CRUSTACEA BRACHYURA

BY

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INTRODUCTION

This small collection of Brachyura from the Dutch East Indies includes several rather uncommon forms and those described as new each exhibit some very distinctive characters. A number of the species are unfortunately each represented by only one or two specimens, often of very small size, so that it has not always been possible to identify them with certainty.

I have intentionally given a rather large number of text-figures in proportion to the text for three reasons. (1) I have wished as far as possible to fill in gaps by illustrating certain characters of specific importance that are not described or figured in sufficient detail in earlier works. (2) I consider that the male pleopods are of specific importance in many, though not in all genera. (3) I have found it necessary, as far as available time and material would permit, to revise *a*) the genus *Phymodius*, *b*) the classification of the subfamily *Eumedoninae* and *c*) the genus *Xenocarcinus*.

The classification followed is that given by Balss in Kükenthal and Krumbach's « Handbuch der Zoologie » (1927, vol. 3, pt. 1, pp. 1014-1025). I have, as a rule, omitted all reference to the names of the subfamilies partly because,

[1] From the Zoology Department, British Museum (Nat. Hist.).

in the *Xanthidae* especially, they require some revision. I have placed the genus *Daira* at the end of the list of genera in the section Hyperolissa because I am not quite sure of its true position. It is very near to *Actaea* but appears to have certain affinities with the *Menippinae*, especially as regards the male pleopods.

I take this opportunity of expressing my thanks to Dr. V. van Straelen, Director of the Royal Museum of Natural History, Brussels, for sending me the collection for study. I also wish to acknowledge my indebtedness to the authorities of the « Muséum d'Histoire naturelle, Paris », of the U. S. National Museum and of the Museum of the University of Turin for sending specimens, including cotypes, for re-examination. It gives me great pleasure to thank Dr. H. Balss (1) of Munich who has helped me to classify some of the *Xanthidae* and has so willingly placed his expert knowledge at my service.

(1) A number of specimens had been sent to Dr. Balss who identified most of them; those that were not later sent to me are indicated as *e. g.* « 7 ex » instead of ♂, ♀ or immature specimens.

BRACHYRHYNCHA

CATOMETOPA

Family GECARCINIDAE Dana.

Genus CARDISOMA Latreille.

Cardisoma hirtipes Dana.

Alcock, 1900, p. 447.
Tesch, 1918*a*, p. 137.

Locality. — Manokwari, 15-III-29, 1 ♂.

Remarks. — This specimen agrees with *C. hirtipes* as described by Alcock except in one respect. The front is much more depressed than usual, being in contact with (1) the basal segments of the antennae which it slightly overlaps

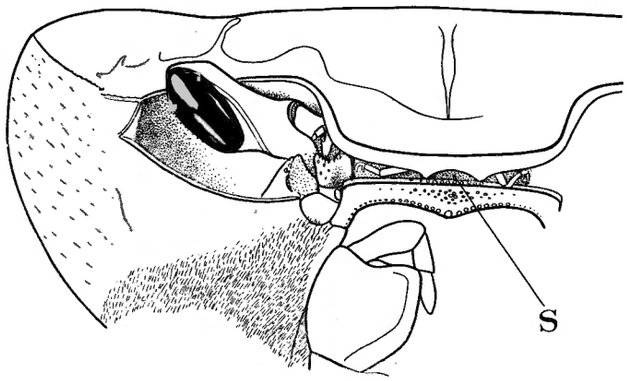

Fig. 1. — *Cardisoma hirtipes* Dana. — Part of carapace in frontal aspect to show epistome and front : *s.* interantennulary septum : × 2.4.

and (2) the epistome on either side of the small sunken interantennulary septum (fig. 1, *cf.* De Man, 1888, pl. XIV, fig. 3*a*).

According to Alcock (1900, p. 446) the basal antennal segment touches the front in *C. carnifex* (Herbst) but not in *C. hirtipes;* Tesch (1918, p. 136) on the other hand, in his diagnosis of the genus, states that « the peduncle of the antenna does not touch the front ». Most of the specimens in the B. M. collection referred to *C. carnifex* have the basal antennal joint nearly or quite in contact with the front, as also has one specimen that is probably referable to *C. hirtipes*. It is more than likely that both species show variation in this respect but I have not seen any other specimen with the front actually touching the epistome on either side of the sunken interantennulary septum (fig. 1, *s.*).

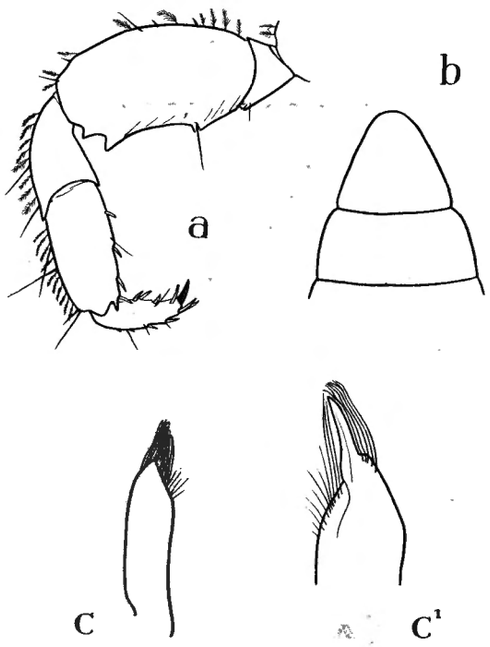

FIG. 2. — *Pachygrapsus minutus* A. M.-EDW. — *a*. Fourth walking leg of left side. *b*. Two terminal segments of male abdomen. *c*. First pleopod of male. *c*¹. Apex of same farther enlarged, and drawn from the reverse side; many setae omitted. (*a*. ×15; *c*. ×23; *c*¹. ×45.)

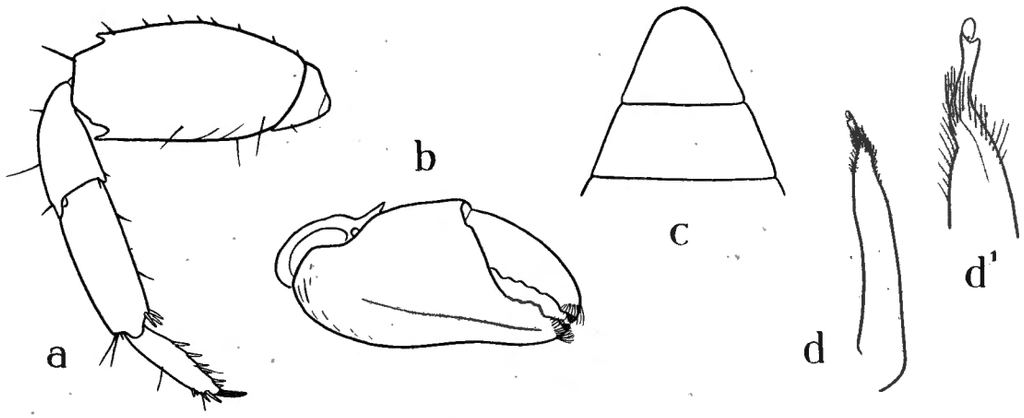

FIG. 3. — *Pachygrapsus planifrons* DE MAN. — *a*. Fourth walking leg of left side. *b*. Right chela. *c*. Two terminal segments of male abdomen. *d*. First pleopod of male from convex side. *d*¹. Apex of same from concave side and farther enlarged.
(*a*. and *b*. ×15; *d*. ×23; *c*. ×45.)

Family **GRAPSIDAE** Dana.

1. Genus PACHYGRAPSUS Randall.

Pachygrapsus minutus A. Milne-Edwards.

Pachygrapsus minutus Tesch, 1918, p. 77 (list of earlier references).
Sesarma murrayi Calman, 1909, p. 708, pl. LXXII, fig. 4 and 5.

Material. — Eiland Weim, 26-II-29, 1 ♂ (*b* of carapace 5.5 mm.; walking-legs 2 and 3 on left side undergoing regeneration); also 7 ex., Balss det. 25-II-29.

Remarks. — The single male specimen in this collection is smaller than that described by Alcock (1900, p. 399) and differs in having the front rather narrower and the orbits correspondingly broader (carapace breadth : front : major diameter of orbit : 1.91 : 1 : 0.52). In this respect it agrees with the specimens from Christmas Island described by Calman (1).

Tesch (1918, p. 77) mentions the presence of « a small obtuse prominence at the end of the proximal third part » of the posterior margin of the merus of the last walking-leg. There is, in fact, a pair of small conical spines, one on either side of the long hair or bristle (Calman, 1909, pl. LXXII, fig. 4 and fig. 2*a* of the present paper).

The most marked differences between this species and *Pachygrapsus planifrons* De Man are tabulated below (p. 8).

Pachygrapsus planifrons De Man.

Pachygrapsus planifrons Tesch, 1918, p. 77.

Material. — Eiland Weim, 26-II-29, 2 ♂, 2 ♀ (one ovigerous).
Nomvoor, 7-III-29, 1 ovig. ♀.

Remarks. — This small species (the ovigerous female has a carapace width of only 4 mm.) is very distinct from *P. minutus* A. M.-Edw. as the following table shows. The merus of the external maxilliped is, as Tesch has noted, far less circular than in De Man's figure (1888, pl. XVI, fig. 2*a*).

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(1) Dr. H. Balss, in a letter dated 12.X.1933, first pointed out that *Sesarma murrayi* Calman was possibly identical with *Pachygrapsus minutus*, and on examination of cotypes I was able to confirm this.

Dr. Calman has given me the following note « After re-examining the types of *Sesarma murrayi* I can only ruefully agree with Balss's identification of them with *Pachygrapsus minutus*. At this distance of time it is impossible to conjecture what temporary aberration of eyesight or of judgment led me to overlook the total absence of all Sesarmine characters ! ». W. T. C.

PACHYGRAPSUS MINUTUS.

1. Sides of carapace strongly convergent posteriorly; entire dorsal surface finely striate.

2. Chelipeds much larger and more massive; chela very nearly as long as carapace (0.94 : 1)— males of same size compared.

3. Tips of fingers of chela without setae in both sexes.

4. Fourth walking-leg as represented in fig. 2*a*, bearing fine feathered setae on anterior margin in addition to the stout bristles; two conical spines on proximal half of posterior border of merus. Propodus and dactylus relatively short and broad.

5. Terminal abdominal segments of male as represented in fig. 2*b*.

6. First pleopods of male as represented in fig. 2*c*, *c'*, the narrow apex concealed by the numerous long setae (many setae omitted in fig. 2*c'*).

PACHYGRAPSUS PLANIFRONS.

1. Sides of carapace feebly convergent posteriorly; striae confined to branchial region.

2. Chelipeds smaller and less massive; chela approximately two-thirds of carapace length.

3. Tips of fingers of chela with a fringe of setae in both sexes (fig. 3*b*).

4. Fourth walking leg as represented in fig 3*a*, without feathered setae on anterior border and without any spines on proximal half of posterior border of merus; dactylus and propodus more elongated and narrow than in *P. minutus*.

5. Terminal abdominal segments of male as represented in fig. 3*c*.

6. First pleopod of male as represented in fig. 3*d*, *d'*, the apex not entirely hidden by setae.

2. Genus PERCNON GISTEL.

Percnon abbreviatum (DANA).

TESCH, 1918, p. 130.

MATERIAL. — Eiland Weim, 28-II-29, 1 ♂, 2 ♀ (the larger bearing two flattened egg masses).

3. Genus METASESARMA H. MILNE-EDWARDS.

Metasesarma rousseauxi H. MILNE-EDWARDS.

TESCH, 1917, p. 212.

MATERIAL. — Pisang Eiland, 17-III-29, 1 ovig. ♀ Dr. Balss det.

FAMILY **OCYPODIDAE** ORTMANN.

1. Genus OCYPODA FABRICIUS.

Ocypoda cordimana DESM.

ORTMANN, 1897, pp. 259, 262.

TESCH, 1918, p. 35.

MATERIAL. — Poelo Pete (Java), 19-I-29, 1 ♂.

Moemi (New Guinea), 13-III-29, 1 ex., Balss det.

Ocypoda ceratophthalma (PALLAS) ORTMANN.

ORTMANN, 1897, pp. 261, 264.
TESCH, 1918, p. 36.

MATERIAL. — Kampong Todowangi, Mangrove, Djailolo; **16-II-29**, 4 ♂.

Jefbi (Misool), **26-II-29**, 1 ♂.

Manoembaai (Aroe), Mangrove, **2** specimens, much damaged.

Poelo Babi (Aroe), **22-III-29**, 1 ♂.

Manokwari (New Guinea), **13-III-29**, 1 ♂, several immature specimens.

Sabang (Sumatra), **12-XII-28**, **2** immature specimens (probably of this species).

Benoea (Bali), **24-I-29**, **1** immature specimen.

REMARKS. — The four adult males from Kampong all possess the long horn or style projecting beyond the cornea of the eye, which is characteristic of this species. The female from Jefbi, which is nearly **37** mm. in carapace width, and all the smaller specimens show little, if any, trace of the style. The variability of the style has been commented on by Ortmann (**1894**, p. **768**).

Ocypoda kuhli DE HAAN.

ORTMANN, 1897, p. 359 (in key) and p. 364.
TESCH, 1918, p. 36.

MATERIAL. — Poelo Pete (Java), **19-I-29**, **2** ♂ and several immature specimens.

REMARKS. — These specimens are nearest to *O. kuhli*, the chela and the dorsal border of the orbit agreeing very well with the figures given by Miers (**1882**, pl. XXII, fig. 8 and 8*a*). The two fissures in the lower orbital border are much less conspicuous than those figured by Ortmann (**1894**, pl. XXIII, fig. 19*a*), and are scarcely visible in the smallest specimens. It is probable that the largest specimen (*b* of carapace **30** mm.) has not attained to the full size for the species.

Ocypoda sp.?

MATERIAL. — Eiland Weim (Misool), **28-II-29**, **1** immature specimen.

Eiland Mansinam, Manokwari (New Guinea), **8-III-29**, **3** immature specimens (Balss det.).

Harang Hawoe (Java), **25-XII-28**, **3** immature specimens (Balls det.).

Poelo Karang (Aroe), **23-III-29**, **1** immature specimen.

2. Genus GELASIMUS LATREILLE (1).

a) **FRONT WIDE.**

Gelasimus annulipes LATREILLE.

H. MILNE-EDWARDS, 1837, p. 55; pl. XVIII, fig. 10-13.
H. MILNE-EDWARDS, 1852, p. 149; pl. IV, fig. 15.
DE MAN, 1891, pp. 23 and 39.
ALCOCK, 1900, pp. 352 and 353.
BOUVIER, 1915, p. 124, text-fig. 36.

MATERIAL. — Poelo Babi (Bali), Mangrove, **24-I-29**, **1** ♂.
S. Manoembaai (Aroe), **4** ♂ (rather damaged).

REMARKS. — The specimens from ? Manoembaai differ from the wide-fronted female — referred to *G. latreillei* — from the same locality in having a wide U-shaped gap between upper and lower orbital borders (*vide infra*). In three of the specimens, including the complete one from Poelo Babi, the dactylus of the chela is broad thin and blade-like and the tooth near the extremity of the fixed finger is a broadly triangular lobe. Otherwise the specimens agree with Alcock's description of this species.

? Gelasimus latreillei H. MILNE-EDWARDS.

H. MILNE-EDWARDS, 1852, p. 150.
BOUVIER, 1915, p. 125, text-fig. 37.

MATERIAL. — S. Manoembaai (Aroe), **1** ♀ (carapace damaged posteriorly, chelipeds and walking-legs missing).

REMARKS. — This specimen undoubtedly belongs to the *gaimardi* group (Ortmann, 1897, p. 353) but differs from the wide-fronted males from the same bottle in having a narrow V-shaped notch at the outer extremity of the orbit. The orbit appears to be very similar to that figured by Bouvier (1915, p. 125, text-fig. 37) for *G. latreillei*.

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(1) = *Uca* Leach 1814. As the genus *Uca* has been used for two different types of crabs I think that the generic name *Gelasimus* (Latreille, 1817), which has for so many years been used to denote only the Fiddler-crabs, ought to be retained. In this instance, as in others, the fact that the generic name had been well established and in general use is a strong argument against too strict an application of the International Rules of Nomenclature.

Gelasimus triangularis A. MILNE-EDWARDS.

DE MAN, 1887, p. 119.
ALCOCK, 1900, pp. 354 and 356.

MATERIAL. — Poelo Babi (Bali) dans mangrove, **24-I-29**, 1 ♂.

Gelasimus sp.?

MATERIAL. — Ambon, **21-II-29**, 1 ♂ without the larger chela.

b) **FRONT NARROW.**

Gelasimus coarctatus H. MILNE-EDWARDS.

DE MAN, 1891, pp. 21 and 31.

MATERIAL. — S. Manoembaai (Aroe), **26-III-29**, many specimens of both sexes (including ovigerous ♀) with *G. dussumieri* and *G. signatus* var. *angustifrons*.

REMARKS. — It was at first difficult to determine how many species were represented in the large collection from S. Manoembaai since the carapace is at first sight similar in all specimens, and the larger cheliped had become detached from many of the males. Also, the presence or absence of an accessary row of granules on the lower wall of the orbit hardly seemed to merit the importance attached to it by De Man since the granules, when present, were frequently as few as **1-3** on each orbit.

The great variation in the form of the larger chela, however, supported the view that more than one species was represented, and, when the male pleopods were examined, this proved to be the case. All males without any trace of the accessary row of granules on the orbital wall had the first pleopod of the type represented in fig. **5**, while those with **1-3** or more granules had the type shown either in fig. **4** or fig **6***b*. Fortunately, in the latter two species, several males of each still had the larger cheliped attached to the carapace, and the chelae proved to be different. According to De Man's key (1891, p. **21**) those specimens with a tooth near the distal extremity of the dactylus belong to *G. coarctatus;* those without this tooth on the dactylus, but with a broadly triangular tooth or lobe a little beyond the middle of the immobile finger, to *G. signatus*

The specimens referred to *G. coarctatus* agree well with the descriptions of that species except that, in many of the chelae, there is a prominent conical tooth a little before the middle of the immobile finger; in senile males this

tooth and the proximal teeth on the dactylus are worn away. They differ from the specimens referred to *G. signatus* var. *angustifrons* in several respects. (1) The antero-lateral borders of the carapace are less sinuous since they begin to converge immediately. (2) There are as a rule fewer granules in the accessary row (1-7). (3) The chela not only differs in shape but also in colour, the lower half of the palm being bright red. (4) The first pleopod of the male has a smaller setose lobe (*l*) near the base of, and no trace of the triangular chitinous lobe (*p*) above the terminal tube (*cf.* fig. 4 and 6*b*). (5) It is probably also a larger form with a distinguishing colour pattern in life.

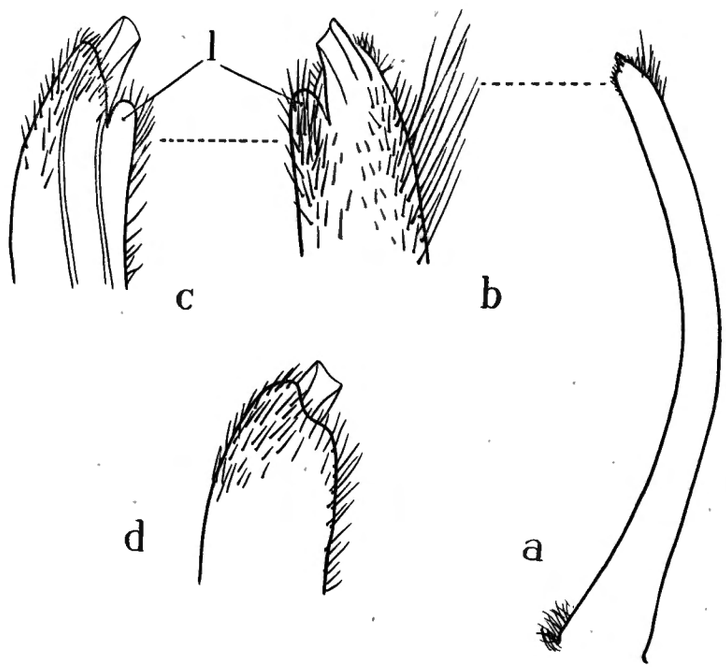

FIG. 4. — *Gelasimus coarctatus* H. M.-EDW. — First pleopod of male.
a. Pleopod from concave side. Apex of same from *b*. concave, *c*. convex side respectively.
d. Apex of first pleopod of a smaller male. *l*. Setose lobe at base of terminal tube.
(*a*. ×10.5; *b*. and *c*. ×36.)

Gelasimus dussumieri H. MILNE-EDWARDS.

DE MAN, 1887, p. 108, pl. VII, fig. 2-7; 1891, p. 20.

ALCOCK, 1900, p. 361.

TESCH, 1918, p. 39.

MATERIAL. — S. Manoembaai (Aroe), **26-III-29**, many specimens of both sexes, including ovigerous ♀, with *G. coarctatus* and *G. signatus* var. *angustifrons*.

Remarks. — These specimens (without any accessary granules on lower orbital wall) run down to *G. dussumieri* in De Man's key to the Indopacific species and agree with the specimens from Mergui identified by the same author (1891, pp. 20 and 26; 1887, p. 108). In males of all sizes the first pleopod is of the type represented in fig. 5 with a rather broad bluntly rounded apex on the concave side of which is a very short tube (*t*) and a triangular projection (*p*). These highly chitinised structures are scarcely visible from the convex side of the appendage (fig. 5*b*).

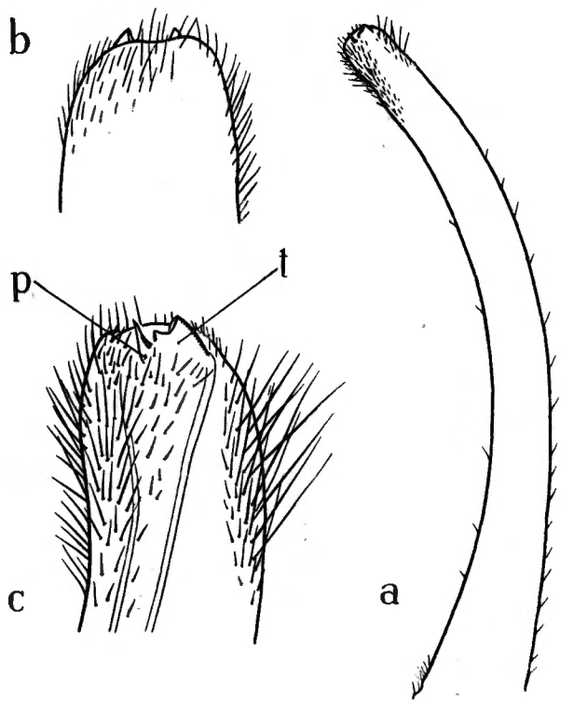

Fig. 5. — *Gelasimus dussumieri* H. M.-Edw. — *a*. First pleopod of male from concave side. Apex of same from *b*, concave, *c*. convex side. *t*. Terminal tube. *p*. Chitinous projection at side of tube. (*a*.×10.5; *b*. and *c*.×36.)

