

REPORT  
TO THE GOVERNMENT OF CEYLON  
ON THE  
PEARL OYSTER FISHERIES  
OF THE  
GULF OF MANAAR,

BY  
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WITH SUPPLEMENTARY REPORTS  
UPON THE  
MARINE BIOLOGY OF CEYLON,  
BY OTHER NATURALISTS.

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PART V.

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## PREFACE.

THIS Report on the Pearl Fisheries and Marine Biology of Ceylon has required a much greater expenditure of time and labour, and has extended to a greater length, than was contemplated at the outset. In the winter of 1901, it was supposed that about one year must elapse, after my return from Ceylon, before the Report could be completed, but the necessary work has occupied all my leisure for over four years, and I am painfully conscious that it is still unfinished—there are several matters I should like to have included, or to have followed up further, had time for investigation and funds for publication been less limited.

But this must be the final volume, and I wish now, in bringing the work to an end, to make use of this opportunity mainly for the purpose (1) of reiterating my thanks to many friends who have kindly helped me, (2) of correcting such errors and omissions\* in the former volumes as have come to my notice, and (3) of saying my final word as to the present position and future prospects of the pearl fisheries.

I have reluctantly come to the conclusion that an index to the five volumes is impracticable. If it contained all specific names it would be largely an unjustifiable repetition of our lists, and every Zoologist who consults the work will be readily able to find any desired species from the classifications given in the reports. It may, however, be some aid to the reader if I give here a scheme indicating in which Part each section of the subject and each special report will be found. The sections of the pearl-oyster report proper are arranged in chronological order, as that corresponds with the natural development of the subject, from preliminaries to final conclusions, and the special, or "supplementary," reports are placed in zoological order from the lowest groups to the highest, so that the position of each in the volumes can be ascertained from this list at a glance.

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\* If I may be allowed to offer the suggestion, I believe the most convenient form of reference to a species in one of these Supplementary Reports would be as follows:—*Spheroma walkeri*, STEBBING, in HERDMAN, 'Ceylon Pearl Fisheries,' Part IV., p. 31, Suppl. Rep. XXIII., "Isopoda," 1905.

No.	XXXIII.—On the Schizopoda and Stomatopoda . . . . .	Part V., p. 157.
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„	XV.—On the Marine Fishes . . . . .	„ II., p. 201.
„	XLI.—Discussion of Faunistic Results . . . . .	„ V., p. 433.

It has been my desire, so far as possible, to deposit the types of new species in the British Museum. In the case of some of the smaller forms the type specimens have become more or less used up in the process of examination, or exist only in the form of fragments on microscope slides or as sections. In other cases, the authors are still actively working at the groups in question, and it has been represented to me that the best interests of science would be served by allowing all the specimens to remain in their hands for the present. I have, however, already sent to the British Museum the types of new species, and, in some cases, representatives of additional species, in the following groups:—Echinodermata, Pantopoda, Hemiptera, Polyzoa, Cumacea, Amphipoda, Leptostraca, Schizopoda, Stomatopoda, and, in the case of other groups, the specimens are now in process of being picked out for packing and transmission.

I am very much indebted to my Zoological friends who have so ably helped me by taking charge of separate groups. The Supplementary Reports which they have contributed form a valuable body of information on the marine fauna of Ceylon which is indispensable in discussing any biological problems in that part of the Indian Ocean. A few corrections and additions kindly supplied by the authors will be found at the end of this volume.

I desire once more to acknowledge the very efficient help which I have received from Mr. JAMES HORNELL, F.L.S., both in the initial investigation and also during the production of this Report. Even after Mr. HORNELL ceased to be formally my assistant in the matter, and was appointed to a responsible post under the Ceylon Government, he continued to spare no pains to keep me fully informed of the changes in the condition of the pearl banks and to obtain any specimens or evidence that might be required to clear up points in doubt.

Since the last volume of this Report was issued, another very successful pearl fishery has been held at Ceylon. Over 67 millions of oysters were fished, and the total proceeds amounted to 1,385,000 rupees. This does not, of course, rival the great fishery of 1905 (when over eighty-one and a half millions of oysters were fished and the revenue brought in was upwards of two and a half millions of rupees), but it comes second on the list of recorded fisheries, and makes the fourth in successive years of a remarkable series—the most profitable pearl fisheries that, so far as is known, have ever been held.

As to the future, it seems probable that the remaining oysters on the Muttuvaratu Paar, along with the patches which are known to be on the Karativo Paar, on the Mid-west Cheval and on a new ground inspected by Mr. HORNELL, lying three to four miles N.N.E. of the Muttuvaratu, will suffice for a fishery of moderate dimensions in 1907. Then, in 1908, there should be a good fishery on the Mid-east Cheval, where there is now a healthy bed of two-year-old oysters, which was reinforced with 1000 tons of cultch last spring. After 1908 the prospects depend upon further careful scientific inspecting, transplanting and cultching, upon the lines which have been laid down in successive sections of this report.

It can scarcely be doubted that the aquicultural operations which have been commenced under the auspices of the Ceylon Government will be carried on vigorously by the Pearl Fishing Company to which the fisheries have now been leased. It must be a matter of congratulation to all concerned—to the Colonial Government, to the Company, and to men of science—that, in the terms of the lease, the necessity for a scientific treatment of the pearl banks during the next twenty years has been duly recognised and provided for.

After such treatment the property ought to be returned to the hands of the Government at the end of the period in a still more valuable condition than it is at present, and even if that were to be the only economic result of the present Report, those who have spent thought, time, and money in the investigation and the publication will be able to feel that their labour has not been in vain.

I cannot conclude without expressing my appreciation of the honour done me by the Royal Society in undertaking the publication of this Report, and I desire especially to thank those I have had to consult with at the Colonial Office, as well as the Officers and Staff at the Royal Society, for much kindly interest and consideration, for advice given and trouble taken during the progress of the work.

W. A. HERDMAN.

THE UNIVERSITY, LIVERPOOL.  
*September, 1906.*

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REPORT  
ON THE  
BRACHYURA

COLLECTED BY

PROFESSOR HERDMAN, AT CEYLON, IN 1902.

BY

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[WITH TWO PLATES AND TEXT-FIGURES.]

INTRODUCTORY.

THE collection comprises 208 species, of which 15 are described as new, and of the latter, three are referred to new genera. Of the three new genera, two are Xanthids (one a large crab which I place near to *Zozymus*—the other a curious little animal with a *Kraussia*-like carapace and a most remarkable hand); the third belongs to the interesting group of Rhizopinæ.

The new species belong to the following genera:—*Dromia* (1), *Tlos* (1), *Achæus* (1), *Halimus* (2), *Cryptopodia* (1), *Doclea* (1), *Actæa* (1), *Euxanthus* (1), *Neptunus* (2), *Pinnoteres* (1), and the three new genera, *Demania* (1), *Mertonia* (1), and *Calmania* (1).

Descriptions of some little known forms have been revised in the light of examples contained in the collection. Among these may be mentioned *Philyra adamsi*, about which there has been misunderstanding. Many of the species and even some of the genera in the collection are new to the India fauna, and the majority had not previously been recorded from the coast of Ceylon.

A matter of considerable interest—both general and systematic—is well illustrated among the Oxyryncha collected. I refer to the phenomenon which GEOFFREY SMITH has recently\* investigated very thoroughly in *Inachus scorpio* (= *dorsettensis*)

\* 'Mittheil. Zool. Sta. Neapel,' xvii., p. 312; see also H. A. HAGEN, "N. Amer. Astacidæ," in 'Ill. Cat. Mus. Comp. Zool. Harvard,' 1870; W. FAXON (1) 'Amer. Journ. Sci.,' xxviii., p. 42, and (2) 'Revision of the Astacidæ,' part i., 1885.

and termed by him facultative dimorphism. SMITH has shown that in males of this species there are at least two breeding periods ("low" and "high" respectively) characterised by well-developed secondary sexual characters, and that between these is intercalated a non-breeding phase ("middle") in which the secondary sexual characters are not evident. What SMITH has concluded for *Inachus scorpion* from statistical evidence, WALTER FAXON had found in a *Cambarus* reared by him in an aquarium. HAGEN had previously described two types of male *Cambarus* and considered them to be characteristic of different individuals, but FAXON, observing aquarium-kept animals, found that the two conditions detailed by HAGEN were alternate phases in the life-history of the same individual correlated with the breeding and non-breeding period respectively; the breeding male with pronounced secondary sexual characters changed by a moult to the non-breeding form with much resemblance to the young. A very beautiful example of facultative dimorphism is added to the above by a series of *Menathius monoceros* in the present collection. There is evidence that the same kind of thing is of wide occurrence amongst the Oxyrhynchs.

The importance of the matter for systematic zoology may be emphasised by reference to *Simocarcinus simplex* and *S. pyramidatus*, one of the very few differentia between which is the cheliped character—a difference for which the theory of facultative dimorphism offers an alternative explanation.

In working over a large collection of crabs, attention is constantly attracted by the considerable amount of growth and of correlation-change which commonly occurs after sexual maturity.

Certain contractions have been found convenient in the following pages:—

C. = carapace, Ch. = cheliped, W.L. = walking leg, F. = finger (dactylus of cheliped), H. = hand, l. = length, b. = breadth, Bord. = border, R. = rostrum. Unless otherwise stated, Ch.l. is measured along the morphological ventral border, and is the sum of (1) a straight line uniting the base of the appendage to the distal end of the merus, and (2) a straight line uniting the last-named point to the tip of the fixed finger. In Oxytomata it is measured along middle of posterior surface.

Measurements are in all cases given in millimetres.

Colonel ALCOCK'S "Materials for a Carcinological Fauna of India" is indispensable to the student of Indian crabs. I have followed him where possible in matters of nomenclature and classification.

Space forbids synonymies; I have in most cases made reference to one good account only of the species in question. A useful list of the literature will be found in KLUNZINGER (1906). The following contractions have been employed:—

A.1.—A.6. = ALCOCK, "Materials, &c.," No. 1—No. 6, in 'Journ. Asiat. Soc. Bengal, 1895 to 1900.



A. Cat. = ALCOCK, 'Cat. Ind. Decap. Crust. Ind. Mus.' Part I. Brachyura. Fasc. 1. Dromiacea, 1901.

A. Invest. = ALCOCK, "Crust." in 'Illusts. Zool. "Investigator."'

B.I.-B.XIII. = BORRADAILE'S Crust. in GARDINER'S 'Fauna, &c., Mald. and Lacc.'

N. = NOBILI, 'Bull. Sci. France et Belg.', vol. xl, 1906.

K. = KLUNZINGER, 'Spitz- u. Spitzmund-Krabben d. Rothen Meeres.' Stuttgart, 1906.

C. = CALMAN, 'Trans. Linn. Soc.', ser. 2, Zool., vol. viii., 1900.

H. = HENDERSON, 'Trans. Linn. Soc.', ser. 2, Zool., vol. v., 1893.

R. = RATHBUN, 'Bull. U.S. Fish. Comm. for 1903.'

My thanks are due in the first instance to Professor HERDMAN for entrusting to my examination this large and interesting collection. Much of the work has been done at the British Museum, and my indebtedness is great to Dr. CALMAN for the courtesy and kindness with which he has facilitated my work among the collections under his charge. Finally, I thank Miss WOODWARD for her excellent drawings and Mr. H. HERRING and Mr. W. J. DAKIN for valuable photographic aid.

## DESCRIPTION OF THE SPECIES.

### DROMIACEA.

#### *Dromia intermedia*, n. sp.

Locality:—Deep water off Galle, one specimen.

Description:—Female, non-ovigerous, but quite possibly mature.

C.l. 23·50, including frontal teeth.

C.b., 23·50, straight line uniting tips of last pair of antero-lateral teeth.

C.b., 23·00, straight line uniting tips of teeth immediately behind cervical groove.

W.L.2.l. 27·25, sum of dorsal borders of (1) meropodite and (2) the three distal segments together (9·0+18·25). W.L.3.l. 14·00 (5·5+8·5). W.L.4.l. 16·00 (7·0+9·0).

It agrees with ALCOCK'S description (A.5, p. 138; A. Cat., pl. ii, fig. 5) of *Dromia cranioides*, DE MAN, except in two very obvious particulars, in which it resembles *Dromia rumphi*, FABRICIUS, 1798 (A.5, p. 137; A. Cat., pl. ii, fig. 4), namely:—(1) Walking leg 4 but little longer than walking leg 3; (2) the sternal grooves of the female terminate on very prominent tubercles set well apart on anterior portion of segment of walking leg 1. A third difference from *D. cranioides* is that the spine on the distal end of the "posterior" border of the propodite of walking leg 4 is slender and only about  $\frac{1}{2}$  length of "anterior" spine (i.e., the one opposing the dactylopodite). There are on the same segment various smaller spinules.

*Dromidia unidentata* (RÜPPELL), 1830—A.5, p. 139; A. Cat., pl. ii, fig. 6.

Locality:—West of Periya Paar, Station LXIII., 17 to 24 fathoms, one specimen.

Description:—Ovigerous female, C.l. = 11·00; C.b. ÷ C.l. = 1·00.

The present example is about half the size of those recorded by ALCOCK, DE MAN, and HENDERSON.

*Dromidiopsis australiensis* (HASWELL), 1882—A. Cat., p. 76.

Localities :—Chilaw Paar, Station LXIX., 8 to 11 fathoms, one specimen (*a*); Jokkenpidi Paar, 10 fathoms, one specimen (*b*).

*Description* :—(*a*) Ovigerous female, agrees fairly well with ALCOCK'S description, C.l. = 16.50; C.b. ÷ C.l. = 0.97. (*b*) This is BORRADAILE'S var. *bidens*, 1903 (B.IX., p. 576), C.l. = 9.25; C.b. ÷ C.l. = 0.97.

*Cryptodromia canaliculata*, STIMPS., 1858—A.5, p. 142; A. Cat., pl. ii., fig. 8.

Locality :—Galle, one specimen.

*Description* :—Young male, C.l. = 4.25; C.b. ÷ C.l. = 1.12.

In this young specimen the second of the two teeth on the antero-lateral border of the carapace is represented by a bluntly angular lobe.

*Cryptodromia bullifera*, ALCOCK, 1899—A.5, p. 143; A. Cat., pl. ii., fig. 9.

Locality :—Cheval Paar, one specimen.

*Description* :—Young female, C.l. = 5.50; C.b. ÷ C.l. = 1.00.

*Cryptodromia demani*, ALCOCK, 1899—A.5, p. 144.

Locality :—Station LIV., 10 fathoms, south of Manaar Island, two specimens.

*Description* :—

	( <i>a</i> ) ovigerous female.	( <i>b</i> ) ad. non-ov. female.
C.l. . . . .	5.40	5.50
C.b. ÷ C.l. . . . .	1.02	1.04

I believe the present forms may be placed under the above species, which has not been hitherto figured. The characteristic dorsal hepatic tooth is weak in (*a*), a little more strongly developed in (*b*). The dactylopodite of walking leg 4 is apposed by a quite fairly developed spine of the propodite; the propodite of walking leg 3 bears a similar but smaller spine. A transverse groove runs behind the front and orbits. The sternal grooves end apart, without very obvious tubercles, just behind the segment bearing the chelipeds.

*Cryptodromia hilgendorfi*, DE MAN, 1887—A.5, p. 145; A. Cat., pl. iii., fig. 11.

Locality :—Mutwal Island, Station LXVI., 30 fathoms, one specimen.

*Description* :—Ovigerous female, C.l. = 14.50; C.b. ÷ C.l. = 1.03.

There is a slight indication of a second tooth on the antero-lateral border of the carapace, behind the tooth at the antero-lateral angle.

*Remarks* :—BORRADAILE has in his suggestive revision of the Dromiacea ('Ann. Nat. Hist.,' ser. 7, vol. xi., p. 299, 1903) included the present species in a new genus, *Dromides*. NOBILI (p. 93) criticises this genus

*Cryptodromia gilesi*, ALCOCK, 1899—A.5, p. 146; A. Cat., pl. iii., fig. 13.

Locality:—Gulf of Manaar, one specimen.

Description:—Male, C.l. = 8.25; C.b. ÷ C.l. = 1.03 (C.b. = straight line uniting tips of last antero-lateral teeth).

*Conchocetes artificiosus* (FABR.), 1798—A.5, p. 151; A. Cat., pl. iii., fig. 16.

Locality:—Trincomalee, three young specimens (a, b, c).

Description:—	(a)	(b)	(c)
C.l. . . . .	7.00	7.00	7.25
C.b. ÷ C.l. . . . .	—	0.96	0.96

Remarks:—New to the Ceylon fauna.

*Conchocetes andamanicus*, ALCOCK, 1899—A.5, p. 152; A. Cat., pl. iii., fig. 17.

Locality:—Pearl banks, Gulf of Manaar, one specimen.

Description:—Male, probably adult. C.l. (frontal teeth included) = 10.25; C.b. ÷ C.l. = 1.00.

It confirms ALCOCK's doubtfully created species, showing, however, certain additional points of difference from *C. artificiosus* not mentioned by ALCOCK:—(1) Prominent fringe of longish hairs on antero-lateral borders of carapace; (2) well-marked median longitudinal groove on anterior part of the carapace running back from notch between the frontal teeth (its length ÷ C.l. = 0.19); (3) the well-developed pair of frontal teeth more strongly deflexed; (4) sub-hepatic regions by no means so swollen, in correlation with which one finds that the antero-lateral border of the buccal cavern slopes downwards from the straight anterior border of the same region at a more obtuse angle (80° approximately instead of 65° approximately); (5) a kind of elongated tubercle occupies middle region of a not very well-marked ridge connecting lateral termination of cervical groove and antero-lateral angle of buccal cavern.

The specimen is protected by a *Pectunculus* valve.

#### OXYSTOMATA.

*Galappa lophos* (HERBST), 1785—A.2, p. 144.

Localities:—Trincomalee, one specimen (a); Gulf of Manaar, one specimen (b).

Description:—	(a) young female.	(b) young male.
C.l. . . . .	8.50	14.75
C.b. ÷ C.l. . . . .	1.26	1.36

Remarks.—Recorded as fossil by DE MAN from post-tertiary of Celebes ('Samm. Geol. Mus. Leiden,' (1), vii., p. 277, 1904).

*Galappa philargius* (LINNÆUS), 1764—A.2, p. 145.

Localities:—Gulf of Manaar, one specimen (a); Station I., off Negombo, one

specimen (*b*); pearl banks, Gulf of Manaar, four specimens (*a*, *d*, *e*, *f*); Galle, one specimen (*g*).

*Description*.—

	(a).	(b).	(c).	(d) young ♀.	(e) young ♀.	(f) young ♀.	(g) adult ♂.
C.l. . .	12.75	12.75	13.50	21.00	22.00	30.00	37.50
C.b. ÷ C.l.	1.25	1.25	1.27	1.32	—	1.38	1.44

Specimens (*f*) young female and (*g*) male answer well to ALCOCK'S description. In the young forms (*a* to *e*) the endostome septum is deeply concave anteriorly, and this is to be noted since the strongly convex character of this region is one of three characters by which ALCOCK distinguishes adults of *C. philargius* from those of *C. lophos*. A parasitic *Sacculina* is attached to the abdomen of (*g*) male ventrally, in the joint between somite VI. and the telson—it has not produced any obvious change of the secondary sexual characters.

*Calappa gallus* (HERBST), 1803—A.2, p. 146.

Localities:—Series (A)—Mutwal Island, Station LXVI., one specimen; south of Mudragam, one specimen; Chilaw Paar, Station LXIX., one specimen; coral reefs, Gulf of Manaar, two specimens; pearl banks, Gulf of Manaar, six specimens. Series (B)—Coral reefs, Gulf of Manaar, two specimens; pearl banks, Gulf of Manaar, eleven specimens; Gulf of Manaar and Palk Straits, three specimens; off Kaltura, Station XLIII., 22 fathoms, one specimen; west of Periya Paar, Station LXIII., 17 to 24 fathoms, two specimens; ten miles north of Cheval, one specimen.

The specimens fall into two morphological series (A and B) which differ in certain particulars. Members of both series are often obtained from the same locality. The figures of HERBST and of KLUNZINGER (K., pl. ii, fig. 14) answer in general to (A), and that of BRITTO CAPELLO to (B). The differences are as follows:—

*Rostrum*.—(A) Anterior border blunt and not at all or but little emarginate; indications of two blunt longitudinal ridges on ventral surface.

(B) General appearance more elegant; anterior border sharper and more definitely emarginate; longitudinal ridges of under surface are fairly sharp compared with (A).

*Teeth of hepatic region of antero-lateral border* small in (A); obsolescent in (B).

*Tubercles of Carapace*.—(A) The rounded tubercles tend to be rough and fairly prominent; the beaded squamiform tubercles occupy a good deal of posterior half of carapace, and they form lines which curve forward on the clypeiform expansions.

(B) Rounded tubercles smoother and more flattened; the beaded tubercles occupy a more limited region, and form lines which are approximately straight on the clypeiform expansions.

*Hepatic region* strongly concave in (A); slightly concave in (B).

*Hair*.—(A) Posterior border of carapace and of clypeiform expansions sparsely fringed; three characteristic tufts placed transversely on abdominal tergum II.; a

fringe on under surface of meropodite of walking leg 4. In (B) hair is absent in these regions.

*Post-cardiac transverse groove* slight but distinct in (A); absent in (B).

*Third tooth of clypeiform expansion*.—(A) Less acute than in (B); points obliquely forward; has anterior border  $\div$  posterior border = 0.54 (average of eight specimens).

(B) Acute; points laterally; has anterior border  $\div$  posterior border = 0.90 (average of nine specimens).

I do not suggest that the above distinctions would be absolute or their correlation perfect for a large series. This would be to separate series (B) as a species apart from *C. gallus*.

In the British Museum is a specimen (adult female, Philippine Islands, 43.6) which combines the (A)-type of front with the (B)-type of the other characters. Another unites the deep hepatic concavity of (A)-type with a more (B)-like front. BRITTO CAPELLO'S figure suggests that his specimen had rougher, more prominent tubercles than (B).

One of present series (B) has a line of hairs posteriorly as in (A) and traces of the same occur in three others.

It is best, I think, for the present, to consider the two groups as varieties which one may call:—(A), var. *gallus*, and (B), var. *capellonis*.

The best distinction between them is perhaps the shape and direction of the 3rd tooth of the clypeiform expansion, which may be expressed by index anterior border  $\div$  posterior border. Examination of this character in our series shows:—

Var. *gallus* . . . Mean = 0.54; range of variation = 0.50–0.55 (8 examples).  
 „ *capellonis* . . . „ = 0.90; „ „ = 0.83–1.07 (9 „ ).

Growth changes do not affect correlation much in these specimens:—

In var. *gallus*, 10 specimens considered (6 young + 4 adult).

	6 females (1 adult).	4 males (3 adult).
C.L. . . . .	9.00–31.50	10.25–33.25
C.b. <sub>1</sub> $\div$ C.L. . .	0.95–0.98	0.95–0.96
C.b. <sub>2</sub> $\div$ C.L. . .	0.81–0.86	0.78–0.85 (Index decreases with size).

Var. *capellonis*, 19 specimens (1 adult male).

	10 females.	9 males.
C.L. . . . .	7.25–25.75	8–33.25
C.b. <sub>1</sub> $\div$ C.L. . .	0.98–1.00	0.95–1
C.b. <sub>2</sub> $\div$ C.L. . .	0.79–0.88	0.74–0.90 (Index decreases with size).

(C.b.<sub>1</sub> = in front of clypeiform expansions. C.b.<sub>2</sub> = across 3rd tooth of clypeiform expansions.)

*Mursia bicristimana*, ALCOCK & AND., 1894—A.2, p. 150; A. Invest., pl. xxiv., fig. 5.

Locality:—Gulf of Manaar and Palk Straits, two specimens.

<i>Description</i> :—	C.l.	C.b. (in front of lateral spines) ÷ C.l.	Lateral spine l. (anterior border) ÷ C.l.
(a) Ovigerous ♀ . . . . .	17·00	1·21	0·22
(b) Adult ♂ . . . . .	17·25	1·22	0·22

The specimens are about one-third the size given by ALCOCK.

The hairs on outer parts of pterygostomian and subhepatic regions are not long, nor do they form a dense felt.

Length ÷ breadth of meropods of walking legs 1, 2 and 3 is only about 0·33 (*e.g.*, meropod W.L. 3 of (a) ovigerous female = 9·5 ÷ 3·15).

**Cryptosoma granulorum** (DE HAAN), 1835—A.2, p. 152.

Locality :—Aripu coral reefs, Gulf of Manaar, two specimens.

*Description* :—(a) Adult male, C.l. = 19·50; C.b. ÷ C.l. = 0·92.

The granular transverse ridge at distal end of arm bears 2 spines only.

*Remarks* :—Genus is new to Ceylon fauna.

**Matuta lunaris** (FORSK.), 1775—A.2, p. 160 (under *M. victor*, FABR.).

Locality :—Galle, one specimen.

*Description* :—Young female, C.l. = 38·50; C.b. (without spines) ÷ C.l. = 1·05; lat. spine l. (ant. border) ÷ C.l. = 0·28; frontal b. ÷ orbital b. = 1·10.

*Remarks* :—The *M. lunaris* of ALCOCK (A.2, p. 161) = *M. planipes*, FABR., 1798 (STEBBING, in 'Mar. Inv. S. Africa,' iv., 1905).

**Matuta miersi**, HENDERSON, 1886-87—A.2, p. 163.

Locality :—Gulf of Manaar and Palk Straits, two specimens (*a, b*); pearl banks, Gulf of Manaar, three specimens (*c, d, e*).

<i>Description</i> :—	(a) Young ♀.	(b) ad. ♀.	(c) ad. ♂.	(d) ad. ♂.	(e) ad. ♂.
C.l. . . . .	17·50	20·75	23·75	26·50	27·50
C.b. (without spines) ÷ C.l. . . . .	1·03	1·04	1·03	1·01	1·02
Front. b. ÷ orbit. b. . . . .	1·15	1·12	1·11	1·10	1·10
Lat. spine l. ÷ C.l. . . . .	0·17	0·14	0·11	0·17	0·12

**Cryptocnemus holdsworthi**, MIERS ('Trans. Linn. Soc.,' 1877, p. 241).

Locality :—Gulf of Manaar, two specimens.

<i>Description</i> :—	(a) ovigerous female.	(b) female.
C.l. . . . .	7·25	7·25
C.b. ÷ C.l. . . . .	1·38	1·48

The carapace outline of this species is subject to some variation. MIERS' specimen and the present ones are the only three recorded so far as I am aware. In treating this genus as non-Indian, ALCOCK overlooks MIERS' locality—Ceylon.

*Tlos havelocki*, n. sp.—Plate I, fig. 2, and text-fig. 1.

Locality :—Coral reefs, Gulf of Manaar, one specimen.

Description :—An adult male. C.l. = 5.75; C.b. ÷ C.l. = 1.48; Ch.l. ÷ C.l. = 1.09; arm l. (inner border of under surface) ÷ C.l. = 0.48; propus l. (lower border) ÷ C.l. = 0.61; F.l. ÷ H.l. (upper border) = 1.14. (Ch.l. is the sum of arm l. and propus l.)

Carapace broadly pentagonal—the front produced and strongly upturned and having its anterior border flattened and a little emarginate in the middle line—the antero-lateral and postero-lateral angles of the pentagon are rounded—the anterior sides concave—the lateral sides converge posteriorly a little—the posterior side is divided by two deep notches into three lobes which all project backwards to approximately the same level. The branchio-hepatic regions are concave and the post-cardiac region deeply so. There are two marginal sutures on each side—one supra-orbital, the other about midway between this and the antero-lateral angle. The margins of the carapace are a little thickened, a little upturned and bordered by enlarged granules as far forward as the more posterior pair of sutures—between the latter and the supra-orbital pair they are rounded and less distinctly granulated—the frontal margin is merely roughened. The true posterior border of the carapace and the surface rising vertically above it are covered with enlarged granules. A longitudinal ridge runs backward from the front to the cardiac region. The latter is prominent and is crowned by a transverse ridge uniting the anterior ends of a pair of very strongly developed, broad topped, granular ridges which run obliquely backward to be continued into the lateral margins at the postero-lateral angles of the pentagon. The rest of the dorsum of the carapace is smooth to the naked eye (seen under lens to be uniformly covered by obsolescent granules).



Fig. 1. *Tlos havelocki*, n. sp.

The pterygostomian region is prominent, its summit is forwardly directed and surmounted by a couple of granules. The exposed portions of the thoracic sterna are covered with enlarged granules—the rest of the under surface of the body, *i.e.*, pterygostomian, sub-hepatic, and sub-branchial regions, is smooth to the naked eye (obsolescently granular under lens).

The orbits are largely ventral. The eyes are visible in part only, in a dorsal view. Antennules not remarkable.

External maxillipedes with exposed surface roughened; not remarkable in form.

Chelipeds—Ch.l. ÷ C.l. = 1.48. The distal end of the arm is seen beyond the carapace (arm l. ÷ C.l. = 0.47). The arm is trigonal, with enlarged granules along its borders—its surfaces are smooth to naked eye (obsolescently granular under lens). Wrist rounded—its borders and much of its surfaces granular. Hand with outer and inner borders granular—under surface rounded and bearing granules which tend to run in rows, of which one curves downwards and outwards from the inner side of the proximal end to be continued along the whole under surface of the propus to the tip

of the fixed finger. The horizontal upper surface of the hand meets the oblique antero-inner surface at an angle, forming an oblique ridge crowned by a characteristic row of enlarged granules (six in this specimen). The inner surfaces of hand and fingers form together a hollowed area. The fixed finger is not constricted off from the hand and is much more massive than the dactylus. The upper surface of the dactylus is fluted—three granular ridges defining two grooves. There are two longitudinal rows of granules on the fixed finger. The distal two-thirds of the apposed border of either finger is flattened to form a facet which is bordered by a few very sharp denticles; the tip of each finger forms a curved tooth—that of the dactylus closes to the inner side of that of the fixed finger.

The meropodites of walking legs 2, 3, and 4 are concealed by the carapace; the succeeding three segments are short, so that by folding the legs at the joint between meropodite and carpopodite they may be entirely concealed from dorsal view. [The first walking legs are lost.] The basipodites and the three distal segments are granular. The meropodites are trigonal, their borders tend to be granular, and their surfaces smooth (obsolescently granular under lens)—the proximal one-third of the under surface occupies a different plane from the distal two-thirds, and is granular.

