassa* in other collections (Copenhagen Museum, i.a.) they proved to belong to another species. This species is new to science. In honour of the late Dr J. G. de Man, one of our greatest carcinologists, I have named this species after him.

Description: The carapace 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 develop-

ed in the female than in the male. The regions are fairly distinct. The whole surface is granular. Between the epibranchial spines a transverse ridge crosses the carapace, 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.

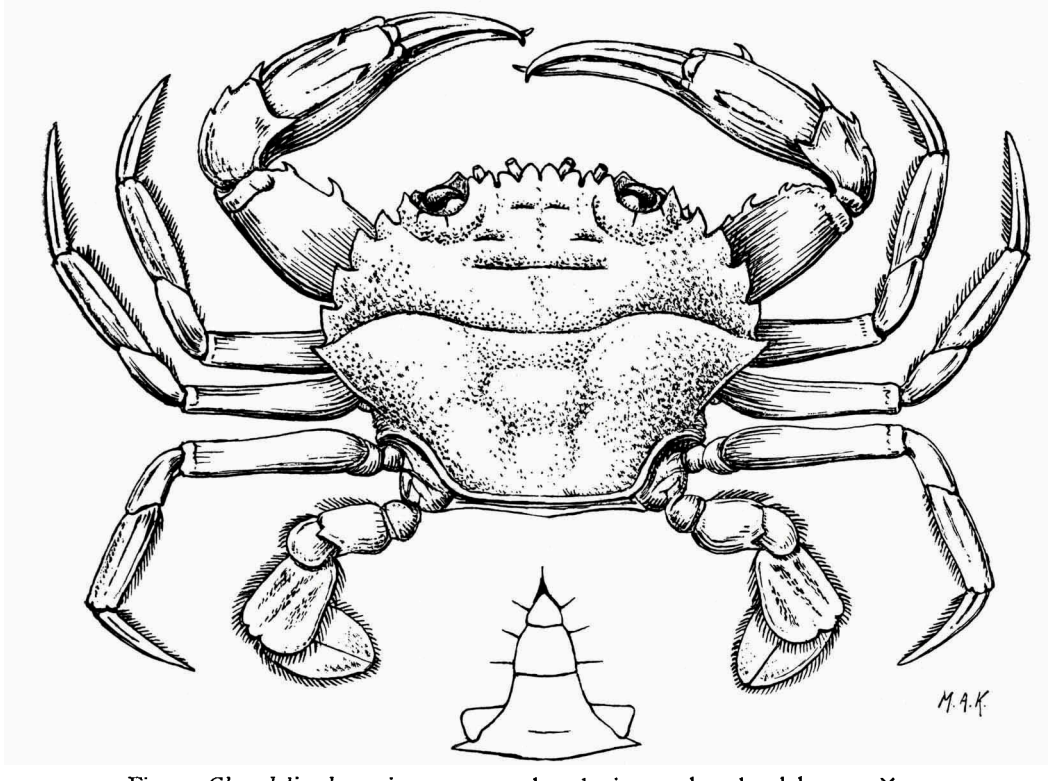

Fig. 3. *Charybdis demani* nov. spec., dorsal view and male abdomen. × 2

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

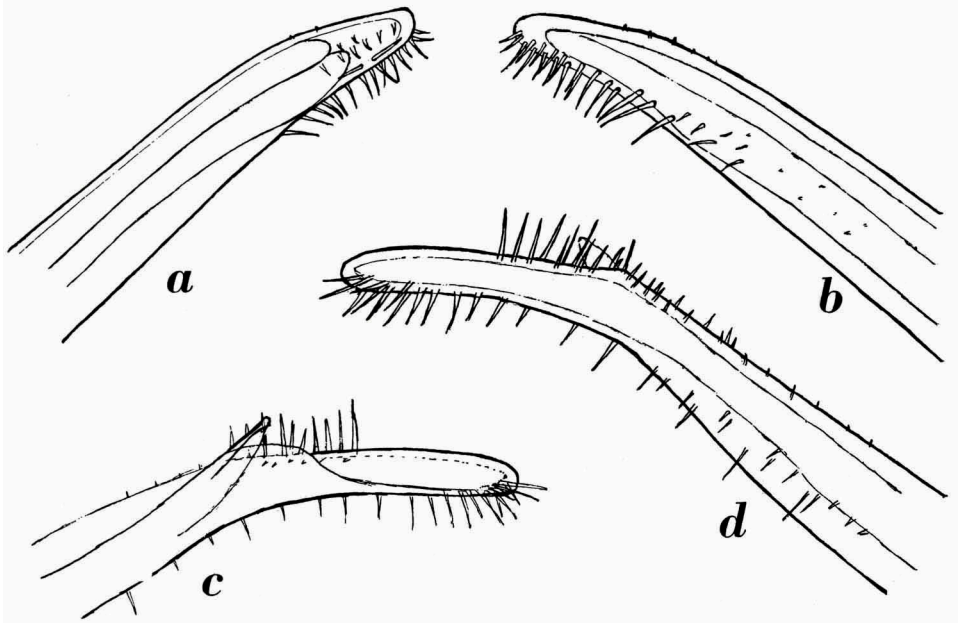

Fig. 4. a, *Charybdis variegata* var. *brevispinosa* nov. var., left first male pleopod, posterior view. b, id., anterior view. c, *Charybdis demani* nov. spec., right first male pleopod, posterior view. d, id., anterior view. × 48.

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 to 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.

The postero-lateral borders converge strongly posteriorly.

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 boundary between the sixth tergum and the telson is somewhat curved anteriorly and between the fifth and sixth terga it 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 carapace. On the distal part of the granular anterior border of the arm there are two curved spines, some distance before 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 of the male:

Length of carapace	22.4
Breadth of carapace	30.0
Front	8.0
Interorbital space	9.5
Orbit	4.8
Length of cheliped (left)	42.0
Length of merus (natatory leg)	5.0
Breadth of merus (natatory leg)	4.0