Gelasimus signatus var. **angustifrons** De Man.

De Man, 1891, p. 38.

Material. — S. Manoembaai (Aroe), **26-III-29**, **20** specimens, including **3** ovigerous ♀, with *G. coarctatus* and *G. dussumieri*.

Remarks. — This appears to be a small form as none of the specimens exceed **20** mm. in width of carapace The larger chela of the male agrees closely with that figured by De Man for *G. signatus* (1891, pl. IV, fig. **11***b*) but the tooth on the dactylus immediately above the proximal end of the triangular lobe of the index finger is larger. The whole of the outer surface

of the palm is coloured a greenish or purplish grey with, in some cases, a reddish brown tinge near the proximal end of the immobile finger. The row of granules near the base of the fingers on the inner surface is rather faint.

In addition to the striking difference in form and colour of the chela, these specimens are distinguishable from *G. coarctatus* in several respects. (1) The granules in the accessary row on the lower orbital wall are smaller but

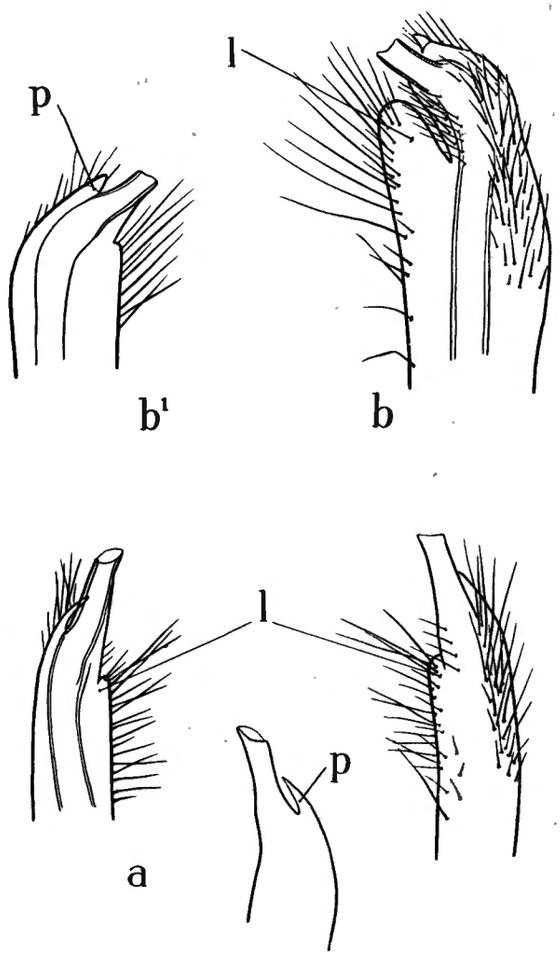

FIG. 6. — *Gelasimus signatus* HESS. — *a*. Apex of first pleopod of male showing terminal tube, small setose lobe (*l*.) and tongue-like process (*p*.) at base of tube. *Gelasimus signatus* var. *angustifrons* DE MAN. — *b*. Apex of first pleopod of adult male. *b*¹. Same of smaller male. *l*. Setose lobe. *p*. Short chitinous process : × 36.

more numerous (8-16). (2) The antero-lateral margins of the carapace are more sinuous as they converge slightly for the first 1-2.5 mm. and then curve inwards rather abruptly. (3) The apex of the first pleopod of the male is as represented in fig. 6*b* (*cf*. with fig. 4*b* — being from a male of about the same size). (4) The depressions on the carapace are usually more pronounced.

The front has always a long narrow median furrow as in *G. signatus* var. *angustifrons* (De Man, 1891, pl. IV, fig. 11*c*). I have not examined type specimens of *G. signatus* Hess but the specimens from Port Curtis, Australia (Miers, 1884, p. 236) are probably correctly referred to that species. They differ from the Manoembaai specimens in having a short, wide frontal furrow (De Man, 1891, pl. IV, fig. 11*a*) and less sinuous antero-lateral margins. Moreover the first pleoped of the male is more slender, with a much longer terminal tube (fig. 6*a*); the setose lobe at the base of the tube is small while there is a longer narrower protuberance on the other side of the tube base. The difference in the pleopod supports De Man's separation of the *angustifrons* form, which may even be a distinct species.

DISTRIBUTION. — *G. signatus* has been recorded from the eastern coast of Australia; *G. signatus* var. *angustifrons* from Batavia.

Gelasimus sp.?

MATERIAL. — S. Manoembaai (Aroe), Mangrove, 2 ♀, incomplete, with narrow front and accessary row of granules on lower orbital wall.

c) **FRONT MISSING.**

Gelasimus sp.?

MATERIAL. — Dodingabaai, Halmaheira, 15-II-29, 1 incomplete ♂, entire dorsal half of carapace missing.

3. Genus SCOPIMERA DE HAAN.

Scopimera aff. **inflata** A. MILNE-EDWARDS.

A. MILNE-EDWARDS, 1873, p. 83.
KEMP, 1919, p. 321, text-fig. 8.
MC CULLOCH & MC NEILL, 1923, p. 49, text-fig. 1, pl. IX, fig. 1 and 2, pl. X, fig. 1 and 2
RATHBUN 1924, p. 10, text-fig. 2.

MATERIAL. — Manokwari (New Guinea), 13-III-29, 9 ♂, 1 ♀ mostly of small size.

These specimens are so near to *S. inflata* and *S. sigillorum* that it is only necessary to give a very brief description of the salient features.

DESCRIPTION OF FEMALE. — Outline of carapace as represented in fig. 7*b*; *l.* = 4.8, *b.* = 7.0 mm. Front deflexed, width between eye-stalks rather less than one-fourth of width between external orbital angles; anterior border with a slight median emargination.

Merus and ischium of external maxilliped in the proportion of 4 : 3, a blunt wide ridge extending downwards from the carpal articulation on distal third of merus. A few long setae which project posteriorly from the apex of the dactylus are not represented in Kemp's figure (1919, p. 322, text-fig. 8).

Endopod of second maxilliped as represented in fig. 8*a*, the setae omitted; this type of elongated parallel-sided terminal segment is also found in *S. bitympana* and may be characteristic of all four species in this group (*vide infra*, p. 17).

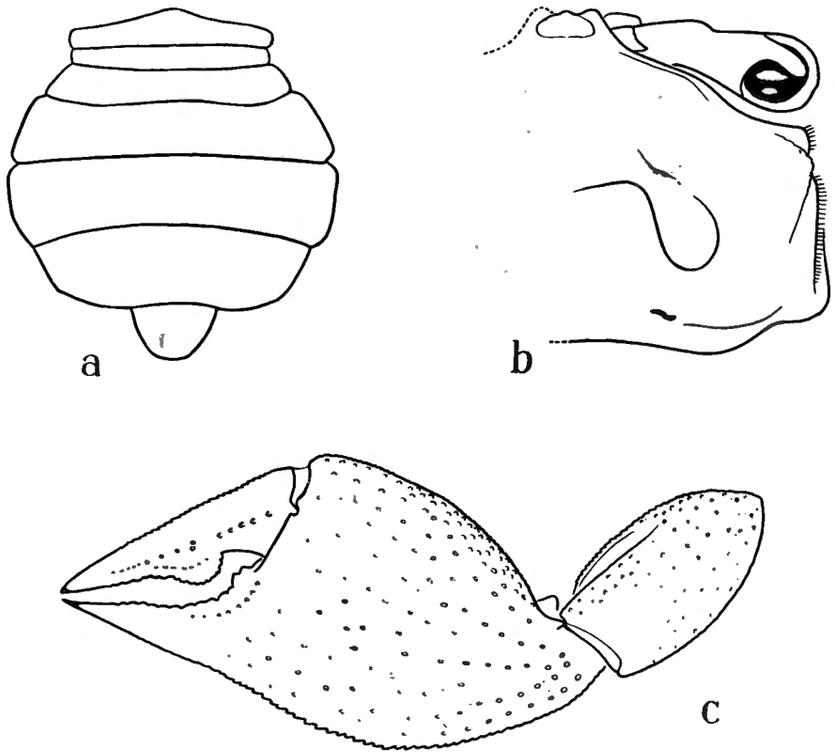

FIG. 7. — *Scopimera* aff. *inflata* A. M.-EDW. — *a*. Female abdomen. *b*. Left half of dorsal surface of carapace of female. *c*. Left chela and carpus of male : × 10.5.

Abdomen subcircular, the maximum width very nearly equal to the length (fig. 7*a*).

Chelipeds equal. The merus, which has a longitudinally divided tympanum on the inner, a smaller undivided one on the outer face scarcely extends beyond the external orbital angle when closely applied to the carapace. Carpus half as long again as wide, unarmed. Fingers of chela considerably longer than dorsal surface of palm; dactylus with a long but very shallow prominence on the proximal half.

First pair of walking-legs agree with Kemp's description of *S. inflata* (1919, p. 323) save that the merus is a trifle shorter in proportion to its width. The

« strong longitudinal ridge » on the anterior face of the propodus is minutely serrated; a similar ridge also occurs on the second pair of legs.

MALE. — The abdomen is similar to that figured by Rathbun (1924, p. 11, text-fig. 2) except that the sum of segments 3 and 4 is equal to segment 5 and the latter is rather less constricted proximally.

Carpus of cheliped unarmed and twice as long as wide. The chela is represented in fig. 7*c*; dactylus equal to dorsal border of palm with a wide prominent lobe on proximal half of ventral margin.

First pleopod slender and sinuous with the apex bent to form a hook (fig. 8*b*; *cf.* that of *S. bitympana*, fig. 8*c*).

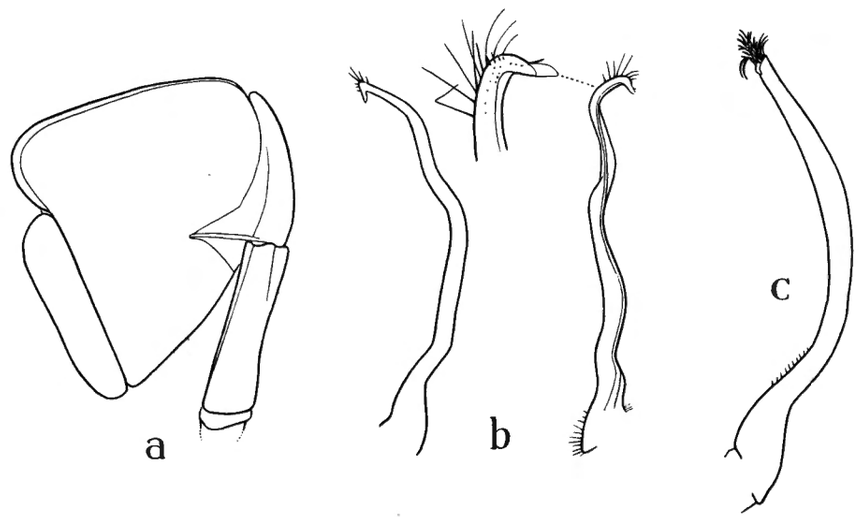

FIG. 8. — *Scopimera* aff. *inflata* A. M.-EDW. — *a*. Endopod of second maxilliped. *b*. First pleopod of male drawn from two different aspects to show amount of twisting; apex of same farther enlarged.
Scopimera bitympana SHEN. — *c*. First pleopod of male. (×15; apex of first pleopod ×45.)

REMARKS. — Kemp (1919, p. 311) divided the species of the genus *Scopimera* into four groups the last showing affinity with *Dotilla*. This group now comprises four closely related species namely *S. sigillorum* Rathbun (1914, p. 83, as *Dotilla sigillorum*), *S. kochi* Roux (1917, p. 610), *S. inflata* A. Milne-Edwards and *S. bitympana* Shen (1930, p. 227; 1932, p. 262).

The specimens from Manoekwari certainly belong to this group but are not referable either to *S. kochi* or to *S. bitympana* (1). They differ from the former in several respects : the front has not granular edges; the mesogastric region is not concave; the merus of the external maxilliped is rather shorter and more

(1) I have been able to examine several specimens of this species through the courtesy of Mr. C. J. Shen.

angulate antero-internally; the meri of the walking-legs are broader proximally with larger tympana than are figured by Roux (1917, pl. XXVIII, fig. 21); the abdomen of the female is much broader (1). From *S. bitympana* they differ chiefly as regards the first pleopods of the male (fig. 8*c*) and the chelipeds. In *S. bitympana* the carpus in both sexes is much broader (*l* : *b* approximately 4 : 3) and in the larger males at any rate the anterior border is thin, almost cristate. The fingers of the chela are longer in both sexes — fingers one and a half (♀) or twice (♂) as long as the dorsal border of the palm — and the tooth on the dactylus of the male is much narrower. In *S. sigillorum* the merus of the third maxilliped is stated to be about three times as large as the ischium.

They are certainly closely related to, if not identical with, *S. inflata;* unfortunately the female abdomen and the first pleopod of the male have not been figured for that species and I have no specimens with which to compare these. There is no tooth at the inner angle of the carpus of the male cheliped (fig. 7*c*, *cf.* Mc Culloch and Mc Neill, 1923, pl. IX, fig. 2) but the largest male does not exceed 7.5 mm. in breadth of carapace. They may prove to be small individuals of *S. inflata* and it does not seem advisable to refer them to a new species merely on the strength of a slight difference in the cheliped.

4. Genus MACROPHTHALMUS Latreille.

Macrophthalmus pacificus Dana, De Man.

De Man, 1890, p. 79, pl. IV, fig. 10.
Tesch, 1915, p. 190, pl. VIII, fig. 11.
Kemp, 1919*a*, p. 391.

Material. — S. Manoembaai (Aroe), 26-III-29, 1 ♂.

Remarks. — It was rather difficult to decide whether this specimen ought to be referred to *M. pacificus* or to *M. crinitus* Rathbun. Kemp (1919, p. 391, in table) states that in *M. crinitus* the granulate crest on the outer surface of the palm of the male is conspicuous. There is certainly no trace of such a granulate crest in this specimen. Of *M. pacificus* Tesch (1915, p. 192) writes « contrary to the usual case in the genus, the ambulatory legs are only slightly hairy... ». Unfortunately the ambulatories of the present specimen are so coated with a rather adhesive slime that it is exceedingly difficult to clean them, but they appear to be almost, if not quite, as hairy as in *M. crinitus* (Rathbun, 1910, pl. I, fig. 3, as *M. pacificus* but the specific name has since been changed). Moreover, while the four short ridges on the branchial region of the carapace are distinct on the right, all save the anterior (transverse) one are absent on the left side, which is somewhat irregular and may be slightly abnormal.

(1) See also Mc Culloch and Mc Neill, 1923, p. 51 (quoted from Kemp).

The absence of any trace of a granulate crest on the palm and the presence of the four short ridges on one side of the carapace agree with *M. pacificus*.

At the inner angle of the wrist is a row of rather high conical granules.

Family **PINNOTHERIDAE** H. Milne-Edwards.

Genus PINNOTHERES Latreille.

Pinnotheres semperi Bürger.

Bürger, 1895, p. 382, pl. IX, fig. 28, pl. X, fig. 27.
Tesch, 1918*a*, pp. 250 and 255.

Material. — Lampasing (Sumatra), **12-IV-29**, an ovigerous ♀ (*l.* and *b.* of carapace = 7.8 and 8.1 mm. respectively).

Remarks. — This specimen is referable to *P. semperi* from Java, according to the key drawn up by Tesch (1918*a*, pp. 251-255). It agrees well with Bürger's description and figures as regards the much reduced fourth pair of walking-

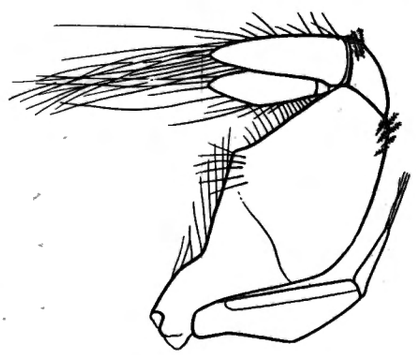

Fig. 9. — *Pinnotheres semperi* Bürger. — Third maxilliped : × 20.

legs and the rather massive chelipeds (Bürger, 1895, pl. IX, fig. 28*a*.) The carapace has the same general outline but is probably smoother and more arched dorsally than in the type specimens the cardiac region, especially, being rather elevated. The front also is more depressed, is scarcely visible in dorsal aspect and bears a rather longer pubescence than do the sides of the carapace. This pubescence is sparse, almost absent on the raised central part of the carapace but may have been rubbed off. There are longish plumose setae on the inner surface of the chelipeds and on the dorsal margin of the walking-legs in addition to the felt mentioned by Bürger.

The external maxilliped is as represented in fig. 9; the dactylus is almost as wide and as long as the propodus, as described by Bürger. When the dense pubescence was removed from the outer surface of the main mero-ischial seg-

ment, a distinct indication of a suture is seen on both maxillipeds (fig. 9); there is, however, no trace of a suture on the inner surface. It is unusual to find such a well-marked superficial suture in the sub-family *Pinnotheridae*.

Unfortunately, I have no data regarding the host with which this specimen was associated but, judging from the shape of the dactylus of the third maxilliped, it was probably a Holothurian. The types of *P. semperi* were found in *Holothuria fuscocinerea*.

Until the type specimens of *P. semperi* are re-examined it is by no means certain that the determination of this Lampasing specimen is correct. *P. semperi* would appear to be a rare form since this is probably only the second record in a period of 39 years.

Pinnotheres villosulus Guérin.

Rathbun, 1924, p. 13, pl. I, fig. 8 (*ubi bibl. et syn.*).

Material. — Eiland Enoe, **24-III-29**, **7** ♀ (**4** ovigerous another specimen has a large ♀ and a small ♂ Bopyrid on the left side).

? New Guinea, **1** ♀ (much damaged) and **2** ♂.

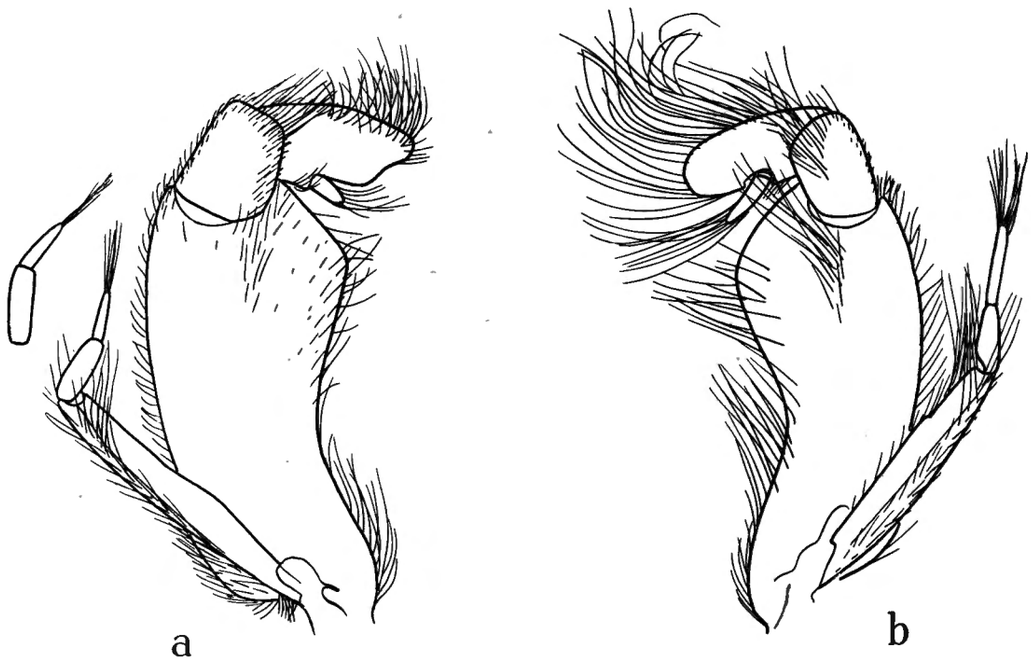

Fig. 10. — *Pinnotheres villosulus* Guérin. — *a.* and *b.* Third maxilliped to illustrate variation in length of setae and in shape and size of dactylus and propodus. (*a.* ×16; *b.* ×20.)

Remarks. — The carapace in all the specimens is similar to that figured by Rathbun but, when denuded, is distinctly angular near the middle of each

lateral border though to a much less degree than in *P. trichopus* (Tesch, 1918*a*, p. 256, pl. XVII, fig. 6).

The third maxilliped varies somewhat from specimen to specimen. In all those from Eiland Enoe the setae are very long, the dactylus and palp of the exognath are of the type represented in fig. 10*b* though the propodus is sometimes more truncated distally. In the female from ? New Guinea the setae, dactylus and palp of the exognath are all shorter and the propodus is distally truncated near the apex (fig. 10*a*).

The male specimens, one of which is very small, probably also belong to this species. The carapace is smooth, polished and coarsely punctate. In general outline that of the larger specimen is similar to *P. mactricolus* (1) Alcock (1902, pl. LXII, fig. 4). The external maxilliped is similar to that represented in fig. 10*b* but the dactylus is extremely short. First pleopod as represented in fig. 11.

Pinnotheres sp.? (aff. **edwardsi** De Man).

Material. — ? New Guinea, 1 ♂ (carapace, *l.* = *b.* = 7 mm.).

Remarks. — This specimen differs from the males referred to *P. villosulus* in several respects. (1) The carapace is soft and poorly calcified with a short dense pubescence round the lateral margins and on the front. There are also patches of this pubescence here and there on the dorsal surface (which is now rather indented) suggesting that it may have been uniformly covered. (2) The front is narrower. (3) The third maxilliped is rather similar but the dactylus is contracted distally and reaches to the inner end of the obliquely truncated propodus (fig. 11*c*). (4) The first pleopod also is more slender, less setose and more obtuse at the apex (*cf.* fig. 11*a* and *b*).

The chelae are similar to those of *P. villosulus*, the movable finger being armed with a tooth which fits into a depression between two smaller teeth on the lower one.

If the dactylus of the external maxilliped be regarded as reaching to the end of the propodus, this specimen is most closely related to *P. edwardsi* De Man, *P. kutensis* Rathbun and *P. obesus* Dana (= *P. siamensis* Rathbun) in Tesch's key (1918*a*, p. 252) but it certainly does not agree with either of the two latter species as figured by Rathbun (1910*a*, pp. 335-336, text-fig. 19 and 20). *P. edwardsi* is known only from the female; according to Tesch's description the dactylus and propodus of the external maxilliped seem to agree with fig. 11*c*, although he does not mention the distal narrowing of the former segment.

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(1) According to Tesch's key (1918*a*, p. 252) the males are referable to this species but in all probability the key should be used only for the determination of female specimens.