*Remarks.*—The new species is closely related to *Tlos petraeus*, A. MILNE-EDWARDS, 1874 (A.2, p. 176), but may be easily distinguished from it by the unbroken character of the oblique post-cardiac ridges. It differs further from *T. petraeus* in the following particulars:—(1) The front is more produced and more upturned; (2) the true posterior border of the carapace does not project further backward than the lobe on either side of it; (3) there are two marginal sutures only on each side; (4) there is a stronger contrast between the obsolescent granules of the general surface and the enlarged granules of special areas; (5) in the prominence of the pterygostomial region; (6) the orbits are less ventral; (7) sculpture of cheliped—in particular the presence of the oblique row of granules on the upper surface of the hand; (8) the facets on the apposed borders of the fingers.

*Tlos latus*, BORRADAILE, 1903 (B.VI, p. 437), differs in—(1) Absence of marginal sutures of carapace; (2) absence of oblique line of granules on upper surface of hand; and (3) isolation of lateral cardiac hump.

*Lithadia sculpta*, HASWELL, var. *aglypha*, nov.—Text-fig. 2.

\* Locality:—Coral reefs, Gulf of Manaar, one specimen.

*Description.*:—An immature individual. C.l. = 8.5.

It bears a considerable general resemblance to the already described form of *L. sculpta*, but differs from it in the following particulars:—(1) The carapace is broader in proportion to its length—C.b. ÷ C.l. = 1.26; (2) the two grooves which border the cardiac region laterally are not continued forward until they meet, but terminate apart in the middle region of the carapace; (3) there is a mere trace of an intestino-cardiac groove, quite different from the well-cut channels which the other



grooves present; (4) the granules on the arm and hand are not so sharp; (5) the strip of carapace cut off laterally by the skirting channel is narrower; between the slightly broadened portions which lie above the bases of cheliped and walking legs 1 and 3 it forms a quite thin ledge; (6) the sub-hepatic region is swollen, much as in *L. sculptus*, and the small tubercle at point of union of antero-lateral and postero-lateral borders is not double.

*Remarks.*—The single specimen is immature, but its order of size is much the same as that of a British Museum specimen of *L. sculpta*. This species is of rare occurrence. Only two other examples are known to me, from two localities (Arafura Sea and Eastern seas), but closely resembling each other, suggesting that variability may be low. The present form may turn out to be the representative of a new species.

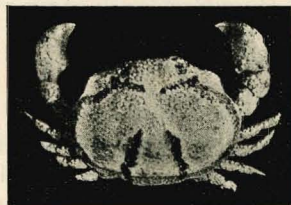


Fig. 2. *Lithadia sculpta*, var. *aglypha*, nov.

***Nursia plicata* (HERBST), 1804, nec auctorum—A.2, p. 180.**

Localities:—Adam's Bridge, one specimen (*a*); pearl banks, Gulf of Manaar, one specimen (*b*).

<i>Description</i> :—	C.l.	C.b. ÷ C.l.	Ch.l. ÷ C.l.	F.l. ÷ H.l.
( <i>a</i> ) adult ♂ . . .	10·25	1·27	1·63	0·55
( <i>b</i> ) adult ♂ . . .	12·50	1·20	1·72	0·54

In carapace length the posterior point is the indentation between the two posterior lobes. Carapace breadth measured by straight line uniting indentations between 2nd and 3rd lateral teeth of either side. In both specimens the greatest carapace breadth is given by a straight line uniting tips of 2nd lateral teeth of carapace—not 3rd pair as in *N. hardwicki*.

***Nursia hardwicki*, LEACH, 1817—A.2, p. 181.**

Localities:—Pearl banks, Gulf of Manaar, one specimen (*a*); Aripu Reef, one specimen (*b*); coral reefs, Gulf of Manaar, one specimen (*c*).

*Description* (C.l. and C.b. measured as in *N. plicata*):—

	C.l.	C.b. ÷ C.l.	Ch.l. ÷ C.l.	F.l. ÷ H.l.
( <i>a</i> ) ♀ . . . . .	10·25	1·15	1·51	0·61
( <i>b</i> ) ♀ . . . . .	10·75	1·12	1·49	0·56
( <i>c</i> ) ♀ . . . . .	11·00	1·11	1·50	0·55

The most anterior of the four antero-lateral teeth, just behind the marginal nodule, is quite conspicuous in (*a*), but only slightly developed in the other examples. In all the greatest carapace breadth is given by a straight line uniting tips of 3rd lateral teeth—not 2nd as in *N. plicata*.

*Ebalia diadumena*, ALCOCK, 1896—A.2, p. 187.

Locality:—Galle, two specimens.

<i>Description</i> :—		(a) young ♀.	(b) ♂.	Ch.l ÷ C.l . . . . .	(a) 1·37	(b) 2·00
C.l . . . . .	4·75	6·50	F.l ÷ H.l . . . . .	0·83	0·77	
C.b ÷ C.l . . . . .	1·05	0·96	H.b ÷ H.l . . . . .	0·83	0·69	

This is first record of male. It differs from ALCOCK's female (Palk Straits) in a few respects:—(1) the gastro-cardiac groove is hardly to be distinguished; (2) the cheliped granulation is not so extensive; (3) about middle of striation on upper surface of immobile finger is a prominent elongated laterally compressed granule; (4) abdominal tergum VI. is armed with strong terminal tooth.

*Ebalia maldivensis*, BORRADAILE, 1903—B.VI., p. 437, fig. 116.

Locality:—Gulf of Manaar, one specimen.

*Description*:—Ovigerous female, C.l = 5·75; C.b ÷ C.l = 1·13; Ch.l ÷ C.l = 1·22; F.l ÷ H.l = 0·75. The mounds on dorsum of carapace are all distinct.

*Myra*\* *fugax* (FABRICIUS), 1798—A.2, p. 202.

Locality:—Aripu coral reefs, Gulf of Manaar, three specimens (*b*, *d*, *f*); Trincomalee, five specimens (*a*, *c*, *e*, *g*, *h*); Galle, three specimens (*j*, *k*, *l*); off Manaar Island, one specimen (*i*).

<i>Description</i> :— <i>a-h</i> , young.								ovig.		ad.		ad.	
	<i>b</i> (♀)	<i>d</i> (♀)	<i>e</i> (♀)	<i>f</i> (♀)	<i>h</i> (♀)	<i>i</i> (♀)	<i>l</i> (♀)	<i>a</i> (♂)	<i>c</i> (♂)	<i>g</i> (♂)	<i>j</i> (♂)	<i>k</i> (♂)	
C.l . . . . .	9·00	12·00	12·25	12·50	17·00	18·00	26·00	8·75	11·50	16·50	19·00	24·75	
C.b ÷ C.l . . . . .	0·86	0·87	0·88	0·86	0·88	0·86	0·85	0·89	0·87	0·82	0·87	0·86	
Ch.l ÷ C.l . . . . .	1·69	1·79	1·79	1·76	1·98	1·86	2·12	1·83	1·85	1·95	2·33	2·38	
H.l ÷ C.l . . . . .	0·39	0·44	0·47	0·42	0·51	0·47	0·58	0·46	0·46	0·51	0·62	0·65	
F.l ÷ H.l . . . . .	0·93	0·86	0·78	0·90	0·80	0·79	0·77	0·81	0·86	0·68	0·74	0·72	
H.l ÷ H.b . . . . .	2·29	2·50	2·87	2·50	2·69	2·67	3·16	2·09	2·62	2·83	3·36	3·56	

Ch.l is the sum of lengths of its segments, measured along median line of posterior surface. C.l is without the spine.

Among the adult specimens considered to be mature, the sexual dimorphism in regard to cheliped length is by no means so marked as ALCOCK records.

In one specimen the more acutely bidentate and upturned front is somewhat reminiscent of *M. brevimana*. It has also a well-marked median longitudinal carina.

Specimen (*i*), an ovigerous female, is an interesting form which deserves note. It tends to combine characters of *M. fugax*, *M. affinis*, and *M. brevimana*. In slender build of chelipeds and in index F.l ÷ H.l it resembles *M. fugax*. In indices Ch.l ÷ C.l and H.l ÷ C.l it more nearly approaches *M. affinis* and *M. brevimana*. The prominence

\* Miss RATHBUN unites this genus with the older genus *Persephona*, LEACH, 1817.

of the upper hepatic tooth is much as in *M. affinis*; the *Leucosia*-like front approximates to that of *M. brevimana*. The specimen is conveniently put under *M. fugax*.

Specimens (*d*) and (*f*) are young forms which may perhaps be put with specimen (*i*).

*Myra affinis*, BELL, 1855—A.2, p. 205.

Locality:—Pearl banks, Gulf of Manaar, five specimens (*g, h, i, j, l*); Coral reefs, Gulf of Manaar, four specimens (*a, d, f, k*); Trincomalee, three specimens (*b, c, e*); off Mutwal Island, one specimen (*m*).

Description:—*a-k*, young

	<i>a</i> (♀)	<i>c</i> (♀)	<i>d</i> (♀)	<i>f</i> (♀)	<i>h</i> (♀)	<i>i</i> (♀)	<i>j</i> (♀)	<i>k</i> (♀)	<i>l</i> (♀)	ad. <i>b</i> (♂)	ad. <i>g</i> (♂)	ad. <i>m</i> (♂)
C.l. (spine).	7.50	11.25	11.50	12.50	16.50	18.75	19.00	19.75	24.00	8.00	15.75	26.75
C.b. ÷ C.l.	0.93	0.89	0.87	0.88	0.84	0.88	0.86	0.86	0.87	0.91	0.86	0.86
Ch.l. ÷ C.l.	1.50	1.49	1.46	1.50	1.51	1.56	1.53	1.57	1.74	1.53	1.54	1.91
H.l. ÷ C.l.	0.40	0.40	0.39	0.40	0.42	0.44	0.42	0.43	0.49	0.41	0.45	0.56
F.l. ÷ H.l.	0.67	0.67	0.67	0.65	0.61	0.61	0.62	0.65	0.60	0.69	0.57	0.53
H.l. ÷ H.b.	2.00	2.00	2.00	2.00	2.15	2.20	2.13	2.12	2.14	2.17	2.34	2.50

Among the small specimens there is a marked tendency to possession of an additional postero-lateral pair of small spicules, a carina, an intestinal granule, and several enlarged antero-lateral denticles. A similar tendency is found in the small young placed under *M. fugax* and *M. brevimana*.

Specimen (*m*) male is large. Its C.l. is only 0.25 millim. less than that of NOBILI'S (p. 95) large specimen, but it by no means approaches the latter in cheliped length or in length of hand. It is indeed but little different from ALCOCK'S smaller specimens in Ch.l. ÷ C.l., though in H.l. ÷ C.l. it exceeds his measurement (NOBILI'S specimen, C.l. = 27.0; Ch.l. = 7.0; H.l. = 2.0). Measurements taken as in *M. fugax*.

*Myra brevimana*, ALCOCK, 1896—A.2, p. 206; A. Invest., pl. xxix., fig. 8.

Locality:—Aripu-coral reefs, Gulf of Manaar, four specimens (*a, b, d, h*); off Kaltura, four specimens (*c, e, f, i*); off Galle, two specimens (*g, j*); Trincomalee, one specimen.

Description:—

	yg. <i>b</i> (♀)	yg. <i>c</i> (♀)	ad. <i>d</i> (♀)	ov. <i>h</i> (♀)	ad. <i>i</i> (♀)	ad. <i>j</i> (♀)	ad. <i>e</i> (♂)	ad. <i>f</i> (♂)	ad. <i>g</i> (♂)
C.l. (spine).	9.50	12.50	16.50	18.50	22.00	25.50	16.00	17.75	18.25
C.b. ÷ C.l.	0.87	0.84	0.83	0.84	0.84	0.84	0.84	0.85	0.79
Ch.l. ÷ C.l.	1.53	1.60	1.67	1.70	1.76	1.75	1.91	1.85	1.88
H.l. ÷ C.l.	0.34	0.38	0.41	0.43	0.43	0.43	0.48	0.45	0.47
F.l. ÷ H.l.	1.00	0.95	0.89	0.84	0.89	0.86	0.77	0.84	0.82
H.l. ÷ H.b.	1.86	1.90	2.08	2.14	1.89	1.84	2.21	2.00	2.00

Variability in size of adults is high. The two smallest specimens have a few scattered hairs. There is a suggestion in the adults of sexual dimorphism as regards

cheliped length. Specimen (*h*), though female, has well-marked spinule on penultimate abdominal tergum. Measurements taken as in *M. fugax*.

*Myra darnleyensis*, HASWELL, 1879—A.2, p. 207.

Localities :—Aripu coral reefs, Gulf of Manaar, four specimens; pearl banks, three specimens.

*Description* :—There are in all considerable traces of the “cruciform constellation” of five enlarged granules on centre of dorsum of carapace. This is evidently not confined to females and young males, as it occurs in an adult male from “pearl banks.”

*Leucosia obtusifrons*, DE HAAN, 1841—A.2, p. 216.

Localities :—Aripu coral reefs, Gulf of Manaar, two specimens (*a*, *b*); off Kaltura, one specimen (*c*).

*Description* :—

	( <i>a</i> ) young ♂.	( <i>b</i> ) young ♂.	( <i>c</i> ) adult ♂.
C.l. . . . .	12.75	17.25	25.00
C.b. ÷ C.l. . . . .	0.90	0.91	0.92
Ch.l. ÷ C.l. . . . .	1.10	1.20	1.45

In addition to the two pairs of white gastric spots characteristic of the species there is a third pair of quite small but otherwise similar ones, anteriorly. In specimen (*a*) young male all these spots are faintly ringed and a pair of postero-lateral orange spots is present also.

*Leucosia longifrons*, DE HAAN, 1841—A.2, p. 217.

Localities :—Trincomalee, two specimens (*a*, *b*); pearl banks, Gulf of Manaar, one specimen (*d*); Station I., off Negombo, one specimen (*c*); Aripu Reef, one specimen (*e*).

*Description* :—

	( <i>a</i> ) young ♀.	( <i>b</i> ) young ♂.	( <i>c</i> ) young ♀.	( <i>d</i> ) young ♀.	( <i>e</i> ) adult ♀.
C.l. . . . .	17.00	17.50	17.50	17.75	26.00
C.b. ÷ C.l. . . . .	0.85	0.87	0.87	0.87	0.87

Specimen (*c*) young female comes under var. *pulcherrima*. Specimens (*a*) young female and (*b*) young male show some tendency to vary in the direction of the same variety (anterior half of carapace is slightly punctate); propodites of walking legs carinate dorsally and tend to be so ventrally also, each of the posterior two of the six spots of gastric shoe is surrounded by red rings.

On the other hand, var. *neocalidonica* characters are hinted at in specimens (*d*) young female and (*e*) adult female, where in addition to dorsal and ventral carination of propodites of the walking legs, common to *pulcherrima* and *neocalidonica*, the chelæ and walking legs have a tendency to the granulation of the latter variety. Thus in (*e*) adult female the wrist has trace of the three granules, the meropodite of walking leg 1 has traces of one dorsal and one ventral row, and that of walking leg 2 has traces of one dorsal row of granules.

*Leucosia urania*, HERBST, 1801—A.2, p. 220.

Locality :—Galle, one specimen.

Description :—Young male, C.L. = 17.00; C.b. ÷ C.L. = 0.84.

A series in the British Museum links this specimen with the adult form, from which latter it differs in certain points :—(1) fingers are crenulate in their distal half only; (2) hand is cristate on both borders (the lower crest is crenulate—the crenulations swollen into granules).

*Leucosia cumingi*, BELL, 1855—A.2, p. 226.

Locality :—Coral reefs, Gulf of Manaar, one specimen.

Description :—Ovigerous female, C.L. = 13.00; C.b. ÷ C.L. = 1.04.

*Leucosia hematosticta*, ADAMS and WHITE, 1848—A.2, p. 229.

Localities :—Aripu coral reefs, Gulf of Manaar, two specimens (b, c); Station I., off Negombo, one specimen (a).

Description :—

	(a) male.	(b) ovigerous female.	(c) ovigerous female.
C.L.	9.75	13.00	13.50
C.b. ÷ C.L.	0.97	1.00	0.98

*Leucosia pubescens*, MIERS, 1877—A.2, p. 233.

Localities :—Galle, one specimen; pearl banks, Gulf of Manaar, three specimens; coral reefs, Gulf of Manaar, three specimens.

In an ovigerous female, C.L. = 18.50.

*Philyra platychira*, DE HAAN, 1841—A.2, p. 242.

Localities :—Coral reefs, Gulf of Manaar, four specimens; pearl banks, three specimens; Trincomalee, three specimens; Welligam Bay, two specimens; Galle, six specimens.

An indication of sexual dimorphism is given by index Ch.l. ÷ C.L. :—

For 12 adult males this has mean value 2.32 and range of variation 2.23–2.40.

“ 4 „ females „ „ 1.83 „ „ 1.67–1.92.

To this difference all the segments of the cheliped contribute. Thus

	Arm I. ÷ C.L.	Wrist I. ÷ C.L.	HL. ÷ C.L.	FL. ÷ C.L.
Male means . . . . .	0.93	0.32	0.60	0.47
Female means . . . . .	0.71	0.26	0.51	0.35

All have some very fine granulation on the posterior and lateral regions of the dorsum of the carapace—the specimens from “Coral reefs, Gulf of Manaar,” have in addition some rather large scattered granules on the lateral region.

Some of the specimens fall under KLUNZINGER'S var. *bidentata* (K., p. 72).

*Philyra adamsi*, BELL, 1855 ('Trans. Linn. Soc.,' xxi, p. 301)—Plate I, fig. 1.

Localities:—Pearl banks, Gulf of Manaar, two specimens; coral reefs, Gulf of Manaar, four specimens, including (b); Galle, seven specimens, including (a).

Description:—	C.I.	C.b. ÷ C.I.	Ch.l. ÷ C.I.	H.l. (upper border) ÷ C.I.	Fixed finger (inner border) ÷ C.I.
(a) Ovigerous ♀ . . . . .	8·00	1·02	1·60	0·34	0·26
(b) Adult ♂ . . . . .	9·00	1·03	2·10	0·46	0·36
(c) BELL's "type," ♂ . . . . .	9·00	1·03	2·25	0·50	0·39

I have compared the specimens with BELL's "type" preserved in the British Museum, and they agree well with it.

BELL's figure gives an inadequate, and in some respects erroneous, idea of his specimen. HENDERSON amends BELL's description (H., p. 400), but omits reference to any hepatic facet, the presumed *absence* of which has been lately emphasised by NOBILI (N., p. 104). In re-figuring BELL's specimen I emphasise (1) general shape of front; (2) presence of a small median frontal tooth, at lower level than rest of front; (3) details of hepatic facet; (4) two tubercles on hand at base of fixed finger; (5) proportions of buccal cavern; (6) exognath of external maxilliped.

*Remarks*:—ALCOCK omits this species from his key, observing that it appears to him to be rather a *Pseudophilyra*. It is indeed intermediate in many ways, e.g.: (1) production of front; (2) general proportions of buccal cavern; (3) shape of exognath of external maxilliped. But in all these particulars it bears considerable resemblance to *Philyra platychira* and to *Ph. granigera*, NOBILI, 1906 (N., p. 102, pl. vi, fig. 30), both of which it further resembles in the presence of the hepatic facet and of the longitudinal grooves of the carapace (the latter more as *P. granigera* than *P. platychira*). It must be placed in the same genus with these, and all three fall under section I.2.1 of ALCOCK's key of *Philyra*.

*Ph. adamsi* is at once distinguished from *Ph. platychira* by the entire sub-orbital border of the endostome and by the characters of hand and fingers.

It is more closely allied to *Philyra granigera* than NOBILI imagined, since it has in reality a hepatic facet. It differs from *Ph. granigera* in possessing:—(1) line of granules on upper border of inner surface of hand and wrist; (2) the distinct granule on upper surface of hand proximal to base of fixed finger (tendency for a second, less distinct granule just distal to the distinct one); (3) the small median frontal tooth.

*Philyra globosa* (FABR.), 1787—A.2, p. 243.

Localities:—Trincomalee, one specimen (immature male); Galle, two specimens (adult females).

*Pseudophilyra tridentata*, MEERS, 1879—A.2, p. 250.

Locality:—Pearl banks, Gulf of Manaar, five specimens (a, b, c, d, e).

Description:—	(a) ad. ♂.	(b) ad. ♂.	(c) ad. non-ov. ♀.	(d) ovig. ♀.	(e) ovig. ♀.
C.I. . . . .	5.00	5.00	5.50	6.00	6.00
C.b. ÷ C.I. . . .	0.85	0.90	0.86	0.92	0.92
Ch.l. ÷ C.I. . . .	1.60	1.60	1.45	1.50	1.46
F.l. ÷ H.l. . . .	0.50	0.50	0.50	0.54	0.54
H.b. ÷ H.l. . . .	0.50	0.50	0.50	0.54	0.54

The specimens are much smaller than those in the Indian Museum from Persian Gulf. The length of the first pair of walking legs exceeds that of the arms by about the last segment only, as NOBILI (N., p. 105) found in his Persian Gulf specimens. H.b. ÷ H.l. is of same order as ratio recorded by NOBILI and by CALMAN (C., p. 28).

There is no distinct abdominal tooth in the males; just a slight convexity in (a) adult male, more marked in (b) adult male.

*Pseudophilyra melita*, DE MAN, 1888—A.2, p. 253.

Localities:—Trincomalee, six specimens; coral reefs, Gulf of Manaar, one specimen; pearl banks, Gulf of Manaar, four specimens.

Description:—*d, g, h, j*, adult.

	(a) yg. ♂.	(c) yg. ♂.	(d) ♂.	(g) ♂.	(h) ♂.	(j) ♂.	(b) yg. ♀.	(e) ♀ ov.	(f) ♀ ov.	(i) ♀ ov.	(k) ♀ ov.
C.I. . . . .	8.75	9.50	9.75	10.25	12.75	13.50	9.00	9.75	10.00	13.00	13.75
C.b. ÷ C.I. . . .	0.88	0.89	0.87	0.88	0.90	0.89	0.92	0.90	0.92	0.88	0.91
Ch.l. ÷ C.I. . . .	1.94	1.89	1.87	1.93	1.90	1.96	1.67	1.67	1.67	1.71	1.71
H.b. ÷ H.l. . . .	0.50	0.48	0.50	0.50	0.52	0.50	0.53	0.53	0.50	0.52	0.50

Sex difference negligible in C.b. and in H.b., but marked in Ch.l.

C.b. ÷ C.I. . . .	Mean adult ♂ = 0.89;	range of variation ♂ = 0.87–0.91
	♀ = 0.90;	♀ = 0.88–0.92
H.b. ÷ H.l. . . .	♂ = 0.50;	♂ = 0.50–0.52
	♀ = 0.51;	♀ = 0.50–0.53
Ch.l. ÷ C.I. . . .	♂ = 1.91;	♂ = 1.87–1.96
	♀ = 1.69;	♀ = 1.67–1.71

*Heterolithadia fallax* (HENDERSON), 1893—A.2, p. 261.

Localities:—Pearl banks, Gulf of Manaar, two specimens (a, e); coral reefs, Gulf of Manaar, two specimens (b, d); Trincomalee, one specimen (c).

Description:—	(a) young ♂.	(b) young ♂.	(c) ovigerous ♀.	(d) ♀.	(e) ovigerous ♀.
C.I. . . . .	9.00	11.25	13.00	15.00	17.50
C.b. ÷ C.I. . . .	1.06	1.02	1.04	1.03	1.03
Ch.l. ÷ C.I. . . .	1.58	1.53	1.50	1.43	1.44
F.l. ÷ H.l. . . .	1.50	1.47	1.45	1.40	1.48
H.b. ÷ H.l. . . .	0.75	0.73	0.66	0.70	0.70

The gastro-cardiac groove is very inconspicuous in all.

*Arcania quinquespinosa*, ALCOCK and ANDERSON, 1894—A.2, p. 266.

Locality:—West of Periya Paar, 17 to 24 fathoms, one specimen.

Description:—Adult female, C.L. = 11·00 (includes frontal lobes, but not posterior spine); C.b. (without spines) ÷ C.L. = 1·05; lateral spine l. ÷ C.L. = 3·41; Ch.l. ÷ C.L. = 2·23; F.l. ÷ H.l. = 1·50. The pair of postero-lateral granules is present.

*Arcania erinaceus* (FABRICIUS), 1787—A.2, p. 268.

Localities:—Pearl banks, Gulf of Manaar, two specimens (*a*, *c*); coral reefs, Gulf of Manaar, one specimen (*b*).

Description (measurements as in *A. quinquespinosa*):—

	( <i>a</i> ) young ♀.	( <i>b</i> ) ad. ♂.	( <i>c</i> ) ad. ♀.
C.L. . . . .	13·25	18·50	18·75
C.b. ÷ C.L. . . . .	0·87	0·84	0·88
Ch.l. ÷ C.L. . . . .	1·55	1·57	1·49
F.l. ÷ H.l. . . . .	0·73	0·59	0·61

A difference between the adult male and the adult female above is the presence in the latter of a median longitudinal line of hair on the ischium of the external maxilliped.

*Arcania tuberculata*, BELL, 1855—A.2, p. 268.

Locality:—Pearl banks, Gulf of Manaar, two specimens (*a*, *b*).

Description:—	C.L.	C.b. ÷ C.L.	Ch.l. ÷ C.L.	F.l. ÷ H.l.
( <i>a</i> ) ovigerous ♀ . . . .	9·50	0·89	1·18	0·77
( <i>b</i> ) ovigerous ♀ . . . .	10·25	0·88	1·17	0·85

*Arcania pulcherrima*, HASWELL, 1879—A.2, p. 269.

Localities:—Trincomalee, one specimen (*a*); coral reefs, Gulf of Manaar, one specimen (*b*).

Description:—	C.L.	C.b. ÷ C.L.	Ch.l. ÷ C.L.	F.l. ÷ H.l.
( <i>a</i> ) young ♂ . . . . .	8·00	1·09	2·06	0·82
( <i>b</i> ) ovigerous ♀ . . . . .	10·75	1·09	2·16	0·77

There are in both specimens 14 tubercles on the dorsal surface of the carapace in addition to the 10 marginal prominences.

*Ixa cylindrus* (FABRICIUS), 1787—A.2, p. 271.

Localities:—Aripu Reef, one specimen (*a*); pearl banks, Gulf of Manaar, one specimen (*b*).

Description (lateral spines included in C.b.):—	( <i>a</i> ) ad. ♂.	( <i>b</i> ) ad. non-ov. ♀.
C.L. . . . .	14·50	16·75
C.b. ÷ C.L. . . . .	2·83	2·88



*Dorippe dorsipes* (LINNÆUS), 1764—A.2, p. 277.

Localities :—South end of Cheval Paar, two specimens; Pearl banks, Gulf of Manaar, six specimens; Coral reefs, Gulf of Manaar, five specimens; Galle, one specimen.

*Description* :—There are no ovigerous females; probably none of the females are adult. Of the males perhaps two or three of the largest specimens are adult. The largest male has C.L. = 23.50, *i.e.*, two-thirds measurement given by ALCOCK for large male. In the smallest specimens (C.L. = 8.50 and 9.00) the spine at outer angle of orbit falls far short of level of frontal teeth; it nearly reaches it in larger specimens; in the largest of all (C.L. = 23.50) it quite does so. In ALCOCK's still larger specimens it projects beyond the frontal teeth. In an immature male (C.L. = 12.00) from "Pearl Banks, Gulf of Manaar," there is on abdominal tergum IV. a small acute tubercle on either side of the larger median tubercle. The hands are still symmetrical in a male whose C.L. = 18.00.

*Dorippe facchino* (HERBST), 1785—A.2, p. 278.

Locality :—Pearl banks, Gulf of Manaar, two specimens.

<i>Description</i> :—	C.L.	C.h. ÷ C.L.	2nd W.L. ÷ C.L.	2nd W.L. ÷ 4th W.L.
(a) Young male . . .	10.25	1.10	3.25 (approx.)	2.50 (approx.)
(b) " " . . .	10.25	1.12	—	—

In neither does the spine at the external orbital angle project so far forward as the level of the frontal teeth. They are less hairy than ALCOCK describes for the adult; hair is entirely absent from walking legs 1 and 2. In this respect they suggest the specimens included by ALCOCK as "*D. granulata*, DE HAAN" (A.2, p. 279).

*Raninoides serratifrons*, HENDERSON, 1893—A.2, p. 293.

Localities :—South of Galle, deep water, three specimens; west of Periya Paar, 17 to 24 fathoms, four specimens.

*Description* :—All are apparently immature. C.L. ranges from 6.50 to 15.25.

#### OXYRHYNCHA.

*Achsus lacertosus*, STIMPSON, 1857—A.1, p. 172.

Localities :—Aripu coral reefs, Gulf of Manaar, two specimens (adult ♂); pearl banks, Gulf of Manaar, one specimen (adult ♂).

*Description* :—C.L. (exclusive of rostrum) of an adult male = 11.00.

*Achsus dubia*, n. sp.—Text-fig. 3.

Localities :—Pearl banks, Gulf of Manaar, four specimens (*a, d, f, g*); Chilaw Paar, one specimen (*e*); west of Periya Paar, 17 to 24 fathoms, one specimen (*b*); off Negombo, Gulf of Manaar, one specimen (*c*).

<i>Description</i> :—	(a) ad. ♂.	(b) ov. ♀.	(c) ov. ♀.	(d) ov. ♀.	(e) ov. ♀.	(f) ov. ♀.	mean ov. ♀.
C.l. . . . .	10·25	8·75	9·00	10·00	10·00	11·00	9·75
Rostrum l. ÷ C.l. . . . .	0·20	0·17	0·14	0·15	0·19	0·18	0·19
C.b. ÷ C.l. . . . .	0·78	0·86	0·75	0·82	0·87	0·84	0·83
Anten. flag. l. ÷ C.l. . . . .	0·83	—	0·67	—	0·75	0·75	0·72
Post. bord. C. ÷ C.l. . . . .	0·32	0·46	0·42	0·45	0·45	0·45	0·45
Arm. l. ÷ C.l. . . . .	0·78	0·51	0·44	0·50	0·55	0·50	0·50
Wrist. l. ÷ C.l. . . . .	0·59	0·37	0·32	0·37	0·40	0·36	0·37
H.l. (up. bord.) ÷ C.l. . . . .	0·73	0·37	0·33	0·37	0·40	0·36	0·37
H.b. ÷ C.l. . . . .	0·36	0·11	—	0·11	0·12	0·11	0·11
F.l. ÷ C.l. . . . .	0·54	0·40	0·36	0·42	0·47	0·41	0·41
W.L. 1. Isch. l. ÷ C.l. . . . .	0·39	0·34	0·31	0·30	0·35	0·32	0·32
„ Merop. l. ÷ C.l. . . . .	2·10	1·46	1·31	1·47	1·70	1·36	1·46
„ Carp. l. ÷ C.l. . . . .	0·93	0·70	0·61	0·70	0·75	0·64	0·68
„ Prop. l. ÷ C.l. . . . .	2·00	1·49	1·39	1·42	1·72	1·45	1·49
„ dact. l. ÷ C.l. . . . .	—	—	0·97	—	—	1·05	1·01

The division between carapace and rostrum is taken to be a line uniting the anterior borders of the orbits; C.b. = a straight line uniting points above base of W.L.1 of either side, which is the region of greatest breadth; posterior border of carapace = a straight line uniting points behind the lateral tubercles of the posterior border; cheliped segments and segments of W.L.2 are measured along upper edge.