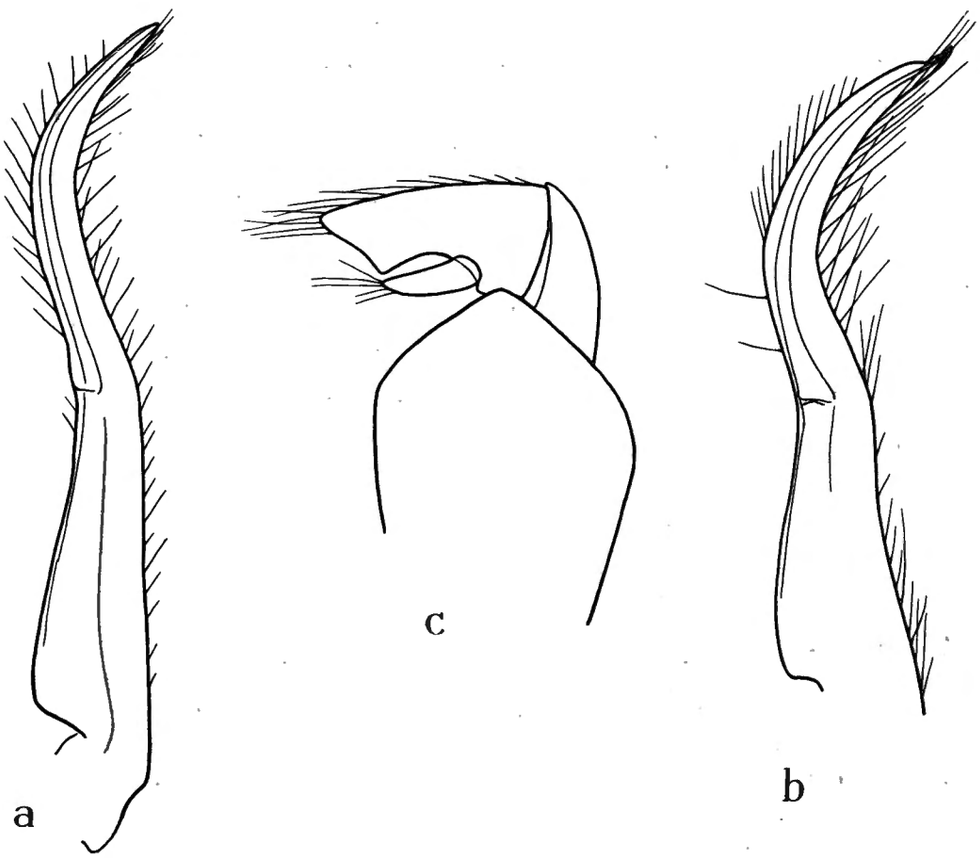

FIG. 11. — *Pinnotheres* aff. *edwardsi* DE MAN. — *a*. First pleopod of male. *c*. Distal part of third maxilliped. *Pinnotheres villosus*. — *b*. First pleopod of male. (*a*. and *b*. ×36; *c*. ×47.)

FAMILY **GONEPLACIDAE** DANA.

Genus LITOCHEIRA KINAHAN.

Litocheira sp.?

MATERIAL. — Eiland Weim, 26-II-29, 1 immature ♂.

REMARKS. — This small specimen is allied to *L. setosa* (A. Milne-Edwards) and to *L. affinis* Tesch. It agrees with the latter in having the carapace length rather less than the fronto-orbital border, and considerably more than 2/3 of the carapace width. The external orbital angle is less prominent than in *L. affinis* but rather more so than in *L. setosa*; the external maxilliped is similar to that of *L. affinis* (Tesch, 1918*a*, pl. VII, fig. 2*a*, 1*a* and 2*b*). It is doubtful, however, whether it belongs to either of these species as there are distinct traces

of 1-3 spinules on the dorsal border of the merus of each of the three anterior walking-legs, as in *e. g. L. quadrispinosa* Zehntner. But again the merus of the external maxilliped is more quadrate than in the latter species.

There are two broad lobes with spinose apices on each antero-lateral border. Only the right chela remains. There are a few small teeth on the lower and upper inner margins of the merus and a blunt triangular lobe at the inner angle of the carpus. The chela is clothed with fine long silky hairs and there are a few scattered granules on the palm especially on the lower third. The dactylus is nearly twice as long as the dorsal border of the palm.

The following are the more important measurements in mm. :

Length of carapace	= 2.5
Greatest breadth of carapace...	= 3.15
Length of fronto-orbital border	= 2.7
Length of front.., ...	= 1.5

Litocheira sp.? (aff. **quadrispinosa** Zehntner).

Material. — Banda Neira, **24-II-29**, **1** small ♀ (carapace *l.* = **3.3**, *b.* = **4.5** mm.).

Remarks. — This small specimen is apparently allied to *Litocheira quadrispinosa* (1) from which it differs in several respects. (1) There is a minute third spine on the antero-lateral border. (2) There is not much trace of the distinctive colour pattern near the front of the carapace. (3) The upper surface of the wrist of each cheliped bears 3-4 small spines in addition to the prominent curved one at the inner angle. (4) The setae on the legs and carapace are, for the most part, soft and plumose. (5) There are only two spines on the merus of each of the three anterior walking-legs, a minute terminal one and a larger one on the distal third of the dorsal margin.

Family **POTAMONIDAE** Ortmann.

Genus PARATHELPHUSA H. Milne-Edwards.

Parathelphusa (Parathelphusa) incerta (Lanchester).

Potamon (*Parathelphusa*) *tridentatum incertum* Lanchester, 1900, p. 749, pl. XLVI, fig. 10.
Potamon (*Parathelphusa*) *incertis* Rathbun, 1905, pp. 229 and 238.

Material. — Sabang, **12-V-29**, **1** ♂.

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(1) Zehntner, 1894, p. 171, pl. VIII, fig. 11 and 11*a*.
Tesch, 1918*a*, pp. 164 and 168, pl. VII, fig. 3 and 3*a*.

REMARKS. — This specimen agrees well with Lanchester's material from Singapore, with which I have compared it. The distal segments of the abdomen are represented in fig. 12.

DISTRIBUTION. — Singapore and Sabang.

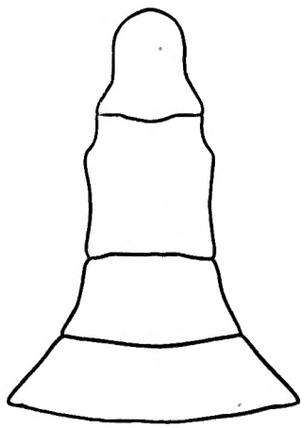

FIG. 12. — *Parathelphusa* (*Parathelphusa*) *incerta* (LANCHESTER). Segments 4-7 of male abdomen : ×2.

FAMILY **XANTHIDAE** ALCOCK.

SECTION I. **HYPEROLISSA.**

1. Genus CARPILODES DANA.

Carpilodes bellus (DANA).

ODHNER, 1925, pp. 10 and 16, pl. I, fig. 9.

MATERIAL. — Banda Neira, **24-II-29**, 1 ♂ with parasitic Rhizocephalan.

Carpilodes lippus (NOBILI).

Chlorodius lippus NOBILI, 1906, p. 263, pl. X, fig. 8.
Carpilodes lippus ODHNER (M. S. name in Berlin Museum).

MATERIAL. — Banda Neira, **24-II-29**, 1 ♂ (Dr. H. Balss det.).

REMARKS. — Dr. Balss has sent me the following communication with regard to this species; « unter Dekapoden des belgischen Kronprinzen, die ich Ihnen sandte, befand ich auch ein Ex. von *Chlorodius lippus* Nobili. Ich schrieb Ihnen schon dass die Gattungsbezeichnung Nobilis falsch sei. Inzwischen habe ich aus dem Museum Berlin Examplare dieser Art gesehen, die

Odhner bestimmt hatte und denen er den Namen *Carpilodes lippus* (Nob.) gegeben hat. Er hat diesen Namen aber in seiner Arbeit 1925 nicht publiziert » (13-VI-33).

The apex of the first pleopod of the male is of a rather unusual type, with a broad scroll-like projection on one side as represented in fig. 13.

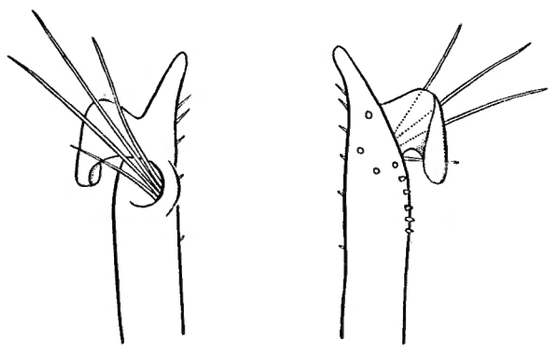

FIG. 13. — *Carpilodes lippus* (NOBILI). — Apex of first pleopod of male to show subterminal scroll-like lobe : × 100.

Carpilodes rugatus (EDW.) A. MILNE-EDWARDS.

ODHNER, 1925, pp. 11 and 20, pl. I, fig. 16.

MATERIAL. — Banda Neira, 24-II-29, 1 young ♂.

Carpilodes stimpsoni A. MILNE-EDWARDS.

ODHNER, 1925, pp. 10 and 17, pl. I, fig. 10.

MATERIAL. — Banda Neira, 24-II-29, 1 ♂.

2. Genus ATERGATIS DE HAAN, A. MILNE-EDWARDS.

Atergatis floridus (RUMPH.).

ALCOCK, 1898, pp. 95 and 98.

MATERIAL. — Lampasing (Lampong), 12-IV-29, 2 ♂.
Kampong Todowangi Mangrove, Djailolo, 16-II-29, 1 ♂.

REMARKS. — The first pleopod of the male is long and slender; the apex is as represented in fig. 14*a* and *b*. The 5-8 long slender setae are replaced by a few much shorter ones in *Atergatis integerrimus* (Lam.) and are entirely wanting in *A. reticulatus* (de Haan) (fig. 14 A, *a* and *b*).

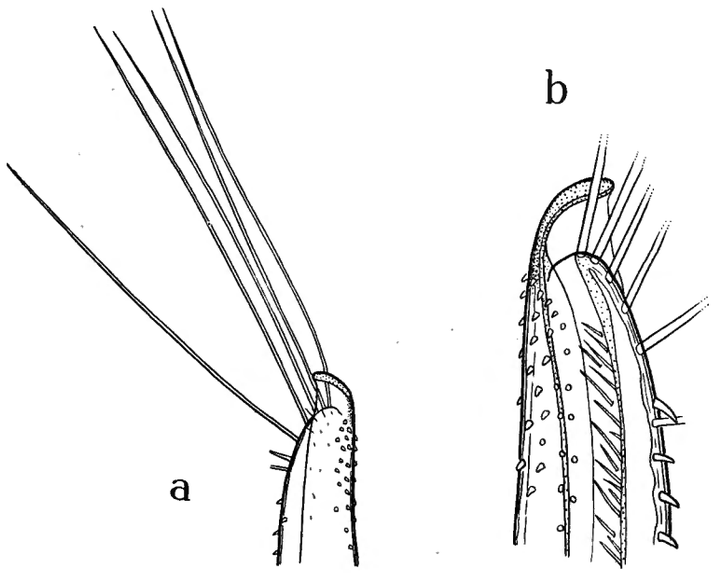

FIG. 14. — *Atergatis floridus* RUMPH. — *a*. Apex of first pleopod of male from concave side : ×27. *b*. Same from convex side : ×60.

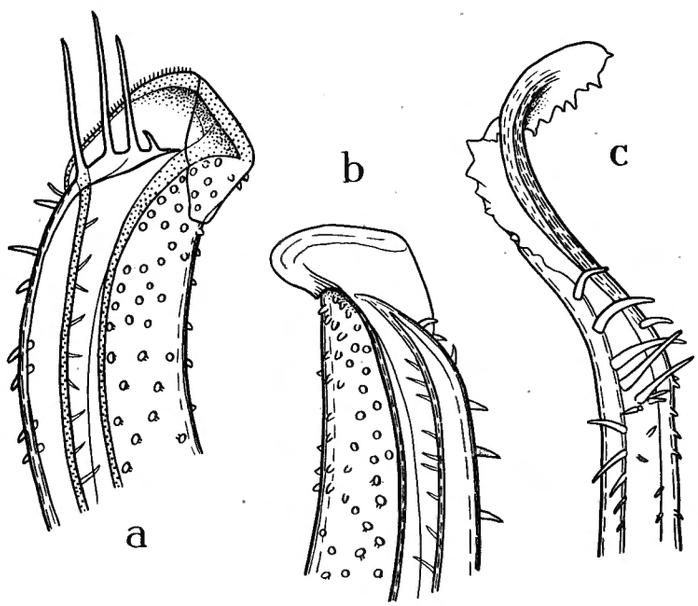

FIG. 14A. — Apex of first pleopod of male of : *a*. *Atergatis integerrimus* (LAM.). *b*. *Atergatis reticulatus* (DE HAAN). *c*. *Etisus laevimanus* RANDALL : × 60.

3. Genus PLATYPODIA BELL.

Platypodia maculata (DE MAN).

Lophactaea maculata DE MAN, 1888, p. 250, pl. IX, fig. 1.
Lophactaea maculata DE MAN, 1902, p. 588.

MATERIAL. — Banda Neira, **24-II-29**, **2** ♀ (one ovigerous), **1** ♂.

REMARKS. — These specimens agree very closely with de Man's description and figure; the spots on the dorsal surface of the carapace are still distinct though rather faint. The first pleopod of the male differs from that of *P. granulosa* (Rüppell) A. Milne-Edwards in being rather more slender and sinuous, with a longer terminal beak-like projection and in having **12** instead of only **2** subterminal setae (1) (*cf.* fig. 15*a* and *b*).

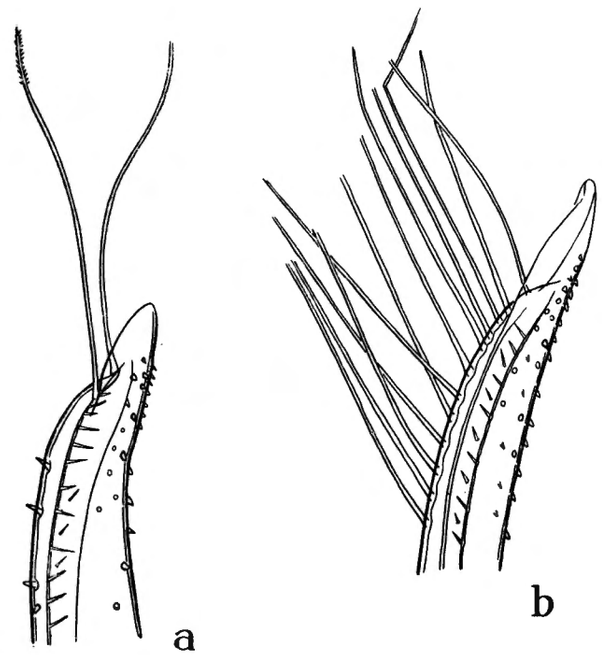

FIG. 15. — Apex of first pleopod of male of : *a. Platypodia granulosa* (RÜPPELL). *b. Platypodia maculata* (DE MAN); ×60.

Platypodia granulosa (RÜPPELL).

Lophactaea granulosa ALCOCK, 1898, pp. 100 and 101.
Lophactaea granulosa DE MAN, 1902, pp. 582 and 587.

MATERIAL. — Banda Neira, **24-II-29**, **4** ♂, **1** ♀.

REMARKS. — See under *P. maculata*.

(1) These setae are nearly all incomplete distilly and may be considerably longer.

4. Genus ZOZYMUS LEACH.

Zozymus kükenthali DE MAN.

Z. gemmula DE MAN, 1888, p. 273, pl. X, fig. 4.
Z. kükenthali DE MAN, 1902, p. 593.

MATERIAL. — Banda Neira, 24-II-29, 1 ♂, 1 ♀ (slightly broken).

REMARKS. — These two specimens agree well with De Man's descriptions; the areolation of the carapace is apparently more distinct than in the type (1) (De Man, 1888, pl. X, fig. 4).

The male though smaller is very similar to the female in general appearance, its measurements are as follows : *l.* of carapace 7.3, *b.* of carapace 11.2 and *b.* of fronto-orbital border 7.5 mm. The terminal segment of the abdomen is a little shorter than its basal width and obtusely rounded distally; the sixth segment is as long as wide.

DISTRIBUTION. — Previously recorded from Amboina.

5. Genus EUXANTHUS DANA.

Euxanthus sculptilis DANA.

E. sculptilis ALCOCK, 1898, pp. 110 and 111.
E. huonii LANCHESTER, 1900, p. 735.

MATERIAL. — Banda Neira, 24-II-29, 1 ♀.

REMARKS. — There is still some difference of opinion as to whether or not *E. huonii* Lucas is a synonym of *E. sculptilis* Dana. The two forms are very similar and such differences as are mentioned by *e. g.* Lanchester are slight. A re-examination of the types of both species (if they are still available) is desirable.

This specimen has the dark colour restricted almost entirely to the fingers whereas in the « Alert » specimen (Miers, 1884, p. 204) it extends well on to the palm especially on the inner surface. The extent of the colour may vary with age and (or) sex but it would be necessary to have a large series of specimens to decide this point. The variation in the curvature of the postero-lateral border might also vary with age.

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(1) I have not been able to examine the type of this species, which is no longer in the collection of the Zoologisches Institut, Göttingen. In 1923 it was sent to the late Professor Odhner (letter from Prof. R. W. Hoffmann, 27.III.1933).

6. Genus XANTHO LEACH.

Xantho (=Leptodius) exaratus var.

MATERIAL. — Ambon, 21-II-29, 1 ♂.

REMARKS. — This specimen is very near to *Xantho* (= *Leptodius*) *exaratus* (H. Milne-Edwards) (1) but the carapace is appreciably shorter in proportion to the breadth; the four teeth on the antero-lateral border are narrower and more widely separated from each other basally; the fronto-orbital border is narrower

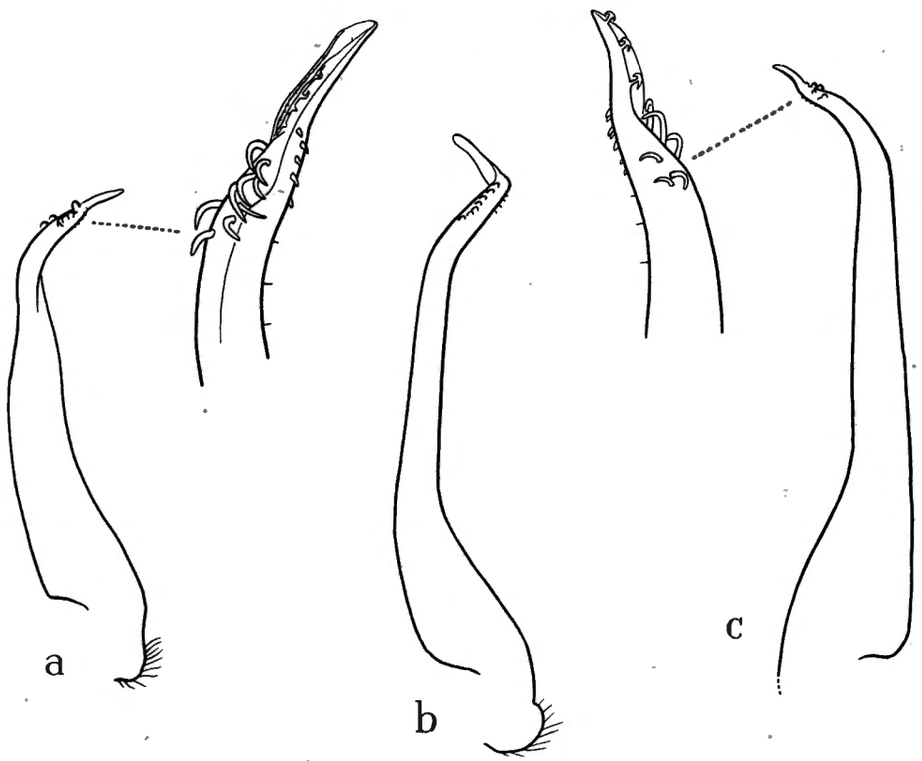

FIG. 16. — First pleopod of male of : *a. Xantho* (=*Leptodius*) *exaratus* var. *b. Xantho* (=*Leptodius*) *exaratus* (H. MILNE-EDWARDS). *c. Xantho* (=*Leptodius*) *exaratus* var. *gracilis* (DANA). (×20 and 60.)

due to the slightly smaller size of the orbits; the carapace and chelipeds are more granular; the two terminal abdominal segments are rather shorter and broader; the first pleopod is less slender with apex as represented in fig. 16*a* (*cf.* fig. 16*b* and fig. 22B, in Gordon, 1931, p. 547); the fingers of the chelae are rather narrower and less curved distally.

(1) See GORDON, 1931, pp. 543-545, fig. 20 and 22.

The specimens described by Miers (1884, pp. 214, 530) as *Leptodius exaratus* var. *gracilis* are somewhat intermediate, as regards the first pleopod, between *X. exaratus* and the specimen from Ambon (fig. 16*c*). They are very similar to *Leptodius gracilis* Dana as figured by Rathbun (1906, pl. IX, fig. 2) and may be identical with that species. The front, however, differs from that figured by Dana (1855, pl. II, fig. 13) in that each half is divided into a small outer and a wide median lobule. A thorough re-examination of all the species, and especially those of the « *exaratus* »-group, is desirable.

Measurements in mm. :	X. *exaratus* var. ♂	X. *exaratus* ♂	♂	X. *exaratus* var. *gracilipes*. ♀
l. of carapace...	9.7	10.1	10.4	10.1
b. of carapace...	15.6	15.0	15.2	15.7
l. of fronto-orbital border	8.8	9.6	9.7	10.0
l. of front...	4.3	4.3	4.4	4.7

7. Genus ETISUS H. MILNE-EDWARDS.

Etisus laevimanus RANDALL.

Etisus laevimanus ALCOCK, 1898, p. 131.

Chlorodopsis espinosus BORRADAILE, 1902, p. 262, text-fig. 57.

MATERIAL. — Eiland Weim, 26-II-29, 2 young ♀.

REMARKS. — These specimens agree closely with the immature specimens described by Borradaile as *Chlorodopsis espinosus* (1) and referred to *Etisus laevimanus* by Odhner (1925, p. 83).

The fronto-orbital border is much wider in the young than in the adult, varying from two-thirds to less than a half of the greatest width of the carapace. Immature specimens would therefore run down to the genus *Chlorodopsis* in Alcock's key (1898, pp. 71-76). The inner orbital border also varies considerably with age. In young specimens there is, between upper and lower inner-orbital-angles, a wide hiatus, which is filled almost entirely (2) by the produced outer angle of the basal antennal segment. As the crabs increase in size the upper and lower orbital angles gradually converge until, in adults, they meet above the prolongation of the basal antennal segment. The flagellum is always excluded from the hiatus.

The tip of the first pleopod of the male is represented in fig. 14 A, *c*.

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(1) I have been able to examine these specimens through the kindness of C. Forster-Cooper, Esq., University Museum, Cambridge.