*Description of Ovigerous Female (f).*—Carapace sub-triangular, the postero-lateral angles well rounded, and the posterior border concave. The rostral lobes appear to the naked eye to be united to form a single short median dorsally grooved and bluntly

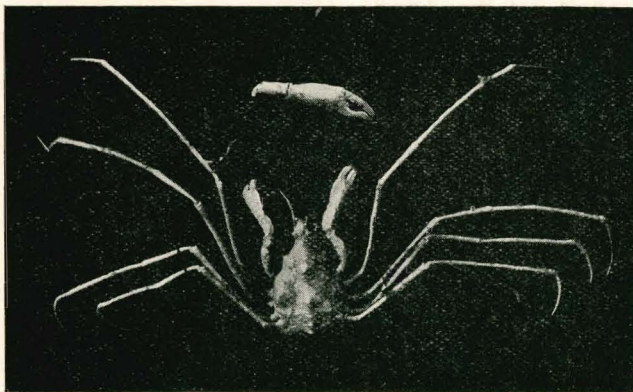


Fig. 3. *Acheus dubia*, n. sp.

pointed projection which reaches forward about as far as the distal end of the first joint of the antennal flagellum. The carapace is narrowed laterally behind the eyes. There is a post-hepatic constriction due to the branchio-cardiac groove. The greatest breadth is in the region above the first pair of walking legs. The regions of the carapace are distinct. The carapace armature consists of (1) tubercles, (2) straight hairs, (3)

hooked hairs. The general surface beneath the hairs is smooth; of the tubercles two at once attract the eye—a large conical gastric one and a still larger one on the cardiac region. The tubercles are in detail:—3 gastric, arranged in form of a triangle, of which the two anterior ones, forming the base, are inconspicuous, while the median posterior one is that already mentioned—1 cardiac (median), the

largest on the animal and already mentioned—3 branchial (paired), of which one is lateral while the other two are dorsal, and so placed that a straight line uniting them would on being produced anteriorly pass between the antero-lateral gastric tubercle of the same side and the median gastric tubercle—2 hepatic tubercles (paired), a larger one below and to the outer side of a smaller—1 sub-hepatic (paired)—1 buccal, *i.e.*, the produced antero-external angle of the buccal cavern (paired)—1 pre-buccal tubercle (paired), quite small, just anterior to and a little above the buccal tubercle, its apex points downwards and outwards—finally, 1 at either end of posterior margin of the carapace. The buccal, the sub-hepatic, and the lateral branchial tubercles on either side are united by a low ridge forming an approximately straight line.

The upper margin of the orbit is smooth, there is no dorsal spine in this region.

The sternal surface is devoid of spinules.

Each tubercle tends to be crowned by one or two hairs of the straight variety. A dorso-lateral longitudinal row of hooked hairs is conspicuous on the branchial regions of either side; it commences on the region above the base of walking leg 3 and runs forward below the two dorsal branchial tubercles. On the anterior half of the carapace the hooked hairs are numerous and tend to run in lines which converge anteriorly.

The abdomen has in both sexes six divisions, somite VI. and telson being as usual fused. On its tergal surface are both straight and hooked hairs.

The basal antennal joint is smooth and fixed, being fused distally to the front. The antennal flagellum is fringed feather-wise with long straight hairs.

In the external maxillipeds the inner edge of the ischium and of the merus is fringed with long straight hairs. The inner edge of the ischium is finely toothed and its exposed surface tends to be roughened (under lens); the roughening is most marked along two slight longitudinal carinae which border a somewhat V-shaped median longitudinal depression. The merus also is grooved longitudinally.

In the chelipeds the under border of the ischium and of the merus, and the upper and under borders of the laterally compressed hand, are carinate and finely denticulate; the denticulation is continued along the proximal half of the under border of the fixed finger. The rest of the cheliped is smooth. The fingers are strongly incurved and are apposable throughout their length. Long straight hairs fringe the upper and under borders of all the cheliped segments. Hooked hairs are arranged in a median longitudinal row on the outer surface of the arm; they occur also on the lower part of the outer surface of the wrist and on the upper portion of the outer surface of the hand.

The dactylopodites of walking legs 3 and 4 are slightly falciform, the curve strongest proximally. The walking legs possess some long scattered straight hairs. A row of hooked hairs is present on the upper border of all the segments of all the walking legs except the dactylopodites of the last two pairs.

Variation among the ovigerous females concerns (1) the size but not the number of

the tubercles of the carapace; (2) the measurements, as given above; (3) the extent to which, if at all, the rostral lobes are apposed. Though all appear apposed to the naked eye, variation is seen by aid of a lens. In (*a*) and (*c*) they are apposed throughout their length, in (*d*) and (*f*) they are apposed distally, but are separated proximally by a narrow space, and in (*b*) and (*e*) they are separate throughout their whole length.

In the single male specimen the cardiac tubercle is, as in the females, the largest; but the median gastric and the posterior branchial tubercle of either side are all of approximately the same size, the former being relatively smaller and the latter relatively larger than in the female specimens. All the segments of the cheliped are longer and more swollen than in the females; their denticles are present, very small and set well apart. The fingers are apposable distally for rather less than half their length, a hiatus being left proximally, which is more or less bridged by a couple of blunt teeth, one near the base of each finger, that of dactylus distal to the one on the fixed finger.

I judge *Achæus dubia* to be closely allied to *A. tenuicollis*, differing from it mainly in the following particulars:—(1) Neither tubercles, rostral lobes, chelipeds, nor sternal surface bear spinules; and (2) Character of rostral lobes.

The rostral lobes are noteworthy. They are more sharply pointed than one expects in *Achæus*, making an approach thus to *Stenorhynchus*, e.g., *S. rostratus*, where they are shorter than usual. The essential distinction hitherto recognised between *Achæus* and *Stenorhynchus* has been that in the former the rostrum consists of two short lobes, and in the latter of two long spines.

**Paratymolus hastatus**, ALCOCK, 1895—A.1, p. 174; A. Invest., pl. xviii, fig. 4.

Locality:—Gulf of Manaar, six specimens (three adult males, one young male, and two adult females, one ovigerous).

Description:—C.l. (exclusive of rostrum) of an ovigerous female = 5·25.

In the above females the genital orifices are, as in ALCOCK's specimen, on the sternum, not on the bases of the 3rd pair of walking legs.

Remarks.—ALCOCK observes that the position of the genital orifices of the female as above confirms ORTMANN's view that the correct place for this genus is among the *Achæus*-like *Maiidæ*.

**Oncinopus aranea**, DE HAAN, 1837—A.1, p. 183.

Localities:—Trincomalee, one specimen (ovigerous ♀); pearl banks, two specimens (adult ♂ and ovigerous ♀); coral reefs, Gulf of Manaar, three specimens (ovigerous ♀, adult ♂, and young ♂); south of Galle, deep water, one specimen (with *Sacculina*).

Description:—C.l. (including rostrum) of an ovigerous female = 8·50.

Remarks.—One of the ovigerous females which bears a parasitic *Sacculina* retains the usual broad female type of abdomen, and its abdominal appendages are also well developed.

*Camposcia retusa*, LATREILLE, 1829—A.1, p. 184.

Locality:—Pearl banks, Gulf of Manaar, one specimen.

*Description*:—Male, apparently adult, C.l. = 23·50. It has the broad sternum (KLUNZINGER, pl. i., fig. 1) and slender cheliped described for males of this species, giving them a curiously female appearance. The sternum, though broad in the male of this species, is not so broad as in the female.

*Apocremnus indicus*, ALCOCK, 1895—A.1, p. 188; A. Invest., pl. xx., fig. 1.

Localities:—Coral reefs, Gulf of Manaar, sixteen specimens; south of Galle, deep water, six specimens; Gulf of Manaar, deep water, three specimens.

*Description*:—In an ovigerous female C.l. (excluding rostrum) = 7·00. A gastric spinule is present—this is figured by ALCOCK, but omitted from his description.

A post-ocular spinule is figured by ALCOCK in his ventral view of the male, but is said by him in his description to be absent. The description—not the figure—is correct for the present specimens.

There is evidence in the present specimens that the male of this species is facultatively dimorphic. The series includes what I believe to be examples of young, non-breeding, and breeding males—the latter I judge to be of the “low” type.

*Xenocarcinus tuberculatus*, WHITE, 1847, var. *alcocki*, nov.—A.1, p. 192.

Locality:—Dutch Modragam Paar, one specimen.

*Description*:—An ovigerous female. C.l. (excluding rostrum) = 12·50; Rost.l. ÷ C.l. = 0·32. The present specimen agrees with A. MILNE-EDWARDS' fig. 1 ('Archiv. du Mus.', viii., 1872, p. 253, pl. xii., figs. 1 to 1g) in character of its legs, and is fairly intermediate in carapace-character between this and WHITE'S “type”-specimen in British Museum which is figured by MIERS ('Zool. Erebus and Terror,' Crust., p. 1, pl. ii., figs. 1 to 1e). It thus agrees in general appearance with ALCOCK'S figure of a specimen from Andamans or from Ceylon, but the rostrum is narrower anteriorly and so more conical. A close examination of the carapace surface reveals some obsolescent tubercles in the position of those seen in A. MILNE-EDWARDS' fig. 1, but are not sufficiently developed to affect the general appearance, which is due rather to nine swellings as in WHITE'S “type”-specimen; they are not, however, so strongly developed, so conical, nor so pointed as in the latter, and in particular the gastric and cardiac eminences are very ill-developed.

*Remarks*.—No second example seems to have been described which is in agreement with WHITE'S “type”-specimen (female) of *X. tuberculatus*. I have examined the five British Museum specimens from Cape Howe, for which MIERS created *X. depressus* in 1874 (reference as above), and find that they come into the series figured by A. MILNE-EDWARDS; one of them in particular is well represented by his fig. 1. CALMAN states (p. 34) that his Murray Island male is in fair agreement with the same figure.

I should recognise a single species within which are (1) a group including specimens figured by A. MILNE-EDWARDS, MIERS' five *X. depressus* specimens from Cape Howe, and CALMAN'S male from Murray Island. This I name var. *depressus*. (2) A group including ALCOCK'S two female examples from Ceylon and Andamans (A. Invest., pl. xxxiii., fig. 3), and the present specimen, also a female. This group is intermediate between (1) and (3). I name it var. *alcocki*. (3) WHITE'S female "type" specimen figured by MIERS, which stands alone. It is characterised among other ways by having its gastric tubercle transversely divided. This I name var. *tuberculatus*.

*Huenia proteus*, DE HAAN, 1837—A. 1, p. 195.

Localities:—Aripu coral reef, two specimens (*g, m*); Chilaw Paar, one specimen (*a*); Cheval Paar, Gulf of Manaar, nine specimens (*h, e, d, b, i, l, n, o, k*); Jokkenpidi, three specimens (*c, f, j*); Navakaddu Paar, one specimen (*p*). (*o* and *p* adult.)

Description:—		Males. ( <i>k</i> ).									
		( <i>k</i> ).	( <i>l</i> ).	( <i>m</i> ).	( <i>n</i> ).	( <i>o</i> ).	( <i>p</i> ).				
C.l.		12.50	14.00	14.75	18.75	20.50	24.75				
R.l. ÷ C.l.		0.36	0.43	0.41	0.40	0.45	0.41				
Ch.l ÷ C.l.		—	0.82	—	—	1.14	1.05				
Propus l. ÷ C.l.		—	0.36.	—	—	0.50	0.46				
		Females.									
		yg. ( <i>a</i> ).	ov. ( <i>b</i> ).	yg. ( <i>c</i> ).	ov. ( <i>d</i> ).	ov. ( <i>e</i> ).	ov. ( <i>f</i> ).	ov. ( <i>g</i> ).	ad. ( <i>h</i> ).	ov. ( <i>i</i> ).	ov. ( <i>j</i> ).
C.l.		13.25	14.25	14.50	14.50	16.50	20.00	20.50	21.25	21.25	21.50
R.l. ÷ C.l.		0.32	0.32	0.33	0.29	0.32	0.32	0.33	0.31	0.33	0.30
Ch.l ÷ C.l.		—	0.81	—	0.79	0.77	0.76	0.79	0.79	0.78	0.82

The kind of alga carried by the animal varies. In (*a*), which is described by a label as a "green crab tinted similarly to the green alga on which it was found," it is a large piece of foliaceous Halimeda, while in (*e*) it is a branch of filamentous alga.

The hepatic lobes of the female may be horizontal as in (*e*), or they may curve considerably upward as in (*h*). Between these limits the other specimens may be arranged in a good connecting series.

The border of the hepatic lobe of the female is in some entire, in others irregular.

In all the males there is a pair of small transversely placed tubercles in front of the anterior median elevation. This is present also in ovigerous female (*f*), and a trace appears in ovigerous female (*i*).

The carapace-outline of all the males except (*p*) agrees with ADAMS and WHITE'S fig. 4 ("Samarang" Crust., pl. iv., fig. 4). Specimen (*p*), which is the largest male in the collection, more resembles DE HAAN'S fig. 5 of the larger form (Crust. in 'Faun. Japon.', pl. xxiii., fig. 5), but the anterior border of the epibranchial lobe slopes obliquely backwards, and in the same crab the upper border of the hand and wrist is strongly carinate, and on the upper, under, and outer surfaces of the arm are a few distinct short blunt spines.

In the two largest males Ch.l. ÷ C.l. is rather more than 1, instead of rather less as

ALCOCK describes. There is a difference between the sexes in rostral length. Thus the measurements show that for 6 males the mean value of R.l.  $\div$  C.l. = 0.41, and range of variation = 0.36–0.45. For 10 females the corresponding figures are 0.32 and 0.29–0.33. Neither the slight variation among the female nor the considerable variation among the male specimens seems to be particularly associated with growth.

*Simocarcinus simplex* (DANA), 1852, var. *pyramidatus*, nov.—A.1, p. 196.

[*Huenia hellerii*, PAULSON, 'Crustacea of the Red Sea' (Russian), Kiev, 1875, p. 8, pl. iii, figs. 2a to c.] *Trigonothir pyramidatus*, KLUNZINGER, p. 19, pl. i, figs. 3 to 3g.

Localities:—Jokkenpiddi Paar, three specimens (*a, b, d*); south end of Cheval Paar, one specimen (*e*); coral reefs, Gulf of Manaar, one specimen (*f*); pearl banks, Gulf of Manaar, four specimens (*g, h, i, j*); off Mutwal Island, one specimen (*c*).

Description:—

	In present collection.				<i>S. simplex</i> in British Mus.				
	(a)ad. ♂.	(b)ad. ♂.	(c)ad. ♂.	(e).	(m)♂.	(n)♂.	(o)ad. ♀.	(p)ad. ♀.	(q)ad. ♀.
C.l.	16.00	16.00	12.25	14.00	15.50	13.50	14.75	12.00	12.00
R.l. $\div$ C.l.	0.95	0.87	0.98	0.57	0.32	0.41	0.20	0.33	0.31
C.b. $\div$ C.l.	0.86	0.91	0.82	0.89	0.97	0.93	0.95	1.00	1.00
Inter-orb. b. $\div$ C.l.	0.25	0.25	0.29	0.30	0.26	0.30	0.27	0.29	0.29
Ch.l. $\div$ C.l.	1.97	1.95	1.65	1.19	1.68	1.43	—	1.19	1.12
W.L.1.1. $\div$ C.l.	2.42	—	2.27	2.05	1.94	1.87	—	—	1.75
W.L.2.1. $\div$ C.l.	1.12	—	1.12	—	1.16	1.09	1.00	1.12	1.17
W.L.4.1. $\div$ C.l.	0.83	0.95	—	—	0.85	0.85	0.86	0.98	0.96

All the specimens have three tubercles on the gastric region of the carapace; they are somewhat blunter in the female than in the male.

The rostrum exhibits variability in several respects: (1) In its length, as above; (2) it may be straight or curved, in the latter case the concavity is below; (3) it may arise from the front of the carapace in such a way as to continue the general horizontal plane of the dorsal surface of the carapace, or it may rise upwards somewhat and make an obtuse angle with that plane. In one male the rostrum is straight and its plane horizontal; in two males it is curved and makes an obtuse angle with the post-rostral carapace.

The hands of one male are massive, with fingers which are only apposable at their tips, and which are, when so apposed, separated at the base by a considerable space; in two other males the hands are slender and the fingers when apposed distally are almost in contact basally.

A lobe is present in all the specimens on either side of the posterior border of the carapace. The size of the lobes is intermediate between those of dried specimens of *S. simplex* in the British Museum and HELLER's figure of *pyramidatus*.

The eye is much as in the British Museum specimens of *simplex*, i.e., less prominent than in DANA's figure. In each of the three females which I place with the above males there is a pair of hepatic lobes,

*Remarks.*—The present specimens form a group which I believe breaks down the distinction between *Simocarcinus simplex* (DANA), 1852, and *S. pyramidatus* (HELLER), 1861. As set forth by ALCOCK, the characters by which the former is distinguished from the latter are (1) the much shorter rostrum of the male; (2) the presence of three tubercles, disposed in a triangle, on the gastric region; (3) the larger and more prominent eyes; (4) the absence of the lobule on either side of the posterior border of the carapace; (5) the much more massive chelipeds of the male.

In the first place, I may remark that the only other specimen which appears to agree with the single one for which HELLER created *pyramidatus* is the male described by ALCOCK. I have examined MIERS' specimens of *S. simplex* in the British Museum and find that, though they are evidently *S. simplex* in the narrower sense of the term, they show two points of difference from DANA's figure which diminish the value of distinctions (3) and (4) above. There is in each of them a lobe at either end of the posterior border (it is distinct, though not so large as in HELLER's figure of *S. pyramidatus*), and in all the males the eyes are less prominent than in DANA's figure. This doubt cast upon the value of distinctions (3) and (4) is confirmed by the present specimens (see description above). The fifth distinction seems, in view of the evidence of the specimens in the present collection, to be one between young and adult males or between non-breeding and breeding adults. There is, however, some difference between the massive chela of male specimens (a) and (b) of the present examples and that of the British Museum male (m); this may or may not be a difference associated with high and low males respectively. Of ALCOCK's two remaining distinctions, (1) and (2), each specimen of the present group unites the three gastric tubercles of *S. simplex* with the long rostrum of *S. pyramidatus*. CANO ('Boll. Soc. Nat. Napol.' iii, 1889, p. 173) describes an animal with a similar combination and unites the two species. More recent writers have not followed him, and KLUNZINGER (p. 19) describes a similar male as *pyramidatus*. The additional evidence confirms CANO.

It is difficult to estimate the value of the character rostrum-length referred to above. It holds excellently as between the present individuals and the specimens labelled *S. simplex* in the British Museum (see measurements above); but in KLUNZINGER's figure the index  $R.L. \div C.L.$  seems to be about 0.62, and HENDERSON describes his specimens as *simplex*, but with longer rostrum. The high variability of this character in *S. camelus*, KLUNZINGER (1906, pl. i, figs. 2a-g), is to be borne in mind. A further point of difference between my specimens and the British Museum examples of *S. simplex* is the greater length of the first pair of walking legs in the former (see measurements above, under  $W.L.1.1. \div C.L.$ ). The present forms and all those with the three gastric tubercles I name var. *pyramidatus*.

I consider that MIERS' distinction between *Simocarcinus* and *Trigonothir* (the latter genus formed for a single male specimen) must be given up. The slender cheliped of the latter is better considered as the character of a young or of a non-breeding



individual. The rostrum is stouter, more swollen and more clumsy in *Trigonothir* than in *Simocarcinus simplex* (includes *S. pyramidatus*) and *S. camelus*, but it is essentially the same otherwise. In all these its under surface is flattened proximally, while distally it is concave and produced into lateral carinæ; and its apex tends to be three-lobed, the lobes set at angles of 120° (very approximately) to each other. I have seen no specimens of *Simocarcinus* with the laterally compressed acute rostrum given by MIERS as a generic character. KLUNZINGER (p. 18) revises MIERS' definition of *Trigonothir*, transferring to it the species *pyramidatus*. As a new generic character he gives the absence of hepatic lobes in the female. The evidence of the present specimens confirms me in doubting the validity of this. As another new generic distinction he points out that in *Trigonothir* the chelipeds of the adult male are unequal. With the additional evidence available to me, I would suggest that this inequality—observed only in a single example (KLUNZINGER, pl. i., fig. 3)—is due to regeneration. I unite *Simocarcinus* and *Trigonothir* under the name of the former and for the present distinguish this genus from *Huenia* by two characters:—

- (1) Pre-ocular spine. This is present in *Huenia*, absent in *Simocarcinus*.  
 (2) Rostrum. In *Huenia* this is sharp-edged below and has an acute tip; in *Simocarcinus* it has a flattened under surface which tends to be concave distally, where its lateral edges are produced—the tip of the rostrum tends to be trilobed.

*Menæthius monoceros* (LATREILLE), 1825—A.1, p. 197.

Localities:—Cheval Paar, Gulf of Manaar, seven specimens (*h, f, g, &c.*); Aripu coral reefs, ten specimens (*c, a, e, i, &c.*); off Mutwal Island, eight specimens (*j*); Jokkenpiddi Paar, two specimens (*b, d*); Navakaddu Paar, one specimen.

Description:—

Males.	(a).	(b).	(c).	(d).	(e).	(f).	(g).	(h).	(i).	(j).
C.L.	6·00	7·00	7·50	9·25	9·50	9·75	10·25	12·00	14·25	15·00
R.L. ÷ C.L.	0·58	0·50	0·37	0·49	0·55	0·51	0·51	0·66	0·72	0·77
Ovig. females.	(k).	(l).	(m).	(n).	(o).	(p).	(q).	(r).	(s).	
C.L.	9·75	9·75	9·75	10·25	10·75	12·00	12·25	13·25	13·50	
R.L. ÷ C.L.	0·32	0·49	0·51	0·59	0·44	0·50	0·43	0·43	0·50	

The first three of the above males are young; there is evidence in the collection that this is a species showing facultative dimorphism.

The specimens show considerable variation in number of tubercles on dorsal surface of the carapace and in the teeth of the lateral border. The majority resemble the variety figured by DANA as *Menæthius sub-serratus* rather than any other variety. Some tend to combine the characters of two or more of DANA's figures, e.g., of the three specimens from Cheval Paar, one agrees fairly with the figure of *M. sub-serratus*, while the other two agree with this figure in character of lateral teeth, but more resemble that of *M. angustatus* in tuberculation. The two specimens from Jokkenpiddi agree fairly with DANA's figure of *M. tuberculatus*.

Variability of rostrum-length is high. Thus for eight ovigerous females the index R.l. ÷ C.l. has mean value = 0.47, and range of variation from 0.32 to 0.59. For the ten males of various ages the corresponding figures are 0.57 and 0.37-0.77.

Specimen *s* (female) stands apart from the others and makes some approach to *Huenia proteus* in the character of its last pair of walking legs. These are comparatively smooth and expanded, and obvious teeth are absent from the dactylopodite. This specimen also has dorso-lateral hepatic swellings.

*Acanthonyx macleayi*, KRAUSS, 1843—A.1, p. 199.

Locality:—Cheval Paar, Gulf of Manaar, one ovigerous female, C.l. = 12.50.

*Halimus pleione* (HERBST), 1803—A.1, p. 208.

Localities:—Pearl banks, Gulf of Manaar, two specimens (ovigerous ♀ *a*, *c*); off Mutwal Island, two specimens (ovigerous ♀ *b* and young ♂ *d*).

Description:—	(a) ovigerous ♀.	(b) ovigerous ♀.	(c) ovigerous ♀.	(d) young ♂.
C.l.	17.00	20.00	23.00	11.00
C.b. ÷ C.l.	0.75	0.75	0.78	0.80
R.l. ÷ C.l.	[—]	0.37	0.31	0.41

In the immature male the rostral spines lie in an approximately horizontal plane; in the three ovigerous females they continue the downward anterior slope of the gastric region of the carapace.

*Halimus hilgendorfi* (DE MAN), 1888—A.1, p. 209.

Localities:—Pearl banks, Gulf of Manaar, sixteen specimens (including *d* and *f*); Aripu coral reefs, Gulf of Manaar, eighteen specimens (including *a*, *b*, *c*, *g*, and *e*); off Mutwal Island, two specimens (*h*, *i*).

Description:—	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
	ov. ♀.	ov. ♀.	ov. ♀.	ov. ♀.	ad. ♂.	ad. ♂.	ad. ♂.	ad. ♂.	ad. ♂.
C.l.	11.50	13.50	14.00	16.50	12.50	12.50	13.50	14.50	15.00
Rost. spine l. ÷ C.l.	0.32	0.44	0.41	0.25	0.52	0.56	0.52	0.52	0.55
D. tips R.sp. ÷ C.l.	0.20	0.33	0.30	0.23	0.42	0.28	0.40	0.34	0.47

The above measurements give an indication of the high variability of the length, and degree of divergence, of the rostral spines. Both the characters named are sexually dimorphic.

A sexual difference is also shown in carapace length.

*Halimus spinosus* (A. MILNE-EDWARDS), 1872—A.1, p. 211.

Locality:—Aripu coral reefs, Gulf of Manaar, three specimens (two young ♀ and young ♂).

Remarks.—I unite *H. consobrinus*, A. MILNE-EDWARDS, and *H. spinosus* specifically. The slight points of difference are that in the former (1) the anterior angle of the

supra-ocular eave is hardly so much produced; (2) the two gastric spines are not so long; (3) the intestinal tubercle is but slightly represented. The present examples belong to the *consobrinus* variety.

*Halimus convexus* (MIERS), var. *hendersoni*, nov.

Localities:—Coral reefs, Gulf of Manaar, two specimens (ovigerous ♀ and young ♂); west of Cheval Paar, two specimens (young ♂); Cheval Paar, three specimens (young ♀).

Description:—C.L. of the ovigerous female = 10·50.

They differ from MIERS' form ("Alert" Expedition, p. 196 and figure) in having (1) an epibranchial tubercle on either side; (2) the carapace regions less strongly demarkated and less convex; (3) the rostral spines less divergent, straighter and shorter.

Remarks.—The specimens agree with the two dried ovigerous females from Penang in the British Museum, with which HENDERSON (p. 344) describes his Martaban example as almost identical. There is thus a group with a fairly wide distribution which differs from MIERS' form in certain definite respects: I call it var. *hendersoni*.

This variety bears a suspiciously close resemblance to descriptions and figures of *Halimus sub-inermis* (ZEHNTNER) ('Revue Suisse de Zool.', ii, p. 136, pl. vii, figs. 2, 2a), and to *Halimus espinosus*, BORRADAILE (p. 688, pl. xlvii, fig. 4). I have not seen specimens of either of these species. The main difference from *Halimus espinosus* seems to be the form of the rostral spines. I should be inclined to merge both in *Halimus convexus* (MIERS).

*Halimus brocki* (DE MAN), 1887 ('Arch. f. Naturges.', liii, p. 22).

Locality:—Off Mutwal Island, one specimen.

Description:—A male, perhaps adult. C.L. (measured anteriorly to the angle between the rostral spines) = 9·50; rostral spine l. ÷ C.L. = 1·0.

The rostral spines diverge less in their distal than in their proximal portions.

*Halimus agassizi*, RATHBUN, 1902—'Bull. Mus. Comp. Zool.' xxxix., p. 133, fig. 6.

Localities:—Pearl banks, Gulf of Manaar, one specimen (a); off Mutwal Island, one specimen (b); pearl banks, off Manaar, one specimen (c).

Description:—	(a) ovig. ♀.	(b) ovig. ♀.	(c) ad. ♀.
C.L. . . . .	8·50	6·00	6·50
R.l. ÷ C.L. . . . .	—	0·58	0·54

In specimen (a) there are a few inconspicuous hooked hairs, in no way hiding from view the tuberculation of the carapace, which I find to agree with Miss RATHBUN'S description of the male. The walking legs have a smooth appearance. In specimens (b) and (c) hooked hairs are numerous, obscuring the tuberculation of the carapace and giving the legs a roughened appearance.

As a point of distribution I may note that I found a specimen of this species (an

ovigerous female) in the bottle which contains Pocock's "type" specimen of *Hyastenus (Chorilia) tenuicornis*, labelled "China Sea."

The interesting little tooth of the supra-orbital margin is referred to under *H. irami*, n. sp.

*Halimus pehlevi*, n. sp.—Plate I, fig. 3, 3a.

Localities:—Coral reefs, Gulf of Manaar, two specimens (*f, g*); pearl banks, Gulf of Manaar, 15 specimens. One is a young female; six are adult females (five are ovigerous); five are young males; five are adult males.

*Description of Adult Male (g)*.—Carapace sub-triangular, globular behind the lateral post-hepatic groove. The regions are distinctly defined, and are convex independently of the general convexity of the carapace, and bear certain granules:—a pair at the anterior border of the gastric region internal to the bases of the supra-ocular eaves; 13 posterior to these on the gastric region, of which three are median; one (median) between the gastric and cardiac regions; three on the cardiac region arranged as a triangle with its base turned forward; one (median) intestinal; one in the posterior portion of the groove on either side of the cardiac region; two on each branchial region. The true posterior border of the carapace is convex apart from the general outline of the carapace. The rostral spines are divergent, the distance between their tips divided by the length of one of them = 1.11. Length of rostral spine (inner border) ÷ carapace length = 0.39. The spines are bordered laterally with hooked hairs. The supra-ocular eave is strongly bilobed; the post-ocular tooth has a denticle about the middle of its anterior border. The pterygostomial region bears a couple of tubercles, one to outer side of and behind the other.