(2) The prolongation of the basal antennal segment is as wide as, but may only fill the lower two-thirds or three-fourths of the hiatus.

8. Genus ETISODES DANA.

Etisodes anaglyptus (H. MILNE-EDWARDS).

ALCOCK, 1898, p. 133.

MATERIAL. — Banda Neira, **24-II-29**, 5 m., **1** young ♀.

9. Genus ACTAEA DE HAAN.

Actaea cavipes (DANA).

ALCOCK, 1898, pp. 139 and 147.
ODHNER, 1925, p. 68.

MATERIAL. — Eiland Weim, **26-II-29**, 1 young ♂.

Actaea hirsutissima (RÜPPELL).

ALCOCK, 1898, pp. 138 and 141.
ODHNER, 1925, pl. 69, pl. IV, fig. 13.

MATERIAL. — Banda Neira, **24-II-29**, 1 ♀, 1 ♂ with Rhizocephalan parasite on abdomen.

Actaea pulchella A. MILNE-EDWARDS.

ODHNER, 1925, p. 39, text-fig. 3, pl. II, fig. 16.

MATERIAL. — Banda Neira, 5 m., **24-II-29**, 1 ♀ (*c. l.* = **12.3**, *c. b.* = 18.2 mm.).

? Actaea rufopunctata (H. MILNE-EDWARDS).

ALCOCK, 1898, pp. 138 and 142.
ODHNER, 1925, p. 60.

MATERIAL. — Banda Neira, **24-II-29**, 1 ♂ without chelipeds and with part of the dorsal surface of carapace missing.

Actaea tomentosa (H. MILNE-EDWARDS).

ALCOCK, 1898, pp. 138 and 140.
ODHNER, 1925, p. 70.

MATERIAL. — Eiland Weim, **26-II-29**, 1 ♂.

Genus PHYMODIUS A. MILNE-EDWARDS.

Alcock (1898, pp. 162-163) regarded *Phymodius monticulosus* as distinct from *Ph. ungulatus;* Rathbun (1907, p. 47), on the other hand, writes « I find it necessary on examination of considerable material to unite the *ungulatus* form with the *monticulosus* or *obscurus* form of *Phymodius*, or, in lieu of this, to make five or six intergrading species ». This is quite the reverse of what one would have expected from these two distinguished carcinologists.

The material in the present collection, though consisting of only six specimens, seemed to point to the existence of two distinct species and I decided to re-examine all the material in the British Museum Collection. This led to a revision of the species of the genus, which, unfortunately, is not as complete as I would have liked it to be (1). I am convinced, however, that *Ph. ungulatus* and *Ph. monticulosus* are distinct species and, with a little practice, it is possible to distinguish the females as well as the males. With regard to the material that I re-examined from the U. S. National Museum Miss Rathbun writes (2) « I approve your separation of *ungulatus* but that still leaves a motley collection. Those which have no spines (to speak of) on the ambulatories have a different shape of carapace from those with evident spines on the legs. The specimens 68182 and 17308 that you examined are of this sort ». Both species show considerable variation which seems to depend largely on age and sex; all the *monticulosus* material appeared to me to belong to a single species.

I also think that *Ph. nitidus* (Dana, 1852) and *Ph. sculptus* (A. Milne-Edwards, 1873) are almost certainly synonymous, although I have not examined any type specimens of the former. Rathbun seems to regard them as distinct « the manus of *sculptus* is devoid of tubercles, the front of the carapace is thicker than in *nitidus*, etc. » (3). The presence or absence of tubercles on the palm of the chela is probably not of specific importance; Klunzinger (1913, p. 221) described material from the Red Sea which varied greatly in this respect as his varietal names imply (3). Should the two species prove to be really distinct, most of Klunzinger's material would be referable to *Ph. nitidus*.

Alcock's (1898, p. 161) definition of the genus requires two slight modifications. (1) The carapace is usually finely granulose in small specimens, *Ph. nitidus* and *Ph. sculptus* excepted, and conspicuously so in *Ph. granulosus*. (2) The proportion of the merus of the cheliped which projects beyond the carapace varies with age and sex and also from species to species.

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(1) The subgenus *Cyclodius* probably should also be included in *Phymodius* but I have not seen any type specimens.

(2) Letter dated, 13.XI.1933.

(3) *Phymodius sculptus* and vars. *granosimana* and *spinosimana*.

TYPICAL SPECIES. — The typical species of the genus may be distinguished as follows :

I. Lobe 2M longitudinally divided.

A. Walking legs sparsely setose.

1. Front as in fig. 17*a*, *a'*.
♂, 1st pleopod as in fig. 18*a*.
Abdominal segments 6 and 7 as in fig. 19*a*. } *Ph. obscurus* = *monticulosus*

2. Front as in fig. 17*b*, *b'*.
♂, 1st pleopod as in fig. 18*b*.
Abdominal segments 6 and 7 as in fig. 19*c*. } *Ph. ungulatus*

3. Front as in fig. 19*d*.
♂, 1st pleopod as in fig. 21*a*. } *Phymodius* sp.? p. 43 (prob. var. of *nitidus*)

B. Walking legs heavily setose.
Front as in fig. 20*b*.
♂, 1st pleopod as in fig. 21*b*.
Abdominal segments 6 and 7 as in fig. 19*b*. } *Ph. granulatus*

II. Lobe 2M entire; walking legs heavily setose.

Front as in fig. 20*a*, *a'*.
♂, 1st pleopod as in fig. 21*a*, *a'*.
Abdominal segments 6 and 7 as in *monticulosus*. } *Ph. sculptus* ? = *Ph. nitidus*

ATYPICAL SPECIES. — Rathbun (1906, p. 858; 1911, p. 206) referred to this genus an atypical species *Ph. laysani* and in the British Museum Collection are five specimens belonging to a closely related new species. The two forms differ from typical *Phymodius* species in several respects. (1) The carapace is deeper. (2) The orbits are shallower and more inclined backwards (*i.e.* dorsally) with margin entire instead of lobulate. (3) The outer frontal lobule is not distincly separable from the inner orbital angle (*cf.* fig. 23*a* with *b* or *c*). (4) The chela is of the characteristic form represented in fig. 25*a* and *b*, with short fingers (dactylus abruptly curved distally) hollowed out but not hoofed at the tips.

These two species appear to be of small size; it might be convenient to refer them to a new subgenus or even genus but for the present I have left them in *Phymodius*.

TYPICAL SPECIES

Phymodius monticulosus (DANA) (1) = **Phymodius obscurus** (LUCAS).

ALCOCK, 1898, p. 163.

RATHBUN, 1907, p. 46 (*Ph. ungulatus* in part).

MATERIAL EXAMINED :

Paris Museum Collection :

(a) Cotype of *Ph. obscurus* lent by Prof. Gravier.

(b) 1 ♂ determined by G. Nobili from Obock, Dr. Jousseaume, 1897.

U. S. Museum, Washington :

(a) Port Lloyd, Bonin Ids. No. 13904, 1 ♂ (RATHBUN, 1907, pl. III, fig. 3, 3*a*).

(b) Fakarava, Id., Paumotus, No. 33405, 2 ♂ (RATHBUN, 1907, pl. IV, fig. 1, 1*a* and 3, 3*a*).

(c) Tari-Tari, Id., No. 33403, 1 ♂, 2 ♀ (♂ RATHBUN, 1907, pl. IV, fig. 4, 4*a*).

(d) Tongatabu, No. 33402, 1 ♂ (RATHBUN, 1907, pl. III, fig. 2, 2*a*).

(e) Honolulu, No. 17308, 3 ♂, 2 ♀ (1 ♂ RATHBUN, 1907, pl. III, fig. 4, 4*a*).

(f) Cocoanut, Id., Oahu, T. H. Stn. 5, No. 64182. July 1930, 1 ♂ U. S. Bur. Fish donor.

(g) Northwest, Id., Capricorn Group, Queensland, No. 64638, 1 ♂. Dec. 1925 from Austr. Mus.

British Museum Collection :

(a) Samoa Ids. Upolu, 74.54, 17 ♂, 4 ♀.

(b) Samoa Ids. 76.17; 3 ♀, 1 ♂ all young, along with *Ph. ungulatus*.

(c) Samoa Ids. 77.35; 1 ♂ along with *Ph. ungulatus*.

(d) Philippines, Zamboanga. H. M. S. « Challenger », 84.31 4 ♀ (2 ovig.) (MIERS, 1886, p. 139 in part).

(e) Aden; low water, coral reef. 85.14, 1 ♂.

(f) Madagascar, 88.5; 1 ♂.

(g) Zamboanga, 92.4.18, 146-156 Odhner det. 9 ♀ (1 ovig), 6 ♂.

(h) Abrolhos. Percy Sladen Expedition, 1931.7.24.90-94, 6 ♂, 2 ♀ (MONTGOMERY, 1931, p. 442 as *Ph. ungulatus*).

(i) The material in the dried collection includes 2 ♂, 2 ♀ from the U. S. Exploring Expedition reported on by Dana. 61.44 (1 ♂ Upolu) and 1 ovig. ♀ from the « Samarang » Collection 47.21. Eastern Seas (« *Xantho peuce* »).

In present Collection :

Mansfield Eiland, 1.III.1929, 2 ♀.

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(1) RATHBUN (1906, p. 858) would give the preference to *Ph. obscurus* since Dana refers to Lucas' figure in his description. I have not been able to ascertain the exact date of publication of the plates of the Crustacea section of Lucas' work.

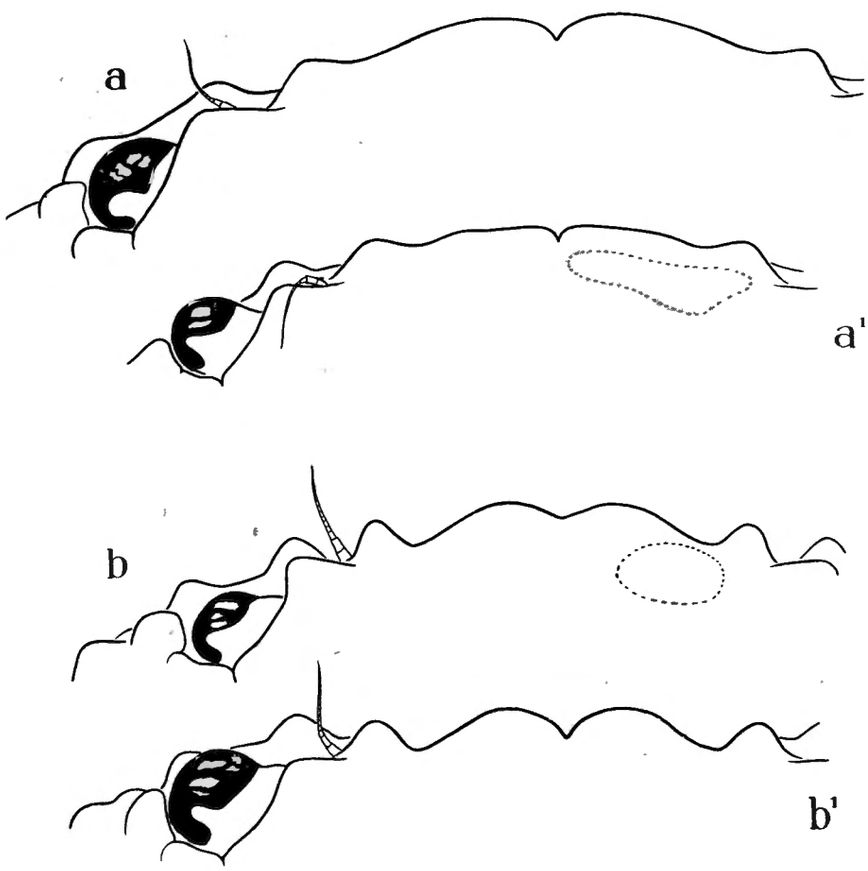

FIG. 17. — Fronto-orbital border of carapace of :
Phymodius monticulosus (DANA). — *a*. 74.54; *c. l.* = 18.5, *c. b.* = 25.6 mm.;
*a*¹. 1931.7.24.90-94; *c. l.* = 15.6, *c. b.* = 21.9 mm.

Phymodius ungulatus (H. MILNE-EDWARDS). — *b*. 82.19; *c. l.* = 15, *c. b.* = 21.9 mm.;
*b*¹. U.S. Mus. 65237; *c. l.* = 16.7, *c. b.* = 24.4 mm. : × 8.

Phymodius ungulatus (H. MILNE-EDWARDS).

ALCOCK, 1898, p. 162.

RATHBUN, 1906, p. 46 (in part).

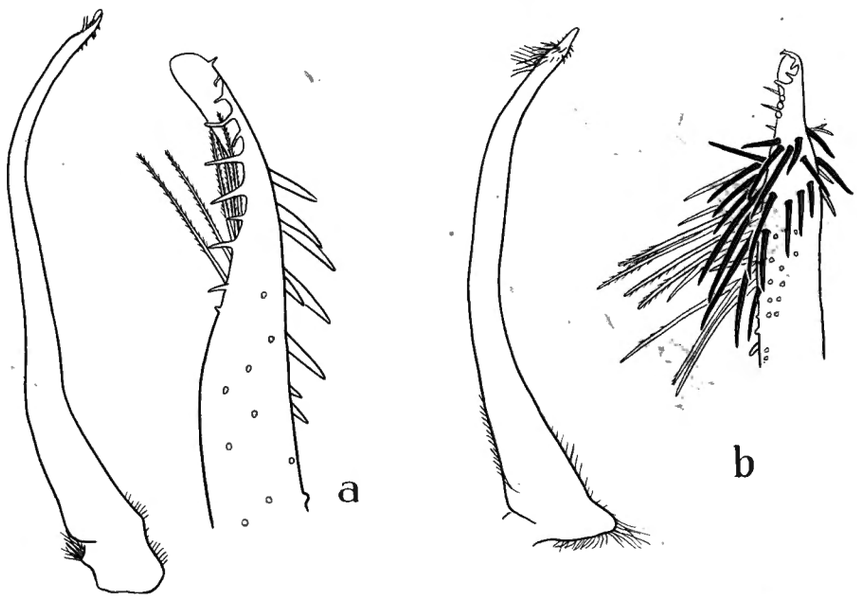

FIG. 18. — First pleopod of male of : *a. Phymodius monticulosus* (DANA). *b. Phymodius ungulatus* (H. MILNE-EDWARDS). × 10 and 75 (apex).

MATERIAL EXAMINED :

Paris Museum Collection :

1 ♂ G. Nobili det. 1906, Kikitea g. Seurat, 1905.

U. S. Museum, Washington :

(a) Borabora, Society Ids. 33404, 1 ♂, 2 ♀ (RATHBUN, 1907, pl. III, fig. 1, 1*a*; pl. IV, fig. 2, 2*a*).

(b) Basilian Strait, Little Santa Cruz, Id., 65237, 1 ♂, Feb. 28, 1914, M. Ward det.

(c) Coetivy W. Indian Ocean, H. M. S. Sealark. J. Stanley Gardiner : 41256, 1 ♂.

British Museum Collection :

(a) Seychelles, 75.20, 2 ♂.

(b) Samoa Ids., 76.17, 2 ♂ (one rather broken).

(c) Samoa Ids., 77.35, 2 ♂, 3 ♀.

(d) Madagascar, 82.6, 2 ♂, 3 ♀ (2 ovig).

(e) Ceylon, Galle, 82.19, 2 ♂, 2 ♀.

(f) Philippines, Zamboanga H. M. S. « Challenger », 84.31, 1 ♂ with *Ph. monticulosus* (MIERS, 1886, p. 139, in part).

(g) Apia, Samoa, 1931.5.26.6, 2 ♂.

In present Collection :

Banda Neira, 24.II.1929, 3 ♂, 1 ♀.

PHYMODIUS MONTICULOSUS (= PH. OBSCURUS).	PHYMODIUS UNGULATUS.
Carapace.	**Carapace.**
Front as represented in fig. 17*a*, *a'*; depressed; outer angle small and much less separated from the broad slightly convex median lobe.	*Front* as represented in fig. 17*b*, *b'*; outer angle well developed and deeply separated from the markedly convex median lobe.
Lobes 2F wide, extending to median depression of front which appears double-rimmed in frontal aspect (fig. 17*a'*).	Lobes 2F much narrower and widely separated from each other (fig. 17*b*).
Gastric region more convex but lobules 1M, 2M and 3M less deeply separated from each other; 2M and 3M often subdivided into secondary lobules in younger specimens, much worn, as a rule, in older specimens.	Gastric region flatter, lobes deeply separated; secondary lobulation occasionally faintly indicated.
Antero-lateral lobes less prominent, never distinctly spinose in young specimens. Arch of front and antero-lateral borders more convex.	Antero-lateral lobes more prominent, the posterior pair often distinctly spinose in young specimens. Arch of front and antero-lateral lobes less convex.
Lobes 4L and 1R larger; a distinct additional lobule between 1R and 2R belonging most probably to 1R.	Lobes 4L and 1R smaller (about equal to last two antero-lateral lobes); 2R usually more or less subdivided into a small outer and larger inner lobe.
Lobes 2P much shorter, only present externally, *i.e.* anterior to each fourth walking leg.	Lobes 2P much longer, reaching almost to the median line.
Terminal abdominal segments as in fig. 19*a*.	Terminal abdominal segments as in fig. 19*c*.
Epistomial border less concave.	Epistomial border more concave.

(Comparing specimens of approximately equal size and of the same sex.)

Appendages.	**Appendages.**
(a) FEMALES.	(a) FEMALES.
In specimens of all sizes the merus of the cheliped scarcely projects beyond the carapaces so that the rounded anterior angle of the mero-carpal articulation fits into the depression between the third and fourth antero-lateral lobes.	Specimens of very small size may have the merus as short as in *Ph. monticulosus*. As a rule (carapace breadth 12 mm. or more) 1/3 to 1/2 of the merus projects beyond the carapace.
. . . . .	Chelipeds more spinose in small, more nodular in large specimens than in *Ph. monticulosus*.

PHYMODIUS MONTICULOSUS (= PH. OBSCURUS).

Appendages (ctd.).

(b) MALES (1).

Small males resemble the females in having short meri (occasionally also specimens up to 26 mm. in breadth). As a rule males of 20 mm. breadth or over have ¼ to ½ of the merus projecting. (Thus the senile males resemble those of *Ph. ungulatus* in this respect.)

Fingers of chela in smaller specimens (2) but little curved distally so as to enclose a narrow gap when in contact.

The first pleopod more slender and as represented in fig. 18*a*, with 2-5 long, slightly plumose setae in the concavity of the apex.

PHYMODIUS UNGULATUS.

Appendages (ctd.).

(b) MALES.

All males examined (breadth 12 mm and over) have ± ½ of the merus projecting beyond the carapace. (If small males of the two species are compared the difference is distinct.)

Fingers of chela in smaller specimens as a rule more curved so as to leave a wider gap when closed.

The first pleopod more robust, as represented in fig 18*b*, and easily recognisable under low magnification by the large number of long backwardly directed spines near the apex.

Walking legs not heavily setose in either form.

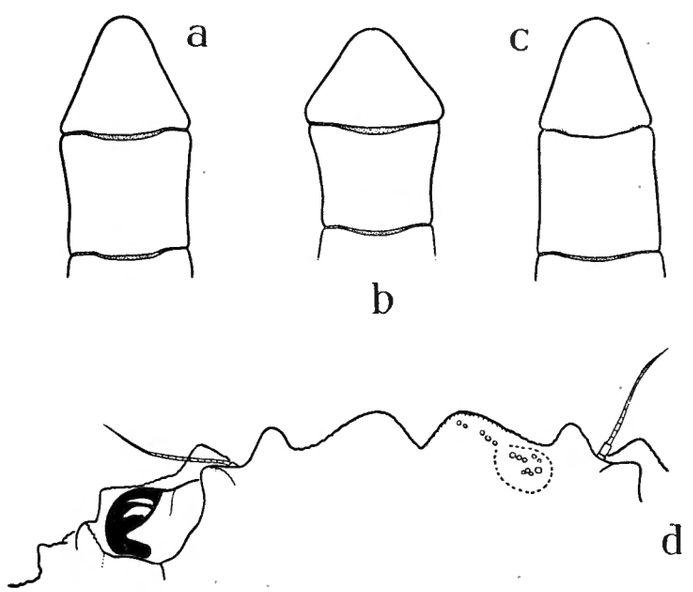

FIG. 19. — Terminal abdominal segments of male of : *a. Phymodius monticulosus* (DANA). *b. Phymodius granulatus* (TARG. TOZZ.). *c. Phymodius ungulatus* (H. MILNE-EDWARDS). *d.* Fronto-orbital border of *Phymodius* sp. ? (aff. *nitidus*). (*a.-c.* ×8; *d.* 11.)

(1) The chelae are unequal in adult males. But in the material examined they are not more unequal in *Ph. monticulosus* than in *Ph. ungulatus* (*cf.* ALCOCK, 1898, p. 164).

(2) There are many senile males (*b* = 23 — 33 mm) of *Ph. monticulosus* in the Brit. Mus. Coll. but no specimen of *Ph. ungulatus* exceeding 23 mm.

Phymodius nitidus (DANA) ? = **Phymodius sculptus** A. MILNE-EDWARDS.

Phymodius nitidus RATHBUN, 1906, p. 858.
Phymodius sculptus ALCOCK, 1898, p. 164.
Phymodius sculptus KLUNZINGER, 1913, pp. 221-224.

MATERIAL EXAMINED. — Referred to *Phymodius sculptus* :

Paris Museum :

Seychelles, M. L. Rousseau, cotype ♂, dried.

Turin Museum :

Red Sea, 1 ♂ Nobili det.

British Museum :

(a) Daidalus Shoal, Red Sea, 74.89, 4 ♀, 5 ♂.
(b) Ceylon, Herdman Colln., 1907.5.22.239, 2 ♂ (LAURIE, 1906, p. 405).
(c) Christmas Island, 1909.5.19, 50-51, 1 ♂, 1 ♀ (CALMAN, 1909, p. 705).
(d) Galle, Ceylon, 82.19, 3 ♂, 2 ♀.

Referred to *Phymodius nitidus*.

U. S. Nat. Museum :

Pukoo, Molokai, H. I. from College of Hawaii, 48933, 1 ♂ (RATHBUN, 1906, p. 858).

DESCRIPTION. — This species can at once be distinguished from the other typical species of the genus by the « smooth, polished, convex but flat-topped lobules » of the carapace and the absence of a longitudinal groove on lobe 2M (at most there is only a trace at the anterior margin). The front is depressed and rather similar to that of *Ph. monticulosus* (*cf.* fig. 20*a*, *a'* and 17*a*, *a'*). Lobe 2F is very low but extends to the median frontal groove giving the front a double-rimmed appearance in face view. The third and fourth antero-lateral lobes of adults are more prominent than in any of the other typical species (1); the fourth (occasionally also the third) ends in a sharp forwardly directed spine so that the width is rather greater in proportion to the length of the carapace.

The chelipeds are only slightly unequal in the male; in the cotype of *Ph. sculptus* at least half of the merus projects beyond the carapace ($l. = 16$, $b = 25.4$ mm.), in the largest ♀ ($l. = 12.1$, $b. = 18.9$ mm.) almost 1/3 of the merus projects. In the smallest female (9.4 × 14.6 mm.) from the U. S. National Museum the upper half of the hand bears 4 rows of tubercles; in a rather larger male (10.8 × 17 mm.) the tubercles are still present, though worn, and in the largest specimens they are almost or entirely absent. The two acute spines at the inner angle of the wrist of young specimens also become worn and only a blunt lobe remains in older specimens.

(1) NOBILI (1906, p. 266) states that the last tooth is always spiniform in *Ph. granulatus* but in the Brit. Mus. material this is rarely the case in young and never in adult specimens.

The terminal abdominal segments of the male are very similar to those of *Ph. monticulosus* (see fig. 19*a*). The first pleopod is of the type represented in fig. 21*a*, *a'*.

The walking-legs are biunguiculate, the two subterminal spines on the dactyli subequal and rather short. They are thickly fringed with soft hairs as in *Ph. granulatus*.

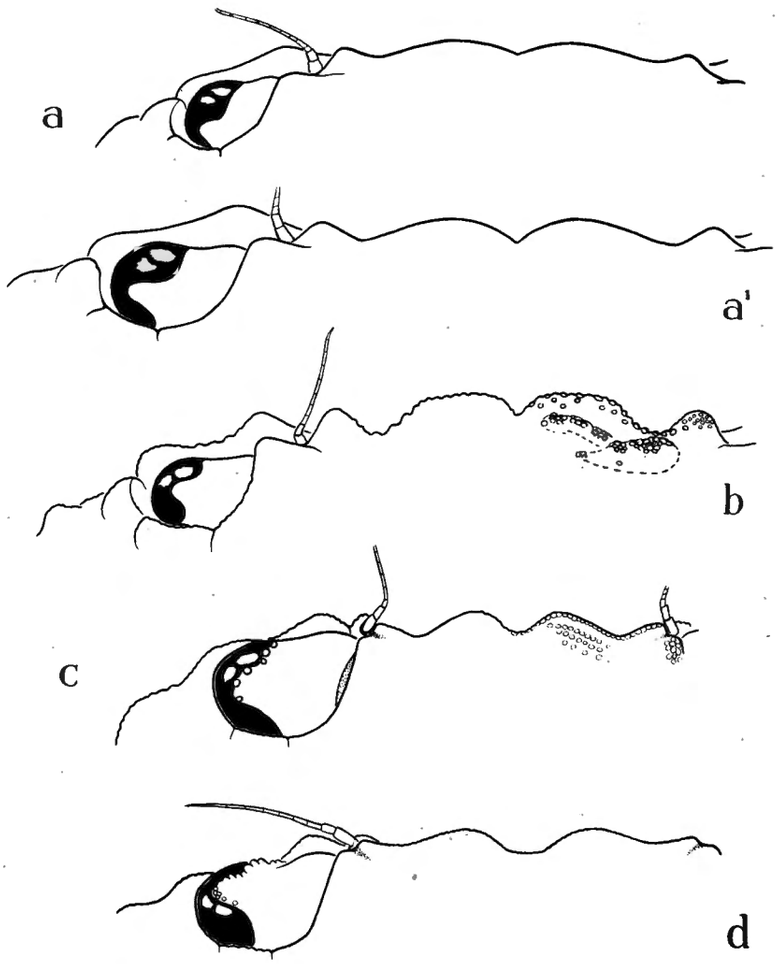

FIG. 20. — Fronto-orbital border of : *a. Phymodius nitidus* (DANA), U.S. Mus., *c. l.* = 12.5, *c. b.* = 19.4 mm. (RATHBUN det.). *a*¹. *Phymodius sculptus* A. MILNE-EDWARDS. Paris Mus. Cotype; *c. l.* = 16, *c. b.* = 25.4 mm. *b. Phymodius granulatus* (TARG. TOZZ.) 69.49; *c. l.* = 15.4, *c. b.* = 22 mm. *c. Phymodius odhneri* n. sp.; *c. l.* = 7.1, *c. b.* = 9.8 mm. *d. Phymodius laysani* RATHBUN; *c. l.* = 8, *c. b.* = 11.2 mm. (RATHBUN det.). (*a.-b.*×8; *c*, *d.*×15.)

REMARKS. — The cotype of *Ph. sculptus* that I examined was a dried specimen and therefore I could not examine the pleopods. It was of much larger size than any of the specimens referred by Miss Rathbun to *Ph. nitidus* and the

frontal lobes were rather more prominent but I am inclined to regard the two forms as cospecific. All the material in the British Museum collection has been referred to *Ph. sculptus*. The specimens from Christmas Island are immature and they alone have distinct tubercles on the palm of the chela. The specimens from Galle, Ceylon (82.19) have the lobules of the carapace more deeply separated than in the U. S. Museum specimens, but agree with the latter as to front (fig. 20*a*) and first pleopod of the male. The specimens from the Red Sea are exactly similar to *Ph. nitidus* as regards lobulation of the carapace, but the front is usually rather more convex with more deeply separated lobes (fig. 20*a'*) and the first pleopod bears fewer long spines near the apex (*cf.* fig. 21*a* and *a'*). The same type of pleopod is also found in the Red Sea specimen determined by Nobili (Turin Museum).

These differences do not seem to be of specific importance. The variation in the chela led Klunzinger (1913, pp. 221-224) to establish two varieties of *Ph. sculptus* namely var. *granosimana* and var. *spinosimana*.

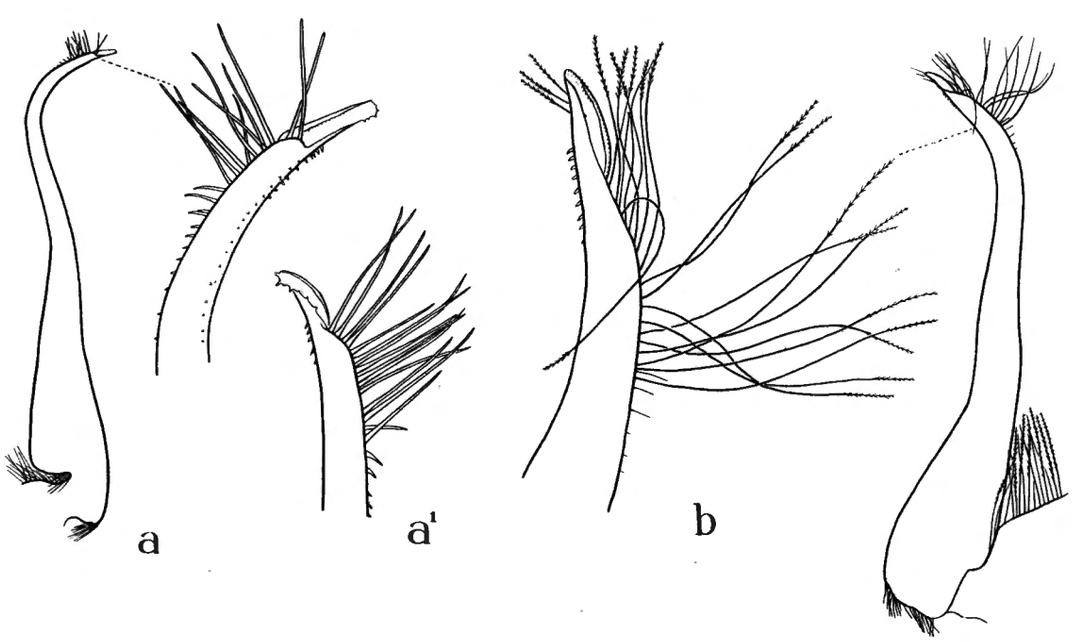

FIG. 21. — First pleopod of male of : *Phymodius nitidus* (DANA). *a*. specimen from Red Sea, Brit. Mus. 74.89. *a*¹. Specimen from U.S. Mus. (×15 and 45.)
b. *Phymodius granulatus* (TARG. TOZZ.). (×12 and 40.)

Phymodius granulatus (TARG. TOZZ.).

Phymodius granulatus KLUNZINGER, 1913, p. 227, pl. III, fig. 3.
Chlorodopsis arabica LAURIE, 1915, p. 450, fig. 1-1*b*, pl. XLII; fig. 2, 4*a*-4*d*, pl. XLIII.

MATERIAL EXAMINED :

Paris Museum :

Baie de Djibouti (M. Gravier), 1 ♂ (NOBILI, 1906, pp. 265-266).

British Museum :

(a) Gulf of Suez, 69.49, 1 ♂.

(b) Daedalus Shoal, Red Sea, 74.89, 1 ♂, 1 ♀.

(c) Egypt (no reg. number), 4 ♂, 3 ♀.

(d) Suez Canal, from coral 8-10-24; 1926.1.26.78, 1 ovig. ♀ (as *Chlorodopsis arabica* LAURIE in CALMAN, 1927, p. 213).

(e) Sudan, 1926.3.15, 1-2, 1 ♂ (203), 1 ♀ (211) (types of *Chlorodopsis arabica* LAURIE, 1915, p. 450, pl. XLII, fig. 1-1*b*; pl. XLIII, fig. 2, 4*a*-4*d*).

REMARKS. — This species differs from both *Ph. ungulatus* and *Ph. monticulosus* in having (1) more hairy walking-legs; (2) much larger and more irregular granules on the lobes of the carapace. The males differ also as regards

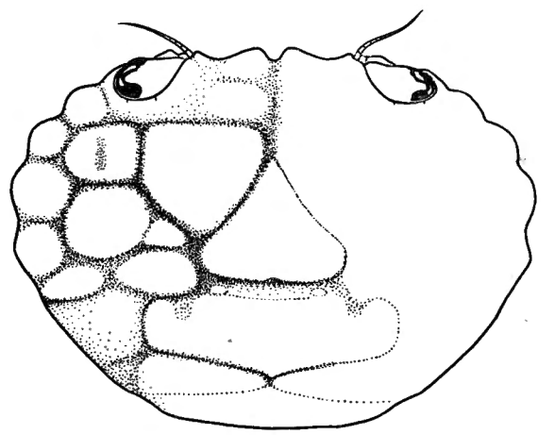

FIG. 22. — *Phymodius odhneri* n. sp. — Dorsal surface of carapace of holotype : ×7.5.

the terminal abdominal segments, the seventh being much broader than long, the sixth considerably narrowed posteriorly (fig. 19*b*); the first pleopod is also quite distinct, the long slightly plumose setae being visible under comparatively low magnification (fig. 21*b*, *cf.* fig. 18*a* and *b*).

In general outline the carapace is similar to that of *Ph. ungulatus*, the lobules being well marked and separated by deep grooves, and the frontal lobes well advanced and deeply separated from each other (*cf.* fig. 20*b* and 17*b*). The gastric region of the carapace however is rather more convex and the subdivision of lobe 2R is always pronounced. The chelipeds of the female resemble those of *Ph. monticulosus* in that they are scarcely visible beyond the anterolateral border (see table, p. 37). In the male the chelipeds are shorter (in specimens of approximately the same length of carapace) and in the largest

specimen examined ($l.$ = 15.4, $b.$ = 22.1 mm.) about 1/3 of the merus projects beyond S.

The walking legs are not biunguiculate, the conical spine at the base of the claw being very small.

MEASUREMENT OF MALE IN MM. :

	Ph. monticulosus.	*Ph. ungulatus.*	*Ph. granulatus.*	*Ph. sculptus.*	
Carapace	13.2 × 18.2	12.2 × 17.8	12.6 × 18.4	12.1 × 19.8	11.2 × 18.1
Larger chela	12.6 × 6.2	17 × 7.4	15.2 × 7.4	15.6 × 6	13.4 × 5.2
Smaller chela	11.7 × 4.7	15.2 × 5.6	13.5 × 5.4	13.6 × 5	13 × 4.5
Length of cheliped projecting beyond S.	17.7 and 15.5	23.8 and 21.5	20 and 18.8	20 and 17.5	—

Phymodius sp. ?

MATERIAL. — Banda Neira, 24-II-29, 1 ♂.

REMARKS. — This specimen is so similar to *P. ungulatus* — apart from the shape of the front — that I was at first inclined to regard it as a somewhat abnormal representative of that species.

The first pleopod, however, is similar to that of *P. nitidus* (fig. 21*a*) though perhaps somewhat less slender and sinuous. But the specimen differs from *P. nitidus* in having (1) only a few hairs on the walking-legs; (2) the lobules of the carapace finely granular instead of smooth and polished and (3) lobe 2M longitudinally divided.

It differs from *P. ungulatus* (of the same size) chiefly as regards the front, which is more advanced with the median lobes separated by a deep V-shaped notch (fig. 19*d*). The tubercles on wrist and palm of the cheliped are also lower and more obtuse. About 1/3 of the merus projects beyond the fourth antero-lateral tooth which terminates in a sharp spine.

The specimen is of small size and may not be quite mature (carapace $l.$ = 9, $b.$ = 12.3 mm.); it is just possible that it is a somewhat abnormal specimen of *P. nitidus*.

ATYPICAL SPECIES

Phymodius odhneri nov. spec.

MATERIAL. — Macclesfield Bank, collected by P. Bassett-Smith Esq., H. M. S. Penguin (Brit. Mus. Coll.). Holotype, ♂ (carapace, $l.$ = 7.1, $b.$ = 9.8, $d.$ = 4.4 mm.). Paratypes, 2 ♂, 2 ♀ (one slightly damaged).

DESCRIPTION OF HOLOTYPE. — Carapace very similar to that of *Ph. laysani* Rathbun (1906, p. 858, fig. 19*a*). Entire dorsal surface lobulated as represented

in fig. 22; 2M entire; 5L subdivided into a large outer and a small inner lobule the latter anterior to and separating 6L from 2M; 4M rather indistinct, 1P very large; 2P almost reaching to median line; 1L, 4L and 1R more or less confluent with the rounded antero-lateral lobes 1, 3 and 4 (*i.e.* E, T and S); 3L and

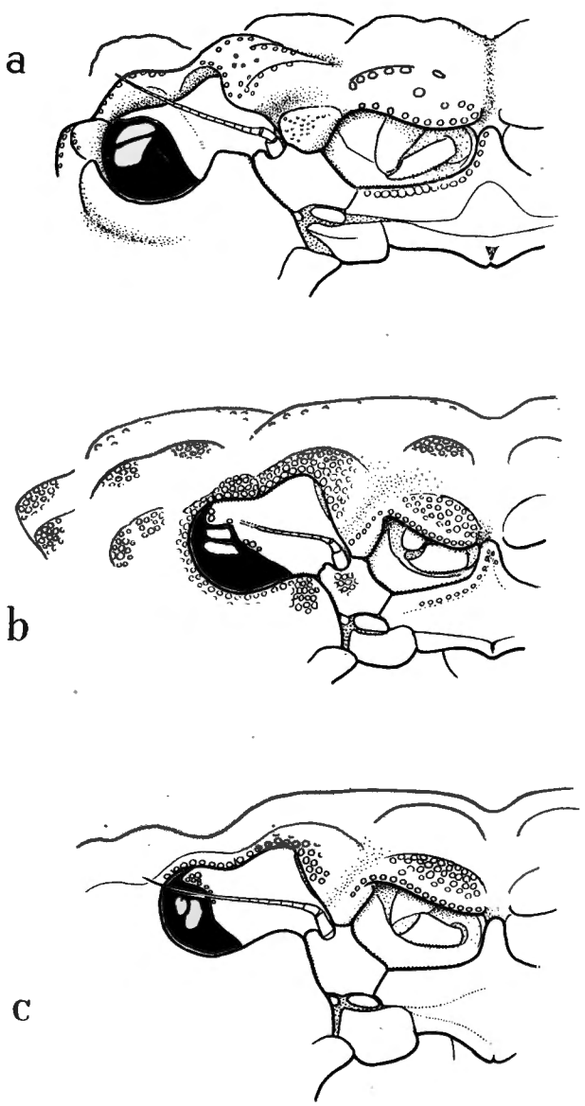

FIG. 23. — Right side of carapace, in frontal aspect, of : *a. Phymodius granulatus* (TARG. TOZZ.), cotype of « *Chlorodopsis arabica* » LAURIE. *b. Phymodius odhneri* n. sp. *c. Phymodius laysani* RATHBUN; many of the granules omitted : all × 14.

2L confluent but their apices distinct and granular. A few large flattened granules on most of the lobules, on front and round orbits (fig. 20*c*).

Front scarcely 1/3 of carapace width; median lobes convex and separated

by a deep U-shaped notch; each outer lobule small and merging into the inner orbital angle (fig. 20*c*).

Eyes wider (antero-posteriorly) than in typical species and only partially concealed by the shallow, backwardly-inclined orbits; orbital border entire, not lobulated as in typical forms, with two faint suture lines dorsally; infra-orbital angle prominent and visible in dorsal aspect (fig. 20*c*).

Basal segment of *antenna* in contact with down turned edge of front and extending into lower half of, flagellum in upper half of, orbital hiatus (fig. 23*b*). Antennular fossa at least 2/3 as deep as wide.

Anterior margin of *buccal cavern* rather straight (fig. 23*b*); palatal ridge rather distinct on anterior half of palate.

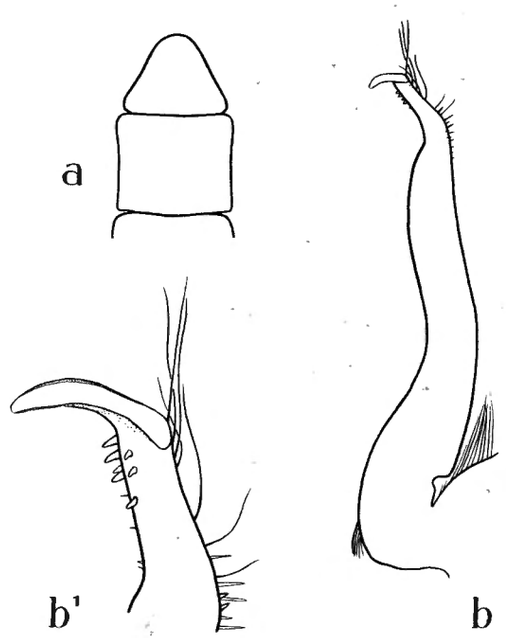

FIG. 24. — *Phymodius odhneri* n. sp. : *a*. Terminal segments of male abdomen. *b*. First pleopod of male. *b*¹. Apex of same farther enlarged. (*a*. ×15; *b*. ×22; *b*¹. ×75.)

Abdomen with segments 3-5 united; the two terminal segments as represented in fig. 24*a*.

Chelipeds subequal; ischium not much smaller than merus in ventral aspect; anterior margin of both crenulate. Upper inner border of merus (near *S*) bearing 4-6 large bluntly conical tubercles; two similar tubercles at inner angle of carpus (lower one more prominent); groups of small round low granules, similar to those on the carapace, on distal end of merus, on outer surface of carpus and upper half of palm.

Chela as represented in fig. 25*b*, finger short, with rather broad hollow tips but not hoof-shaped, each having an inner and an outer tuft of long fine

bristles; dactylus abruptly downturned distally so as to resemble a beak. The darker colouring on the immobile finger must have extended well on to the palm (indicated by the dotted line in fig. 25*b*) but, though this area is quite distinct, it now scarcely differs in colour from the rest of the palm.

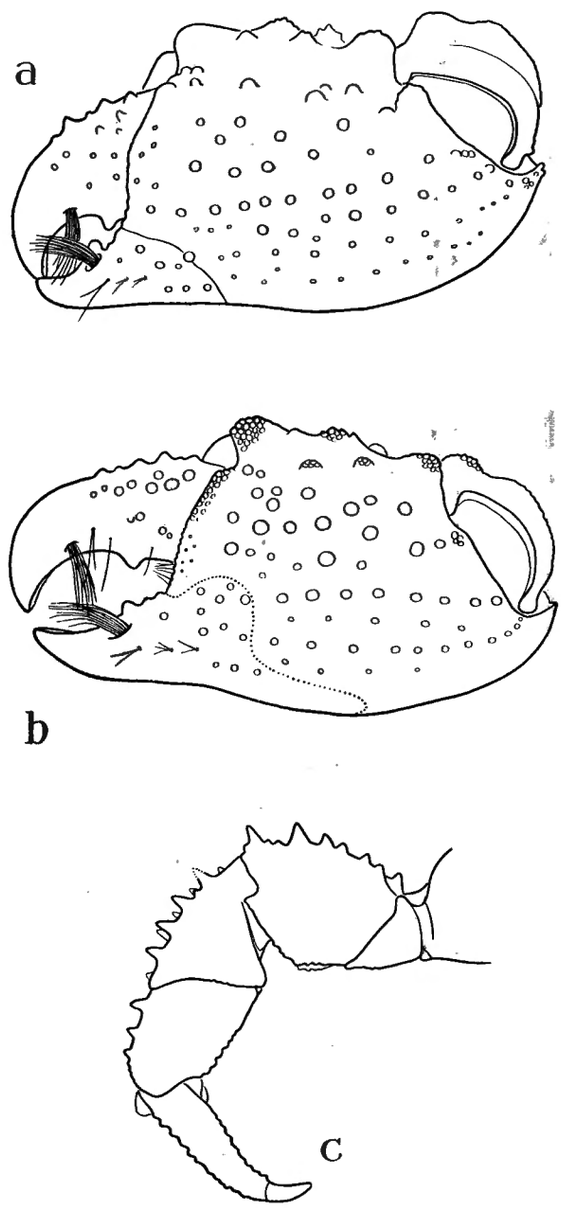

FIG. 25. — *Phymodius laysani* RATHBUN (RATHBUN det.). — *a*. Left chela of female. *Phymodius odhneri* n. sp. — *b*. Left chela of male. *c*. Third right leg of female, anterior aspect : all × 11.

Walking-legs clothed with long soft plumose yellow hairs; dorsal margin of merus, carpus, and propodus spinose (see fig. 25*c* — ♀); dactylus, propodus, dorsal part of carpus and ventral margin of merus granulose.

First *pleopod* as represented in fig. 24*b* and *b'*.

The *females* are smaller than but very similar to, the holotype; apparently the colouring did not extend very far beyond the base of the immobile finger of the chela (*cf.* that of ♀ of *Ph. laysani*, fig. 25*a*).

Remarks. — This species was determined by the late Dr. Odhner as « *Phymodius* n. sp. (*laysani* Rathbun aff.) ». I have compared the specimens with a female (1) of that form and the most important differences between the two are as follows : *Ph. laysani* has (1) a deeper carapace with a wider frontal notch (*cf.* fig. 20*c* and *d*); (2) the anterior border of the buccal cavern is much less regular, being deeply concave on either side of the median line (*cf.* fig. 23*c* and *b*) and the palatal ridges are much less pronounced; (3) the fingers of the chela are considerably shorter and less hollowed at the tips.