The antero-external angle of the basal antennal joint is produced into a stout tooth which is just concealed in a dorsal view of the animal. Behind it the outer border of the basal joint of the antenna presents a slight convexity which is produced ventrally a little. Posterior to this and external to the opening of the green gland is a prominent laterally compressed tubercle, and posterior to this again the antero-external angle of the buccal cavern forms a prominence. The four prominences just named form a longitudinal row. The antennal flagellum does not reach so far forward as the tip of the rostral spine; it is stout and bears a few thick hairs averaging somewhat more than 0.5 millim. in length.

The merus of the external maxilliped has its antero-external angle produced, and its inner border indented by two notches. The inner border of the ischium of the same appendage is serrated.

Chelipeds are smooth beneath the hairs. In this adult male they are a little stouter than the walking legs and 1.2 times as long as the carapace (excluding rostral spines). The fingers gape proximally for about two-thirds of their length, a tooth on the proximal portion of the mobile finger projecting into the hiatus. The distal, apposable portion of the fingers is denticulate.

Walking legs are smooth beneath the hairs.  $W.L.1.l. \div C.l. = 1.74$ ;  $W.L.2.l. \div C.l. = 1.17$ ;  $W.L.3.l. \div C.l. = 1.00$ ;  $W.L.4.l. \div C.l. = 0.91$ . The dactylopodite of walking leg 1 is almost straight, denticulate, and about half as long as the propodite. The dactylopodites of walking legs 2, 3, and 4 are curved, spinulous, and about the same length as the propodites of the same appendages.

C.l.	C.b. $\div$ C.l.	Ch.l. $\div$ C.l.	Propus l. $\div$ C.l.	Arm l. $\div$ C.l.	H.l. (up. bord.) $\div$ C.l.	F.l. (up. bord.) $\div$ C.l.
11.5	0.78	1.20	0.59	0.52	0.33	0.22

Arm length is measured along under surface from proximal end of ischium to tip of outer distal tubercle. Ch.l. = sum of arm l. and a line uniting outer distal tubercle of arm to tip of fixed finger when elbow is bent at a right angle. Propus l. is measured along lower border by a straight line uniting the proximal tubercle to the tip of the fixed finger.

*Remarks.*—This species may be recognised by the character of its orbital border.

The bilobed character of its supra-ocular eave is a point of resemblance to *Halimus verrucosipes* and *Halimus gracilirostris*.

The denticle on the anterior border of the post-ocular tooth is referred to under *H. irami*, n. sp.

*Halimus irami*, n. sp.—Plate I, figs. 4, 4a.

Locality:—Muttuvaratu Paar, two specimens—an ovigerous ♀ (*a*) and a *Sacculina*-infested male (*b*).

*Description of Ovigerous Female.*—Body and legs tomentose. Carapace subpyriform; the regions are defined, not very distinctly, by shallow grooves; the grooves defining the hepatic region are well marked; the gastric region shows a fairly prominent convexity. The denuded carapace is seen to be pitted, the pits well apart. The only protuberance on the carapace is a small epibranchial tubercle near the hinder limit of either branchial region. The rostral spines are 0.50 the length of the carapace (0.60 in the male example), fringed with a row of hairs on either side; the distance between their tips is 0.90 the length of one of them; though sloping obliquely downward, their slope is less inclined than that of the anterior surface of the carapace (in the male their slope is more oblique, in the same plane as that of the carapace).

The supra-ocular eave is produced anteriorly into a strong triangular tooth; at the base of the post-orbital tooth, between it and the supra-ocular eave, is a small tooth (it varies in position in the two specimens, as will be remarked later).

The antennal flagellum consists of about eight elongated segments, from the joints between which arise a few isolated stout hairs; it is damaged in this specimen, in the male it just falls short anteriorly of the tip of the rostral spine.

The outer anterior angle of the basal antennal segment is produced anteriorly into a stout tooth, visible from dorsal view, the outer border is a little convex; to the outer side of the aperture of the green gland is a compressed tubercle; behind the latter the

antero-external angle of the buccal cavern is produced as a petaloid projection; on the pterygostomial ridge running obliquely backward from this there are two tubercles, and a third still further back just above the base of the cheliped.

The chelipeds are rather more slender than the walking legs.  $\text{Ch.l.} \div \text{C.l.} = 0.91$ . The dactylopodites of the walking legs are roughened, hardly denticulate, on their lower borders. Carapace length is 8.75.

The general form of the carapace and of the rostral spines, together with the slight epibranchial tubercle, suggest alliance with the *H. convexus* group. The small but distinct supra-ocular tooth is interesting. It occurs in *H. agassini*; in *H. pehlevi* there is no isolated tooth, but the lower half of the upper anterior border of the large post-ocular tooth bears a smaller tooth, which is perhaps its representative. At all events, the two examples of *H. irami* enable one to make a very pretty series; in specimen (a) there is on the right an isolated supra-orbital tooth well separated from both supra-ocular eave and large post-ocular tooth, on the left side it is at the base of the latter, though distinct from it, in (b) it is on either side hardly separated from the post-ocular tooth and might be described as situated upon it: this leads to the condition seen in *H. pehlevi*.

For purposes of key this new species comes under section II.2.ii.b. of ALCOCK'S arrangement (A.1, p. 208) with *H. planasius*; from the latter it is easily to be distinguished by its supra-ocular tooth.

The male example of the new species is of interest as exhibiting a condition of abdomen and chelipeds evidently due to the presence of the parasitic *Sacculina*. The chelipeds are much as in the female, the abdomen is much broadened, resembling that of a half-grown female; the larger pair of copulatory appendages reach back about half way along the abdomen.

*Naxia investigatoris*, ALCOCK, 1895—A.1, p. 218; A. Invest., pl. xxi., fig. 6.

Localities:—Coral reefs, Gulf of Manaar, one specimen (ovigerous ♀); pearl banks, Gulf of Manaar, one specimen (ovigerous ♀); off Mutwal Island, one specimen (♂).

Description:—	C.l.	Rost.sp.l. ÷ C.l.	Ch.l. ÷ C.l.
(a) ovigerous ♀ . . . . .	16.00	0.25	1.00
(c) adult ♂ . . . . .	16.00	0.37	1.19

The present male example suggests that facultative dimorphism occurs in the species. It has a well-grown appearance. In spite of its "non-breeding" type of cheliped, it is larger than a male specimen of ALCOCK'S in the British Museum, which has chelipeds of "breeding" type; it is perhaps a "middle" male.

*Naxia hirta* (A. MILNE-EDWARDS), 1865—A.1, p. 218.

Localities:—Aripu coral reefs, Gulf of Manaar, nine specimens; Chilaw Paar, one specimen; pearl banks, Gulf of Manaar, seven specimens; off Mutwal Island, two specimens.

<i>Description</i> :—	C.L.	Rostr.spine l. + C.L.	Ch.l. + C.L.
(a) adult ♂ . . . . .	35.50	0.30	1.31
(b) ovigerous ♀ . . . . .	31.25	0.24	0.94
(c) adult ♂ . . . . .	18.25	0.22	0.88

In adult male (a) one notes:—(1) The cheliped length exceeds considerably the length of the carapace, whereas ALCOCK describes his specimens as having these measurements equal; (2) the fingers are considerably arched and so are well separated at the base when clenched—again contrasting with ALCOCK's description. ALCOCK does not give the size of his specimens, they are evidently either young or "non-breeding" forms. In the present collection males agreeing with ALCOCK's description in characters of cheliped have C.L. from 18.00 to 21.00.

*Doclea gracilipes*, STIMPSON, 1857—A.1, p. 229.

Localities:—Trincomalee, three specimens; pearl banks, Gulf of Manaar, two specimens.

*Description*:—All the examples are young—three are males and two females. They fall under ALCOCK's general description of the species, and are in fairly close agreement with the *Doclea* sp. of DE MAN, from Mergui. The smaller of his two specimens I have seen in the British Museum.

*Doclea alcocki*, n. sp.—Plate I., fig. 5, Plate II., fig. 2.

Locality:—Pearl banks, Gulf of Manaar, one specimen.

*Description*:—A female, non-ovigerous, but, judging from the broad abdomen, it is adult. C.L. (a straight line uniting base of posterior spine to posterior end of rostral groove) = 44.5. Body and legs, except the hands and dactylopodites, are covered with velvet.

Carapace sub-pyriform rather than sub-globular (Pl. II., fig. 2); the posterior part of the margin is semicircular, the anterior part (rostrum included) is triangular. Rostrum bifid; its length (a straight line uniting the tip of a rostral spine to the posterior end of the longitudinal dorsal rostral groove) is 0.25 the carapace length; the length of the free portion of a rostral spine is 0.55 the rostrum length; the rostral spines are compressed in an oblique plane and curve a little downwards distally. Inter-orbital breadth (a straight line uniting the fissures between the supra-ocular eave and post-ocular tooth of either side) is 0.25 the carapace length. The anterior angle of the supra-orbital eave is produced obliquely forward and outward as a tubercle. There are numerous tubercles (say 56). Of these, eight are in the median longitudinal line and increase in size from before backwards (four gastric, of which the most anterior is about one-third the size of the other three, one between gastric and cardiac region, one cardiac, one on posterior border; the last named is a good deal larger than any of the others (at its base on either side is a smaller tubercle, that on the right quite minute, that on the left strongly developed). Just anterior to this median dorsal row is a pair of small tubercles, one

on either side of the posterior limit of the median longitudinal rostral groove; these and the small anterior one of the median dorsal row form a triangle; the three are sub-equal in size and are roughly one-third the size of the second member of the median dorsal row. The antero-external angle of the buccal cavern is produced into a tubercle, and this is the most anterior member of a row of four, of which the second is on the sub-hepatic region and the third and fourth are on the lateral border of the carapace. Parallel to this a row of four tubercles runs obliquely backwards and outwards from the posterior angle of the orbit; of these, the first is hepatic and the rest branchial. On either side between this row and the mid-dorsal row are twelve tubercles, four gastric and eight branchial. The gastric ones are small and occupy the corners of an antero-posterior oblong, of the branchial ones five follow the groove separating branchial from middle regions (second and sixth well developed, rest small), the remaining three lie to outer side, the posterior one being well developed, and the two anterior very close together. The middle regions of the carapace are separated from the lateral ones by distinct sinuous grooves; the branchio-hepatic groove also is distinct. In addition to the tubercles described above, the basal antennal segment is produced into one, there is another just behind this to the outer side of the opening of the green gland and just in front of the tubercle at the antero-external angle of the buccal cavern, already described. The interantennular septum is produced ventrally in the middle region to form a much compressed tooth.

The merus of the external maxilliped has a very distinct notch in the anterior part of its inner border, its anterior border is oblique and a little convex, its outer angle rounded and slightly produced, its exposed surface concave; the ischium has its inner border obviously dentate. The length of the buccal cavern (a straight line uniting the inner base of the antero-external tubercle to the outer posterior angle) is 0.98, its breadth (across region of the two antero-external tubercles); outer border of merus  $\div$  breadth of buccal cavern = 0.48; outer border of ischium  $\div$  breadth of buccal cavern = 0.60.

Chelipeds slender, about the same degree of stoutness as the 2nd pair of walking legs, but a good deal shorter. Ch.l.  $\div$  C.l. = 1.15. W.L.1.l.  $\div$  C.l. = 2.37; W.L.2.l.  $\div$  C.l. = 1.98; W.L.3.l.  $\div$  C.l. = 1.64; W.L.4.l.  $\div$  C.l. = 1.37.

Abdominal segments IV. to VI. are fused (the specimen is female), but grooves representing joints remain very distinct.

*Egeria aráchnoides* (RUMPHIUS)—A.1, p. 223.

Localities:—Coral reefs, Gulf of Manaar, one specimen; south-east of Ceylon, 18 fathoms, one specimen.

*Description*:—Males—both probably immature.

*Tylocarcinus styx* (HERBST), 1803—A.1, p. 235.

Locality:—Cheval Paar, two specimens (ovigerous ♀ and young ♀).

*Description*:—C.l. of the ovigerous female = 16.5.



*Paramithrax* (*Chlorinoides*) *longispinus* (DE HAAN), var. *bispinosus*, nov.

Localities:—Pearl banks, two specimens; coral reefs, Gulf of Manaar, three specimens; off Kaltura, one specimen; Trincomalee, one specimen; south-east of Ceylon, 18 fathoms, one specimen; deep water, off Galle, two specimens.

*Description*:—C.I. of an ovigerous female = 12·00 (posterior and rostral spines excluded). For characters of the species see A. 1, p. 242.

The examples include two ovigerous females, one adult non-ovigerous female, five adult males, one doubtfully adult male, and one young male.

They all differ from DE HAAN'S figure ("F. Japon. Cr.," pl. xxiii, fig. 2) in the absence of the most anterior of the three supra-ocular spines. I name them var. *bispinosus*. The "Challenger" specimens included by MIERS under *Paramithrax coppingeri* illustrate a parallel variation in that closely allied species; the *P. coppingeri* specimens of HASWELL have three supra-ocular spines—the "Challenger" examples have two only.

*Schizophrys aspera* (H. MILNE-EDWARDS, 1834)—A. 1, p. 243, pl. xxxv, fig. 1.

Localities:—Off Mutwal Island, two specimens (young ♀ and adult ♂); Jokkenpidi Paar, one specimen (young ♂); pearl banks, one specimen (young ♂); coral reefs, Gulf of Manaar, one specimen (young ♀).

*Description*:—C.I. of the adult male = 29.

*Cyclax suborbicularis* (STIMPSON), 1857—A. 1, p. 245.

Locality:—Galle, lagoon, one specimen.

*Description*:—A young male. It agrees in many points with A. MILNE-EDWARDS' fig. 2 of a young form ('Nouv. Archiv. du Mus.,' viii, p. 236, pl. x, 1872). The orbit, however, is different from his figures, both of young and adult, but as growth-changes are very considerable in this species, I do not exclude my specimen from it.

*Stenocionops cervicornis* (HERBST), 1803—A. 1, p. 248.

Localities:—Jokkenpidi Paar, one specimen (b); Cheval Paar, two specimens (a, c); pearl banks, Gulf of Manaar, three specimens; Chilaw Paar, three specimens; coral reefs, Gulf of Manaar, four specimens.

*Description*:—Among the specimens is one ovigerous female, one adult non-ovigerous female, and at least one adult male.

	C.I.	C.b. ÷ C.I.	Rost. spine ÷ C.I.	Sup.-oc. spine ÷ C.I.	Eye stalk ÷ C.I.
(a) ovigerous ♀ . . .	34·50	—	0·42	0·41	0·34
(b) adult ♀ . . . . .	25·00	0·71	0·35	0·37	0·34
(c) adult ♂ . . . . .	42·00	—	—	—	—

The posterior projection is, in all the specimens, blunter and more broadly triangular than in CUVIER'S figure in the "Règne Animal" (pl. xxxi, fig. 1), i.e., it is to some

extent intermediate between that figure and A. MILNE-EDWARDS' figure of *Stenocionops curvirostris*. Among the present specimens there is nothing further to minimise the somewhat slender specific distinction between *S. cervicornis* and *S. curvirostris*.

In the young examples the tuberculation is less distinct than in the adult, and also the posterior projection of the carapace is less prominent. HENDERSON (p. 343) found in his specimens that the posterior projection was narrower and more upturned in the male than in the female; this does not hold as a distinction between the ovigerous female and the adult male of the present collection.

It would be of interest to re-examine A. MILNE-EDWARDS' "type"-specimens of *Stilbognathus* for the purpose of verifying the generic distinction between that genus and *Stenocionops*.

*Pseudomicippa nodosa*, HELLER, 1861—'S.B. Ak. Wien,' xliii, p. 303, pl. i, fig. 3.

Locality:—Muttuvaratu Paar, Gulf of Manaar, one specimen.

Description:—An ovigerous female. C.l. (without front) = 9.50. It is labelled "crab with black sponge." The sponge completely covers the dorsum of the carapace.

Remarks.—For remarks on the limits and affinities of the genus, see CALMAN (p. 40). He favours the generic separation of *P. nodosa* and *P. varians* on the grounds that (1) the rostrum is very strongly deflexed in *P. nodosa*—not so in *P. varians*; (2) the anterior angle of the orbit is produced into a long spine in *P. nodosa*—not so in *P. varians*; (3) the distal tooth of the basal antennal joint is directed obliquely forwards in *P. nodosa*—outwards in *P. varians*. With the additional evidence of the present specimen and of some specimens in the British Museum, I find it inadvisable to separate the species generically. Thus the present example combines the strongly deflexed rostrum of *P. nodosa* with an anterior orbital angle which is only drawn out a little more than in *P. varians*. In the British Museum I find specimens which show some variation in the degree to which the rostrum is deflexed. The third distinction does not appear to me to be one of generic value. In the present specimen the antennal angle is *nodosa*-like in pointing obliquely forwards, though it differs from HELLER's figure—the latter agreeing with dried Red Sea specimens in the British Museum. This genus is new to the Indian fauna.

*Micippa phylira* (HERBST), 1803—A.1, p. 249.

Localities:—Coral reefs, Gulf of Manaar, four specimens (*a, b, d, e*); off Mutwal Island, one specimen (*c*).

Description:—

	C.l.	C.b. ÷ C.l.	Antenn.l. ÷ C.l.	2nd sgt. ant.l. ÷ R.b.	Arm.l. ÷ C.l.	H.l. ÷ C.l.	H.b. ÷ H.l.
(a) ovig. ♀	23.00	0.87	0.43	0.25	0.33	0.24	0.36
(b) adult ♂	20.00	0.87	0.50	0.34	0.39	0.35	0.61
(c) adult ♂	22.50	0.87	0.51	0.28	0.37	0.29	0.46

ALCOCK records a male dimorphism in this species, believing it to be comparable

with the phenomenon recorded among the beetles. Dimorphism is illustrated by the males (*b*) and (*c*) above, but it is noteworthy that it is the larger example (*c*) which has the more female-like form of cheliped, while the smaller one (*b*) has a cheliped of strongly marked male character. This seems to be a case of facultative dimorphism, specimens (*b*) and (*c*) being respectively "breeding" (perhaps "low") and "non-breeding" ("middle") forms.

In length of mobile portion of the antenna, the two adult males come under var. *mascarena*. In the ovigerous female this measurement is larger than in females of the species as described by ALCOCK.

The surface of the post-cardiac region of the carapace varies in character. It is smooth in (*b*), it has a trace of granulation in (*a*) which is rather more obvious in (*c*) and (*d*) and quite fairly developed in (*e*). The vertical portion of the carapace plus the rostrum has in (*a*) and (*b*) a flattened surface, in (*c*) the lateral pair of lobes curve forward somewhat, so that the anterior surface is concave from side to side. Example (*d*) is intermediate.

All the specimens possess the following spines on the lateral margins of the carapace:—Three spines on hepatic border, one (a small tubercle) on the antero-lateral branchial border, three on branchial border in the region of the epibranchial angle. In addition, the two males (*b*) and (*c*) have two spines, both obsolescent in (*c*), and anterior one so in (*b*), on the border between the epibranchial angle and the true posterior margin of the carapace, just above the granular ridge.

*Micippa thalia* (HERBST), 1803—A.1, p. 251.

Localities:—Off Mutwal Island, two specimens; coral reefs, Gulf of Manaar, seven specimens; Cheval Paar, two specimens; pearl banks, Gulf of Manaar, 18 specimens.

*Description*:—The specimens fall into two groups, corresponding with the figures of A. MILNE-EDWARDS ('Nouv. Archiv. du Mus.' viii, p. 238, pl. xi, fig. 1, 1872) and of HERBST ('Krabben,' iii, pl. lviii, 3) respectively. Twenty-eight of them agree very fairly with the former and one with the latter. It may be noted that forms resembling the "type"-specimen of this species have been seldom recorded.

A. The following is the arrangement of the spines in 20 adult individuals of the first variety. The number which occurs in each region with maximum frequency is printed in heavy type.

Dorsal Surface of Supra-ocular Hood.—Fourteen specimens have a mere indication of one granule on each hood, three have a more obvious granule, and three have a small blunt spinule.

Dorsal Surface of Branchial Region.—Nineteen specimens have two spines on each side (may be written 2·2), one specimen has one on the left side and two on the right side (may be written 1·2).

Gastric Region.—Nineteen specimens have 2 median spines (reduced in one specimen), and one has a spine and a granule.

Upper Margin of the Orbit behind the Supra-ocular Spine.—All have 3·3, of which the third is the largest.

Hepatic Margin.—All have 3·3.

Branchial Margin.—Fifteen specimens have 5·5; one has 4·5; one has 5·6; one has 5·7; one has 6·6; one has 6·7.

B. Specimen ( $\alpha$ ), an ovigerous female, differs from the other examples in the collection in various ways, as set forth below, and goes with HERBST's "type"-specimen of the species:—

(1) The rostral spines are more strongly curved outwards at their tips (see HERBST's figure).

(2) The hepatic regions are not so much pinched in dorsally.

(3) The under surface of the basal antennal segment is smooth and its antero-lateral angle is produced into a longer, more definite spine, the border of which is entire (in the A-specimens the outer half of the under surface of the basal antennal segment is more or less granular, and its antero-lateral angle is produced to form a triangular and less spiniform infra-orbital projection with a crenulate border).

(4) The arrangement of spines is different.

Dorsal surface of the supra-ocular hood of either side has a definite blunt spine. The anterior and posterior angles of the eave form blunt projections.

Dorsal surface of branchial region of each side has three arranged in a longitudinal row; of each row the two anterior members are spinules merely, the posterior one is a well-developed spine. There is also a denticle on the branchial region which would lie about one-third way along a line drawn from the large spine just named to the middle point of the gastro-cardiac groove.

Gastric Region.—Two not very obvious median tubercles.

Upper margin of orbit behind the supra-ocular eave of either side has three spines, the middle one much the strongest.

Hepatic Margin, 0.

Branchial Margin, 7 8 (on the left side the anterior four are granules, the three posterior are larger; on the right side the anterior five and the seventh are granules; the sixth and eighth are larger).

Posterior Border of Carapace.—A pair of spines close together, one on either side of middle point.

Of the above particulars the form of the rostral lobes, the strong development of the middle one of the three supra-orbital spines, the presence of the two spines of the posterior border, and the crenulate margin of the antero-lateral spiniform production of the basal antennal segment, are conveniently conspicuous characters.

*Micippa margaritifera*, HENDERSON, 1893—A. 1, p. 253; A. Invest., pl. xxxv., fig. 3.

Localities:—Jokkenpiddi Paar, two specimens (ovigerous ♀); Aripu coral reef, one

specimen (ovigerous ♀); Gulf of Manaar, three specimens (one adult ♂ and two young ♂).

*Description*.—All the specimens have their walking legs folded beneath them, in which position the expanded meropodites, together with the retroflected tip of the rostrum, enclose a space beneath the body and help to give the animal a rounded ball-like appearance. The space referred to is widely open posteriorly, where a considerable squarish gap is left between the members of the last pair of walking legs. Slits remaining between the successive legs of either side are more or less occluded by fringes of hair which border the appendages.

A variable character to note is the size of the innermost of the three branchial tubercles; in none of the specimens, however, does this exceed two-thirds of the size of the two outer tubercles.

*Micippa parca*, ALCOCK, 1895—A.1, p. 253; A. Invest., pl. xxxv., fig. 4.

*Locality*.—Coral reefs, Gulf of Manaar, one specimen.

*Description*.—C.l. = 11·25 (a straight line uniting base of the median posterior spinule with the middle point of a faint inter-ocular groove); C.b. ÷ C.l. = 0·98; Inter-orbital b. ÷ C.l. = 0·58 (inter-orbital breadth is measured by a straight line uniting the notches made by the junction of pre-ocular spinule with supra-ocular eave of either side); breadth between the bases of the mobile portions of the antennæ ÷ C.l. = 0·36; Arm l. ÷ C.l. = 0·42; H.l. ÷ C.l. = 0·38.

The present specimen of *M. parca* differs from *Micippa margaritifera*, to which it is closely allied, in the following particulars:—

(1) The median region of the posterior border of the carapace is occupied by a group of spinules (three in a transverse row) instead of by a single pearl-like tubercle; (2) the post-cardiac cluster of granules and the cluster on either side of it are but slightly indicated; (3) the gastro-cardiac groove is more distinct; (4) the difference in size between the inner branchial spinule (a mere rudiment—not a real spinule) and the two outer ones (well developed) is more marked; (5) the meropodites of the walking legs are still more expanded, which is largely due to the greater foliation of their posterior borders; their distal borders are finely and fairly regularly toothed; (6) the walking legs are less hairy; (7) the upper portion of the outer surface of the hand is granular.

*Lambrus (Lambrus) longimanus*, LEACH, 1815—A.1, p. 260.

*Localities*.—Galle, three specimens (c, e, g); pearl banks, Gulf of Manaar, four specimens (a, b, d, f).

*Description*.—(a) young ♀. (b) young ♀. (c) young ♂. (d) young ♂. (e) young ♂. (f) adult ♂.

C.l. (rostr. included)	11·50	17·50	9·75	12·00	17·50	25·50
C.b. ÷ C.l.	1·04	1·01	1·50	1·00	1·11	1·12
Ch.l. ÷ C.l.	3·22	3·31	3·10	3·25	3·64	4·40

In the young male (*e*) the median lobe of the rostrum is reduced to a declivous denticle of approximately the same length as the denticular lateral lobes, which are in this example more strongly developed than usual. Considerable growth-changes in cheliped length for males are indicated by the measurements given above.

*Lambrus (Platylambrus) carinatus*, H. M.-EDW., 1834—A.1, p. 263.

Localities:—Coral reefs, Gulf of Manaar, four specimens; off Mutwal Island, one specimen; pearl banks, Gulf of Manaar, nine specimens.

Description:—The specimens include four ovigerous females (incl. *f-h*), six non-ovigerous females (incl. *a-e*), and four adult males.

	(a) ♀.	(b) ♀.	(c) ♀.	(d) ♀.	(e) ♀.	(f) ♀.	(g) ♀.	(h) ♀.	(i) ♂.	(j) ♂.	(k) ♂.	(l) ♂.
C.L. . . .	8.75	11.00	11.25	13.00	13.00	9.25	11.25	11.50	9.25	9.25	11.25	11.25
Arm.l. ÷ C.L.	0.80	0.77	0.82	0.65	0.73	0.73	0.73	0.72	0.89	0.86	0.84	1.02
H.L. ÷ C.L.	0.94	0.93	1.02	0.83	0.92	0.94	0.87	0.83	0.94	0.95	0.96	1.11

Some characters exhibit high variability:—

(1) The mid-dorsal teeth may be large and laterally compressed, or they may be smaller and peg-like. In one example the most anterior of the three is obsolescent.

(2) The branchial ridges vary in number and in character. There may be on each side a single sharp carina, a single granular ridge, a pair of granular ridges, or a pair of smooth ridges; the second ridge may be very inconspicuous, and there may be a granule or two in the middle of such a faint ridge.

(3) The carapace may be free from granules, or granules may be present, but confined to the depression on either side of the cardiac region, or a few may extend over the branchial region also.

Remarks.—I include *Lambrus holdsworthi*, MIERS, as a synonym. A. MILNE-EDWARDS' brief diagnosis of *L. carinatus* applies to MIERS' "type"-specimens of *L. holdsworthi* in the British Museum. Some of my specimens, which I group as var. *holdsworthi*, agree with the latter; others agree with ALCOCK's description of his examples of *L. carinatus*—I call these var. *alcocki*.

In var. *alcocki* there is a single carinate ridge on each branchial region; in var. *holdsworthi* there are two low granular ridges.

In var. *alcocki* the mid-dorsal tubercles are more prominent and are laterally compressed; in var. *holdsworthi* they are more peg-like and less prominent.

In var. *alcocki* the carapace tends to be free from granules; a fair number of granules are present in var. *holdsworthi*.

The variations presented by the present forms in regard to median dorsal teeth and branchial ridges—which I have referred to above—minimise or break down two of the distinctions which ALCOCK draws between his specimens of *L. carinatus* and of *L. prensor*. All my specimens agree with those described by ALCOCK in the character of the sub-orbital lobe (bilobed, the inner lobe rounded and not produced

into spine nor seen in dorsal view) and of the anterior borders of the meropodites of the walking legs (serrate).

**Lambrus (Rhinolambrus) contrarius** (HERBST), 1804—A.1, p. 266.

Localities:—Coral reefs, Gulf of Manaar, four specimens (*b, c, g, h*); pearl banks, Gulf of Manaar, four specimens (*a, e, i, d*); Chilaw Paar, one specimen (*f*).

*Description*:—

	(a) yg. ♀.	(b) yg. ♀.	(c) yg. ♂.	(d) yg. ♂.	(e) yg. ♂.	(f) yg. ♂.	(g) ad. ♂.
C.l. (rost. included) . . . . .	11·50	24·00	9·50	18·00	19·75	22·75	38·75
C.b. ÷ C.l. . . . .	0·89	0·92	0·84	0·92	0·90	0·89	0·93
Ch.l. ÷ C.l. . . . .	2·17	2·30	2·18	2·36	2·34	2·58	2·86

The growth-changes in ratio Ch.l. ÷ C.l. will be noted.

**Lambrus (Rhinolambrus) longispinis**, MIERS, 1879—A.1, p. 266.

Localities:—Pearl banks, Gulf of Manaar, eight specimens; coral reefs, Gulf of Manaar, three specimens.

*Description*:—The specimens are all young—four of them males. The C.l. of the latter varies from 10·5 to 16; the scanty evidence suggests that no great change in the ratio Ch.l. ÷ C.l. accompanies this growth. There is at this size no very obvious establishment of sexual dimorphism.

	(a) yg. ♀.	(b) yg. ♀.	(c) yg. ♀.	(d) yg. ♀.	(e) yg. ♂.	(f) yg. ♂.	(g) yg. ♂.	(h) yg. ♂.
C.l. (rost. included) . . . . .	12·25	12·25	12·50	19·25	10·50	11·25	12·50	16·00
C.b. ÷ C.l. . . . .	0·94	0·98	0·92	1·00	0·98	0·94	0·92	0·97
Ch.l. ÷ C.l. . . . .	2·14	2·16	2·06	2·39	2·24	2·11	2·08	2·22

The present specimens agree closely with ALCOCK's example and confirm his belief that the species is more nearly related to *L. contrarius*, HERBST, than to *L. validus*, DE HAAN. Variability is low among the above examples for most characters; the shape of the rostrum is an exception. The latter is acutely pointed in most of the examples, narrowing rather suddenly a short distance in front of the eyes; in one specimen no such sudden narrowing occurs; in another there are two small lateral lobes near the apex; other examples are intermediate.