Dr. Balss has since sent me a male of *Ph. laysani* determined by Pesta; in this specimen the anterior border of the buccal cavern is not quite so concave on either side of the median line as in the female but the palatal ridges are very low compared with those of *Ph. odhneri*. The chela is very similar to that of *Ph. odhneri* but with a considerably shorter immovable finger. The first pleopod also is very similar to that of *Ph. odhneri* the terminal beak being rather longer and more curved at the apex.

Genus CHLORODOPSIS A. Milne-Edwards.

Chlorodopsis melanodactyla A. Milne-Edwards.

Lenz, 1905, p. 355.

Material. — Banda Neira, 24-II-29, 1 immature ♀ (Balss det.); 1 immature ♂.

Chlorodopsis pilumnoides (White).

Alcock, 1898, pp. 165 and 167.

Material. — Banda Neira, 24-II-29, 1 ♂ (without chelipeds — carapace *l.* = 11.3, *b.* = 15.8 mm.), 1 immature ♂ and 1 ovigerous ♀ (the ♀ identified by Dr. H. Balss).

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(1) Kindly lent by Dr. Mary Rathbun.

REMARKS. — Both chelipeds and several of the walking-legs are missing from the larger male but the areolation of the carapace agrees with the much larger Samarang cotypes. A characteristic feature of the species is the presence of a long raised line of granules on area 1P parallel to, and separated by a rather deep depression from, the posterior margin of the carapace.

The median frontal lobes are sharply denticulate and almost straight; each outer lobule is tridenticulate.

The first pleopod of the male is represented in fig. 26*a*.

The immature male probably also belongs to this species but the areolation of the carapace is scarcely apparent; the first pleopod has only a few (about 7) of the long spines near the apex (*cf.* fig. 26*a*).

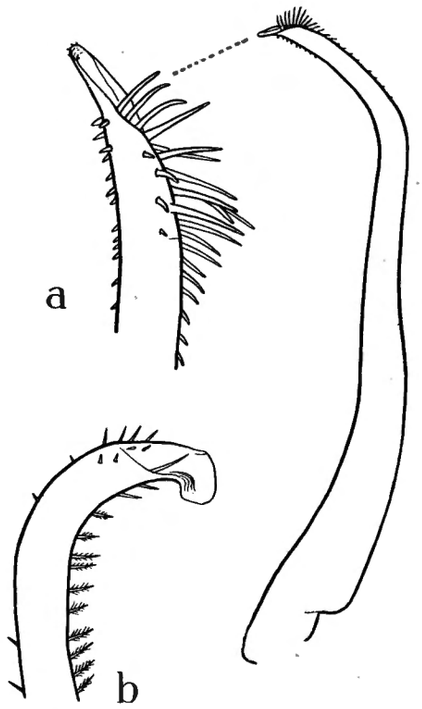

FIG. 26. — *a. Chlorodopsis pilumnoides* (WHITE). — First pleopod of male and apex of same farther enlarged. (× 20 and 60.)
b. Chlorodiella bidentata (NOBILI). — Apex of first pleopod of male : × 100.

Chlorodopsis pugil (DANA).

Pilodius pugil DANA, 1852, vol. I, p. 219; pl. XII, fig. 8*a-i*.
Chlorodopsis pugil, KLUNZINGER, 1913, p. 248; pl. VI, fig. 18*a-c*.

MATERIAL. — Banda Neira, 24-II-29, 1 immature ♂ (Dr. H. Balss det.).

Genus CHLORODIELLA RATHBUN.

Chlorodiella bidentata (NOBILI).

Chlorodius bidentatus n. sp.? NOBILI, 1901, p. 15.

MATERIAL. — Banda Neira, 24-II-29, 2 ♀, 3 ♂ (only the largest with both chelipeds), Dr. H. Balss det.

REMARKS. — Balss, who identified the specimens, referred this species to the genus *Chlorodiella* and the carapace is certainly very similar to that of *Chlorodiella barbata* (Borradaile, 1900, p. 587, pl. XLI, fig. 4) for example. It differs, however, in at least two respects from typical species of that genus (*e. g. Chl. niger*). (1) The front is of the same general form but is bilobed, without any trace of the small outer lobules or of the triangular process which descends from each to meet the rather broad basal antennal segment. Instead, the narrow basal is separated by the rather long succeeding antennal segment from the front. (2) There is a distinct palatal ridge extending to the anterior boundary of the buccal cavern.

The chelipeds, which are unequal in both sexes, especially in the male, are long and rather slender being at least twice the carapace length in the female, thrice in the male (*cf.* Nobili, 1901, p. 15 « I chelipedi sono piuttosto corti »). The long merus, most of which projects beyond the antero-lateral border, is armed with 2 (in one instance 3) curved spines on the anterior border. The chelae are smooth, long and narrow, with short almost straight fingers; the palm is twice as long as high. The tips of the fingers are blunt and hollowed except in the case of the larger chelae of the oldest male where they are rather worn.

The sutures between segments 3-5 of the male abdomen are distinct although the three segments may not be freely movable. The last segment is only 2/3 as wide as high, with rounded apex; the penultimate is about 2/3 as high as wide. The apex of the first pleopod is represented in text-fig. 26*b*.

The first two antero-lateral teeth are inconspicuous, the third is rather long and spiniform; the fourth is absent in small specimens, rudimentary in the two largest specimens.

There is a wide orbital hiatus but the flagellum stands in the notch between front and inner orbital angle.

Measurements of largest male in mm. :

l. of carapace	4.5	*l.* of larger chela	7.6
b. of carapace	6.9	*h.* of palm of larger chela	2.7
l. of front	2.8	*l.* of smaller chela	5.2
l. of fronto-orbital border	5.7	*h.* of palm of smaller chela	1.3

Chlorodiella niger (Forskal).

Chlorodius niger Alcock, 1898, p. 160.
Chlorodiella nigra Montgomery, 1931, p. 441.

Material. — Banda Neira, 24-II-29, 1 ♂, 3 ♀ (2 ovigerous), all of small size.

Remarks. — The orbital hiatus is variable, being quite wide in three of the specimens, very narrow and slit-like in the largest ovigerous female.

Genus CYMO De Haan.

Cymo andreossyi (Audouin) De Haan.

Alcock, 1898, p. 73.

Material. — Banda Neira, 2 ♀, one very small.

Cymo melanodactylus De Haan.

Alcock, 1898, pp. 73 and 74.

Material. — Banda Neira, 24-II-29, 2 ♂ (one the host of *Sacculina leopoldi* Boschma).

Genus DAIRA De Haan.

Daira perlata (Herbst) De Haan.

Alcock, 1898, pp. 71 and 155.
Stimpson, 1907, p. 42.
Rathbun, 1907, p. 44.

Material. — Mansfield Eiland, 1-III-29, 1 ♂.
Eiland Weim, 28-II-29, 1 ♂.

Remarks on Systematic Position of the Genus. — Alcock (1898, pp. 137-156) referred the genus *Daira* to the subfamily Actaeinae together with *Actaea* and *Banareia*. *Daira perlata* is certainly very similar in general appearance to many species of *Actaea*, especially those with concave postero-lateral borders. The abdomen of the male is also very similar in shape to that of *e. g. A. hirsutissima* (Rüppell) being rather narrow with the apex opposite the middle of the base of the cheliped. The sutures between segments 3-5 are, however, distinct although the segments are not movable on one another. The pleopods of the

male are surprisingly different from those of *Actaea*, the second being whip-like and longer than the first (fig. 27*a* and *b*). This type of second pleopod is characteristic of the subfamily Menippinae (section Hyperomerista) as emended by Balss (1932, p. 510) but may be found in other Xanthids although, as far as my present knowledge goes, it does not occur elsewhere in the section Hyperolissa than in *Daira*. The difference in the second male pleopod, which must be associated with some physiological difference, seems to me more important than slight differences in fronto-orbit, palatal ridges, etc. But, until a revision of the Xanthidae can be undertaken it is not possible to be dogmatic as to the

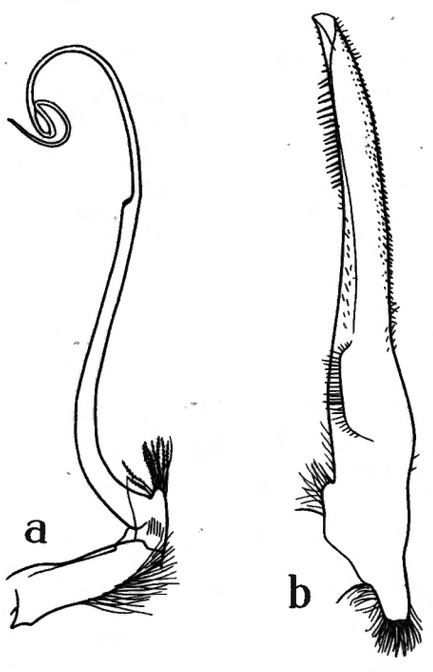

FIG. 27. — *Daira perlata* (HERBST). — *a*. Second and *b*. first pleopod of male : × 9.

position of the genus. It seems to have affinities with the Menippinae, *c. g.* the structure of the front, orbit and antenna is at least as closely related to that of *Menippe* as to that of *Actaea* where the outer lobule is in contact with the basal antennal segment (*cf.* fig. 28*a* and *b*). The fact that the endostomial ridges, though well developed posteriorly, do not extend to the anterior border of the buccal cavern need not necessarily exclude the genus from the Menippinae (*e. g.* Balss found that in the Pilumninae « die Gaumenleisten sind entweder nur schwach entwickelt oder fehlen ganz » in *Heteropilumnus*, 1933, p. 41). The male abdomen in all the Menippinae that I have examined is broader than in *Daira* and does not reach quite so far forward, the apex being opposite the anterior end of the base of the first walking-leg. *Daira* is somewhat interme-

diate between the Actaeinae and the Menippinae; Ortmann (1893, pp. 473-476) referred it to his Oziidae but placed it in his subfamilly Panopaeinae with *Actumnus*, *Panopeus* and *Melia* rather than in his Oziinae with *Ozius*, *Epixanthus* and *Eurytium*. Of these six genera only *Ozius* and *Epixanthus* have the long type of second male pleopod and both are now placed in the Menippinae. Should *Daira* prove to belong to the Menippinae its position would appear to be intermediate between *Menippe* and the *Pseudozius-Ozius-Epixanthus* group.

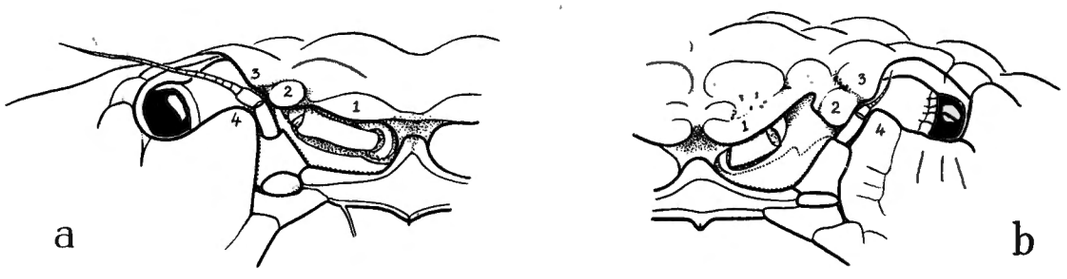

FIG. 28. — *a. Menippe bellangeri* (H. MILNE-EDWARDS). — *b. Daira perlata* HERBST.
1. Median, 2. lateral frontal lobe. 3. Upper, 4. lower inner orbital angle : × approx. 5.

SECTION II. **HYPEROMERISTA.**

Genus EURÜPPELLIA MIERS.

Eurüppellia annulipes H. MILNE-EDWARDS.

Ozius (*Eurüppellia*) *annulipes* ALCOCK, 1898, p. 188.

MATERIAL. — Jefbi, **26-II-29**, 1 ♀ (rather worn).

Genus ERIPHIA LATREILLE.

Eriphia laevimana LATR. EDW.

ALCOCK, 1898, p. 214.

MATERIAL. — Poelo Babi (Aroe), **21-III-29**, 1 ♀.
No locality : 1♂, 1 ♀.

Eriphia laevimana var. **smithii** MACLEAY.

Eriphia laevimana var. *smithii* ALCOCK, 1898, p. 216.
Eriphia sebana smithii RATHBUN, 1910, p. 359.

MATERIAL. — Kaimana (New Guinea), **19-III-29**, 1 ♀.

REMARKS. — The apices of the first and second pleopods of the male are represented in fig. 29*a* and *b*; they are very similar in the typical form E. *laevimana* Latr.

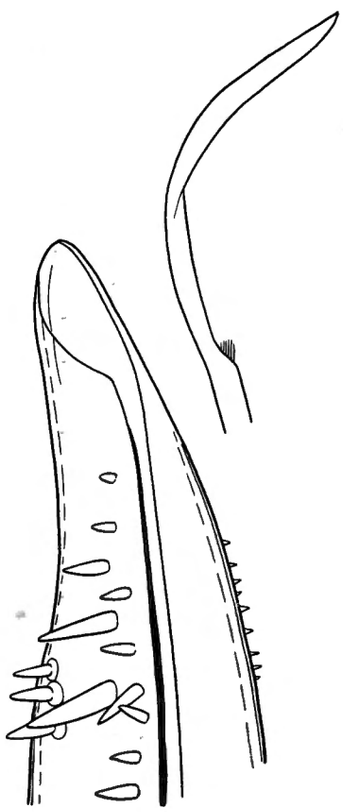

FIG. 29. — *Eriphia laevimana* var. *smithi* MACLEAY. — Apex of first and second pleopods of male respectively : × 60.

Genus PILUMNUS LEACH (*sensu restricto*) (1).

Pilumnus laevimanus DANA.

KLUNZINGER, 1913, p. 267.
BALSS, 1933, p. 12 (in list of species).

MATERIAL. — Lampasing (Lampong), 12-IV-29, 1 small ♀ with *P. vespertillo* Fabr. (Dr. H. Balss det.).

Pilumnus spinicarpus GRANT and MC CULLOCH.

GRANT and MC CULLOCH, 1906, p. 15, pl. I, fig. 2, 2*a*.
RATHBUN, 1923, pp. 109 and 123.

(1) See BALSS, 1933, p. 10.

MATERIAL. — Eiland Enoe, 24-III-2, 1 ♂ (*l.* of carapace only 5 mm.) and ? 2 smaller specimens.

? New Guinea, 1 immature ♂.

REMARKS. — The largest specimen agrees closely with the description of *P. spinicarpus* but the spine on the inner border of the carpus of the larger chela is absent; it has probably been broken off as there seems to be a definite spine base. There are two spines on the inner border of the merus of each cheliped.

The smaller specimens probably also belong to this species.

Pilumnus vespertilio FABR.

BALSS, 1933, p. 21.

MATERIAL. — Lampasing (Lampong), 12-IV-29, 1 ♂.
Ambon, 21-II-29, 1 ♂.

Pilumnus neglectus BALSS.

BALSS, 1933, p. 25, text-fig. 3.

MATERIAL. — Banda Neira, 24-II-29, 1 ♂, 1 ♀ (Dr. H. Balss det.).

Genus GLABROPILUMNUS BALSS.

Glabropilumnus dispar (DANA) BALSS. (= **Pseudozius dispar** DANA).

BALSS, 1932, p. 516; 1933, p. 39.

MATERIAL. — Banda Neira, 24-II-29, 2 ovigerous ♀ (Dr. H. Balss det.).

Glabropilumnus latimanus nov. spec.

MATERIAL. — Banda Neira, 24-II-29, 1 ovigerous ♀ (holotype).

DESCRIPTION. — *Carapace* convex from side to side, very convex fore and aft; smooth to the unaided eye, finely punctate under high magnification. Postero-lateral longer than antero-lateral border, the latter indistinctly 3-4 lobed (fig. 30). Front deflexed, anterior margin almost straight and passing gradually into each upper orbital border; there is a shallow V-shaped notch below the outer orbital angle and a trace of a suture near the middle of the upper border. Basal antennal segment scarcely reaching the front; the flagellum, which is rather longer than the orbit lies in the wide orbital hiatus. Palatal ridges well developed, extending to the anterior boundary of the buccal cavern.

Chelipeds very unequal and dissimilar, the meri scarcely projecting beyond the fourth antero-lateral lobule. The larger chela is of a rather unusual form with a very deep palm and a broadly triangular white immovable finger (fig. 30).

The upper and the outer surfaces of the palm, except for a narrow strip along the lower border of the latter, are covered with a very short light brown felt (1) from which a few soft bristles and numerous granules project, a few of the

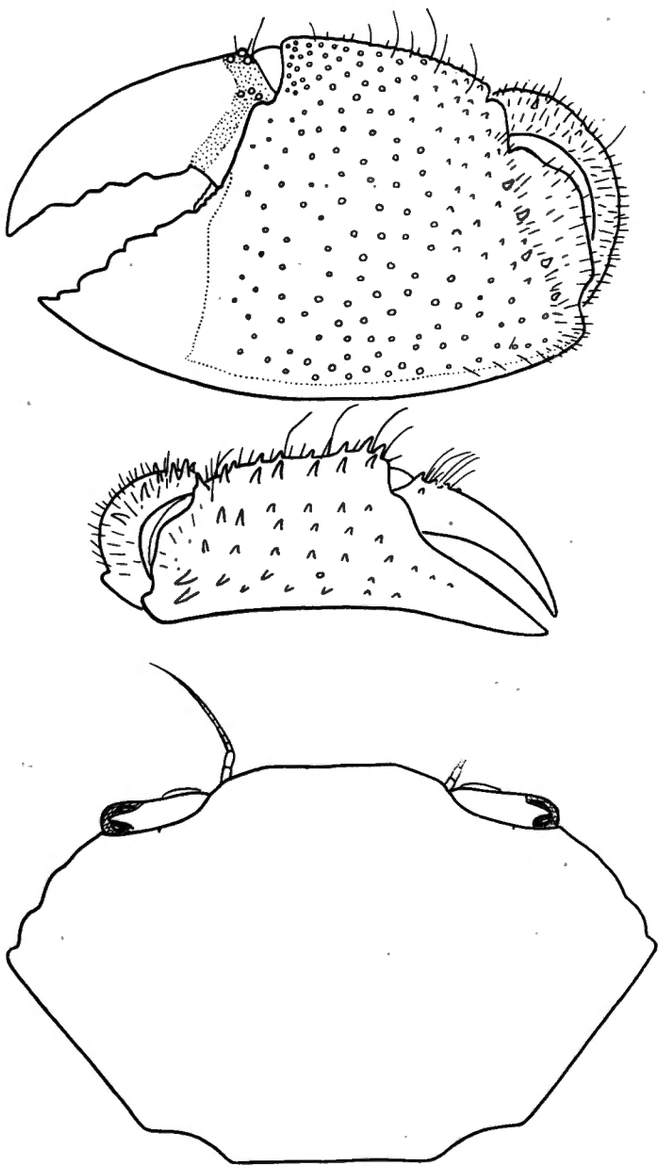

FIG. 30. — *Glabropilumnus latimanus* n. sp. — Holotype. — Carapace in dorsal aspect tilted slightly backwards to show front; × 12.5. Smaller and larger chela : each × 15.

granules near the carpo-propodal articulation are sharply conical. The carpus is only a little longer than broad, the blunt inner angle is beset with 4-5 round

(1) The felt covers the entire area within the finely dotted line in fig. 30.

granules and a number of rather stiff bristles; much shorter setae partially conceal the granules on the dorsal surface especially posteriorly and distally. The smaller chela has a longer narrower palm armed with numerous sharp teeth; the fingers are sharp pointed and more slender (fig. 30); there is a small tooth or spine near the blunt inner angle of the carpus.

The walking-*legs* have each a number of short and a few longer bristles on the three terminal segments and a small dorsal spine at the distal end of the carpus; the last pair are short and dorsal in position.

MEASUREMENTS. — *l.* of carapace 4.7; *b.* of carapace 7.3; fronto-orbital border 5.2 mm.

REMARKS. — Dr. Balss to whom I sent this specimen, writes that it « gehört, wie ich glaube, in die Gattung *Glabropilumnus* mihi, wenn auch der Seitenrand nicht in Zähne geteilt is. Jedenfalls steht sie dieser Gattung, bes. *G. dispar* nahe. Ist sicher eine neue Art, schon wegen der merkwürdigen Schere » (20-III-34). This specimen differs from all the species referred to this genus by Balss (1932, p. 516) in having a much broader carapace with very indistinct antero-lateral lobules, no distinct median frontal notch and very dissimilar chelipeds.

Genus PARAPILUMNUS DE MAN.

Parapilumnus leopoldi nov. spec.

MATERIAL. — Banda Neira, 24-II-29, 1 ♀ (holotype).

DESCRIPTION. — *Carapace* convex fore and aft, slightly convex from side to side; length very nearly two-thirds of the greatest breadth and approximately equal to the length of the fronto-orbital border (fig. 31 *a*). Front depressed, the two lobes separated by a rather wide shallow median emargination, the outer angle of each lobe separated from the inconspicuous inner orbital angle in dorsal view (fig. 31 *b*). A short distance behind the front is a row of long delicate plumose setae. Upper orbital border granulate, with the merest indications of two sutures. Lower orbital border also granulate with a strongly developed inner angle (fig. 31 *b* and *c*); the inner orbital angle on the left is narrower than that on the right side and has a single granule at the apex) and a deep but narrow fissure near the outer orbital angle.

Postero-lateral considerably longer than the antero-lateral border, the latter divided into four lobes, including the outer orbital angle, as represented in fig. 31 *b*.

When the setae (described later) are removed from the dorsal surface of the carapace a number of granules are exposed. These granules — which give the carapace a rather rough appearance — are confined for the most part to the branchial regions, the largest being arranged in two irregular series near the antero-lateral border, on the third and fourth antero-lateral teeth and near the postero-lateral border (fig. 31 *a* and *b*).

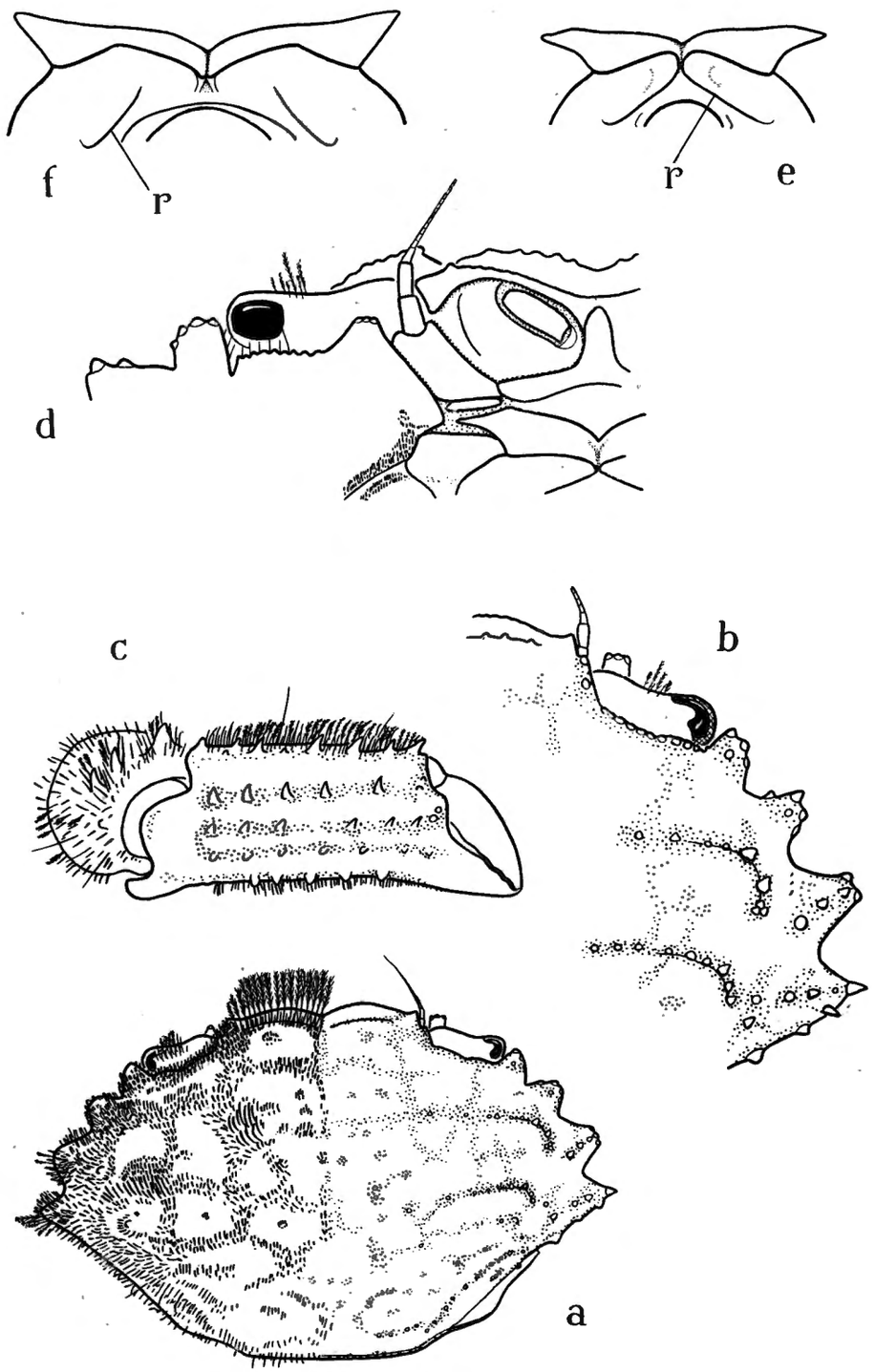

FIG. 31. — *Parapilumnus leopoldi* n. sp. — Holotype.
a. Carapace, dorsal aspect, tilted slightly backwards to show front with the setae represented diagrammatically on left half. *b*. Part of carapace farther enlarged to show antero-lateral teeth and orbit. *c*. Right chela; the dots represent the position of the setae on the outer surface. *d*. Right side of carapace, in frontal aspect, showing fronto-orbital border and epistome. *e*. Anterior portion of palate showing the very oblique ridges *r* meeting in the middle line.
Parapilumnus verrucosipes (STIMPSON). — *f*. Anterior portion of palate showing the widely separated palatal ridges *r*. (*a*. ×9.3; *b*. and *c*. ×15; *d*.-*f*. ×20.)

Basal antennal segment scarcely reaching the front; the flagellum which is almost as long as the orbit; stands in the wide orbital hiatus. There are two strong oblique palatal ridges (*r*) which meet anteriorly in the middle line (fig. 31*d* and *e*) but the more lateral palatal ridges characteristic of *Pilumnus* and *Heteropilumnus* are absent (see remarks).

Chelipeds not very unequal and of relatively small size the lesser being equal in length to the first walking-leg. Merus of the larger cheliped, which scarcely projects beyond the fourth antero-lateral lobe, with a few conical granules on the upper and lower inner borders. Carpus with 1-2 small conical granules at the inner angle and some larger granules and teeth on the upper and outer surfaces. The larger chela is represented in fig. 31*d*; the palm is nearly twice as long as high, armed with 5 rows of teeth or spines more or less concealed by the short plumose setae; the fingers are white sharp pointed and short. The smaller chela is very similar to the larger but the setae are fewer in number and more evenly distributed on the outer surface.

The three anterior walking-*legs* subequal, the fourth a little shorter than the third; upper and lower borders of the meri and upper border of carpus granulate.

Setae. This specimen exhibits what will doubtless prove to be a characteristic arrangement of the numerous soft plumose setae. Those on the dorsal surface of the carapace are only represented diagrammatically on the left half, their distribution is shown rather more accurately by dots on the right half of the carapace (fig. 31*a*). There are a few short setae on the subhepatic and pterygostomial regions and on the external maxilliped there is a median band on the proximal three-fourths of the ischium. The walking-legs are all setose, especially along the upper and lower borders of the meri, on the carpus where the setae tend to be arranged in 3-4 longitudinal series, and on the two terminal segments; these setae are interspersed with longer bristles. On the larger chela the setae are arranged in 5-6 bands round the teeth, a few also occur on the inner surface of the palm where they are arranged in 3-4 rows; on the carpus they also tend to group themselves round the granules and teeth.

Measurements. — *l*. of carapace 6.2; *b*. of carapace 9.3; fronto-orbital border 6.0 mm.

Remarks. — I sent this specimen to Dr. Balss for examination and received the following reply « No. 67 möchte ich zu *Parapilumnus* stellen, wenn auch die Gaumenleisten fehlen (was ja auch bei *Heteropilumnus* vorkommt). Jedenfalls ist die Form in dem Habitus des Carapax sehr ähnlich den *Parapilumnus*-arten aber auch eine neue Art mit sehr characterischen Scheren » (20-III-34). While this specimen is certainly very similar in general appearance to the species referred to *Parapilumnus* by Balss in his recent excellent revision of the genus *Pilumnus* and allied forms (1933, pp. 38-39), the palate seems to be rather unusual. I have only been able to examine the specimens of *Parapi-*

lumnus verrucosipes (Stimpson) described by Miers (1881, p. 216, pl. XIII, fig. 5). In that species the palatal ridges are well developed posteriorly but do not extend forward to the anterior boundary of the buccal cavern (*r*, fig. 31*f*). In *P. leopoldi* these ridges appear to have become longer and more oblique, meeting in the middle line.

P. leopoldi differs from the previously described species in having (1) much less massive and unequal chelipeds with shorter fingers and a long narrow palm; (2) a more prominent outer-orbital angle and (3) a distinctive arrangement of the numerous setae on carapace and appendages.

Genus TRAPEZIA Latreille.

Trapezia cymodoce (Herbst).

Alcock, 1898, pp. 218 and 219.
Rathbun, 1907, p. 58.

Material. — Sorong (New Guinea), 2-III-29, 1 ♂, 1 ♀, 2 immature specimens; also 2 ex., Balss det.

Banda Neira, 5 m., 24-II-29, 1 ♂; also 25 ex., Balss det.

Trapezia cymodoce areolata Dana.

Rathbun, 1907, p. 59.
T. ferruginea var. *areolata* Alcock, pp. 218 and 221.

Material. — Sorong (New Guinea), 2-III-29, 2 small dried specimens.
Banda Neira, 5 m., 24-II-29, 1 ♀; also 1 ex., Balss det.

Trapezia cymodoce ferruginea Latr.

Rathbun, 1907, p. 58.
T. ferruginea Alcock, 1898, pp. 218 and 220.

Material. — Banda Neira, 6 dried specimens, all of small size.
Banda, 23-II-29, 6 dried specimens.
Sorong (New Guinea), 2-III-29, 4 dried specimens.
Banda Neira, 24-II-29, 1 immature ♂; also 4 ex., Balss det.

Trapezia cymodoce guttata Rüppell.

Trapezia ferruginea guttata Ortmann, 1897, Zool. Jahrb. Syst. X, p. 205 (*ubi bibl.*).
Trapezia guttata De Man, 1902, p. 640, pl. XXI, fig. 25.

Material. — Banda Neira, 24-II-29, 6 ex., Balss det.

Trapezia rufopunctata (HERBST) LATR.

ALCOCK, 1898, pp. 218 and 222.
RATHBUN, 1907, p. 57.

MATERIAL. — Banda Neira, 5 m., 24-II-29, 1 ♀, 1 ♂.

Genus TETRALIA DANA.

Tetralia glaberrima (HERBST).

ALCOCK, 1898, p. 223.

MATERIAL. — Sarong door, 2-III-29, 3 ♀; also 2 ex., Balss det.
Banda Neira, 24-II-29, 1 immature ♂; also 34 ex., Balss det.

Genus DOMECIA EYDOUX et SOULEYET.

Domecia glabra ALCOCK.

ALCOCK, 1899, *J. Asiat. Soc. Beng.* Calcutta, vol. LXVIII, pt. 2, p. 117.
ALCOCK, 1901, *Illustrations Zoology « Investigator »*, pt. *IX*, pl. LIV, fig. 3, 3*a*.

MATERIAL — Banda Neira, 24-II-29, 1 immature specimen; also 1 ♂ det. by Dr. Balss.

FAMILY **PORTUNIDAE** DANA.

Genus CARUPA DANA.

Carupa laeviuscula HELLER.

ALCOCK, 1899, pp. 10 and 26.

MATERIAL. — Banda Neira, 24-II-29, 1 ovigerous ♀.

Genus NEPTUNUS DE HAAN.

Neptunus (Achelous) granulatus (EDW.) A. MILNE-EDWARDS.

ALCOCK, 1899, pp. 32 and 45.

MATERIAL. — Sorong (New Guinea), 2-III-29, 1 ♂.

Genus THALAMITA LATREILLE.

Thalamita admeta (HERBST) EDW.

ALCOCK, 1899, pp. 74 and 82.

MATERIAL. — Mansfield Eiland, 1-III-29, several small specimens probably belong to this species; also 3 ex., Balss det.

Thalamita crenata (LATR.) EDW.

ALCOCK, 1899, pp. 73 and 76.

MATERIAL. — Ambon, 21-II-29, 1 ♂.

REMARKS. — The chelipeds are missing but the proportion of length to breadth of carapace is just under two-thirds, so that the specimen would appear to belong to *Th. crenata* rather thant to *Th. danae* Stimpson.

Thalamita integra DANA.

ALCOCK, 1899, pp. 74 and 85.

MATERIAL. — Eiland Weim, 26-II-29, 7 ex. juv., Balss det.

Thalamita sima EDW.

ALCOCK, 1899, pp. 74 and 81.

MATERIAL. — Mansfield Eiland, 1-III-29, 1 ex., Balss det.

Thalamita stimpsoni A. MILNE-EDWARDS.

ALCOCK, 1899, pp. 73 and 79.

MATERIAL. — Lampasing (Lampong), 12-IV-29, 1 ♂.

Genus THALAMITOIDES A. MILNE-EDWARDS.

Thalamitoides quadridens A. MILNE-EDWARDS.

Thalamita (*Thalamitoides*) *quadridens* A. MILNE-EDWARDS, 1869, p. 147, pl. VI, fig. 8-15.
Thalamitoides quadridens DE MAN, 1888, p. 332.
Thalamitoides quadridens RATHBUN, 1907, p. 64.

MATERIAL. — Banda Neira, 5 m., 24-II-29, 1 ♂ (Dr. H. Balss det.).

INCERTE SEDIS.

Genus HAPALOCARCINUS STIMPSON.

Hapalocarcinus marsupialis STIMPSON.

CALMAN, 1900, p. 43, pl. III, fig. 29-40.
BORRADAILE, 1902, p. 271.
STIMPSON, 1907, p. 170, pl. XIV, fig. 8.

MATERIAL. — Sorong (New Guinea), 2-III-29, 1 dried specimen from a gall in *Seriatopora* sp.

REMARKS. — Although this specimen is very small (carapace length scarcely exceeds 2 mm.) the narrowness of the abdomen and the unusually robust chelipeds and first walking-legs (1) would lead one to suppose that it is a male. Yet there appears to be a pair of genital openings on the sternum close to the base of the second walking-legs. Unfortunately the specimen is too brittle to permit of careful examination of the abdomen and pleopods, but it is most likely a very young female.

OXYRHYNCHA

FAMILY **PARTHENOPIDAE** ALCOCK.

SUBFAMILY **EUMEDONINAE** MIERS.

Flipse (1930, p. 20, in key) divided this subfamily into two groups according to the structure of the orbital border. In group A, comprising the genera *Zebrida* and *Eumedonus*, he states that the floor of the orbit (or inner orbital angle) is not in contact with the front and that the hiatus is more or less filled by the second antennal segment. Of group B, comprising the genera *Ceratocarcinus* and *Harrovia* he says « Boden der Augenhöhle in Kontakt mit der Stirn, sodass die Antennen ganz von der Augenhöhle getrennt sind ».

On re-examining the specimens of *Harrovia albolineata* and *Ceratocarcinus longimanus* (group B) in the « Samarang » collection (2) I found that, in both species, there is a distinct orbital hiatus; the inner orbital angle, especially in the latter, extends rather farther forward than is typical of group A (*cf.* fig. 33*a* and *c* with fig. 32*a* and *b*). The antenna, however, lies in a depression or groove (*g*) in the front although the third segment can be made to enter the

(1) Compared with a rather larger female from Torres Straits (CALMAN det.).

(2) The type specimens of the genotypes.

hiatus. Dana (1855, pl. VI, fig. 8*b*) figures a similar orbital hiatus in *Ceratocarcinus speciosus*. A. Milne-Edward's figure (1872, pl. XIV, fig. 2*a*), on the other hand, shows that there is complete separation of orbit and antenna in *C. dilatatus* (1). As a matter of fact the degree of separation of antenna from orbit is too variable in Flipse's group B to serve as the distinguishing character of the group. The variation would appear to be specific in some cases since

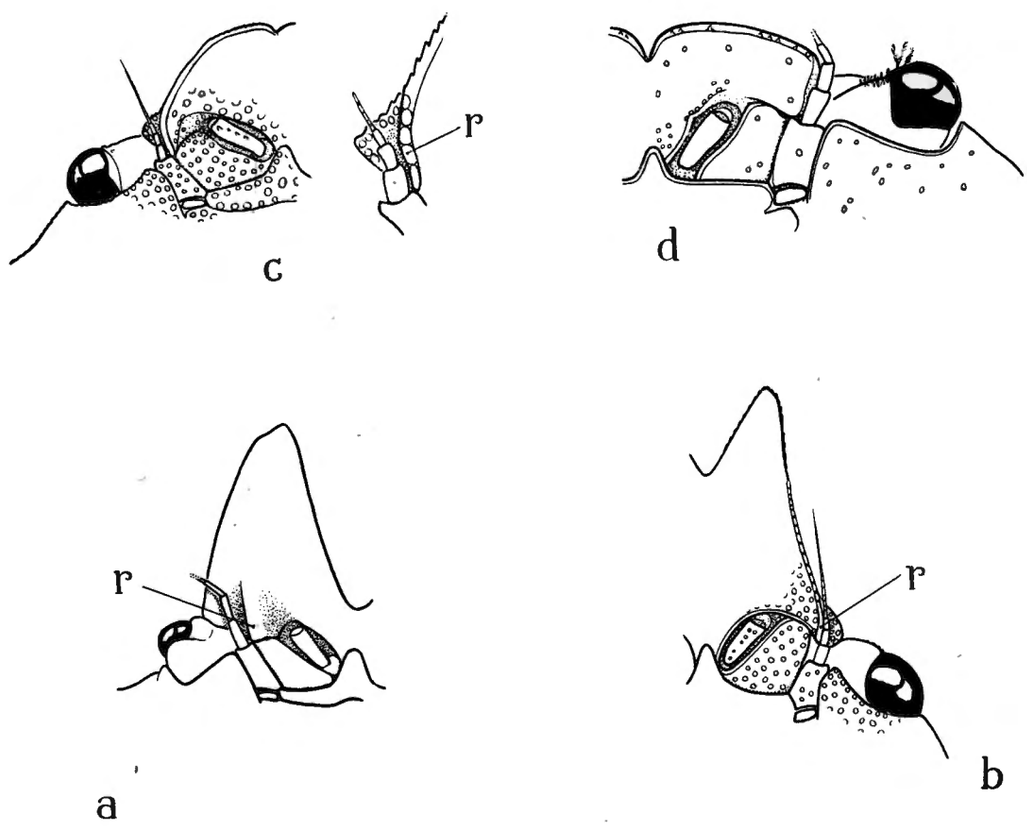

FIG. 32. — Front of carapace and orbit, in ventral aspect, of Group A.
a. Zebrida adamsi WHITE. — Holotype (total length of carapace 6.6 mm.). *b. Eumedonus zebra* ALCOCK. *c. Gonatonotus pentagonus* ADAMS and WHITE. — Holotype. Ridge *r* farther enlarged. *d. Calmania prima* LAURIE. — Holotype. *r*. Ridge on inner side of shallow antennal groove. (*b*., *c*.×14, *d*.×20.)

(1) the type of *C. longimanus* is of approximately the same size as the « Challenger » specimen described by Miers (see footnote); (2) all specimens of *Harrovia albolineata* are similar in this respect. In *C. spinosus*, however, it depends on the age of the specimens. The holotype, which is very small, has a wide

(1) This is also true of two « Challenger » specimens of *C. dilatatus* that were not included in Miers' report as well as in the specimen referred by Miers (1886, p. 105) to *C. longimanus* but which probably also belongs to *C. dilatatus*.

orbital hiatus more or less filled by the second antennal segment (fig. 33*b*); in a much larger specimen from the Red Sea the inner orbital angle extends forward to, but does not fuse with, the base of the large rostral spine (fig. 33*b'*). The antenna, which normally lies in a very shallow groove bounded on the inner side by a low ridge (*r*) can pass into the narrow gap for a short distance as represented in the figure.

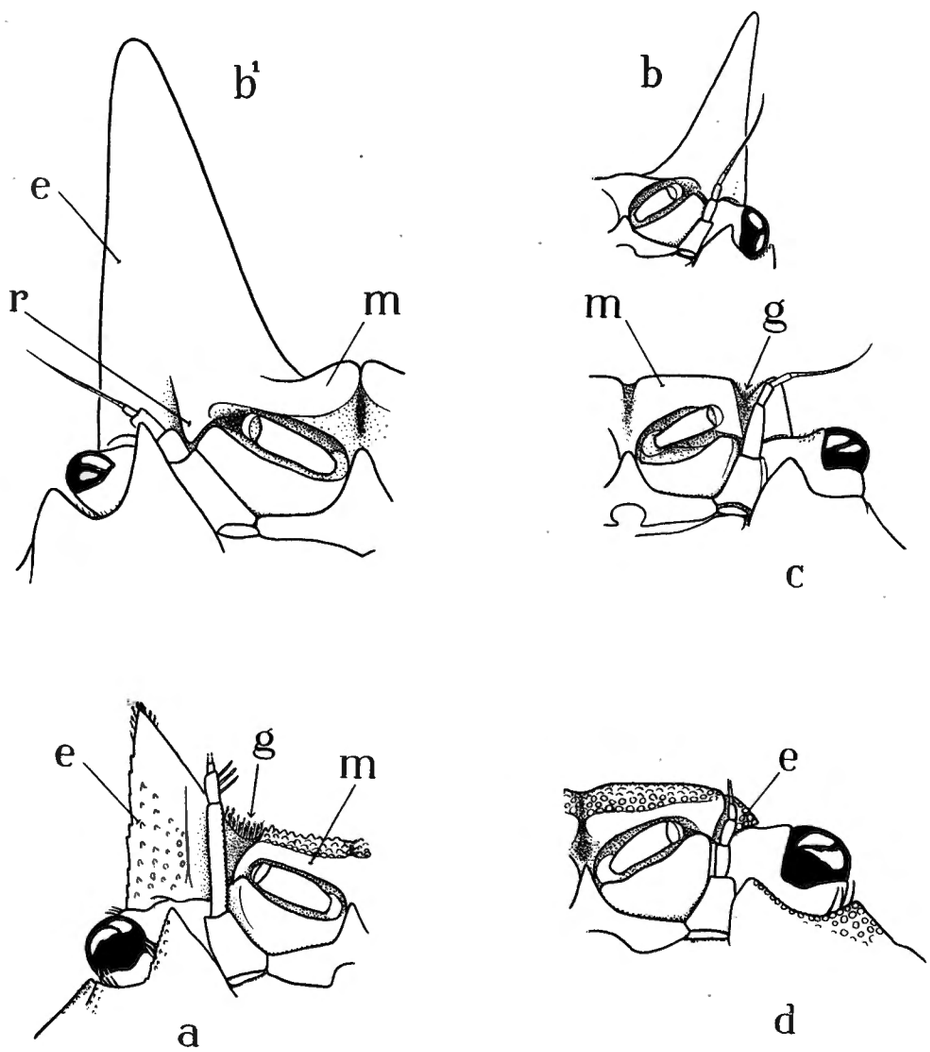

FIG. 33. — Front of carapace and orbit, in ventral aspect, of Group B.
a. Ceratocarcinus longimanus ADAMS and WHITE. Holotype. *b. Ceratocarcinus spinosus* MIERS. Holotype. *b*¹. A larger specimen of same species from Red Sea. *c. Harrovia albolineata* ADAMS and WHITE. Cotype. *d. Harrovia purpurea* n. sp. Holotype. *e.* Lateral lobe, *m.* median lobe of front. *g.* Antennal groove. *r.* Ridge on inner side of shallow antennal groove. (*a.*, *b.*×20; *b*¹.× circa 8; *c.*×14; *d.*×27.)

I have examined all the material of the subfamily Eumedoninae in the British Museum Collection, which, in addition to the types already mentioned, includes the original specimens for which the genera *Zebrida*, *Calmania* and *Gonatonotus* were established. Although this survey is not complete — *e. g.* the genus *Eumedonus* is represented by a single specimen of *E. zebra* Alcock presented by the Indian Museum — there appear to be two characters in which species in group A differs from those in group B, namely (1) rostrum; (2) walking-legs.

1. Rostrum. — In group A the rostrum — whether it be as short as in *Calmania* or as long as in *Eumedonus* and *Zebrida* (fig. 32*a* and *d*) — is divisible into two broad lobes or two or more less distinct horns. In *Calmania* there is no trace of an antennal groove (fig. 32*d*); in *Eumedonus* and *Gonatonotus* (1) there is a shallow depression bounded on the inner side by a low but distinct ridge (*r*, fig. 32*b* and *c*). In *Zebrida* the ridge is situated at a greater distance from the lateral border of the rostral spine (fig. 32*a*).

In group B the rostrum is always divisible into four parts : (1) two median lobes (*m*) which are broad in *Harrovia* but may be very narrow and inconspicuous as in *Ceratocarcinus spinosus* (fig. 33*a* and *b'*) and (2) two lateral lobes (*e*) which are sometimes narrow and but little advanced, if at all, beyond the median lobes, sometimes large and spiniform (*cf.* fig. 33*c*, *d* with *a*, *b*, *b'*) (2).