**Lambrus (Rhinolambrus) pelagicus**, RÜPPELL, 1830—A.1, p. 267.

Localities:—Coral reefs, Gulf of Manaar, one specimen (young ♀); off Mutwal Island, one specimen (adult ♂).

*Description*:—

Young ♀ . . . . C.l. = 7·50; C.b. ÷ C.l. = 1·00; Ch.l. ÷ C.l. = 2·63.

Adult ♂ . . . . C.l. = 16·00; C.b. ÷ C.l. = 1·02; Ch.l. ÷ C.l. = 3·16.

**Lambrus (Aulacolambrus) hoplonotus**, ADAMS and WHITE, 1848—A.1, p. 273.

Localities:—Pearl banks, Gulf of Manaar, four specimens (*a, b, e, g*); coral reefs, Gulf of Manaar, three specimens (*c, d, f*).

*Description*.— (a) young ♀. (b) young ♀. (c) adult ♀. (d) young ♂. (e) young ♂. (f) adult ♂.

C.L.	7.00	13.00	15.00	8.50	9.25	13.25
Ch.l. ÷ C.L.	2.75	2.62	2.77	2.71	2.65	2.57

The above series present but little variation among themselves. They come under var. *planifrons*, with some approach also to var. *granulosus*. Thus adult female (c) bears considerable resemblance to MIERS' specimen of var. *planifrons* in the British Museum, excepting that the spines of the posterior border of the hand are neither so flattened nor so broad, i.e., more as in var. *granulosus*, and in the same example the apex of the rostrum is a further point of resemblance to the latter variety.

The number of spines on the outer border of the hand is fairly constant, that of the teeth of the inner border more variable. Thus in all the specimens there are on the outer border of the hand six large smooth spines and four smaller alternating ones (the most distal of the alternating spines is in (b) larger than in the others, and in (f) it is almost the size of the larger ones); the inner border bears from eleven to thirteen teeth.

*Lambrus (Anulacolambrus) curvispinis*, MIERS, 1879—A.1, p. 274.

Localities:—Galle, one specimen (adult ♀); Trincomalee, one specimen (ovigerous ♀).

*Description*.—

Adult ♀	C.L. = 21.00; Ch.l. ÷ C.L. = 3.07.
Ovigerous ♀	C.L. = 24.00; Ch.l. ÷ C.L. = 3.15.

*Lambrus (Parthenolambrus) calappoides* (ADAMS and WHITE), 1847—A.1, p. 275.

Localities:—Coral reefs, Gulf of Manaar, nine specimens (a to i); Trincomalee, one specimen (j).

*Description*.—

	(a) yg. ♀.	(b) yg. ♀.	(c) yg. ♀.	(d) ad. ♀.	(e) ♂.	(f) ♀.	(g) ♂.	(h) ♀.	(i) ♀.	(j) ♂.
C.L.	9.50	14.50	15.75	19.25	19.00	14.50	17.50	8.00	14.00	16.75
Ch.l. ÷ C.L.	1.84	1.84	—	—	2.09	1.66	1.71	1.97	1.96	2.04

The present examples show a good deal of variation about two centres; the two groups I call var. *alcocki* (corresponding more or less with ALCOCK'S description of *L. calappoides*) and var. *confragosus* (= *L. confragosus*, CALMAN).

I have seen the "type"-specimens of *L. confragosus* in the British Museum, and find that with the aid of the present forms and of the British Museum examples of *L. calappoides* I can arrange a transitional series which unites the two forms named.

Differences between the two varieties are:—(1) The post-ocular notch is well indicated in var. *confragosus*; absent in var. *calappoides*. (2) The lateral hepatic region is prominent, dentiform and compressed in var. *confragosus*; little prominent and rounded in var. *calappoides*. (3) The post-hepatic notch is well indicated in var. *confragosus*; slightly so in var. *calappoides*. (4) The median dorsal spines are prominent and pointed backward in var. *confragosus*; in var. *calappoides* they are represented by inconspicuous tubercles. (5) The tubercles of the carapace are



granulated in var. *confragosus*; in var. *calappoides* they are more or less smooth, low and obsolescent and the general surface of the carapace tends to be pitted and uneven, producing what ALCOCK aptly terms a "boiled" appearance. (6) The postero-lateral angles are angular and spine-bearing in var. *confragosus*; rounded in var. *calappoides*. (7) The greatest carapace-breadth is in var. *confragosus*, across the region of the postero-lateral angle; in var. *calappoides* it is anterior to this region. (8) There are two large tubercles on the inner border of the arm in var. *confragosus*, one about one-third from its distal end and the other about one-third from its proximal end. The latter is the larger, a good deal compressed from above downwards, and has a small tubercle at its base; in var. *calappoides* there are traces only of both. (9) The rostrum is obliquely deflexed in var. *confragosus*; vertically deflexed in var. *calappoides*.

The above characters show a fair degree of correlation; the transitional forms tend to combine intermediate conditions of most of them. The correlation is, however, by no means perfect, e.g., a "Challenger" female from "off Tongatabu," in the British Museum, combines with most characters of var. *calappoides* a considerable development of the median dorsal spines.

*Lambrus* (*Parthenolambrus*) *beaumonti*, ALCOCK, 1895—A.1, p. 276.

Localities:—Coral reefs, Gulf of Manaar, three specimens (*a*, *d*, *e*); south of Galle, deep water, one specimen (*b*); Gulf of Manaar, deep water, one specimen (*c*).

*Description*:— (*a*) young ♀. (*b*) ovigerous ♀. (*c*) ovigerous ♀. (*d*) adult ♂. (*e*) adult ♂.

C.l.	6.75	7.75	8.00	9.25	10.00
C.b. ÷ C.l.	1.11	1.06	1.09	1.00	1.07
Ch.l. ÷ C.l.	1.74	—	1.91	2.46	2.90

The difference in ratio Ch.l. ÷ C.l. between the two males—both apparently adult—is interesting. In the present forms there is much variation in the size of gastric and cardiac tubercles. They are both absent in the young female example (*a*), they are both rudimentary in the larger of the two males (*e*), there is a blunt tubercle on each of these regions in ovigerous female (*b*), finally, in the smaller male (*d*), there is a stout spine on the gastric eminence, and a still stouter one on the cardiac.

*Lambrus* (*Parthenolambrus*) *harpax*, ADAMS and WHITE, 1848—A.1, p. 278.

Locality:—Pearl banks, one specimen.

*Description*:—A male, apparently young. C.l. = 14.25; Ch.l. ÷ C.l. = 2.79. This individual, belonging to a highly variable species, agrees with ALCOCK's description of the Indian Museum specimen from the Andamans, excepting that the index Ch.l. ÷ C.l. is considerably higher.

*Cryptopodia fornicata* (FABRICIUS), 1793—A.1, p. 282.

Locality:—Pearl banks, Gulf of Manaar, one specimen.

*Description*:—A young male, C.l. (rostrum included) = 18.0; C.b. ÷ C.l. = 1.46.

*Cryptopodia pan*, n. sp.—Plate I, fig. 6, and text-fig. 4.

Localities :—Coral reefs, Gulf of Manaar, one specimen (adult ♀ = *a*); west of Periya Paar, 17 to 24 fathoms, two specimens (young ♀ = *b*; young ♂ = *c*).

*Description of female (a)*.—C.l. (rostrum included) = 22.5. Carapace broadly triangular; antero-lateral margin slightly sinuous, smooth in its anterior third and lacinated in its posterior two-thirds; the posterior and postero-lateral margins form a single strong curve, the edge of which shows faint traces of crenulation; the surface of the carapace is fairly smooth to the naked eye, but some obsolescent granules crown the prominences, and there are a few also scattered on the posterior slope; there are some

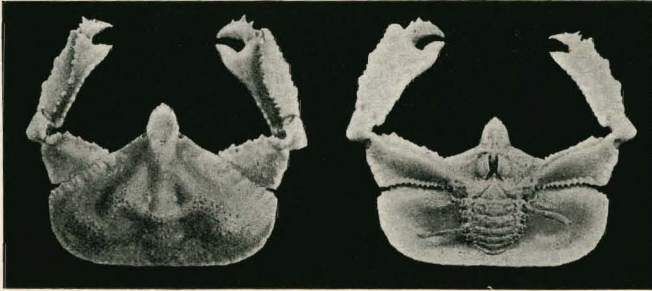


Fig. 4. *Cryptopodia pan*, n. sp.

pits, obvious to the naked eye, on the cardiac prominence and on the prominence on either side of it; the whole surface (as also that of the chelipeds) is dull, which is seen under lens to be due to a fine pitting which covers it; the triangular depression is shallow; the oblique branchial ridge of either side is much swollen and rounded; the rostrum is prominent, obtusely pointed, rather longer than broad, and has the anterior part of the edge faintly crenulate. The carapace is produced beyond the abdomen posteriorly for a distance equal to 0.08 the carapace length.  $C.b. \div C.l. = 1.43$ .

The third pair of maxillipeds form together a striking bulge. This is due in part to curvature of the appendage, but the most important factor is an actual thickening of the substance of the ischium. The exposed surface of the ischium is glazed, its outer two-thirds particularly are thickened, its inner one-third is ornamented with a double row of granules. The merus is granular on its proximal portion; distally it is smooth beneath a pubescence. The exopodite is, for the most part, concealed in ventral view by the ischial bulge.

The chelipeds are much as in *Cryptopodia fornicata* (see A.1, p. 282), but the surface is dull, not glazed; the armature is not so sharp; the outer border of the wrist has no tooth, but its blunt outer angle is well developed, so that its outer border is made up of two borders of approximately equal length set at right angles to each other. The meropodites of all the walking legs have their upper border, and those of

the 1st and 4th pairs their lower border also, armed with a spiniform crest; the other segments are a little compressed from side to side, but not carinate.

Differences from *Cryptopodia fornicata* are:—(1) The duller surface of the carapace and chelipeds (due largely to fine pitting); (2) the more rounded surfaces of the prominences, and less sharply cut armature; (3) the angular wrist; (4) form of rostrum; and (5) the swollen external maxillipeds. The last-named particular separates the new species at a glance from any other member of the genus known to me.

*Heterocrypta petrosa*, KLUNZINGER, 1906—(K., p. 53, pl. ii., figs. 9a, b).

Locality:—Gulf of Manaar, one specimen (a); off Mutwal Island, one specimen (b).

Description:—	C.l.	C.b. ÷ C.l.	Ch.l. ÷ C.l.	Rt.H.b. ÷ Lt.H.b.
(a) Ovigerous ♀ . . . . .	13.25	1.47	2.00	1.50
(b) Adult ♂ . . . . .	18.00	1.57	2.44	1.35

In the female specimen the true posterior border of the carapace forms a convex bulge. The carapace regions are more rounded in the male specimen than in the female. The latter variation is probably not concerned with sex, for KLUNZINGER'S figure of a male bears a stronger resemblance to my female than to my male example in this respect.

*Remarks.*—This species falls decidedly into the genus *Heterocrypta*, as defined by ALCOCK, but, having conformed so far, its further resemblances are rather to *Cryptopodia spatulifrons* than to any *Heterocrypta*. Such resemblances concern (1) general appearance of cheliped (no crest, however, on outer surface of wrist); (2) general shape of posterior border of the animal (*i.e.*, true posterior border of carapace together with posterior border of clypeiform expansions); (3) sculpture of exposed surface of the external maxillipeds, of uncovered portions of thoracic sterna, and of the abdominal terga.

On its part, *Cryptopodia spatulifrons* (as also *C. dorsalis*) makes some approach to *Heterocrypta* in the slight posterior expansion of its carapace—much slighter, for example, than in *Cryptopodia fornicata*.

*Zebrida adamsi*, WHITE, 1847—A.1, p. 287.

Localities:—Gulf of Manaar, one specimen; south of Manaar Island, two specimens.

*Description.*—C.l. of an adult male (rostral lobes included) = 8.0.

*Harrovia albolineata*, ADAMS & WHITE, 1848—(“Samarang” Zool., Crust., p. 56).

Localities:—South of Manaar Island, hauls 3, 4 and 5, two specimens (adult ♂, adult ♀); pearl banks, Gulf of Manaar, one specimen (young ♀); coral reefs, Gulf of Manaar, one specimen (ovigerous ♀).

*Description.*—C.l. of ovigerous female = 7.00.

## CYCLOMETOPA.

*Carpilodes tristis*, DANA, 1852—A.3, p. 82.

Locality:—Galle, lagoon, three specimens (one adult ♂, two young ♂).

Description:—C.L. of adult male = 10·0.

*Carpilodes pediger*, ALCOCK, 1898—A.3, p. 83; A.Invest., pl. xxxvi, fig. 4, ♀.

Localities:—Off Mutwal Island, two specimens (one adult ♂ = *a*, one young ♂ = *b*); west of Periya Paar, 17 to 24 fathoms, one specimen (adult ♀ = *c*); pearl banks, Gulf of Manaar, three specimens (adult ♂ = *d*, ovigerous ♀ = *f*, young ♀ = *e*).

Description:—C.L. of ovigerous female = 5·25.

The third of the four antero-lateral teeth of the carapace may be continuous with the lobe 4L of DANA's nomenclature as in (*b*), it may be separated therefrom by a faint groove as in (*a*), (*d*), and (*e*), or by a more evident groove, agreeing with ALCOCK's figure, as in (*f*).

*Carpilodes cariosus*, ALCOCK, 1898—A.3, p. 86; A.Invest., pl. xxxvi, fig. 7, ♀.

Localities:—Muttuvaratu Paar, 6 to 9 fathoms, one specimen (adult ♂ = *a*); Gulf of Manaar, three specimens (young ♂ = *b*, two adult ♀ = *c*, *d*); Jokkenpidi Paar, one specimen (adult ♀ = *e*).

Description:—C.L. of an adult female = 4·50.

There is variation in lobulation of carapace. The lobe 3M (DANA's nomenclature) is entire in all except the young male (*d*), where a groove separates the narrow anterior limb from the posterior broad part. Lobe 2M is completely divided by a longitudinal groove in all except the adult female (*b*), in which the groove is incomplete posteriorly. The outer division of 2M is entire in adult females (*b*) and (*e*); its inner border is notched in adult male (*a*) on both right and left sides of the animal; in adult female (*c*) its inner border is notched on the lobe of the right side of the animal, while on the lobe of the left side there is an indication of a transverse groove; finally, in young male (*d*) a distinct transverse groove divides the lobe of each side. Lobe 5L is entire in all except adult male (*a*), in which it is divided obliquely. Lobes 2R, 1R, and S are fused in adult male (*a*) and adult females (*b*, *c*); in young male (*d*) and in adult female (*e*) there is an indication of their separation by grooves. Variation is not always bilaterally symmetrical. The degree of sub-division of the lobules is the most apparent difference between the present species and *C. monticulosus*. The variations above noted are within the limits allowed to the species by ALCOCK.

*Atergatis integerrimus* (LAMARCK), 1818—A.3, p. 95.

Locality:—Galle, lagoon, one specimen (very small young).

*Lophactæa anaglypta* (HELLER), 1861—A.3, p. 102.

Locality:—Gulf of Manaar, two specimens (both males). C.L. = 16.0.

(See RATHBUN, 'Proc. Biol. Soc. Wash.', xi., p. 159, for *Platypodia* as generic name.)

*Zozymus gemmula*, DANA, var. *ceylonica*, nov.—Plate I, fig. 7.

Locality:—Trincomalee, three specimens (*a*, *b*, *c*).

*Description*:—Two males, one of which appears to be adult, and one female, which, though non-ovigerous, has a broad abdomen loosely applied to the sternum and may well be adult. Except in regard to the walking legs, the specimens show a very close similarity in most respects to those described and figured by DE MAN under *Zozymus gemmula*, DANA (DE MAN, 'Abh. Senck. Ges.', xxv., p. 588). However, the walking legs show considerable differences. The following is a description of these appendages in my specimens:—The four pairs of the same individual are very similar. Dorsal border of the meropodite faintly denticulated. Carpopodite and propodite have well-developed dorsal crests; that of the carpopodite is deeply fissured about the middle of its extent (a little more distal than the middle). The carpopodite has a longitudinal groove on its posterior surface; a transverse groove crosses this, continuing the line of the incision of the crest, and marking off a more or less triangular distal area of the segment. The joint between carpopodite and propodite is markedly oblique. The lower border of the propodite curves upward obliquely, approaching the upper border, so that the segment is more or less triangular in shape. The upper part of the flattened posterior surface of the propodite presents a triangular excavation filled with hair. The dactylopodite is narrow and slightly curved, terminating in a dark brown spinule.

The points in which the walking legs differ from DE MAN'S description and figure of those of *Z. gemmula* concern: (*a*) the similarity of the members of the four pairs—in DE MAN'S specimens they show considerable differences; (*b*) the upper border of the meropodites; (*c*) the free edges of the dorsal crests of carpopodite and propodite form a continuous even line; (*d*) the position of the fissure of the upper crest of the carpopodite; (*e*) the transverse grooves of the posterior face of the carpopodite; (*f*) the dorsal border of the propodite (for detail compare with DE MAN'S figure).

Further differences from DE MAN'S specimens are:—(1) The most posterior tubercle on the dorsal border of the hand is more prominent, it attracts notice with its flattened surface and its backwardly and inwardly projecting sharpened edge; (2) the anterior border of the front is a little more horizontal (see figures)—DE MAN found that the front was more prominent in the male than in the female, this does not hold for my specimens; (3) the ratio of fronto-orbital breadth divided by carapace length is greater in both sexes; (4) the granules of the outer surface of the fixed finger are more definitely arranged in two longitudinal rows; (5) they are smaller: it is possible, however, that they are not fully grown.

The value of distinctions (2), (3), and (4) appears to me very doubtful. I only

emphasise particularly (1) above, together with the condition of the walking legs, and for the present consider this form a variety of *Z. gemmula*.

I may note that 2M is completely divided into two by a longitudinal groove both in DE MAN's *Z. gemmula* and in the new variety, while DANA describes it as only partly divided. Another point is that in the present specimens the hollowing of the finger tips is not obvious; I should describe the fingers as blunt merely, DE MAN's figure indeed represents them very well. A point in the present specimens not mentioned by DE MAN is the presence of a curious little tuft of brown hair (seen well with a lens) which rises from a groove running along the inner surface of the fixed finger.

	(a) adult ♂.	(b) young ♂.	DE MAN'S ♂.	(c) adult ♀.	DE MAN'S ♀.
C.l.	7.25	5.50	14.25	6.25	10.00
C.b. ÷ C.l.	1.48	1.45	1.47	1.48	1.53
Fronto-orbital b. ÷ C.l.	0.93	1.00	0.81	1.00	0.90

#### *Demania*, n. gen.

Carapace pentagonal, moderately convex antero-posteriorly, flattened from side to side in its posterior half; the regions well delimited and subdivided into numerous lobules, the surface of which is smooth. The antero-lateral borders are blunt, cut by shallow grooves into four lobes; the border is faintly continued below the eye to the antero-lateral angle of the buccal cavern; the postero-lateral borders are straight and strongly convergent.

Front prominently bilobed, its breadth about one-third the greatest carapace-breadth, its plane is a continuance of the postero-anterior curve of the dorsum of the carapace. Orbits large, the three suture lines near the outer angles distinct; eyes on short thick stalks.

The antennules fold in a transversely oblique direction, making an angle of 40° (approximately) with a transverse line; the inter-antennulary septum is broad. Basal joint of antenna not quite as long as the posterior border of one of the antennulary fossæ; as a whole it stops short of the orbital hiatus, but its antero-external angle is produced into the latter; its antero-internal angle touches a downward projection of the front; the flagellum is short (less than major diameter of orbit), lodged in the orbital hiatus.

No ridges define efferent branchial channels in anterior portion of buccal cavern.

Merus of external maxillipeds pointed anteriorly, its borders sloping obliquely backwards, making together an angle of 90° (approximately). Chelipeds equal in female (male not known); fingers not hollowed at tips. Walking legs with the upper border of the merus, carpus and propus and the lower border of merus and propus cristate.

Abdomen of male not known.

Carapace length (including rostral lobes) of only specimen known is 32.50 millims.

This new genus bears considerable resemblance in general appearance to the genus *Zozymus*; the sculpture of its carapace and chelipeds, and its cristate walking legs, are reminiscent of *Zozymus æneus*. It presents, however, many points of difference from that genus.

These differences concern:—(1) Plane of the posterior half of the dorsal surface of the carapace; (2) antero-lateral borders of the carapace; (3) direction in which the folded antennules lie; (4) antero-external angle of the basal antennal segment; (5) shape of anterior part of merus of external maxillipeds; and (6) finger tips.

The form of the antero-lateral borders of the carapace is, moreover, a point of difference from ALCOCK's description of the Alliance in which he places *Zozymus*, i.e., Alliance *Zozymoida* (see A. 3, p. 77); the character of the walking legs is a link with this Alliance. The sub-orbital continuation of the antero-lateral borders of the carapace, and the production of the outer angle of the basal antennal joint into the orbital hiatus, are links with the Alliance *Euxanthoida*. The pentagonal form of the carapace is a point of similarity to the Alliance *Halimédoida*. (See NOBILI for figure of *Haliméde hendersoni*—N., p. 123, pl. vi., fig. 31.)

*Demania splendida*, n. sp.—Plate I., fig. 8, and Plate II., fig. 1.

Locality:—Trincomalee, a single non-ovigerous, but probably adult, female.

Description:—Carapace roughly pentagonal, with prominent deeply notched front and rounded epibranchial angles; the antero-lateral borders are convex, the postero-lateral borders concave, the posterior border slightly concave.

The general surface is convex fore and aft; it is also convex from side to side—quite obviously so in the hepatic regions, only slightly so in the branchial regions. The regions are well delimited by pubescent grooves, and are themselves broken by similar grooves into numerous lobules; the latter are more numerous and more distinctly demarcated in the posterior half; in the anterior half they are often more or less confluent, the separating grooves dying away. The lobules are all smooth and polished, and the grooves are found on removal of the pubescence to be smooth. The carapace has thus a general resemblance to that of *Zozymus æneus*.

The front is considerably produced and deeply divided to form two prominent bluntly pointed lobes; at the base of the outer border of each of the latter the outer angle of the front is produced as a distinct, blunt, forwardly directed tooth. Frontal breadth ÷ C.L. = 0.31; length of frontal lobe (inner border) ÷ frontal breadth = 0.27.

Orbital border smooth. Upper border has tumid inner portion. There are three fissures—one a little to outer side of the middle point of the upper border, the other two are in the neighbourhood of the outer angle, one above and one below. The inner orbital angles, both upper and lower (the latter a blunt tooth), are prominent; the intervening hiatus receives only a narrow projection of the outer angle of the basal antennal segment.

Antero-lateral border of carapace rounded; the actual edge shows a slight sharpening,

and there is a suggestion of its continuance anteriorly below the orbit to the antero-external angle of the buccal cavern. It is divided by grooves into four sufficiently distinct, but little-prominent, lobes; the groove between the 1st and 2nd lobe is the least distinct.

Under surface of carapace smooth and polished, and lobulated as dorsal surface. A distinct groove runs obliquely backward from the region of the green gland aperture, to end at the border of the carapace just above the base of walking leg 4. There is a patch of hair above the base of the chelipeds, and a fringe follows the edge of the carapace above the bases of the walking legs, and skirts abdomen.

Thoracic sternal region is in its exposed portion broken by transverse pubescent grooves into regions appropriate to the segments bearing chelipeds and four walking legs. There is some tendency to subdivision of these regions (see figure), and the surfaces are polished and show some dimples.

Abdomen.—The seven abdominal terga are separate. Tergum VI. is about twice as long as any of the first five (which are subequal in length) and of approximately the same length as tergum VII. In addition to a little dimpling, each tergum is traversed by a pubescent transverse groove, before and behind which, in the case of VI., is a slightly marked additional groove. The abdomen is well fringed with hair.

Antennules fold obliquely—making an angle of  $40^\circ$  (approximately) with a horizontal line.

Antennæ.—Basal antennal segment, as a whole, falls short of the inner orbital angles; its outer angle, however, is produced into the hiatus; its inner angle touches a downgrowth of the front. The orbital hiatus thus remains open for the most part, and in it is seen the short antennal flagellum (flagellum length  $\div$  C.I. = 0.11).

External Maxillipeds.—See figure. The merus is of approximately the same breadth as the ischium and about one half as long; it is pointed anteriorly, its borders sloping obliquely backwards and making together an angle of  $90^\circ$  approximately. The flagellum arises from the inner side of the apex. A longitudinal groove traverses both merus and ischium. The surface of the external maxilliped is polished.

Chelipeds of equal size. The upper, outer, and under surfaces of the arm, wrist, and hand are subdivided by pubescent grooves into polished lobes somewhat reminiscent of brain convolutions. The inner surface of the arm is smooth, and is concave in correlation with the convex under surface of the carapace; on the sharp inner border of the merus are three blunt teeth (exclusive of the distal angle), the same border has a fringe of hair; the upper border is also sharp; the inner border is well rounded. The length and breadth of the upper surface of the wrist are equal, its inner anterior angle is produced into a tooth, to the inner side of which is a much smaller one; the upper and outer surfaces form a continuous curve. The upper border of the hand is armed with a row of six or seven blunt teeth, or tubercles (six on right hand, seven on left hand); the grooves of the hand, transverse in the main, are crossed by two which are longitudinal (one running to the outer side of the base of the dactylus,



the other to the base of the inter-digital cleft). The fingers have pointed tips, they meet throughout their length; apposed borders are toothed throughout, the distal teeth being the larger; when clenched, the inner surfaces of the fingers taken together are concave; an irregular pubescent groove runs along the proximal portion of the upper surface of the dactylus.

Walking legs flattened laterally, the dorsal border of meropodite, carpopodite, and propodite in each is expanded as a considerable crest; the ventral border of the meropodite of each has distally two ridges, the anterior of which extends the whole length of the segment, and is more prominent proximally, particularly in walking leg 4; in walking leg 4, also, the ventral border of the propodite is expanded, so that the segment is foliaceous; there are traces of transverse grooves on the posterior surfaces of the meropodites of all the walking legs; the posterior surface of the propodite is dimpled.

The dactylopodites of the first three pairs are fairly similar, somewhat compressed antero-posteriorly, both anterior and posterior surfaces with a longitudinal groove, dorsal border flattened and bearing a mat of short hairs. The dactylopodite of walking leg 4 is foliaceous, but its flattened surface is only 0.36 as broad as that of the propodite of the same appendage. There is a tuft of hair on the dorsal border of the proximal portion of the meropodite of each walking leg.

C.b. (rostral lobes included) = 32.50; Front.b. ÷ C.l. = 0.31; Fronto-orb.b. ÷ C.l. = 0.58. C.b. ÷ C.l. = 1.11; Front.b. ÷ C.b. = 0.32; Fronto-orb.b. ÷ C.b. = 0.50. Ant.lat.bord.C. ÷ C.l. = 0.43; Post-lat.bord.C. ÷ C.l. = 0.58; Post.bord.C. ÷ C.l. = 0.52. Ch.l. (i.e., Arm l. + Propus l.) ÷ C.l. = 1.30; Arm l. (lower border, condyle of basal joint included) ÷ C.l. = 0.58; Propus l. (lower border) ÷ C.l. = 0.72.

*Lophozozymus incisus* (H. MILNE-EDWARDS, 1834)—A.3, p. 107.

Locality:—Gulf of Manaar, one specimen.

Description:—An adult male. C.l. = 15.0.

*Lophozozymus dodone* (HERBST, 1801)—A.3, p. 108.

Localities:—Off Mutwal Island, two specimens (adult ♂, adult ♀); coral reefs, Gulf of Manaar, two specimens (adult ♂); pearl banks, Gulf of Manaar, two specimens (♂, ? young); Trincomalee, two specimens (young ♂, young ♀).

Description:—Variability among the specimens concerns:—(1) Index C.b. ÷ C.l.; and (2) the fact that most are somewhat concave laterally, but an adult male has approximately straight sides.

*Lophozozymus pulchellus*, A. MILNE-EDWARDS, 1867—('Nouv. Arch. Mus.', ix., p. 205).

Locality:—Galle, one specimen.

Description:—Adult female. C.l. = 10.5. It is covered with a pubescence. The most anterior of the three antero-lateral teeth is obsolete. Traces of the network of red lines are seen in the posterior and postero-lateral regions with a lens.

*Remarks.*—This species is new to the Indian fauna. It may conveniently be separated from all other Indian forms by having the edge of the antero-lateral border of the carapace rounded in its anterior portion.

*Euxanthus herdmani*, n. sp.—Plate I., figs. 9, 9a.

*Locality* :—Pearl banks, Gulf of Manaar, one specimen.

*Description* :—An adult male. C.l. (including frontal lobes) = 23.00.

The lobules of the carapace are strongly convex, 2L more prominent than the others; they are dimpled, but 3M very slightly so; there is a fine pitting on the anterior part of the surface of the carapace, producing a dull appearance; the posterior part is glazed. The antero-lateral border is cut into four blunt tubercular teeth, the hindermost of which is smaller than the other three, which are of sub-equal size; the sub-orbital continuation of the border is indistinct. The curve of the orbit is unbroken by any denticle at the outer angle, and is seen by the lens to be finely granular.

The exopodite of the external maxilliped is granular, so is the outer proximal part of the ischium and the free border of the merus. The longitudinal groove of the ischium and that of the merus are both deep. The outer surfaces of the wrist and hand, as of the corresponding segments of the legs, are nodular, both nodules and the hollows between them being smooth. The outer surface of the wrist is rounded, with the nodules faintly marked (by no means so obvious as in *E. melissa* or *E. sculptilis*). The inner surface of hand, wrist, and arm is flattened and smooth; the upper surface of the hand has two nodules distally behind the finger joint, and a third posteriorly just in front of the wrist joint. Running obliquely backward and outward from the outer of the two distal nodules is a series of three others, from each of the first and third of which runs forward a wrinkled non-granulated line. The fingers have strongly toothed cutting edges, the distal end of the fixed finger is hollowed on the inner side of the teeth; the proximal portion of the upper surface of the dactylus is granular.

The upper and lower borders of the walking legs and the upper border of the arms are fringed with hair; the fringe is replaced on the upper border of the dactylopodites of the walking legs by a close-set covering of short hairs.

C.l. (rostral lobes included) = 23.00; C.b. ÷ C.l. = 1.33; Fronto-orbital b. ÷ C.l. = 0.71; Antero-lateral border (a straight line uniting the outer angle of orbit with the tip of the 4th antero-lateral tooth) ÷ C.l. = 0.62; Postero-lateral border (a straight line uniting the tip of the 4th antero-lateral tooth with the point at which the carapace border meets the 1st abdominal tergum) ÷ C.l. = 0.53; Posterior border of carapace (line of junction with abdominal tergum 1) ÷ C.l. = 3.04.

*Remarks.*—Among forms hitherto described the new species comes nearest to *E. melissa* in general character of the lobules of the carapace and in the absence of the denticle at the outer angle of the orbit. It is somewhat intermediate in the

sculpture of its hands and fingers, between *E. melissa* and *E. sculptilis*. It differs from forms hitherto described in:—(1) Ratio of C.b. ÷ C.l.; (2) the more produced frontal lobes (see figure); (3) the antero-lateral border of the carapace has only four tubercles. The latter point is useful for purposes of key. The anterior of the antero-lateral teeth seems to take the place of the first two antero-lateral tubercles of *E. melissa* or of *E. sculptilis* and of a third tubercle to the inner side of these on the dorsal surface of the carapace, which is distinct in both the species named. Correlated with this arrangement is the more regular curve made by the front and the antero-lateral borders.

The form of the front is not unlike that of a specimen of *Hypocolpus rugosus* in the British Museum, in which, moreover, there are only four indistinct lobes on the antero-lateral border. There is a faint depression on the ventral surface behind the orbit and to inner side of 1st antero-lateral tooth. This does not represent the curious deep cavity found in *Hypocolpus*, for both are present in *H. sculptus* (i.e., in British Museum specimen from Mauritius 84.8).

*Hypocolpus* [= *Hypocelus*] *rugosus*, HENDERSON, 1893—A.3, p. 111.

Locality:—Coral reef, Gulf of Manaar, two specimens (ovigerous ♀ and adult ♂).

I note (1) granules of carapace are larger than in a specimen of *H. granulatus* in the British Museum instead of smaller as in HENDERSON'S description; (2) the three teeth of the antero-lateral border of the carapace are not so obvious as in HENDERSON'S figure, and in the adult ♂ (*b*) an additional small tooth occurs between the 2nd and 3rd larger ones counting from before backwards. In the adult ♀ (*a*) there is a mere trace of this additional tooth.

A point of difference between the present specimen of *H. rugosus* and the British Museum specimen of *H. granulatus* is that in the former the sternal area on either side of the flexed abdomen has an eroded appearance, while in the latter it is covered irregularly by distinct granules.

*Xantho distinguendus*, DE HAAN, 1835—A.3, p. 113.

Localities:—Coral reefs, Gulf of Manaar, one specimen (*a*); south of Galle, deep water, three specimens (*b*, *c*, *d*).

Description:—Specimen (*a*) is an adult male, C.l. = 6.0; specimens (*c*) and (*d*) are non-ovigerous adult females; specimen (*b*) is male, with a parasitic *Sacculina*.

Remarks.—On comparing with DE HAAN'S example, one notes (1) the much smaller size, and (2) that the posterior surface of the meropodite of the walking leg 4 is smooth instead of granulated. They thus tend to agree with MIERS' "Challenger" specimens which he called *Lophozozymus bellus*, var. *leucomanus*, but are still smaller. This species is the *L. (Lophoxanthus) leucomanus* of LANCHESTER. The *Sacculina* attached to the male specimen (*b*) does not seem to have affected the sexual characters of its host; the male appendages and the general shape of the abdomen are much as in specimen (*a*), and no abdominal appendages appropriate to the female are developed.

*Xantho* (*Leptodius*) *exaratus* (H. M.-EDW., 1834)—A.3, p. 118.

Locality :—Trincomalee, one specimen (female, doubtfully adult).

Description :—It answers to ALCOCK's description. Comparing with KOSSMANN's figures, its greatest carapace-breadth is across the region of the 3rd, not the 4th, lateral teeth.

*Cycloxanthops* [= *Cycloxanthus*] *lineatus*, A. M.-EDW., 1867—A.3, p. 124.

Localities :—Coral reef, Gulf of Manaar, three specimens (*a*, *b*, *c*); Cheval Paar, one specimen (*d*); off Kaltura, one specimen (*e*).

Description :—All are males, apparently adult. The spirit has removed the colour, but the specimens give evidence (under lens) that there are colour varieties within the species.

A. In specimens (*b*) and (*d*) there are faint whitish lines on the carapace in the positions represented in A. MILNE-EDWARDS' figure.

B. In specimens (*a*) and (*e*) the carapace is covered with large spots a little darker than the general surface, each of which is surrounded by a whitish ring.

C. Specimen (*c*) has neither lines nor spots.

*Polyceremus ochtodes* (HERBST, 1783)—A.3, p. 135.

Localities :—Pearl banks, six specimens (three ♂, probably adult, two ♀, one young ♀); coral reefs, Gulf of Manaar, three specimens (two ♂, probably adult, and one ♀, probably adult).

*Actæa speciosa* (DANA, 1852)—A.3, p. 143.

Locality :—Gulf of Manaar, one specimen.

Description :—Female, adult, but non-ovigerous. C.L. = 6.25. It agrees with KOSSMANN's description and photograph of *Psaumis glabra*. It also agrees with DANA's description, but differs from his figure in some points. In mine (1) the lobe 2M is more deeply subdivided; (2) though in the posterior portion of the carapace the grooves are very shallow and partly obliterated by granules, it is still possible to distinguish, somewhat indefinitely, the lobes 1R, 2R, 1P and 2P. There is a distinct fissure between the outer angle of the orbit and the sub-orbital border, stated by ALCOCK to be absent in his specimens (three, from the Persian Gulf, Ceylon, and Andamans). DE MAN finds this fissure in his specimen ('Abh. Senckb. Ges.,' xxv., 609).

Differences between my specimen of *A. speciosa* and the descriptions of the closely allied *A. rufopunctata* are that in the former :—(1) Carapace is relatively longer and narrower; (2) carapace, chelipeds, and walking legs devoid of hair; (3) lobulation of carapace much less complete and bold except on antero-lateral regions, that of chelipeds and walking legs is much as in *A. rufopunctata*; (4) the anterior tongue of 3M reaches farther forward; (5) the longitudinal division of 2M is hardly complete posteriorly; (6) the groove separating 2M from 2L diverges a good deal anteriorly

from its fellow of the opposite side; (7) lobe 1P is not subdivided by a longitudinal groove and is more or less top-shaped, an anterior strip being marked off.

*Actæa ruppelli* (KRAUSS), 1843—A.3, p. 144.

Locality:—Navakaddu Paar, Gulf of Manaar, three specimens.

*Actæa alcocki*, n. sp.—Text-fig. 5.

Locality:—Gulf of Manaar.

*Description*:—An adult male. C.l. = 16.5.

The breadth of the carapace across region of last pair of antero-lateral teeth is 1.53 its length; breadth across region of next to last pair of antero-lateral teeth is 1.48 its length; frontal b. ÷ C.l. = 0.36; fronto-orbital b. ÷ C.l. = 0.64; antero-lateral border l. ÷ C.l. = 0.71; postero-lateral border l. ÷ C.l. = 0.60; posterior border l. ÷ C.l. = 0.60 (the junction of the posterior and postero-lat. border is the posterior end of a finely marked groove). The carapace and exposed surfaces of chelipeds and walking legs are covered with a short down which does not conceal the lobulation or granulation; the anterior two-thirds of the carapace are lobulated, the lobules are distinctly though not strongly demarcated by shallow grooves; on the posterior one-



Fig. 5. *Actæa alcocki*, n. sp.

third of the carapace the lobulation is obsolete. The whole dorsal surface of the carapace, grooves and lobules, and the exposed surfaces of chelipeds and walking legs, are covered with crisp, not particularly strong, granules. The lobes of the antero-lateral border are bluntly pointed, increasing in size from before backward; the first is obsolescent. The front is vertically deflexed, continuing the curve of the anterior part of the carapace; it is quite obviously bilobed; at the outer base of each lobe the inner supra-orbital angle is produced vertically downwards to form a distinct tooth. Supra-orbital margin moderately tumid, cut by two fissures in its outer portion and separated from the lower border by a third fissure.

Basal antennal segment does not quite reach the inner orbital angles.

The surfaces of the arm are smooth, a row of small sharp granules borders its lower edge. The upper and lower borders and the outer surfaces of hand and wrist (*i.e.*, the

“exposed surfaces”) are granular as the carapace; the granules of the hand are the larger and are arranged in longitudinal rows on the lower half of the outer surface; the other surfaces are smooth. There is a slight transverse groove on the outer surface of the wrist behind the joint with the hand. The proximal part of the upper border of the mobile finger is roughened; there is a tooth on the biting border of each finger about one-third of its length from the base; the fingers are grooved and pointed. Distally the upper border of the hand turns abruptly downward at a right angle to the point where the mobile finger is hinged.

There is a longitudinal groove to the outer side of the upper border of the carpopodites of the walking legs. Colours in spirit (4½ years), yellowish, with a circular brown patch on the gastric region, and brown fingers.

The new species comes most easily into section I.L.2 of ALCOCK'S key, A.3, p. 139, though carapace length = 0.66 the breadth. It is distinguished by absence of shaggy hair, the shallow nature of its grooves, the festooned appearance of its antero-lateral borders, and by its general facies.

*Actæa variolosa*, BORRADAILE, 1902—B.III., p. 256, fig. 54.

Localities:—Jokkenpidi Paar, one specimen (adult ♂); Navakaddu Paar, three specimens (one adult ♂, two adult ♀).

*Description*:—The grooves which delimit the cardiac region laterally agree in the adult male (b) with their condition in BORRADAILE'S figure, but in the other specimens they are more obvious—running back to a slightly indicated transverse groove parallel to and just in front of the posterior border of the carapace.

The tooth on the base of the dactylus is quite small; that on the base of the fixed finger is stout. On either side of the base of each of these teeth is a curious little tuft of dark brown hair.

*Actæa peroni* (H. M.-EDW.), var. *squamosa*, HENDERSON, 1893 (H., p. 357).

Localities:—Coral reefs, Gulf of Manaar, one specimen (adult ♀); Navakaddu Paar, two specimens (adult ♀ and young ♀).

*Description*:—Add to HENDERSON'S description that there are tubercles on the front and on the antero-lateral border.

*Remarks*.—These specimens, from two localities, fall under HENDERSON'S description of var. *squamosa*—i.e., the only specimens recorded from India fall into a group having varietal distinction from ALCOCK'S description (A.3, p. 150). The latter applies to the Australian variety, of which I have seen 13 specimens in the British Museum from various parts of the coast of Australia.

*Actæa calculosa* (H. M.-EDW., 1834)—A.3, p. 152.

Localities:—Pearl banks, Gulf of Manaar, nine specimens; off Kaltura, one specimen; Galle coral reef, one specimen; Navakaddu Paar, two specimens.

*Remarks*.—I consider *A. calculosa* and *A. granulata* to be distinct species. Comparing the present series of the former with a series of over 20 specimens of the latter in the British Museum, I find that though the differences are individually slight, they are numerous, constant and highly correlated. A series of differences between the two species has been set forth by CALMAN (C., p. 8).

I have seen MIERS' specimens in the British Museum, for the reception of which he made *Eucanthus tuberculosus*; as CALMAN points out, they certainly = *A. calculosa*.

*Actæa granulata* (AUDOUIN, 1826)—A.3, p. 151.

*Localities*:—Off Negombo, Gulf of Manaar, two specimens; coral reefs, Gulf of Manaar, one specimen.

*Xanthias* [= *Xanthodes*] *lamarcki* (H. M.-EDW., 1834)—A.3, p. 157.

*Locality*:—Galle, lagoon, four specimens (two adult ♂, two young ♀).

*Xanthias* [= *Xanthodes*] *notatus*, DANA, 1852—A.3, p. 158.

*Locality*:—Chilaw Paar, one specimen.

*Description*:—Adult male; agrees well with ALCOCK'S description. In comparing with DANA'S figure it may be noted that, both in ALCOCK'S description and in the present specimen, the last two antero-lateral teeth are procurved and spine-like. The 3rd tooth is in this specimen the longest.

*Chlorodiella* [= *Chlorodius*] *niger* (FORSKÅL, 1755)—A.3, p. 160.

*Localities*:—Trincomalee, one specimen (*a*); Palk Bay, one specimen (*b*).

*Description*:—Specimen (*a*) is a small male (? immature), C.l. = 6.50; specimen (*b*) is an ovigerous female, C.l. = 9.25. In both examples the last two antero-lateral prominences are blunt teeth (sharper than the 1st and 2nd teeth of the series in (*a*), much as 2nd tooth in (*b*)). They do not terminate in "procurved spine-like points" as in the examples described by ALCOCK. In specimen (*a*) there is neither spine nor tubercle on the anterior border of the arm.

*Phymodius sculptus* (A. M.-EDW., 1873)—A.3, p. 164.

*Locality*:—Coral reef, Galle, two small males.

*Chlorodopsis areolata* (H. M.-EDW., 1834)—A.3, p. 166.

*Localities*:—Galle, two specimens (adult ♀ and adult ♂); Galle, lagoon, one specimen (young ♀).

*Description*:—In the adult female, C.l. = 9.50; C.b. ÷ C.l. = 1.42; Frontal b. ÷ C.l. = 0.66; Frontal l. ÷ C.b. = 0.46.

The female of this species is figured by DANA under the name *Etisodes calatus*.

*Chlorodopsis pilumnoides* (WHITE, 1847)—A. 3, p. 167.

Localities :—Coral reefs, Gulf of Manaar, six specimens; Navakaddu Paar, four specimens; Jokkenpiddi Paar, two specimens; Muttuvaratu Paar, six specimens.

*Description* :—The above include six adult males, one young male, three ovigerous females, six adult non-ovigerous females, and two young females. C.l. ovig. ♀ = 9.5.

*Pilodius pugil*, DANA, 1852—('U.S. Expl. Exp.,' Crust., I., 1852, p. 219, pl. xii, fig. 8.)

Locality :—Gulf of Manaar, one specimen.

*Description* :—An adult male. C.l. = 10.0.

*Cyzo andreossi* (AUDOUIN), 1826—A. 3, p. 173.

Locality :—Gulf of Manaar, one specimen.

*Description* :—Adult male, C.l. = 6.50.

*Calmania*, n. gen.

Carapace subcircular, its length and breadth about equal; it is convex antero-posteriorly, less so from side to side; the only region distinctly indicated is the cardiac, which is delimited anteriorly and antero-laterally by an obvious groove. The antero-lateral border is indistinctly four-lobed.

Fronto-orbital breadth about two-thirds the greatest carapace breadth. Frontal breadth about one-third the greatest carapace breadth. The front is rounded anteriorly, continuing the general antero-lateral curve of the carapace; it is very distinctly bilobed; the lobe of either side is not separated by notch or groove from the orbital border. One of the two supra-orbital grooves is present, the other indicated merely. Eyes on short thick stalks.

The fold of the antennules is longitudinally oblique, making an angle of a little less than 45° with a perpendicular line.

The basal antennal segment falls short of the orbital hiatus, into which its outer angle is not produced. The antennal flagellum slender and naked; it is about  $\frac{1}{4}$  C.l.

No ridges define efferent branchial channel in anterior portion of buccal cavern.

The merus of the external maxillipeds is broader than long. The ischium is slightly longer than broad. The outer angle of the merus is rounded.

Chelipeds equal (a non-ovigerous, but quite probably mature, female only known), not long, but very massive, the fingers remarkably large, gaping proximally, their tips pointed; the upper border of the hand bears two prominences—the distal of the two is particularly enlarged. The walking legs are approximately the same length as the cheliped; they are fringed with silky hair.

It is a little difficult to find relatives for the new genus. I place it among the Xanthidæ, as having the anterior epistomial margin of the buccal cavity well defined and not overlapped by the external maxillipeds, and the antennal flagellum slender; it differs, however, from the usual Xanthid form in the greater length of its antennal



flagellum and in the longitudinally oblique fold of the antennules. The latter characters and the general *Kraussia*-like shape of the carapace suggest Cancrid affinities. It may possibly fall into the sub-family Chlorodinæ (A.3, p. 78); but it does not agree with any of the three Alliances into which ALCOCK divides the sub-family, but the obliquely folding antennules of *Cymo* are to be remembered. From *Cymo*, however, the new genus presents many points of difference.

*Calmania prima*, n. sp.—Plate I, fig. 12, *a-c*.

Locality :—Gulf of Manaar, one specimen.

Description :—A female, non-ovigerous, but quite probably adult.

C.l. = 7.0; C.l. ÷ C.b. = 0.93; the only region distinctly indicated is the cardiac, which is delimited anteriorly and antero-laterally by a well-marked groove; a fainter groove completes the isolation of the branchial regions anteriorly, a groove runs back in the middle line from the notch between the frontal lobes. There are four tufts of hair on the dorsal surface of the carapace, one on each side of the gastric region and one behind and to outer side of each of these. The antero-lateral border of the carapace is sharpened, almost cristate, and has three slight teeth behind the external orbital angle, which faintly indicate a division into four lobes.

Fronto-orbital b. ÷ C.b. = 0.71; frontal b. ÷ C.b. = 0.46. For further description of front see generic description; it is fringed by long silky hairs.

The folded antennule makes an angle of 40° approximately with a perpendicular line. The antennal flagellum is slender and naked. Ant. flag. l. ÷ C.l. = 0.25, approx.

For external maxillipeds, see description of genus. The ischia do not quite meet.

Ch.l. ÷ C.l. = 1.22; the massive hand and fingers are remarkable; the fingers are bent on the hand somewhat as in *Lambrus*; when closed, the distal halves of the fingers meet, but between the proximal halves there is a rounded gap left; the distal appposable part of both fingers is dentate. The inner surface of the hand is smooth and polished; the outer surface of hand and fingers is richly sculptured; both above and below an intermediate region of outer surface of hand is a groove bordered on both edges by a granular line. On the upper border of the wrist is a row of granules. The sculpture of the hand and fingers is hidden a good deal by hair; long silky hairs are found also on the upper border of the hand, and a tuft on the outer surface of the wrist.

The walking legs are of approximately equal length, 2nd walking leg l. ÷ C.l. = 1.20; they are a little compressed laterally; their surface is smooth and glazed; their borders are fringed with silky hair.

*Ozius rugulosus*, STIMPSON, 1858—A.3, p. 182.

Locality :—Galle, one specimen (adult ?).

*Ozius tuberculosus*, H. M.-EDW., 1834—A.3, p. 183.

Locality :—Trincomalee, one specimen.

*Description*.—An adult male. The central part of the carapace is smooth, *i.e.*, the pearly tubercles are here absent.

*Epixanthus frontalis* (H. M.-EDW., 1834)—A.3, p. 185.

*Locality*.—Trincomalee, two specimens (*a*, *b*).

<i>Description</i> .—	C.l.	C.b. ÷ C.l.	Frontal b. ÷ C.l.	Frontal b. ÷ C.b.
( <i>a</i> ) adult ♂ . . .	13.25	1.64	0.57	0.34
( <i>b</i> ) ovigerous ♀ . . .	16.00	1.62	0.56	0.35

*Pilumnus vespertilio* (FABRICIUS), 1793—A.3, p. 192.

*Locality*.—Trincomalee, one specimen.

*Description*.—An adult male, C.l. = 19.0. The sub-hepatic denticle of the right side is double, and that of the left side is represented by a group of three granules.

*Pilumnus longicornis*, HILGENDORF, 1878—A.3, p. 193.

*Locality*.—Gulf of Manaar, two specimens.

*Description*.—Both adult males.

*Pilumnus cursor*, A. M.-EDW., 1873—A.3, p. 195.

*Locality*.—Gulf of Manaar, one specimen.

*Description*.—Female, probably adult. C.l. = 8.00.

This specimen agrees very fairly with ALCOCK's description of the samples which he puts with a query under this species. However, an area occupying the distal part of the lower portion of the outer surface of its larger chela (say one-third of whole outer surface) is naked and polished. Its fingers are dark brown.

*Actumnus setifer* (DE HAAN), var. *tomentosus* (DANA), MIERS—A.3, p. 202.

*Locality*.—Pearl banks, Gulf of Manaar, four specimens (including *a*); off Mutwal Island, two specimens (*b*, *c*); south of Modragam, one specimen.

*Description*.—The series includes six males—all perhaps adult—and one ovigerous female. C.l. of the latter = 5.5.

In male specimen (*a*) the denuded carapace appears smooth to the naked eye, but fine granules are revealed by the lens. A similar fine granulation occupies the central part of the carapace of males (*b*) and (*c*), in both of which an antero-lateral strip is granular to the unaided eye. Distinctness of areolæ possesses high variability; specimens (*c*), (*a*), and (*b*), together with a Torres Straits specimen in the British Museum, form a series linking *tomentosus* and *setifer* in respect of this character.

*Remarks*.—The evidence of the British Museum specimens and of those before me compels me to consider, with MIERS ("Alert," p. 225), that *tomentosus* and *setifer* are a single species. ALCOCK kept them apart, however, and in so doing he had before him 32 specimens of the former and 53 of the latter. It would be interesting to have some exact knowledge of variability within such considerable samples.

*Actumnus setifer* (DE HAAN), var. *setifer*—A. 3, p. 202.

Localities:—Pearl banks, Gulf of Manaar, one specimen (adult ♀); deep water off Galle, one specimen (ovigerous ♀); Trincomalee, one specimen (ovigerous ♀).

*Description*.—In these specimens the areolæ are more distinct than in the figures of either DE HAAN or of A. MILNE-EDWARDS. Moreover, the tomentum gives place to a slight pubescence, and the general appearance is reminiscent of *A. verrucosus*, HENDERSON, from which the specimens may, however, be distinguished as in ALCOCK'S key by having the lobule of the lateral gastric region semicircular instead of ω-shaped.

*Remarks*.—The specimens suggest that an examination into the specific distinctness of *A. setifer*, *A. bonnieri*, and *A. verrucosus* is desirable.

*Actumnus verrucosus*, HENDERSON, 1893—A. 3, p. 203.

Localities:—Pearl banks, Gulf of Manaar, 25 specimens; coral reefs, Gulf of Manaar, five specimens; Muttuvaratu Paar, one specimen.

*Remarks*.—There is in the British Museum a single adult male specimen of this species labelled in MIERS' (?) writing "*Actumnus ceylonicus*, MIERS—Ceylon. Presented by E. W. H. HOLDSWORTH, Esq.—1875." I am not aware that he published any description of the crab.

*A. verrucosus* is very closely allied to *A. setifer* on the one hand and to *A. bonnieri*, NOBILI, 1905, on the other.

*Actumnus bonnieri*, NOBILI, 1905—(N., p. 132, pl. vi, fig. 32).

Localities:—Pearl banks, Gulf of Manaar, two specimens (one adult ♀); deep water off Galle, one specimen (ovigerous ♀).

The present examples of *A. bonnieri* agree well with NOBILI'S description and photograph. They are smaller than the average of *verrucosus* specimens known to me. The difference between the two species in question is mainly a difference in the form of the lateral gastric lobe. A similar distinction does not separate it from *A. setifer*, though other differences hold here.

Apart from the characteristic ω-shaped lateral gastric lobe of *A. verrucosus*, the characters which separate *A. setifer* var. *tomentosus*, *A. setifer* var. *setifer*, *A. verrucosus*, and *A. bonnieri* from each other are highly variable. An exact knowledge of the variation within large samples is very desirable. Such variable characters are:—(1) C.b. ÷ C.l., (2) convexity of carapace, (3) distinctness of areolæ, (4) hairiness of carapace, (5) condition of outer angles of front, (6) condition of fissure in lower orbital margin (?), (7) granulation of wrist.

*Actumnus fissifrons*, ALCOCK, 1898—A. 3, p. 204; A. Invest., pl. xxxvii, fig. 5.

Locality:—Deep water off Galle, one specimen (adult ♂).

*Trapezia cymodoce* (HERBST, 1801)—A.3, p. 219.

Localities:—Muttuvaratu Paar, four specimens (*e, f, g, h*); Jokkenpidi Paar, one specimen (*k*); coral reef, Galle, twelve specimens (*m, n, p, q, r, s, t, u, v, w, x, y*); pearl banks, Gulf of Manaar, eight specimens (*a, b, c, d, i, j, k, o*).

*Description*:—ALCOCK'S observation, that the carapace of the adult female is more curved than that of the male, is reversed in the present series. Variation concerns—(1) size: the size of adult specimens varies a good deal, *e.g.*, two adult males C.L. = 6.25 and 16.0, and two ovigerous females C.L. = 5.75 and 10.75; (2) the outer angles of the frontal lobes: these are entire in most, but crenulate in adult male (*i*) and in ovigerous female (*b*), and they tend to be so also in (*j*) young ♀, (*m*) ovigerous ♀, and (*n*) adult ♂; (3) the outer orbital angle is in most cases produced and pointed, but in the adult male (*k*) and also in (*p*), (*q*), and (*r*) it is blunt, in ovigerous ♀ (*v*), ovigerous ♀ (*x*), and adult ♂ (*y*) it is only slightly produced, and in adult ♂ (*w*) it is not produced; (4) the lateral epibranchial spine is quite obvious and sharp in most cases, but in (*k*), (*p*), (*q*), and (*r*) it is blunt, while in (*v*), (*x*), and (*y*) it is obsolete. It will be noted that variation of outer orbital angle and of lateral epibranchial spine are correlated.

A specimen (*z*) from "Lagoon, Galle, 1903," may be conveniently included here as a variety. In it the lateral epibranchial tooth of the carapace is absent, the antero-lateral borders diverging posteriorly to form a continuous curve with the anteriorly divergent postero-lateral borders. The hand is naked. The front agrees fairly with that of *T. ferruginea* or *T. cymodoce*. I would name it **var. edentula**.

Another specimen (*z'*), a doubtfully mature male, has the merest trace of a lateral epibranchial tooth and a rather strongly reflected front.

*Remarks*.—The specimens (*p*), (*q*), and (*r*) combine the outer orbital angle, the lateral epibranchial tooth, and the inner sub-orbital tooth of *ferruginea* with the hand of *cymodoce*. The front is intermediate in character. The specific distinction between the two species is thus minimised. Judging from my specimens and from those in the British Museum, the best distinction is the hair of the hand.

*Trapezia ferruginea*, LATREILLE, var. *areolata*, DANA, 1852—A.3, p. 221.

Localities:—Coral reef, Galle, two specimens; Trincomalee, one specimen; Cheval Paar, two specimens; Jokkenpidi Paar, two specimens.

*Description*:—C.L. of an ovigerous female = 12.

*Trapezia maculata* (MACLEAY, 1838)—A.3, p. 221.

Locality:—Jokkenpidi Paar, two specimens (young ♂ and young ♀).

*Trapezia rufopunctata* (HERBST, 1799)—A.3, p. 222.

Locality:—Jokkenpidi Paar, one specimen.

*Description*:—An ovigerous female, C.L. = 13.

*Tetralia glaberrima* (HERBST, 1790)—A.3, p. 223.

Localities:—Galle, one specimen; pearl banks, Gulf of Manaar, two specimens; Navakaddu Paar, two specimens; Muttuvaratu Paar, one specimen; off Mutwal Island, one specimen.

*Description*:—The above include three ovigerous females, one young female, one adult male, and two doubtfully young males.

*Quadrella coronata*, DANA, var. *granulosa*, BORRADAILE, 1902 (B.III., p. 266).

Locality:—Gulf of Manaar, six specimens; Galle, deep water, three specimens.

*Description*:—C.l. of two ovigerous females = 7.0 and 13.75.

*Portunus tuberculatus*, ROUX, 1830.

Locality:—Deep water off Galle and onwards, one specimen.

*Remarks*.—This genus (*i.e.*, the *Portunus* of FABRICIUS) is new to the Indian fauna.

*Lissocarcinus polybioides*, ADAMS and WHITE, 1848—A.4., p. 19.

Localities:—South-east of Modragam, on weed-bearing oyster spat, one specimen (adult ♂); Gulf of Manaar, two specimens (ovigerous ♀ and young ♂).

*Description*:—C.l. of ovigerous female = 9.5.

*Lissocarcinus orbicularis*, DANA, 1852—A.4, p. 20.

Localities:—Negombo, one specimen (ov. ♀ *a*); Galle, lagoon, one specimen (adult ♀ *b*).

*Description*:—C.l. of ovigerous female = 12.00.

Specimen (*a*) is labelled "black crab from mouth of Trepang," and specimen (*b*), which is wound about with Holothurian threads, bears the label "black and white crab from rectum of black Holothurian."

*Lissocarcinus laevis*, MIERS, 1886—A.4, p. 21.

Localities:—Pearl banks, Gulf of Manaar, ten specimens (*a* to *g* and *n* to *p*); coral reefs, Gulf of Manaar, six specimens (*h* to *m*).

*Description*:—The difference in size between (*a*) and (*b*), both adult females (the latter ovigerous), is to be noted. C.l. of (*a*) = 11.00; C.l. of (*b*) = 7.00. Apart from this, variability is low in the above series.

*Lipocyclus rotundatus*, ADAMS and WHITE, 1848—A.4, p. 23.

Localities:—Off Kaltura, two specimens (*a*, *b*); deep water off Galle, four specimens; coral reef, Gulf of Manaar, ten specimens (including *c*).

*Description*:—The series includes three ovigerous females, three adult non-ovigerous females, three young females, five adult males, and two young males. C.l. of an ovigerous female = 10.00.

In the above specimens there are indications of ridges in similar positions to those

of *Neptunus (Lupocycloporus) whitei*, except that the anterior gastric ridge of the latter is not represented.

In ovigerous female (c) and in adult male (a) the three posterior of the interdental denticles are excessively rudimentary; a character described by ALCOCK for the young (i.e., the absence of these denticles) tends thus to survive in the adult.

*Lupocyclus strigosus*, ALCOCK, 1899—A. 4, p. 24.

Locality:—Gulf of Manaar, three specimens (2 adult ♂ and 1 young ♀).

Description:—C.L. of an adult male (front included) = 12·00. The present examples have only five teeth on the antero-lateral margin of the carapace (outer orbital angle included) instead of six. It is the second tooth which is absent.

*Neptunus (Neptunus) sanguinolentus* (HERBST, 1783)—A. 4, p. 32.

Localities:—Gulf of Manaar, one specimen; Trincomalee, two specimens.

Description:—Two females and a male—all young.

*Neptunus (Neptunus) pelagicus* (LINN.), 1764—A. 4, p. 34.

Locality:—Off Chilaw, 2½ to 4 miles off shore, one specimen (adult non-ovigerous ♀). (RATHBUN, 'Proc. Biol. Soc. Wash.', xi., for genera of this and last species.)