(1) This genus differs from *Eumedonus* only as regards the rostrum which is much shorter and unforked at the apex and should probably be included in *Eumedonus* (see Balss, 1922, p. 136).

(2) There is considerable variation in the terminology applied by various authors to the front or rostrum in the sub-family, especially in group B, as the following examples show :

AUTHOR.	GENUS.	LATERAL PART.	MEDIAN PART.
De Man, 1887-1888, p. 22..	*Harrovia.*	Intra orbital tooth.	Frontal lobes.
Alcock, 1895, p. 288.....	*Ceratocarcinus.*	Rostral spine.	Median lobes referred to as « wide interspace ».
Rathbun, 1906, p. 886...	*Harrovia.*	Orbital angles.	Frontal lobe.
Balss, 1922, p. 136.....	*Harrovia.*	Die Frontalhörner.	Stirnrand.
Flipse, 1930, p. 5	*Harrovia.*	Intra orbital tooth.	Lateral (rostral) tooth.
Flipse, 1930, p. 5, fig. 5.	*Ceratocarcinus.*	Der antoculare Dorn.	Septum antennulo-orbitale, Seitlicher Rostralzahn.

In such closely allied genera, it is desirable that the same terms be applied to corresponding parts as far as the marked differences in the form of the rostrum will permit. With regard to the terminology used by Flipse (1930, p. 5, fig. 5), in *Ceratocarcinus spinosus* it is likely that the rostral horn includes, in addition to the antocular spine proper, a large part of the median lobe — probably that referred to as the antennulo-orbital septum. In group B I have used the rather general terms « lateral and median lobes » but it is obvious that in *Harrovia* most of the rostrum goes to the median, in *Ceratocarcinus* to the lateral, lobe.

In group B there is often a deep well-defined antennal groove (*g*, fig. 33*a* and *c*); it is very shallow in *Harrovia purpurea* n. sp. and in *Ceratocarcinus spinosus* there is a short ridge (*r*), resembling that found in *Zebrida*, on the inner side of the shallow depression (fig. 33*d* and *b'*).

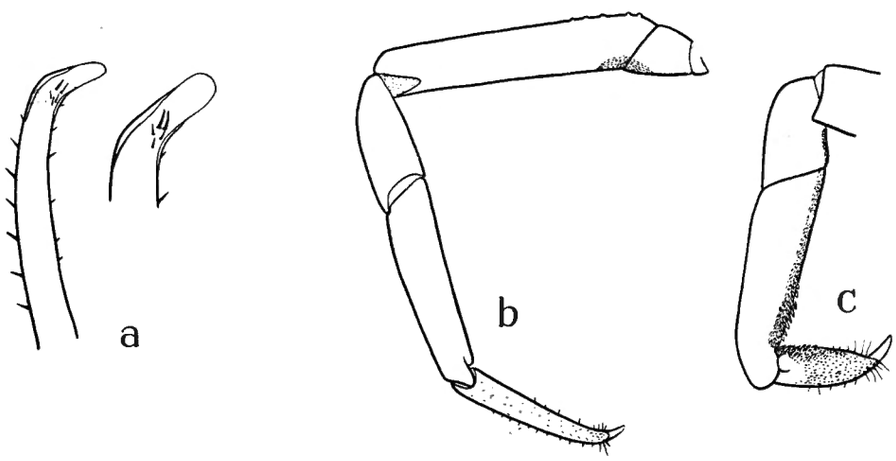

FIG. 34. — *Harrovia purpurea* n. sp. Holotype. — *a*. Apex of first pleopod. *b*. First walking leg ventral side. *c*. Distal segments of third walking leg from dorsal side. (*a*. ×60 and 100; *b*., *c*. ×15.)

2. WALKING-LEGS. — In all the species of group A that I have examined the first walking-legs do not differ appreciably from the succeeding pairs (1). They are subequal to, or rather shorter than, the second legs; all four pairs have subequal and similar dactyli.

In group B, on the other hand, the first pair of walking-legs is usually much longer and more slender than the succeeding pairs; the proprodus is less compressed and the dactylus is longer and subcircular in cross section. The propodus and dactylus in the last two pairs are distinctly compressed (*cf.* fig. 34*c* and *b*); the second pair may be similar to the third or intermediate between the first and third pairs but the dactylus is always short. In *Ceratocarcinus spinosa* the first is not much longer or more slender than the second pair of legs but the propodus is more slender while the dactylus is distinctly longer and subcylindrical.

Provisionally the two groups may be separated as follows :

A. — Rostrum bipartite consisting of two broad lobes or two more or less distinct horns (fig. 32); walking legs with subequal and similar dactyli.

Genera : 1. *Calmania;* 2. *Eumedonus;* 3. *Gonatonotus;* 4. *Zebrida.*

---

(1) A study of the figures of other species seems to bear out the difference in the walking legs in the two groups; in certain figures, however, the first dactylus is much foreshortened.

B. — Rostrum quadripartite (fig. 33); first pair of walking legs usually longer and more slender than the succeeding pairs, always with a longer narrower and subcylindrical dactylus (fig. 34*b*).

Genera : 1. *Harrovia;* 2. *Ceratocarcinus* (perhaps should be united with 1).

Genus HARROVIA Adams and White.

Harrovia purpurea nov. spec.

Material. — Sorong (New Guinea), 2-III-29, 1 ♂, holotype (carapace *l.* = 3.6, *b.* = 4.9 mm.).

Description. — *Carapace* flattened, pentagonal, with a short conical spine at junction of antero- and postero-lateral borders (fig. 35). Areolation fairly distinct but masked (1) by the setose covering and (2) by the underlying colour pattern (to be described later). The most prominent regions are the gastric which is faintly trilobed and the cardiac.

Rostrum very short, slightly convex and deflexed, double-edged, granulose; divided into two wide median and two narrow lateral (1) lobes. Antero-lateral border faintly trilobed.

Orbital hiatus wide, partially filled by the second antennal segment (fig. 33*d*); antennal groove very shallow as compared with that of *Harrovia albolineata* (*cf.* fig. 33*d* and *c*).

Appendages. Chelipeds much more massive than the walking-legs; right somewhat larger than the left which is represented in fig. 35; carpus unarmed.

First pair of walking-legs long and slender, reaching to about the middle of the palm of the cheliped; dactylus very long and almost circular in cross section (fig. 34*b*). The succeeding pairs shorter stouter and more compressed; dactyli subequal (fig. 34*c*), the third rather longer than the second pair. Apex of first pleopod as represented in fig. 34*a*.

Setae. A close felt of short clubbed brownish setae covers the entire dorsal surface with the exception of the granular antero-lateral and rostral edges. Seen from above under low magnification they are circular or oval in outline with a darker centre. The setae are continued on to the abdomen and thoracic sternum but become smaller on the ventral surface; setae are also present external to the base of each cheliped. Much shorter setae occur on the ventral margin and on the dactyli of each of the three posterior pairs of walking-legs (2-4); the distal half of the propodi and the dactyli also bear several rows of what appear to be short spines (fig. 34*c*).

(1) Orbital angle of Rathbun and equivalent to the antocular spine of Flipse.

Colour. When the setose felt is removed the carapace is seen to have a distinctive colour pattern which is indicated by heavy dotted lines in fig. 35. The antero-lateral and frontal margins are granular and whitish; the rest of the carapace is of a dark purplish colour broken by four irregular transverse bands of a much paler purple crossing the middle line; the paler colour is repeated round the postero-lateral and posterior margins.

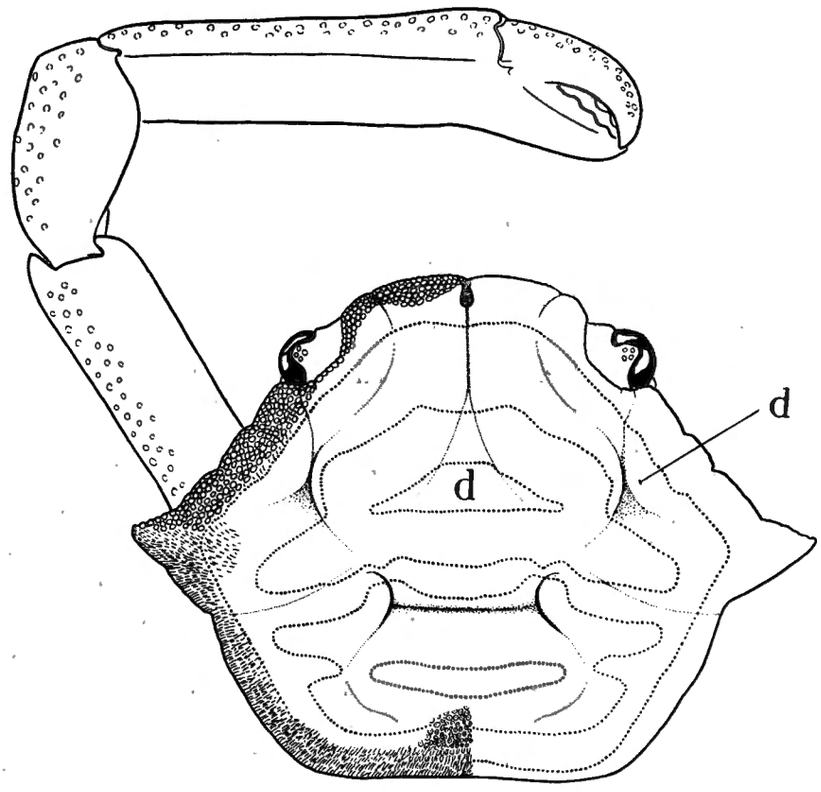

FIG. 35. — *Harrovia purpurea* n. sp. Holotype. — Dorsal surface of carapace and left cheliped. The short setose felt which covers the dorsal surface, with the exception of the granular antero-lateral borders and front, has been almost entirely omitted to show the colour pattern : × 20. *d*. Darker purple areas.

REMARKS. — This specimen differs from all the previously described species in having the lateral lobes (intra-orbital tooth, Flipse, p. 5, 1930) less advanced than the median frontal or rostral lobes (lateral rostral tooth, Flipse). In this respect it most nearly approaches *H. truncata* Rathbun (1906, p. 886, pl. XIV, fig. 8) which, however, has a much shorter cheliped, with armed carpus, conspicuous rounded lobulations on the dorsal margin of the propodus and carpus of each walking-leg and « two teeth of moderate size at the lateral angle » of the carapace.

Genus CERATOCARCINUS ADAMS and WHITE.

Ceratocarcinus longimanus ADAMS and WHITE.

ADAMS and WHITE, 1847, P. Z. S., p. 57.
ADAMS and WHITE, 1847, Ann. Mag. N. H., vol. XX, p. 62.
ADAMS and WHITE, 1848 « Samarang » Crustacea, p. 34, pl. VI, fig. 6.

MATERIAL. — Banda Neira, 24-II-29, 1 ♀.

FAMILY **MAIIDAE** ALCOCK.

SUBFAMILY **MAIINAE** ALCOCK.

Genus TIARINIA DANA.

Tiarinia angusta DANA.

DE MAN, 1902, p. 676.

MATERIAL. — Banda Neira, 24-II-29, 15 ♂, 8 ♀ (6 ovigerous).

SUBFAMILY **ACANTHONYCHINAE** ALCOCK.

Genus XENOCARCINUS WHITE.

ALCOCK, 1895, p. 191.

REMARKS. — While this genus has a very characteristic facies the variation in the specimens hitherto described has often been commented on. Laurie (1906, p. 371) stated that « no second example seems to have been described which is in agreement with White's « type »-specimen (female) of *X. tuberculatus*. He referred all the material (*X. conicus* A. Milne-Edwards, 1865, p. 144, excepted) to *X. tuberculatus* but recognised 3 varieties, var. *tuberculatus* represented by White's type, var. *depressus* and var. *alcocki*.

Recently Dr. Herklots presented to the British Museum an ovigerous female from Hong-Kong which agrees very closely with the type of *X. tuberculatus*, except that (1) the rostrum is relatively shorter and narrower (1) and (2) the

(1) $\frac{l.\ \text{of rostrum (to ant. border of orbit)}}{\text{total } l.\ \text{of carapace}} = \frac{7.5}{22.5} = \frac{1}{3}$ in type;

$= \frac{5}{18.9} = \frac{1}{3.8}$ in ♀ from Hong Kong.

suture between abdominal segments 3 and 4-6 is more distinct (1). It is doubtful whether any of the other specimens described as *X. tuberculatus* really belong to this species.

I have re-examined Miers' types of *X. depressus* and regard them as specifically distinct (see p. 72). The two specimens of *X. tuberculatus* described by A. Milne-Edwards (1872, p. 253) that I have examined and also the specimen from Murray Island (Calman, 1900, p. 34) (2) certainly belong to *X. depressus*.

I have also seen a cotype of *X. conicus* (= *Huenioides conicus* A. Milne-Edwards, 1865, p. 144); it is dried and mounted and the chelipeds are missing; the dactyli are more of the *tuberculatus* type but with fewer serrations on the ventral margin; the one or two teeth nearest the claw are much more prominent than in *X. tuberculatus*. It may be a distinct species.

Xenocarcinus depressus Miers.

X. depressus Miers, 1874, p. 1.

X. tuberculatus A. Milne-Edwards, 1872, p. 253, pl. XII, fig. 1.

X. tuberculatus Calman, 1900, p. 34.

X. tuberculatus Laurie, 1906, p. 371 in part (var. *depressus*).

Material. — Banda Neira, 24-II-29, 1 small ♀.

Description. — Outline of *carapace* as represented in fig. 36*a*, *b*, regions ill defined and the surface (rostrum excepted) beset with very low tubercles indicated rather diagrammatically in the figures. There are two rather distinct bands of a reddish brown colour on either side of the broad median greyish-white band (the latter enclosed by dotted lines in fig. 36*a*).

Rostrum a long broad beak, bifid at the apex and uniformly beset with a short dense fur; long curved somewhat club-shaped setae on apex (fig. 36*a*, *b*).

Appendages. Chelipeds and walkings-legs slightly nodular, especially on dorsal border of merus; the latter faintly mottled with the same reddish brown colour as on carapace. Chelipeds shorter and not much stronger than the first pair of walking-legs which exceed the rostrum by the length of the dactylus.

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(1) Alcock states « abdomen of the female is four-jointed, the 3rd-6th segments being fused together » (1895, p. 191). But in the type of *X. tuberculatus* there is a suture between segments 3 and 4-6, although the 3rd segment may not be freely movable; in the specimen from Hong Kong the 3rd segment would appear to be freely movable (see also, p. 72).

(2) Kindly lent by the authorities of the Paris Museum and the University of Dundee respectively.

The two terminal segments are represented in fig. 36*c*; the dactylus ends in a rather long claw and the ventral margin is armed with 3 or 4 short conical teeth in addition to a number of short spinose setae which tend to conceal the teeth. The second walking-leg is represented in fig. 36*d* showing the nodules on the merus and the teeth on the dactylus.

The first *abdominal segment* is free but segments 2-6 appear to move together although two faint suture lines are present between 2, 3 and 3, 4; the terminal segment is somewhat wider at the base than high.

The *pleopod* of the male (fig. 37*a*) terminates in a long slender stylus.

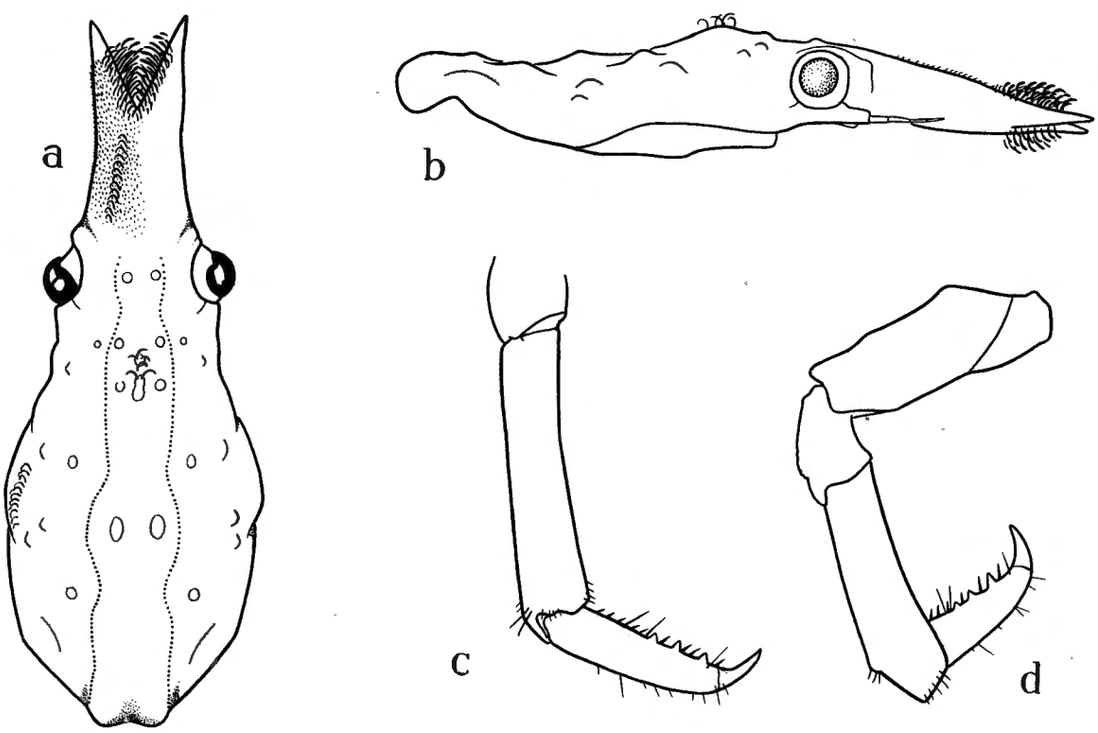

FIG. 36. — *Xenocarcinus depressus* MIERS. Female. — *a*. Carapace in dorsal, *b*. in lateral aspect. *c*. Propodus and dactylus of right first walking-leg (anterior aspect). *d*. Left second walking-leg (posterior aspect) : all × 20.

REMARKS. — The five cotypes of this species are still in the British Museum Collection but the two smallest specimens are badly damaged. The tubercles of the carapace of the largest (♀) specimen are more distinct than those represented in fig. 36*a*, *b*; there are a few additional ones on the raised gastric region. The walking-legs are considerably more nodular. The first three abdominal segments are distinct. The chelipeds of the male are more robust and the chela is similar to that figured by A. Milne-Edwards (1872, pl. XII, fig. 1*d*).

I regard these specimens as specifically distinct from *X. tuberculatus* (see above, p. 70) because (1) the profile of the carapace differs so markedly (*cf.* fig. 36 *b* with Miers, 1874 pl. II, fig. 1 *a*) and (2) the walking-legs are very different in the two, those of *X. tuberculatus* having no nodules on the merus,

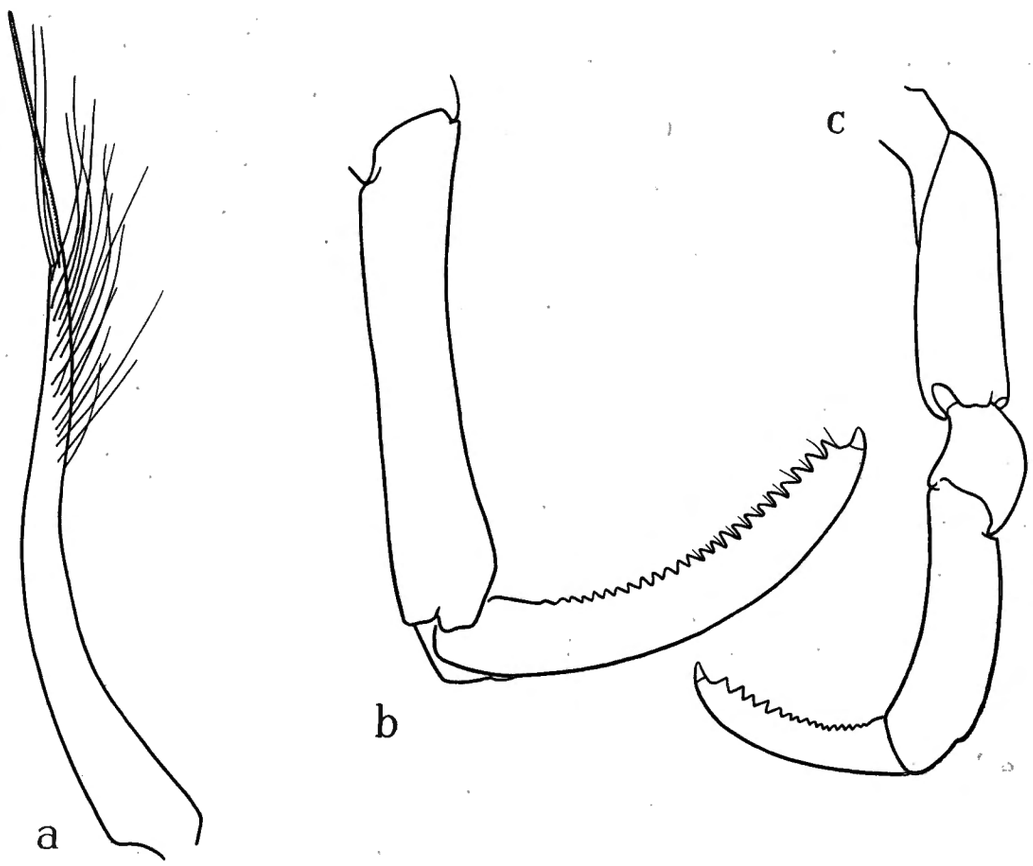

FIG. 37. — *Xenocarcinus depressus* MIERS. — *a*. First pleopod of male from Murray Island : × 47.
Xenocarcinus tuberculatus WHITE. Female from Hong-Kong. — *b*. Propodus and dactylus of right first walking-leg (anterior aspect) : × 15. *c*. Right second walking-leg (posterior aspect) : × 12.

much longer dactyli with numerous teeth or serrations on the ventral margin and short terminal claws (*cf.* fig. 36 *c*, *d* and 37 *b*, *c*).

Without a re-examination of Alcock's (1) material it is not possible to say to which, if either, of these two species it belongs. There is a small but distinct projection on either side of the carapace, a short distance behind the orbit, that

(1) 1895, p. 192 : *Illustrations Zool. Investigator, Crustacea VI*, 1898, pl. XXXIII.

is not found in the types of either species. From his figures the dactyli of the walking-legs would appear to be of the *tuberculatus* type but the meri are decidedly nodular.

OXYSTOMATA

Family **CALAPPIDAE** Alcock.

Genus CALAPPA Fabricius.

Calappa hepatica (Linn.).

Alcock, 1896, pp. 141 and 142.
Ihle, 1918, p. 183.

Material. — (No locality label), 1 ♂.

Genus MATUTA Fabricius.

Matuta banksi Leach.

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