ALCOCK unites *N. pelagicus* and *N. trituberculatus*. Miss RATHBUN keeps them apart ('Proc. U.S. Nat. Mus.', vol. xxvi., p. 26, 1902). The present specimen comes under *N. pelagicus* in Miss RATHBUN'S sense. WHITELEGGE'S notes on variability should be consulted ('Mem. Austral. Mus.', iv., p. 154, 1900). He concludes, after an examination of some hundreds of examples from Port Jackson, that the character of the median tooth is not to be used as a specific distinction between the two species. Perhaps the granulation of the carapace is much a matter of sex. This character is in the present specimen of the type described by WHITELEGGE as essentially female. ORTMANN and CALMAN have cast doubt upon the specific distinctness of *N. armatus* from the present species (C., p. 21).

*Neptunus (Amphitrite) gladiator* (FABRICIUS, 1798)—A. 4, p. 35.

Localities:—Off Negombo, Gulf of Manaar, one specimen; off Kultura, two specimens; Galle, one specimen; pearl banks, Gulf of Manaar, thirty specimens; coral reefs, Gulf of Manaar, four specimens; Chilaw Paar, one specimen.

Description:—There are five ovigerous females, six adult but non-ovigerous females, fifteen young females, one adult male, and twelve young males.

The present specimens are small compared with some I have seen from Madras. I give some measurements of three of the ovigerous females:—

C.L. . . . .	22·00	20·00	20·00
C.b. ÷ C.L. . . . .	1·45	1·46	1·49
Rt. lat. spine l. (anterior border) ÷ C.L. . . . .	0·12	0·17	0·17

C.b. is measured by a straight line uniting the notches between teeth 8 and 9.

*Neptunus (Amphitrite) argentatus*, WHITE, 1847—A.4, p. 36.

Localities:—Deep water off Galle, one specimen (ovigerous ♀); coral reefs, Gulf of Manaar, two specimens (adult ♀, adult ♂); off Kaltura, five specimens (one ovigerous ♀, one adult non-ovigerous ♀, and three adult ♂).

Description:—C.l. of an ovigerous female = 15.50.

*Neptunus (Amphitrite) petreus*, ALCOCK, 1899—A.4, p. 37.

Locality:—Gulf of Manaar.

Description:—A young specimen (C.l. = 5.00) which I put a little doubtfully in this species. Its wrist has the strikingly elongated inner spine. A point in which it differs from ALCOCK's figure (A. Invest., pl. xlvi, fig. 2) is the still more blunt nature of the frontal lobes, the notches between them being wider and shallower.

*Neptunus (Amphitrite) euglyphus*, n. sp.—Text-figs. 6 and 7.

Localities:—Pearl banks, Gulf of Manaar, 13 specimens (*a* to *e* and *m* to *t*); coral reefs, Gulf of Manaar, four specimens (*f* to *i*); off Negombo, three specimens (*j*, *k*, *l*).

Description:—The association of a strong lateral production of the antero-external angle of the merus of the external maxilliped with rounded posterior carapace angles, and a much enlarged last spine of the antero-lateral series, show *N. euglyphus* to be a member of the sub-genus *Amphitrite* (i.e., I.A.1.ii. of ALCOCK's key. A.4, p. 31).

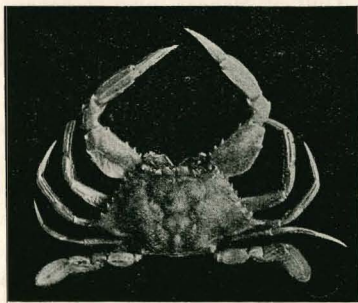


Fig. 6. *Neptunus euglyphus*, n. sp.

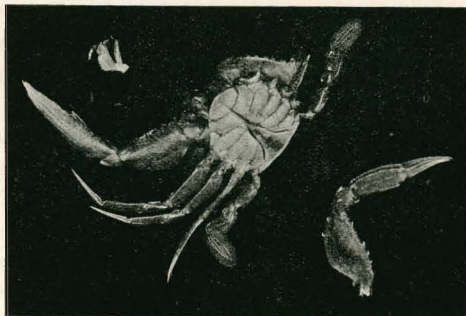


Fig. 7. Ventral view, external maxilliped and cheliped.

It differs from *Neptunus (Amphitrite) gladiator* in the following particulars:—(1) The grooves which delimit the several regions of the carapace are more strongly marked; (2) the two median frontal teeth are closer together: they meet the dentiform process of the epistome, so producing an appearance not unlike a single dorsally grooved median tooth; (3) the large last spine of the antero-lateral series has a very characteristic appearance: it is very broad proximally, flattened dorso-ventrally, and its posterior border is strongly recurved downwards and forwards;

(4) correlated with (3) is the short postero-lateral border of the carapace; (5) the middle region of the posterior border of the arm is considerably expanded—the inner surface of the hand and of the fixed finger is granular, and the under surfaces of all segments of the cheliped have a glazed appearance; (6) walking legs 1, 2, and 3 are, as a whole, glazed, there are a few hairs along the upper border, walking leg 4 is more or less tomentose.

*Remarks.*—The new species is distinguished at a glance from all other members of the sub-genus by its very characteristic last pair of lateral spines. It will be noted from (5) above that the cheliped bears a considerable resemblance to that of *Neptunus (Achelous) granulatus* (H. MILNE-EDWARDS).

I append the measurements of three adult males:—

	C.l.	C.b. ÷ C.l.	Lat. sp. (post. bord.) ÷ C.l.	Front. b. ÷ C.l.	Front. orb. b. ÷ C.l.	Ant. lat. bord. ÷ C.l.	Post. lat. bord. ÷ C.l.	Post. bord. ÷ C.l.
(a) . .	12.50	1.64	0.46	0.36	0.88	0.68	0.32	0.56
(n) . .	13.00	1.58	0.54	0.38	0.85	0.73	0.37	0.58
(o) . .	13.00	1.58	0.50	0.37	0.85	0.73	0.33	0.58

Antero-lateral border is from outer angle of orbit to notch between teeth 8 and 9.

Postero-lateral border is from base of posterior border of large spine to point of junction with abdomen.

*Neptunus (Hellenus) hastatoides* (FABRICIUS, 1798)—A. 4, p. 38. Text-fig. 8.

Localities:—Galle, one specimen; pearl banks, Gulf of Manaar, nine specimens; off Mutwal Island, two specimens; coral reefs, Gulf of Manaar, twelve specimens; Palk Bay, two specimens.

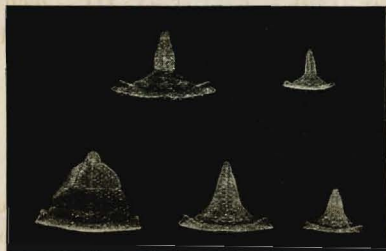


Fig. 8. Growth stages in abdomen of *Neptunus hastatoides*—upper row males, lower three females.

*Description.*—C.l. of an ovigerous female = 18.0.

*Remarks.*—LANCHESTER gives some account of sexual differences obtaining in this species. In view of the specimens before me I judge his figure ('Proc. Zool. Soc.,' 1900, p. 745, pl. xlv., figs. 7a, 7b) of a female abdomen to be evidently that of a young example. It agrees well with that of the young males of the present collection (see text-fig. 8).

*Neptunus (Hellenus) hastatoides* (FABRICIUS), var. *unidens*, nov.

Locality:—Coral reefs, Gulf of Manaar, one specimen.

*Description.*—A male, doubtfully adult, both chelipeds missing, C.l. = 12.25.

This specimen differs from other specimens of *N. hastatoides* known to me in the following particulars:—



(1) It possesses a single median frontal tooth instead of a pair, so that the front is cut into three teeth only. (This median tooth is somewhat smaller and less prominent than the lateral teeth, and its apex is flattened.)

(2) The tip of the dactylopodite of walking leg 4 is not darkened in colour (one must, of course, not overlook the possible agency of the spirit in producing this appearance).

(3) The carina of abdominal segment III. is more prominent in its middle portion and its median notch is deeper, approaching in appearance that of *N. macrophthalmus*, RATHBUN, 1903 (R., p. 871, fig. 31).

The granulation of the sternum of this male closely resembles that of the adult male of *N. hastatoides*.

*Remarks*.—I call attention to the absence of both chelipeds. It is therefore impossible to ascertain various essential characters. Leaving these necessarily out of consideration, the specimen is so closely similar to *N. hastatoides* (except in particulars given above) that it may be conveniently included as a varietal example of that species, in which the pair of narrow median frontal teeth have coalesced. This latter particular seems of sufficient interest to warrant my putting the specimen on record. I append the following measurements:—

C.b.<sub>1</sub> (a straight line uniting the notches between the 8th and 9th antero-lateral teeth of either side) ÷ C.l. = 1.51; C.b.<sub>2</sub> (a straight line uniting points immediately behind the great lateral spines) ÷ C.l. = 1.10; Posterior border of C. ÷ C.l. = 0.65; Frontal b. ÷ C.l. = 0.41; Fronto-orb.b. ÷ C.l. = 0.82; lateral spine l. (posterior border) ÷ C.l. = 0.49; antero-lateral border of C. (a straight line uniting outer orbital angle with notch between the great lateral spine and the tooth in front of it) ÷ C.l. = 0.69; postero-lateral border of C. (a straight line uniting base of great lateral spine with postero-lateral angle) ÷ C.l. = 0.39.

*Neptunus (Hellenus) spinipes*, MIERS, 1886—A. 4; p. 39.

*Locality*:—Galle, one specimen.

*Description*:—An adult male, C.l. = 11.00.

*Remarks*.—I have examined the Martaban specimens placed by HENDERSON as *N. andersoni*, and which are preserved in the British Museum, and find that in reality they are *N. spinipes* of MIERS, whose "Challenger" specimens I have also consulted.

*Neptunus (Hellenus) longispinosus* (DANA), var. *bidens*, nov.—(See A. 4, p. 40).

*Localities*:—Off Negombo, one specimen (adult ♂); off Mutwal, one specimen (adult ♂); Gulf of Manaar, one specimen (ovigerous ?).

*Description*.—C.l. of an ovigerous female = 6.50.

In all three specimens the hand has only two spines, a point of resemblance to *Neptunus (Hellenus) tuberculatus*, A. MILNE-EDWARDS. I suggest for them the varietal name *bidens*.

The antero-external angle of the merus of the external maxillipeds and the shape of the male abdomen are evidently characters with high variability in this species if ALCOCK is correct in including both the forms figured by DANA. The present examples agree in combining a merus resembling DANA's fig. 2c with a male abdomen in which the borders are still more sinuous than in his fig. 3b—abdominal segment VI being the one chiefly involved.

*Neptunus (Hellenus) tenuipes* (DE HAAN, 1835)—A. 4, p. 42.

Locality:—Pearl banks, Gulf of Manaar, one specimen.

Description:—Adult male. C.L. = 16.00.

Behind the single distal spine of the outer border of the arm is a sub-terminal tubercle marking the position of the second spine of some allied species.

*Neptunus (Lupocycloporus) whitei* (A. M.-EDW., 1861)—A. 4, p. 44.

Localities:—Coral reefs, Gulf of Manaar, two specimens (adult ♂ and adult ♀); pearl banks, Gulf of Manaar, one specimen (young ♀); off Mutwal Island (young ♀).

Description:—C.L. of adult female = 18.00.

In both the adult specimens (a ♂ and a ♀) one notes:—(1) The cardiac ridge is broken in the middle line so that it takes the form of two low broad tubercles, granulated on their posterior slope; (2) there is a small granulated protuberance on the post-gastric region; (3) there is a longitudinal row of granules on the middle line of the carapace; its anterior commencement is just in front of the break in the anterior gastric ridge, and runs back across the second gastric ridge, to terminate posteriorly between this and the third gastric ridge.

*Neptunus (Achelous) granulatus* (H. M.-EDW., 1884)—A. 4, p. 45.

Localities:—Off Negombo, one specimen; Gulf of Manaar, 17 specimens; off Mutwal Island, one specimen.

Description:—The above specimens include four ovigerous females, five adult females, seven adult males and three young males. C.L. of an ovigerous female = 13.

There is a pearly sheen, much as in *N. argentatus*, on the crests of abdominal terga II. and III., the terminal spine of the arm, the crest of the outer surface of wrist, and the upper surface of the dactylus.

The spinule on the hand, in front of the apex of the wrist, is said by ALCOCK to be blunt. Among the present examples it is sharp, except on the left hand of two and the right hand of three specimens.

*Neptunus (Achelous) dubia*, n. sp.—Text-fig. 9.

Localities:—Coral reefs, Gulf of Manaar, one specimen; off Negombo, one specimen.

Description:—Adult ♂ C.L., 13; C.b. ÷ C.L., 1.31; front.b. ÷ C.L., 3.85; front.-orb.b. ÷ C.L., 0.85; ant.lat.bord. C. ÷ C.L., 0.54; post.bord. C. ÷ C.L., 0.62; post.lat.bord. C. ÷ C.L., 0.58; Ch.l. ÷ C.L., 2.00.

It differs from *Neptunus (Achelous) granulatus* in the following characters:—(1) The outer fissure of the supra-orbital margin is obsolete; (2) the nine teeth of the antero-lateral border gradually decrease in size from before backwards; (3) the antero-lateral angle of the merus of the external maxillipeds is rounded and but slightly produced in a lateral direction; (4) the chelipeds in the male are about twice the length of the carapace, the posterior border of the arm is more expanded than in *N. granulatus*, the anterior border of the arm bears three well-developed spines and a fourth inconspicuous one posterior to these, the posterior border bears one spine only in the position of the distal one of *N. granulatus*; (5) the outline of the abdomen of the male is triangular, abdominal terga II. and III. both have well-marked carinae, across abdominal tergum V. runs a transverse ridge just anterior to the joint between terga V. and VI.—this is correlated with the form of the copulatory appendages; (6) the form of the male copulatory appendages is characteristic.

It will be noted that in characters (1), (2) and cheliped-length the new species agrees with *Neptunus (Achelous) orbicularis*, but it differs from the latter and resembles *N. granulatus* in the granulation of its carapace and chelipeds, in the open character of the

inner fissure of the supra-orbital margin, and in ratio  $C.b. \div C.l.$  I have not seen any specimen of *N. orbicularis*, but as points (3), (5), (6) and spines of hand, *i.e.*, part of (4), are not specified by ALCOCK as differences from *N. granulatus* in his description of *N. orbicularis* (A.4, p. 47), I conclude that the new species is sufficiently distinct from the latter.

The characters of the antero-lateral angle of the merus of the external maxilliped may be conveniently used to separate *N. dubia* from the other two members of the sub-genus given in ALCOCK'S key (A.4, p. 32).

I may note here that I judge *Achelous rubro-marginatus*, LANCHESTER ('Proc. Zool. Soc.', 1900, p. 746, pl. xlvi., fig. 8), to belong to the sub-genus *Amphitrite*, linked to the *gladiator* group by *Neptunus (Amphitrite) petreus* (A.4, p. 37). The latter species may have been unknown to LANCHESTER; its description did not long precede that of *rubro-marginatus*.

***Neptunus (Pontus) convexus*, DE HAAN, 1833.**

Localities:—South of Modragam, one specimen; off Mutwal Island, two specimens; coral reefs, Gulf of Manaar, nine specimens; pearl banks, eleven specimens.

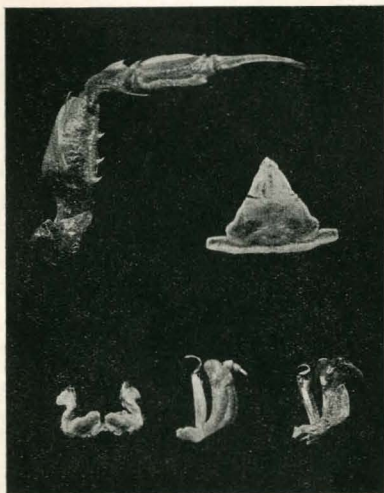


Fig. 9. *Neptunus dubia*, n. sp., adult male.

*Description*:—The above include one ovigerous female, six adult non-ovigerous females, nine young females, five adult males, and two young males. The specimens from "Coral reefs, Gulf of Manaar," are larger than those from the other localities.

*Neptunus convexus* is not definitely included in the Indian fauna by ALCOCK (A. 4, p. 32). He suggests that its affinities are with the sub-genus *Neptunus*. It seems advisable to keep it apart, however, as the single representative of *Pontus*, a sub-genus re-defined by DE MAN ('Abb. Senckenb. Ges.,' xxv., pt. iii., p. 643, pl. xxi., fig. 27, 1902).

*Charybdis (Goniosoma) natator* (HERBST, 1794)—A. 4, p. 61.

*Localities*:—Off Mutwal Island, two specimens; pearl banks, Gulf of Manaar, thirteen specimens.

*Description*:—The above include four females and eleven males, all young.

*Charybdis (Goniosoma) orientalis*, DANA, 1852—A. 4, p. 63.

*Localities*:—Coral reefs, Gulf of Manaar, five specimens; pearl banks, Gulf of Manaar, fifteen specimens; south of Galle, one specimen; off Mutwal Island, one specimen.

*Description*:—C.l. of ovigerous female = 9.50.

*Charybdis (Gonichellenus) ornata*, A. M.-EDW., 1861—A. 4, p. 64.

*Locality*:—Coral reef, Galle, one specimen.

*Description*:—The specimen is a male, C.l. = 9.75.

The last of the antero-lateral teeth is a little larger than the others instead of smaller as in ALCOCK'S description. A parasitic *Sacculina* is attached to the abdomen. On comparing the crab with one of similar size in the British Museum (ref. 73.28) I find that this has had little effect upon the form of the abdomen, but that the copulatory appendages are sensibly less developed.

*Thalamita prymna* (HERBST), var. *crenata* (= *T. crenata*, LATR.)—A. 4, p. 76.

*Locality*:—Trincomalee, three male specimens.

*Description*:—

C.L . . . . .	29.00	38.00	41.00
C.b. ÷ C.L . . . . .	1.47	1.49	1.50

The high variability in size is to be noted, as all three are possibly adult.

*Thalamita prymna* (HERBST), var. *annectans*, nov.

*Locality*:—Trincomalee, two specimens.

*Description*:—One is a small, but quite probably adult, male, C.l. = 16.00.

The following are its most interesting characters for systematic purposes:—(1) The fourth tooth of the antero-lateral margin of the carapace is rudimentary; (2) the ridge on the basal joint of the antenna bears spines; (3) the four middle lobes of the

front are more or less squarely cut; (4) the transverse mid-gastric ridge is not continued to the notch between the first and second teeth of the antero-lateral border of the carapace; (5) there are four ridges on the hand: two of these are ill-defined and unite the two rows of spines on its upper surface—a third corresponds in position to the third ridge of var. *crenata* and is similarly continued on to the fixed finger—the fourth is smooth, runs above the third, and ends distally just behind the cleft between the fingers; (6) there are three spines in the upper row on the palm—the distal one is smaller than the other two; (7) there is a distal spine on the wrist, just behind the upper row of spines of the palm; (8) the lower border of the propodite of walking leg 4 bears obvious spines distally; these become smaller proximally and disappear on the proximal third.

The second specimen is an immature female (Cl. = 10) which may probably be correctly put with the above. The fourth tooth of the antero-lateral margin of the carapace is seen under the lens to be excessively minute—still more rudimentary than in the male. The ridges of the hand are granular, and there is a trace of an additional ridge above the position of the one which ends interdigitally in the male.

*Remarks* on the species *Thalamita prymna* (HERBST). ALCOCK (1899) supports KOSSMANN'S view of the specific identity of *T. prymna* (HERBST)—*T. crenata* (LATREILLE) (including *T. crassimana*, DANA)—*T. danae*, STIMPSON—*T. stimpsoni*, A. MILNE-EDWARDS—and *T. picta*, STIMPSON—*i.e.*, those forms with an eight-lobed front combined with a very broad basal antennal joint. Material recently described tends to justify this view. Thus CALMAN describes three series of Torres Straits forms (C., p. 22), of which two at least evidently belong to the group, and tend to combine characters of the other members rather than to belong decidedly to any recognised division. The same kind of thing occurs in the specimen of the present collection described above. It is allied by characters (1), (2), and (3) to var. *prymna*, by (4) to var. *crenata* and var. *danae*, while characters (6) and (7) separate it from varieties known to me. ALCOCK'S key brings the present variety under var. *prymna*, from which it may readily be distinguished by characters (6) and (7) above.

***Thalamita chaptali***, AUDOUIN and SAVIGNY, 1826—A.4, p. 80.

Localities:—Pearl banks, Gulf of Manaar, 23 specimens; coral reefs, Gulf of Manaar, 26 specimens; off Mutwal Island, one specimen; 10 miles north of Cheval, one specimen.

*Description*:—C.l. of an ovigerous female = 8.25.

***Thalamita poissoni***, AUDOUIN and SAVIGNY, 1826—A.4, p. 81.

Localities:—West of Periya Paar, one specimen (ovigerous ♀); pearl banks, Gulf of Manaar, one specimen (adult ♂).

*Description*:—C.l. of the ovigerous female = 7.50.

The fourth tooth of the antero-lateral border is very rudimentary in both examples.

***Thalamita admeta* (HERBST, 1803)—A. 4, p. 83.**

Localities:—Pearl banks, Gulf of Manaar, 58 specimens; coral reefs, Gulf of Manaar, four specimens; off Negombo, one specimen; off Mutwal Island, four specimens; Muttuvaratu Paar, two specimens.

All the above specimens come under var. *admeta* as defined by BORRADAILE (p. 202). The fourth tooth of the antero-lateral border of the carapace, considerably reduced in all, is very rudimentary in some—particularly among the females. It is, perhaps, most rudimentary, however, in one of the adult males.

***Thalamita exetastica*, ALCOCK, 1899—A. 4, p. 86; A. Invest., pl. xlvii, figs. 2, 2a.**

Localities:—Pearl banks, Gulf of Manaar, two specimens (adult ♀, one ovigerous); south of Galle, deep water, one specimen (adult ♀).

*Description*:—As in BORRADAILE'S specimens (p. 203), the squamiform markings of the cheliped are almost absent; a trace only is present, on the upper distal portion of the arm. On the upper surface of the arm and on the upper portion of the outer surface there are more or less rounded granules; the inner surface, the under surface, and the lower portion of the outer surface are smooth. The ridges of the carapace are well marked.

In the ovigerous female there are one or two spinules on the posterior border of the propodite of walking leg 4. This is an approach to *Charybdis orientalis*, DANA.

***Thalamita integra*, DANA, 1852—A. 4, p. 85.**

Locality:—Pearl banks, Gulf of Manaar, six specimens.

***Thalamita investigatoris*, ALCOCK, 1899—A. 4, p. 85; A. Invest., pl. xlvii, fig. 1.**

Localities:—Off Mutwal Island, one specimen; Gulf of Manaar, deep water, three specimens; deep water off Galle, four specimens; coral reefs, Gulf of Manaar, one specimen (*a*).

*Description*:—There are five ovigerous females, one young female, one adult male, and two young males. C.l. of an ovigerous female = 7.00.

Spines are present on the propodite of walking leg 4 as described by ALCOCK, but omitted from his figure. As differences from ALCOCK'S description of the single male for which he creates the species one notes that the median lobes of the front tend to have a straight rather than a rounded anterior border, and are not obviously more prominent than the sub-median pair, the latter point agreeing with ALCOCK'S figure, however. I should not describe the fifth tooth of the antero-lateral margin of the carapace as, "very" small. The wrist and hand bear more numerous spines.

The fourth tooth of the antero-lateral margin of the carapace is absent in one of the ovigerous females (*a*).

***Thalamita sexlobata*, MEERS, 1886—A. 4, p. 87.**

Localities:—Pearl banks, Gulf of Manaar, eight specimens; coral reefs, Gulf of Manaar, four specimens; off Mutwal Island, one specimen.

*Thalamita wood-masoni*, ALCOCK, 1899—A.4, p. 90.

Locality:—10 miles north of Cheval Paar, one specimen (young ♀).

Description:—The fourth tooth of the antero-lateral margin of the carapace, which ALCOCK describes and figures (A. Invest., pl. xlvi, figs. 1, 1a) as rudimentary, is absent in the present example.

*Thalamita oculus*, ALCOCK, 1899—A.4, p. 91.

Localities:—Coral reefs, Gulf of Manaar, 10 specimens; pearl banks, Gulf of Manaar, 19 specimens; off Mutwal Island, three specimens; deep water off Galle, two specimens; off Kaltura, one specimen; Trincomalee, one specimen.

Description:—C.I. of an ovigerous female = 10·00.

*Kraussia nitida*, STIMPSON, 1858—A.4, p. 98 (*pars*).

Localities:—Off Mutwal Island, one specimen (*a*); pearl banks, one specimen (*b*); west of Periya Paar, 17 to 24 fathoms, one specimen (young ♀).

Description:—

	C.I.	C.b. ÷ C.I.	Fronto-orb.b. ÷ C.I.
( <i>a</i> ) adult ♂	12·00	1·04	0·62
( <i>b</i> ) adult ♀	10·00	1·10	0·62

MISS RATHBUN ('Bull. Mus. Comp. Zool.,' Harvard, xxxix., No. 5, 1902, p. 132) separates HENDERSON'S *nitida* from this species and makes for it a new species, *Kraussia hendersoni*. The specimens of the present collection come under *K. nitida* in MISS RATHBUN'S sense. They agree with her figure. MISS RATHBUN'S photographs of species of *Kraussia* are useful (*loc. cit.* and R., 1903).

This genus is new to the Ceylon fauna. The only other genus of the family Cancridæ which I know to have been recorded from Ceylon is *Trichopeltarium*, represented by a single species (? *T. ovale*, A.4, p. 99).

I may note here that I have seen in the British Museum the "type"-specimens described by ADAMS and WHITE in the 'Voyage of the "Samarang"' (p. 59, 1850) as *Trichocera porcellana*, and find that the latter name is a synonym of *K. rugulosa*. DANA puts it as such with a query (Crust., 'U.S. Expl. Exped.,' I, p. 302, 1852).

*Gomezia bicornis*, GRAY, 1831.

Localities:—Deep water, off Galle, one specimen (*a*); pearl banks, Gulf of Manaar, six specimens (*b* to *g*).

Description:—Examples (*b*), (*c*), and (*g*) are ovigerous females, (*a*) is an adult but non-ovigerous female, and (*d*) to (*f*) are adult males.

Variability is high within the species. The present specimens fall into three groups:—(1) The non-ovigerous female (*a*, C.I. = 20) approaches A. MILNE-EDWARDS' figure under name *Gomezia viginti-spinosa* ('Nouv. Archiv. du Mus. Paris,' vol. x., p. 52, pl. iii., fig. 5, 1874); (2) examples (*b*, C.I. = 15·5) to (*f*) agree with DE HAAN'S figure

(Crust. in 'Fauna Japonica,' p. 44, pl. ii., fig. 5, 1835); (3) the ovigerous female (d. C.I. = 23) goes with the "Challenger" specimens preserved in the British Museum.

Some variable characters of the species may be set forth in the form of a key.

- I. Inner sub-orbital spine small . . . . . var. A.
- II. Inner sub-orbital spine large.
  - a. Carapace strongly pilose . . . . . var. B.
  - b. Hairs on carapace few or absent.
    - i. Spiniform outer angle of orbit as well developed as first antero-lateral spine . . . . . var. C.
    - ii. Spiniform outer angle of orbit much shorter than the first antero-lateral spine . . . . . var. D.

The family Corystidæ is new to the Ceylon fauna.

#### CATOMETOPA.

*Catoptrus nitidus*, A. M.-Edw., 1870—A.6, p. 307.

Locality:—West of Periya Paar, 17 to 24 fathoms.

Description:—Male, apparently adult, C.I. = 3.80; Ch.l. (smaller) ÷ Ch.l. (larger) = 0.92; C.b. ÷ C.I. = 1.51; F.l. (larger) ÷ C.I. = 1.05; Ch.l. (larger) ÷ C.I. = 0.33; F.l. (smaller) ÷ F.l. (larger) = 0.75.

Remarks.—The small size of the specimen may be noted—ALCOCK refers to some

	<i>G. inæqualis</i> , RATH.	<i>C. nitidus</i> : A.6, p. 307.	Present specimen.	<i>C. nitidus</i> (= <i>G. truncatiformis</i> , DE MAN).
	♂.	(Sex ?)	♂, probably adult.	♂, young.
(1) C.I. . . . .	7.00	9.50	3.80	6.20
(2) C.b. ÷ C.I. . . . .	1.51	1.53	1.51	1.66
(3) Ant. lat. region. . .	Finely granular	Finely granular	Finely granular	Coarsely granular
(4) Denticle betw. ant. lat. teeth 1 and 2	Absent	(Not mentioned)	Absent	Present
(5) Ch.l. (larger) ÷ C.I. . .	3.00	—	3.03	2.50
(6) Ch.l. (smaller) ÷ C.I. .	3.40	About 3.00	3.29	Much as larger Ch.l. ÷ C.I.
(7) Ant. border arm . . .	"Coarsely granu- lous," no spines.	Finely serrulate, one serration at either or both ends enlarged and spiniform.	Finely serrulate, one serration at prox. end enlarged and spiniform.	Granular, a spine distally in larger Ch. In smaller Ch. one behind middle also.



similarly small examples. *Goniocaphyra inæqualis*, RATHBUN, is, I believe, a synonym—her photograph gives an excellent impression of the present specimen. The preceding table shows comparative characters in these forms. ALCOCK's description was based on 19 specimens from various localities. His measurements refer to Mauritius specimens in particular. A. MILNE-EDWARDS' "type"-specimen was large (C.b. = 23.00).

*Goniocaphyra inæqualis* comes under *Catoptrus nitidus* as described by ALCOCK except as regards characters (6) and (7) of table, and of these (7) is admittedly variable (even in Miss RATHBUN's photograph there seems to be some indication of a proximal tubercle). My specimen is intermediate in regard to character 6.

Dr. DE MAN points out ('Notes, Leyden. Mus.,' xii, p. 67, 1890) that his *Goniocaphyra truncatifrons* is young and = *Catoptrus nitidus*. The evidence suggests a single species for the forms included in the table, within which DE MAN's *truncatifrons* specimen stands somewhat apart.

#### *Mertonia*, n. gen.

*Description*.—Carapace rudely semicircular in outline, the posterior border being the longest, and the postero-lateral borders anteriorly convergent, to form a common curve with the well-arched antero-lateral and anterior borders; it is but little broader than long, is convex fore and aft, and strongly declivous anteriorly. Regional distinctions are almost imperceptible. Fronto-orbital border more than one-half (about 0.6 in the two specimens), and front one-quarter, the greatest breadth of the carapace; front is prominent and bilobed.

Orbits somewhat ventral, completely filled by immovable elongated eye-stalks; eyes small.

Antennules small; they fold obliquely into proper pits.

Basal antennal segment fairly long, its antero-external angle stands well in the orbital hiatus; the anterior portion of the hiatus is occupied by the flagellum, which is stout and markedly plumed and half the carapace length.

The epistomial wall of the buccal cavern is well formed and prominent; the buccal cavern is not completely closed by the external maxillipeds, a considerable space being left between their inner borders, particularly those of the meri; the flagellum articulates with the antero-internal angle of the merus; the antero-external angle of the merus is produced.

Chelipeds a little unequal, much more massive than, but about the same length as, the 3rd pair of walking legs; palm short, deep, and compressed, with sharp edges.

Walking legs slender, unarmed; dactylopodites styliform: the 3rd and 4th pair of approximately equal length (the 2nd pair missing).

For key purposes *Mertonia* comes under division I.1.ii.b. of ALCOCK's key to the Indian genera of the Rhizopinæ (A.6, p. 317). The other occupant of the same division is *Xenophthalmodes*, from which the new genus is distinguished readily by

the lateral production of the outer angle of the merus of the external maxillipeds; additional differences from the same genus concern: (1) ratio of fronto-orbital breadth  $\div$  C.b.; (2) ratio of frontal b.  $\div$  C.b.; (3) the more ventral position of the orbits; (4) eyes, though very small, are distinct; (5) direction of fold of antennules; (6) relations of basal antennal segment and orbital hiatus (associated, no doubt, with more ventral position of orbit); (7) the markedly plumed antennal flagellum. Characters (4) and (5) approach the condition found in *Typhlocarcinus*; (2) and (3) are intermediate between the latter genus and *Xenophthalmodes*.

*Mertonia lanka*, n. sp.—Plate I, fig. 11, a, b.

Locality:—Gulf of Manaar, two specimens ( $\varnothing$  and  $\delta$ ).

Description:—C.l. = 4 in  $\delta$ , 4.5 in  $\varnothing$ ; C.b. = 5.5 in  $\delta$ , 6 in  $\varnothing$ .

Carapace has practically smooth surface, polished, with some irregular dimpling; its free edges fringed with longish silky hairs; C.b.  $\div$  C.l. = 1.37 in  $\delta$ , 1.33 in  $\varnothing$ ; frontal b.  $\div$  C.b. = 0.27 in  $\delta$ , 0.28 in  $\varnothing$ ; fronto-orbital b.  $\div$  C.b. = 0.64 in  $\delta$ , 0.58 in  $\varnothing$ ; front strongly declivous and decidedly bilobed.

Orbits elongated; long diameter of orbit  $\div$  C.l. = 0.25 in  $\delta$ , 0.28 in  $\varnothing$ .

The antennal hairs are numerous and long; antennal flagellum l.  $\div$  C.l. = 0.5 in  $\delta$ .

The buccal cavern increases slightly in breadth anteriorly; the merus of the external maxilliped has its length and breadth about equal (the measurements taken along the middle line in each case); its outer border somewhat convex; its anterolateral angle produced and rounded; the ischium is not much longer than broad; its breadth is as that of the merus; a space is left between the ischia and a larger one between the meri (see Pl. I, fig. 11, a).

Chelipeds about same length as walking leg 4; hands sub-equal; inner angle of wrist acuminate; upper and lower edges of hand sharpened, its surfaces polished, with some dimpling; the edges of the chelipeds are fringed with silky hairs, these are long on the wrist, shorter on the hand. Walking legs fringed with silky hairs.

*Scalopidia spinosipes*, STIMPSON, 1858—A. 6, p. 325.

Locality:—Gulf of Manaar, one specimen.

Description:—A young male, C.l. = 5.75; C.b.  $\div$  C.l. = 1.30.

*Pinnoteres margaritifera*, n. sp.—Text-fig. 10, 10 a.

Locality:—Pearl banks, Gulf of Manaar, one specimen.

Description:—An adult male. C.l. = 5.25.

Carapace well calcified, circular, smooth, and polished; seen under lens to be pitted, more markedly so towards the margins; it is flattened a good deal, though a little convex; its margins are rounded and ill-defined. Front produced, with straight anterior border in dorsal view; its tip is really, however, deflexed acutely, and its true anterior border, seen in anterior view, is obtusely pointed. Eyes small, well pigmented; not entirely visible in a dorsal view of the animal. Propus of external

maxilliped spathulate; dactylus slender and inconspicuous, arising from about the middle of the flexor surface of the propus, which arises before the termination of the carpus, and the latter before the termination of the merus. Cheliped slightly longer than the carapace ( $\text{Ch.l.} \div \text{C.l.} = 1.12$ ); two or three times as stout as walking leg 1, but rather shorter ( $\text{Ch.l.} \div \text{W.L.1.l.} = 0.86$ ); the segments inflated, smooth, and



Fig. 10. *Pinnotheres margaritifera*, n. sp.  $\times 3$ .

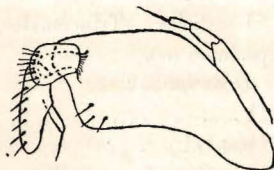


Fig. 10A. External maxilliped.

polished; dactylus is about two-thirds as long as the upper border of the hand; its tip is strongly bent down; there is a stout tooth near its base, on its apposable border.

Walking legs slender; lower borders fringed sparsely with hair.  $\text{W.L.1} \div \text{C.l.} = 1.33$ ;  $\text{W.L.2} \div \text{C.l.} = 1.38$ ;  $\text{W.L.3} \div \text{C.l.} = 1.38$ ;  $\text{W.L.4} \div \text{C.l.} = 1.05$ . The dactyli of walking legs 1, 2, and 3 are sub-equal in length (about 0.2 of C.l.); that of walking leg 4 is about one-half as long again.

*Gelasimus*\* *annulipes*, LATREILLE—A.6, p. 353—Text-fig. 11.

Locality:—Off Mutwal Island, two specimens (*a*, *b*).

Description:	—C.l.	C.b. + C.l.	Post. bord. C. + C.l.	Front bord. $\div$ C.l.	Larger propus l. $\div$ C.l.
(a) ♂ . . . . .	8.75	1.66	0.91	0.29	2.17
(b) ♀ . . . . .	9.25	1.62	0.95	0.28	—

C.b. is measured by a straight line uniting produced post-orbital angles.

Posterior border C. is measured by a straight line uniting points just above and to inner side of bases of 4th pair of walking legs.

Propus length is measured along lower border.

NOBILI (in 'Boll. Mus. Torino,' xvi., No. 397, p. 13, figs. A, B, 1901) has distinguished two varieties of the species—differentiated by presence or absence of a large triangular tooth at distal end of fixed finger.

A, var. *orientalis*, NOBILI, 1901. Large tooth present.

B, var. = *Gelasimus perplexus*, A. M.-EDW., 1852. Large tooth absent.

\* I retain the generic name *Gelasimus*—sanctioned by tradition—to avoid confusion with the distinct group of land crabs known as *Uca*.



Fig. 11. *Gelasimus annulipes*, the larger chela  $\times 2$ .

The photograph (fig. 11) should be compared with NOBILI's figures. It might conceivably be included under var. *orientalis*, but does not agree well with either.

Length of large propus is in adult male (*a*) much less than that given by ALCOCK, who had before him 300 Indian specimens (ALCOCK's index, large propus  $l. \div C.l. = 3.00$ ).

*Ocyropa ceratophthalma* (PALLAS, 1772)—A.6, p. 345.

Localities:—Trincomalee, mangrove swamps, two specimens (*b*, *c*); Galle, one specimen (*a*).

Description:—	(a) ad. ♀.	(b) ad. ♀.	(c) ad. ♂.
C.l. . . . .	13.50	30.00	36.50
C.b. $\div$ C.l. . . . .	1.02	1.13	1.07
Projection of eye stalk beyond eye (lower border) $\div$ C.l. . . . .	0.0	0.10	0.29

C.b. is a straight line uniting points of lateral borders where the serrulate line forks.

In adult female (*b*) the outer band of granules of the ischium of external maxillipeds is somewhat obsolescent, tending, in conjunction with a specimen of *O. platyarsis* in the present collection, to cast doubt upon granulation of this region as a character of specific value.

*Ocyropa platyarsis*, H. M.-EDW., 1852—A.6, p. 348.

Localities:—Gulf of Manaar, one specimen (*d*); Trincomalee, mangrove swamps, three specimens (*a*, *b*, *c*).

Description:—	(b) young ♀.	(c) young ♀.	(d) adult ♂.
C.l. . . . .	15.00	24.00	50.00
C.b. $\div$ C.l. . . . .	1.27	1.34	1.26
Projection of eye stalk beyond eye (lower bord.) $\div$ C.l. . . . .	0.10	0.19	—

The distinction between this species and *O. ceratophthalma* in regard to C.b.  $\div$  C.l. holds, in the present specimens, for both adult and young. In adult male (*d*) the granulation of ischium of external maxillipeds approaches the condition recorded above for an adult female specimen of *O. ceratophthalma*.

*Dotilla myctiroides* (H. M.-EDW., 1852)—A.6, p. 368.

Localities:—Off Mutwal Island, three specimens; coral reefs, Gulf of Manaar, three specimens; Galle, twenty-three specimens.

Description:—C.l. of an adult male = 8.50.

All the specimens are males except a single immature female from "Coral Reefs, Gulf of Manaar." All the males are mature save one, or perhaps two.

The immature female has seven separate abdominal terga.

Remarks.—Is the striking preponderance of males over females in the collection correlated with a difference in habit, the latter staying at home in the mud?

DE HAAN's use of the division of the female abdomen into five movable parts only, as a generic character, is not to be considered as contradicted by the present specimen, as the latter is immature (C.l. = 5.50).

*Macrophthalmus latreillei* (DESMAREST), 1822—Plate II., fig. 3, text-fig. 12.

Locality :—Gulf of Manaar, one specimen.

*Description* :—Ovigerous female. C.l. (front included) = 21.00; C.b. ÷ C.l. = 1.33; front.b. ÷ C.l. = 0.13. (C.b. = straight line uniting points where the granulated line which borders the carapace bends above the bases of walking legs 1. Front.b. is measured across the "neck.")

The carapace, particularly in its grooves, has traces of hair, but there is by no means a hairy covering such as ORTMANN describes for *M. laniger*. The lateral teeth of the carapace are both in flatness and in outline more as ORTMANN's description and figure of *M. laniger* than as MIERS' figure of *M. serratus* (= *latreillei*).

*Remarks*.—I agree with DE MAN in uniting *M. polleni*, HOFFMANN, 1874, with *M. latreillei*—also with ORTMANN in adding *M. serratus*, ADAMS and WHITE, to the union. I believe further that *M. laniger*, ORTMANN, 1894, is not specifically distinct. The main characters in which ORTMANN describes *M. laniger* as differing from *M. latreillei* (= *serratus*) are that the former has :—(1) Well-developed hairy covering of carapace; (2) flat, not thorn-like, teeth of lateral margin of carapace; (3) almost straight under border of chela; (4) cheliped of male not very strongly developed.

I have before me a series which makes it difficult to accept these as distinctions of specific value. Another male B.M. specimen (D) is figured (pl. ii., fig. 3).

	A. ♂ (dry). "Challeng." <i>serratus</i> . B. Mus. 43-6. Phil. Isds.	C. ♂ (dry). B. M. 83-24. Singapore.	B. ♂ (dry). B. M. 43-6. Phil. Isds.	C. ♂ (dry). B. M. 83-24. Singapore.	E. ♀ (spirit). Present form. Ceylon.	F. ♂. <i>laniger</i> (ORT.'s descr. and figure).
C.l. . . . .	41.50	29.00	30.25	27.50	21.00	small
C.hair . . . .	absent	much	absent	much	little	much
Arm l. ÷ C.l. . .	0.84	0.74	[0.45]	0.71	0.45	—
P.l. ÷ C.l. . . .	1.37	1.28	[0.65]	1.20	0.62	—
H.l. ÷ C.l. . . .	1.00	0.88	[0.36]	0.82	0.32	—
H.height ÷ C.l. .	0.46	0.47	[0.22]	0.45	0.14	—
F.l. ÷ C.l. . . .	0.54	0.56	[0.31]	0.53	0.35	—
F.l. ÷ H.l. . . .	0.54	0.64	[0.86]	0.64	1.07	—

P.l. = Propus length (under border). H.l. is measured along upper border. Specimen (B) has only one cheliped, and that is a regenerated one.

Examining the above table and the plate one notes that a hairy type of carapace is associated indifferently either with "flat, not thorn-like" carapace-teeth (F), or with acute upturned carapace-teeth (C), or with a somewhat intermediate form (C'). On

the other hand, the character of the marginal teeth of the carapace, the male cheliped measurements and the size of the crab (measured by C.L.), are correlated.

The cheliped differences in the males have the appearance of being growth-changes. The appearance of regenerated cheliped of (B) is suggestive (Pl. II, fig. 3, B). Possibly the differences in the character of the marginal teeth are also growth-changes; one

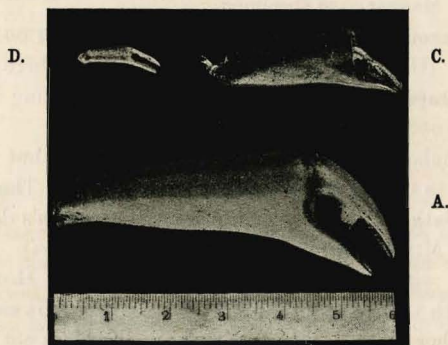


Fig. 12. *Macrophthalmus latreillei*—growth stages of male chela.

requires more evidence. It may be noted that in all the males the copulatory appendages appear to be well developed; it would be difficult to say that the smaller specimens are not sexually mature.

I have seen MIERS' small "Challenger" specimens from Japan, referred to by ORTMANN, and put them with the example in the present collection. In one of them the degree of development of hair on the carapace is much as in my specimen. Specimens of this variable species are often found as sub-fossils (HENDERSON, p. 389).

***Elamena truncata*, A. M.-EDW., 1873—A.6, p. 386.**

Locality:—Galle Bay, "From bags hung from buoy," three specimens.

<i>Description</i> :—	(a) young ♀.	(b) young ♀.	(c) adult ♀.
C.L. . . . .	5.00	5.25	6.25
C.b. ÷ C.L. . . . .	0.95	0.95	1.00

The front is "broadly truncated," but its anterior border cannot be described as "quite straight." BORRADAILE (B.X., p. 682) follows ORTMANN in placing the Hymenosomidæ among the Oxyrhyncha.

***Geograpsus crinipes* (DANA, 1851)—A.6, p. 396.**

Locality:—Galle, in tow-net, one specimen.

*Description*:—An adult male, C.L. = 32.00. The label gives colours in life:—"Dorsum of carapace very dark purplish-red, ventral surface red (except dactylo-

podites of walking legs—which are nearly white), eye stalks dark purplish-red (as dorsum of carapace), lens black.”

The exopodite of external maxilliped bears a slender flagellum—a point which is to be noted, for ALCOCK uses the absence of a flagellum as a generic character, speaking of it in his key as present in *Grapsus* and absent in *Geograpsus*. The two genera are, however, distinguished at once by the very striking fringe of hair on the apposed borders of the coxæ of walking legs 2 and 3—present in *Geograpsus*, absent in *Grapsus*.

*Metopograpsus messor* (FORSKÅL, 1775)—A.6, p. 397.

Locality:—Trincomalee, four specimens.

Description:—C.L. of an ovigerous female = 16·00.

*Sesarma edwardsi*, var. *brevipes*, DE MAN, 1889 ('Zool. Jahrb. Syst.,' iv., p. 425).

Locality:—Mouth of a stream near Galle, one specimen.

Description:—An adult male, C.L. = 9·50.

*Leiolophus planissimus* (HERBST, 1804)—A.6, p. 439.

Locality:—Galle, lagoon, two specimens (small, immature).

*Plagusia depressa* (FABR.), var. *immaculata*, LAMK., 1818.

Localities:—Cheval Paar, four specimens (*a*, *b*, *c*, *d*); Navakaddu Paar, one specimen (*e*).

Description:—	C.L.	C.b. ÷ C.L.	Post.bord.C. ÷ C.L.	Fronto-orb.b. ÷ C.L.
( <i>a</i> ) ovigerous ♀	29·00	1·09	0·59	0·66
( <i>b</i> ) ovigerous ♀	24·25	1·08	0·58	0·70

All come definitely under *P. immaculata* of MIERS' revision ('Ann. Mag. Nat. Hist.,' (5), i., p. 150, 1878). The tubercles are naked in all.

Remarks.—There is some confusion of terminology in regard to this and allied forms. ALCOCK writes "*Plagusia depressa*, var. *squamosa* (HERBST)," which is interpreted by BORRADAILE as "*Plagusia depressa* (HERBST), 1783 [misprinted as 1793], var. *squamosa*, HERBST, 1790." This can hardly be ALCOCK's meaning, for then (1) *squamosa* would = *depressa* and (2) FABRICIUS had already used *depressa* in a different sense. I take ALCOCK to mean "*Plagusia depressa* (FABR.), 1775, var. *squamosa*, HERBST, 1790," which implies two things: (1) a development of MIERS' views in bringing together under one species the three (*P. depressa* (FABR.), 1775, *P. tuberculata*, LAMARCK, 1818, and *P. immaculata*, LAMARCK, 1818) recognised by the latter in his excellent revision of the Plagusiidæ; (2) a union of the *P. tuberculata* and *P. immaculata* as a single variety within the species so formed. I agree with the first suggestion, but cannot accept the second.

*Plagusia depressa* (FABRICIUS), 1775, may be divided as follows:—

1. Carapace covered by numerous—often more or less squami-  
form—tubercles, each bordered by a fringe of short stiff  
hairs:
  - a. Posterior coxal process of 2nd and 3rd walking  
legs entire. . . . . var. *tuberculata*.
  - b. Posterior coxal process of 2nd and 3rd walking  
legs dentate . . . . . var. *depressa*.
2. Carapace tubercles more depressed—those on gastric region  
obsolescent:
  - a. Posterior coxal process of 2nd and 3rd walking  
legs entire. . . . . var. *immaculata*.

The few specimens hitherto described show that the above distinctions are average, not absolute, e.g., MIERS' "Challenger" specimen of *depressa* is hardly dentate, and DE MAN describes an example of *immaculata* which has a few hairs on some tubercles. The amount of material is not sufficient to enable one to estimate the exact degree of overlapping.

Additional differentia requiring investigation are:—

1. MIERS points out that carapace is more convex in *immaculata* than in *depressa* or *tuberculata*. This holds in general, but is broken in two instances known to me among the collections of the British Museum, in which *tuberculata* shows approximately same degree of convexity as *immaculata*.
2. Degree of fusion of abdominal terga 3, 4, 5 and 6. I have before me only 4 males (1 *immaculata* + 2 *depressa* + 1 *tuberculata*), which suggest that the tendency for such fusion may be found to be greater in *depressa* and *immaculata* than in *tuberculata*.
3. Shape of abdomen.
4. Size of carapace—*immaculata* being smaller than the others.

Of the above, the first at least is of value—possibly all are so. I retain for the varieties the names used by MIERS, entirely avoiding *squamosa*. If used, the latter should apply to the *tuberculata* series only, but it has the grave disadvantage of having been used by HERBST to denote in the text a form with entire coxal process, and in his figure one with coxal process dentate.

*Palicus jukesii* (WHITE, 1847)—A. 6, p. 451—Plate I, fig. 12.

Locality:—Coral reefs, Gulf of Manaar, one specimen.

Description:—An adult male. C.L. = 14.25 (frontal lobes included). C.b. ÷ C.L. = 1.11.

Remarks:—This specimen confirms CALMAN's inclusion of *Cymopolia carinipes*, PAULSON, 1875, in the synonymy of the species—for, while answering to ALCOCK's description, it has, instead of the sub-hepatic tubercle described by CALMAN for his



Torres Straits specimen, a transverse row of four granules (*cf.* PAULSON'S ridge), from outer end of which a row of granules runs backward for a short distance parallel to the lateral margin of the carapace. With my figure should be compared that of Dr. CALMAN (C., pl. i, fig. 10).

I follow ALCOCK in emphasising the probably catometope affinities of the genus *Palicus*. On this matter see CALMAN, p. 29.

*Palicus serripes* (ALCOCK and AND., 1894)—A. 6, p. 454; A. Invest., pl. lxxvii, fig. 1.

Localities:—Trincomalee, one specimen (*a*); Gulf of Manaar, deep water, one specimen (*b*).

Description:—(*a*) ovigerous ♀ . . . C.l. = 10.50; C.b. : C.l. = 1.10  
 (*b*) ovigerous ♀ . . . C.l. = 9.00; C.b. ÷ C.l. = 1.11

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NOTE.—In the above pages 196 species are named. There remain 12 undetermined forms in the collection, making 208 in all. Of these 12, one is an Oxystome, one an Oxyrhynch, seven are Xanthids, one is a Portunid, and the remaining two are Catametopes.

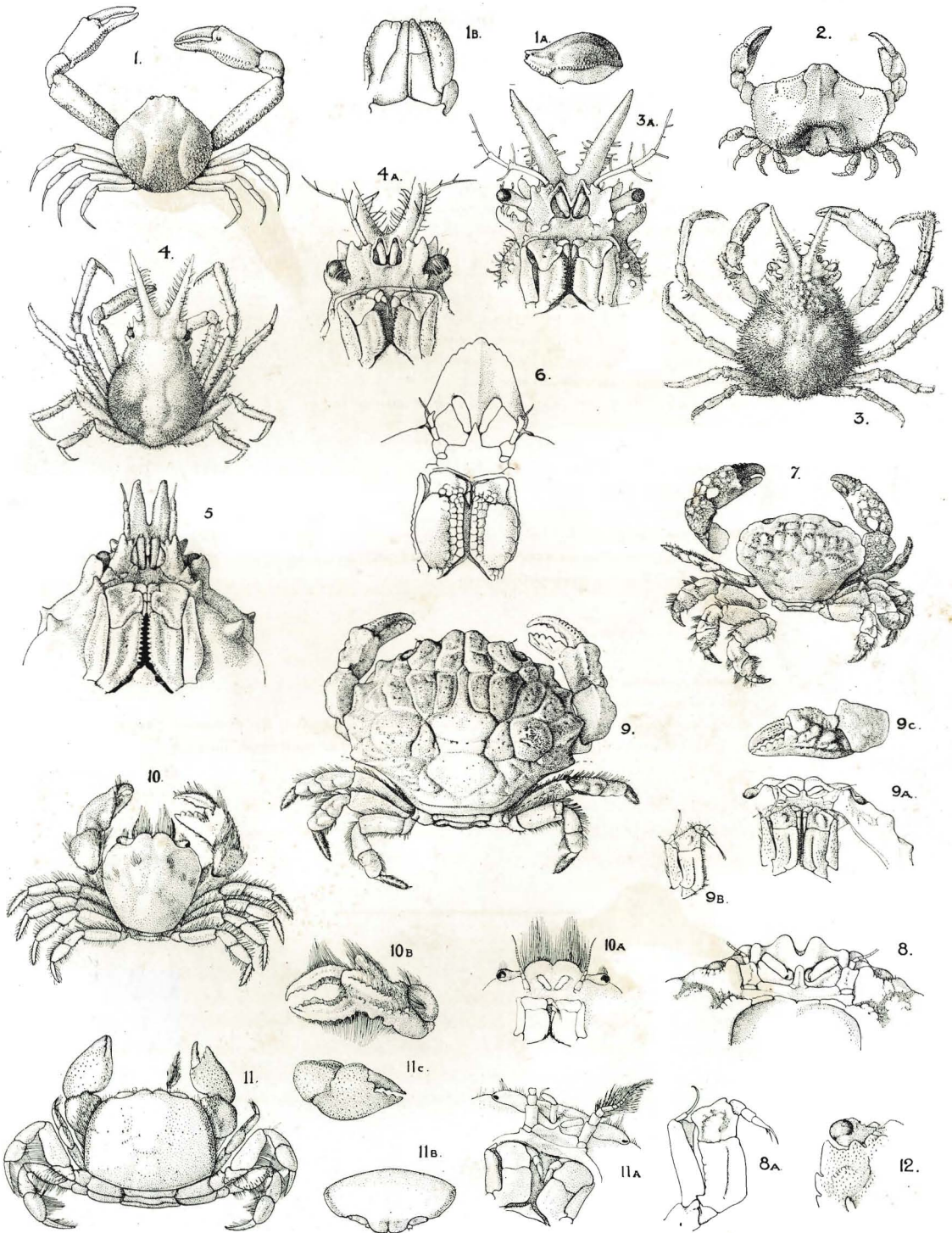
## EXPLANATION OF PLATES.

## PLATE I.

- Fig. 1. *Philyra adamsi*, BELL. ♂. (BELL'S "type"-specimen refigured.) × 2.  
 a, hepatic facet, &c. × 2; b, buccal region with external maxilliped of one side removed. × 5.
- " 2. *Tlos havelocki*, n. sp. × 3.
- " 3. *Halimus pehlevi*, n. sp. × 2.  
 a, ventral view of anterior region. × 5.
- " 4. *Halimus irami*, n. sp. × 2½.  
 a, ventral view of anterior region. × 5.
- " 5. *Doclea alcocki*, n. sp., ♀, ventral view of anterior region. × 1½.
- " 6. *Cryptopodia pan*, n. sp., ventral view of anterior region. × 4.
- " 7. *Zozymus gemmula*, var. *ceylonica*, nov. × 2.
- " 8. *Demania splendida*, n. gen. et sp., ventral view of anterior region. × 2.  
 a, external maxilliped. × 2.
- " 9. *Euzanithus herdmuni*, n. sp. × 1½.  
 a, ventral view of anterior region. × 1½; outer surface of wrist, hand and fingers. × 1½.
- " 10. *Calmania prima*, n. sp. × 3.  
 a, ventral view of anterior region. × 2. b, outer surface of hand. × 3.
- " 11. *Mertonia lanka*, n. sp. × 4.  
 a, ventral view of anterior region. × 8. b, anterior view. × 4. c, outer surface of hand. × 4.
- " 12. *Palicus jukesi* (WHITE), sub-hepatic region. × 2.

## PLATE II.

- Fig. 1. *Demania splendida*, dorsal and ventral views. Nat. size.
- " 2. *Doclea alcocki*, dorsal and ventral views. × ½.
- " 3. *Macrophthalmus latreillei* (DESM.)—A-E, five specimens illustrating the characters given in the text. B shows regenerated cheliped; opposite surface in small figure alongside.



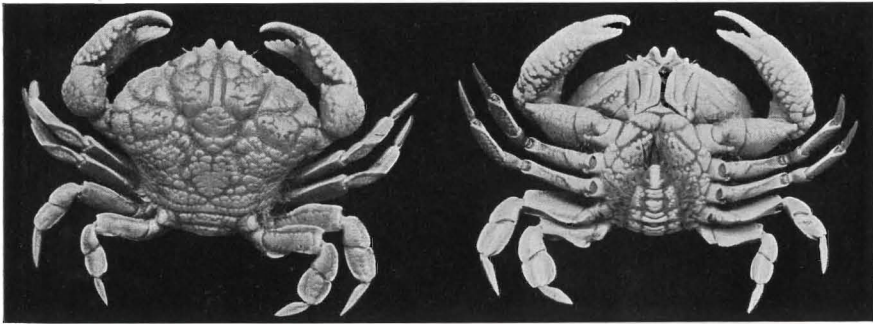


Fig 1.

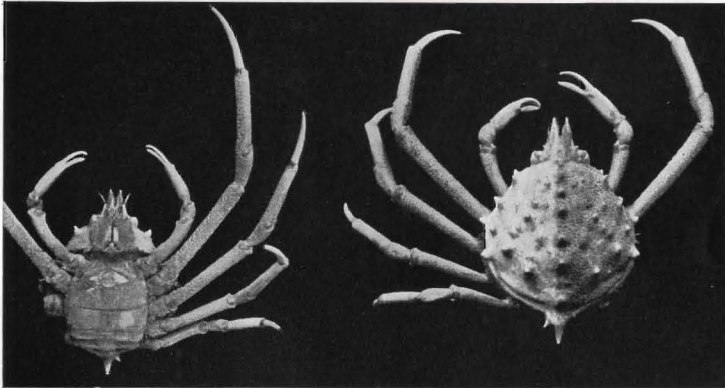


Fig 2.

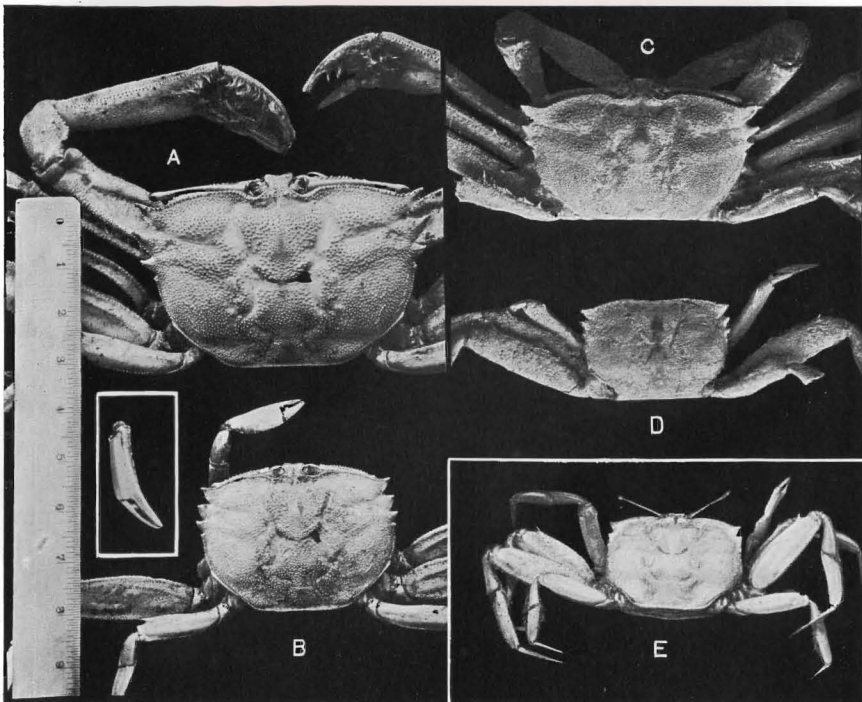


Fig. 3.